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Analysis of the Economic Burden on Tuberculosis Patients Based on Educational Level in Kupang City

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ABSTRAK

The purpose of this study was to analyze the economic burden on tuberculosis patients based on educational level in Kupang City. Tuberculosis remains a significant public health problem that not only affects physical health but also imposes substantial financial challenges on patients and their families. This study used a quantitative cross-sectional design involving 94 tuberculosis patients from 12 community health centers. Data were collected through structured interviews using validated questionnaires, which included information on direct non-medical costs and indirect costs. Data analysis was conducted using the Kruskal–Wallis test to assess differences based on educational level. The results showed that the average total economic burden was IDR 162,707.45, with indirect costs being the largest component. Patients with lower educational levels tended to experience a higher economic burden compared to those with higher education levels. However, statistical analysis revealed that there was no significant difference in economic burden based on educational level ($p = 0.136$). In conclusion, the economic burden experienced by tuberculosis patients is more strongly influenced by employment status and income level rather than educational background. These findings highlight the importance of providing targeted socioeconomic support and effective health policy interventions to reduce the financial burden on patients and improve treatment adherence and overall health outcomes.

Keywords: Tuberculosis, Economic Burden, Education Level

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INTRODUCTION

Tuberculosis (TB) remains one of the most serious global health problems and is among the leading causes of death from infectious diseases worldwide. Based on the Global Tuberculosis Report 2023, it is estimated that there were 10.6 million TB cases globally in 2022, an increase from 10.3 million cases in 2021, with the highest distribution among men, followed by women and children (1). Indonesia ranks second among countries with the highest TB burden in the world after India, with an estimated 969,000 cases or 354 per 100,000 population in 2021, along with an 18% increase in incidence (2).

At the regional level, TB control in East Nusa Tenggara Province (NTT) still faces significant challenges, as indicated by a case detection rate of 46% and a treatment success rate of 89.7% in 2023, which have not yet met national targets, particularly in Kupang City (3). In addition to its impact on health, TB also imposes a substantial economic burden, especially from indirect costs such as income loss, which can account for more than 50% of household income (4), (5).

National surveys indicate that the largest component of direct non-medical costs comes from the purchase of supplements, reflecting variations in patient expenditures influenced by socioeconomic factors, including educational level (6). Education plays an important role in shaping health behavior and influencing spending decisions among TB patients (7), (8). Previous studies have shown that patients with lower educational levels are more likely to experience catastrophic costs (9). Data from Statistics Indonesia also indicate disparities in educational attainment between Kupang City and other areas in NTT (10). Therefore, this study aims to analyze differences in the economic burden of TB patients based on educational level in Kupang City.

METHOD

This study is a quantitative research with a comparative analytic approach using a cross-sectional design. This design was chosen to analyze the differences in the total economic burden among tuberculosis patients based on educational level at a single point in time without any intervention from the researcher. The cross-sectional approach is commonly used in studies of the economic burden of infectious diseases because it can describe the actual conditions experienced by patients during treatment (6), (12).

The study was conducted in all community health centers (puskesmas) in Kupang City, totaling 12 health centers, with the aim of obtaining a comprehensive and representative overview of the economic burden of tuberculosis patients in the area. Data collection was carried out from March to November 2025, adjusted to the routine visit schedule of tuberculosis patients to primary healthcare facilities (3).

The population in this study consisted of all tuberculosis patients undergoing active treatment in community health centers in Kupang City. Based on data from the Kupang City Health Office in 2024, the total population of tuberculosis patients was recorded at 1,434 individuals (2). The sample size was determined using the Slovin formula with a margin of error of 10%, resulting in a total of 94 respondents. The sampling technique used was purposive sampling, considering the suitability of respondents with the inclusion criteria and the variation in educational levels required to address the research objectives (4).

The inclusion criteria included patients diagnosed with tuberculosis based on medical records, who had undergone anti-tuberculosis drug (OAT) treatment for at least one month, were aged ≥18 years, resided in and received treatment at community health centers in Kupang City, and were willing to participate by signing informed consent. Patients who were uncooperative, had severe comorbid diseases, were diagnosed with drug-resistant tuberculosis, or had transferred healthcare facilities outside Kupang City were excluded to reduce potential measurement bias in the economic burden (11).

The independent variable in this study was educational level, classified into no formal education, primary education, secondary education, and higher education. The dependent variable was the total economic burden of tuberculosis patients, defined as the accumulation of direct non-medical costs and indirect costs incurred by patients during treatment. Other variables such as employment status, family income, access to healthcare services, and comorbid conditions were identified as confounding factors but were not analyzed in depth statistically (6).

The total economic burden was defined as all expenditures and economic losses due to tuberculosis, including direct non-medical costs such as transportation, additional food consumption, and accommodation, as well as indirect costs in the form of loss of income and productivity of both patients and their caregivers during the treatment period. This definition refers to the tuberculosis financing framework used by the World Health Organization and the Tuberculosis Patient Cost Survey in Indonesia (1), (6), (19).

Data collection was conducted through direct interviews using a tuberculosis patient cost survey questionnaire adapted from the Indonesia Tuberculosis Patient Cost Survey 2020. The questionnaire had undergone content validation through supervision by academic advisors and a pilot test to ensure clarity of questions and consistency of responses (6).

Data analysis was performed using SPSS version 28. Univariate analysis was used to describe respondent characteristics and the average total economic burden. The Kolmogorov–Smirnov

normality test was conducted to assess the distribution of total economic burden data. Since the data were not normally distributed and the educational level variable was ordinal categorical, bivariate analysis was performed using the Kruskal–Wallis test to determine differences in total economic burden among educational level groups. This test was chosen because it is appropriate for comparing more than two independent groups with non-parametric data (12).

This study has received ethical approval from the Health Research Ethics Committee of the Faculty of Public Health, Nusa Cendana University, with registration number No:004115/KEPK FKM UNDANA/2025.

RESULTS AND ANALYSIS

Overview of the Study

This study was conducted from March to November 2025 in 12 community health centers in Kupang City, involving 94 tuberculosis patients. Data were collected through interviews using structured questionnaires and analyzed using SPSS 28. The analysis included univariate analysis to describe the characteristics of respondents and their economic burden, as well as bivariate analysis using the Kruskal–Wallis test to assess differences in economic burden based on education level.

Characteristics of Respondents

Table 4.1. Characteristics of Respondents

Characteristics	Category	n	%
Sex	Male	50	53,2
	Female	44	46,8
Age (years)	18–29	28	29,8
	30–39	20	21,3
	40–49	16	17
	50–59	16	17
	≥ 60	14	14,9
Educational Level	Did not attend school	2	2,31
	Elementary school	13	13.8
	Junior high school	10	10,6
	Senior high school	36	38,3
	Diploma (D3)	4	4,3
	Bachelor's degree (S1)	29	30,9
Diagnosis Center	Community health center	56	59,6
	Hospital	38	40,4
Types of TB	Pulmonary TB (Bacteriologically Positive)		
91	96,8		
	Extra Pulmonary TB	3	3,2
Job Classification	Not Working	42	44,7
	Informal Workers	23	24,5
	Formal Workers	18	19,1
	Entrepreneurship	11	11,7
BMI (*Body Mass Index*)	Underweight (< 18,5)	35	37,2
	Normal (18,5 – 24,9)	53	56,4
	Overweight (25 – 29,9)	6	6,4
	Obesity (≥ 30)	0	0
Total Respondents		94	100

Most respondents were male (53.2%) and of productive age (18–39 years). Respondents had diverse educational backgrounds, with the largest proportion having secondary and higher education. The majority were diagnosed at community health centers and had bacteriologically positive pulmonary TB. Nearly half of the respondents were unemployed, and in terms of nutritional status, most were in the normal category, although the proportion of underweight individuals was still quite high.

Univariate Analysis

1. Economic Burden Distribution

Table 2. Distribution of Economic Burden of TB Patients in Kupang City (n = 94, IDR)

Economic Burden Comp.	Min	Max	Mean	SD
Non Medical Direct Costs	0	1.535.000	57.920,21	164.278,32
Indirect Costs	0	3000.000	104.787,23	404.548,67
Total Economic Burden	0	3.135.000	162.707,45	468.097,64

The average non-medical direct costs for TB patients were IDR 57,920.21, indirect costs were IDR 104,787.23, and the total economic burden was IDR 162,707.45. The maximum total economic burden reached IDR 3,135,000, while the minimum value of all components was IDR 0. The variation in costs between respondents was quite large, especially in indirect costs, indicating that loss of income was the main component of the economic burden of TB patients.

2. Distribution of Education Levels

Tabel 3. Frequency Distribution of Variables Level of Education

Level of Education	N	Percentage
Did not attend school	2	2,1%
Elementary school	23	24,50%
Junior high school	36	38,30%
Senior high school	33	35,10%
Total	94	100%

Most respondents had a secondary education (38.3%), followed by higher education (35.1%), primary education (24.5%), and no schooling (2.1%). This distribution shows a relatively balanced variation in education levels between groups.

Bivariate Analysis

Tabel 4. Bivariate Test of Non-Medical Direct Cost Economic Burden Based on Education Level

Variable	Tingkat Pendidikan	Median	n	*p-value*
Non-Medical Direct Costs	Did not attend school	65.000	2	0,377
	Elementary School	30.000	23	
	Junior high school	13.500	36	
	Senior high school	30.000	33	

Tabel 5. Bivariate Test of Indirect Economic Burden Based on Education Level

Variabel	Tingkat Pendidikan	Nilai Tengah	n	*p-value*
Indirect Costs	Did not attend school	1.500.000	2	0,096
	Elementary School	0	23	
	Junior high school	0	36	
	Senior high school	0	33	

Tabel 6. Uji Bivariat Total Beban Ekonomi Berdasarkan Tingkat Pendidikan

Variable	Tingkat Pendidikan	Nilai Tengah	n	*p-value*

Total Economic Burden	Did not attend school	1.565.000	2	0,136
	Elementary School	35.000	23	
	Junior high school	20.000	36	
	Senior high school	30.000	33	

The Kruskal–Wallis test results showed that there were no significant differences between education levels and non-medical direct costs (p = 0.377), indirect costs (p = 0.096), or total economic burden (p = 0.136) among tuberculosis patients in Kupang City.

Discussion

Based on the distribution of the economic burden among 94 tuberculosis patients in Kupang City, the average direct non-medical cost was IDR 57,920.21 and the indirect cost was IDR 104,787.23, with an average total economic burden of IDR 162,707.45. The maximum value of direct non-medical costs reached IDR 1,535,000 and indirect costs reached IDR 3,000,000, while the minimum value for all cost components was IDR 0 (zero). These findings indicate a considerable variation in the economic burden among respondents, even though tuberculosis treatment is provided free of charge under the national program (1), (6).

Most respondents had a secondary education level (senior high school), while respondents with no formal education consisted of only two individuals. In the no formal education group, the median direct non-medical cost was the highest compared to other educational groups, while the lowest median was found in the secondary education group. This pattern suggests differences in the distribution of economic burden across educational levels, although the number of respondents in the no formal education group was very limited, so the results should be interpreted with caution.

Direct non-medical costs in this study were dominated by expenditures on nutritional supplements. This finding is consistent with the Indonesia Tuberculosis Patient Cost Survey 2020, which reported that most direct non-medical costs were allocated for the purchase of nutritional supplements, followed by transportation, consumption, and accommodation costs during treatment (6). In the no formal education group, direct non-medical costs were higher compared to other educational groups, although this group consisted of only two respondents. This finding is in line with McAllister et al. (2020), which stated that the magnitude of costs borne by TB patients is more influenced by the healthcare system and access to services rather than formal education level (23).

Indirect costs in this study were only found in the group of respondents with no formal education and were not observed in other educational groups. Of the two respondents in this group, only one respondent, who worked as a fisherman, experienced indirect costs due to income loss because he was unable to continue working during TB treatment. Thus, out of the total 94 respondents, only one individual reported indirect costs. Although experienced by only one respondent, the economic loss incurred was substantial, amounting to IDR 1,500,000, or more than 50% of the regional minimum wage in Kupang City. This finding indicates that indirect costs, although infrequent, can have a significant economic impact on patients' households (1), (19).

These results are consistent with reports from WHO and the Indonesia Tuberculosis Patient Cost Survey, which state that indirect costs, particularly income loss, are one of the main contributors to the variation and magnitude of the economic burden among TB patients (1), (6), (24). According to Sari et al. (2018), indirect costs are relatively smaller in nominal terms compared to direct costs, especially among patients without fixed income; however, the type of occupation affects the extent of income loss during treatment (25). Informal sector workers, such as fishermen or laborers, tend to experience greater income loss compared to those with formal employment, who generally have more stable income systems and job protection.

The results of the Kruskal–Wallis test showed that there was no statistically significant difference in economic burden based on educational level (p = 0.136). The non-significant result is likely influenced by the unequal data distribution and the presence of extreme values, considering that only one respondent experienced indirect costs. However, the mean rank values indicate a tendency for a higher economic burden in the no formal education group, suggesting that education is not a direct determinant of economic burden, but rather reflects underlying socioeconomic conditions associated with this group (14), (15), (18).

Thus, it can be concluded that the economic burden of tuberculosis in Kupang City is more influenced by employment and income factors rather than educational level. Therefore, TB control interventions should consider providing socioeconomic support for patients (1), (6).

CONCLUSIONS

Based on the results of research on the differences in the economic burden of tuberculosis patients based on education level in Kupang City, it can be concluded that the average total economic burden of tuberculosis patients during their last visit was IDR 162,707.45, consisting of non medical direct costs of IDR 57,920.21 and indirect costs of IDR 104,787.23 as the largest component. In addition, statistical analysis shows that there is no difference in the economic burden of tuberculosis patients based on educational level in Kupang City ($p = 0.136$).

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