

# DETERMINANTS RELATED TO LUNG TUBERCULOSIS IN THE WAY OF PUBLIC HOSPITAL ANUTAPURA

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## ABSTRACT

Pulmonary Tuberculosis (pulmonary TB) is an infectious airborne disease caused by the bacterium *Mycobacterium tuberculosis*, which affect the lower respiratory tract. Education level, smoking, income, and family history were known as risk factors for pulmonary TB. The purpose of this study was to determine the determinants associated with pulmonary TB in the outpatient department of Anutapura General Hospital, Palu.

This research was an analytical study with a cross-sectional design. The independent variables in this study were the level of education, smoking status, income, and family contact history, while the dependent variable was pulmonary TB. We enrolled 43 respondents with accidental sampling method. Data analysis using univariate and bivariate analysis.

The results showed that there was a relationship between education level and pulmonary TB ( $p = 0.024$ ), smoking status and pulmonary TB ( $p = 0.004$ ), income and pulmonary TB ( $p = 0.001$ ), and family contact history with pulmonary TB ( $p = 0.001$ ). There is a relationship between education level, smoking status, income, and family contact history with pulmonary TB. It is suggested to the health workers of RSU Anutapura Palu to increase understanding and knowledge of patients regarding the prevention and transmission of pulmonary TB disease.

**Keywords:** education, smoking, income, contacts, tuberculosis

## INTRODUCTION

Goal of health development is to increase awareness, willingness and ability to live for everyone in order to achieve an optimal degree of public health. There are several factors that influence the degree of public health, including the level of economy, education, environmental conditions, health, and social culture [3]. The degree of public health is influenced by four factors, namely: environment, behavior, health services, and heredity/genetics. [14].

In achieving this, it is necessary to carry out comprehensive, integrated, equitable, acceptable and affordable health efforts by all levels of society. These efforts include health promotion,

disease prevention, treatment and rehabilitation covering all factors, one of which is the result of the emergence of pulmonary TB disease in the community. Pulmonary tuberculosis (pulmonary TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis* which is one of the lower respiratory tract diseases where most of the tuberculosis bacilli enter the lung tissue through *Airbone Infection* [9].

The level of education plays an important role in the occurrence of TB disease, where someone who has a low level of education will affect knowledge about housing that meets health requirements and knowledge about pulmonary TB disease. In addition, a

person's education level will affect the type of work and income [6]. In Ogboi's research in *Negeria Zaria*, it was proven that the factor that influences the incidence of pulmonary tuberculosis in a person is the level of education, where the level of education is lower than those who are highly educated [16].

Smoking will damage the lung defense mechanism called *Muccociliary clearance*. Vibrating hairs and other materials in the lungs do not easily get rid of an infection that has already entered because the vibrating hairs and other organs in the lungs are damaged by smoking. In addition, smoking will make it easier for the occurrence of pulmonary TB infection [6].

The type of work of a person also affects family income which will have an impact on daily life patterns among food consumption, health maintenance besides that it will also affect home ownership (house construction). The head of the family who has an income below the city minimum wage will consume food with nutritional content that is not in accordance with the needs of each family member so that he has a deficient nutritional status and will make it easier to contract infectious diseases including pulmonary tuberculosis. In terms of types of house construction with less income, the construction of the house that is owned does not meet health requirements so that it will facilitate the transmission of pulmonary TB disease in the home [6].

People who have a history of family contact with pulmonary TB sufferers, especially those with positive smear and in their families with children suffering from pulmonary TB should undergo screening through examination. Compliance with a person in undergoing TB treatment includes all aspects of a person doing something according to the advice or recommendations of a health worker. Meanwhile, non-adherence is a complex

and dynamic phenomenon from various factors related to behavior [13].

Pulmonary TB cases are one of the main causes of death for smokers. About 20% of deaths from pulmonary TB in India are related to smoking. Smoking is estimated to be able to kill nearly one million citizens of productive age. The study also revealed that tuberculosis and smoking were two significant public health problems, especially in developing countries [1]. The results of research at Dr. Moewardi Surakarta, smokers have a risk of developing tuberculosis 3 times greater than nonsmokers. This is because smoking weakens the lungs and makes it easier for the lungs to become infected with *Mycobacterium tuberculosis*. With smoking will make it easier for pulmonary TB infection [11].

In 2012, an estimated 9 million new TB patients and 3 million deaths due to pulmonary TB worldwide. It is estimated that 95% of pulmonary TB cases and 98% of deaths due to pulmonary TB in the world occur in developing countries and 75% of people with pulmonary TB are in the productive age group 16-64 years [10]. The World Health Organization states that 90% of pulmonary TB sufferers in the world attack the weak or poor socioeconomic groups. Pulmonary TB disease is the most common disease affecting low-income countries. Low income will lead to conditions of high density and poor environment. In addition, the problem of malnutrition and low ability to get proper health services is also a problem for low-income groups, so that it can make it easier to be infected with pulmonary TB disease [10].

This was also evidenced in a study in Kota Bharu Kelantan, which explained that with a low income the risk of developing pulmonary TB increased 2.458 times greater than that of high-income families [18]. Cases of transmission of pulmonary TB germs are often found in one family. Because it does not

immediately cause pain on the spot, the transmission can sometimes be discovered only after conducting an examination. Pulmonary TB germs are easily transmitted through droplets or sputum that comes out when coughing and then inhaled by other people. If untreated, TB patients with a positive AFB (Acid Resistant Basil) status can transmit germs to at least 10-15 people a year. A person who is infected with pulmonary TB will not necessarily get sick immediately. Germs that enter the body can remain in *adormant state* for years, forming a sheath and only become active when the person's immune system decreases. This condition causes the phenomenon of alternating illness in one family [13].

The study was conducted in a cohort for two years (2011-2013) at the Semarang Lung Public Health Center. At the end of the study, there were 12 contact respondents and 13 not household contacts. The Wilcoxon test showed a significant difference in the mean of IFN-g levels between the contact group and the non-household contact group ( $p$  value = 0.004). Mean IFN-g levels in household contacts decreased in the majority of cases (75%). In the household contact group, 25% showed clinical symptoms of suspected pulmonary tuberculosis [2]. Based on data in the Southeast Asian region, it shows that pulmonary TB kills around 2,000 people every day and about 40% of pulmonary TB cases in the world are in the Southeast Asia region. Indonesia is the third largest country in the world with around 528 cases of pulmonary TB sufferers. Until 2010, WHO noted that the number of pulmonary TB patients had decreased by around 429 cases. Data from the *Global Report 2013* WHO, all total pulmonary TB cases in Indonesia in 2012 were 294,731 cases, of which 169,213 new TB cases were smear positive, 108,616 smear negative TB patients, 11,215 extra pulmonary TB cases, 3,709 recurrent TB cases, and

patient's re-treatment outside of recurrence cases 1,978 cases. Cases of pulmonary tuberculosis is still high, it is still affected by several factors such as: the level of education, their smoke, their income and their history of family contacts with pulmonary tuberculosis patients positive [22].

Based on data from Profiles Health Office of Central Sulawesi province, that number The incidence of new pulmonary TB cases in all regions of Central Sulawesi Province during 2011 showed that the number of clinical pulmonary TB cases was 19,083 people. In 2012 the number of pulmonary TB cases was 24,910 people with AFB positive as many as 2,307 people and in 2013 the number of pulmonary TB cases was 29,807 people with positive AFB 2,796 people [4]. The report of the Palu City Health Office in 2011 shows that the number of pulmonary TB cases was 1,314. souls with positive BTA were 136 cases. In 2012 the number of pulmonary TB cases was 1,951 people with BTA positive 139 cases and in 2013 the number of pulmo-nary TB cases was 2,063 people [5].

Based on data from medical records reports at Anutapura General Hospital, Palu, it shows the incidence of pulmonary TB in the outpatient department of in 2012 with a total of 554 cases. In 2013 the number of patients was 658 cases and in 2014 cases of pulmonary TB had increased with 701 cases. While the average visits per month in 2014 with the number of visits in January were 49 cases, February 49 cases, March 54 cases, April 51 cases, May 53 cases, June 62 cases, July 61 cases, August 65 cases, September 63 cases, October 76 cases, November 53 cases, December 65 cases and the average visit in 2015 with 68 cases in January, February 52, March 66 cases. From the results of the researchers' interviews with 10 patients or their families of patients who visited the Anutapura General Hospital, Palu on June 2,

2015, it was shown that the average patient suffering from pulmonary tuberculosis had a low level of education or <high school and the average patient was also smoker and smoker. the average patient income is low or <UMK Rp. 1,675,000 per month and as a result of contact from a family with smear positive pulmonary TB so that they are exposed to pulmonary TB [19].

**RESEARCH METHODOLOGY**

The method of this study was an analytical observational study with a design *Cross Sectional*. The population in this study were all patients who visited the outpatient TB clinic at Anutapura General Hospital, Palu. The sample in this study was 43 samples that met the inclusion and exclusion criteria. The sampling technique used was *Accidental sampling*. Data collection techniques through primary data with direct interviews and secondary data through medical record data. Data analysis techniques using univariate and bivariate analysis performed using chi-square analysis  $p < \text{value } 0.05$ .

**RESULTS**

**Relationship Education Level and Pulmonary Tuberculosis**

**Tabel 1.** Respondents Distribution Level of Education - Pulmonary Tuberculosis

No	Level of Education	For Pulmonary Tuberculosis		TOT AL	<i>p</i> value		OR	
		TB	Not TB		n	%		
		n	%		n	%		
1.	Low	19 9	67, 9	9 1	32, 1	28 0	10 6	5,80 6
2.	High	4 7	26, 7	11 3	73, 3	15 0	10 0	0,024 3-
	Total	23 5	53, 5	20 5	46, 5	43 0	10 0	23,3 63)

Source: Result of Data Process (2021)

Based on these results it can be seen that respondents who experienced tuberculosis at the low level of education were 67.9%, compared to higher education as much as 26.7%. The results

of the test *chi-square* between the educational level variables and pulmonary tuberculosis obtained value  $p = 0.024$  ( $p < 0.05$ ) with *Odds Ratio* (OR) = 5.806 (1.443-23.363), which means that there is a significant relationship between education level and pulmonary tuberculosis. The results of the analysis also show that the value means that respondents with a low level of education have 6 times the chance of suffering from pulmonary tuberculosis compared to respondents with a high level of education.

**The Relationship Between Smoking and Pulmonary Tuberculosis**

**Tabel 2.** Respondents Distribution Smoking-Pulmonary Tuberculosis

No	Smoking	Pulmonary TB Disease		Total	<i>p</i> value		OR	
		TB	Not TB		n	%		
		n	%		n	%		
1.	Smoking	13 7	86, 7	2 3	13, 3	15 0	10 0	11,7 00
2.	Not smoking	10 7	35, 7	18 3	64, 3	28 0	10 0	0,004 6-
	Total	23 5	53, 5	20 6	46, 6	43 0	10 0	62,6 16)

Source: Result of Data Process (2021)

Based on these results it can be seen that the respondents had tuberculosis in smoking patients was 86.7% compared to non-smokers as much as 35.7%. The results of the test *chi-square* between smoking and pulmonary tuberculosis variables obtained value  $p = 0.004$  ( $p < 0.05$ ) with an *Odds Ratio* (OR) = 11.700 (2.186-62.616), which means that there is a significant relationship between smoking and pulmonary tuberculosis. The results of the analysis also showed that it means that respondents who smoke have 12 times the chance of suffering from pulmonary tuberculosis than respondents who do not smoke.

**Relationship Between Income and Pulmonary Tuberculosis**

**Tabel 3.** Respondents Distribution Income - Pulmonary Tuberculosis

*Terminants Related to Lung Tuberculosis in the Way of Public Hospital Anutapura*

No	Income	Pulmonary TB Disease		Total	p value		OR	
		TB	Not TB		n	%		
		n	%		n	%		
1.	Low	18	67,9	9	32,1	28	10,0	5,806
2.	High	5	26,7	11	73,3	15	10,0	0,024 (1,443-23,363)
Total		23	53,5	20	46,5	43	10,0	

Source: Result of Data Proceess (2021)

Based on the results of this study it can be seen that respondents who experienced tuberculosis in low income as much as 72.0% compared to high income of 27.8. The results of thetest *chi-square* between income variables and pulmonary tuberculosis obtainedvalue  $p = 0.011$  ( $p < 0.05$ ) with an *Odds Ratio* (OR) = 6.686 (1.731-25.823), which means that there is a significant relationship between income and pulmonary tuberculosis. The results of the analysis also show that it means that respondents with low incomes have 7 times the chance of suffering from pulmonary tuberculosis compared to respondents with high incomes.

**Relationship Between Family Contact History and Pulmonary Tuberculosis**

**Tabel 4.** Respondents Distribution Family Contact History - Pulmonary Tuberculosis

No	History Family Contact	Pulmonary TB Disease		Total	p value		OR	
		TB	Not TB		n	%		
		n	%		n	%		
1.	There Are	19	76,0	6	24,0	28	10,0	11,083 (2,623-46,838)
2.	None	4	22,2	14	77,8	15	10,0	0,024 (1,443-23,363)
Total		23	53,5	20	46,5	43	10,0	46,838

Source: Result of Data Proceess (2021)

Based on the results of this study It can be seen that respondents who had tuberculosis in the family history of AFB positive BTA contact were 76.0% compared to those who had no family contact history of AFB positive 22.2%. The results of thetest *chi-square* between the variable family contact history with pulmonary tuberculosis obtainedvalue  $p =$

0.001 ( $p < 0.05$ ), the *Odds Ratio* (OR) value = 11.083 (2,623-46,838), which means that there is a significant relationship between family contact history and pulmonary tuberculosis. . The results of the analysis also show that it means that respondents who have a history of contact with a positive AFB positive family have 11 times the chance of suffering from pulmonary tuberculosis than respondents who do not have a history of contact with a positive AFB positive family.

**DISCUSSION**

**1. Relationship Between Education Level And Pulmonary Tuberculosis**

level of education is closely related to health problems, especially pulmonary TB disease. One of the contributing factors is the low level of education of a person so that it will affect their health, because the higher one's education, the wider one's ability in the health sector, the more concerned he is in taking care of himself and others [12].

The results showed that there was a relationship between the level of education and pulmonary tuberculosis in the outpatient clinic in the outpatient section of the Anutapura General Hospital, Palu. Patients who have a low level of education have a 5 times greater risk or chance of suffering from pulmonary tuberculosis than patients who have a high level of education. More patients with low education or patients who only completed their education through elementary school and junior high school were more than respondents who had higher education or respondents who completed their education from high school and college. This is due to several factors, one of which is that these patients do not complete their education to a higher level because their income is still less and more focused on working.

The author assumes that a person's low education level will be susceptible to

disease due to lack of knowledge to protect the environment and family around him to stay healthy and avoid various diseases, the higher a person's education level, the better his knowledge will be in preventing a disease and vice versa if the more the lower the level of education of a person, the less knowledge they have in the health sector or in the field of prevention of a disease, especially pulmonary tuberculosis. According to researchers, this is due to a lack of knowledge in receiving information about pulmonary tuberculosis or other diseases. This is because health workers do not pay attention to public health and provide information about what factors affect the health status of their community. So that people can live healthy and free from various diseases.

A person's education level will affect knowledge about the causes of a disease in their environment. With a low level of education, there will be less knowledge and understanding in receiving information about the causes of a disease, namely: modes of transmission, prevention, dangers and appropriate methods of treatment. Someone with a low level of education will be more at risk of being infected with a disease, one of which is pulmonary tuberculosis. If a patient with pulmonary tuberculosis has limited knowledge, it will affect his attitude and behavior as a sick person and ultimately result in becoming a source of infection for those around him [6].

The higher a person's education level, the better his / her knowledge is in preventing a disease and vice versa if a person's education level is lower, the less knowledge is in the health sector or in the field of prevention of a disease, especially pulmonary TB disease [6].

This research is in line with the results of research conducted at the Puskesmas Cigeureung Cipedes Kota Tasikmalaya with a total sample of 56 respondents. The results of the chi-square

statistical test showed that there was a relationship between the level of education and the incidence of pulmonary tuberculosis ( $p = 0.020$ ;  $OR = 4.324$ ) [15]

In addition, this study is in line with that conducted in Dr. Ibnu Sutowo Baturaja with a total sample of 110 respondents. Based on the results of the chi-square statistical test, it showed that there was a significant relationship between the level of education and the incidence of pulmonary tuberculosis ( $p = 0.041$ ;  $OR = 4.5$ ). Where people who have low education will have less understanding of pulmonary tuberculosis, so that it will make it easier for them to get the disease [7]

## **Relationship Between Smoking and Pulmonary Tuberculosis**

Smoking is a risk for infection with the bacterium *Mycobacterium tuberculosis*, infection will develop into disease and risk of death. Nearly 60% of deaths in tuberculosis patients are related to smoking [11]. The results showed that there was a relationship between smoking and pulmonary tuberculosis in outpatient poly patients at the General Hospital of Anutapura Palu. Patients who smoked had an 11 times greater risk or chance of suffering from pulmonary tuberculosis than patients who did not smoke. There were more patients who did not smoke than those who smoked. There are still some patients in the outpatient clinic of Anutapura General Hospital, Palu who have this smoking habit, especially men because they are used to smoking cigarettes when they are on break from work or after eating. They do this because it is to get rid of boredom and fatigue from day-to-day activities that have been carried out all day long. The frequent smoking and the number of cigarettes smoked every day will worsen the lung health condition of the patient so that he will be susceptible to contracting pulmonary tuberculosis.

The authors assume that a person who does not smoke will be less susceptible to a disease than a smoker because smoking can impair the lung defense mechanism called Muccociliary clearance. Because a smoker does not only have an impact on himself but also affects others, where passive smokers have a higher risk of contracting a disease than active smokers. In addition, cigarette smoke is also known to reduce the response to antigens so that if a foreign object enters the lungs it is not young to be recognized and resisted. According to researchers, this is because most people already know the impact of smoking, but they still have pulmonary TB. This is caused by other factors such as the sputum of people who are suffering from smear positive pulmonary TB, from air pollution, the results of combustion, cigarette smoke smoking around us or environmental conditions that do not meet health requirements.

Smoking can interfere with normal lung work, because hemoglobin carries oxygen more easily. If there is carbon monoxide in the lungs, it will be carried by hemoglobin and the body gets less than usual oxygen intake. Almost all smokers do not realize that smoking is wrong, but most are not smokers and are able to get rid of the smoking habit because most of them already consume fruits and vegetables [1].

Cigarette smoke is also known to reduce the response to antigens so that if a foreign object enters the lungs it is not easy to recognize and fight. Biochemically, cigarette smoke also increases etalase synthesis and decreases the production of anti-processing to the detriment of our bodies. With the smoking habit will make it easier for the occurrence of pulmonary tuberculosis infection [6].

This research is in line with the results of research conducted at the Tuan-Tuan Public Health Center, Katapang Regency, West Kalimantan. Where the

smoking habit variable obtained p value = 0.011 <0.05, it means that there is a significant relationship between smoking and the incidence of pulmonary tuberculosis. The magnitude of the risk from the output results obtained by the value of RR = 2.407 greater than 1 (95% CI: 1.118-5.186) whose value does not include 1, meaning that people who smoke will have an increased risk of contracting TB by 2.407 times greater than people who do not. smoking [21]

In addition, this study is in line with that conducted at the Ketanggungan Public Health Center, Brebes Regency, with a total sample of 62 respondents. Based on the results of statistical tests, there was a relationship between smoking and pulmonary tuberculosis (p = 0.002; OR = 3.169) Eka Fitriani [6]

### **3. Relationship Between Income and Pulmonary Tuberculosis**

. Less income will have an impact on daily life patterns between food consumption and maintenance. health besides that will also affect home ownership (house construction). A person who has an income below the city minimum wage or low income will consume food with nutritional levels that do not match the needs of each family member so that he has a deficient nutritional status and will make it easier to get infectious diseases, including pulmonary TB compared to people with high incomes can buy foods that have good nutrition or meet health requirements so that they are not susceptible to disease, especially pulmonary tuberculosis [6].

The results showed that there was a relationship between income and pulmonary tuberculosis in the outpatient clinic of Anutapura General Hospital, Palu . Patients who have low income or less than the City Minimum Wage in Palu City have a risk or opportunity 6 times greater to develop pulmonary tuberculosis than respondents who have high incomes.

respondents who have low income are more than respondents who have high income. Patients who have income are due to the fact that some of the patients in the outpatient clinic of Anutapura General Hospital Palu work as non-permanent entrepreneurs and there are still some respondents who work as laborers whose income is still not in accordance with the minimum wage in Palu City. This can be seen where many outpatients in the treatment process almost all respondents use the Community Health Insurance assistance during the examination and treatment process at the hospital.

The author assumes that less income is very risky for contracting a disease, including pulmonary tuberculosis. Where this impact is influenced by the pattern of consuming food with nutritional levels that are not in accordance with the needs of each family member so that they have a less nutritional status and will make it easier to get infectious diseases including pulmonary tuberculosis. According to researchers, low or less income cannot have a house construction that meets health requirements so that it will facilitate the occurrence of various diseases in the home, one of which is pulmonary tuberculosis. However, some of those who have high income are affected by pulmonary TB such as private employees whose earnings are above the City Minimum Wage. This is due to other factors such as factory air pollution or waste that is directly exposed to workers.

Economic limitations or it is said that the level of income is insufficient means that the family's purchasing power is inadequate, which means that they are not able to buy good quality foodstuffs or according to health standards, so their nutritional fulfillment will be disrupted. This means that the economic level or family income will affect a person's nutritional status, which will not improve so that he is susceptible to disease, including pulmonary TB disease [6].

This research is in line with the results of research conducted in the work area of Puskesmas Peterongan Jombang which states that the income variable is ( $p$  value = 0.001,  $\rho$  = -0.572), and the R square result is 38.9%. This means that the level of income or socio-economy that does not affect the incidence of pulmonary tuberculosis is 38.9%, while 62.1% is influenced by other factors. A person with a good level of income or socio-economy will have a good level of health as well. Low income or socio-economic levels result in low knowledge of pulmonary tuberculosis and difficulty in accessing good health services, so that improvements in the socio-economic conditions of the community are needed to prevent the emergence of infectious diseases such as pulmonary tuberculosis [17]

In addition, this study is in line with the results of this study. which was conducted at Puskesmas Ketanggungan Brebes Regency with a total sample of 62 respondents. Based on the results of statistical tests, it shows that there is a relationship between income and the incidence of pulmonary tuberculosis ( $p$  = 0.002; OR = 3.169) [6]

#### **4. Relationship between Family Contact History and Pulmonary Tuberculosis The**

Risk of people who have family or neighbors around positive pulmonary tuberculosis level of exposure to sputum splash. Pulmonary tuberculosis patients with smear positive gave the possibility of a greater risk of transmission than patients with smear negative pulmonary tuberculosis. The risk of transmission each year is indicated by the *Annual Risk Of Tuberculosis Infection (ARTI)*, which is the proportion of the population at risk of being infected with TB for one year. [3].

The results showed that there was a relationship between family contact history and pulmonary tuberculosis in the outpatient clinic of Anutapura General



Hospital, Palu. Patients who had a history of contact with a smear positive family member had an 11 times greater risk or chance of suffering from pulmonary tuberculosis than respondents who had no history of contact with a smear positive family member. respondents who had a history of family contacts were more than respondents who had no family contact history. Patients who have a family contact history are due to the fact that most of the patients in the outpatient clinic of Anutapura General Hospital, Palu, where in the patient's house it turns out that before suffering from pulmonary tuberculosis, previously there was one of his family members who suffered from pulmonary tuberculosis so that it was transmitted to that patient. Pulmonary tuberculosis itself is an infectious disease caused by the bacteria *Mycobacterium tuberculosis*. These bacteria usually enter the human body through breathing air into the lungs.

The author assumes that someone who has a family with smear positive pulmonary TB will be at greater risk of transmitting it to other people than those with smear negative pulmonary TB, because people who often interact with patients with smear positive pulmonary TB will quickly get infected through the air as a result of the splash or phlegm from the other people or neighboring families who suffer from smear positive pulmonary TB. Where the higher the degree of positivity of the sputum examination results, the more infectious the patient is. According to the researcher, that someone who has family, children or neighbors around the house who has smear positive pulmonary TB. Chances are that a person has a low immune system so that it is easy for disease to enter his body. If an infection occurs, such as pulmonary tuberculosis, the number of pulmonary TB patients will increase, thus the transmission of pulmonary TB in the community will also increase.

People who have a history of family contact with patients with pulmonary TB, especially those who are smear positive and in their family, children or neighbors who suffer from smear positive pulmonary TB should undergo screening through examinations. Adherence of a person in undergoing treatment for smear positive pulmonary TB includes all aspects of a person doing something in accordance with the advice or recommendations of health workers [8].

This research is in line with the results of research conducted at the Semarang Public Health Center with a total sample of 60 respondents. The results of the Chi-square statistical test showed that there was a relationship between family contacts and pulmonary tuberculosis ( $p = 0.020$ ;  $RP 4.3$ ). Where people in the family environment have a history of family contact who suffer from tuberculosis, it will facilitate transmission to other family members [20]

In addition, this study is in line with the results of research conducted in Wonogiri Regency where the sample of this study was 136 respondents. After statistical analysis, the results showed that the variables associated with the incidence of pulmonary tuberculosis were family contacts ( $OR = 3,975$ ;  $95\% CI = 1,887-8,375$ ) and the closeness of the relationship status in the family ( $OR = 2.908$ ;  $95\% CI = 1.173-7.212$ ) [23]

#### **CONCLUSION**

The level of education has a significant relationship with the incidence of tuberculosis, smoking has a significant relationship with the incidence of tuberculosis, income has a significant relationship with the incidence of tuberculosis, and family contact history has a significant relationship with the incidence of pulmonary tuberculosis in outpatient poly outpatients at Anutapura General Hospital, Palu.

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