



The Relationship Between Ventilation Area and Floor Type with The Incidence of ARI in Toddlers in Pepayungen Angkup Village

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ABSTRACT

Acute Respiratory Infection (ARI) in toddlers is an infectious condition that attacks the upper and lower respiratory tract in children under five years of age. This study aims to determine the relationship between ventilation area and floor type with the incidence of ARI in toddlers in Pepayungen Angkup Village. this research is analytic with a cross-sectional design. Data were collected through questionnaires given to 76 respondents using simple random sampling technique. The research was conducted from May 20 to July 03, 2024. Analysis using chi-square test. The results showed that there was a relationship between the area of ventilation with the incidence of ARI in toddlers in the village of Pepayungen angkup with a P value (0.023), and there was a relationship between the type of floor with the incidence of ARI in toddlers in the village of Pepayungen angkup with a P value (0.027). The conclusion in the study shows that environmental conditions, especially ventilation and floor type are factors that need to be considered to prevent the incidence of ARI in toddlers. Suggestions, Improve the quality of home ventilation by ensuring the ventilation area meets health standards, Use more hygienic floor types, such as ceramic or cement floors, to reduce the risk of ARI in toddlers and Educate the public about the importance of a healthy home environment to prevent ARI disease in toddlers.

INTRODUCTION

Acute Respiratory Infection (ARI) is a leading cause of disease and mortality worldwide. This condition has a significant morbidity and mortality rate, particularly among children and toddlers. Respiratory diseases are one of the primary causes of death among children under five years old, accounting for 16% of all deaths (Rizka Sabila et al., 2023). ARI occurs due to interactions between host, agent, and environmental components. Any disruption in these components can lead to an imbalance, increasing disease occurrence. The factors contributing to ARI are highly variable, with disease transmission and impact being influenced by environmental factors, host factors, the availability and effectiveness of healthcare services, infection prevention measures, and pathogen characteristics (Fauziah & Fajariyah, 2023).

This can be observed from the global under-five mortality rate estimated by WHO, which reports approximately 13 million child deaths annually, primarily occurring in developing countries across Asia and Africa, including India (48%), Indonesia (38%), Ethiopia (4.4%),

Pakistan (4.3%), China (3.5%), Sudan (1.5%), and Nepal (0.3%). ARI is one of the leading causes of death, responsible for approximately 4 million out of 13 million under-five deaths each year (Irianto et al., 2021).

In Indonesia, ARI consistently ranks as the leading cause of infant mortality. In 2017, 533,187 cases of ARI were reported among toddlers, increasing to 643,874 cases in 2018. By 2019, the number of ARI cases had risen to 866,623 cases. A mortality survey conducted by the ARI Control Program in 2019 identified ARI as the primary cause of infant mortality in Indonesia, accounting for 22.30% of all child deaths (Fera Atmawati et al., 2021).

The physical environment of a household is a crucial factor that significantly affects the health status of its residents. Housing health standards are essential, as residential infrastructure greatly influences public health outcomes. Several factors affecting ARI incidence include nutritional status, exclusive breastfeeding, immunization status, gender, ventilation, lighting, humidity, flooring, walls, roofing, housing density, cooking fuel type, household members who smoke, maternal education, maternal occupation, and family income (Suharno et al., 2019).

Extrinsic factors contributing to ARI include housing density, ventilation, lighting, household dust levels, kitchen smoke ventilation, and building construction. Intrinsic factors consist of age, gender, and nutritional status (Rizky Anindya Putri, 2021). Additionally, the use of mosquito coils indoors may produce smoke and odors that impair respiratory function, potentially increasing the risk of ARI in toddlers (Putra et al., 2022).

The Indonesian government has implemented policies to address ARI, including the Regulation of the Minister of Health of the Republic of Indonesia Number HK.02.02/MENKES/294/2016 on the Expert Committee on Acute Respiratory Infections. This policy focuses on addressing ARI-related issues in Indonesia, improving disease control efforts, and increasing community participation in ARI prevention. Key preventive measures include avoiding direct contact with ARI patients, maintaining household environmental cleanliness, avoiding exposure to cigarette smoke and harmful cooking fuels, and adopting a healthy lifestyle (Saripudin & Sukaresik, 2024).

ARI among toddlers is a disease with a high morbidity rate but relatively low mortality rate, highlighting the need for prevention efforts to reduce disease incidence. Risk factors that contribute to ARI in toddlers include host factors (such as immune system strength, age, gender, immunization status, and vitamin A intake), environmental factors, and infectious agents (pathogens) (Sudirman et al., 2020). The occurrence of ARI among toddlers and the general population is often linked to environmental health issues, which remain a significant concern for the government (Zairinayati & Putri, 2020).

The research problem formulated in this study is: "What factors are associated with the incidence of ARI among toddlers in Pepayungen Angkup Village?" The objective of this study is to analyze the relationship between ventilation area and floor type with the incidence of ARI among toddlers in Pepayungen Angkup Village in 2024.

METHODS

This study is an analytical research using a cross-sectional study design (Akbar, 2022). The total sample size in this study was 76 respondents, selected using the simple random

sampling technique. The study was conducted from May 20 to July 3, 2024. The research instrument used was a questionnaire, consisting of a set of structured questions in the form of multiple-choice responses (Mukhlidah Hanun Siregar et al., 2022). The collected data were processed manually through the following steps: editing (data refinement), coding (coding sheet), entry (data input), and tabulating (data tabulation). After the manual data processing, the data were analyzed using SPSS software, employing the chi-square test, which included univariate and bivariate analysis. The results were then presented in the form of frequency distribution tables, cross-tabulations, and narratives (Sugiyono, 2018).

RESULTS

Univariate Analysis

Table 1. Distribution of Ventilation Area, Floor Type, and Incidence of Acute Respiratory Infection (ARI) in Toddlers in Pepayungen Angkup Village

Variable		n	%
House Ventilation Area	Meets the requirements	33	43,4
	Does not meet the requirements	43	56,6
Type of House Flooring	Meets the requirements	27	35,5
	Does not meet the requirements	49	64,5
Incidence of ARI in Toddlers	Yes	54	71,1
	No	22	28,9
Total		76	100

Source: Primary Data, 2024

Based on Table 1, it was found that the majority of respondents had inadequate home ventilation areas, with 43 respondents (56.6%) out of 76. Additionally, 49 respondents (64.5%) had floor types that did not meet health standards. Furthermore, the incidence of Acute Respiratory Infection (ARI) in toddlers was reported in 54 respondents (71.1%) out of 76.

Bivariate Analysis

Table 2. Cross-Tabulation of the Relationship Between Home Ventilation Area and Floor Type with the Incidence of ARI in Toddlers in Pepayungen Angkup Village

Variable	Incidence of ARI in Toddlers				Total	p-value	
	Yes		No				
	n	%	n	%	n		%
House Ventilation Area							0,023
Meets the requirements	19	25	14	18,4	33	43,4	
Does not meet the requirements	35	46,1	8	10,5	43	56,6	
Type of House Flooring							0,027
Meets the requirements	15	19,7	12	15,8	27	35,5	
Does not meet the requirements	39	51,3	10	13,2	49	64,5	

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Total	54	71	22	29	76	100
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Source: Primary Data, 2024

From Table 2, it can be seen that among the 76 respondents with adequate home ventilation areas, 19 respondents (25%) had toddlers experiencing ARI. Meanwhile, among respondents with inadequate home ventilation areas, 35 respondents (46.1%) reported ARI cases in toddlers. The results of the Chi-square analysis in the chi-square test table appendix showed a probability value of 0.023 ($< \alpha$ significance level = 0.05). This analysis meets the hypothesis relationship criteria, indicating that ventilation area has a significant association with the incidence of ARI in toddlers.

Similarly, Table 2 shows that among the 76 respondents with adequate floor types, 15 respondents (19.7%) had toddlers with ARI. Meanwhile, among respondents with inadequate floor types, 39 respondents (51.3%) reported ARI cases in toddlers. The results of the Chi-square analysis in the chi-square test table appendix showed a probability value of 0.027 ($< \alpha$ significance level = 0.05). This analysis meets the hypothesis relationship criteria, indicating that floor type has a significant association with the incidence of ARI in toddlers.

DISCUSSION

Acute Respiratory Infection (ARI) is a leading cause of morbidity and mortality among infectious diseases worldwide. ARI is also the third leading cause of death globally and the primary killer in low- and middle-income countries. Mortality due to ARI is ten to fifty times higher in developing countries compared to developed nations. ARI is classified as an Airborne Disease, which spreads through airborne transmission. Pathogens enter and infect the respiratory tract, leading to inflammation (Putri Lan Lubis et al., 2019).

The majority of households in communities living near hauling roads do not meet ventilation standards. This is due to the minimalist design of their houses, which have relatively small rooms and limited ventilation, resulting in poor air circulation inside the house. Poor indoor air quality affects overall health, particularly by increasing the risk of ARI among residents (Sultan et al., 2021).

Additionally, poor ventilation in these homes limits sunlight penetration into indoor spaces, affecting lighting, temperature, and humidity levels. If ventilation does not meet health standards, the risk of ARI increases. Poor home ventilation is clearly linked to ARI incidence (Wulandhani & Purnamasari, 2019).

Ventilation is a significant factor influencing ARI incidence. A study by Mahendrayasa, Farapti, and Safrizal (2018) found a relationship between household ventilation and ARI incidence. Individuals living in houses with poor ventilation had a 2.59 times greater risk of developing ARI compared to those in well-ventilated homes (Istifaiyah et al., 2019).

Similarly, a study by Saputra on the relationship between home environmental health and ARI incidence among students of SD Negeri 1 Ulak Depati used the Chi-Square statistical test with a significance level of $\alpha = 0.05$ and a 95% Confidence Interval (CI). The study obtained a p-value of 0.000, indicating a significant relationship between ventilation size and ARI incidence among students (Saputra, 2019).

Several factors contribute to ARI incidence in toddlers, categorized into three main groups: Host Factors (Human Factors): Child's gender, birth weight, maternal education. Environmental Factors: Home ventilation, type of flooring, type of cooking fuel, household smoking habits, health education. Agent Factors (Disease-Causing Factors): Presence of microorganisms such as viruses, bacteria, and fungi (Lazamidarmi et al., 2021).

However, these findings are inconsistent with a study by Renti (2029). The Chi-Square statistical test in their study yielded a p-value of 0.412, which is greater than $\alpha = 0.05$, indicating no significant relationship between flooring type and ARI incidence in toddlers. The Odds Ratio (OR) test showed an OR of 1.833 (95% CI = 0.614 – 5.471), meaning that respondents with substandard flooring had a 1.833 times higher risk of developing ARI compared to those with proper flooring (Raenti et al., 2019).

CONCLUSION

The findings of this study indicate a significant relationship between ventilation size and flooring type with ARI incidence in toddlers in Pepayungen Angkup Village. The p-values obtained were 0.023 for ventilation size and 0.027 for flooring type, demonstrating a strong correlation between these variables and ARI incidence.

Improve home ventilation by ensuring adequate ventilation area in accordance with health standards. Use more hygienic flooring materials, such as ceramic or cement flooring, to minimize the risk of ARI. Educate communities on the importance of a healthy home environment in preventing ARI in toddlers.

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