Open Access Research Article

The 1st Cirebon International Health Symposium: Faculty of Medicine, Universitas Swadaya Gunung Jati *Update on Non-Communicable Diseases: Global Perspective on Health Challenges and Innovation*

# Relationship Analysis of Risk Factors Concerning the Incidence of Pulmonary Tuberculosis in Children at Panti Abdi Dharma Hospital, Cirebon, Indonesia

Annisa Shintya Pratama[1*], Defa Rahmatun Nisaa[2], Nanang Ruhyana[3]

1. Faculty of Medicine, Universitas Swadaya Gunung Jati, Cirebon, Indonesia, 45132;
2. Department of Paediatrics, Faculty of Medicine Universitas Swadaya Gunung Jati, Cirebon, Indonesia, 45132;
3. Department of Public Health, Faculty of Medicine Universitas Swadaya Gunung Jati, Cirebon, Indonesia, 45132.

***Corresponding author's e-mail: defa.suwarto@gmail.com**

**DOI**: 10.35898/ghmj-82s1228

## ABSTRACT

**Background:** Tuberculosis (TB) is an infectious disease caused by the Mycobacterium tuberculosis germ. The germs are spread from people with TB through the air. Nearly a quarter of the world's population is infected with Mycobacterium tuberculosis germs and 11% are children.

**Aims:** To analyze the association of risk factors that most influence the incidence of pulmonary tuberculosis in children at Panti Abdi Dharma Hospital, Cirebon City in 2024.

**Methods:** Using a cross sectional analytical observational approach, systematic sampling technique on 138 respondents using bivariate analysis (chi-square) and multivariate analysis (logistic regression).

**Results:** The results showed that risk factors associated with the incidence of tuberculosis in children were age (P-value 0.002), gender (P-value 0.027), father's education (P-value 0.032) and parents' socioeconomic status (P-value 0.001). The risk factor that most influenced the incidence of tuberculosis was parents' socioeconomic status (Exp(B) value 3.798).

**Conclusion:** In the 10 risk factors studied, 4 risk factors were found to have an association with the incidence of tuberculosis in children, namely child age, child gender, father's education, and parents' socioeconomic status. The most influential risk factor in this study was parents' socioeconomic status.

**Keywords:** *Risk factors; Relationship analysis; Pulmonary tuberculosis; Child health.*

**Received:** 21 June 2025 **Reviewed:** 09 July 2025 **Revised:** 22 July 2025 **Accepted:** 15 August 2025.

# 1. Introduction

Tuberculosis (TB) is an infectious disease caused by the germ Mycobacterium tuberculosis. The germs spread from people with TB through the air. The Mycobacterium tuberculosis germ usually attacks the lung organ, but can also attack other than the lung (extra-pulmonary). Almost a quarter of the world's population is infected with Mycobacterium tuberculosis germs. About 89% of TB patients are adults (56.5% men and 32.5% women) and 11% are children (Kemenkes, 2022)

Worldwide there are an estimated 10 million cases of TB in 2020, 10.3 million cases in 2021, and 10.6 million cases in 2022 (WHO, 2023). In 2022 Indonesia itself is in second place after India with the most cases of about 10% of the world's 87% of TB cases amounting to 969,000 cases per year. When compared by gender, the number of cases in men is higher than in women by 58.0% and 42.0% in women. Meanwhile, based on the age group, the highest number of cases was found in the age group 45-54 years, which amounted to 16.5%, followed by the age group 0–14 years, which amounted to 15.3%. The highest number of cases was reported from provinces with large populations, one of which is West Java (Kemenkes, 2022).

Reported TB cases in West Java in 2022 amounted to 160,661 cases out of 656,154 suspected TB cases (Kemenkes, 2022). The highest TB cases were in Bogor Regency, Bandung City and Bekasi City, which accounted for 6–14% of the total new cases in West Java. Cirebon City is one of the cities with a high number of pulmonary TB cases (Profil Kesehatan Jawa Barat, 2022). Risk factors for TB transmission in children are the same as for TB in general, depending on the level of transmission, length of exposure and body resistance (Kemenkes, 2023).

The results of several studies related to risk factors for pulmonary TB in Indonesia and other countries show that the incidence of pediatric pulmonary TB is influenced by factors related to child factors, parental factors, socioeconomic factors, environmental factors and contact with adult pulmonary TB patients. The risk factors for TB in children are parental knowledge, BCG vaccination history, the behavior of TB patients at home such as smoking habits and length of contact (Abimulyani *et al.*, 2023). The risk factors for TB in children are parental knowledge (Almira *et. al.,* 2023). The risk factors for TB in children are parental knowledge (Nurilhami *et al*., 2023). The risk factors for TB in children are parental knowledge, nutritional status, and smoking habits (Sutriyawan *et. al.*, 2022). The most risk factors for TB in children are age 0–4 years and female gender (Ekawati, 2022). The risk factors for TB in children are parents' education level (Agustian *et al.*, 2022).

This shows that there are many risk factors that can influence the occurrence of pulmonary TB in children, originating from both the children themselves and their parents. This study can serve as a basic indicator for identifying these risk factors. Therefore, the purpose of this study is to determine the relationship between risk factors and the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City, in 2024.

# 2. Methods

## *Study design/ Research procedures*

This study is an analytical observational with a cross sectional approach with a sample size of 138 respondents within the research period of 2 months. Sampling method with systematic sampling technique, namely sampling technique based on the order of the population number given a serial number. The sample of this study were pediatric patients aged 0-17 years who visited the Panti Abdi Dharma Hospital, Cirebon City in May-June 2024 with inclusion criteria, namely children aged 0-17 years, parents who were willing to respond by filling out informed consent and filling out questionnaire data, and exclusion criteria, namely not willing to be interviewed / not willing to be a research subject and the required data was not available / the questionnaire was not filled in completely. The way to get a sample is that the researcher waits in the waiting room of the pediatric poly and the researcher gives a serial number to each newly arrived patient until the number of samples per day is fulfilled by doing informed consent and giving a questionnaire.

**Table 1.** Operational Definition in the Questionnaire

| NO | VARIABLES | DEFINITION | RESULTS | MEASURING SCALE |
|---|---|---|---|---|
| **Independent Variables** | | | | |
| 1 | Age | The age of the child from birth to the time of diagnosis of Pulmonary TB | 1 = ≤1 years<br>2 = >1–5 years<br>3 = >5–10 years<br>4 = >10–15 years<br>5 = >15–17 years | Ordinal |
| 2 | Gender | The child's natural physical characteristics that distinguish between male and female | 1 = Male<br>2 = Female | Nominal |
| 3 | Nutrition | The nutritional status of the child measured anthropometrically based on the BW/TB index from the standard Z score of BW/TB before the diagnosis of pulmonary TB | 1= Malnutrition : <-3SD<br>2 = Undernutrition : -3SD until <-2SD<br>3 = Good nutrition : 2SD until 1SD<br>4 = Over-nutrition : >2SD until 3SD | Ordinal |
| 4 | Exclusive Breastfeeding History | Breastfeeding status only without other food and drink until 6 months of age, for patients <6 months of age, breastfeeding status only without other food and drink | 1 = Not exclusively breastfed<br>2 = Exclusive breastfeeding | Ordinal |
| 5 | Birth Weight | Child's weight at birth | 1 = LBW (<2500gr)<br>2 = Normal (≥2500gr) | Ordinal |
| 6 | BCG Immunization History | BCG immunization history asked and seen from the immunization book | 1 = No<br>2 = Yes | Nominal |
| 7 | History of Contact TB Patients | Presence of family members diagnosed with TB | 1 = No<br>2 = Yes | Nominal |
| 8 | Father's Education | Formal education of the child's father | 1 = Not graduated Elementary School<br>2 = Elementary School graduate<br>3 = Junior High School graduate<br>4 = Senior High School graduate<br>5 = College | Ordinal |
| 9 | Mother's Education | Formal education of the child's mother | 1 = Not graduated Elementary School<br>2 = Elementary School graduate<br>3 = Junior High School graduate<br>4 = Senior High School graduate<br>5 = College | Ordinal |
| 10 | Parents' Socioeconomic Status | The average monthly income of the mother and father compared to the minimum wage (UMR) of Cirebon City (≥2.4 million) | 1 = ≥2,4 million<br>2 = <2,5 million | Ordinal |
| 11 | Smoking Behavior of Family | The presence of family members who smoke in the house | 1 = No<br>2 = Yes | Ordinal |
| **Dependent Variables** | | | | |
| 12 | Pulmonary Tuberculosis | Pediatric patients who meet the Pediatric TB scoring system / have been diagnosed with Pulmonary TB by a doctor | 1 = No<br>2 = Yes | Nominal |

### *Measurements*

Shown in Table 1, the independent variables in this study were age, gender, nutritional status, exclusive breastfeeding history, birth weight, BCG immunization history, direct contact with Tuberculosis patients in children, as well as educational status, socioeconomic status of parents and smoking behavior in family members, while the dependent variable in this study was the incidence of Pulmonary Tuberculosis in children. The author took primary data, namely questionnaires from previous researchers, Irma Surya Kusuma in 2011 which has been validated, tested for reliability, and well-adapted and distributed them to respondents who had filled out informed consent.

The questionnaire consists of 4 sections, namely general data which aims to determine the order of the respondent's number and the date of data collection obtained, respondent data which aims to determine the identity of parents/guardians of children as research samples, child characteristics which aim to determine the identity of children as research samples, and risk factors that may or may not be related to the incidence of pulmonary TB in children. This section consists of 4 sections, namely general data which aims to determine the order of the respondent number and the date of data collection obtained, respondent data which aims to determine the identity of the parents/guardians of the child as a research sample, child characteristics which aim to determine the identity of the child as a research sample, and risk factors that may or may not be related to the incidence of pulmonary TB in children.

### *Statistical techniques*

The analysis conducted in this study is univariate analysis which aims to determine the description or distribution of each independent variable, then bivariate analysis which aims to determine whether or not there is a relationship between risk factors as independent variables to the incidence of pulmonary TB in children as the dependent variable using the chi-square test, then multivariate analysis which aims to determine the risk factors that are most influential on the incidence of pulmonary TB in children using logistic regression test.

### *Ethical Clearance*

This study has been ethically approved by the Ethic Committee of Faculty of Medicine, Universitas Swadaya Gunung Jati, following the seven WHO standards, with number No.44/EC/FKUGJ/V/2024, on 06th May 2024.

## 3. Results

### *Respondent characteristics*

Table 2 summarizes the distribution of the characteristics of the most respondents is the age group >1–5 years as many as 80 people (58%), male gender as many as 74 people (58%), malnutrition status as many as 41 people (30%), the history of exclusive breastfeeding as many as 83 people (60%), normal birth weight as many as 129 people (93%), There was a history of BCG immunization as many as 126 people (91%), there was no history of contact with TB patients as many as 124 people (90%), as well as father's education finishing high school as many as 73 people (53%), mother's education finishing high school as many as 69 people (50%), socio-economic status of parents below UMR as many as 79 people (57%) and the presence of smoking behavior of family members as many as 109 people (79%).

**Table 2.** Respondents' Characteristics

| Variables | | N | % |
|---|---|---|---|
| **Age** | | | |
| | ≤1 years | 16 | 12 |
| | >1–5 years | 80 | 58 |
| | >5–10 years | 32 | 23 |
| | >10–15 years | 8 | 6 |
| | >15–17 years | 2 | 1 |
| **Gender** | | | |
| | Male | 74 | 58 |
| | Female | 64 | 46 |
| **Nutrition** | | | |
| | Malnutrition | 36 | 26 |
| | Undernutrition | 41 | 30 |
| | Good nutrition | 40 | 29 |
| | Over-nutrition | 21 | 15 |
| **Exclusive Breastfeeding History** | | | |
| | No | 55 | 40 |
| | Yes | 83 | 60 |
| **Birth Weight** | | | |
| | LBW (<2500gr) | 9 | 7 |
| | Normal (≥2500gr) | 129 | 93 |
| **BCG Immunization History** | | | |
| | No | 12 | 9 |
| | Yes | 126 | 91 |
| **History of Contact TB Patients** | | | |
| | No | 124 | 90 |
| | Yes | 14 | 10 |
| **Father's Education** | | | |
| | Not graduated Elementary School | 0 | 0 |
| | Elementary School graduate | 30 | 22 |
| | Junior High School graduate | 24 | 17 |
| | Senior High School graduate | 73 | 53 |
| | College | 11 | 8 |
| **Mother's Education** | | | |
| | Not graduated Elementary School | 0 | 0 |
| | Elementary School graduate | 34 | 25 |
| | Junior High School graduate | 24 | 17 |
| | Senior High School graduate | 69 | 50 |
| | College | 11 | 8 |
| **Parents' Socioeconomic Status** | | | |
| | ≥RMW | 59 | 43 |
| | <RMW | 79 | 57 |
| **Smoking Behavior of Family** | | | |
| | No | 29 | 21 |
| | Yes | 109 | 79 |

## *Bivariate analysis*

Table 3 shows the distributions of patients based on age, gender, nutrition status before diagnosis, exclusive breastfeeding history, birth weight, BCG immunization history, history of contact TB patients, father's and mother's education, parents' socioeconomic status and smoking behavior of family. The statistical analysis shows that age significantly contribute to tuberculosis children (p value = 0.002), gender significantly contribute to tuberculosis children (p value = 0.016), father's education significantly contribute to tuberculosis children (p value = 0.032) and socioeconomic status of parents significantly contribute to tuberculosis children (p value = 0.001).

**Table 3.** Bivariate Analysis

| Variables | TB Status | | | | Total N (%) | P-Value |
|---|---|---|---|---|---|---|
| | TB | | Non TB | | | |
| | N | % | N | % | | |
| **Age** | | | | | | |
| ≤1 years | 7 | 5% | 9 | 7% | 16 (12%) | 0.002 |
| >1–5 years | 63 | 46% | 17 | 12% | 80 (58%) | |
| >5–10 years | 22 | 16% | 10 | 7% | 32 (23%) | |
| >10–15 years | 2 | 1% | 6 | 4% | 8 (6%) | |
| >15–17 years | 2 | 1% | 0 | 0% | 2 (1%) | |
| **Gender** | | | | | | |
| Male | 45 | 33% | 29 | 21% | 74 (54) | 0.016 |
| Female | 51 | 37% | 13 | 9% | 64 (46%) | |
| **Nutrition status before diagnosis** | | | | | | |
| Malnutrition | 30 | 22% | 6 | 4% | 36 (26%) | 0.215 |
| Undernutrition | 27 | 20% | 14 | 10% | 41 (30%) | |
| Good nutrition | 26 | 19% | 14 | 10% | 40 (29%) | |
| Over-nutrition | 13 | 9% | 8 | 6% | 21 (15%) | |
| **Exclusive Breastfeeding History** | | | | | | |
| No | 39 | 28% | 16 | 12% | 55 (40%) | 0.780 |
| Yes | 57 | 41% | 26 | 19% | 83 (60%) | |
| **Birth Weight** | | | | | | |
| LBW (<2500gr) | 7 | 5% | 2 | 1% | 9 (7%) | 0.722 |
| Normal (≥2500gr) | 89 | 64% | 40 | 29% | 129 (93%) | |
| **BCG Immunization History** | | | | | | |
| No | 9 | 7% | 3 | 2% | 12 (9%) | 1.000 |
| Yes | 87 | 63% | 39 | 28% | 126 (91%) | |
| **History of Contact TB Patients** | | | | | | |
| No | 84 | 61% | 40 | 29% | 124 (90%) | 0.227 |
| Yes | 12 | 9% | 2 | 1% | 14 (10%) | |
| **Father's Education** | | | | | | |
| Elementary School graduate | 23 | 17% | 7 | 5% | 30 (22%) | 0.032 |
| Junior High School graduate | 20 | 14% | 4 | 3% | 24 (17%) | |
| Senior High School graduate | 49 | 36% | 24 | 17% | 73 (53%) | |
| College | 4 | 3% | 7 | 5% | 11 (8%) | |
| **Mother's Education** | | | | | | |
| Elementary School graduate | 26 | 19% | 8 | 6% | 34 (25%) | 0.267 |
| Junior High School graduate | 16 | 12% | 8 | 6% | 24 (17%) | |
| Senior High School graduate | 49 | 36% | 20 | 14% | 69 (50%) | |
| College | 5 | 4% | 6 | 4% | 11 (8%) | |
| **Parents' Socioeconomic Status** | | | | | | |
| ≥RMW | 32 | 23% | 27 | 20% | 59 (43%) | 0.001 |
| <RMW | 64 | 46% | 15 | 11% | 79 (57%) | |
| **Smoking Behavior of Family** | | | | | | |
| No | 19 | 14% | 10 | 7% | 29 (21%) | 0.594 |
| Yes | 77 | 56% | 32 | 23% | 109 (79%) | |

### *Multivariate analysis*

The prevalence ratio of age, gender, father's education parents' and socioeconomic status with tuberculosis in children was analyzed using binary logistic regression test with 95% CI.

**Table 4.** Multivariate Analysis

| | Variables | B | Sig. | Exp(B) | 95% C.I for EXP (B) | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| Step 1[a] | Age | -.222 | .390 | .801 | .483 | 1.328 |
| | Gender | .989 | .017 | 2.689 | 1.194 | 6.057 |
| | Father's Education | -.272 | .269 | .762 | .470 | 1.234 |
| | Parents' Socioeconomic Status | 1.190 | .005 | 3.287 | 1.425 | 7.582 |
| | Constant | -.901 | .574 | .406 | | |
| Step 2[a] | Gender | .982 | .017 | 2.669 | 1.188 | 5.998 |
| | Father's Education | -.226 | .345 | .798 | .499 | 1.275 |
| | Parents' Socioeconomic Status | 1.190 | .005 | 3.286 | 1.426 | 7.573 |
| | Constant | -1.561 | .267 | .210 | | |
| Step 3[a] | Gender | 1.000 | .015 | 2.717 | 1.214 | 6.081 |
| | Parents' Socioeconomic Status | 1.334 | .001 | 3.798 | 1.734 | 8.315 |
| | Constant | -2.609 | .003 | .074 | | |

Table 4 shows that parent's socioeconomic status the most significant associated variable with tuberculosis in children (P<0,001, OR = 3.798, C.I = 95%). The conclusion of this study is that nutrition status before diagnosis, exclusive breastfeeding history, birth weight, BCG immunization history, history of contact with TB patients, mother's education and smoking behaviour of family did not have a significant association with the incidence of childhood tuberculosis. Age, gender, father's education and parent's socioeconomic status have a significant association the incidence of childhood tuberculosis, with parent's socioeconomic status being the most significant associated variable on the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital in Cirebon City.

## 4. Discussion

### Age

Based on table 3, it can be seen that age has a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital in Cirebon City with a sig. (P-Value) of 0.002 (<0.05), which means there is a significant relationship. Based on the theory in the book Pediatric Respirology by the Indonesian Pediatric Association, the risk factor for TB in children is age. Children aged <5 years have a greater risk of experiencing progression of infection to TB disease because their cellular immunity is not fully developed (immature). However, this risk gradually decreases with age. In addition, the results of this study are in line with Dianita's research (2022) which states that there is a significant relationship between age and the incidence of childhood TB. This proves that children aged <5 years are at risk of suffering from TB compared to children aged >5 years. Children aged <5 years are more at risk of contracting TB disease because childhood is a period of rapid growth and development and the immune system is not yet fully formed so that at that age they still have a low immune system and are more susceptible to diseases including pulmonary TB.

## Gender

Based on Table 3, it can be seen that age has a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital in Cirebon City with a sig. (P-Value) of 0.027 (<0.05), which means there is a significant relationship. In addition, the results of this study are in line with Dianita's research (2022) which states that TB cases are more prevalent in daughter than son.

## Nutritional Status

Based on Table 3, it can be seen that nutritional status does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.215 (>0.05), which means there is no significant relationship. Based on the theory in the book Technical Guidelines for the Management of Child and Adolescent Tuberculosis Indonesia 2023 by the Ministry of Health of the Republic of Indonesia, children and adolescents with severe acute malnutrition are at high risk of developing TB due to low cellular immunity. Severe acute malnutrition associated with TB is poor nutrition. In addition, the results of this study are in line with Zulkarnain's research (2023) which states that there is no relationship between nutritional status and the incidence of TB in children, where according to researchers someone who has an abnormal nutritional status can affect a person's immune system so that they are susceptible to infectious diseases, one of which is TB. However, there are still respondents whose nutritional status is normal and suffer from TB.

## Exclusive Breastfeeding History

It can be seen at Table 3, exclusive breastfeeding does not have a significant relationship with the incidence of pulmonary tuberculosis in children at Panti Abdi Dharma Hospital, Cirebon City with a sig value. (P-Value) of 0.928 (>0.05), which means there is no significant relationship. Based on the theory in the book National Guidelines for Medical Services for Tuberculosis Management by the Ministry of Health of the Republic of Indonesia 2020, infectious diseases in children can be prevented by exclusive breastfeeding. Breast milk has the ideal nutritional content for children's growth and development. Breast milk contains carbohydrates, fat, protein, nutrients and antibodies that can inhibit growth and increase the body's defense system against pathogenic germs. Children who are not breastfed or exclusively breastfed have an impact on low nutritional status, which affects the body's resistance to infections including TB and HIV infections. In addition, the results of this study are in line with Flores's research (2020) which states that there is no relationship between exclusive breastfeeding history and the incidence of TB in children.

## Birth Weight

Based on table 3, it can be seen that birth weight does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.722 (>0.05), which means there is no significant relationship. The babies with low birth weight have a smaller chance of survival and are more susceptible to diseases, especially infectious diseases such as TB infection. Low birth weight tends to have impaired cognitive development, mental retardation, and is more prone to infections that can result in illness or even death (Pristya *et al*, 2020).

## BCG Immunization History

BCG immunization history does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 1.000 (>0.05). Based on the theory in the book Technical Guidelines for the Management of Child and Adolescent Tuberculosis Indonesia 2023 by the Ministry of Health of the Republic of Indonesia, the administration of the BCG vaccine, which contains attenuated *Mycobacterium bovis*, aims to provide protection against the occurrence of TB disease. Although its effectiveness varies (up to 90%), it is very useful in preventing severe TB. In addition, the results of this study are in line with Dianita's research (2022) which states that there is no relationship between BCG immunization and the incidence of TB in children. This proves that children with BCG immunization status are still at risk of TB.

## Contact History with Adult TB Patients

Based on Table 3, it can be seen that contact history does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.227 (>0.05), which means there is no significant relationship. Based on the theory in the book Pediatric Respirology by the Indonesian Pediatric Association, the most important source of TB infection in children is exposure to infectious adults, especially with positive BTA. The risk of transmission of germs from adults to children will be higher if the adult patient has BTA positive sputum, extensive infiltrates, or cavities in the upper lobes, sputum production is abundant and watery, cough is productive and strong, and there are unhealthy environmental factors, especially poor air circulation. In addition, the results of this study are in line with Rita & Qibtiyah's research (2020) which states that there is no relationship between contact history and the incidence of TB in children. This is evidenced by the national indicators of TB control based on the number of suspected screening; there is a relationship between the contact history of TB patients and the incidence of TB in children with a value that cannot exceed the value of 3-5%.

## Father's Education

It can be seen at Table 2, father's education has a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.032 (<0.05), which means there is a significant relationship. In addition, the results of this study are in line with research by Dias (2022) which states that there is a relationship between father's education and the incidence of TB in children. This is evidenced by the level of education will affect a person to have knowledge related to disease prevention and also healthy housing so that someone who has sufficient knowledge will carry out a healthy and clean lifestyle. In addition, the father is the head of the family where the father's education level will affect the type of work that will be related to the economic status of parents and nutritional status in children.

## Mother's Education

Contrary with the fathers education, maternal education does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.267 (>0.05), which means there is no significant relationship. In addition, the results of this study are in line with research by Dias (2022) which states that there is no relationship between maternal education and the incidence of TB in children.

## Parents' Socioeconomic Status

In this recent study, it is noted that the socioeconomic status of parents has a significant relationship with the incidence of pulmonary tuberculosis in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.001 (<0.05). Based on the theory in the book Pediatric Respirology by the Indonesian Pediatric Association, poverty is one of the main causes of the increasing number of TB cases in children, especially in developing countries. In addition, the results of this study are in line with Sihaloho *et al.* research (2021) which states that there is a relationship between the socioeconomic status of parents and the incidence of TB in children. This is evidenced by the smaller a person's income, the possibility of contracting TB is very high because it cannot meet proper health requirements. Someone who has a high income tends to be able to maintain the cleanliness of their living environment, drink clean water and maintain the quality of their food so that the tendency to contract TB is lower.

## Smoking Behavior of Family Members

It can be seen that the smoking behavior of family members does not have a significant relationship with the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital, Cirebon City with a sig. (P-Value) of 0.760 (>0.05), which means there is no significant relationship. In addition, the results of this study are in line with Nurjana & Tjandrarini research (2019) which states that the absence of a relationship between smoking behavior of family members and the incidence of TB in children may be influenced by several things including the level of cigarette addiction of family members. The lower the level of cigarette addiction, the less exposure to cigarette

smoke to children so that it does not have a major effect on children's health. Another factor is the manner of smoking, smoking outside the home or not close to the child will reduce exposure to cigarette smoke to children.

### Most Influential Variable

The most influential variable on the incidence of pulmonary TB in children at Panti Abdi Dharma Hospital in Cirebon City is the low socioeconomic status of parents because it is 3.798 times more likely to get TB than the female gender. Socioeconomic status has the most influence on the incidence of TB. This is consistent with previous research that individuals with low income have a greater chance of developing TB disease than those with high income. Community income can affect individual health, where people who have low income will find it difficult to get access to good food, resulting in a nutritional balance that is vulnerable to disruption and a decreased immune system. In addition, the stress associated with financial instability contributes to a decreased immune system which increases the risk of TB.

This research process has limitations and is not fully adequate because several aspects still need to be improved in future studies. The limitations of this study include the first study in a Panti Abdi Dharma hospital and there are several other factors that have not been studied such as parental knowledge and parental employment status.

## 5. Conclusion

Based on the results of a study conducted at Panti Abdi Dharma Hospital in Cirebon City with a total sample of 138 people, it was found that the risk factors that showed a significant association with the incidence of tuberculosis in children were age (P-value 0.002), gender (P-value 0.016), father's education (P-value 0.032) and parents' socioeconomic status (P-value 0.001) which were the most influential risk factors for the incidence of tuberculosis in children. Researchers hope that the results of this study will make changes to public health interventions, especially in cases of childhood tuberculosis such as nutrition programs, TB screening in low-income groups and improving parental education. However, it should be remembered that this study is a cross-sectional study, so it is recommended that future researchers can examine other characteristics such as retrospective studies.

### Conflict of Interest

The authors declare no conflicts of interest for the results.

### References

Abimulyani Y, Kainde YY, Mansyur TN, San N, Siregar A. Analisis Faktor Risiko Tb Paru Anak Yang Tinggal Serumah Dengan Penderita Tb Paru Dewasa. J Pharm Heal Res. 2023;4(2):312–8. https://doi.org/10.47065/jharma.v4i2.3671

Agustian, M.D., Masria, S. and Ismawati (2022, January). Hubungan Usia, Jenis Kelamin dan Tingkat Pendidikan dengan Kejadian TB Paru di Wilayah Kerja Puskesmas Cibadak Kabupaten Sukabumi. In *Bandung Conference Series: Medical Science* (Vol. 2, No. 1, pp. 1120-1125).

Almira Fn, Rakhmawati W, Hendrawati S, Asriyani Maryam Nn. Pengetahuan Orang Tua Dengan Anak Tuberkulosis Di Rsud Dr. Soeselo Tegal. J Surya Med. 2023;9(2):161–7. https://doi.org/10.33084/jsm.v9i2.5685

Ekawati D. Pengaruh Faktor Risiko, Usia, Jenis Kelamin Dan Status Imunisasi Pada Kasus Tb Paru Anak Di Puskesmas Merdeka. Koloni J Multidisiplin Ilmu. 2022;1(3):965–71.

Flores, J. A., Coit, J., Mendoza, M., Leon, S. R., Konda, K., Lecca, L., & Franke, M. F. (2021). Is exclusive breastfeeding for six-months protective against pediatric tuberculosis?. *Global Health Action*. 2021 Jan 1;14(1):1861922. https://doi.org/10.1080/16549716.2020.1861922

Kemenkes Ri. Petunjuk Teknis Tata Laksana Tuberkulosis Anak Dan Remaja Indonesia 2023. 2023.

Kemenkes RI. Profil Kesehatan Indonesia 2022. Pusdatin.Kemenkes.Go.Id. 2022.

Nurilhami, I. T., Rakhmawati, W., Maryam, N. N. A., & Hendrawati, S. (2023). Gambaran Pengetahuan dan Sikap Orang Tua yang Memiliki Anak dengan Tuberkulosis di Rsud Bandung Kiwari: Knowledge and Attitude Among Parents of Children with Tuberculosis in RSUD Bandung Kiwari. *Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing)*, *9*(2), 248-256. https://doi.org/10.33023/jikep.v9i2.1442

Nurjana, M. A., & Tjandrarini, D. H. (2019). Risiko tuberculosis paru pada balita di daerah kumuh Indonesia. *Prosiding Poltekkes Kemenkes Palu*, *1*(1), 18-29.

Pristya, T. Y., Novitasari, A., & Hutami, M. S. (2020). Pencegahan dan pengendalian BBLR di Indonesia: systematic review. *Indonesian Journal of Health Development*, *2*(3), 175-182.

Profil Kesehatan Jawa Barat. Profil Kesehatan Jawa Barat 2022. 2022. https://www.scribd.com/document/696468666/PROFIL-KESEHATAN-PROVINSI-JAWA-BARAT-TAHUN-2022

Rita, E., & Qibtiyah, S. M. (2020). Hubungan kontak penderita tuberkulosis terhadap kejadian tuberkulosis paru pada anak. *Indonesian Journal of Nursing Sciences and Practice*, *3*(1), 35-41.

Sihaloho, E. D., Amru, D. S., Agustina, N. I., & Tambak, H. S. P. (2021). Pengaruh Angka Kemiskinan Terhadap Angka Tuberkulosis di Indonesia. *JABE (Journal of Applied Business and Economic)*, *7*(3), 325-337.. https://doi.org/10.30998/jabe.v7i3.6470

Sutriyawan A, Nofianti N, Halim R. Faktor Yang Berhubungan Dengan Kejadian Tuberkulosis Paru. J Ilm Kesehat. 2022;4(1):98–105. https://doi.org/10.36590/jika.v4i1.228

Zulkarnain, D. W. (2023). Hubungan Status Gizi Dengan Kejadian Tuberkulosis pada Anak Balita di Puskesmas X Kabupaten Bekasi. *Bekasi: Stikes Mitra Keluarga*.

**Cite this article as:**
Pratama, A. S., Nisaa, D. R., & Ruhyana, N. (2025). Relationship Analysis of Risk Factors Concerning the Incidence of Pulmonary Tuberculosis in Children at Panti Abdi Dharma Hospital, Cirebon, Indonesia. *GHMJ (Global Health Management Journal)*, *8*(2s), 293–303. https://doi.org/10.35898/ghmj-82s1228