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Economic Status, Knowledge Level, and Physical Condition of the House with the Incidence of Pulmonary Tuberculosis

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Abstract. Tuberculosis is a directly infectious disease caused by the bacterium Mycobacterium Tuberculosis. During the last three years, most patients with pulmonary tuberculosis were at the Kambaniru Health Center. The purpose of this study was to determine the relationship between economic status and the incidence of pulmonary tuberculosis, to determine the level of knowledge about the incidence of pulmonary tuberculosis, and to determine the relationship between the physical condition of the house and the incidence of pulmonary tuberculosis. This research is an analytic observational study with a case-control research design. The sample in this study was 110 people, consisting of 55 cases and 55 controls. The data obtained were analyzed using the Chi-square test. The results showed that there was a significant relationship between economic status (0.001), level of knowledge (0.022), type of floor (0.001), temperature (0.001), and the incidence of pulmonary tuberculosis. There is no relationship between occupancy density (0.095), ventilation (0.096), humidity (0.233), and the incidence of pulmonary tuberculosis. Therefore, there is a need for cooperation between the government, public health center officers, and the community so that efforts can be made to reduce tuberculosis cases at the Kambaniru Health Center.
Keywords: *economy, knowledge, physical condition of the house*

Abstrak. Tuberkulosis merupakan penyakit menular langsung yang disebabkan oleh bakteri Mycobacterium Di Kabupaten Sumba Timur, penderita tuberkuloisis paru terbanyak selama 3 tahun terakhir terdapat di Puskesmas Kambaniru. Tujuan dari penelitian ini untuk mengetahui hubungan status ekonomi dengan kejadian tuberkulosis paru, untuk mengetahui tingkat pengetahuan dengan kejadian tuberkulosis paru, untuk mengetahui hubungan kondisi fisik rumah dengan kejadian tuberkulosis paru. Penelitian ini merupakan penelitian observasional analitik dengan rancangan penelitian case control. Sampel dalam penelitian ini sebanyak 110 orang, terdiri dari 55 kasus dan 55 kontrol. Data yang diperoleh dianalisis menggunakan uji Chi-square. Hasil penelitian menunjukkan ada hubungan yang signifikan antara status ekonomi (0,001), tingkat pengetahuan (0,022), jenis lantai (0,001), suhu (0,001) dengan kejadian tuberkulosis paru. Tidak ada hubungan antara kepadatan hunian (0,095), ventilasi (0,096), kelembaban (0,233) dengan kejadian tuberkulosis paru. Oleh karena itu, perlu adanya kerjasama antara pemerintah, petugas puskesmas dan masyarakat agar dapat dilakukan upaya-upaya untuk menurunkan kasus tuberkulosis di Puskesmas Kambaniru.
Kata kunci: *economy, knowledge, physical condition of the house*

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Introduction

Tuberculosis is a directly infectious disease where the disease is caused by rod-shaped bacteria (bacilli), also known as Mycobacterium Tuberculosis, most of which (80%) attack the lungs (Meutia, 2019). Many factors are closely related to the incidence of pulmonary tuberculosis, such as the source of bacterial transmission, history of contact with patients, socioeconomic level, the virulence of the bacillus, low immune system related to genetics, nutritional status, age, immunization, housing conditions which include (building materials) housing, ventilation, lighting, humidity, occupancy density, and the environment around the house and work (Rusmidarti, 2017).

Economic conditions and good knowledge can influence a person to establish an excellent place to live, protecting every family member. The house is a shelter building where the environment of the structure can be helpful for physical and spiritual health and social conditions, both family and individual health (Meutia, 2019). The house's physical condition is essential in spreading pulmonary TB bacteria to healthy people. The source of this transmission can be through the intercession of saliva or phlegm of patients containing Mycobacterium tuberculosis (Dawile et al., 2014). The prevalence of pulmonary TB in Indonesia has increased over the last three years. The incidence of pulmonary TB in the province of East Nusa Tenggara itself has fluctuated wherein 2015 there were 2,561 cases; in 2016, there were 1,320 cases; in 2017, there were 3,670 cases, and in 2018, there was an increase in cases to 6,583 where East Sumba Regency is one of the five highest regencies after Kupang City, Belu Regency, Timor Tengah Selatan Regency, and Sikka Regency (BPS NTT, 2019).

Kambaniru Health Center is located in East Sumba Regency, with the highest smear-positive in three years. Data from the Kambaniru Public Health Center in 2020 showed 55 cases at the East Sumba Health Center. This case is influenced by the low economic status, knowledge of the community, and the house's physical condition that does not meet health requirements, so it impacts increasing cases at the Kambaniru Health Center. Communities in the working area of the Kambaniru Health Center generally make a living as farmers with varying levels of education ranging from no school, elementary, middle school, high school, and university. Most of the people in the Kambaniru Public Health Center working area have a junior high school education, which results in insufficient knowledge and the economy and the physical condition of the house that does not meet the requirements. Previous research conducted in Pekalongan showed that people with low knowledge had a 2.5 times higher risk of contracting tuberculosis than those with high knowledge (Sari, 2018). In addition, research conducted in the working area of the Ngemplak Boyolali Health Center showed that the environment and home conditions that did not meet health requirements were risk factors for TB transmission, which significantly affected the incidence of pulmonary TB (Syafri, 2015). This study aims to determine whether there is a relationship between economic status, level of knowledge, and physical condition of the house with the incidence of pulmonary tuberculosis in the Kambaniru Health Center working area in 2021.

Method

This study uses observational analytic research that explores how and why this phenomenon or problem occurs with a case-control research design. This research starts from the effects/or consequences that have occurred, then will be traced backward regarding the causes. This research was conducted in the working area of the Kambaniru Public Health Center, East Sumba Regency, from November-December 2021. The population in this study was divided into two, namely the case

population and the control population. The case population is all patients with pulmonary TB who are in the working area of the Kambaniru Health Center, with as many as 55 people. In contrast, the control population is all people in the Kambaniru Health Center working area who do not suffer from pulmonary TB, which is 34,585 people. The sample in this study was divided into two, namely case samples and control samples with a ratio of 1:1. Several samples used were 110 respondents consisting of 55 case groups and 55 control groups. Sampling in the study used total sampling and a random sampling system. The total sampling technique is used for sampling in the case group where all population members are sampled. In contrast, the random sampling system is used for sampling in the control population, where the research sample is taken randomly from the population. The instrument used in this study was a questionnaire with a Guttman scale to measure economic status and level of knowledge. The questionnaire for the variable of economic status was adopted from 14 criteria for low-income families from the Central Statistics Agency. In contrast, for the variable level of knowledge, a questionnaire was adopted from Astuti Sumiyati. In addition, this study also uses participatory observation because the observers go directly to the research site and are directly involved with various things being observed. This observation aims to determine the relationship between floor type, temperature, humidity, occupancy density, and ventilation with the incidence of pulmonary TB and its measurement using several measuring instruments such as a roller meter and thermometer. Data analysis used univariate and bivariate analysis with a chi-square test, at a significance level of 0.05 and a 95% confidence level.

Result

1. General Characteristics of Respondent

Table 1.
General Characteristics of Respondent

Characteristics	Frequency (n=110)	Proportion(%)
Respondent's Gender		

Man	64	58,1
Women	46	41,9
Respondent's Age		
16-25	16	15
26-35	10	9
36-45	38	35
46-55	34	31
56-65	12	11
Respondent's Last educations		
Primary school	12	11
Junior high school	49	45
Senior high school	24	22
College	20	18
No School	5	4
Respondent's Job		
Farmer	52	48
Housewife	20	18
Entrepreneur	8	7
Government Employees	14	13
Honorary	7	6
Student	9	8

Table 1 shows that the distribution of respondents based on gender is mostly male respondents with as many as 64 people (58.1%), and the least is female as many as 46 people (42.9%). Respondents based on age were mainly at the age of 36-45 years as many as 38 people (35%) and at least at the age of 26-35 years as many as 10 people (9%). Respondents based on education are primarily junior high school groups as many as 49 people (45%), and minor education is not in school as many as 5 people (4%). Respondents based on occupation are primarily farmers, as many as 52 people (48), and minor jobs are honorary jobs, as many as 7 people (6%).

2. Variable Observation Results

Table 2.
Variable Observation Results

Variable	Frequency (n=110)	Proportion(%)
Occupancy Density		
Not good	22	20

Well	88	80
Floor-type		
Not good	50	45,5
Well	60	54,5
Ventilation		
Not good	15	13,6
Well	95	86,4
Humidity		
Not good	23	20,9
Well	87	79,1
Temperature		
Not good	39	35,5
Well	71	64,5

Table 2 shows that the results of observations in the field found that there were more respondents whose occupancy density met the requirements than those who did not meet the requirements. In the type of floor variable, it was found that more respondents had floors that met the requirements. In the ventilation variable, more respondents have adequate ventilation. In the Humidity variable, more respondents have room humidity that meets the requirements. In the temperature variable, more respondents have room temperature that meets the requirements.

3. Bivariate Analysis

Table 3 shows that the results of the bivariate analysis using the chi-square test found that there were four variables related to the incidence of pulmonary TB, namely economic status (p = 0.001), level of knowledge (p = 0.022), type of floor (p = 0.01) and temperature (p=0.001). While the variables that had no relationship with the incidence of pulmonary TB were occupancy density (p=0.095), ventilation (p=0.096), humidity (p=0.159).

Table 3.
Relationship of Economic Status, Knowledge Level, and Physical Condition of the House with the Incidence of Pulmonary Tuberculosis in the Work Area of the Kambaniru Health Center, East Sumba Regency

Variable	Pulmonary Tuberculosis				*p=value*	OR (95% CI)
	Case		Control			
	n	%	N	%		
Economic Status						
Well	19	34,5	38	69,1	0,001	4,235
Not good	36	65,5	17	30,9		(1,908-9,402)
Knowledge Level						
Well	23	41,8	36	65,5	0,022	2,636
Not good	32	58,3	19	34,5		(1,218-5,7050
Home Physical Condition						
Floor-type						
Well	21	38,2	39	70,9	0.001	3.946
Not good	34	61,8	16	29,1		(1,779-8,753)
Occupancy Density						
Well	40	72,7	48	87,3	0,095	
Not good	15	27,3	7	12,7		
Ventilation						
Well	44	80	51	92,7	0,096	
Not good	11	20	4	7,3		
Temperature						
Well	27	49,1	44	80	0,001	4,148
Not good	28	50,9	11	20		(1,780-9,668)
Humidity						
Well	40	72,7	47	85,5	0,159	
Not good	15	27,3	8	14,5		

Discussion

Economic status is the level of prestige or position of a person based on work or material possessions. Good economic status guarantees to meet the needs of life and health will be more secure, this is because nutritional needs will be more fulfilled (Prihartini et al., 2013). The results of statistical analysis showed that there was a relationship between economic status and the incidence of pulmonary

tuberculosis in the work area of the Kambaniru Public Health Center, East Sumba Regency. This is influenced by the respondent's low income, where most of the respondents' jobs are farmers with low incomes so they cannot meet their daily needs. A good economic status will guarantee a person to meet the needs of life. Meanwhile, people with poor economic status tend to have an impact on education, environmental sanitation, nutrition, and access to health services. Some data indicate that micronutrient deficiencies can increase the risk of developing tuberculosis, in addition, Body Mass Index (BMI) is highly inversely related to the risk of disease progression (reduction of TB incidence from 14% per unit increase in BMI). This also affects treatment outcomes where poor nutrition can worsen treatment outcomes (Selleca, 2012).

The results of this study are in line with previous studies which showed that there was a relationship between poor families and the incidence of pulmonary TB in coastal areas in Tallo Makassar District, where families with low economic status were 5 times more likely to experience pulmonary TB than families with high economic status (Yunus, 2017).

A person with a low economy will have an impact on the adequacy to meet needs where one of which which is education so that it will have an impact on one's knowledge Knowledge is the result of knowing, and this can happen where after someone senses a certain object (Djannah et al., 2015). The results of statistical analysis showed that there was a relationship between the level of knowledge and the incidence of pulmonary tuberculosis in the work area of the Kambaniru Public Health Center, East Sumba Regency. The results of statistical analysis showed that there was a relationship between the level of knowledge and the incidence of pulmonary tuberculosis in the work area of the Kambaniru Public Health Center, East Sumba Regency.

Knowledge is needed as support in generating self-confidence as well as attitudes and behavior in their daily lives, so it can be concluded that knowledge is dominant which is very important to shape one's actions (Notoatmodjo, 2014). Good

knowledge about pulmonary tuberculosis and prevention efforts will greatly affect behavior and public awareness to make prevention efforts where the better the level of knowledge, the better the tuberculosis prevention efforts are carried out (Astuti, 2016).

The results of this study are not in line with previous studies, namely that there is no relationship between the level of knowledge and the incidence of pulmonary tuberculosis in the Manokwari Dormitory, Sleman Jakarta. In this study, respondents who have a good level of knowledge are more than those who have less. However, the attitudes and habits of the respondents, such as 2-3 people in one room, poor ventilation, and rarely open windows. In addition, students have a smoking habit as well as environmental cleanliness that is not maintained with dirty floors visible. These things are risk factors for the transmission of pulmonary TB disease (Djannah et al, 2015).

A good level of knowledge and economic status will help a person to make his environment better and more comfortable so that it can protect individuals and society. One of them is the house, where a good place to live will protect every member of the family. A good house is a house that is built according to health requirements such as waterproof floors, good ventilation, good humidity, and temperature, and residential density (Fahreza and Anwar, 2016).

A healthy home component has a waterproof floor and does not dampen. The type of ground floor has a role in the process of pulmonary tuberculosis incidence. Through the humidity in the room, in the summer the floor will tend to become dry so that it can cause a lot of dust that is harmful to the occupants (Akyuwen, 2016). The results of statistical analysis showed that there was a relationship between the type of floor and the incidence of pulmonary tuberculosis in respondents in the working area of the Kambaniru Public Health Center, East Sumba Regency. A good floor is a floor made of water-resistant materials. If the floor is damp it will be a good breeding ground for Mycobacterium tuberculosis bacteria. According to the Decree of the Minister of Health Number 829 of 1999

concerning housing health requirements, a good house floor is a floor that is watertight and easy to clean.

The results of this study are in line with previous research conducted in the work area of the Sangkrah Public Health Center Surakarta in 2016 which showed that there was a relationship between the type of floor and the incidence of tuberculosis, where someone who had a non-waterproof house floor had a risk 3 times greater than someone who had a house. with a waterproof floor. The floor can act as a transmission medium so that if the phlegm is disposed of on the floor, TB germs will fly in the air and will infect the people around (Susanti, 2016).

Not only the floor, but the size of the house is also a factor in a healthy home, where a healthy house must be sufficient to meet the occupants in it. The area of the house that is not by the number of occupants results in overload. The denser the occupants of the house, the faster the air in the house will be polluted this can increase CO2 levels in the air in the house and will provide more opportunities to grow and multiply for Mycobacterium tuberculosis (Aprianawati, 2018).

The results of statistical analysis showed that there was no relationship between residential density and the incidence of pulmonary tuberculosis in respondents in the working area of the Kambaniru Public Health Center, East Sumba Regency. This is because some of the respondent's family members in both the case and control groups are married, migrated, and studied in different places, while their children live with relatives so that there is no overcrowding in the respondent's house. According to the Decree of the Minister of Health Number 829 of 1999 concerning housing health requirements, the occupancy density that meets the requirements is one person at least 8 m^2 per person, and is not recommended for more than two people (Akyuwen, 2016),

The results of this study are not in line with previous studies which showed that there was a relationship between occupancy density and the incidence of pulmonary tuberculosis in the working area of the Perumnas I and II Public Health Centers where someone who lives at home whose occupancy density does not meet

the requirements has a risk of 13.5 times greater when compared to a person who lives in a house with an adequate occupancy density. The larger the occupancy in one house, the greater the interaction that will occur between residents in the house (Deni et al, 2016).

Every house must have a ventilation system in the form of circulation and air exchange with natural ventilation and/or artificial ventilation. Ventilation has several functions, namely to keep the airflow in the house fresh so that the balance of oxygen (O2) needed is maintained, to free the room air from pathogenic bacteria because there will be continuous airflow, and to maintain the optimum air humidity.

The results of statistical analysis showed that there was no relationship between ventilation and the incidence of pulmonary tuberculosis in respondents in the working area of the Kambaniru Public Health Center, East Sumba Regency. This is because it is more dominant that respondents have ventilation with a size of more than 10% of the floor area. A healthy house must have ventilation where this ventilation will function as an exchange of air in and out. According to the Minister of Health of the Republic of Indonesia No. 1077/Menkes/Per/V/2021 concerning Guidelines for Air Sanitation, a good ventilation area is at least 10% of the floor area. Air exchange that is not good or does not meet the requirements can lead to the growth of microorganisms that can cause human health problems. Bacteria will last a long time in the house if the ventilation in the house is very minimal. Lack of ventilation will cause humidity in the room because the evaporation process occurs (Aprianawati, 2018).

The results of this study are not in line with previous studies which showed that there was a relationship between ventilation and the incidence of tuberculosis in the working area of the Kampung Baru Health Center in 2019 where the ventilation conditions of the house did not meet the requirements had a 0.178 times greater risk of suffering from pulmonary TB compared to respondents who lived at home whose ventilation met the requirements (Sakati et al, 2019).

Air humidity is a percentage of the total water content in the air (Astuti, 2016). An environment that has unqualified humidity can affect health. The results of statistical analysis showed that there was no relationship between humidity and the incidence of pulmonary tuberculosis in respondents in the working area of the Kambaniru Public Health Center, East Sumba Regency. According to the Decree of the Minister of Health of the Republic of Indonesia Number 1077/Menkes/Per/V/2011 concerning guidelines for indoor air sanitation, it is stated that good and qualified air humidity is humidity in the range of 40%-60%. Humidity that does not meet the requirements can cause the growth of microorganisms that can cause disturbances to human health.

The results of this study are also not in line with previous studies which showed that there was a significant relationship between house humidity and the incidence of pulmonary TB where humidity that did not meet the requirements had a 4 times risk of developing pulmonary TB compared to those whose humidity met the requirements. Humidity that does not meet the requirements or more than 70% is a good means for the growth of Mycobacterium tuberculosis, this is because the place is a good place for bacteria to breed (Indriyani, et al. 2016).

Temperature is the heat or coldness of the air expressed in units of a certain degree. The results of statistical analysis showed that there was a relationship between temperature and the incidence of pulmonary tuberculosis in respondents in the working area of the Kambaniru Public Health Center, East Sumba Regency. The Minister of Health of the Republic of Indonesia Number 1077/Menkes/Per/V/2011 concerning Guidelines for Air Sanitation, the room temperature that meets the requirements ranges from 18ºC-30ºC. Temperatures that are too low can cause health problems in the body that can cause hypothermia, while temperatures that are too high can cause dehydration up to heat stroke. Abnormal temperatures can also cause a medium for the growth of microorganisms. Abnormal temperatures also have a role in the process of pulmonary TB incidence, through abnormal air conditions (Syafri, 2015). The results of this study are in line

with previous studies which showed that there was a relationship between temperature and the incidence of pulmonary TB in the work area of the Tobelo Health Center, North Halmahera Regency where respondents who had room temperatures that did not meet the requirements had 7 times the risk compared to respondents whose house temperatures met the requirements (Dawile, 2014).

The weakness of this study is that the measurement of temperature and humidity variables in the respondents' homes is not carried out at the same time. In addition, the researchers only examined a few variables.

Conclusion

The research results conducted by researchers in the working area of the Kambaniru Public Health Center, East Sumba Regency, showed a relationship between variables of economic status, level of knowledge, type of floor, and temperature with the incidence of pulmonary TB. In comparison, the variables that do not have a relationship with the incidence of pulmonary TB are occupancy density, ventilation, and humidity. Low public education is one factor that results in a lack of public knowledge about this pulmonary tuberculosis disease. It is also influenced by the low economy of the community so people are less able to build houses that physically do not meet health standards.

Suggestion

There is a need for collaboration between the government, public health center officers, and the community so that efforts can be made to reduce tuberculosis cases at the Kambaniru Health Center, such as providing assistance to underprivileged communities and conducting counseling about pulmonary tuberculosis so that people can make efforts to prevent pulmonary tuberculosis.

For further researchers to measure research variables at the same time so that the results are more accurate. In addition, it is expected to examine other variables that are at risk for the incidence of pulmonary TB such as nutritional status, smoking habits, and so on.

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