

Factors Related to the Incident of Pulmonary Tuberculosis in the Working Area of the Tarok Health Center Payakumbuh Citi West Sumatra Province 2023

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ABSTRACT

*Tuberculosis is a disease caused by the bacteria *Mycobacterium tuberculosis*. Tarok Health Center has the highest incidence rate of pulmonary TB in Payakumbuh City in 2022. In 2019 the CNR of TB cases was 178 per 100,000 populations. In 2020, the number of CNR TB cases was 112 per 100,000 populations. The CNR of TB in 2021 was 122 per 100,000 populations, in 2022 the CNR of TB cases will be 56 cases with a CNR of 284 per 100,000 populations. This research uses quantitative methods with case control methodology. The total sample was 88 samples; the research was carried out from September to October 2023 with analysis using the chi-square statistical test. This research shows that there is a relationship between ventilation area (0.005), humidity (0.031), temperature (0.029) and contact history (0.017) with the incidence of pulmonary TB in the working area of the Tarok Health Center, Payakumbuh City, then no relationship was found between floor type (=1) and residential density (0.052) and the incidence of pulmonary TB in the working area of the Tarok Health Center, Payakumbuh City.*

Keywords: tuberculosis, ventilation, humidity, temperature, contact history

INTRODUCTION

The degree of health can be influenced by several factors, namely environment, behavior, health and hereditary services. Environmental factors and human behavior, which can be endangering health, is the factor that has the greatest impact on the health level of a population. One of the diseases caused by the environment is tuberculosis.

Tuberculosis is still an environmentally based disease pose a threat to public health throughout the world. *Mycobacterium* bacteria *Tuberculosis* is the source of the infectious disease tuberculosis. Tuberculosis is a problem health in terms of mortality rates, disease incidence rates, and identification and treatment rates.

Pulmonary TB is still a major public health problem in the world today, according to the World Health Organization (Global TB Preport, 2022) 10.6 million cases of pulmonary TB have been reported. diagnosed globally in 2021, an increase of approximately 5.8 million people from 2021 previously, namely 2020. Meanwhile, in 2019 there was a decrease compared to in 2020, namely 7.1 million people. For 6.4 million (60.3%) of the 10.6 million cases there have been reported and received treatment, while 4.2 million (39.7%) were unaccounted for, diagnosed, and reported. At least 6 million of the 10.6 million cases in 2021 are adult men,

followed by 3.4 million adult women and the remaining 1.2 million cases of pulmonary TB, all of whom are children.

West Sumatra Province is one of the provinces in Indonesia that still has facing the challenges of treating tuberculosis cases. After K. Riau, South Sumatra, and North Sumatra, West Sumatra has the fourth highest Case Notification Rate (CNR) on Sumatra Island in 2021. Based on Sumatra Health Profile data West Sumatra in 2019, the CNR of TB cases in Payakumbuh was in 9th place out of 19 cities/ districts in West Sumatra with a total of 91 per 100,000 populations. According to Riskesdas data, the prevalence of TB in West Sumatra Province was 0.31% in 2018. Based on the Health Profile, in 2019 the CNR of all tuberculosis cases was 203 per 100,000 population.⁶ In 2020 the CNR had a figure of 98 per 100,000 population, and in 2021 the CNR of tuberculosis cases will be 148.8 per 100,000 population.

In 2020, Indonesia was in third place in terms of the number of cases the largest after India and China. In 2020 the TB incidence rate in Indonesia is 301 per 100,000 populations, a decrease compared to the TB incidence rate in 2019, it was 312 per 100,000 populations. Meanwhile, the TB death rate in in 2019 and 2020 it is still the same, namely 34 per 100,000 populations. In 2021, Indonesia is estimated to have 969,000 cases of pulmonary TB or one case every 33 seconds. An increase of 17% from 2020, namely 824,000 cases. In Indonesia there were 354 cases pulmonary tuberculosis per 100,000 populations in 2021. This condition is a significant obstacle to achieving the TB elimination target by 2030.

Based on data from the Payakumbuh City Health Service, Community Health Center Work Area Tarok had the highest incidence of pulmonary TB in Payakumbuh City in 2018 2022. In 2019 the CNR of TB cases in the Tarok Community Health Center working area was 178 per 100,000 inhabitants. In 2020, the Tarok Community Health Center work area had a CNR of TB cases of 112 per 100,000 populations. The CNR of TB in 2021 was 122 per 100,000 populations. And in 2022 the CNR of TB cases was 56 cases with a CNR of 284 per 100,000 populations.

The Gordon Model often known as the epidemiological triad is a theory of spread disease in society proposed by John Gordon in 1950. According to John Gordon's view, the environment, the agent, and the host are the three fundamental causes of the origin of disease in society.

Environmental factors play an important role in health status influenced. The physical environment, social culture, and other factors shape the environment in trouble. If people can manage the environment effectively, it will not have a negative impact on the health of people, families, and society. Risk factors Pulmonary TB demographics include age, gender, income and education level, as well aspects of the home environment such as ventilation width, residential density, lighting intensity, floor type, and temperature.

The impact of TB is physical weakness such as fever, chest pain and stones long-term, psychological disorders such as worry that the condition

cannot be cured, and socio-economically such as loss of income due to inability to work. Tuberculosis is exacerbated by poor housing sanitation conditions, especially in poor and densely populated areas. Because home is a place where duration contact and quality of exposure related to pulmonary TB victims, home environmental factors have a significant impact on the possibility of developing pulmonary TB.

A healthy house is a residential building that meets health requirements, namely houses that have healthy toilets, clean water facilities, rubbish disposal areas, waste water disposal facilities, good house ventilation, appropriate occupant density and the floor of the house is not made of earth. Coverage of Healthy Homes in the Tarok Health Center Working Area in 2021 is 4,325 homes (96.3 %).

The criteria for a Healthy Home according to the Republic of Indonesia Minister of Health Decree (1077/Menkes/Per/2011) include materials The building is made of materials that are not harmful to health, has air circulation smoothly, the total ideal ventilation area is at least 10% of the total floor area in each room. Whether bedroom, living room, kitchen, living room, bedroom, even the warehouse must have ventilation, the ceiling is strong, does not become a rat's nest, easy to clean and at least 2.5 meters high from the floor, natural or artificial lighting It must be sufficient and able to illuminate the entire room, not dazzling and in the morning sunlight can enter the room of the house, the house is not crowded with people goods, because they can become a breeding ground for disease-transmitting insects if not cleaned regularly. The minimum bedroom area is 8m² and it is not recommended to use more of two people sleeping in one bedroom, except children under 5 years old, is available drinking water and clean water facilities that meet health requirements and are sufficient for needs daily, good food and drink processing at home, facilities available Healthy latrines equipped with septic tanks, and watertight and easy floors cleaned.¹⁷

The researchers' initial observation findings were collected during a field survey in the work area Tarok Health Center, Payakumbuh City, found 5 whose houses had potential Tuberculosis disease will occur, such as lack of ventilation, wooden floors, house area that does not comply with healthy house standards, namely 8 m² /person, and poor house position. not quite right so sunlight doesn't enter the house.

Based on interviews/discussions with Puskesmas Health officers, that in part Most TB patients have low economic status. Although not directly related, poor nutritional conditions and housing conditions, such as the risk of disease can increase in a home whose physical environment does not comply with healthy home guidelines.

There has been no previous research regarding the factors associated with incidence of pulmonary tuberculosis in the Tarok Health Center area, Payakaumbuh City. Therefore, Researchers are interested in conducting research on factors related

to incidence of pulmonary tuberculosis in the Tarok Health Center Working Area, Payakumbuh City, Province West Sumatra in 2023.

RESEARCH METHOD

This type of research uses a case control methodology with an analytical survey. By differentiating the case group and the control group according to their exposure status, research using a case control approach attempts to confirm the relationship potential link between exposure and disease. This research will be conducted in the Work Area Tarok Health Center, Payakumbuh City, West Sumatra Province. This research was carried out in March–December 2023.

RESEARCH RESULT

Characteristics of Respondents Based on Gender, Age, Last Education, Respondent's Occupation

Data from research on the distribution of respondents based on gender, age, last education and occupation of respondents in the Tarok City Health Center working area Payakumbuh, West Sumatra Province in 2023 can be seen in the following table:

Characteristics	n = 88	%
Gender		
Man	50	56,8%
Woman	38	43,2%
Age		
Toddler	16	18,2%
Children	6	6,8%
Teenager	19	21,6%
Mature	29	33%
Pre-elderly	12	13%
Elderly	6	6,8%
Last Education		
Not yet/not at school	23	26,1%
Elementary School	15	17%
Junior High School	10	11,4%
Senior High School	38	43,2%
College	2	2,3%
Work		
Government employees	2	2,3%
Self-employed	2	2,3%
Farmer	20	22,7%
Farm workers	8	9,1%
Student	25	28,4%
Not yet/not working	31	35,2%

Source: Primary Data, 2023

Table 4.1 shows the distribution of characteristics based on gender the majority were men, namely 56.8%. Distribution of characteristics based on age of majority in adults (20-44 years) namely 33%. Distribution of characteristics by education finally the majority was at the SMA/SMK level, namely 43.2%. Characteristic distribution based on work, the majority are not yet/not working, namely 35.2%.

Univariate Analysis

Table 2. Univariate Analysis of Factors Associated with the Incidence of Pulmonary TB in the Tarok Community Health Center Working Area

Number	Ventilation Area	Amount	%
1	Not Eligible	58	65,9%
2	Qualify	30	34,1%
Number	Floor type	Amount	%
1	Not Eligible	1	1,1%
2	Qualify	87	98,9%
Number	Residential Density	Amount	%
1	Congested	24	27,3%
2	Not Solid	64	72,7%
Number	Humidity	Amount	%
1	Not Eligible	51	58%
2	Qualify	37	42%
Number	Temperature	Amount	%
1	Not Eligible	51	58%
2	Qualify	37	42%
Number	Contact history	Amount	%
1	Have A Contact History	54	61,4%
2	Has No Contact History	34	38,6%

Source: Primary Data, 2023

The table above shows that most of the respondents' houses have ventilation area in the working area of the Tarok Community Health Center in the category of not meeting the requirements (<10% of the floor area) amounting to 65.9% or 58 respondents, the category meets the requirements (>10% floor area) amounting to 34.1% or 30 respondents. Indicates that most Floor Types the respondent's house in the Tarok Community Health Center working area is in the ineligible category (not waterproof such as wooden floors, soil) by 1.1% or 1 respondent, category meets the requirements (waterproof such as plaster, ceramic) of 98.9% or 87 respondents.

Shows that most of the respondents' residential density is in the work area Tarok Health Center in the non-eligible category (<8m² /person) was 27.3% or 24 respondents, in the eligible category (>8m² /person) was 72.7% or as many as 64 respondents. Shows that most of the respondents' home humidity in the Tarok Community Health Center working area in the category of not meeting the requirements of 58% or 51 respondents, the qualifying category (>40%, <60%) was 42% or 37 respondents.

Shows that most of the respondents' home temperatures are in the work area Tarok Health Center in the category of not meeting (<18oC, >30oC) requirements was 73.9% or 65 respondents, in the category of meeting requirements (>18oC, <30oC) was 26.1% or as many as 23 respondents. Shows that most of the Contact History is home respondents in the Tarok Community Health Center working area were in the category of not meeting the requirements (having contact with cases) was 61.4% or 54 respondents, category met the requirements (had no contact with the case) of 38.6% or 34 respondents.

Bivariate Analysis Results

Table 3. Bivariate Analysis of Factors Associated with the Incidence of Pulmonary TB in the Tarok Community Health Center Working Area

Physical Condition Of The House	Pulmonary TB				Amount	OR	95% CI	P
	Case		Control					
	n	%	N	%				
Ventilation area								
Not Eligible	27	61,4%	13	29,5%	40	3,787	1,559-9,200	0,005
Qualify	17	38,6%	31	70,5%	48			
Floor type								
Not Eligible	1	2,3%	0	0,0%	1			1,000
Qualify	43	97,7%	44	100%	87			
Residential Density								
Congested	16	26,4%	7	15,9%	23	3,020	1,095-8,333	0,052
Not Solid	28	63,6%	37	84,1%	65			
Humidity								
Not Eligible	31	70,5%	20	45,5%	51	2,862	1,189-6,888	0,031
Qualify	13	29,5%	24	54,5%	37			
Temperature								
Not Eligible	32	72,7%	21	47,7	53	2,921	1,201-7,793	0,029

Qualify	12	27,3%	23	52,3%	35				
Contact History									
Have A Contact History	32	72,7%	20	45,5%	52	3,2	1,314-7,793	0,017	
Has No Contact History	12	27,3%	24	54,5%	36				

Source: Primary Data, 2023

Differences in the proportion of pulmonary TB in the community in the Tarok health center working area in cases whose ventilation area does not meet the requirements is higher by 61.4% compared the proportion of people in the working area of the Tarok Health Center who control the ventilation area who meets the requirements. From the results of the *bivariate* analysis, it shows that there is a relationship significant between ventilation area and the incidence of pulmonary TB, $p = 0.005$ ($p < 0.05$). Ventilation is one of the supporting factors for a healthy home as a place.

Ventilation is one of the supporting factors for a healthy home as a place change of indoor air. Ventilation in the house helps indoor air quality room, room temperature that meets the requirements. Ventilation also affects the dilution process air and dilutes the concentration of TB germs and other germs, where the germs will be carried outside and die from exposure to ultraviolet light. (24)

As a result of observations during the research, researchers found that there was no ventilation meets the requirements, namely less than 10% of the floor area of the house and apart from ventilation that is not met the requirements, researchers also found house windows that were rarely opened for reasons respondents did not open the window, among other things, because there were lots of mosquitoes, which is rare at home, and some say that the air is cold.

Adequate ventilation allows for air changes in the room, so that it can reduce the possibility of transmission to other people along with decreased concentration of germs. Rooms with inadequate ventilation area causes germs to always be in high concentrations, thus increasing transmission to others. Insufficient house ventilation causes air flow to not be maintained so that the humidity in the room rises and this condition becomes a good medium for the development of pathogenic germs. To allow smooth air changes, a minimum ventilation hole area of 10% of the floor area is required.

Relationship between floor type and incidence of pulmonary tuberculosis

Based on bivariate analysis using the *Chi-Square* test to determine the relationship Between the type of floor and the incidence of pulmonary TB, the *p-value* = 1, which means it doesn't exist significant relationship between floor type

and the incidence of pulmonary TB in the work area Tarok Health Center, Payakumbuh City.

Based on the frequency distribution, 1 (2.3%) respondent suffered from pulmonary TB and the type of floor that does not meet the requirements due to the condition of the original floor of the house in plaster but it is cracked and there are some that look like dirt, based on interviews with respondents conducted by researchers because of the house it's old.

According to researchers based on observations and field interviews of respondents Located in the working area of the Tarok Health Center, Payakumbuh City, the floor types are adequate condition. Because most of the floor types in the respondents' houses are ceramic and some are it's been plastered. Based on the results of research on existing floor type variables meets the requirements but suffers from pulmonary TB, this is because there are other triggering factors The spread of pulmonary TB is the growth of bacteria due to hygiene conditions if the floor is not maintained then the floor becomes damp and becomes a breeding medium bacteria.

Relationship between Residential Density and the Incidence of Pulmonary Tuberculosis

Differences in the proportion of pulmonary TB in the community in the Tarok health center working area in cases whose residential density does not meet the requirements is higher by 26.4% compared The proportion of people in the working area of the Tarok Health Center that is controlled by their residential density who meets the requirements. The results of the *bivariate* analysis show that there is no relationship significant relationship between residential density and the incidence of pulmonary TB, $p = 0.052$ ($p > 0.05$).

According to researchers based on measurements and field interviews of respondents Located in the Tarok Community Health Center working area, the residential density meets the requirements. Because the number of residents in one house is in accordance with the floor area of the house. And because most of the respondents' houses are very spacious. Based on the results of research in Residential density variable that meets the requirements but suffers from pulmonary TB because there are other factors that trigger the spread of pulmonary TB, namely the development of the virus due to environmental conditions that support the widespread spread of pulmonary TB disease ventilation <10% of the floor area of the house, house humidity that does not meet the requirements (>60%), temperature that does not meet the requirements for a healthy home (>30o C) and direct contact with pulmonary TB sufferers.

Relationship between humidity and the incidence of pulmonary tuberculosis

Differences in the proportion of pulmonary TB in the community in the Tarok health center working area in cases where the humidity does not meet the requirements is higher by 70.5% compared to the proportion the community in the

working area of the Tarok Community Health Center controls the humidity in the room who meets the requirements. From the results of the *bivariate* analysis, it shows that there is a relationship significant between humidity and the incidence of pulmonary TB $p = 0.031$ ($p < 0.05$).

Based on observations, several respondents suffered from pulmonary TB. It was found that the humidity in the respondent's house did not meet the requirements, this was because the house does not get direct sunlight. This is supported by researchers who measured the humidity in the respondents' homes. From the measurement results, humidity is mostly unqualified. This can be seen from the distribution. The frequency with the case group is 70.5% of respondent houses that do not comply with requirements and 29.5% of respondents' homes met the requirements.

A house that does not have humidity that meets health requirements will have an impact on its residents. Home is a good medium for growth of microorganisms, including bacteria, spirochetes, rickettsia and viruses. These microorganisms can enter the body through the air.

Based on the results of home interviews of respondents who did not meet the requirements, the incidence of pulmonary TB disease is caused by the windows in the bedroom being sparse once opened for the reason that during the day no one is home, there is no time for opening the window because of work, because there are lots of mosquitoes and doing other activities. The same thing with temperature, people should increase their self-awareness, especially regarding the spread of pulmonary TB disease which can easily be transmitted through the air, especially at hot and humid room temperatures, by opening windows, especially on bedroom so that bacteria that contaminate the air cannot grow.

Relationship between temperature and the incidence of pulmonary tuberculosis

Differences in the proportion of pulmonary TB in the community in the Tarok health center working area in cases whose room temperature does not meet the requirements is higher by 72.7% compared to the proportion of people in the Tarok health center working area who control their room temperature who meet the requirements. From the results of the *bivariate* analysis, it shows that there is a relationship significant between temperature and the incidence of pulmonary TB $p = 0.029$ ($p < 0.05$).

This is supported by researchers who measured the temperature of the respondents' homes. From the results of measuring house temperatures, most of them do not meet the requirements. This can be seen from the frequency distribution with the case group amounting to 72.7% of respondents' homes that do not qualify and 47.7% of homes that meet the requirements.

According to the Republic of Indonesia Minister of Health Regulation No.1077/Menkes/PER/2011 Guidelines Cleaning Air in Home Spaces. The room

temperature in the house is adequate Health requirements are 18°C and 30°C. The temperature in the house is too low can cause health problems, including hypothermia, while temperatures that are too high can cause dehydration and even heat stroke. (24)

Based on the results of observations or observations made by researchers that Some of the respondents who did not suffer from pulmonary TB had no temperature at home meet this requirement because they have very poor ventilation and lack of maintaining cleanliness in areas inside the house. The results of the interview at the respondent's house does not meet the requirements for the incidence of pulmonary TB, namely because it was caused by a house window rarely opened because during the day no one is at home or there is no time to open windows and perform other activities. *Mycobacterium tuberculosis* bacteria live and grow well in the temperature range of 31°C - 37°C. The temperature in the house will affects health in the house, where hot temperatures will certainly have an effect on activity. The community should increase self-awareness, especially regarding distribution Pulmonary TB disease which can easily be transmitted through the air, especially at temperature hot and humid room.

Relationship between contact history and the incidence of pulmonary tuberculosis

Differences in the proportion of pulmonary TB in the community in the Tarok health center working area in cases who have a higher contact history of 72.7% compared to the proportion of the community The working area of the Tarok Community Health Center is a control that has no history of contact qualify. From the results of the *bivariate* analysis, it shows that there is a relationship significant relationship between contact history and the incidence of pulmonary TB, $p = 0.017$ ($p < 0.05$).

This is supported by researchers who conducted interviews with respondents. From Most of the interview results had a contact history. This can be seen from the distribution frequency with the case group was 72.7% of respondents who had a history of contact and 45.5% of respondents had no contact history. When conducting an interview, there were 80.6% of respondents who did not know that pulmonary TB was a disease airborne diseases.

According to the results of interviews with respondents who had a history of contact with sufferers Pulmonary TB is caused by direct contact with sufferers who live together in adjacent areas, such as in direct contact with neighbors to chatting at a fairly close distance or in direct contact with peers at school, at play, or at work. Should The community be increasing awareness, especially regarding the spread of pulmonary TB disease can easily be transmitted through the air, especially when in direct contact with pulmonary TB sufferers.

CONCLUSION

There is a relationship between ventilation area, humidity, temperature and history of contact with incidence of pulmonary tuberculosis in the Tarok Community Health Center monkey area. There is no relationship between floor type and residential density with the incidence of pulmonary tuberculosis in the work area Tarok Health Center. There is a need for education about healthy homes and disease pulmonary tuberculosis to the community as well as about clean and healthy living behavior. And Puskesmas officers should increase their home visits to pulmonary TB patients This is to see directly the condition of the physical environment of the house and to find out if there are any whether or not the sufferer's family is likely to be infected so that action can be taken prevention.

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