The Correlation Of House's Physical Environtment Factors With Infants Pneumonia In Working Areas Of Community Health Center Sirimau District, In 2017 Ambon City

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Abstract*: Pneumonia is still an infectious disease that causes death of many infants in either Regency or City of Ambon. The low quality of home physical environment factors is one of the main causes of this disease that become a dangerous threat for toddlers in Ambon Regency / City. This study aims to find out the correlation of house physical environment factors with the incidence of infants pneumonia of Community Health Center in Sirimau District in Ambon City in 2017. The design of this research uses a case control (retrospective study) with 62 subjects. Data collection is done through direct observation and check list tools. The results showed the type of house floor (OR=7,667), walls condition (OR=15), ventilation width (OR=5), residential density (OR=4,2), humidity level (OR=6,12), and light intensity (OR=10,714) are the risk factors of the infant pneumonia in working area of community health center sirimau district, ambon in 2017. In conclusion of this research is physical environment factors of the house which include the type of floor of the house, walls condition, ventilation width, residential density, humidity level, and light intensity have meaningful correlation with Infant pneumonia in working area of community health center sirimau district ambon city in 2017*

Keywords*: house's physical environment factors, pneumonia, infants.*

I. Introduction

Maluku province is one of Eastern Indonesian province that has vulnerability of pneumonia virus transmission. In 2017, Infant Mortality Rate (IMR) in Ambon City reached 5.4 per 1,000 live birth rates. Infant Mortality at the age ranging from 0-11 months had reached 12.7% caused by Pneumonia. Meanwhile, the death of infants by the age of 0-59 months was 13.2% due to Pneumonia.[1]

The numbers of pneumonia cases toward infants that have been discovered and handled in Maluku Province in 2017 were 599 cases with a percentage of 3.64% from the estimated cases, which were obtained by estimation based on population in all regencies / cities of Maluku province, of 16,466 cases. Whereas, cases of infants Pneumonia that were found and handled in Ambon Regency / City in 2015 amounted to 58 cases with a percentage of 1.1% from the estimated cases obtained by estimation based on the population of Ambon Regency / City, which is 5,220 cases.[2,3]

Pneumonia is still an infectious disease that causes infant mortality in Ambon Regency / City. The low quality of home physical environment factors is one of the main causes of this disease which is still a dangerous threat for toddlers in Ambon Regency / City. The physical environment factors of house can be type of floor in the house, conditions on walls, extent of house ventilation, level of occupancy density house, level of humidity, and intensity of light.

Based on this description, it is necessary to conduct research to determine the impact of the physical environment factors of the house with the incidence of pneumonia in infants in Community Health Center in the Sirimau District in Ambon City in 2017.

II. Method

The observation research used in this study with a case control design. The population of this study was all outpatients, who were suffering Pneumonia, in working area of Community Health Center, Sirimau District, Ambon City in 2017. In January-December 2017 there were 86 infants suffering from Pneumonia. The sample in this study was 32 cases and 32 controls toddlers. Primary data was collected through direct observation / observation and check list tools, while secondary data was obtained by researchers through study documentation of routine Puskesmas report files in the work area of Sirimau District, Ambon City in 2017. The research data that has been collected completely was analyzed by researchers using univariate analysis methods / techniques

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through frequency distribution, bivariate analysis through Chi Square test, and multivariate analysis through logistic regression tests.

III. Result

Based on the results of statistical tests on univariate analysis through frequency distribution it was known that the majority ages of parents respondents were 20-30 years old, in the case group 68.8% and in the control group 62.5%; the majority parents of respondents were housewives, in the case group it was 56.3% and in the control group at 59.4%; the majority parents of respondents had high school education, in the case group it was 59.4% and in the control group 75.0%, and the majority parents of respondents had toddlers with female sex, in the case group it was 53.1% and in the control group 62.5%.

The common type of house floor in cases group were not permanent floor, such as the ground floor / plank / woven bamboo that close to the ground / plaster that was cracked and dusty (75%) and in the control group the respondent's home floor was a permanent floor, such as plastered / tile / ceramic floors (71,9%); the average condition of the walls of the house in cases group were not walls and semi-permanent walls (50%) and the wall in control group the respondent's house was a permanent wall (93,8%); the average home ventilation in the case group is no ventilation or ventilation but there is extensive permanent ventilation <10% of the floor area (62.5%) and in the control group of respondents', that was ventilation there, with extensive permanent ventilation (75,0%); the average occupancy density in the case group was solid, with a population of> 9 m2 / person (68.8%) and in the control group the occupancy density of respondents was not solid, with the number of occupants being <9 m2 / person (65,6); the average air humidity at home in the case group was moist with a humidity level of <40% and < 70% (53,1%) and in the control group the humidity in the respondent's house was not moist, with moisture levels 40%-70% (84,4%%); and the average light intensity at home in the case group was haven't enaugh of sunlight intensity < 60 Lux (75%) and the light intensity in control group the respondent's house was have enaugh sunlight intensity ≥ 60 Lux (78,1%).

In table 1. shows the results of statistical tests on bivariate analysis through the chi square test, 1) there was a significant association between the type of house floor and the incidence of pneumonia in infants (p-value = 0,000), [OR = 7,667 (95% CI; 2,254-23,284)], (2) there was a significant association between the condition of the wall of the house and the incidence of pneumonia in infants (p-value = 0,000), [OR = 15 (95% CI; 3,058-73,576)], (3) there was a significant association between the extent of home ventilation and the incidence of pneumonia in infants (p-value = 0,002), [OR = 5 (95% CI; 1,709-14,628)], (4) there was a significant association between the level of occupancy density and the incidence of pneumonia in infants (p-value = 0,006), [OR = 4,2 (95% CI; 1,478-11,936)], (5) there was a significant association between the level of humidity and the incidence of pneumonia in infants (p-value = 0,002), [OR = 6,12 (95% CI; 1,88-19,919)], and (6) there was a significant association between light intensity and the incidence of pneumonia in infants (p-value = 0,000), [OR = 10,714 (95% CI; 3,363-34,135)].

Table 1. Recapitulation of Statistical Tests on Bivariate Analysis

No	Variabel	P	OR	95% CI		Information
				Lower	Upper	
1	Type of house floor	0,000	7,667	2,254	23,284	Significant
2	Wall condition	0,000	15	3,058	73,576	Significant
3	Area of house ventilation	0,002	5	1,709	14,628	Significant
4	Occupancy density level	0,006	4,2	1,478	11,936	Significant
5	Humidity level	0,002	6,12	1,88	19,919	Significant
6	Light intensity	0,000	10,714	3,363	34,135	Significant

In table 2. show the results of a multivariate logistic regression analysis, such as the physical environment factor variables that influence the incidence of pneumonia in infants in the Work Area of Community Health Center in the Sirimau District in Ambon City in 2017 were the floor type of the house, the condition of the house walls, the extent of home ventilation, the level of occupancy density, the level of humidity, and the intensity of light. The strength of the association can be seen from the OR value. The strength of the largest and smallest association is the level of humidity and the condition of the house walls.

Table 2. Results of Logistic Regression Analysis of Physical Environmental Factors of Houses

No	Variabel	B	P	Exp (OR)	95% CI	
					Lower	Upper
1	Type of house floor	4,298	0,043	73,566	1,143	4736,920
2	Wall condition	3,966	0,039	52,799	1,220	2285,584
3	Width of house ventilation	4,651	0,024	104,729	1,858	5902,294
4	Occupancy density level	4,260	0,013	70,786	2,466	2031,881
5	Humidity level	6,345	0,016	569,366	3,260	99436,271
6	Light intensity	4,384	0,013	80,121	2,547	2520,321

Constanta :-44,625

IV. Discussion

The results of the study prove that the type of house floor is one of the factors of the physical environment of the house that causes Pneumonia in infants in the Sirimau District Community Health Center in Ambon City in 2017. The floor is a wall covering the bottom of the house that must be tightly watered and always dry so that it is easy to clean from dirt and dust. In addition, making permanent house floors, such as ceramics or tiles, must be considered in order to avoid rising soils which can cause increased humidity in the room. If the type of floor is classified as not permanent, it is very possible for the condition of the house to be moist, so that it is resulting the precondition of growth of germs, fungi, or pathogenic bacteria Streptococcus Pneumoniae and Haemophyilus Influenzae which can cause pneumonia in infants.[4]

The results of the study prove that the condition of the walls of the house is one of the factors causing the incidence of pneumonia in infants in the Work Area of Community Health Center the Sirimau District in Ambon City in 2017. The wall serves as a protector both from rain and wind disturbances and protects from the influence of heat, so that the best used is a pair of bricks or walls (permanent) that are not flammable and waterproof so that they are easy to clean. If the condition of the walls that are not walls and semi-permanent walls have never been cleaned of dust or dirt, then the wall can be a container or place for viruses or bacteria that cause pneumonia in infants. This is because the condition of the walls of the house is not permanent can affect the humidity in the house, causing the proliferation of viruses and bacteria that cause pneumonia.[5]

Ventilation in a house serves to keep the air flow in the house fresh. Lack of extensive ventilation will cause a lack of oxygen in the home, so that CO2 levels increase which can be toxic to residents. The lack of ventilation also increases the humidity in the house.[6] This moisture is a good medium for the development of pneumonia-causing bacteria. However, if the ventilation area in the house meets the standards, then the ventilation can function to free the air inside the house from bacteria, especially bacteria that cause pneumonia, because there is always a continuous flow of air so that the bacteria carried by the air will always flow. Thus, it can be explained that ventilation has a very important role to ensure the quality and adequacy of air circulation coming out and inside the house. Lack / insufficient ventilation (<10% of the floor area) will make pollutants in the room longer, which will increase the risk of exposure to pollutants in the room.[6]

The research results prove that occupancy density is one of factors causing case of Pneumonia toward infants in working area of Community Health Center, Sirimau District, Ambon City in 2017. The increase of Pneumonia risk toward infants occurred because the disease pathogens can be spread faster in a dense environment. The density of occupancy will increase room temperature caused by breathing process and exhalation of hot air from human body that lives in the house. This will increase the humidity due to the vapor of breathing and the body temperature. Therefore, the more number of occupants in the house, the faster air will be polluted by gas or bacteria that can interfere to the health of infants' lung (Pneumonia).[7] Therefore, every house that is not densely populated can reduce the risk of pneumonia toward infants. The High density of housing will affect the house temperature. Overcrowded house occupants will increase the temperature inside the house due to the expenditure of body heat. High indoor air temperature can allow bacteria to grow and multiply with.[8]

The results of study prove that humidity level is one of factors that causing occurrence of Pneumonia toward infants in working area of Community Health Center, Sirimau District, Ambon City in 2017. Air humidity is inversely related to air temperature, if the air temperature is low the air humidity will increase. High humidity in the house can be affected by the humidity outside the house. In addition, air humidity can also be affected by ventilation in the house, because good air circulation will regulate the humidity level inside the house. Furthermore, the types of floor and walls condition of house also contribute to the humidity inside. Humidity that does not meet health requirements is good place for Pneumonia microorganisms to grow which can affect the infants. Low humidity conditions, which are often but not always accompanied by low temperatures, enhance survival times of viral aerosols.[9]

Moreover, another result of the study prove that light intensity is one of factors that also causing the occurrence of pneumonia toward infants in working area of Community Health Center, Sirimau District ,Ambon City in 2017. The lighting is considered natural home lighting by sunlight through windows, vents and doors from the east side in the morning and west side in the afternoon. One reason for the lack of natural lighting

entering the house is because the house is located in an area of dense population, so the distance between one house to another is very narrow and reducing sunlight into the house. Though, this lighting is indeed very important to light the house, reducing humidity, and killing germs. If the room in the house does not get a good intensity of sunlight (stuffy and humid), then it is possible that the viral microorganisms or pathogenic bacteria is causing Pneumonia. A different wavelength (780 nm laser device) was tested to compare the ICG efficiency to be photoactivated for two different light sources and wavelengths. And in conclusion, it is possible to optimize the ICG concentration, incubation time, and light dose in a way to obtain bacterial death in the absence of toxic effects on the co- incubated macrophages.[10]

V. Conclusion

The result of the research shows type of house floor (OR=7,667), walls condition (OR=15), ventilation width (OR=5), residential density (OR=4,2), humidity level (OR=6,12), and light intensity (OR=10,714) those are the risk factors of Infant pneumonia in working area of Community Health Center, Sirimau District, Ambon City in 2017. Therefore, this research conclude that home physical environment that consist of types of floor, walls condition, extent of ventilation, occupancy density, level of humidity, and also light intensity have meaningful interconnection toward infants Pneumonia case in working area of Community Health Center, Siramau District, Ambon City in 2017.

Acknowledgments

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