

THE RELATIONSHIP OF THE PHYSICAL QUALITY OF HOUSES WITH THE INCIDENCE OF PULMONARY TUBERCULOSIS IN THE WORKING AREA OF THE ACEH BESAR HEALTH CENTER

AJIRNA¹, SOFIA², NURJANNAH³, SAID USMAN⁴, T MAULANA⁵

^{1,2,3,4,5}Department of Environmental Health, Faculty of Medicine, Universitas Syiah Kuala.
Banda Aceh, Indonesia, 23111

ABSTRACT

Background: The spread of pulmonary TB (Tuberculosis) disease is influenced by the environmental conditions in which people live. Environmental components themselves include residential density, ventilation, humidity, type of house floor, type of house walls, temperature and lighting. Apart from that, personal hygiene and environmental sanitation have a significant influence on the incidence of tuberculosis. A house with good lighting and ventilation will make it difficult for germs to grow, because ultraviolet light can kill germs and good ventilation causes air exchange, thereby reducing the concentration of germs. The aim of this research is to find out what the relationship between the physical quality of the house and the incidence of pulmonary TB in Aceh Besar district health center working area. **Research methods:** This research is an analytical observational research with a case control type of research. **Population and sample:** The total number of samples studied was 34 case samples and 34 control samples with a ratio of 1:1 so that the number of possible samples in this study was 68 samples. **Results:** Research results were obtained there is no relationship between the age values $p \text{ value } 0.272 > 0.05$, with a 95% CI value of 1.84 (0.61-5.53), gender on the value $p \text{ value } 0.808 > 0.05$, with a value of 95% CI 1.12 (0.43-2.91), education Value value $p \text{ value } 0.401 > 0.05$, with a 95% CI value of 0.62 (0.20-1.89), work value $p \text{ value } 0.323 > 0.05$, with a 95% CI value of 0.51 (0.13-1.95), floor type to value $p \text{ value } 0.804 > 0.05$, with a 95% CI value of 10.88 (0.33 - 2.33), wall type value $p \text{ value } 0.115 > 0.05$, with a 95% CI value of 0.16 (0.26 - 3.07), residential density value $p \text{ value } 0.742 > 0.05$, with a 95% CI value of 1.24 (0.34 - 4.54). There is a relationship between the ventilation area value $p \text{ value } 0.001 < 0.05$, with a 95% CI value of 4.88 (1.67 - 14.27), temperature value $p \text{ value } 0.022 > 0.05$, with a 95% CI value of 4.57 (1.16 - 14.39), lighting value $p \text{ value } 0.015 < 0.05$, with a 95% CI value of 33.37 (1.26-9.15) and humidity value $p \text{ value } 0.026 < 0.05$, with a 95% CI value of 3.12 (1.13 - 8.63). on the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. **Conclusion:** Researchers hope that the community will be able to improve the condition of houses that still do not meet the requirements for a healthy house. Health workers are expected to provide education regarding the criteria for a healthy house that meets the requirements and how to prevent the transmission of tuberculosis.

KEYWORDS: Socio Demographics, Physical Condition of the House, Tuberculosis incidence.

INTRODUCTION

Pulmonary TB is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. This disease is transmitted through the air when sufferers cough, sneeze or talk and droplets containing the bacteria are inhaled by other people when breathing (Knechel, 2013). Most of these bacteria attack the lungs, but can also affect other body organs. The number of new tuberculosis cases in Indonesia is still ranked third in the world and is one of the biggest challenges facing Indonesia and requires attention from all parties, because it causes a high burden of morbidity and mortality (*Indonesian Ministry of Health, 2019*).

Based on Indonesia's health profile data in 2020, the number of tuberculosis cases found was 351,936 cases. Over the last 3 years, the number of TB patients found in Bali Province has generally increased, although not significantly. In 2016 the total number of TB cases found in Bali Province was 3,133 people. Denpasar City is the city with the highest number of pulmonary TB cases in Bali (*Dinkes, 2016*).

This figure has decreased compared to all tuberculosis cases discovered in 2019, namely 568,987 cases. In the province of Aceh in 2020 there were 6,456 cases found, this number of cases decreased compared to 2019, namely 8,647 cases (Ministry of Health of the Republic of Indonesia, 2020). In Aceh, Be sar District, 348 cases were found, this number increased compared to 2019 where 96 cases were found (*Aceh Health Profile, 2020*).

Based on Profile Data from the Want Jaya Community Health Center, Want Jaya District, in 2020, 17 TB cases were found. Meanwhile, in 2021, 27 TB cases were reported to be found, where the number of cases increased from the previous year. From the beginning of 2022 to July, 17 TB cases were found in the working area of the Want Jaya Community Health Center. For the Baitussalam Community Health Center working area, Baitussalam District, 30 cases were found in 2021, then for the Kuta Malaka Community Health Center working area, Kuta Malaka District, 17 cases were found in 2021 (*Aceh Health Office, 2022*).

The spread of pulmonary TB disease is influenced by the environmental conditions in which people live. Environmental components themselves include residential density, ventilation, humidity, type of house floor, type of house walls, temperature and lighting. Apart from that, personal hygiene and environmental sanitation have a significant influence on the incidence of tuberculosis (*Naga, 2014*).

Sanitation of the residential environment is closely related to disease transmission. A house with good lighting and ventilation will make it difficult for germs to grow, because ultraviolet light can kill germs and good ventilation causes air exchange thereby reducing the concentration of germs (*Siddiq, 2013*).

Hygiene practices are also needed to minimize the problem of tuberculosis transmission. Actions that can be taken to prevent transmission include covering your mouth when coughing and not throwing phlegm anywhere. (*Dragon, 2012*).

Disease incidence is the result of interactions between host, agent and environmental factors. People who have a smoking habit are 16 times more likely to suffer from pulmonary TB than someone who does not smoke (*Saffira, 2015*). The results of research (Dwi, 2021) state that there is a relationship between ventilation area, residential density and humidity on the incidence of pulmonary TB in the Kuala Tungkal II Jambi Health Center Working Area (*Karini, 2023*).

Direct research in the field shows that in the working areas of several Community Health Centers in Aceh Besar there are still residents whose physical conditions do not meet the requirements. There are two families living in one relatively narrow house, Insufficient ventilation in the house and insufficient lighting cause conditions inside the house to tend to be damp and dark. Preliminary survey results showed that there were several families whose family members suffered from tuberculosis (Nur Ainun Oktaviani Astri, 2020). This is due to the lack of knowledge of sufferers and their families regarding hygiene practices. Another because that greatly influences the spread of tuberculosis in several working areas of Community Health Centers in Aceh Besar is the lack of discipline in sufferers in taking medication regularly, this condition increases the risk of transmitting tuberculosis to other healthy people. (Melinda Dewi, 2019).

According to Syed (2007), if sufferers are left without treatment or do not continue treatment, they will spread this disease to an average of 10 to 15 healthy people every year. Based on the researcher's preliminary survey, for several Puskesmas as work areas in Aceh Besar, no publications have been found regarding the physical quality of houses on the incidence of pulmonary TB. From the initial survey, cases continue to increase every year, so we need to know what factors dominate the prevalence of pulmonary TB cases which continues to increase. Therefore, researchers are interested in researching the very dense population, "The Relationship between the Physical Quality of Houses and the Incidence of Pulmonary TB in Aceh Besar Regency Health Center Working Area".

METHOD

This research is an analytical observational research with a case control type of research, namely a type of research by comparing a group of cases with a control group based on their exposure status (retrospective) to analyze the relationship between the physical quality of the house and the incidence of pulmonary TB.

Population are all sufferers from 28 health centre's in Aceh Besar, because the characteristics of the population here are homogeneous, so the researchers took 3 health center areas. So, the total number of samples studied was 34 case samples and 34 control samples with a ratio of 1:1 so that the number of possible samples in this study was 68 samples. The time for carrying out this research is the start date 24 November to 29 December 2023.

Research ethics have been issued by the Chair of the Health Research Ethics Committee (KEPPKN) of the Faculty of Medical Sciences, Syiah Kuala University (USK) with registration number: 1171012P. Ethical Exempted with letter number: 181/EA/FK/2023.

RESULTS

The results of univariate analysis were carried out to describe the characteristics of respondents for each variable, both the independent variable and the dependent variable. The final results of this research were a total sample of 68 people. The characteristics of the respondents can be seen in the table below:

Table 1 (Frequency Distribution of Respondents Aceh Besar Regency Health Center Working Area
(N=68 Samples).)

Category	N	Percentage
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Age		
Mature	50	73.5
Elderly	18	26.5
Gender		
Man	35	51.5
Woman	33	48.5
Education		
Tall	17	25.0
Low	51	75.0
Work		
Civil servants	11	16.2
Non-civil servant	57	83.3
Respondent Status		
Case	34	50
Control	34	50
Floor Type		
Qualify	41	60.3
Not eligible	27	39.7
Wall Type		
Qualify	19	27.9
Not eligible	49	72.1
Ventilation area		
Qualify	25	36.8
Not eligible	43	63.2
Residential Density		
Qualify	57	83.8
Not eligible	11	16.2
Temperature		
Qualify	52	76.5
Not eligible	16	23.5
Lighting		
Qualify	32	47.1
Not eligible	36	52.9
Humidity		
Qualify	41	60.3
Not eligible	27	39.7
Total	68	100.0

Source: Research Data Processing Results, 2023

Based on table 4.1 above, it shows that most of the respondents were in the adult category, 73.3%, most of the respondents studied were male, 51.5%. Most of the respondents studied were educated in the low category, 75.2%, most of the respondents studied had jobs in the non-PNS category, 83.3%. Meanwhile, for the core variables, most of the floor types in respondents' homes met the requirements (waterproof such as ceramics, plaster, tiles) at 60.3%. most types of walls in respondents' houses met the requirements (waterproof such as walls, ceramics, plaster) at 72.1%. the majority of respondents' house ventilation areas did not meet the requirements (< 10% of the floor area) amounting to 63.2%. the majority of respondents' residential density met the requirements (> 8m²) at 83.8%. the majority

of respondents' house temperatures did not meet the requirements (< 18oC - > 30oC) amounting to 76.5%. the majority of respondents' home lighting did not meet the requirements (< 60 lux) at 52.9% and the majority of respondents' home humidity did not meet the requirements (< 40% - > 60%) at 60.3%.

Table 2 (Relationship Table Physical Quality of Houses with the Incidence of Pulmonary TB in the Work Area Aceh Besar Health Center in 2023)

Variable	Respondent Status		OR	95%CI	P
	Control f %	Case f %			
Age					
1. Mature	57 (54.0)	23 (46.0)			
2. Elderly	7 (38.9)	11 (61.1)	1.84 (0.61-5.53)		0.272
Gender					
1. Woman	17 (51.5)	16 (48.5)			
2. Man	17 (48.6)	18 (51.4)	1.12 (0.43-2.91)		0.808
Education					
1. Tall	7 (41.2)	10 (58.8)			
2. Low	27 (52.9)	24 (47.1)	0.62 (0.20-1.89)		0.401
Work					
1. Civil servants	4 (36.4)	7 (63.6)			
2. Non-civil servant	30 (52.6)	27 (47.4)	0.51 (0.13-1.95)		0.323
Floor Type					
1. Qualify	10 (48.8)	21 (51.2)			
2. Not eligible	14 (51.9)	13 (48.1)	0.88 (0.33 - 2.33)		0.804
Wall Type					
1. Qualify	14 (73.7)	5 (26.3)			
2. Not eligible	20 (40.8)	29 (59.2)	0.16 (0.26 - 3.07)		0.115
Ventilation area					
1. Qualify	19 (76.0)	6 (24.0)			
2. Not eligible	15 (34.9)	28 (28.1)	4.88 (1.67 - 14.27)		0.001
Residential Density					
1. Qualify	29 (50.9)	28 (49.1)			
2. Not eligible	5 (45.5)	54 (54.5)	1.24 (0.34 - 4.54)		0.742
Temperature					
1. Qualify	30 (57.7)	22 (42.3)			
2. Not eligible	4 (25.0)	12 (75.0)	4.09 (1.16 - 14.39)		0.022
Lighting					
1. Qualify	21 (65.6)	11 (34.4)			
2. Not eligible	13 (36.1)	23 (63.9)	3.37 (1.26-9.15)		0.015
Humidity					
1. Qualify	25 (61.0)	16 (39.0)			
2. Not eligible	9 (33.3)	18 (66.7)	3.12 (1.13 - 8.63)		0.026

Source: Research Data Processing Results, 2023

Based on table 4.2 above, it shows that the percentage of ages in the adult range in the case group is 23 (46.0%), while the elderly in the case group are 16 (61.1). This means that the tuberculosis disease experienced is not influenced by age. It can be influenced by other factors such as economic factors, behavioral factors, and disease factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with P Value Sig.0.272 > 0.05, meaning there is no relationship between age and the incidence of tuberculosis in the work area of the Aceh Besar Regency Health Center. So, the case group whose age is not in the adult category is 1 times more likely than the control group to experience the incidence of tuberculosis with a 95% CI value of 1.84 (0.61-5.53).

The percentage of gender is in the male category, namely 18 (51.4%) of cases, while 16 (48.5%) of women are in the case group. This means that the tuberculosis disease experienced is not influenced by gender. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig. 0.808 > 0.05, meaning there is no relationship between gender and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group whose gender was not in the male category was 1 times more likely than the control group to experience the incidence of tuberculosis with a 95% CI value of 1.12 (0.43-2.91).

The percentage of education in the low education range in the case group was 24 (47.1), while in the high education category the case group was 10 (58.8). This means that the tuberculosis disease experienced is not influenced by education. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig.0.401 > 0.05, meaning there is no relationship between education and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with education that was not in the low education category was 0.62 times more likely than the control group to experience the incidence of tuberculosis with a 95% CI value of 0.62 (0.20-1.89).

The percentage of jobs in the non-PNS category in the case group was 27 (47.4%), in the PNS category the case group was 7 (63.3%). This means that the tuberculosis disease experienced was not influenced by work. It can be influenced by other factors such as economic factors and behavioral factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with P Value Sig. 0.323 > 0.05 means there is no relationship between work and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the control group with jobs in the Non-PNS category had a 0.51 times greater chance than the case group in the PNS category of experiencing tuberculosis with a 95% CI value of 0.51 (0.13-1.95).

The percentage of floor types that did not meet the requirements in the case group was 13 (48.1%) and in the control group was 14 (49.8%). Meanwhile, those who met the requirements were also in the case group as many as 21 (51.2) and 10 (48.8) in the control group. From the results of researchers' observations, many types of flooring meet the requirements, meaning that the tuberculosis disease experienced is not influenced by the type of flooring. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig. 0.804 > 0.05, meaning there is no relationship between the type of floor and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with floor types that did not meet the requirements had a 1 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 0.88 (0.33 – 2.33).

The percentage of wall types that did not meet the requirements in the case group was 29 (59.2%) and in the control group was 20 (40.8%). Meanwhile, those who met the requirements were also in the case

group as many as 5 (26.3) and 14 (73.7) in the control group. In the case group, many types of walls met the requirements, meaning that the tuberculosis disease experienced was not influenced by the type of wall. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, it can be seen that the correction (continuity correction) with P Value Sig.0115 > 0.05 means that there is no relationship between the type of wall and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with wall types that do not meet the requirements has a 1 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 1.00 (0.28 – 3.28).

The percentage of ventilation area that did not meet the requirements in the case group was 28 (54.1%) and in the control group was 15 (34.9%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 6 (24.0) and 19 (76.0) in the control group. In the case group, there was a ventilation area that met the requirements, meaning that the tuberculosis disease experienced was not influenced by the ventilation area. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (continuity correction) is seen with a P Value of Sig.0.001 <0.05, meaning there is a relationship between ventilation area and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the control group with a ventilation area that does not meet the requirements has a 4.8 times greater risk than the case group of experiencing tuberculosis with a 95% CI value of 4.88 (1.67 – 14.27).

The percentage of residential density that did not meet the requirements in the case group was 54 (54.5%) and in the control group was 5 (45.5%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 28 (49.1) and 29 (50.9) in the control group. In the case group, many residential densities met the requirements, meaning that the tuberculosis disease experienced was not influenced by residential density. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, it can be seen that the correction (continuity correction) with P Value Sig.0.742 > 0.05 means that there is no relationship between residential density and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with inadequate ventilation area had a 1.24 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 1.24 (0.34 – 4.54).

The percentage of temperatures that did not meet the requirements in the case group was 12 (75.0%) and in the control group was 4 (25.0%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 22 (42.3) and 30 (57.7) in the control group. In the case group, there was a temperature that met the requirements, meaning that the tuberculosis disease experienced was not influenced by temperature. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (continuity correction) with P Value Sig. 0.022 < 0.05 means there is a relationship between temperature and the incidence of tuberculosis in the working area of the Aceh Besar Regency Health Center. So, the case group with a temperature that does not meet the requirements has a 4.09 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 4.09 (1.16 – 14.39).

The percentage of lighting that did not meet the requirements in the case group was 23 (63.9%) and in the control group was 13 (36.1%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 11 (34.4) and 21 (65.6) in the control group. In the case group, there was lighting that met the requirements, meaning that the tuberculosis disease they experienced was not influenced by lighting. Can be influenced by other factors such as economic factors, behavioral

factors. Based on the Chi-Square test that has been carried out, it can be seen that the correction (continuity correction) with P Value Sig.0.015<0.05 means that there is a relationship between lighting and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with inadequate lighting had a 3.3 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 3.37 (1.26-9.15).

The percentage of humidity that did not meet the requirements in the case group was 18 (66.7%) and in the control group was 9 (33.3%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 16 (39.0) and 25 (61.0) in the control group. In the case group, there was humidity that met the requirements, meaning that the tuberculosis disease experienced was not influenced by humidity. Based on the Chi-Square test that has been carried out, the correction (continuity correction) is seen with P Value Sig. 0.026 < 0.05, meaning there is a relationship between humidity and the incidence of tuberculosis. So, the group of cases with inadequate humidity had a 3.1 times greater risk of experiencing tuberculosis with a 95% CI value of 3.12 (1.13 – 8.63).

Table 3 (The Most Dominant Factors Associated with the Incidence of Pulmonary TB in the Working Area of the Aceh Besar Community Health Center in 2023.)

Variable	Model 1			Model 2			Model 3		
	OR	(95%CI)	P Value	OR	(95%CI)	P Value	OR	(95%CI)	P Value
Age									
Mature									
Elderly	2.33	Ref 0.73-7.40	0.151				1.84	Ref 0.39-8.75	0.439
Gender									
Woman									
Man	1.18	Ref 0.44-3.18	0.733				0.66	Ref 0.16-2.75	0.575
Education									
Tall									
Low	0.72	Ref 0.16-3.28	0.677				0.38	Ref 0.06-2.44	0.315
Work									
Civil servants									
Non civil servant	0.48	Ref 0.08-2.96	0.437				0.20	Ref 0.01-2.24	0.193
Floor Type									
Qualify									
Not eligible				0.62	Ref 0.17-2.24	0.475	0.66	Ref 0.16-2.63	0.556
Wall Type									
Eligible				3.49	Ref	0.130	7.04	Ref 1.03-48.06	0.046
Not Eligible									

		0.69- 17.68			
Ventilation area					
Eligible Not Eligible		Ref 1.69-26.0		Ref 1.57-28.43	
	6.65		0.007	6.68	0.010
Residential Density					
Eligible Not Eligible		Ref 0.10-3.16		Ref 0.08-4.52	
	0.58		0.531	0.63	0.642
Temperature					
Eligible Not Eligible		Ref 1.12-26.4		Ref 1.54-48.06	
	5.44		0.036	9.77	0.015
Lighting					
Eligible Not Eligible		Ref 0.76-10.13		Ref 0.87-15.33	
	2.78		0.120	3.68	0.075
Humidity					
Eligible Not Eligible		Ref 0.41-5.338		Ref 0.33-5.33	
	1.50		0.532	1.33	0.680
R square R2	90,974	68,252		62,071	

Table 4.3 shows that in the first model, the results of the demographic data test show that the age variable in the elderly category has the opportunity or is the most dominant in the incidence of pulmonary TB with OR value: 2.33, p-value: 0.151, CI: 0.73-7.40. Furthermore, in the second modeling of the core variable testing results, it was found that the variable that had a high probability of being a factor in the incidence of pulmonary TB based on physical factors of the house was the ventilation area variable with an OR value: 6.65 CI: 1.69-26.0, p-value: 0.007, and the temperature variable with OR value: 5.44, CI: 1.12-26.4 with p-value: 0.036. Meanwhile, in the modeling, the three researchers carried out tests simultaneously and obtained the results of the factors that have the greatest potential for the risk of pulmonary TB based on the physical condition of the house and socio-demographics, namely the variables of wall type, temperature, house ventilation and lighting.

DISCUSSION

1. Sociodemography

Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with P Value Sig.0.272 > 0.05, meaning there is no relationship between age and the incidence of tuberculosis in the work area of the Aceh Besar Regency Health Center. So, the case group whose age is not in the

adult category is 1 time more likely than the control group to experience the incidence of tuberculosis with a 95% CI value of 1.84 (0.61-5.53).

The results of this study are in line with Elisa SK's research at Noongan Regional General Hospital, that age is not the main risk factor for transmitting the disease because it depends on how many Mycobacterium tuberculosis bacilli are in the sputum, virulence and air pollution by droplets so that the disease can be suffered by age. regardless of whether it is a baby, toddler, young adult or old adult (Korua, 2015).

However, this is contrary to Dotulong's (2015) research in Wori Village, Wori District, which stated that there was a relationship between age and the incidence of pulmonary TB because the 15-55 age group was an age that had very high mobility and therefore had very high exposure to Mycobacterium tuberculosis in addition to endogenous reactivation factors.

In this study, it was found that age did not have a significant relationship with the incidence of pulmonary tuberculosis. Meanwhile, from the results of the analysis it was found that respondents of productive age suffered the most from pulmonary tuberculosis. Pulmonary tuberculosis is most often found in people of productive age, economically aged around 15-49 years. Nowadays, demographic transmission has caused the life expectancy of the elderly to become higher. At an advanced age of more than 55 years, a person's immunological system declines, making them very susceptible to various diseases, including tuberculosis (Naga, 2012).

According to Government Regulation No. 87 (2014), the age classified as unproductive is 58 years, while the productive age is 15 – 58 years. Productive age is an age where there is likely to be a lot of contact with people in school, work or other environments. This condition is not surprising if it makes someone closer to the incidence of pulmonary TB. According to the Ministry of Health (2015), TB sufferers in productive age reach 75%, while the rest occur in non-productive age. However, in non-productive age, pulmonary TB disease can be congenital while still in productive age.

According to the researchers' analysis, pulmonary TB disease is indeed more susceptible to occurring in the productive age because the interaction at this age is quite high. This is proven by the research results in table 4.2 which shows the percentage of ages in the adult range (25 - 45 years) in the group of 18 cases. (51.4%), in the control group there were 17 (48.6%).

Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig. 0.808 > 0.05, meaning there is no relationship between gender and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group whose gender was not in the male category was 1 time more likely than the control group to experience the incidence of tuberculosis with a 95%CI value of 1.12 (0.43-2.91).

This is in accordance with research by Samsugito and Iwan (2018) on 62 cases of pulmonary TB sufferers, slightly higher in men, 36 cases (58.1%) than women, 26 cases (41.9%). The results of research by Vina DV, (2020) stated that 17 cases were men and 7 women. 19 In terms of quantity, men suffer from pulmonary TB more often than women, this could happen because men have a habit of drinking alcohol and smoking which can lowering the human body's defense system, making it easier for someone to suffer from pulmonary TB (Korua ES, 2015).

Pulmonary tuberculosis tends to be higher in men than women. Men have a heavy workload and unhealthy lifestyles such as smoking and alcohol. Women pay more attention to their health than men, therefore women are less likely to suffer from pulmonary TB. Women are more likely to report symptoms of illness and consult a doctor because women tend to have more diligent behavior than men (Dewanty et al., 2016).

Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig.0.401 > 0.05, meaning there is no relationship between education and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with education that was not in the low education category was 0.62 times more likely than the control group to experience the incidence of tuberculosis with a 95%CI value of 0.62 (0.20-1.89).

This research is in line with research by Hisbah R, (2012) where there were 83 people (79.05%) who had low education and 33 people (56.9%). Another study conducted by Eka Fitriani (2013), showed that there were 44 TB sufferers with low education, compared to 20 people with high education. The level of education will influence a person's knowledge regarding disease prevention and healthy housing so that someone who has sufficient knowledge will lead a healthy and clean lifestyle.

Another similar research conducted by Prananda in (2017) stated that education level had no relationship with the incidence of pulmonary tuberculosis with a probability value ($p= 0.405$) (Prananda et al, 2017). Likewise, research conducted by Suswati in 2006 with a probability value ($p= 0.306$) (Suswati, 2006). Meanwhile, the results of this study are different from research conducted by Absor in 2018 which stated that there was a relationship between education level and compliance with treatment for pulmonary tuberculosis sufferers with a significant value of $p=0.026$ (Absor et al, 2018). According to Suryo (2010) a person's level of education will influence a person's knowledge, including regarding a house that meets health requirements and knowledge of pulmonary TB disease so that with sufficient knowledge, a person will try to have a clean and healthy lifestyle.

Results Research shows that respondents with low levels of education (primary school and no school) and secondary education (SMA) experienced more cases of pulmonary TB and received treatment compared to respondents with high levels of education. This strengthens the research results, namely that there is no relationship between education level and the incidence of pulmonary tuberculosis.

Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with P Value Sig. 0.323 > 0.05 means there is no relationship between work and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the control group with jobs in the Non-PNS category had a 0.51 times greater chance than the case group in the PNS category of experiencing tuberculosis with a 95% CI value of 0.51 (0.13-1.95).

Results This research is in line with that conducted by Siregar (2015), that there is no significant relationship between type of work and the incidence of pulmonary TB. The type of work does not have a major influence on the growth and proliferation of mycobacterium tuberculosis which can cause pulmonary tuberculosis, regardless of the type of work. According to Suryo (2010) the type of work determines the risk factors that each individual must face. If workers work in a dusty environment, exposure to dust particles in the exposed area will cause respiratory problems.

Meanwhile, this research is not in line with that conducted by Loihala in 2015 which stated that there was an influence of the patient's work on the incidence of pulmonary tuberculosis with a value of ($p= 0.000$) (Loihala, 2015). People who work spend relatively less time at home, so the intensity of contact with pulmonary tuberculosis sufferers will decrease.

A bad work environment is never monitored, for example steam and toxic gases which can be dangerous for breathing if inhaled and pollute the air, dust which can become a pollutant and also pollute the air, humid and dirty environmental temperatures can become a place for the growth of Mycobacterium tuberculosis bacteria. , and unhealthy community behavior such as not maintaining personal hygiene and so on.

According to Suryo (2010) a person's level of education will influence a person's knowledge, including regarding a house that meets health requirements and knowledge of pulmonary TB disease so that with sufficient knowledge, a person will try to have a clean and healthy lifestyle.

According to researchers' assumptions, people working as civil servants will gain more insight. People who have better jobs have more updated information media and are frequently exposed to it. In contrast to people who work as non-civil servants, they will usually seek information first or wait for education from health workers.

2. Floor Type

The percentage of floor types that did not meet the requirements in the case group was 13 (48.1%) and in the control group was 14 (49.8%). Meanwhile, those who met the requirements were also in the case group as many as 21 (51.2) and 10 (48.8) in the control group. From the results of researchers' observations, many types of flooring meet the requirements, meaning that the tuberculosis disease experienced is not influenced by the type of flooring. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (fisher's exact test) is seen with a P Value of Sig. 0.804 > 0.05, meaning there is no relationship between the type of floor and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with floor types that did not meet the requirements had a 1 times greater risk than the control group of experiencing tuberculosis with a 95%CI value of 0.88 (0.33 – 2.33).

This was supported when the researcher made observations of the respondent's house regarding the type of floor in the respondent's house, on average it met the requirements. Such as ceramics, plaster, tiles. This can also be seen from the frequency distribution, namely that 41 (60.3%) of the respondent's houses had floor types that met the requirements. The type of floor that meets the requirements is watertight (ceramic, plaster, tile), while the type of floor that does not meet the requirements is not watertight (soil, bamboo, wooden planks) as many as 27 (39.7%).

This research is supported by research conducted by Kusuma (2015) which said that there was no relationship between floor type and the incidence of tuberculosis, resulting in a p value of 0.595 > 0.05. This is because the floor condition of the respondent's house meets the requirements. This research is in line with research by Wulandari (2012) which produced an analysis of p value 0.370 > 0.05, which means there is no significant relationship between floor type and the incidence of TB. The same research was also conducted by Bachtiar (2012) who said there was no relationship between the type of floor and the incidence of TB with a p value of 0.247 > 0.05.

The type of dirt floor plays a role in the incidence of pulmonary tuberculosis, through humidity and space. Home floors that meet the requirements are waterproof floors such as ceramic or marble, flat, non-slip and easy to clean. Not a damp floor or an earthen floor, because a damp or easily wet floor can create a medium for microorganisms to grow. However, not everyone is able to repair or install a waterproof floor in their house, this is influenced by economic factors.

Because installing a waterproof house floor also requires a lot of money. So, economic factors can influence the condition of the house if it doesn't meet the requirements. Therefore, there are still many people who have house floors that are not waterproof. This is supported by research by Dawile (2013) showing the results of analysis of house floor types with a value (p value) = 0.000 (<0.05) indicating that there is a significant relationship between floor type and pulmonary tuberculosis.

Based on the frequency distribution, 41 (60.3%) of the respondent's houses had floor types that met the requirements. Based on research in the field, almost half of the respondents' houses have met the requirements. Some respondents have realized that it is important to install tiles or ceramics or plaster

the floor of the house in order to ensure that there is not a lot of dust in the house and it is easy to clean. So, the type of floor has no relationship with the incidence of TB in the work area of the Aceh Besar District Health Center. Types of floors that are not waterproof tend to create moisture, which can also increase the number of breeding places for bacteria.

If you have a plank house floor so that it is watertight and not damp, the planks need to be covered with rubber mats as a waterproof base so that it can protect against water seepage and damp conditions. This type of floor that meets the requirements will not experience humidity in the room of the house. This can be prevented because mycobacterium tuberculosis cannot survive in a room with low humidity.

3. Wall Type

The percentage of wall types that did not meet the requirements in the case group was 29 (59.2%) and in the control group was 20 (40.8%). Meanwhile, those who met the requirements were also in the case group as many as 5 (26.3) and 14 (73.7) in the control group. In the case group, many types of walls met the requirements, meaning that the tuberculosis disease experienced was not influenced by the type of wall. Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, it can be seen that the correction (continuity correction) with P Value Sig.0115 > 0.05 means that there is no relationship between the type of wall and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with wall types that do not meet the requirements has a 1 times greater risk than the control group of experiencing tuberculosis with a 95%CI value of 1.00 (0.28 – 3.28).

This can also be seen from the frequency distribution, namely that 19 (27.9%) of the respondent houses had wall types that met the requirements. Types of walls that meet the requirements are watertight (walls, tiles, plaster), while types of walls that do not meet the requirements are not watertight (wooden boards, woven bamboo, plywood, bricks).

This research is supported by research conducted by Kusuma (2015) which said that there was no relationship between the type of wall and the incidence of tuberculosis, resulting in a p value of 1,000 > 0.05. This is because the condition of the walls of the respondent's house meets the requirements. This research is also in line with research conducted by Kartika (2015) showing research results with a p value of 0.230 > 0.05, which means there is no relationship between the type of wall and the incidence of tuberculosis. The same research was also conducted by Daroja (2014) who said that there was no significant influence between the type of wall and the incidence of tuberculosis. The resulting p value was 0.74 > 0.05.

The wall is a divider or space divider, apart from being a room divider, it also functions to keep out wind and dust, the wall is equipped with ventilation facilities to regulate air circulation. Walls that meet the requirements are walls that are watertight, such as brickwork or plastered, not wooden walls which can have damp characteristics. The type of wall also plays a role in the bacterial reproduction process, through the humidity of the wall. However, not everyone is able to repair or install watertight walls in their house, this is influenced by economic factors. Because building watertight walls of a house also requires a lot of money.

So, economic factors can influence the condition of a house that does not meet the requirements. Therefore, there are still many people who have house walls that are not yet watertight. This is supported by research conducted by Wahyuni (2015) showing that the results of statistical analysis obtained a value (p value) = 0.004 (<0.05), this shows that there is a significant relationship between the type of wall and the incidence of tuberculosis.

Based on the frequency distribution, only 19 (27.9%) of the respondent's houses had wall types that met the requirements. Based on research in the field, almost half of the respondent's houses met the requirements for wall types. Some respondents felt comfortable if they had walls in their houses because they were stronger and sturdier, and could make the house less hot. So the type of wall has no relationship between the type of wall and the incidence of TB in the work area of the Aceh Besar District Health Center. Types of walls that are not watertight tend to create moisture and easily become moldy, which can also increase the number of breeding places for bacteria

4. Ventilation area

The percentage of ventilation area that did not meet the requirements in the case group was 28 (54.1%) and in the control group was 15 (34.9%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 6 (24.0) and 19 (76.0) in the control group. In the case group, there was a ventilation area that met the requirements, meaning that the tuberculosis disease experienced was not influenced by the ventilation area.

Can be influenced by other factors such as economic factors, behavioral factors. Based on the Chi-Square test that has been carried out, the correction (continuity correction) is seen with a P Value of Sig.0.001 <0.05, meaning there is a relationship between ventilation area and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the control group with a ventilation area that does not meet the requirements has a 4.8 times greater risk than the case group of experiencing tuberculosis with a 95% CI value of 4.88 (1.67 – 14.27).

Meanwhile, according to multivariate analysis using a logistic regression test to find out which variable is most related, it was obtained that the ventilation area variable had a value of $p = 0.000 < 0.05$, which means that the ventilation area variable was related and significant to the incidence of tuberculosis in the work area of the Aceh Besar District Health Center, as well as has a risk value of 40.60 times.

Matter This was supported when researchers made observations and measurements on the ventilation area of the respondent's house. In many houses the ventilation hole area is still minimal or less than 10% of the floor area, and the ventilation hole area is not proportional to the area of the house. This can also be seen from the frequency distribution, namely that 43 (63.2%) of the house ventilation areas do not meet the requirements. The ventilation area that meets the requirements is $\geq 10\%$ of the floor area, while the ventilation area that does not meet the requirements is $< 10\%$ of the floor area.

Ventilation is a hole or wind that must be in the house. This ventilation functions as an exchange of air in and out. According to the Republic of Indonesia Minister of Health Regulation no. 1077/Menkes/Per/V/2011 concerning Air Hygiene Guidelines 2011, the requirement for sufficient ventilation area is a minimum of 10% and states that poor or inadequate air exchange can cause the fertile growth of microorganisms which can cause human health problems. Bacteria will survive for a long time in the house if the ventilation in the house is very minimal. Lack of ventilation will also cause indoor air humidity, due to the evaporation process.

Wide We must be wary of inadequate ventilation which poses a risk of transmission of pulmonary tuberculosis, where transmission occurs in a room when the droplets of an infected person are in the air for a long time. Ventilation can allow air exchange to reduce the number of sparks and sunlight entering through room ventilation can kill Mycobacterium tuberculosis. A home environment that meets the requirements, such as sunlight entering the house and adequate ventilation, will reduce the risk of developing and transmitting pulmonary tuberculosis (Satria et al, 2020).

This research is supported by the results of Kusuma's research (2015) which states that ventilation area is one of the risk factors for the incidence of tuberculosis. With statistical results ($p < \alpha 0.05$). The OR = 15.167 results indicate that people who live in houses with ventilation areas that do not meet

health requirements have 15 times the risk of suffering from pulmonary TB compared to people who live in houses with ventilation areas that meet health requirements. The same research was also conducted by Agustyan Deny (2014) who stated that there was a relationship between ventilation area and the incidence of tuberculosis.

With the result p value = $0.013 < 0.05$ and OR value = 6.505. This means that someone who lives in a house with inadequate ventilation has a 6.5 times higher chance of suffering from pulmonary TB than someone who lives in a house with adequate ventilation. Daroja's research (2014) also shows that there is a relationship between ventilation area and the incidence of TB, and ventilation area that does not meet the requirements has a risk of 3.67 times greater than ventilation area that meets the requirements. P value $0.000 < 0.05$, OR 3, 67.

Based on the frequency distribution, 40 (58.8%) of the respondent's houses had ventilation areas that did not meet the requirements. Based on research, one of the factors that influences the lack of large ventilation holes in respondents' homes is that the average respondent said and reasoned that if there was too much ventilation or too large ventilation holes, it would result in a lot of dust entering the house when there was a lot of wind coming in. Ventilation conditions that do not meet health requirements cause reduced air exchange in the room, which will result in disease-causing bacteria, especially tuberculosis bacteria, to multiply.

On If air exchange does not occur properly, the number and concentration of bacteria will increase, so the risk of disease transmission will be higher. It is best for the health center to provide education regarding the requirements for a healthy home that meets the requirements, especially the ventilation area must meet the requirements of a minimum of 10% of the floor area so that the ventilation area required for air circulation is sufficient. Therefore, it is very necessary to increase the amount of house ventilation.

5. Residential Density

The percentage of residential density that did not meet the requirements in the case group was 54 (54.5%) and in the control group was 5 (45.5%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 28 (49.1) and 29 (50.9) in the control group. In the case group, many residential densities met the requirements, meaning that the tuberculosis disease experienced was not influenced by residential density. Can be influenced by other factors such as economic factors, behavioral factors.

Based on the Chi-Square test that has been carried out, it can be seen that the correction (continuity correction) with P Value Sig.0.742 > 0.05 means that there is no relationship between residential density and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with inadequate ventilation area had a 1.24 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 1.24 (0.34 – 4.54).

This can also be seen from the frequency distribution, namely that 57 (83.8%) of the respondent houses had a residential density that met the requirements. Residential density that meets the requirements is $\geq 8\text{m}^2/\text{person}$, while residential density that does not meet the requirements is $< 8\text{m}^2/\text{person}$.

This research is supported by research conducted by Daroja (2014) which states that there is no relationship between residential density and the incidence of TB, with a p value of $1,000 > 0.05$. This research is in line with research conducted by Liani (2014) showing the results of her research p value $0.15 > 0.05$, which means there is no relationship between residential density and the incidence of TB. The same research was also conducted by Kusuma (2015) who obtained statistical analysis results with a p value of $1,000 > 0.05$. This means that there is no significant relationship between residential density and the incidence of pulmonary TB.

Residential density is the ratio between the available house area and the residents or family members in the house. According to the Republic of Indonesia Minister of Health Regulation no. 1077/Menkes/Per/V/2011 concerning Guidelines for Air Hygiene, the residential density that meets the requirements is one person occupying a minimum of 8m² in order to prevent disease transmission. The size of the house that does not match the number of residents can cause overload. The more densely populated the house is, the faster the air inside the house becomes polluted. Increasing CO₂ levels in the air in the house will provide more opportunities for bacteria to grow and reproduce. However, not everyone can afford to have a house where one person occupies a minimum area of 8m².

This is because the condition of the house is less spacious and is influenced by economic factors. Because to have a large house you also need to spend a lot of money to buy the land. So, economic factors can influence the condition of a house that does not meet the requirements. Therefore, there are still many people who still live in houses that are relatively narrow in size. This is supported by research by Batti (2013) showing a p value = 0.036, meaning that residential density has a significant relationship with the incidence of pulmonary TB.

Based on the frequency distribution, 57 (83.8%) respondents' residential density met the requirements. Based on research in the field, almost half of the residential density meets the requirements. Because the majority of houses in villages are quite spacious, and only have a few residents. It is not proportional to the size of the house. So there is no relationship between residential density and the incidence of TB in the work area of the Aceh Besar District Health Center.

Residential density if < 9 / person does not meet the requirements and if ≥ 9 / person then the residential density meets the requirements. According to calculations, residential density is the ratio between the area of the house and the number of residents in the house. If the area of the house is not proportional to the number of occupants in the house or there are more occupants in the house than the area of the house which is not spacious, it will cause overload. The more densely populated the house is, which is not proportional to the area of the house, the more pollution will occur in the house. From the results of Liani's (2014) research, there is no relationship between residential density and the incidence of pulmonary tuberculosis (p value 0.15). Apart from that, research by Sejati and Sofiana (2015) also stated that there was no relationship between residential density and the incidence of pulmonary tuberculosis (p value 0.422).

Several respondents said that a spacious house with relatively few occupants does not create cramped conditions when carrying out activities at home. Housing density that does not meet these requirements can make it easier for bacteria to grow well. Because the more crowded a house is, the greater the risk of disease transmission.

6. Temperature

The percentage of temperatures that did not meet the requirements in the case group was 12 (75.0%) and in the control group was 4 (25.0%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 22 (42.3) and 30 (57.7) in the control group. In the case group, there was a temperature that met the requirements, meaning that the tuberculosis disease experienced was not influenced by temperature. Can be influenced by other factors such as economic factors, behavioral factors.

Based on the Chi-Square test that has been carried out, the correction (continuity correction) with P Value Sig. 0.022 < 0.05 means there is a relationship between temperature and the incidence of tuberculosis in the working area of the Aceh Besar Regency Health Center. So, the case group with a temperature that does not meet the requirements has a 4.09 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 4.09 (1.16 – 14.39).

This can also be seen from the frequency distribution, namely that 16 (23.5%) respondent houses had temperatures that did not meet the requirements. temperatures that meet the requirements are $\geq 18^{\circ}\text{C} - \leq 30^{\circ}\text{C}$, while temperatures that do not meet the requirements are $< 18^{\circ}\text{C} - > 30^{\circ}\text{C}$.

This research is supported by research by Kusuma (2015) which produced a p value of $0.531 > 0.05$ which states that there is no significant relationship between temperature and the incidence of tuberculosis. This research is also in line with research by Ika Lusy (2016) showing statistical results of p value $0.212 > 0.05$ so it is concluded that there is no relationship between house temperature and the incidence of pulmonary TB. The same research was also conducted by Lanus (2012) who stated that there was no significant relationship between house temperature variables and the incidence of TB. Because the p value is $1,000 > 0.05$.

House temperature is a quantity that expresses the degree of hotness and coldness of a room in the house. A temperature in the room at home that is too low can cause health problems and can cause hypothermia, while a temperature that is too high can cause dehydration and even head stroke. Abnormal temperatures can also create a medium for the growth of microorganisms. Abnormal temperatures play a role in the process of pulmonary tuberculosis, through abnormal air conditions.

According to the Republic of Indonesia Minister of Health Regulation Number.1077/Menkes/Per/V/2011 concerning Guidelines for Indoor Air Health, it is stated that the room temperature that meets the requirements ranges from $18^{\circ}\text{C} - 30^{\circ}\text{C}$. However, not all houses have good temperature conditions or meet the requirements, this is influenced by other house condition factors such as the absence of ventilation holes and lack of lighting and there are no glass tiles in the house.

Matter This is supported by research conducted by Dawile (2013) showing that the temperature variable obtained a value of ($p 0.001 < \alpha 0.05$), this means that there is a significant relationship between room temperature and the incidence of pulmonary tuberculosis. With $\text{OR} = 7.50$, this shows that respondents whose room temperature does not meet the requirements are likely to have a 7 times greater risk of suffering from pulmonary TB.

Based on the frequency distribution, 48 (70.6%) respondents' house temperatures did not meet the requirements. Based on field research, almost half of the respondents' house temperatures did not meet the requirements. Because it is supported by extensive levels of ventilation, humidity and lighting that do not meet the requirements. Abnormal temperatures play a role in the bacterial growth process. According to researchers, another reason why temperature is not the variable most related to the incidence of tuberculosis is because temperature levels can change every minute, depending on the existing air conditions. So, the respondent (sufferer) experienced tuberculosis due to other factors such as inadequate ventilation, humidity and lighting in the house. As with other factors, sufferers need to know about the risk of developing tuberculosis

7. Lighting

The percentage of lighting that did not meet the requirements in the case group was 23 (63.9%) and in the control group was 13 (36.1%). Meanwhile, those categorized as meeting the requirements were also in the case group as many as 11 (34.4) and 21 (65.6) in the control group. In the case group, there was lighting that met the requirements, meaning that the tuberculosis disease they experienced was not influenced by lighting. Can be influenced by other factors such as economic factors, behavioral factors.

Based on the Chi-Square test that has been carried out, the correction (continuity correction) with P Value $\text{Sig}.0.015 < 0.05$ means there is a relationship between lighting and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. So, the case group with inadequate lighting

had a 3.3 times greater risk than the control group of experiencing tuberculosis with a 95% CI value of 3.37 (1.26-9.15).

Meanwhile, according to multivariate analysis using the logistic regression test to find out which variable is most related, the lighting variable has a value of $p = 0.003 < 0.05$, which means that the lighting variable is related and significant to the incidence of tuberculosis in the work area of the Aceh Besar Regency Health Center, and has a value 3.9 times more risk.

Matter This was supported when researchers took measurements on the lighting in the respondents' homes. Many houses have minimal or insufficient lighting, this condition is influenced by the lack of glass tiles or lack of ventilation in the house. This can also be seen from the frequency distribution, namely that 36 (52.9%) home lighting did not meet the requirements. Lighting that meets the requirements is ≥ 60 lux, while lighting that does not meet the requirements is < 60 lux.

Lighting or illumination is really needed in a room. This lighting is really needed so that the house does not become damp, and the walls of the house do not become moldy due to bacteria or germs entering the house. Because disease-causing bacteria like dark places to breed. The more sunlight that comes in the better. According to Minister of Health Regulation no. 1077 of 2011 states that the minimum lighting requirement in a house is 60 lux. Sunlight has a role as a germicidal (germ or bacteria killer). In order to obtain lighting, especially natural light, every room must have light holes or ventilation that allow light to enter directly or indirectly.

This research is supported by the results of research by Ika Lusy (2016) who found that the p value = $0.002 \leq 0.05$, OR = 8.000, which means there is a relationship between lighting and the incidence of TB, and has a risk of 8 times. This research is also in line with research by Amalia (2015) which states that there is a relationship between lighting and the incidence of tuberculosis. Obtained a p value of $0.003 < 0.05$ with an OR value of 8.125 and a risk of 8.1 times.

Dawile's research (2013) also shows that there is a significant relationship between lighting and the incidence of tuberculosis and lighting that does not meet the requirements has a risk value of 4 times. Obtained p value $0.010 < 0.05$ with OR 4.000. Based on the frequency distribution, 41 (60.3%) of the respondent's houses had lighting that did not meet the requirements.

Based on the research results of Sahadewa et al (2019), there is a significant relationship between residential lighting and the incidence of tuberculosis with (p -value 0.024), poor lighting has a 6.667 times greater risk of experiencing pulmonary tuberculosis than respondents experiencing good lighting levels. Endah's (2018) research results also showed that there was a significant relationship between lighting and the incidence of pulmonary tuberculosis (p -value 0.003). Lighting conditions play an important role in the occurrence of pulmonary tuberculosis. With good lighting, the transmission and proliferation of *Mycobacterium tuberculosis* can be prevented.

Based on research, one of the factors that influences the lack of lighting in the respondent's house is the lack of vents or ventilation, as well as the lack of glass roof tiles. Lighting conditions that do not meet the requirements (< 60 lux) can cause darkness and become a good medium for germ growth. This will also increase the number and concentration of bacteria, so that the risk of disease transmission will be higher. It is better if the community health center provides education regarding the requirements for a healthy home that meets the requirements, especially the lighting must meet the minimum requirements of 60 lux so that the lighting in the house is not lacking/dark and is not dazzling. Lighting is also related to ventilation. Adding ventilation can also affect lighting conditions.

8. Humidity

The percentage of humidity that did not meet the requirements in the case group was 18 (66.7%) and in the control group was 9 (33.3%). Meanwhile, those categorized as meeting the requirements were

also in the case group as many as 16 (39.0) and 25 (61.0) in the control group. In the case group, there was humidity that met the requirements, meaning that the tuberculosis disease experienced was not influenced by humidity.

Based on the Chi-Square test that has been carried out, the correction (continuity correction) is seen with P Value Sig. $0.026 < 0.05$, meaning there is a relationship between humidity and the incidence of tuberculosis. So, the group of cases with inadequate humidity had a 3.1 times greater risk of experiencing tuberculosis with a 95% CI value of 3.12 (1.13 – 8.63).

Matter This was supported when researchers took measurements of the humidity in the respondents' homes. Many homes have high humidity levels. This condition is influenced by the lack of vents or ventilation in the house. This can also be seen from the frequency distribution, namely that 27 (39.7%) house humidity did not meet the requirements.

Humidity that meets the requirements is ($\geq 40\% - \leq 60\%$), while humidity that does not meet the requirements is ($< 40\% - > 60\%$). Home air humidity is the average water content in the house. According to the Republic of Indonesia Minister of Health Regulation No.1077/Menkes/Per/V/2011 concerning Guidelines for Indoor Air Health, the air humidity that meets the requirements is 40% -60%. Air humidity that does not meet the requirements can cause the growth of microorganisms which can harm human health. Smooth air flow can reduce indoor humidity. High humidity is a good medium for pathogenic bacteria that cause disease (Macfoedz, 2008).

Based on the research results of Sahadewa et al (2019), there is a significant relationship between residential lighting and the incidence of tuberculosis with (p-value 0.024), poor lighting has a 6.667 times greater risk of experiencing pulmonary tuberculosis than respondents experiencing good lighting levels.

ResultsEndah's research (2018) also found that there was a significant relationship between lighting and the incidence of pulmonary tuberculosis (p-value 0.003). Lighting conditions play an important role in the occurrence of pulmonary tuberculosis. With good lighting, the transmission and proliferation of *Mycobacterium tuberculosis* can be prevented.

This research is supported by research by Kusuma (2015) which shows that there is a relationship between humidity and the incidence of tuberculosis with a risk value of 6 times. P value $0.002 < 0.05$, OR = 6.417. This research is in line with research by Liani (2014) which states that there is a relationship between humidity and the incidence of tuberculosis, with a risk value of 3.8 times. P value $0.008 < 0.05$, OR = 3.85.

The same research also conducted by Kusuma (2015) also stated that there was a significant relationship between humidity and the incidence of tuberculosis with a p value of $0.002 < 0.05$, with OR = 6.14 which means the risk was 6.1 times greater than someone who live in a house with adequate humidity.

Based on the frequency distribution, 27 (39.7%) of the respondents' houses had humidity that did not meet the requirements. Based on research, one of the factors that influences the lack of humidity in the respondent's house is the lack of vents or ventilation, as well as the lack of glass roof tiles. Inadequate humidity conditions can cause susceptible germs or bacteria to live better in rooms with high humidity levels. The humidity that meets the requirements is between 40% - 60% so that the humidity in the house meets the requirements and does not make the house a breeding ground for bacteria. How to reduce humidity levels is also closely related to the presence of adequate ventilation. And often open the doors and windows in the morning, so that the air in the house can change.

CONCLUSION

Based on the results of research regarding The relationship between the physical quality of the house and the incidence of pulmonary TB in Aceh Besar Regency Health Center Working Area, it can be concluded:

1. There is no relationship between age and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.272 > 0.05$, with a 95% CI value of 1.84 (0.61-5.53).
2. There is no relationship between gender and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.808 > 0.05$, with a 95% CI value of 1.12 (0.43-2.91).
3. There is no relationship between education and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.401 > 0.05$, with a 95% CI value of 0.62 (0.20-1.89).
4. There is no relationship between work and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.323 > 0.05$, with a 95% CI value of 0.51 (0.13-1.95).
5. There is no relationship between the type of floor and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.804 > 0.05$, with a 95% CI value of 0.88 (0.33 – 2.33).
6. There is no relationship between the type of wall and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.115 > 0.05$, with a 95% CI value of 1.00 (0.28 – 3.28).
7. There is a relationship between ventilation area and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.001 < 0.05$, with a 95% CI value of 4.88 (1.67 – 14.27).
8. There is no relationship between residential density and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.742 > 0.05$, with a 95% CI value of 1.24 (0.34 – 4.54).
9. There is a relationship between temperature and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.022 > 0.05$, with a 95% CI value of 4.809 (1.16 – 14.39).
10. There is a relationship between lighting and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.015 < 0.05$, with a 95% CI value of 3.37 (1.26-9.15).
11. There is a relationship between humidity and the incidence of tuberculosis in the work area of the Aceh Besar District Health Center. The p value is $0.026 < 0.05$, with a 95% CI value of 3.12 (1.13 – 8.63).

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