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Behavior Model Analysis and Risk Factors of Pulmonary Tuberculosis Transmission of Honai Residents in Wamena, Jayawijaya District, Papua

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Abstract

Pulmonary tuberculosis treatment success rate in Indonesia is 74%, Gorontalo Province is the highest success of treatment with (96%), whereas the treatment of pulmonary TB in Papua province was only reached of 24%. The study took place in Wamena Jayawijaya Papua Province that aims to identify: (1) the relationship of demographic factors, (2) socioeconomic factors, (3) behavioral factors, (4) the nutritional status, (5) the physical environment of the house to the transmission of pulmonary TB in the community dwellers Honai Jayawijaya Wamena in Papua Province. This study is observational analytic with Case Control studies design. The sample consisted of 58 respondents, the sampling process was done by purposive sampling. Results revealed that positive BTA mostly in the age range of 21-40 years (p = 0.292), 55% positive at primary and secondary school education (p = 0.019), OR = 9.292, IK 95% (1.432 to 60.284). A total of 69.0% were positive on the job of farmer (p = 0.410), OR = 0.46, IK95% (0.073 to 2.917). A total of 69.0% expenditure <IDR. 290.000 (p = 0,023) and OR = 6.659, IK95% (1.306 to 33.950). 62.1% found the incidence of transmission of knowledge is less experienced positive pulmonary TB (p = 0.027), OR = 5.803, IK95% (1.217 to 27.665).

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Found 55.2% less attitude experienced incidence of pulmonary TB infection (p = 0.031), OR = 6.716, IK95% (1.195 to 37.733). Found 55.2% less action experienced something positive pulmonary TB infection (p = 0.020), OR = 7.319, IK95% (1.362 to 39.328). IMT was found 55.2% less experienced something positive pulmonary TB infection (p = 0.272), OR = 2.290, IK95% (0.523 to 10.027), the lighting is less 100%, less moisture as much as 84.6%. Honai density is high (100%). Conclusions: There was no relationship between demographic factors on the risk of transmission of pulmonary TB. There is a correlation between socioeconomic against pulmonary TB transmission risk. There is a relationship behavior against pulmonary TB transmission. There was no relationship Nutritional Status against pulmonary TB transmission. There are currently no relation physical environment home against pulmonary TB transmission in the community dwellers Honai in Wamena, Jayapura Papua Province.

Keywords: Honai; behavior; environment; education; income; actions.

1. Introduction

People in the developing world increasingly suffering from tuberculosis because their immune systems are weak. Typically, they suffer from Tuberculosis due infected with HIV and develop AIDS. In the 1990s, Indonesia was ranked 3rd world tuberculosis patients, but the situation has improved and in 2013 became the world rankings to fifth. The treatment success rate (success rate) Pulmonary TB in Indonesia is 74%. Propvinsi that treatment success is highest Gorontalo (96%), NTB (93%), Lampung (93%) and East Java (91%), while the success of the treatment of pulmonary TB in Papua province has reached 24% (DG & PL, 2012). Physical condition and affects the physical events the house according to the results of a study Wahyu [1] about the relationship of physical condition and characteristics of individuals with incident TB BTA positive in Ciputat health centre South Tangerang City in 2012, earned four variables that have a relationship to the incidence of pulmonary smear positive, namely natural lighting p value (0.010), type of wall p value (0.043), extensive natural ventilation holes p value (0.045), humidity p value (0,040). In addition to the indicators of the environmental factors, lifestyle factors and unhealthy behaviors, nutritional status, as well as socio-economic conditions also played a role as determinants of the incidence of pulmonary TB.

Factor nutritional intake is a risk factor for the incidence of Tuberculosis. Based on research Izzati, Bechar, Nazar; Arsunan, Wahiduddin, Jumriani [2, 3] showed that the nutritional status and home lighting has had a statistically significant relationship with the occurrence of pulmonary TB. Behavior may include terms of knowledge, attitudes and actions. While a healthy housing free Terms of pulmonary tuberculosis are covers lighting, humidity, and temperature sufficient, standard density, type of wall and floor are eligible, as well as adequate ventilation. It is also very important factor of nutritional intake into the study material factor in the incidence of pulmonary TB.

2. Materials and Methods

2.1 Location Research and Types of Research

Location of the study conducted in Jayawijaya Wamena in Papua Province. The consideration is Honai

accompanied their high incidence of pulmonary tuberculosis. This study was an observational analytic study is nested case control.

2.2 Time Research

Research was conducted in March - August 2016

2.3 Population and Sample

The study population was all the people who live in Honai either tested positive or negative of pulmonary TB disease. The research sample was determined by using purposive sampling technique. The sample consisted of 29 cases and 29 controls

2.4 Research Instrument

The instrument will be used in this research is Luxmeter, hygrometer, questionnaires, scales, *microtoise*, SPS sputum, smear staining with Ziehl Neelsen method and the PCR (Polymerase Chain Reaction).

2.5 Data collection technique

Primary data were obtained from the observation through direct measurements in the field, including the number of germs / bacteria, lighting, humidity, temperature and population density in the sampling locations and the data that is the result of questionnaires.

Secondary data were obtained from recording data about people from the district office, village office. Health data obtained from district health offices and health center as well as data on the environmental health of the environmental evaluation documents center for research and development of the environment in 2011 or available.

Data the number of germs on the results of the examination, temperature, humidity measured in Honai. Data individuals with filling out the questionnaire, the results of weighing and height measurement. The data have been obtained is then used to calculate the potential risk of bacteria (Mycobacterium Tuberculosis) in Honai.

2.6 Data Processing Techniques

Perform univariate analysis, conducted bivariate analysis, using the Chi-square test for the bivariate analysis between variables, select the variable that will go a multivariate analysis, conducting multivariate analysis Logistic Regression by way Backward Lr, make the equation logistic regression, assess the significance statistically with a view p values and confidence intervals of the OR, to interpret the OR, assess the clinical significance by comparing the OR obtained as expected, judging equation based calibration through the test of Hosmer and Lomeshow.

Assess the quality of the regression equation based discrimination through ROC Curve analysis with regard

Area Under the Curve (AUC).

3. Research Results

Relationship between the Demographic and Socio-economic characteristics with incidence of pulmonary TB Transmission

Table 1: Relations Demographic and Socio-economic characteristics with incidence of pulmonary TB Transmission

No	Variables	TB occurrence				*p*
		Positive		Negative		
		n	%	n	%	
1	Age					
	10-20 year	1	3,4	1	3,4	
	21-30 year	14	48,3	7	24,1	0,292
	31-40 year	8	27,6	12	41,4	
	41-50 year	6	20,7	9	31,1	
	Number	29	100	29	100	
2	Education					
	Basic & Med s	16	55,2	11	37,9	
	High s	13	44,8	18	62,1	0,188
	Number	29	100	29	100	
3	Occupation					
	Farmer	20	69,0	15	51,7	0,180
	Company emp.	9	31,0	14	48,3	
	Number	29	100	29	100	
4	Expenditure					
	< Rp. 290.000	20	69,0	12	41,4	0,035
	> Rp. 290.000	9	31,0	17	58,6	
	Number	29	100	29	100	

Based on Table 1 shows that the incidence of transmission of the most positive pulmonary TB in the age range 21-40 years (p = 0.292), 55% positive at primary and secondary school education (p = 0.188), as many as 69.0% were positive on farm work (p = 0.180) and 69.0% in the samples with expenditure <IDR. 290.000. Based on the test results Chi_Square statistics show that spending significant relationship with the incidence of transmission of pulmonary TB in Jayawijaya Wamena Papua (p = 0.035).

2. Variable Behavior Relationships with the incidence of transmission of pulmonary TB

Table 2: Relationship Variable Transmission Genesis Behavior with pulmonary TB

No	Variables	TB occurrence				*P*
		Positive		Negative		
		n	%	N	%	
	Knowledge					
1	Less	18	62,1	4	13,8	
	Good	11	37,9	25	86,2	0,000
	Number	29	100	29	100	
	Attitude					
2	Less	17	58,6	6	20,7	
	Good	12	41,4	23	79,3	0,003
	Number	29	100	29	100	
	Action					
3	Less	16	55,2	9	31,0	
	Good	13	44,8	20	69,0	0,063
	Number	29	100	29	100	
	Night activity					
4	Yes	9	31,0	4	13,8	
	No	20	69,0	25	86,2	0,115
	Number	29	100	29	100	

Research shows that there is a 62.1% incidence of transmission of knowledge is less experienced positive pulmonary TB with Chi-Square test results obtained by value p = 0.000 (p <0.05), which means a significant relationship. The results showed 55.2% experienced a lack of pulmonary TB transmission events with the results of Chi-square test p = 0.003 (p <0.05).

It was also found 55.2% less action experience of positive pulmonary TB transmission with the results of Chi-square test p = 0.063 (p> 0.05).

The study also found 31% positive in those who have evening activities with the results of Chi-square test p = 0.115 (p> 0.05)

3. Description of the Physical Environment Variables Honai

Table 3 Description of the Physical Environment Variables Hona

Table 3: Physical Environmental condition of Honai and the tribe

No	Physical Environmental	Tribe				Total
		Wamena		Paniai		
		n	%	n	%	
1	Lighting					
	Less	52	89,7	6	10,3	58
	Good	0	0,0	0	0,0	0
	Number	52	89,7	6	10,3	58
2	Morning moisture					
	Less	6	100	0	0,0	6
	Good	46	88,5	6	11,5	52
	Number	52	89,7	6	10,3	58
3	Afternoon moisture					
	Less	0	0,0	0	0,0	0
	Good	52	89,7	6	10,3	58
	Number	52	89,7	6	10,3	58
4	Night moisture					
	Less	44	88,0	6	12,0	50
	Good	8	100	0	0,0	8
	Number	52	89,7	6	10,3	58
5	Temperature					
	Less	52	89,7	6	10,3	58
	Good	0	0,0	0	0,0	0
	Number	52	89,7	6	10,3	58
6	Pop density					
	High	52	89,7	6	10,3	52
	Low	0	0,0	0	0,0	6
	Number	52	89,7	6	10,3	58

Table 3 shows that 100% in poor lighting conditions (in Wamena tribe and Paniai), moisture morning both categories as much as 88.5% in Wamena tribe and 11.5% in Paniai tribe, humidity during both categories as much as 89.7% in Wamena tribe and 10.3% in Paniai tribe, humidity evening unfavorable category as much as 88.0% in Wamena tribe and 12.0% in Paniai rate, temperature less category as much as 89.7% in Wamena tribe and 10.3% in Paniai tribe and a high population density as much as 89.0% in Wamena tribe and 10.3% in Paniai tribe.

4. Description of Genesis Examination Results Pulmonary TB transmission

Table 4: Description of Examination incidence of pulmonary TB transmission

No	Examination	PCR		Total
		Positive	Negative	
1	Positive BTA	5 (a)	2 (b)	7 (a+b)
2	Negative BTA	24 (c)	27 (d)	51 (c+d)
Total		29 (a+c)	29 (b+d)	58

Table 4 describes as follows:

Sensitivity = a / (a + c) = 0.208333

Specificity = d / (b + d) = 0.931034

Positive predictive value = a / (a + b) = 0.714286

Negative predictive value = d / (c + d) = 0.529412

Positive likelihood ratio = sensitivity / 1-spesivity = 3.020833

Negative likelihood ratio = 1-sensitivity / spesivity = 0.850309

5. Multivariate Analysis

Table 5: Results Logistic regression analysis methods Backward LR all variables (Variables in the Equation)

No	Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 5[a]	Education (1)	2.229	.954	5.459	1	.019	9.292	1.432	60.284
	Expenditure (1)	1.896	.831	5.204	1	.023	6.659	1.306	33.950
	Knowledge (1)	1.758	.797	4.869	1	.027	5.803	1.217	27.665
	Attitude (1)	1.904	.881	4.677	1	.031	6.716	1.195	37.733
	Action (1)	1.990	.858	5.383	1	.020	7.319	1.362	39.328
	Constant	-5.437	1.594	11.639	1	.001	.004		

Table 5 describes it as follows:

a. make the equation

We can make the final model equation logistics regression

$y = a + \beta 1x1 + ... + \beta iXi$

y = -5437 + 2,229 Education (1) + 1,896 Income (1) 1,758 + Knowledge (1) + 1.904 Attitude (1) + 1.990 Measures (1)b. Assessing the statistical significance with p values and confidence intervals of the OR Wald test p value of all the coefficients <0.05. In the range of the confidence interval of each variable OR no figure 1. It can be concluded that the variables of education, income, knowledge, attitudes and actions are variables significantly associated with the incidence of pulmonary TB transmission.

c. Interpretation of the OR

OR value of 9.292 means the odds education subjects low education (primary and secondary school) for the occurrence of disease Pulmonary TB is 9.292 times the odds of higher education (SLTA). OR value of 6.659 means the odds earnings subject of low income (<Rp. 280,000) for the occurrence of disease Pulmonary TB is 6.659 odds higher income (> Rp.280.000). OR value of 5.803 means the odds subject knowledge less knowledge of disease Pulmonary TB is 5.803 times ODSS good knowledge. OR value of 6.716 means the odds attitude is less subject to occurrence of disease Pulmonary TB is 6.716 times the odds of a good attitude. OR value of 7.319 means the odds measures less action subject to the occurrence of disease Pulmonary TB is 7.319 times the odds of good action.

d. Assessing the clinical significance OR minimal in this study was 2.0. In this research, OR smallest obtained was 5.803 greater than minimal OR desired. Thus, clinically, the relationships between all the variables with pulmonary TB disease is significant.

e. Assess the quality of the regression equation based calibration

Table 6: Results of Hosmer and Lemeshow Test

Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	9.104	8	.334
2	7.018	8	.535
3	8.063	8	.427
4	8.082	8	.426
5	7.289	8	.506

base on table 6, the p-value was 0.506. This means there is no difference between the observed and expected values. Thus, the equation is obtained calibrated properly

f. Assess the quality of the regression equation based discrimination

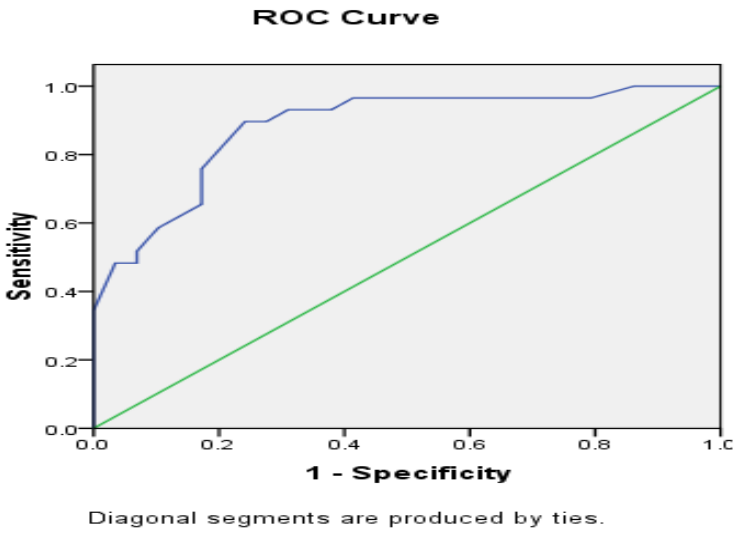

Figure 1: ROC Curve

Table 6. Values Tea Area Under the Curve Test Result Variable (s): Predicted probability

Table 6: Value of Area Under the Curve

No	Area	Std. Error[a]	Asymptotic Sig.[b]	Asymptotic 95% Confidence Interval	
				Lower Bound	Upper Bound
1	.881	.045	.000	.793	.969

Sumber: Data Primer, 2016

Area No. Std. Error a Sig.b asymptotic asymptotic 95% Confidence Interval Lower Bound Upper Bound 1 .881 .045 .000 .793 .969

Area Under the Curve (AUC) of 88.1% (CI 95%: 79.3% - 96.9%). Statistically, therefore, the p-value less than 0.05 and the confidence interval of AUC there is no figure of 50%, the null hypothesis is rejected. Thus, statistically AUC from the regression equation significant different from the reference line. Judging from the magnitude of the AUC, AUC values, including strong. AUC values are clinically meaningful.

4. Discussion

1. Demographic factors (age and Parts)

a. Age

Positive pulmonary TB incidence of transmission of the highest in the age range 21-40 years (p = 0.292). The results of this study have the meaning that the age variable is not related to pulmonary TB transmission in the community dwellers Honai in Wamena, Jayawijaya regency in Papua province. The examination regarding compliance in accordance with the results of research Ruditya [4] about the relationship between the characteristics of pulmonary TB patients with sputum examined compliance during treatment. Results The study found that age was not associated with the compliance check sputum during treatment with p = 0.699.

b. tribe

Based on the incidence of transmission of pulmonary TB, the Wamena tribe was positive in 50% and in Paniai tribe with 50%. However, between the cases and controls stay in one Honai, where Honai have the same characteristics of the physical environment so it can not test a relationship or correlation. Variable rate is important to note in relation to the transmission of pulmonary TB because they relate to customs and beliefs of each tribe as one of the cultural factors. Future research needs to explore more and more in touch with the two tribes as research Pratiwi, Roosihermiatie and Hargono [5] about the determinants health culture in the transmission of diseases of pulmonary TB were found norms, stigma society in the area of Pariaman, disease pulmonary tuberculosis as a disease for *Tamakan*, due to use-for other people who are not happy, as evidenced by habit, the behavior of people throwing spit carelessly place. Trust / belief communities in the district of West Lombok NTB that assumed when the former drinking water Kiai Datuk Ismail they will be cured.

2. Socioeconomic Factors

a. Education

Found as many as 55% positive at primary and secondary school education with (p = 0.019), OR = 9.292, IK95% (1.432 to 60.284). In line with research conducted by Sian [6] concerning the analysis of factors associated with recurrence of pulmonary TB (Case Study at BKPM Semarang Year stating that the level of education regarding the recurrence of pulmonary TB with a value of p = 0.046 and OR = 3.889

b. Work

Found as many as 69.0% were positive on the job Tani (p = 0.410), OR = 0.46, IK95% (0.073 to 2.917). Jobs in addition to dealing with the work environment is also related to the income level of the work done. Based on the research results Fitriany [7] About the Risk Factors Associated with Tuberculosis incident found that the level of income related to the transmission of pulmonary TB (p-value = 0.002, OR = 3.169)

c. expenses

Found as much as 69.0% in the samples with expenditure <IDR. 290.000. Based on the statistical test results show that a significant relationship with the incidence of transmission expenses of pulmonary TB in Wamena District Jaya Wijaya Papua (p = 0.023), OR = 6.659, IK95% (1.306 to 33.950). This study is in line with research Fitriany [7] about the risk factors associated with the incidence of Tuberculosis stating that family income is associated with the incidence of Tuberculosis (p value = 0.002, OR = 3.169).

3. Behavior

a. Knowledge

62.1% found the incidence of transmission of knowledge is less experienced positive pulmonary TB (p = 0.027), OR = 5.803, IK95% (1.217 to 27.665). Knowledge includes what is known by someone on the ways health care, such as knowledge of pulmonary TB, factors related to pulmonary TB, health care facilities and know-how to avoid the disease. Wahyuni research results [8] on the determinants of people's behavior in the prevention of disease transmission pulmonary TB in Bendosari health centre showed no effect or a significant relationship between knowledge and prevention of transmission of disease Pulmonary TB (p = 0.000).

b. Attitude

Found 55.2% less attitude experienced incidence of pulmonary TB infection (p = 0.031), OR = 6.716, IK95% (1.195 to 37.733). Attitude include an assessment by a person on the ways health care, such as attitudes about the disease Pulmonary TB, attitudes toward factors related pulmonary TB transmission, attitudes towards health care facilities and the attitude to avoid the disease. Wahyuni research results (2008) [9] on the determinants of people's behavior in the prevention of disease transmission pulmonary TB in Bendosari health centre showed no effect or a significant relationship between attitudes to the prevention of transmission of disease Pulmonary TB (p = 0.000).\

c. Action

Found 55.2% less action experienced something positive pulmonary TB transmission with (p = 0.020), OR = 7.319, IK95% (1.362 to 39.328). The study also found 31% positive in those who have evening activities (p = 0.115), OR = 2.961, IK95% (0.322 to 27.203). Measures include a person's actions on the ways health care, such as action against pulmonary TB disease transmission, action on related factors of pulmonary TB, action on health care facilities and the attitude to avoid the disease.

Attitudes related to the behavior itself in the results Fibriana [9] about the relationship between attitudes and behavior of families regarding the prevention of infectious diseases of tuberculosis showed that the Spearman's Rho test results obtained by the Sig. (2-tailed) or p value 0,000 (for p value <0.05), which means there is a relationship between attitudes to family behavior regarding the prevention of infectious diseases of pulmonary TB in Wringianom health centre Gresik. Spearman correlation coefficient value of 0.767, which means indicates that the direction of a positive correlation with the strength of a strong correlation.

d. Nutritional Status (IMT and Nutrition)

Based on the results of the study found 55.2% BMI less experienced positive events malaria (p = 0.272), OR = 2.290, IK95% (0.523 to 10.027) and 82.8% occurred at a frequency of 2 meals with value (p = 0.466 , OR = 2.033, IK95% (0.328 to 12.576). the results Elvina Naidoo [10] from the center of nutrition regional university of Indonesia stated that the number of patients with pulmonary TB with the problem of shortage or excess nutrients in adults (18 years and over) is an important issue , because in addition to having the risk of the disease - a particular disease, it can also affect productivity. the study concluded that people with lung TB largely malnutrition (BMI <18, 5kg / m2) [10]. Research Rukmini and Chatarina [11] about the factors that influence the incidence of transmission of pulmonary TB. In Indonesia (Basic Health Research Data Analysis Year 2010) [12] found that the nutritional status influenced the incidence of pulmonary TB nutritional status (OR = 2.101, p = 0.009)

5. Conclusions and Recommendations

5.1. Conclusion

1. There was no relationship demographic factors (age and ethnicity) on the risk of pulmonary TB transmission in the community dwellers Honai in Jayawijaya Wamena in Papua Province.
2. There is a relationship socioeconomic factors (education and expenditure) on the risk of TB transmission in the community dwellers Lung Honai in Jayawijaya Wamena in Papua Province.
3. There is a relationship behaviors (knowledge, attitude and action) against pulmonary TB transmission in the community dwellers Honai in Jayawijaya Wamena in Papua Province.
4. There was no relationship Nutritional Status (IMT and Nutrition) against pulmonary TB transmission in the community dwellers Honai in Jayawijaya Wamena in Papua Province.
5. Establishment of a model capable of describing the relationship of risk factors on the incidence of pulmonary TB transmission in the community dwellers Honai in Jayawijaya Wamena in Papua Province. Based on the results of multivariate analysis, it can be obtained by the model equations: Y = -5437 + 2,229 Education (1) + 1,896 Income (1) 1,758 + Knowledge (1) + 1.904 Attitude (1) + 1.990 Measures (1)

5.2 Recommendations

1. Practical: the model equations that include variables of education, income, knowledge, attitudes and actions can be used to combat the incidence of pulmonary TB transmission on the occupants Honai in Jayawijaya Wamena.
2. Science: need to do further research related that this research can be used in all areas of Papua. Needs further research needs to be conducted intervention or treatment tehadap Honai good physical environment in terms of lighting, humidity, temperature and density of occupancy to see changes in the physical environment Honai so that there are variations in the values and statistical test results are good also.

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