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Relationship of Lighting, Floor Type, Ventilation, and House Wall with Tuberculosis Incidence in Mandailing Natal District in 2022

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Abstract

The research objective is to analyze relationship of lighting, floor type, ventilation, and house wall with tuberculosis incidence in Mandailing Natal District in 2022. This research is a case control study. The case population in this study were tuberculosis sufferers in Mandailing Natal Regency in 2021 which were divided into the work areas of the highland Community Health Center, namely Hutabargot, Sibanggor Jae, Kayu Laut, and Gunung Baringin. While in the lowlands, namely Panyabungan Jae, Longat, Gunung Tua, and Mompang. The total sample in this study is a minimum of 124 people. The data collection method used primary and secondary data. Data analysis used bivariate analysis.

Keywords
lighting; floor type; ventilation; house wall; tuberculosis

I. Introduction

Tuberculosis is caused by the bacterium Mycobacterium tuberculosis which most often attacks the lungs. Tuberculosis spreads from person to person through the air. When people with pulmonary tuberculosis cough, sneeze, or spit, they push the tuberculosis germs into the air. Worldwide, tuberculosis is one of the top 10 causes of death and the leading cause of infectious agents. A total of 1.4 million people died from tuberculosis in 2019 (World Health Organization, 2019).

In 2019, it is estimated that 10 million people will develop tuberculosis worldwide. 5.6 million men, 3.2 million women, and 1.2 million children. The 30 countries with high tuberculosis burdens accounted for 87 percent of new tuberculosis cases. Eight countries accounted for two-thirds of the total, India being the country with the highest number of tuberculosis sufferers, followed by Indonesia, China, the Philippines, Pakistan, Nigeria, Bangladesh and South Africa (World Health Organization, 2019).

Based on the Ministry of Health, the number of tuberculosis patients in 2019 was 568,987 cases and in 2020 the number of tuberculosis patients decreased by 351,936 cases. The number of tuberculosis sufferers in men is 1.4 times higher in all provinces compared to women. Even in Aceh, North Sumatra, and North Sulawesi, cases in men were twice as high as in women. Tuberculosis patients in North Sumatra reached 26,418 in 2018, this case increased when compared to tuberculosis patients found in 2019 of 33,779. based on gender in 2019 the number of male tuberculosis patients was 21,198 higher than women, which was 12,585. In each district/city in all cases of North Sumatra, more cases occur in men than women.

In 2018 Mandailing Natal occupied the top 10 with the highest number of cases in North Sumatra with 900 cases. The number of tuberculosis cases found in Mandailing Natal Regency in 2019 was 885 cases, this number increased in 2020 to 900 cases. According to gender, the number of cases in men was 583 cases or 65.9 percent higher than women, which was 302 cases or 34.1 percent. In each sub-district throughout

Mandailing Natal District, more cases occurred in males than females. In addition, in Mandailing Natal Regency, there is an increase in tuberculosis cases in children and other vulnerable communities (Mandailing Natal District Health Office, 2019).

The administrative area of Mandailing Natal Regency consists of 23 sub-districts and with an area of 6620.7 km^2 with a population of 447,287 people and a density of 67.56/km^2. The Mandailing Natal Regency area is located in the highlands, namely there are 10 sub-districts which are North Panyabungan District, Malintang Hill, West Panyabungan, Muara Batang Gadis, Natal, Batahan, Hutabargot, Panyabungan, Sinunukan, and Naga Juang. While the highland areas are Kotanopan, Batang Natal, Muara Sipongi, East Panyabungan, South Panyabungan Districts, Sorik Merapi Valley, Tambangan, Ulung Pangkat, Lingga Bayu, Pakantan, and Sorik Merapi Peak (Mandailing Natal District Health Office, 2019).

The lowlands which have very different temperatures from the highlands, if the highlands of temperature and humidity are one of the factors, tuberculosis bacteria can breed very easily because they have oxygen density, in contrast to the lowlands where the temperature and humidity have compressed oxygen so it should make bacteria tuberculosis is difficult to breed, but in fact the number of patients with tuberculosis in Mandailing Natal Regency in the lowlands is actually higher than in the highlands.

The occurrence of cases of pulmonary tuberculosis is influenced by several factors, including the physical condition of the home environment. The quality of the unhealthy physical home environment plays an important role in the transmission and proliferation of Mycobacterium tuberculosis. Lack of sunlight that enters the house, poor ventilation tends to create a humid and dark atmosphere, this condition causes germs to survive for days to months in the house. The risk factors for the physical environment of the house that play a role in determining the interaction between the host and the causative elements in the process of occurrence of pulmonary tuberculosis are the density of the occupants, humidity, ventilation area, lighting, floors and walls of the house (Rosdiana, 2018).

Based on Law Number 1 of 2011 concerning Housing and settlements, the principle of a healthy house that meets health requirements is that floors and walls must be dry (not damp) and easy to clean. In order to keep it dry, the floor must be made of building materials that do not carry groundwater to the floor surface (watertight). The height of the floor must be higher than the outside yard, which is 10 cm from the yard and 25 cm from the road surface. The area of the window opening is at least 1/9 of the floor space and the window must be able to penetrate the sun.

Regulation of the Minister of Health of the Republic of Indonesia Number 077/Menkes/Per/V/2011 concerning Guidelines for Indoor Air Sanitation, one of the requirements for a healthy home is a house equipped with ventilation, at least 10 percent-20 percent of the floor area with a cross ventilation system. To qualify, the ventilation must have a minimum size of 10 percent of the floor area. Ventilation is a hole through which light and air from outside can enter the room. The existence of ventilation provides a gap for light to enter so that the room becomes bright, not stuffy and not humid. Home ventilation conditions that do not meet the requirements block the entry of sunlight.

Smoking habits are also closely related to tuberculosis. Smoking can weaken the lungs and make the lungs more susceptible to infection with tuberculosis germs. Tuberculosis can be transmitted through the air because pulmonary tuberculosis is easily transmitted and if handled too late it can be fatal, namely death.

The relationship between house conditions and the incidence of pulmonary tuberculosis in Baharaya Village, Bontoala District, Makassar City, that there is a significant relationship between pulmonary tuberculosis and occupancy density,

ventilation, temperature, and humidity on the incidence of pulmonary tuberculosis. There is a relationship between lighting, humidity, temperature, ventilation, residential density, kitchen smoke holes, floors, and the physical condition of the house with the incidence of pulmonary tuberculosis.

Smoking is one of the factors that cause tuberculosis, this is because smoking habits can damage the work system and lung defenses so that the longer people consume cigarettes, the more risky they are exposed to tuberculosis. There is a significant relationship between smoking habits and the incidence of tuberculosis and people who smoke for a period of > 10 years have a 2 times greater risk of developing tuberculosis than people who do not consume cigarettes.

The research objective is to analyze relationship of lighting, floor type, ventilation, and house wall with tuberculosis incidence in Mandailing Natal District in 2022.

II. Research Method

This research is a case control study. Case-control research is an observational analytic epidemiological study that examines the relationship between certain effects and certain risk factors (Asyraini et al., 2022; Octiva, 2018; Pandiangan, 2015).

Population is a group or collection of objects or objects that will be generalized from the results of research (Octiva et al., 2018; Pandiangan, 2018). The case population in this study were tuberculosis sufferers in Mandailing Natal Regency in 2021 which were divided into the work areas of the highland Community Health Center, namely Hutabargot, Sibanggor Jae, Kayu Laut, and Gunung Baringin. While in the lowlands, namely Panyabungan Jae, Longat, Gunung Tua, and Mompang. Meanwhile, the control population is non-tuberculosis sufferers in Mandailing Natal Regency in 2021 who are in the affected area. The sample is part of the population that has characteristics similar to the population itself (Jibril et al., 2022; Pandiangan et al., 2018; Pandiangan, 2022). The total sample in this study is a minimum of 124 people.

The data collection method used primary and secondary data. Primary data is data taken directly by researchers without going through intermediaries so that the data obtained are in the form of raw data. Secondary data is data taken through intermediaries or parties who have previously collected the data, in other words, researchers do not directly take their own data into the field. Sources of primary and secondary data also vary, depending on what method is used by researchers (Octiva et al., 2021; Pandiangan et al., 2021; Pandia et al., 2018).

Data analysis used bivariate analysis. Bivariate analysis was used to see whether there was a relationship between the independent variable and the dependent variable, using the chi square test with a significance level of=0.05 (Pandiangan et al., 2022; Tobing et al., 2018).

III. Results and Discussion

3.1 Overview of Research Sites

Mandailing Natal Regency is a district located in North Sumatra Province, located between 0 0100 - 1 0500 North Latitude and 980500-1000100 East Longitude. Mandailing Natal Regency occupies an area of 662,069,99 hectares consisting of 23 sub-districts, 407 urban villages. The Mandailing Natal Regency area is directly adjacent to South Tapanuli Regency and Padang Lawas Regency in the North, West Sumatra Province in the South and East, and the Indonesian Ocean in the West.

The population of Mandailing Natal Regency in 2020 is 472,886 people with a population density of 71 people per km2. The largest population is in Panyabungan District, which is 90,049 people and the smallest population is in Pakantan District, which is 2,222 people. The sex ratio is 99.19, which means that for every 100 female population, there are approximately 99-100 male residents.

The dependency ratio is a comparison between the total population aged 0-14 years, plus the population aged 65 years and over (both referred to as non-labor force) compared to the total population aged 15-64 years (labor force). Dependancy Ratio can be used as an indicator that can roughly show the economic condition of a country whether it is classified as a developed country or a developing country. Dependency ratio is one of the important demographic indicators. The higher the percentage of dependency ratio indicates the higher the burden that must be borne by the productive population to finance the lives of the unproductive and unproductive population. Meanwhile, the lower percentage of the dependency ratio indicates the lower the burden borne by the productive population to finance the unproductive and unproductive population.

In terms of age group, 30.96 percent of the population of Mandailing Natal Regency are aged 0-14 years, 64.56 percent of the population of Mandailing Natal Regency are 15-64 years old, while the population aged 65 years and over is only 4.48 percent. This shows that the population of productive age (age 15-64 years) is greater than the population of non-productive age (age 0-14 years and age 65+). The total population of productive age is 64.56 percent while the number of non-productive age is 35.44 percent. So, the dependency ratio of 54.89 percent means that every 100 people of productive age in Mandailing Natal Regency bear around 54 to 55 people of non-productive age.

Based on the results of the 2020 Susenas, information was obtained that as many as 13.48 percent of the population of Mandailing Natal Regency experienced health complaints which resulted in their activities being disrupted or suffering from illness, meaning that 13 to 14 of 100 residents of Mandailing Natal Regency were sick. When viewed by gender, it is known that of the total female population in Mandailing Natal, 14.49 percent suffer from illness. While the male population who experienced illness was 12.43 percent. This shows that the percentage of the population who is sick is relatively not different between the female population and the male population.

In terms of age group, the population aged 65 years and over is the population group that suffers the most pain during the last month and causes daily activities to be disrupted, which is 20.55 percent. This can be said to be reasonable because people aged 65 years and over are vulnerable to health problems. In this age group, the body's resistance to various types of diseases begins to decline so that many people suffer from both infectious and non-communicable diseases.

3.2 Characteristics of Respondents

The 124 respondents aged between 15-45 years, 84 respondents, and 40 respondents with >45 years of age. Based on the gender variable from a total of 124 respondents, 77 male respondents and 47 female respondents.

Characteristics based on education from a total of 124 respondents, the highest proportion is elementary education, as many as 55 respondents, 32 people with junior high school education, 23 respondents with high school education, while 14 respondents with higher education.

Based on the characteristics of the work of the respondents who were divided into two categories, from a total of 124 respondents who worked as many as 102 people and the number of respondents who did not work as many as 22 people. Based on the income

characteristics, the respondents in the able category are 64 respondents and the poor category are 60 people.

3.3 Bivariate Analysis Results

Table 1. Bivariate Analysis Results

Variable	Tuberculosis						p-value	OR	CI 95%	
	Yes		No		Amount					
	n	%	N	%	n	%			Lower	Upper
Lighting										
MS	46	48.9	48	51.1	94	100	0.675	1.193	0.523	2.717
TMS	16	53.3	14	46.7	30	100				
Floor Type										
KA	35	43.2	46	56.8	81	100	0.038	2.218	1.039	4.736
TKA	27	62.8	16	37.2	43	100				
Ventilation										
MS	43	50	43	50	86	100	1.000	1.000	0.466	2.146
TMS	19	50	19	50	38	100				
House Wall										
MS	31	41.3	44	58.7	75	100	0.017	2.444	1.166	5.127
TMS	31	63.3	18	36.7	49	100				

MS : Qualify
TMS : Not Qualify
KA : Waterproof
TKA : Not Waterproof

The results show that there is no a relationship between lighting with tuberculosis incidence in Mandailing Natal District in 2022. There is a relationship between floor type with tuberculosis incidence in Mandailing Natal District in 2022. There is a no relationship between ventilation with tuberculosis incidence in Mandailing Natal District in 2022. There is a relationship between house wall with tuberculosis incidence in Mandailing Natal District in 2022.

IV. Conclusion

The results show that there is no a relationship between lighting with tuberculosis incidence in Mandailing Natal District in 2022. There is a relationship between floor type with tuberculosis incidence in Mandailing Natal District in 2022. There is a no relationship between ventilation with tuberculosis incidence in Mandailing Natal District in 2022. There is a relationship between house wall with tuberculosis incidence in Mandailing Natal District in 2022.

Suggestions in this research are:

1. For the Community

   Pay more attention to individual health, clean and healthy living behavior, maintain a healthy lifestyle or lifestyle, and increase knowledge about infectious diseases, especially the epidemiology of pulmonary tuberculosis.

2. For Further Researchers

   It is necessary to conduct further research on risk factors for tuberculosis in a more in-depth manner with a larger sample size in Mandailing Natal District.

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