Home Environmental Factors and ARI among Toddlers in Semurup Community Health Center, Kerinci Regency

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ABSTRACT

ARI is a disease that can cause death, especially in children. The initial survey that has been conducted still found that residents' houses are not permanent, some of which still use flammable materials such as wood and plywood. Semi-permanent houses are still quite a lot, namely 271, wooden houses as many as 68. The location of the house is close to the market, and there are still many houses that are close together. Some of the house ventilation there also still does not meet the requirements for a healthy home. This study aims to analyze the condition of the home environment with the incidence of ARI in toddlers in the Semurup Health Center Work Area, Air Hangat District, Kerinci Regency in 2023. This type of research is cross-sectional. The sample in this study amounted to 108 respondents. Data were analyzed using Chi-Squere and logistic regression. The results showed a significant relationship between parental knowledge, ventilation area, housing density, smoking habits, wall types, lighting, and air humidity with the incidence of ARI. There is no relationship between parental income and the incidence of ARI in toddlers. The variables of lighting, air humidity, and parental knowledge are the most dominant in the incidence of ARI in toddlers in the working area of the Semurup Health Center, Air Hangat District, Kerinci Regency in 2023.

Keywords: influencing factors, ARI, toddlers

INTRODUCTION

Acute Respiratory Infection (ARI) killed more than 808,000 children under the age of 5 in 2017, accounting for 15% of all deaths of children under the age of 5. People at risk of pneumonia also include adults over the age of 65 and people with pre-existing health problems (WHO, 2019). In Indonesia, respiratory infection is the cause of 16% of toddler deaths, an estimated 920,136 toddlers in 2015. The population mortality rate due to pneumonia in toddlers in 2016 was 0.11%, while in 2015 it was 0.16%. The mortality rate due to pneumonia in 2016 in the 1-4 age group was slightly higher at 0.13% compared to the infant group, which was 0.06% (Ministry of Health of the Republic of Indonesia, 2018). Jambi is a province with a fairly high prevalence of ARI based on the results of the 2018 Jambi Province Riskesdas. According to the diagnosis of health workers, some symptoms

had been experienced by household members (ART) of 5.5%. In Jambi Province, one of the dominant diseases is ARI. The prevalence of ARI in Jambi Province, diagnosed according to health workers, was 3.20%, while based on the diagnosis or symptoms that had been experienced, it was 5.55%. The incidence of ARI in Jambi Province was dominated by the age group 70+ years 3 at 10.88%, at the age of 15-24 years by 6.88%, and at the age of <1 year by 5.19%. Kerinci Regency is ranked first with the highest prevalence of ARI in Jambi Province at 6.15%. According to data from the Central Statistics Agency of Kerinci Regency in 2019, ARI also ranked first out of 10 diseases that dominate in Kerinci Regency, namely 15,096 cases with a prevalence of 64.96%. The incidence of ARI almost dominates in every sub-district in Kerinci Regency.

Factors that influence the high rate of ARI in toddlers in general, namely individual child factors (nutritional status, age, immunization status, regulARIty of vitamin A administration) and environmental factors (indoor air pollution, ventilation, house, and density of housing) (Maryunani, 2017). Environmental factors are related to the incidence of ARI, especially the home environment (ARIano et al., 2019). The physical quality of the environment that does not meet the requirements can also be a medium for the growth of disease-causing organisms that will meet the health of the occupants of the house (Mahendrayasa and Farapti, 2018).

Houses with high occupancy density have lower air circulation and can be susceptible to disease because disease transmission will be faster if there is mass gathering coupled with the area of house ventilation that also does not meet the requirements of a healthy house, thereby increasing humidity and room temperature, which is not optimal. Based on the Indonesian Minister of Health No. 1077/MENKES /V/2011 concerning guidelines for the distribution of indoor air in the house. Suboptimal humidity and room temperature can cause the growth of bacteria that cause ARI, as well as lighting in the house, because light that enters the house, especially sunlight, can kill bacteria that cause ARI, while the condition of the house building, such as floors, walls, and roofs, and those that do not meet the requirements of a healthy house, such as dusty, damaged, or damp, can also cause ARI in toddlers (Putrid and Mantu, 2019).

LITERATURE REVIEW

Acute Respiratory Infection (ARI) is an acute respiratory disease with various symptoms (syndromes) caused by bacteria or viruses. Acute respiratory infection is the main cause of

morbidity and mortality in toddlers in developing countries such as Indonesia. ARI that is not handled properly will enter the lung tissue and become the main cause of death in toddlers (Yorida, 2017).

Another definition of ARI is one of the environmental-based diseases that spread through the air. This disease can be transmitted if the virus or bacteria contained in the droplets are inhaled by a healthy person. Droplets from sufferers can spread through coughing or sneezing. The process of disease occurrence after the disease agent is inhaled takes place in an incubation period of 1 to 4 days until it develops and causes ARI. If the air contains substances that are not needed by humans in dangerous amounts, then the quality of the air environment can determine various types of disease transmission (Yuhendri, 2019).

The etiology of ARI consists of more than 300 types of bacteria, viruses, and rickettsia. Bacteria that cause ARI include the genera Streptococcus, staphylococcus, pneumococcus, Hemophilus, bordetella, and Corynebacterium. Viruses that cause ARI include myxovirus, adenovirus, coronavirus, picornavirus, mycoplasma, herpesvirus, and others (Gusti, 2017).

Several diseases have direct clinical manifestations of ARI, such as diphtheria, pertussis, and measles. Diphtheria is a disease that is easily transmitted, and the focus of the organs attacked is mainly the upper respiratory tract so it manifests directly in the occurrence of ARI. In addition to diphtheria, measles can also manifest directly in the occurrence of ARI. Similar to diphtheria, the morbilli virus that causes measles also attacks the nasopharynx and will eventually cause clinical symptoms resembling influenza (Laode, 2016).

Influenza viruses and rhinoviruses are examples of viruses that can cause ARI. Acute respiratory tract infections can be suffered without symptoms in the form of mild infections but can also be severe and fatal infections. This disease is caused by various causes (multifactorial) that attack the upper respiratory tract, namely involving the nose and throat, the lower respiratory tract, the trachea, the bronchi, and the lungs. Although the respiratory tract organs above are involved, the focus is on the lungs because of the high mortality of pneumonia (Yorida, 2017).

Acute Respiratory Tract Infections (ARI) are caused by bacteria or viruses that enter the respiratory tract. Another cause of ARI is smoke from burning wood fuel, which is usually used for cooking. This wood fuel smoke attacks many people's environments because people, especially housewives, always cook every day using wood, gas, or oil fuel. The emergence of this smoke without realizing it, they have inhaled it every day, so many people complain of coughing, shortness of breath, and difficulty breathing (Gusti, 2017).

The level of pollution produced by fuel-using wood is much higher than fuel using gas.

Several studies have shown that exposure to indoor pollution increases the risk of ARI in children. The results of the use of biomass fuels produce, among others, CO, NOx, SO2, ammonia, HCL, and hydrocarbons, including formaldehyde, benzene, and benzo (a) pyrene, which are potential carcinogens and particulates. Hydrocarbons and CO are produced at high levels. Substances produced from the use of biomass fuels are substances that are harmful to health and can cause various diseases (Sri, 2017).

The pathophysiology of ARI is the invasion of pathogens resulting in an inflammatory reaction due to the immune response. Infection by bacteria, viruses, and fungi can change the pattern of bacterial colonization. Defense mechanisms arise in the respiratory tract, such as air filtration, inspiration in the nasal cavity, cough reflex, epiglottis reflex, mucociliary clearance, and phagocytosis. Due to the decreased immunity of toddlers, pathogenic bacteria can pass through the body's defense system mechanism, resulting in invasion of the upper and lower respiratory tract. Transmission or spread of ARI is very easy to occur through coughing and sneezing, which form infectious particles in the air that can be transmitted from sick people to people who are at risk of infection due to immune factors (Agrina, Suyanto, and Arneliwati, 2014).

METHODS

This research design is quantitative. The method used is cross-sectional. The location of the study was carried out in the Semurup Health Center Working Area, Kerinci Regency, which consists of 6 health centers and 24 villages. This research was conducted in October-December 2023. The population is the entire object of research or the object being studied. The population in this study were all mothers who had toddlers aged 0-59 months, with the number of visits in May 2023 being 108 visits. The sample in this study were mothers who had toddlers at the Semurup Health Center and had been appointed to the Semurup Health Center sanitation clinic, with the number of samples in this study being 108 mothers of toddlers.

Inclusion criteria in this study: mothers have toddlers aged 0-59 months, mothers have been appointed to the Semurup Health Center sanitation clinic, and Received treatment at the Semurup Health Center, Kerinci Regency, in 2023. Located in the Semurup Health Center working area, Willing to be respondents. Exclusion criteria Not willing to be a respondent, Mother does not have a toddler aged 0-59 months, Never been appointed to the Semurup Health Center sanitation clinic, Not treated at the Semurup Health Center, Kerinci Regency in 2023, not domiciled in the Semurup Health Center work area.

RESULTS

Table 1. Frequency Distribution Based on the Description of Variables Related to the Incidence of ARI

No.	Variable	Total	Percentage
I	**Parental knowledge**		
1.	Poor	87	80,6
2.	Good	21	19,4
II	**Ventilation area**		
1	Does not meet	77	71.3
2	Meets	31	28.7
III	**Occupancy density**		
1.	Does not meet	79	73.1
2.	Meets	29	26.9
IV	**Smoking habits**		
1.	Smoking	86	79.6
2.	Non-smoking	22	20.4
V	**Wall type**		
1.	Does not meet	76	70.4
2.	Meets	32	29.6
VI	**Lighting**		
1.	Does not meet	79	73.1
2.	Meets	29	26.9
VII	**Air humidity**		
1.	Does not meet	76	70.4
2.	Meets	32	29.6
VIII	**Parental income**		
1.	Low	68	63.0
2.	High	40	37.0
	Total	**108**	**100.0**

The results of the study on 108 respondents showed that most respondents had poor knowledge as many as 87 respondents (80.6%), the house had a ventilation area that did not

meet the requirements of as many as 77 respondents (71.3%), the density of housing did not meet the requirements as many as 79 respondents (73.1%), had a smoking habit as many as 86 respondents (79.6%), had a wall type that did not meet the requirements as many as 76 respondents (70.4%), lighting did not meet the requirements as many as 79 respondents (73.1%), air humidity did not meet the requirements as many as 76 respondents (70.4%), low parental income as many as 68 respondents (63%).

Table 2. Factors Influencing the Utilization of Integrated Non-Communicable Disease Development Posts (Posbindu PTM) in Siulak Deras Mudik Village, Gunung Kerinci District, Kerinci Regency.

No	Variable	ARI Incident						
		ARI		No ARI		N	%	*p-value*
		N	%	N	%			
I	**Parental knowledge**							0,000
1.	Poor	80	92,0	7	8,0	87	100	
2.	Good	9	42,9	12	57,1	21	100	
II	**Ventilation Area**							
1	Does not meet	71	92,2	6	7,8	77	100	0,000
2	Meets	18	58,1	13	41,9	31	100	
III	**Residential Density**							
1.	Does not meet	75	94,9	4	5,1	79	100	0,000
2.	Meets	14	48,3	15	51,7	29	100	
IV	**Smoking habit**							0,000
1.	Smoking	79	91,9	7	8,1	86	100	
2.	No smoking	10	45,5	12	54,5	22	100	
V	**Wall type**							

1.	Does not meet	71	93,4	5	6,6	76	100	0,000
2.	Meets	18	56,2	14	43,8	32	100	
VI	**Lighting**							
1.	Does not meet	73	92,4	6	7,6	79	100	0,000
2.	Meets	16	55,2	13	44,8	29	100	
VII	**Air humidity**							
1.	Does not meet	73	96,1	3	3,9	76	100	0,000
2.	Meets	16	50,0	16	50,0	32	100	
VIII	**Parental income**							0,197
1.	Low	59	86,8	9	13,2	68	100	
2.	High	30	75,0	10	25,0	40	100	

DISCUSSION

The results of a study conducted by Febrianti (2020) showed a relationship between parental knowledge and the incidence of ARI in toddlers. Meanwhile, research by Salim et al. (2021) did not find any relationship between parental knowledge and the incidence of ARI in toddlers. According to research by Salim et al. (2021), the absence of a relationship between parental knowledge and the incidence of ARI in toddlers is caused by other factors such as habits in society, which are usually more strongly correlated than knowledge. The high incidence of ARI occurs due to the lack of maternal knowledge in preventing ARI. Many mothers only know what ARI is but do not know the dangers, impacts, and how to prevent it, such as not providing exclusive breastfeeding for 0–6 months, not providing complete immunizations, and not keeping toddlers away from families who smoke (Sabri et al., 2019). Ventilation can affect the incidence of ARI, such as research conducted by Mahendrayasa and Farapti (2018) and Safrizal (2017), which state that there is a relationship between home ventilation and the incidence of ARI. A person who has inadequate home ventilation has a risk of getting ARI 2,590 times greater than a person who has good home ventilation. The ventilation system builds components that support the ventilation process or air exchange in space. This component can be in the form of a part of the building itself or the form of

additional equipment installed in the building (Ministry of Health of the Republic of Indonesia, 2018).

Ventilation aims to get fresh air according to the needs of building users, get air conditions that support sweat evaporation and body heat release so that thermal comfort can be achieved, and get interior cooling with changes in warm and outside air in the cooling room. Ventilation is one of the important aspects of building construction, including boarding school buildings. Poor ventilation can cause decreased oxygen levels and increased carbon monoxide gas levels and can cause the growth of microorganisms that can cause disorders in human health (Ministry of Health of the Republic of Indonesia, 2018).

Smoking in the house is part of the risk factors that cause ARI, one of which is Pneumonia. The duration of smoking and the amount of cigarette consumption have a significant relationship with the prevalence of ARI, asthma, Pneumonia, and heart disease. Cigarette smoke is not a direct cause of Pneumonia in toddlers but is an indirect factor that can cause lung disease that will weaken the toddler's immune system. Lighting is one of the important elements in a room that can provide comfort for users. Lighting with a good system can support activities carried out indoors, there are three main criteria in a good lighting system, namely quality, quantity, and lighting rules (Fleta, 2021).

Humidity is closely related to ventilation, a damp house allows viruses, and fungi that can play a role in the pathogenesis of respiratory diseases. Humidity in the house can be overcome by always opening doors and windows, always cleaning the house, not letting the house get damp, increasing the area of house ventilation, and using waterproof types of floors and walls. This is in line with what was stated by the Ministry of Health (2011) in the Regulation of the Minister of Health of the Republic of Indonesia Number 1077/MENKES/PER/V/2011 concerning Guidelines for Indoor Air Health in Homes (Putra & Wulandari, 2019).

Poor room light intensity affects the room temperature. A good room should have enough natural lighting. Poor light intensity is caused by insufficient openings in the room to receive natural light. Other buildings are too close to the residence and do not have a yard, reducing the intensity of natural light entering the room. The orientation of the openings in the residence that is not right for the movement of the sun also prevents natural light from entering the house (Nurhaiza, 2016).

CONCLUSION

There is a significant relationship between maternal knowledge, ventilation area, housing

density, smoking habits, wall types, lighting, and air humidity with the incidence of ARI in toddlers in the Semurup Health Center Work Area, Air Hangat District, Kerinci Regency in 2023.

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