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# Paper

*by* Diyah Arini 10

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Factors affecting the incidence of pulmonary tuberculosis in children in East  
Perak Public health centers Surabaya.

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**ABSTRACT**

Pulmonary TB is a bacterial infection that caused by *Mycobacterium tuberculosis*. Factors that affect TB to the children are the child age, gender, contact history, nutrition stats, and economical status. The purpose of this research is to discoveres the most dominant factor on the the Pulmonary TB phenomenon.

The research design is analutic observation, with the *Cross Sectional* approach. The population that is used in this research is children that are diagnosed suspect and the pulmonary TB. The Samples are 57 childrens who experiencing pulmonary TB symptoms, that are chose by *Simple Random Sampling*. Data collection instrument in this research uses questioner sheets. The data analysis uses factors analysis and presented in table.

The result from *chi square* test shows that there is significance relation between contact history with pulmonary TB phenomenon ( $p=0,034$ ), and economical status ( $p=0,017$ ). While there is no relation between children age factors with pulmonary TB ( $p=0,336$ ), gender ( $p=0,122$ ) and nutrition stats ( $p=0,718$ ). From the result of the reesearch, it is found that the most dominant factors beased on *Binary Logistic Regression* test is economical status shown by index  $p=0,013$  ( $p < 0,05$ )

The decrease of pulmonary TB incident to the children can be achieve if the knowledge of family about TB are enough to do the prevention of the TB symptoms, So it is suggested that Health Department increases the information spread by health counseling about the pulmonary TB.

**Keywords:** *Pulmonary TB, Children, Factors*

## Introduction

Pulmonary tuberculosis is an infectious caused by *Mycobacterium tuberculosis* (Ngastiyah, 2005). Pulmonary tuberculosis in infants and children is also called primary tuberculosis and is a systemic disease. Primary tuberculosis usually begin slowly so difficult to determine when the first symptoms occurs. Sometimes the symptoms was fever and is often accompanied by signs of an upper respiratory tract infection (Ngastiyah, 2005).

Number of patients with pulmonary tuberculosis in children in East Java has reached 2,342 patients and as many as 1,308 of them already died (Dinkes 2013). Number of patients with pulmonary tuberculosis in Surabaya reached 4,336 patients (Dinkes 2014). In 2014, the number of children who have been examined for pulmonary tuberculosis in East Perak Public Health Center as many as 67 children. 12 children (17%) of them BTA (+) status, while 55 children (83%) with suspected pulmonary tuberculosis status. Based on the preliminary study on February 4, 2015 against five parents who visit the East Perak Public Health Center in Surabaya to undergo pulmonary tuberculosis treatment to children aged less than 5 years, got three parents who earn less than Rp 2.2 million (distric minimum wage in 2014), namely by Rp.1.500.000, Rp 2,000,000 and Rp 1,750,000. 2 parents remaining income in accordance with the distric minimum wage.

The main factor a person can become infected after inhaling air containing droplets containing *M. tuberculosis* bacteria are transmitted by smear pulmonary tuberculosis patients positif. Droplet containing TB bacilli resulting from coughing can float in the air up to approximately two hours depending on the quality of ventilation, if droplets inhaled by healthy people, the droplet will

be stranded on the walls of the respiratory system. When an infected person coughs or sneezes, germs and smear positive pulmonary TB were shaped very small droplet will fly in the air. If the droplet is superbly inhaled and lodged in the lungs of children, then the bacteria will divide or multiply. Kids are very vulnerable age group infected with pulmonary TB disease, it is partly because their immune systems are still developing and not yet perfect. In addition, close contact and prolonged with adult pulmonary TB patients who live at home, also facilitates the spread of pulmonary tuberculosis. This is understandable, because the son who has been infected with *M. tuberculosis* easily develop into pulmonary TB disease if they are poor nutritional status. Currently, amid pressure economic conditions with high inflation rates and rising prices of basic necessities, predicted a growing number of poor families. This condition will certainly improve the development of children with severe malnutrition (Rev. 2008). Source of TB infection in children is most important is exposure to infectious yng adult, especially with smear positive. Hiswani (2009) says that exposure of pulmonary TB disease in a person affected by several factors such as socioeconomic status and nutritional status.

Key to the success of TB control in children is the right treatment. One way to reduce the rate of transmission is by distancing individuals infected with TB susceptible populations, while increasing the healing rate necessary maximal treatment. Socio-economic improvements, and improving the quality of life can reduce the number of tuberculosis patients in children. Expected active efforts examination, especially in high-risk groups and malnutrition status to reduce the risk of contracting tuberculosis. In addition to providing immunizations to prevent TB disease, parents should also pay attention to good nutrition for children. Giving a good balanced nutrition coupled with BCG immunization is expected to be a weapon

powerful enough to ward off attack TB bacteria (Mufidah, 2012). The incidence number of tuberculosis in children can be decrease by giving sufficient knowledge about TB family for TB preventive action so that the health department suggested that further improve the provision of information through health education about pulmonary tuberculosis.

Factors that influence the occurrence of pulmonary TB are as follows: According Nugrahaeni (2011), these factors can be grouped into three main factors, namely host factors (host), the agent (agent) and the environment (environment).

1. Host : Age, Sex, Contact history, Nutritional status, Economic status
2. Agent : Mycobacterium tuberculosis
3. Environmental factors : exposure. Air temperature and humidity

Based on the explanation above, the researchers tried to further examine the factors that influence the incidence of pulmonary tuberculosis in children in the health center East Perak Surabaya.

## Methods

This research using analytical methods Observational study design which were observed to identify whether the independent variables which include age, gender, economic status, contact history, and the nutritional status that affects the dependent variable (incidence of children with pulmonary TB). This study was done by cross-sectional by measuring the observed data or independent variables (age, sex, nutritional status, contact history, and economic status) and dependent (TB incidence) only one at a time. Populations in this study were children with suspected pulmonary tuberculosis and pulmonary tuberculosis in the health center East Perak Surabaya in 2014 as many as 67 children. The sampling technique used in this study is simple random sampling. The sample in this research were 57 children with criteria that has complete data in medical record in

East Perak Surabaya health center. The research was conducted on May 13, 2015 in East Perak Surabaya Health Center.

## Result

### 1. Age

Table 1. Cross Tabulation Between Age and incidence of pulmonary TB in East Perak Health Center Surabaya period May 13-June 3, 2015

| Age          | Pulmonary TB |       |            |       |       |      |
|--------------|--------------|-------|------------|-------|-------|------|
|              | TB+          |       | TB Suspect |       | Total |      |
|              | F            | (%)   | F          | (%)   | F     | (%)  |
| < 5th        | 4            | 15,4% | 22         | 84,6% | 26    | 100% |
| >5th         | 8            | 25,8% | 23         | 74,2% | 31    | 100% |
| <b>Total</b> | 12           | 21,1% | 45         | 78,9% | 57    | 100% |

Chi Square test ( $p = 0,336$   $p\text{ value} > 0,05$ )

Table 1 show that in children aged > 5 years there were 23 children (74.2%) had suspected, 8 children (25.8%) had pulmonary tuberculosis. Chi-square test results show the value of  $p = 0,336$  ( $p\text{ value} > 0,05$ ) was no statistically significant correlation between age children with pulmonary tuberculosis incidence.

Possible toddler to be infected and cause illness are very high. Before puberty primary infection found in the lungs. According Rahajoe (2012)  $\leq 5$  year-old son had a greater risk of having the infection into tuberculosis because of its cellular immunity has not fully developed (immature).

### 2. Sex

Table 2. Cross tabulation Between Sex and Pulmonary TB incidence in East Perak Health Center Surabaya period May 13-June 3, 2015

| Sex | Pulmonary TB |     |            |     |       |     |
|-----|--------------|-----|------------|-----|-------|-----|
|     | TB+          |     | TB Suspect |     | Total |     |
|     | F            | (%) | F          | (%) | F     | (%) |

|            |    |       |    |       |    |      |
|------------|----|-------|----|-------|----|------|
| Boys       | 6  | 15,4% | 33 | 84,6% | 39 | 100% |
| Girls      | 6  | 33,3% | 12 | 74,2% | 18 | 100% |
| <b>Sum</b> | 12 | 21,4% | 45 | 78,9% | 57 | 100% |

Chi Square test ( $p = 0,122$   $p\text{ value} > 0,05$ )

Table 2 show that there were 33 boys (84.6%) had suspected, 6 boys (15.4%) had pulmonary tuberculosis. While the girls found there were 12 girls (66.7%) had suspected, 6 girls (33.3%) had pulmonary tuberculosis. Chi-square test results show the value of  $p = 0.122$  ( $p\text{ value} > 0.05$ ) so it's mean there were no statistically significant correlation between sex with pulmonary tuberculosis incidence.

The development of pulmonary tuberculosis infection becoming tuberculosis pulmonary disease in women more quickly than men. (WHO, 2010). It still requires further investigation and research, both at the behavioral, psychological level, the immune system, as well as the molecular level. For the time being, allegedly female gender is a risk factor are still require evidence in each region, as the basis for the control or management basis. (Wadjah, 2012)

### 3. History Contact

Table 3. Cross tabulation Between Children's History Contact and Incidence of pulmonary TB in East Perak health center Surabaya period May 13 - June 3, 2015

| History Contact | Pulmonary TB |       |            |       |       |      |
|-----------------|--------------|-------|------------|-------|-------|------|
|                 | TB+          |       | TB Suspect |       | Total |      |
|                 | F            | (%)   | F          | (%)   | F     | (%)  |
| Yes             | 1            | 27,3% | 32         | 72,7% | 44    | 100% |
| No              | 0            | 0%    | 13         | 100%  | 13    | 100% |
| <b>Sum</b>      | 1            | 21,4% | 45         | 78,9% | 57    | 100% |

Chi Square test ( $p = 0,034$   $p\text{ value} < 0,05$ )

Table 3 show that children who have a history of contact as many as 44 children, out of the 44 children found there were 32 children (72.7%) had suspected, 12 children (27.3%) had pulmonary tuberculosis. Chi-square test results show the value of  $p = 0.034$  ( $p\text{ value} < 0.05$ ) there was statistically significant correlation between a history of contact with pulmonary TB incidence.

The main source of TB infection in children is exposure to adults who infectious, especially with positive BTA, extensive infiltrates, lots and diluted sputum production, productive cough and strong, and the environmental factors particularly unhealthy air circulation is not good. Data from adult pulmonary TB patients in 2014 in the health center East Perak counted 74 adult pulmonary TB patients who have been diagnosed with BTA (+). So, pulmonary TB in children are closely related from pulmonary tuberculosis disease in adults.

### 4. Nutritional Status

Table 4 Cross Tabulation Between Nutritional Status and Pulmonary TB incidence in East Perak health center Surabaya period May 13 - June 3, 2015

| Nutritional Status    | Pulmonary TB |       |            |       |       |      |
|-----------------------|--------------|-------|------------|-------|-------|------|
|                       | TB+          |       | TB Suspect |       | Total |      |
|                       | F            | (%)   | F          | (%)   | F     | (%)  |
| Severely malnourished | 1            | 25%   | 3          | 75%   | 4     | 100% |
| malnourished          | 2            | 12,5% | 14         | 87,5% | 16    | 100% |
| normal                | 9            | 25%   | 27         | 75%   | 36    | 100% |
| Obesity               | 0            | 0%    | 1          | 100%  | 1     | 100% |
| <b>Sum</b>            | 1            | 21,4% | 45         | 78,9% | 57    | 100% |



Chi Square test ( $p = 0,718$   $p\text{ value} > 0,05$ )

Table 4 show that children whom in malnutrition condition found that 14 of them (87.5%) had suspected while two children (12.5%) had pulmonary tuberculosis. In children who have poor nutritional status 3 of them (75%) had suspected, and one child (25%) had pulmonary tuberculosis. The results show the value of chi-square  $p = 0.718$  ( $p\text{ value} > 0.05$ ), there was no statistically significant correlation between nutritional status and the incidence of pulmonary tuberculosis.

Children who malnutrition decline their cellular immune response so it is very easy to get an infection mycobacteria, viruses and fungi, it is certain that the immune response in humans is strongly influenced by the severity of the nutritional condition and age. (Subowo, 2013). Researchers assumed that the nutritional status of children is very important, because a good nutritional status will improve the endurance and the immune system, so they are not likely to develop TB disease. But if a child with a good nutritional status are also infected, they tend to suffer mild TB compared with malnutrition.

### 5. Economic Status

Table 5. Cross Tabulation Between Economic Status and Incidence of pulmonary TB in East Perak health center Surabaya Period May 13 to June 3 201

| Salary         | Pulmonary TB |       |            |       |       |      |
|----------------|--------------|-------|------------|-------|-------|------|
|                | TB+          |       | TB Suspect |       | Total |      |
|                | F            | (%)   | F          | (%)   | F     | (%)  |
| < Wage Minimum | 10           | 33,3% | 20         | 66,7% | 30    | 100% |
| ≥ Wage         | 2            | 7,4%  | 25         | 92,6% | 27    | 100% |

Mimum

|    |   |     |    |     |    |     |
|----|---|-----|----|-----|----|-----|
| Su | 1 | 21, | 45 | 78, | 57 | 100 |
| m  | 2 | 1%  |    | 9%  |    | %   |

Chi Square test ( $p = 0,017$   $p\text{ value} < 0,05$ )

Table 5 show that parents with economic status less than the minimum wage by 20 children (66.7%) had suspected, 10 children (33.3%) had pulmonary tuberculosis. While the economic status of children over UMK many as 25 children (92.6%) had suspected, two children (7.4%) had pulmonary tuberculosis. Chi-square test results show the value of  $p = 0.017$  ( $p\text{ value} < 0.005$ ) there was statistically significant correlation between economic status with the incidence of pulmonary tuberculosis.

Researchers assumed that the low economic level indicates a low level of education, employment and income that can affect one's health. With a lack of education, the knowledge of the disease, especially of pulmonary TB disease is also less.

### 6. Binary Logistic Regression

Table 6. Binary Logistic Regression Results

| No.    | Variables              | P value | Exp (β) | 95% C.I for EXP (β) |            |
|--------|------------------------|---------|---------|---------------------|------------|
|        |                        |         |         | Batas bawah         | Batas atas |
| Step 1 | Age (1)                | 0.78    | 0.78    | 0.13                | 4.63       |
|        | Sex (1)                | 8       | 4       | 3                   | 6          |
|        | Contact History(1)     | 0.19    | 0.33    | 0.06                | 1.76       |
|        |                        | 6       | 3       | 3                   | 3          |
|        |                        | 0.99    | 1.28    | 0.00                | 0          |
| Step 2 | Nutrition Status (1)   | 0.26    | 8.37    | 0.20                | 346.082    |
|        |                        | 3       | 8       | 3                   |            |
|        | Nutritional Status (2) | 0.89    | 1.26    | 0.04                | 38.522     |
|        |                        | 2       | 7       | 2                   |            |
|        | Nutritional Status     | 1.00    | 1.56    | 0.00                |            |
|        | 0                      | 76E8    | 0       |                     |            |

|        |                        |           |             |           |            |
|--------|------------------------|-----------|-------------|-----------|------------|
| Step 3 | (3)<br>Economic status | 0.01<br>0 | 12.0<br>24  | 1.81<br>5 | 79.6<br>46 |
|        | Age (1)                | 0.332     | 0.46        | 0.09      | 2.2        |
|        | Sex (1)                | 0.170     | 0           | 6         | 07         |
|        | Nutritional Status (1) | 0.333     | 0.35<br>5   | 0.08<br>1 | 1.5<br>58  |
|        | Nutritional Status (2) |           | 4.42<br>4   | 0.21<br>8 | 89.<br>851 |
|        | Nutritional Status (3) | 0.828     | 1.34<br>5   | 0.09<br>3 | 19.<br>529 |
|        | Economic status (1)    | 0.027     | 7.08<br>5   | 1.25<br>3 | 40.<br>070 |
|        | Age (1)                | 0.227     | 0.44<br>2   | 0.10<br>1 | 1.9<br>27  |
|        | Sex (1)                | 0.199     | 0.39<br>2   | 0.09<br>4 | 1.6<br>34  |
|        | Economic status (1)    | 0.040     | 5.72<br>7   | 1.08<br>4 | 30.<br>252 |
| Step 4 | Sex (1)                | 0.266     | 0.45<br>7   | 0.11<br>5 | 1.8<br>16  |
|        | Economic status (1)    | 0.041     | 5.58<br>0   | 1.07<br>5 | 28.<br>969 |
| Step 5 | Economic status (1)    | 0.027     | 6.25<br>0   | 1.22<br>7 | 31.<br>838 |
| Step 6 | Contact History (1)    | 0.998     | 7.97<br>2E8 | 0.00<br>0 |            |
|        | Economic status (1)    | 0.013     | 8.33<br>3   | 1.55<br>6 | 44.<br>642 |

Table 6 show that by using binary logistic regression analysis showed economic status is the most affecting factors the incidence pulmonary tuberculosis. It's found that  $p = 0.013$  with OR 8.333 this suggests that the economic status <Rp 2.200.000 8.333 times higher risk than economic status> Rp 2,200,000 pulmonary tuberculosis exposure.

According to WHO (2003) in Rahajoe (2012) states that 90% of pulmonary TB patients throughout the country attacked the lower socioeconomic groups. Low socioeconomic condition will cause high-density living quarters. Condition of the house comprising, occupant density, quality of ventilation and bad lighting can facilitate the transmission of pulmonary TB than any other factor. Droplets containing TB bacilli resulting from coughing can suspended in the air up to about two hours, if the droplets inhaled by healthy people, the droplet will be stranded on the walls of the respiratory system (Darmanto, 2009).

### Conclusion

1. Age, sex, and nutritional status didn't influence the incidence of pulmonary tuberculosis in children in East Perak health centers Surabaya.
2. Economic status and contact history influence the incidence of pulmonary tuberculosis in children in East Perak health centers Surabaya.
3. economic status was the most influential factors on the incidence of pulmonary tuberculosis in children in East Perak health center Surabaya.

### Recommendations

1. Society is expected to participate in health education conducted by the health service so they have better knowledge in order to know how to prevent vulnerability of several disease especially pulmonary tuberculosis.
2. Beside providing health education and support, public health service are also expected to conduct strict supervision of medication adherence pulmonary tuberculosis patients.

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