



Factors Related to the Incidence of Pneumonia in Children under Five at the Makki Public Health Center, Lanny Jaya Regency

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Abstract

Background: Pneumonia is one of the acute lower respiratory tract infections which is a major cause of morbidity and mortality in children under five years of age, especially in developing countries. The risk factors that cause the high mortality rate of pneumonia in children under five in developing countries are pneumonia that occurs in infancy, low birth weight, not receiving measles, DPT and Hib immunizations, not receiving adequate breastfeeding, malnutrition, and the environment. **Objectives:** The purpose of this study is to identify the factors related to the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency. **Methods:** This study was conducted at the Makki Public Health Center, Lanny Jaya Regency using a quantitative method with a Cross-Sectional design. A total of 21 cases were used in the study. Data were analyzed using Fisher's Exact Test. **Result:** According to the findings of this study, low birth weight ($p=0.002$) was significantly related to the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency. Meanwhile, occupancy density ($p = 1.000$), ventilation ($p=0.1.000$), and smoking behavior in the family ($p=0.198$), were not related to the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency.

Keywords: Risk factors; pneumonia; children under five.

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1. Introduction

Pneumonia is one of the acute lower respiratory tract infections that cause significant morbidity and mortality in children under the age of five, particularly in developing countries. Every day, approximately 2,500 children die as a result of pneumonia in toddlers. According to statistics, children under the age of five who died from pneumonia worldwide in 2015 accounted for 16% of all deaths in children under the age of five, or 920,136 children [1].

Pneumonia in infancy, low birth weight (LBW), not receiving measles immunization, DPT and Hib, not receiving adequate breastfeeding, and malnutrition are risk factors that contribute to the high mortality rate of pneumonia in children under five in developing countries [2].

According to the Republic of Indonesia's Ministry of Health in 2001, there are three (three) risk factors for pneumonia: environmental factors, individual child factors, and behavioral factors. Air pollution in the home, the physical condition of the home, and the density of housing are all environmental factors. Individual child factors include the child's age, birth weight, nutritional status, vitamin A status, and immunization status. While behavioral factors related to the prevention and control of pneumonia in infants and toddlers in this case are the mother's or other family members' handling of pneumonia in the family.

Building materials (e.g., asbestos), building structures (e.g., ventilation), upholstery materials for furniture and interiors (in organic solvents), residential density, outdoor air quality (ambient air quality), radiation from Radon (Rd), formaldehyde, dust, and excessive moisture all have an impact on indoor air pollution. Furthermore, activities in the home such as the use of environmentally unfriendly energy, the use of relatively cheap energy sources such as coal and biomass (wood, dry manure from livestock, agricultural residues), smoking behavior in the home, pesticide use, cleaning chemicals, and cosmetics all have an impact on air quality. These chemicals can emit pollutants that can linger in the home for an extended period of time [3].

According to the WHO 2017 report, pneumonia was responsible for 15% of all deaths in children under the age of five, or 5.5 million deaths, and there were more than 800,000 children in Indonesia based on the 2016 Balitbangkes registration system sample. In 2019, Indonesia had a 52.9 percent coverage rate for finding cases of pneumonia in children under the age of five, while Papua had a figure of only 0.2 percent [4].

According to the 2018 Basic Health Research (RISKESDAS) results, the prevalence of pneumonia based on health workers diagnoses and symptoms in Papua Province was 8%, putting Papua and NTT Provinces first [5].

According to data from the Lanny Jaya District Health Office, the incidence of pneumonia in children under the age of five was 1512 in 2018, 2654 in 2019, and 639 in 2020 [6]. Meanwhile at the Makki Health Center itself, the incidence was 187 in 2018, 108 in 2019, and 278 in 2020 [7].

According to the researcher's observations, the housing condition in the Makki Health Center's working area is dense housing, inadequate ventilation, smoking habits in the house, and the majority of babies born with low birth weight (LBW).

Based on this background, the researchers were interested in conducting a study at the Makki Health Center titled risk factors for the incidence of pneumonia in children under the age of five.

2. Methods

The research was conducted through observation using a cross-sectional design approach. This means that researchers only observe and measure variables at a single point in time. That is, each independent variable and dependent variable are observed, measured, and recorded simultaneously, and measurements are performed only once on the research subject [8]. This research was conducted at the Makki Public Health Center. The time of data collection starts from November to December 2021. The samples were taken as many as 21 infants by purposive sampling. Data were analyzing using Fisher's Exact Test with a 5% significant level.

3. Results

3.1. Relationship between Occupancy density and the Incidence of Pneumonia

Testing the relationship between occupancy density and the incidence of pneumonia using the Fisher's Exact Test. The test results can be seen in the following table:

Table 1: The relationship between the occupancy density and the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency.

Occupancy density	The incidence of Pneumonia				Total	%
	Pneumonia		Not Pneumonia			
	n	%	n	%		
Crowded	6	54,5	5	45,5	11	100
<u>Not crowded</u>	6	60,0	4	40,0	10	100
TOTAL	12	57,1	9	42,9	21	100

P-value = 1,000 (Fisher's Exact Test)

Source: Primary data, 2022

Based on Table 1, it was found that the incidence of pneumonia with dense residential densities was 6 people (54.5%). While the respondents who are not pneumonia with dense residential density are as many as 5 people (45.5%). The results of the Fisher's Exact Test statistical test obtained a p-value of 1,000 > significance level (0.05), then H0 is accepted. So it can be concluded that there is no significant relationship between residential density and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency.

3.2. The Relationship between Ventilation and the Incidence of Pneumonia

Testing the relationship of ventilation with the incidence of pneumonia using the Fisher's Exact Test. The test results can be seen in the following table:

Table 2: The relationship between ventilation and the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency.

Ventilation	The incidence of Pneumonia				Total	%
	Pneumonia		Not Pneumonia			
	n	%	n	%		
Did not fulfil the conditions	7	53,8	6	46,2	13	100
<u>Fulfil the conditions</u>	5	62,5	3	37,5	8	100
TOTAL	12	57,1	9	42,9	21	100

P-value = 1,000 (Fisher's Exact Test)

Source: Primary data, 2022

According to Table 2, it was found that the incidence of pneumonia with home ventilation did not meet the requirements, namely 7 people (53.8%). Meanwhile, the respondents who did not have pneumonia with home ventilation did not meet the requirements, namely 6 people (46.2%). The results of the Fisher's Exact Test statistical test obtained a p-value of 1,000 > the significance level (0.05), then H0 was accepted. So it can be concluded that there is no significant relationship between home ventilation and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency.

3.3. The Relationship between Smoking behavior and the Incidence of Pneumonia

Testing the relationship between smoking behavior and the incidence of pneumonia using the Fisher's Exact Test. The test results can be seen in the following table:

Table 3: The relationship between smoking behavior and the incidence of Pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency.

Smoking Behavior	The incidence of Pneumonia				Total	%
	Pneumonia		Not Pneumonia			
	n	%	n	%		
Smoking	8	72,7	3	27,3	11	100
<u>Not smoking</u>	4	40,0	6	60,0	10	100
TOTAL	12	57,1	9	42,9	21	100

P-value = 0,198 (Fisher's Exact Test)

Source: Primary data, 2022

According to Table 3, it was found that the incidence of pneumonia with families who had smoking behavior was 8 people (72.7%). While the respondents who are not pneumonia with families who have smoking behavior are as many as 3 people (27.3%). The results of the Fisher's Exact Test statistical test obtained a p-value of $0.198 >$ the significance level (0.05), then H_0 was accepted. So it can be concluded that there is no significant relationship between smoking behavior and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency.

3.4. The Relationship between Low birth weight and the Incidence of Pneumonia

Testing the relationship between low birth weight and the incidence of pneumonia using the Fisher's Exact Test. The test results can be seen in the following table:

Table 4: The relationship between smoking behavior and the incidence of Pneumonia in **children under five at the Makki Public Health Center, Lanny Jaya Regency.**

Low Birth Weight	The incidence of Pneumonia				Total	%
	Pneumonia		Not Pneumonia			
	n	%	n	%		
Low birth weight	10	90,9	1	9,1	11	100
<u>Not low birth weight</u>	2	20,0	8	80,0	10	100
TOTAL	12	57,1	9	42,9	21	100

P-value = 0,002 (Fisher's Exact Test)

Source: Primary data, 2022

According to Table 4, it was found that the incidence of pneumonia in families with low birth weight babies was 10 people (90.9%). Meanwhile, the respondents who did not have pneumonia who had low birth weight babies were 1 person (9.1%). The results of the Fisher's Exact Test statistical test obtained a p-value of $0.002 <$ significance level (0.05), then H_0 was rejected. So it can be concluded that there is a significant relationship between LBW and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency.

4. Discussion

4.1. Relationship between Occupancy density and the Incidence of Pneumonia

The results of this study indicate that there is no significant relationship between residential density and the incidence of pneumonia in children under five. Occupancy density is very sensitive to respiratory tract infections because a higher residential density will affect sensitive inhalation, making it easier to transmit to toddlers or other family members [9]. This study is not in line with research conducted by Putri Setyo Wulandari in 2016 which showed that there was a significant relationship between residential density and the incidence of pneumonia in children under five in the working area of the Jatasampurna Public Health Center, Bekasi City

[10].

The risk of a toddler getting pneumonia will increase if you live in a house with a dense occupancy rate. The level of residential density that does not meet the requirements is due to the area of the house that is not proportional to the number of families who occupy the house. The narrow area of the house with the large number of family members causes the ratio of occupants to the area of the house to be unbalanced. This residential density allows bacteria and viruses to be transmitted through breathing from one householder to another. Narrow living quarters, many occupants, lack of ventilation, can increase air pollution in the house, so that it can affect the toddler's immune system. Toddlers with weakened immune systems can easily get pneumonia again after having previously been exposed to pneumonia or recurrent pneumonia.

4.2. The Relationship between Ventilation and the Incidence of Pneumonia

The results of this study indicate that there is no significant relationship between ventilation and the incidence of pneumonia in children under five. The ventilation area is the ratio between the size of the hole (not the window) used as a means of entering and leaving air in a room with the floor area of the room. One of the requirements for a healthy house is to have a ventilation area that meets the requirements if it has a ventilation area of >5% of the floor area. Ventilation is used as a means of air exchange in the house so that fresh air circulation enters the house and dirty air leaves the house [11]. If the ventilation area does not meet the requirements, it will have a bad impact, namely reduced oxygen, increased carbon dioxide, increased humidity from the evaporation process of liquid from the skin so that it becomes a good medium for the growth of pathogenic bacteria that cause pneumonia [10].

This study is not in line with the research conducted in Tegal which proved that there was a significant relationship between ventilation area and the incidence of pneumonia. This study revealed that the ventilation area that does not meet the requirements can worsen the air circulation rate making it easier for bacteria, algae, fungi and insects to grow, this is due to low wind speed conditions. Meanwhile, other studies that are in line with their research prove that there is no relationship between the area of ventilation and the incidence of pneumonia in children under five. The extent of ventilation is thought to be a risk factor for pneumonia in infants, but in this study it has not shown a relationship between the extent of ventilation and the incidence of pneumonia in children under five [12].

4.3. The Relationship between Smoking behavior and the Incidence of Pneumonia

The results of this study indicate that the majority of toddlers who experience pneumonia are toddlers who have families who smoke living in one house compared to toddlers who do not have smoking families living in one house. Based on bivariate analysis using Fisher's test, it showed that there was no significant relationship between family smoking behavior factors and the incidence of pneumonia in children under five in the Makki Public Health Center, Lanny Jaya Regency.

The results of this study are not in line with research conducted by Gothankar (2018) which shows that toddlers who have families who smoke have a higher risk than families who do not smoke [13]. Smoke from cigarettes

and smoke from burning fuel such as for cooking with high concentrations will also cause pneumonia which results in reduced ciliary function, destroying humoral and cellular immunity both locally and systemically. The results of a similar study were also conducted by Putri Setyo Wulandari whose research showed that there was a relationship between the presence of smokers and the incidence of pneumonia in toddlers [10]. Smoking activities are usually carried out by the head of the family, namely the toddler's father, grandfather, mother or father. Cigarette smoke contains particles such as polycyclic hydrocarbons, carbon monoxide, nicotine, nitrogen oxides and acrolein which can cause damage to the ciliated epithelium, reduce mucociliary clearance and suppress phagocytic activity and bactericidal effects so that it can disrupt the defense system in the lungs [1].

4.4. The Relationship between Low birth weight and the Incidence of Pneumonia

The results of this study indicate that there is a significant relationship between birth weight and the incidence of pneumonia. Babies with low birth weight will have less than perfect formation of anti-immune substances, growth and maturation of organs and body organs are not perfect as a result, babies with low birth weight will be more at risk of complications and infections, especially pneumonia and other respiratory disorders. The results of this study are in line with research conducted by Arminingrum (2016) in the work area of the Bergas Public Health Center, Semarang Regency which showed that there was a significant relationship between the history of Low Birth Weight Babies (LBW) and the incidence of pneumonia in toddlers [14].

The results of this study are also in line with the theory put forward by Cunningham (2014) which states that low birth weight (LBW) babies will determine physical and mental growth and development in toddlers. Babies with low birth weight (LBW) show a tendency to be more susceptible to infectious diseases than babies with normal birth weight, this causes a high infant mortality rate [15]. Meanwhile, babies with normal birth weight, especially in the first month of birth, will form less than perfect immune substances, making them easier to get infectious diseases, especially pneumonia and other respiratory infections [16].

5. Conclusion

After conducting research on the risk factors for pneumonia in children under five in the Makki Community Health Center, Lanny Jaya Regency, it can be concluded that:

1. There is no significant relationship between house density and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency (p-value: 1,000).
2. There is no significant relationship between ventilation and the incidence of pneumonia in children under five at the Makki Public Health Center, Lanny Jaya Regency (p-value: 1,000).
3. There is no significant relationship between smoking behavior and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency (p-value: 0.198).
4. There is a significant relationship between LBW and the incidence of pneumonia in children under five at the Makki Health Center, Lanny Jaya Regency (p-value: 0.002)

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