

# RELATIONSHIP OF INDIVIDUAL CHARACTERISTICS AND BEHAVIOR WITH THE TUBERCULOSIS PREVALENCE IN KUPANG CITY

Wanti Wanti<sup>1\*</sup>; Ety Rahmawati<sup>1</sup>; Sisilia Leny Cahyani<sup>1</sup>; Debora G Suluh<sup>1</sup>; Enni Rosida Sinaga<sup>1</sup>; Agustina Agustina<sup>1</sup>; Siprianus Singga<sup>1</sup>

<sup>1</sup> Poltekkes Kemenkes Kupang ; NTT Province, Indonesia  
trivena78@yahoo.com

## ABSTRACT

It is estimated that one-third of the world's population has been infected by TB germs, and Indonesia is in the top 3<sup>rd</sup> ranks with the most cases in the world. Many factors are associated with the incidence of TB so this study aims to determine the factors associated with the incidence of Tuberculosis. This analytic observational study used a case-control study design. The study was carried out in Kupang City in 2021. The case sample was 75 cases of TB patients undergoing treatment during the study, while the control sample was 75 non-TB patients around the control house. The dependent variable was the tuberculosis prevalence, while the independent variable was age, gender, knowledge, attitude, smoking habits, cigarettes per day. The data were collected by interview and then the data were analyzed by univariate and bivariate by chi square test. This study found variables related to the incidence of TB, namely knowledge (p 0.049 <0.05; OR 2.03; 95% CI: 1.056 – 3.909), attitude (p 0.001 <0.005; OR 3.50; 95% CI: 1.695–7.228), smoking behavior (p 0.000 <0.005; OR 4,447; 95% CI: 2.174 – 9.094), and smoking 10 cigarettes per day (p 0.000 <0.05; OR 7.731; 95% CI: 3.265-18.302) . While the variables that are not related to the incidence of TB are age (p 0.513 >0.05, 95% CI: 0.403-1.454) and gender (p 0.250 >0.05; C 95%: 0.338-1.239). The greatest risk of tuberculosis is smoking behavior >10 cigarettes per day, namely 7.731 and followed by smoking and attitude variables, while lack of knowledge has the lowest risk of suffering from tuberculosis, which is 2.032. It is necessary to intensify outreach to the community to increase knowledge and attitudes in preventing tuberculosis transmission and counseling about the impact of smoking on the risk of tuberculosis incidence so that it is expected to reduce the number of smokers and the number of TB cases in the community.

**Key Words:** Tuberculosis; Knowledge; Attitude; Smoking

## Introduction

Tuberculosis (TB) is caused by the bacterium *Mycobacterium tuberculosis*, and is still a global public health problem (Kemenkes RI, 2019). It is estimated that one-third of the world's population has been infected by TB germs, with cases and deaths due to TB being found in many developing countries, including Indonesia (Kemenkes RI, 2017).

TB patients are mostly found in the productive age, namely 15-50 years of age. This causes TB patients to become unproductive because they lose some of their working time 3-4 months a year and lose 20-30% of income each year, and lose 15 years for patients who die. Globally,

TB cases in Indonesia are ranked 3rd after India (27%), and China (9%). Ranked in the top 3 in the world because Indonesia accounts for 8% of all cases in the world or around 845,000 cases, followed by the Philippines (6%), Pakistan (5%), Nigeria (4%), Bangladesh (4%) and South Africa (3%). The high number of cases means hard work is needed to reduce cases and achieve TB elimination by 2030 and Indonesia to be free of TB in 2050 (Kemenkes RI, 2017, 2019).

The estimated absolute number of TB in NTT in 2019 is 7,137 cases with the Case Notification Rate still low at 131 cases per 100,000 population, and this CNR is still low compared to the national figure of 197 cases per 100,000 population (Kemenkes RI, 2020). Based on the NTT Provincial Health Office (2018), the highest notification rate in NTT in 2017 was in Kupang City with the CNR of all TB cases being 127.53 per 100,000 population (Dinkes Provinsi NTT, 2019, 2020).

Various steps have been taken by the government in efforts to prevent and control TB, but TB cases in Indonesia continue to increase, including in the Province of NTT and the City of Kupang. TB prevention will be more effective if the risk factors that play a role in the incidence of TB in an area are known. In general, the main causes of increasing TB cases are poverty, failure of TB programs, demographic changes and also the impact of the HIV pandemic. In addition to these factors, there are other factors such as public knowledge about TB and its prevention, home conditions and environmental factors and other factors. All of these factors are interrelated, causing the TB problem to continue to exist and the more complex prevention and intervention steps that must be taken. This study aims to determine the relationship between individual characteristics and behavior with the incidence of TB.

## **Methods**

This research is an analytic observational study with a case control study design, which is a study that compares groups of patients and non-patients to look for determinants of TB incidence in the past (at the time before being diagnosed with TB) or also called a retrospective study. The study was conducted in Kupang City, East Nusa Tenggara Province in 2021. The case sample was TB patients who were undergoing treatment at the time of the study and the sample size was based on Lwanga and Lemenshow, so the case sample size was 75 TB patients. Control samples were non-TB patients who lived near TB patients (neighbors) as many as 75 people. The inclusion criteria for the case sample were tuberculosis patients who were recorded in the health center register book in 2021 WHO were undergoing treatment at the time the research was carried out, could read and write and were willing to be used as samples for this study. The control inclusion criteria were: not being sick with TB or having never been diagnosed with TB, being able to read and writing and being a neighbor of the case group and willing to be a sample of the study.

The dependent variable is the incidence of tuberculosis, while the independent variables are individual characteristics which include age, gender, knowledge, attitudes, smoking habits, and the number of cigarettes smoked per day.

The research data were obtained by interviewing TB patients and the control group who did not suffer from TB. The analysis was carried out univariate and bivariate. Univariate analysis was conducted to see the frequency distribution of research variables, while bivariate analysis with Chi square test was conducted to see the relationship between variables.

## **Result and Discussion**

This study was conducted on 150 samples consisting of 75 cases (TB patients and 75 controls who were not TB patients who lived around the patient's house in Kupang City. The results of the bivariate analysis on the research variables studied can be seen in Table 1.

**Table 1. Bivariate Analysis of Dependent Variables and Independent Variables with Chi Square Test**

Variable		Kasus	Kontrol	Sig	OR (95% CI)
Age	≥30 years	36 (48.0%)	41 (54.8%)	0.513	0.765 (0.403 – 1.454)
	<30 years	39 (52.0%)	34 (45.3%)		
Sex	Female	38 (50.7%)	46 (61.3%)	0.250	0.647 (0.338 – 1.239)
	Male	37 (49.3%)	29 (38.7%)		
Knowledge	Low	48 (64.0%)	35 (46.7%)	0.049	2.032 (1.056 – 3.909)
	Enough/ Good	27 (36.0%)	40 (53.3%)		
Attitude	Low	35 (46.7%)	15 (20.0%)	0.001	3.50 (1.695 – 7.228)
	Enough/ Good	40 (53.3%)	60 (80.0%)		
Smoking	Yes	41 (54.7%)	16 (21.3%)	0.000	4.447 (2.174 – 9.094)
	No	34 (45.3%)	59 (78.7%)		
Cigarette per day	≥10 per day	36 (48.0%)	8 (10.7%)	0.000	7.731 (3.265 – 18.302)
	<10 per day	39 (52.0%)	67 (89.3%)		

Based on the chi square test, only a few variables were found related to the incidence of TB, namely knowledge, attitudes, smoking behavior, number of cigarettes smoked every day. While the variables of age, and sex are not statistically related to the incidence of tuberculosis

This study found that tuberculosis patients aged 30 years were 48% (36 people) or most were <31 years old, namely 52%) of the total 75 cases of tuberculosis. The p-value is  $0.513 >$ , which means that there is no relationship between age and the incidence of TB. The difference in cases based on gender in tuberculosis patients was only slightly, namely 49.3% male and 50.7% female. This gender difference was not statistically significant, ie p value  $0.250 >$ , which means that there is no relationship between gender and the incidence of TB.

Knowledge in this study found that more TB patients had less knowledge about tuberculosis (64%) than in the non-tuberculosis group, only 46.7% had less knowledge about tuberculosis. Statistically, it was found that there was a relationship between knowledge and the incidence of TB ( $p 0.049 <$ ). The risk for TB disease (OR) for those with less knowledge is 0.492 times compared to those with poor knowledge or the risk of TB incidence in those with low knowledge is 2.03 times higher than those with good/enough knowledge, as shown in Table 1.

Most TB patients in this study had a sufficient attitude (53.3%), and only 46.7% had a poor attitude towards preventing TB transmission. Based on the chi square test, there was a relationship between this attitude and the incidence of TB ( $p 0.001 <$ ), with the odds ratio for less attitude is 3.50. Some of TB patients were found to be smoking, namely 54.7%, while 45.3% of TB patients smoked when or who had never smoked. Based on the chi square test, it was found that there was a relationship between smoking behavior and the incidence of TB, namely those who smoked had a TB risk of 4.447 times compared to non-smokers ( $p 0.000 < \alpha$ ), as well as those who smoked 10 cigarettes per day had a risk of developing TB 7.731 times. compared to non-smokers or smokers <10 cigarettes per day ( $p 0.000 <$ ).

This study found that those aged  $\geq 30$  years did not differ much from those aged 30 years in both the case group and the control group, and statistically there was no relationship between age and the incidence of TB ( $p < 0.05$ ). In contrast to previous studies where age is associated with the incidence of TB (Pangaribuan, Kristina, Perwitasari, Tejayanti, & Lolong, 2020; Sari & Arisandi, 2018). Likewise, gender in the study was not found to be associated with the incidence of TB ( $P < 0.05$ ). Whereas in previous studies it was also stated that gender was not associated with the incidence of TB (Pangaribuan et al., 2020) and also not associated with the incidence of TB relapse (Jaya & Mediarti, 2017).

This study found that the incidence of TB was related to knowledge, where the risk for the occurrence of TB in the low knowledge group was 2.032 times greater than that of those with good or sufficient knowledge. This means that the better the knowledge, the lower the risk of suffering from TB. This is the same as what was found in previous studies, namely that poor knowledge of mothers causes the risk for children aged 0-14 years to suffer from TB as much as 8.25 times compared to mothers who have good knowledge about TB. (Hamidi, 2011). This shows that with good knowledge, it is hoped that the community will also have good behavior so that it can prevent the transmission of TB both to themselves and to others around them.

Attitudes were also found to be associated with the incidence of TB in this study in Kupang City, where the risk for suffering from TB was 3.50 times for those who had a bad attitude than those with a good attitude. Likewise, in previous studies, it was found that mothers who have negative attitudes in TB prevention increase the risk of children 0-14 years suffering from TB by 12.6 times compared to the risk of children from mothers who have positive attitudes in TB prevention (Hamidi, 2011). A good knowledge and attitude in preventing TB play a role in the risk of TB in someone because with a good knowledge, it is hoped will result in a good attitude, and then with a good attitude, it is hoped that good actions from the community will be formed in preventing TB transmission, so that it can suppress the increase in TB cases in the community.

As with knowledge and attitudes, the action in this study was found to be associated with the incidence of TB, the action among those who smoked had a risk of suffering from TB 4,447 times compared to those who did not smoke with a  $p$  value of 0.000. This study found 54.7% of TB patients were smokers, and this is almost the same as the prevalence of smokers in TB patients in Spain, which is 39.3% (Penas, Mir, Solano Reina, Riesco-Miranda, & Caylá, 2016). Furthermore, this study proved that those who smoked  $>10$  cigarettes per day had a 7.731 times higher risk of developing TB than those who smoked  $<10$  cigarettes per day or did not smoke at all.

This is in accordance with previous research where mothers with negative behavior in TB prevention will increase the risk of children aged 0-14 years suffering from TB by 6.07 times compared to the risk of children with mothers who take positive TB prevention measures. (Hamidi, 2011). More clearly it was found that people who smoke have a risk of suffering from TB is 4,333 compared to people who do not smoke. This shows that the risk of smoking is not protective or does not reduce the risk of suffering from TB but on the contrary, smoking will increase the risk of developing TB (Alnur & Pangestika, 2018). However, several studies have found that smoking is not associated with the incidence of TB nor with the incidence of relapse in TB (Mathofani & Febriyanti, 2020; Pangaribuan et al., 2020).

The effect of smoking on TB has been widely reported in many studies before, namely that countries with a large number of smokers will find higher TB patients, and failure to cure TB is also found in smokers, so smoking cessation is the most effective intervention in TB prevention and also in increasing cure rates (Hassmiller, 2006; Perriot, Underner, & Peiffer, 2018). For this reason, quitting smoking or staying away from cigarette smoke is highly recommended for the community to be free from TB disease, and this smoking cessation extension should continue to be encouraged on an ongoing basis in all walks of life.

## Conclusion and Suggestion

Variables related to the incidence of TB were knowledge, attitudes, smoking behavior, and the number of cigarettes smoked every day. Meanwhile, the variables of age and sex were not statistically related to the incidence of tuberculosis. The greatest risk for the occurrence of tuberculosis is smoking behavior >10 cigarettes per day which is 7,731 and followed by smoking behavior and attitude variables, while the knowledge variable has the lowest risk of suffering from tuberculosis, which is 2,032.

It is recommended to continue to intensify outreach to the community to increase knowledge and attitudes about tuberculosis, such as about modes of transmission, prevention and good treatment methods. It is necessary to educate about the impact of smoking on the risk of tuberculosis incidence so that it is expected to reduce the number of smokers in the community.

## References

- Alnur, R. D., & Pangestika, R. (2018). Faktor Risiko Tuberkulosis Paru pada Masyarakat di Wilayah Kerja Puskesmas Bambu Apus Kota Tangerang Selatan. *ARKESMAS*, 3(2), 112–117. <https://doi.org/10.22236/arkesmas.v3i2.2929>
- Dinkes Provinsi NTT. (2019). *Profil Kesehatan Provinsi NTT 2018*. Kupang: Dinkes Provinsi NTT.
- Dinkes Provinsi NTT. (2020). *Profil Kesehatan Provinsi NTT 2019*. Kupang: Dinkes Provinsi NTT.
- Hamidi, H. (2011). Hubungan Antara Pengetahuan, Sikap, Dan Perilaku Ibu Tentang Pencegahan Penyakit TB Paru Dengan Kejadian TB Paru Anak Usia 0-14 Tahun Di Balai Pengobatan Penyakit Paru-Paru Kota Salatiga. *Public Health Department Faculty of Sports Science Semarang State University*. Retrieved from <http://lib.unnes.ac.id/608/1/7310.pdf>
- Hassmiller, K. M. (2006). The Association Between Smoking and Tuberculosis. *Salud Pública de México*, 48(3 SUPPL. 1), s201–s216. <https://doi.org/10.1590/S0036-36342006000700024>
- Jaya, H., & Mediarti, D. (2017). Faktor-Faktor yang Berhubungan dengan Tuberkulosis Paru Relaps Pada Pasien di Rumah Sakit Khusus Paru Provinsi Sumatera Selatan Tahun 2015-2016. *JPP (Jurnal Kesehatan Palembang)*, 12(1), 71–82.
- Kemenkes RI. (2017). *Profil Kesehatan Indonesia Tahun 2016*.
- Kemenkes RI. (2019). *Profil Kesehatan Indonesia 2018*. Jakarta: Kemenkes RI.
- Kemenkes RI. (2020). *Profil Kesehatan Indonesia Tahun 2019*. Jakarta: Kemenkes RI.
- Mathofani, P. E., & Febriyanti, R. (2020). Faktor-Faktor Yang Berhubungan Dengan Kejadian Penyakit Tuberkulosis (TB) Paru di Wilayah Kerja Puskesmas Serang Kota Tahun 2019. *Jurnal Ilmiah Kesehatan Masyarakat*, 12(1), 1–10. Retrieved from <https://jikm.upnvj.ac.id/index.php/home/article/download/53/45/>
- Pangaribuan, L., Kristina, K., Perwitasari, D., Tejayanti, T., & Lolong, D. B. (2020). Faktor-Faktor yang Mempengaruhi Kejadian Tuberkulosis pada Umur 15 Tahun ke Atas di Indonesia. *Buletin Penelitian Sistem Kesehatan*, 23(1), 10–17. <https://doi.org/10.22435/hsr.v23i1.2594>
- Penas, A., Mir, I., Solano Reina, S., Riesco-Miranda, J. A., & Caylá, J. A. (2016). Factors Associated with Smoking among Tuberculosis Patients in Spain. *BMC Infectious Diseases*, 16(1), 1–9. <https://doi.org/10.1186/s12879-016-1819-1>
- Perriot, J., Underner, M., & Peiffer, G. (2018). Tuberculosis and Tobaccos Smoking. *Journal of Tuberculosis*, 1(01), 17–22. <https://doi.org/10.1055/s-0041-109601>

Sari, R. P., & Arisandi, R. D. (2018). Faktor-faktor yang Berhubungan dengan Kejadian Penyakit TB Paru di Wilayah Kerja Puskesmas Walantaka. *Jurnal Ilmu Kesehatan Masyarakat*, 07(01), 25–32. Retrieved from <https://journals.stikim.ac.id/index.php/jikm/article/view/49>

