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Analysis of Factors Associated with Events *Tuberculosis* (TB) Lungs at Dr H Koesnadi Bondowoso Regional Hospital

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Abstract
Introduction : Tuberculosis (TB) has become an epidemic in the world and is the main cause of death from infectious diseases. Because the transmission of pulmonary TB infection is easily transmitted to other people, which occurs when a person inhales droplet nuclei containing mycobacterium tuberculosis organisms released by someone who is infected with pulmonary TB. Because the transmission of pulmonary TB infection is easily transmitted to other people, this is can also be caused by several causative factors such as age, knowledge, environment, history of direct contact with pulmonary tuberculosis (TB) patients, and smokers.Methods: this study uses a correlational design that is used to find the relationship between two variables, which uses a cross-sectional approach. Cross-sectional design is a data collection method used to compare several different variables at. the same timeResults: The results showed that of the five independent variables, all of them Had a relationship with the dependent variables: knowledge (OR=5.48416),Direct contact with patients (OR=3.7278) , environment (OR=3.4097), smokers (OR=0.894) Conclusion: There are 5 variables related to the incidence of pulmonary tuberculosis, between age, knowledge, environment, direct contact with pulmonary tuberculosis patients and smokers whose most dominant relationship is knowledge, the results of research that have been done later can increase the level of knowledge and several other factors that trigger a person to deal with a health problem with pulmonary tuberculosis.

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1. INTRODUCTION

In human history,the war was against infectious diseases *tuberculosis* lungs, there is disconnection thousands of years ago already attacked the population of its time. Until now *Tuberculosis* (TB) remains an epidemic in the world as well as a major cause of deat from an infectious disease. Because this pulmonary TB infection is easily transmitted to o ther people, which occurs when a person inhales nuclei droplets that contain the organism *mycobacterium tuberculosis* excreted by someone infected with pulmonary TB.

Globally, the incidence of tuberculosis is still high, in 2020 WHO estimated that 10 million were infected, in 2021 it reported TB cases of 10.6 million. In Indonesia, tuberculosis is a major public health problem. and is the country with the 2nd largest number of TB patients in the world after India[7]. There are a total of 420,994 cases of pulmonary TB in Indonesia in 2021[8] . East Java Province is ranked 2nd in Indonesia with the number of TB cases reaching 23,487 cases. and the Bondowso region is ranked 11th with a total of 922 cases.

TB is an infectious disease that spreads very quickly, because it is through inhalation and makes this disease a public health problem, especially in developing countries, if one family member is infected with TB then the other family members have a high chance of being infected. There are various previous studies, Mathofani, (2020) concluded that there is a relationship between the level of knowledge and the incidence of pulmonary TB[15]. Meanwhile, according to Budi et al, (2018) there is a statistically significant relationship between the sanitation of the housing environment (condition of the roof, walls and floor

of the house) and the incidence of pulmonary tuberculosis.[11] **.** Meanwhile, according to Darmin et al (2020), there is a significant relationship between history of contact with pulmonary tuberculosis patients.

2. METHOD

This research design uses a correlational design which is used to look for the relationship between two variables, which uses *cross sectional*. Design *cross sectional* is a data collection method that is used to compare several different variables at the same time. The population in this research is all TB patients undergoing treatment at the Koesnadi bondo woso RSUD, which numbers 120 patients from January – June 2023 in the pulmonary inpatient ward. The instrument in this research uses a questionnaire. A questionnaire or also often called a questionnaire is a data collection method that is carried out by giving or asking a set of questions or written statements to respondents to answer.

3. RESULTS AND DISCUSSION

Respondent Characteristics

1. Univariate Analysis

In this section, the characteristics of the 120 respondents will be described based on age and gender.

Table of Characteristics of Pulmonary Tuberculosis Patients at Dr H Koesnadi Bondowoso Regional Hospital, Based on Age

	Category	Frequency	Percentage(%)
Age	**15-30 years**	**15**	**12,5**
	31-45 years old	**45**	**37,5**
	46-60 years old	**60**	**50**
Total		**120**	**100,0**

Based on the results of the research, it is clear that the majority of pulmonary tuberculosis sufferers at RSUD Dr.) and aged 15-30 years were 15 respondents (12.5%)

Characteristics of Pulmonary Tuberculosis (TB) Patients at Dr H Koesnadi Bondowoso Regional Hospital, Based on Gender Koesnadi Bondowoso, Based on Gender

	Category	Frequency	Percentage(%)
Type	**Male Female**	**78**	**65**
sex		**42**	**35**
Total		**120**	**100,0**

From the table above, it is clear that pulmonary tuberculosis (TB) sufferers at Dr.

2. Bivariate Analysis

A. Identifying the Relationship between Age and Events *Tuberculosis* (TB)

Lungs at Dr H Koesnadi Bondowoso RSUD
Which were analyzed using tests *Rank Spearmen*.

The Relationship between Knowledge Level and the Incidence of Pulmonary Tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital

Correlation Test	Variable	Correlation Coefficient	P Value
Rank Spearman	Age	0,295	0,003
	Sample	120	

Based on the research results, it can be explained that the results of the analysis between the age factor and blood pressure obtained a P value (0.003) < 0.05, which means there is a significant relationship between the age factor and the incidence of pulmonary tuberculosis (TB) at the Koesnadi Bondowoso Regional Hospital, and the Correlation Coefficient value obtained (0.295) which means the level of correlation is weak between the age factor and the incidence of pulmonary tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital.

B. Identifying the relationship between knowledge level and the incidence of tuberculosis (TB) Lungs at Dr H Koesnadi Bondowoso Regional Hospital which were analyzed using tests *Rank Spearmen*)

Table of the relationship between knowledge level and the incidence of pulmonary tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital

Test Correlation	Variable	Coefficient Correlation	P Value
Rank Spearman	Knowledge	0,776	0,000
	Sample	120	

Based on the table, the values are obtained *themselves* (0.000) which means there is a significant relationship between the level of knowledge and the event of tuberculosis (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. And get a *Correlations coefficient* (0.776) which means a high level of correlation between the level of knowledge and events of tuberculosis (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.

C. Identifying Environmental Relationships to Events *Tuberculosis* (TB) Lungs at Dr H Koesnadi Bondowoso Regional Hospital which were analyzed using tests *Rank Spearmen*)

Table of Environmental Relationships to the Incidence of Tuberculosis (TB) Lungs at Dr H Koesnadi Bondowoso Regional Hospital

Test Correlation	Variable	Coefficient Correlation	P Value.
Rank Spearman	Environment	0,964	0,000
	Sample	120	

Based on table 5.4, the values obtained *themselves* (0.000) which means there is a significant relationship between the environment and the event *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. And get value *Correlations coefficient* (0.964) which means the level of correlation is very high between the environment and the event *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital

D. Identifying the Relationship between History of Contact with Pulmonary TB (TB) Patients and Events *Tuberculosis* (TB) Lungs at Dr H Koesnadi Bondowoso Regional Hospital which were analyzed using tests *Rank Spearmen*)

Table of the Relationship between History of Contact with Pulmonary TB Patients and the Incidence of Pulmonary Tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital

Test Correlation	Variable	Coefficient Correlation	P Value.
Rank Spearman	Contact history with patient *Tuberculosis* (TB) published	0,259	0,004
	Sample	120	

Based on table 5.5, the values obtained *themselves* (0.004) which means there is a significant relationship between the history of contact with TB patients and the incidence of tuberculosis lungs. And get Correlations *coefficient* (0.259) which means the level of correlation is very low between the history of direct contact with the patient *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.

E. Identifying the relationship between smokers and events of tuberculosis Lung (TB) at RSUD Dr H Koesnadi Bondowoso which was analyzed using tests *Rank Spearmen*).

Table of the Relationship between Smokers and the Incidence of Pulmonary Tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital.

Test Correlation	Variable	Coefficient Correlation	P Value.
Rank Spearman	Smoker	0,254	0,005
	Sample	120	

Based on the table, the values are obtained *themselves* (0.005) which means there is a significant relationship between smokers and the incident *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. And get value *Coefficient* Correlations (0.254) which means the level of correlation is very low between smokers and the incidence of pulmonary tuberculosis (TB) at Dr H Koesnadi Bondowoso Regional Hospital.

3. Multivariate Analysis Using Logistic Regression

A. Model Fit Test Analysis

Tabel Model Summary (x1,x2,x3,x4)

Step	Chi-Square	Df	Significance
1	4,578	7	0,001

H0 : Suitable model

H1 : The model does not match

H0 rejected if p < α. Based on the output results in table 5.7, it can be seen that the chi-square value = 4.578. Because the p value (0.001) is greater than the significance level α = 0.05 (p>0.05), it can be concluded that the model is appropriate. This means that perceived severity, perceived benefits, cues to action and self-efficacy contribute significantly to the odds ratio of diet compliance & taking hypertension medication, because the logistic model is appropriate. So, it can be concluded that this model is suitable to be used to predict the chances of hypertension sufferers complying with treatment.

B. **Parameter Significance Test**

1) Coefficient of Determination Test

Tabel Model Summary (x1,x2,x3,x4)

Step 1	-2Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	12,753	0,477	0,900

Based on the output results in table 5.8, it can be seen that the G value is 12.753. Then the Nagelkerke R Square value was obtained at 0.900, which means that the independent variables (Knowledge, Environment, History of direct contact with patients and smokers) were able to explain 90% of the dependent variable for the incidence of pulmonary tuberculosis (TB), and the remaining 10% was explained by other factors.

2) Uji F

According to Vikaliana (2022) to test the influence of independent variables simultaneously or together on the dependent variable, by looking at the significance value of the table *Omnibus Test ofModel Coefficients*

Tabel Omnibus Test of Model Coefficients (x1,x2,x3,x4)

Step 1	Chi-Square	Df	Significance
Step Block Model	77,672	4	0,000
	77,672	4	0,000
	77,672	4	0,000

Based on the output results in Table 5.21, it can be seen that the chi-square value obtained is 77.672 with degrees of freedom = 4, p value = 0.000. Because the p value = 0.000 < α = 0.05, H0 is rejected and H1 is accepted, meaning that knowledge, environment, history of direct contact with patients and smoking influences the incidence of pulmonary tuberculosis (TB).

3) Uji T

According to Vikaliana (2022), to partially test the influence of independent variables on the dependent variable is to look at the table *Variables in the Equation.*

Tabel Variable in the Equation

	B	H.E.	Forest	Df	Say.	Exp(B)
Step 1						
Knowledge	38.543	0.5673	0.993	1	0.000	5.48416
Environment	17.345	0.1323	0.996	1	0.000	3.4097
Contact with patients	19.736	0.1323	0.995	1	0.000	3.7278
Smoker	-.112	1.502	0.941	1	0.006	0.894
Constant	-131.761	1.7014	0.994	1	0.000	0.000

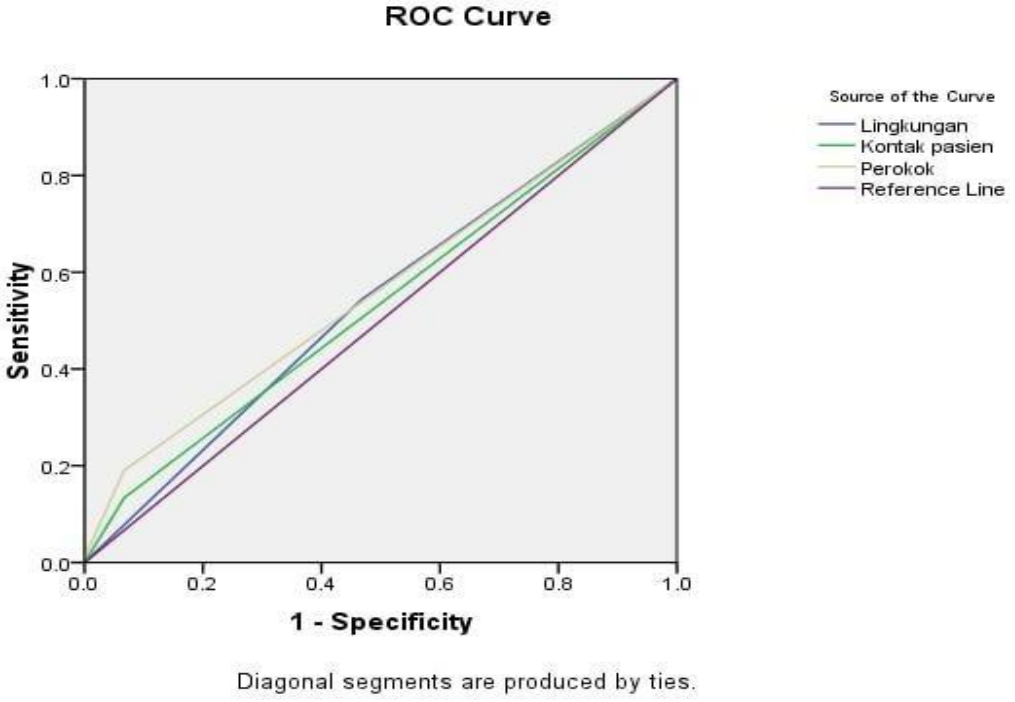
The table shows that there are 3 independent variables that influence the dependent variable, namely the Knowledge variable with a sig value of 0.000 < 0.05, the Environmental variable with a sig value of 0.000 < 0.05, the variable direct contact with patients with a sig value of 0.000 < 0.05 , and the smoking variable has no influence on the dependent variable because the sig value is 0.006 > 0.05. Meanwhile, of the 4 independent variables: knowledge, environment, direct contact with TB patients, smokers, only the variable "Knowledge" has the most dominant influence on the dependent variable *tuberculosis* lungs, this can be seen from the Exp(B) value of 5.48416 which is greater than the other 3 variables (environment, direct contact with TB patients, and smokers)

4) Classification Accuracy

Tabel Classification Table

Observed		Predicted		
		Tuberculosis		Percentage Correct
		Sufferer	Symptom	
Step 1 Tuberculosis	Sufferer	104	1	87,5
	Symptom	2	13	12,5
Overall Percentage				87.5

Based on the table, the number of respondents and sufferers is known as tuberculosis lungs of 105 respondents, prediction of 87.5%. Meanwhile, the



number of respondents who had symptoms of pulmonary tuberculosis was 15 respondents, predicted to have a low chance of having tuberculosis symptoms with a prediction correctness level of 12.5%, so that the percentage accuracy of the model that could predict correctly was 83.3% ROC Curve *(Receiver Operating Characteristic)*

Tabel 5. 13 ROC curve

Test result variable (s)	Area	Std. Error	Asymptotic Sig.	Asymptotic 95% Confidence Interval	
				Lower Bund	Upper Bound
Knowledge	0,620	0.082	0,000	0,459	0,781
Environment	0,543	0.082	0,000	0,381	0,705
Contact with px	0,462	0.077	0,000	0,310	0,614
Smoker	0,445	0.079	0,000	0,291	0,599

Table 5. 14 Interpretations of AUC Values

AUC value	Interpretation
>50% - 60%	Very weak
>60% - 70%	Weak
>70% - 80%	Currently
>80% - 90%	Strong
>90% - 100%	Very strong

(Source: Dahlan, 2014)

From the table above it can be explained that the AUC value of the variable x1 *(0,620)* which means a medium level of accuracy, while the variable x2 *(0,543)* x3 *(0,462)* and x4 *(0,442)* which means the level of accuracy of the entry.

Discussion

1. **Relationship between age and the incidence of pulmonary tuberculosis (TB) at Koesnadi Bondowoso Regional Hospital**

   The results of the analysis between the age factor and pulmonary tuberculosis showed a P value (0.003) < 0.05, which means there is a significant relationship between the age factor and the incidence of tuberculosis. And the Correlation Coefficient value was obtained (0.295), which means the level of correlation is weak between age and the incidence of pulmonary tuberculosis. at Koesnadi Bondowoso Regional Hospital. TB patients are in the productive age group and pulmonary TB is often found in the productive age group of 15-55 years; the immunological system declines so they are very vulnerable to all diseases including pulmonary TB.

2. **Relationship between level of knowledge and events *Tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.**

   Research results show perceived knowledge is not related to obtained values *themselves* (0.000) < 0.05 which means there is no relationship between the level of knowledge and the event *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. And get value *Correlations coefficient* (0.776) which means the level of correlation is very low between the level of knowledge and events *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. Which means there is a correlation that is in accordance with what is in the research. In other words, there is a significant correlation between test results and the level of knowledge in pulmonary tuberculosis patients.

3. **The relationship of the environment to events *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.**

   The research results show that there is a relationship between the environment and events tuberculosis value is obtained *themselves* (0.000) < 0.05 which means there is a significant relationship between the environment and the event *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital and obtained values *Correlations*

coefficient (0.964) which means the level of correlation is very high between the environment and the event *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.

4. The relationship between history of contact with pulmonary TB patients and the incidence of tuberculosis (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.

The research results show that there is a relationship between the environment and events where tuberculosis value is obtained *themselves* (0.004) < 0.05, which means there is a significant relationship between direct contact with TB patients and the incidence of pulmonary tuberculosis. And get a *Correlations coefficient* (0.259) which means the correlation level is very low between direct contact with TB patients and the incidence of pulmonary tuberculosis at Dr H Koesnadi Bondowoso Regional Hospital.

5. **Relationship of smokers to events *tuberculosis* (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital.**

The results of the research show that there is a relationship between smoking and the incidence of tuberculosis (TB). *themselves* (0.005) < 0.05 which means there is a meaningful relationship between smokers and tuberculosis (TB) lungs at Dr H Koesnadi Bondowoso Regional Hospital. And get the *correlation coefficient* (0.254) which means the correlation level is very low between smokers and the incidence of pulmonary tuberculosis (TB). In this study, smoking was a factor related to the occurrence of pulmonary tuberculosis at Dr H Koesnadi Bondowo Regional Hospital.

4. CONCLUSION

Based on the results of the research that has been carried out, it can be concluded that there is a relationship between several factors with the occurrence of health problems with pulmonary tuberculosis carried out at Dr. H Koesnadi Bondowoso Regional Hospital.

1. There is a significant relationship between age and the incidence of pulmonary tuberculosis (TB) at Dr. H Koesnadi Bondowoso Regional Hospital, the relationship is very low.
2. There is a significant relationship between knowledge and the incidence of pulmonary tuberculosis (TB) at Dr. H Koesnadi Bondowoso Regional Hospital.
3. There is a significant relationship between the environment and the incidence of pulmonary tuberculosis (TB) at RSUD Dr. H Koesnadi Bondowoso. The relationship is very high.
4. There is a significant relationship between the history of direct contact with the patient *tuberculosis* (TB) with the incidence of pulmonary tuberculosis (TB) in Dr. H Koesnadi Bondowoso Regional Hospital, the relationship is moderate
5. There is a significant relationship between smoking and the incidence of pulmonary tuberculosis (TB) at RSUD Dr. H Koesnadi Bondowoso. The relationship is low.

Of the five independent variables studied in a multivariate manner, it was found that the knowledge variable was the most dominant in the event *tuberculosis* Pulmonary TB (TB) at Dr.H Koesnadi Bondowoso Regional Hospital is low

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