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Research Article

The Determinant Of Pneumonia In Children Under Five Years Old Related To Environmental And Behavioral Factors

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ABSTRACT

Background: Pneumonia is an acute lower respiratory tract infection that affects the lung tissue (alveoli) and is the single biggest cause of death in children under 5 years old. Several factors cause pneumonia, namely, environmental factors, individual child factors, and behavioral factors . The purpose of this study was to determine the relationship between the physical home environment and behavior with the incidence of pneumonia in children.
Methods: This research is an analytic observational study using a Cross Sectional Study design. The population of this study was all mothers who had children aged 0-59 months in 2021 with a total of 1,045 people and 92 samples were obtained from the slovin formula.
Results: We found that out of 92 children who had pneumonia, around 34 children(37 %) had poor lighting, 34 children (37 %) had floors that did not meet the requirements, 36 (39.1%) had ventilation that did not meet the requirements, 20 children(21.7%) family members had a habit of smoking inside the house and 37 (30.2%) house windows that were not opened frequently. The results of statistical tests using the Chi-Square Test concluded that lighting, house floors, ventilation, smoking habits and the habit of opening windows were significantly related to the incidence of pneumonia in children with a p-value of 0.00 ; 0.002 ; 0.004; 0.005; 0.015 respectively.
Conclusions: Physical environmental factors of the house, lighting conditions, floors and ventilation that do not meet the requirements, and factors of smoking behavior and rarely opening the windows of the house are causes of pneumonia in children.

Keyword : Pneumonia, Environment, House, Behavior, Children

INTRODUCTION

Pneumonia is the single biggest cause of death in children worldwide. The first five years of a child's life (children), is a period that is very sensitive to the environment and this period lasts very short and cannot be repeated, so the toddler period is referred to as the "golden period" (golden period), "window of opportunity" (window of *opportunity*) . *opportunity*) and "critical *period* " [1] . Children are an age group that is vulnerable to nutrition and disease. Children under five must get protection to prevent diseases that can cause growth and development to be disrupted or even cause death [2] .

According to WHO (*World Health Organization*), pneumonia kills around 1.4 million children annually, accounting for 18% of all under-five deaths worldwide. Populations that are susceptible to pneumonia are children aged less than 2 years, elderly more than 65 years and people who have health problems (malnutrition, immunological disorders). As much as 95% of pneumonia sufferers in the world occur in developing countries, in this case it occurs in Southeast Asia and Africa [3,4] .

In Indonesia alone cases of pneumonia in children in an area are 10% of the number of children in that region. The mortality rate due to pneumonia in children is 1.19 % . In the infant group, the mortality rate was 2.89% higher than in the 1-4 year age group which was 0.20% [5] . In Southeast Sulawesi, pneumonia cases are 20.99% in 2021 with the Kendari city area being one of the areas with the highest prevalence of 33.13%. From several Health centre in Kendari City, the highest pneumonia case (first order) in 2021 was the Nambo Health Center with 71 cases (68.20%) while the lowest case was the Mokoau Health Center with 1 case (0.73%) [6.7] .

There are several parameters that cause pneumonia, namely environmental factors, individual child factors, and behavioral factors. Environmental factors include air pollution in the house, the physical condition of the house, and the density of the house's occupancy. Individual child factors include the child's age , birth weight, nutritional status, vitamin A, and immunization status. Meanwhile, behavioral factors that can increase the risk of pneumonia are the use of fuel and smoking behavior. The practice of treating pneumonia in the family, whether carried out by the mother or other family members, is very important for the prevention and management of pneumonia in infants and children[8–10] .

The results of the initial observations made in the working area of the Poasia Health Center in 10 families, showed that 80% of the families of children still smoked in the house. Children who are exposed to cigarette smoke continuously can be at risk of developing pneumonia. Unfavorable behavior such as the habit of rarely opening the windows of the house or bedroom windows is also at risk of getting pneumonia in children. Physical environmental factors such as the absence of good ventilation facilities, poor lighting in the room, and the ground floor of the house.The increase in cases of pneumonia under five in the working area of the Nambo Health Center is due to the condition of the home environment and unhealthy behavior of the community . Thus the purpose of this study was to analyze the relationship between the physical home environment and behavior with the incidence of pneumonia in children in the working area of the Nambo Health Center.

METHOD

Participants and Data Collection

This research is an analytic observational study using a *Cross Sectional Study design* . The population of this study were all mothers with children under 5 years old in 2021 with a total sample of 92 children who were selected using a simple random sampling technique. Data collection was carried out by interviews using questionnaires, observations using observation sheets and measurements using *a roll meter* to obtain ventilation area data and *a lux meter* to obtain lighting data.

Measurement and statistical analysis

The incidence of pneumonia was categorized as suffering and not suffering. Factors in the physical environment of the house, namely lighting, house floors and ventilation are categorized as fulfilling the requirements and not fulfilling the requirements. Meanwhile, smoking habits and closing windows are categorized as yes or no. Data analysis was carried out in 2 stages including univariate analysis in which each variable would produce the distribution and percentage of each variable studied and a bivariate analysis was used to see the relationship between the two variables, namely the independent and dependent variables and displayed in the form of a contingency table using the Chi-Square test.

Ethical considerations

The study was approved by the Health Research Ethics Committee, Mandala Waluya University (date: 16.05.2022, decision no: 018/KEP/UMW/V/2022, protocol no: 1552218013).

RESULTS

The results of our study showed that out of 92 respondents mothers under five were dominated by the age group 25-29 years as many as 32 (34.8 %) with the level of education most of the mothers did not attend school or dropped out of school 35 (38%) so that the majority 73(79) .3%) mothers under five do not work but only as housewives. Whereas in children, the largest age group was the age group 12-23 months in 41 (44.6 %) with the most sex being male 63 (68.5%). The characteristics of the respondents are seen in Table 1.

Table 1. Characteristics of Respondents

Characteristics of Respondents	n	%
Mother's age		
≤ 20	8	8,7
21–24	10	10,9
25–29	32	34,8
30-34	28	30,4
≥ 35	14	15,2
Mother's Education		
No school	35	38.0
Elementary School	9	9,8
Junior High School	12	13.0
Senior High School	31	33,7
Diploma	4	4,3
College	1	1,1
Mother's job		
Trader	4	4,4
Self-employed	10	10,9
civil servant	5	5,4
Doesn't work	73	79.3
Toddler Age		
0 – 11 Months	9	9,8
12 – 23 Months	41	44,6
24 – 35 Months	21	22,8
36 – 47 Months	8	8,7
48- 59 Months	13	14,1
Toddler Gender		
Man	63	68.5
Woman	29	31.5

Bivariate analysis aims to determine which variables are significantly related to the incidence of pneumonia in children. The results of the bivariate analysis showed that of the 92 children who had pneumonia, around 34 (37%) had inadequate lighting in their homes , 34 (37 %) had floors that did not meet the requirements, 36 (39.1%) had ventilation that did not meet the requirements. 20 (21.7%) family members had a habit of smoking inside the house and 37 (30.2%) house windows that were not opened frequently. Furthermore, the results of statistical tests using the Chi-Square Test concluded that lighting, house floors, ventilation, smoking habits and the habit of opening windows were significantly related to the incidence of pneumonia in children with a p-value of 0.001 each; 0.002; 0.004; 0.005; 0.015 (Table 2).

Table 2. Bivariate analysis of factors associated of Pneumonia

Variable	Pneumonia incident		Total n (%)	P-values
	Not Suffering n (%)	Suffer n (%)		
Lighting				
Good	29 (31.5)	15 (16.3)	44 (47.8)	0.001*
Not enough	14 (15,2)	34 (37.0)	48 (52.2)	
House floor				
Eligible	28 (30.4)	15 (16.3)	43 (46.7)	0.002*
Not eligible	15 (16.3)	34 (37.0)	49 (53.3)	
Ventilation				
Eligible	27 (29.3)	13 (14,1)	40 (43.4)	0.004*
Not eligible	16 (17,4)	36 (39.1)	52 (56.5)	
Smoking habit				
Yes	12 (13.0)	29 (31.5)	41 (44.6)	0.005*
No	31 (33.7)	20 (21.7)	51 (55.4)	
Window Opening Habit				
Yes	22 (23.9)	12 (13.0)	34 (36.9)	0.015*
No	21 (22.8)	37 (40.2)	58 (63.0)	

Data were use Chi-Square Test
*a p-value <0.05 was statistically significant

DISCUSSION

We found that environmental factors such as lighting, house floors and ventilation were the causes of pneumonia in children. The results of our observations show that most of the natural lighting in the respondent's house does not meet the requirements. The respondent's house is more often closed so that the intensity of light that enters the house is relatively low and the windows in the house do not open, but there are several houses where natural light exceeds the requirements [11,12] . Natural lighting that exceeds the limit of 100 lux can be caused by too many glass tiles installed on the roof of the respondent's house. In addition, floor conditions that do not meet standards are a good medium for the growth of bacteria or viruses that cause pneumonia [1 8,13] . Our observations on toddler homes show that there are houses where the floors are still made of earth, houses with floors made of planks and floors in concrete but not yet plastered. The results of interviews with mothers of children, for the floor of a house

made of soil, if it's the dry season, the conditions inside the house are very dusty and if it's not sprinkled with water, the dust in the house really disturbs the breathing of every occupant in the house, especially children and if it's the rainy season, the conditions are the house is very damp. Coupled with the large ventilation area of the respondent's house, it does not meet the requirements because most of the respondent's houses are minimalist in shape with a small room area big And making design the ventilation Also No big and make the sun's rays enter the house not illuminating the whole room [14] . The ventilation area referred to in this study is the window area (in the living room, family room and bedroom) divided by the floor area (in the living room, family room and bedroom)Sleep). The ventilation size that meets the requirements is 10% of the floor area. The ventilation area of the house that functions for air regulation, because the condition of the walls of the house can contribute to the creation of humidity and temperature which allows disease germs to die or reproduce.The risk of children getting pneumonia will increase if they live in a spacious house with ventilation that does not meet the requirements [15] . The ventilation area of the house that does not meet the requirements is due to the small type of house due to narrow land ownership. More house ventilation only at the front of the house. While on the side it coincides with the wall of the neighboring house. Home ventilation is related to the humidity of the house, which supports the vitality of viruses and bacteria. Sunlight can kill bacteria or viruses, so adequate lighting will reduce the risk of pneumonia [11,16] .

Pneumonia is not only caused by environmental factors, but behavioral factors can also be a trigger for the occurrence of pneumonia in children if unhealthy behaviors are applied daily such as smoking in the house and not often closing windows. The results of our observations show that most of the respondents have family members who smoke at home, most of them are the parents of the boys themselves. The average cigarette smoked per day is less than 1 (one) pack average - the average cigarette smoked per day is less than 1 (one) pack . Cigarette smoke is not only a direct cause of respiratory disease in children, but also an indirect factor which can weaken the immune system of children[17,18] . Cigarette smoke can reduce the ability of macrophages to kill bacteria. Another factor is also due to the high concentration of CO in inhaled cigarette smoke resulting in increased COHb levels in the blood. Apart from being harmful to people who smoke, the presence of cigarette smoke containing CO is also harmful to people around them because the smoke can be inhaled [19,20] . The incidence of pneumonia in this study was caused by cigarette smoke where smoking is a lifestyle for everyone, generally parents of children (fathers or other families living in the house) smoke cigarettes while resting after work or after eating. They do not realize that cigarette smoke contains nicotine which can irritate the respiratory tract in children under five, especially parents (fathers) who smoke while carrying their children. In addition , most of the windows in the respondent's house were not opened and covered with curtains and had permanent windows, which prevented sunlight from entering the room. In accordance with the theory, it is known that the habit of opening windows will make it easier for sunlight to enter the house and opening windows every day from morning

to evening is very important for air exchange [21,22].

CONCLUSION

This study found that environmental factors, lighting conditions, house floors and ventilation that did not meet the requirements, smoking behavior and rarely opening the windows of the house were the causes of pneumonia in children. Inadequate lighting causes low room temperature and high humidity, making it a good medium for the growth of pneumonia-causing bacteria. Lack of lighting in the house because it has ventilation with a closed model or has no ventilation, the habit of smoking family members which causes cigarette smoke to be inhaled by children and windows that are rarely opened so that it reduces the possibility of sunlight to enter the room in the house and causes air to not flow perfectly. In addition, houses with non-permanent floors (earth) have a major contribution to the incidence of pneumonia because the floor of a house made of soil will cause the conditions inside the house to become dusty. Thus the importance of socialization and education from the government regarding early prevention of pneumonia, especially in children at the toddler posyandu in each village.

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