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Factors Associated With Acute Respiratory Infections Among Children Aged 6–10 In The Working Area of Putri Ayu in 2025

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Abstract

Acute Respiratory Infections (ARI) remain a common health problem in the working area of Putri Ayu Public Health Center. Behavioral factors and household environmental conditions are suspected to contribute to the increased risk of ARI. To determine the factors associated with the incidence of ARI among children aged 6–10 years in the working area of Putri Ayu Public Health Center in 2025. This study used a cross-sectional design with sampling conducted among community members who met the inclusion criteria. Data were analyzed using the Chi-Square test and Prevalence Ratio (PR) calculations. The findings showed significant associations between handwashing with soap (p-value = 0,049), smoking habits (p-value = 0,000), occupancy density (p-value = 0,033), and household ventilation (p-value = 0,044) with ARI incidence. Meanwhile, temperature (p-value = 1,000), humidity (p-value = 0,625), and lighting (p-value = 0,400) showed no significant associations. Smoking habits had a PR of 6.696, indicating that children living with smoking family members have nearly seven times higher risk of developing ARI. Behavioral factors such as handwashing and smoking habits, as well as environmental factors such as ventilation and occupancy density, are associated with ARI incidence. Promotive and preventive efforts are needed, particularly reducing indoor smoking and improving household ventilation.

Keywords: ARI, Handwashing, Smoking Habits, Occupancy Density, Home Environment.

INTRODUCTION

Acute Respiratory Tract Infection (ARI) is a public health problem that continues to dominate morbidity and mortality rates, particularly among children. ARI is an acute infectious disease that affects the upper and lower respiratory tract and can be caused by viruses, bacteria, or fungi, with a duration of less than 14 days (World Health Organization, 2020). High population density and unhealthy organizational environments play a significant role in increasing the risk of transmission of this disease (Fitriyah, 2016).

According to the epidemiological triangle concept, disease incidence is influenced by the interaction between the host, the agent, and environmental factors. Behavioral factors such as handwashing with soap and smoking habits, along with physical environmental conditions including ventilation, occupancy density, temperature, humidity, and lighting, are important determinants of ARI incidence (Yusnita et al., 2022).

The Putri Ayu Community Health Center (Puskesmas) operates in a densely populated area, with some areas classified as densely populated. This impacts the physical environment of homes, including ventilation, density, temperature, humidity, and lighting, which often fall short of health standards. An unhealthy home environment can foster the growth of microorganisms that cause acute respiratory infections (ARI) and accelerate transmission between residents, especially children (Haryani & Misniarti, 2021).

In addition to environmental factors, societal behavior also plays a significant role in the incidence of respiratory infections (ARI). Poor handwashing with soap (CTPS) increases the risk of infectious disease transmission, including ARI, as hands are the primary vehicle for germ transmission (Risnawaty, 2017). Furthermore, indoor smoking worsens indoor air quality and increases children's exposure to secondhand smoke, which puts them at high risk of respiratory problems (Sapta Wardana et al., 2020).

Global and national data show that ARI remains a major cause of morbidity and mortality from infectious diseases. The WHO reports that millions of deaths from ARI occur annually worldwide, with the greatest burden of disease in developing countries (Anggraini et al., 2023). The ARI rate in Indonesia, based on the results of the 2023 Indonesian Health Survey (SKI), was 23.5%, while the ARI rate in children varies according to regional characteristics, with children aged 5 to 14 years at 28.6%. By gender, 23.2% are male and 23.9% are female. Mountainous Papua is the province with the highest number of cases out of 34 provinces in Indonesia, contributing around 41.7% of ARI cases (Kemenkes RI, 2023). In Jambi City, the working area of the Putri Ayu Community Health Center has been recorded as one of the areas with the highest number of ARI cases in recent years (Dinas Kesehatan Kota Jambi, 2023).

Based on these conditions, this study was conducted to determine behavioral and home environmental factors related to the incidence of ARI in children aged 6–10 years in the working area of Putri Ayu Health Center in 2025

RESEARCH METHODS

This research is a quantitative study with a cross-sectional design. This research was conducted in the working area of Putri Ayu Community Health Center, Jambi City from April to May 2025. The population of this study was people aged 6-10 years who were in the working area of Putri Ayu Community Health Center with a total of 108 respondents. The independent variables in this study were Handwashing with Soap (CTPS), smoking behavior, residential density, temperature, humidity, ventilation, and lighting. The dependent variable in this study was the incidence of Acute Respiratory Tract Infection (ARI). Data were obtained through interviews with respondents using questionnaires and observations. Data analysis used the Chi-square test.

RESULTS AND DISCUSSION

A. Respondent Characteristics

Tabel 1. Respondent Characteristics

No	Characteristics	Frequency (f)	Percent (%)
1	**Child's age (Years)**		
	6 Years	43	39.8
	7 Years	28	25.9
	8 Years	14	13.0
	9 Years	17	15.7
	10 Years	6	5.6
2	**Child's Gender**		
	Male	58	53.7
	Female	50	46.3
3	**Parent's Age (Years)**		
	25-29	35	32.4
	30-34	18	16.7
	35-39	35	32.4
	40-44	10	9.3
	45-49	10	9.3
4	**Parent's Gender**		
	Male	99	91.7

	Female	9	8.3
5	**Parents' education background**		
	Elementary School	6	5.6
	Junior High School	23	21.3
	Senior High School	76	70.4
	Diploma/Bachelor's Degree	3	2.8
6	**Parent's Job**		
	Wiraswasta	96	88.9
	IRT	12	11.1

Source: Primary Data 2025

Respondent characteristics based on age were mostly in the 6-year-old age group, namely 43 respondents (39.8%) and the least in the 10-year-old age group, namely 6 respondents (5.6%). Respondent characteristics based on child gender were mostly male, namely 58 respondents (53.7%). Based on parents' age, most were in the 25–29 and 35–39 age groups, each with 35 respondents (32.4%), while the least age groups were 40–44 and 45–49 years, each with 10 respondents (9.3%). Respondent characteristics based on parents' gender were mostly male, namely 99 respondents (91.7%). Based on the last education, the majority of respondents had a high school education, namely 76 respondents (70.4%), while the least had a bachelor's/diploma education, namely 3 respondents (2.8%). Meanwhile, the characteristics of parents' work showed that most worked as self-employed, namely 96 respondents (88.9%).

B. Univariate Analysis

Tabel 2. Distribution of Respondents Based on ARI at Putri Ayu Community Health Center

Variable	Frequency (f)	Percent (%)
ARI category		
ARI	79	73.1
Not ARI	29	26.9
Total	108	100.0

Source: Primary Data 2025

Based on table 2 from 108 respondents, the following results were obtained for the ARI category, respondents who experienced ARI were 79 people with a percentage of 73.1%, while those who did not experience ARI were 29 people with a percentage of 26.9%.

Tabel 3. Distribution of CTPS Respondents in the Putri Ayu Community Health Center

CTPS category	Frequency (f)	Percent (%)
CTPS Not good	56	51.9
CTPS Good	52	48.1
Total	108	100.0

Source: Primary Data 2025

Based on table 3 from 108 respondents, the following results were obtained for the CTPS (Handwashing with Soap) category, respondents whose CTPS behavior was not good were 56 people with a percentage of 51.9%, while those whose CTPS behavior was good were 52 people with a percentage of 48.1%.

Tabel 4. Distribution of Smoking Behavior in the Putri Ayu Community Health Center Community

Smoking Behavior	Frequency (f)	Percent (%)
Smoking	92	85.2
No Smoking	16	14.8
Total	108	100.0

Source: Primary Data 2025

Based on table 4 from 108 respondents, the following results were obtained for the smoking category, respondents who smoked were 92 people with a percentage of 85.2%, while respondents who did not smoke were 16 people with a percentage of 14.8%.

Tabel 5. Distribution of Residential Density in the Putri Ayu Community Health Center Community

Residential Density	Frequency (f)	Percent (%)
Not eligible	46	42.6
qualify	62	57.4
Total	108	100.0

Source: Primary Data 2025

Based on table 5 from 108 respondents, the following results were obtained for the residential density category, respondents who live in dense housing are 46 people with a percentage of 42.6%, while respondents who live in non-dense housing are 62 people with a percentage of 57.4%.

Tabel 6. Distribution of Temperature Variables in the Community of Putri Ayu Health Center

Temperature	Frequency (f)	Percent (%)
Not Eligible	86	79.6
Eligible	22	20.4
Total	108	100.0

Source: Primary Data 2025

Based on table 6 of 108 respondents, the following results were obtained for the temperature category, respondents whose house conditions did not meet the requirements were 86 people with a percentage of 79.6%, while those who met the requirements were 22 people with a percentage of 20.4%.

Tabel 7. Distribution of Humidity Variables in the Putri Ayu Community Health Center Community

Humidity	Frequency (f)	Percent (%)
Not Eligible	92	85.2
Eligible	16	14.8
Total	108	100.0

Source: Primary Data 2025

Based on table 7 from 108 respondents, the following results were obtained for the humidity category, respondents whose house conditions did not meet the requirements were 92 people with a percentage of 85.2%, while those who met the requirements were 16 people with a percentage of 14.8%.

Tabel 8. Distribution of Ventilation Variables in the Putri Ayu Community Health Center Community

Ventilation	Frequency (f)	Percent (%)
Not Eligible	41	38.0
Eligible	67	62.0
Total	108	100.0

Source: Primary Data 2025

Based on table 8 from 108 respondents, the following results were obtained for the ventilation category, respondents whose house conditions did not meet the requirements were 41 people with a percentage of 38.0%, while those who met the requirements were 67 people with a percentage of 62.0%.

Tabel 9. Distribution of Lighting Variables in the Putri Ayu Community Health Center

Lighting	Frequency (f)	Percent (%)
Not Eligible	38	35.2
Eligible	70	64.8
Total	108	100.0

Source: Primary Data 2025

Based on table 9 from 108 respondents, the following results were obtained for the lighting category, respondents whose house conditions did not meet the requirements were 38 people with a percentage of 35.2%, while those who met the requirements were 70 people with a percentage of 64.8%.

C. Bivariate Analysis

1. The relationship between handwashing with soap (CTPS) and the incidence of ARI in the work area of Putri Ayu Health Center in 2025

Tabel 10. The relationship between handwashing with soap (CTPS) and the incidence of ARI in the Putri Ayu Community Health Center area

Washing Hands with Soap (CTPS)	ARI				Total		PR	95 % CI	P-Value
	Ya		No						
	n	%	n	%	n	%			
CTPS Not good	46	82,1%	10	17,9%	56	100%	1,294	1.019 – 1,645	0,049
CTPS Good	33	63,5%	19	36,5%	52	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents with good CTPS behavior (82.1%) is higher than that of respondents with good CTPS behavior (63.5%). Based on the results of statistical tests, the Prevalence Ratio (PR) was 1.294 (p = 0.049, 95% CI: 1.019 – 1.645), which means that the analysis results show that there is a relationship between CTPS behavior and the incidence of ARI. Respondents with poor CTPS behavior are at risk of experiencing ARI 1.29 times compared to respondents with good CTPS behavior.

2. The relationship between smoking habits and the incidence of ARI in the work area of Putri Ayu Health Center in 2025.

Tabel 11. The relationship between smoking habits and the incidence of ARI in the Putri Ayu Community Health Center area

smoking habits	ARI				Total		PR	95 % CI	P-Value
	Ya		No						
	n	%	n	%	n	%			
Smoking	77	83,7%	15	16,3%	92	100%	6,696	1,826 – 24,557	0,000
No Smoking	2	12,5%	14	87,5%	16	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents who have a smoking habit (83.7%) is higher than respondents who do not smoke (12.5%). The results of the chi square statistical test obtained a value (p = 0.000, PR = 6.696, 95% CI; 1.826-24.557), meaning that there is a significant relationship between smoking behavior and the incidence of ARI in the work area of the Putri Ayu Health Center, Jambi City in 2025. Respondents whose smoking behavior is risky in the Smoking category increase the incidence of ARI 6.696 times compared to those whose dangerous behavior is in the non-smoking category.

3. The relationship between temperature and the incidence of ARI in the work area of Putri Ayu Health Center in 2025.

Tabel 12. The relationship between temperature and the incidence of ARI in the Putri Ayu Health Center area

Temperature	ARI				Total		PR	95 % CI	P-Value
	Ya		No						
	n	%	n	%	n	%			
Not Eligible	63	73,3%	23	26,7%	86	100%	1,007	0,757 –1,341	1,000

Eligible	16	72,2%	6	27,3%	22	100%

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents whose home temperature conditions do not meet the requirements (73.3%) is almost the same as respondents whose home temperature conditions meet the requirements (72.2%). The results of the chi-square statistical test obtained a value (p = 1.000, PR = 1.007, 95% CI: 0.757–1.341), Respondents with Home Temperatures that do not meet the requirements are at risk of experiencing ARI 1.007 times compared to respondents with home temperature conditions that meet the requirements. This means that there is no significant relationship between home temperature conditions and the incidence of ARI in the work area of the Putri Ayu Community Health Center, Jambi City in 2025.

4. The relationship between humidity and the incidence of ARI in the work area of Putri Ayu Health Center in 2025.

Tabel 13. The relationship between humidity and the incidence of ARI in the Putri Ayu Community Health Center area

Humidity	ARI				Total		PR	95 % CI	P-Value
	Ya		Tidak						
	n	%	n	%	n	%			
Not Eligible	69	75%	23	25%	92	100%	1,200	0,806-1,786	0,462
Eligible	10	62,5%	6	37,5%	16	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents whose home humidity conditions do not meet the requirements (75%) is higher than that of respondents whose home humidity conditions meet the requirements (62.5%). The chi-square statistical test results obtained a value (p = 0.462, PR = 1.200, 95% CI: 0.806–1.786). Respondents with home humidity conditions that do not meet the requirements are at risk of experiencing ARI 1.2 times compared to respondents with home humidity conditions that meet the requirements. This means that there is no significant relationship between home humidity conditions and the incidence of ARI in the work area of the Putri Ayu Community Health Center, Jambi City in 2025.

5. The relationship between ventilation and the incidence of ARI in the work area of Putri Ayu Health Center in 2025.

Tabel 14. Relationship between ventilation and the incidence of ARI in the Putri Ayu Community Health Center area

Ventilation	ARI				Total		PR	95 % CI	P-Value
	Ya		Tidak						
	n	%	n	%	n	%			
Not Eligible	35	85,4%	6	14,6%	41	100%	1,300	1,049-1,611	0,044
Eligible	44	65,7%	23	34,3%	67	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents whose home ventilation conditions do not meet requirements (85.4%) is higher than that of respondents whose home ventilation conditions meet requirements (65.7%). The chi-square statistical test results obtained a value (p = 0.044, PR = 1.300, 95% CI: 1.049–1.611). Respondents with home ventilation conditions that do not meet requirements are at risk of experiencing ARI 1.3 times compared to respondents with home ventilation conditions that meet requirements. This means that there is a significant relationship between home ventilation conditions and the incidence of ARI in the work area of the Putri Ayu Community Health Center, Jambi City in 2025.

6. The relationship between residential density and the incidence of ARI in the working area of Putri Ayu Health Center in 2025

Tabel 15. The relationship between residential density and the incidence of ARI in the Putri Ayu Community Health Center area

Residential Density	ARI				Total		PR	95 % CI	P-Value
	Ya		Tidak						
	n	%	n	%	n	%			
Not eligible	39	84,8%	7	15,2%	79	100%	1.314	1.053-1.640	0,033
qualify	40	64,5%	22	35,5%	29	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents with dense housing conditions (84.8%) is higher than that of respondents with non-dense housing conditions (64.5%). The results of the chi-square statistical test obtained a value (p = 0.033, PR = 1.314, 95% CI: 1.053–1.640). Respondents with dense housing conditions are at risk of experiencing ARI 1.314 times compared to respondents with non-dense housing conditions. This means there is a significant relationship between residential density and the incidence of ARI in the work area of the Putri Ayu Community Health Center, Jambi City in 2025.

7. The relationship between lighting and the incidence of ARI in the work area of Putri Ayu Health Center in 2025

Tabel 16. The relationship between lighting and the incidence of ARI in the Putri Ayu Community Health Center area

Lighting	ARI				Total		PR	95 % CI	P-Value
	Ya		Tidak						
	n	%	n	%	n	%			
Not eligible	28	73,7%	10	26,3%	38	100%	1,011	0,797-1,283	1,000
qualify	51	72,9%	19	27,1%	70	100%			

Source: Primary Data 2025

The table shows that the proportion of ARI in respondents whose home lighting conditions do not meet requirements (73.7%) is almost the same as respondents whose lighting conditions meet requirements (72.9%). The results of the chi-square statistical test obtained a value (p = 1.000, PR = 1.011, 95% CI: 0.797–1.283). Respondents with home lighting conditions that do not meet requirements are at risk of experiencing ARI 1.011 times compared to respondents with home lighting conditions that meet requirements. This means that there is no significant relationship between home lighting conditions and the incidence of ARI in the work area of the Putri Ayu Community Health Center, Jambi City in 2025.

D. Discussion

1. The relationship between washing hands with soap (CTPS) and the incidence of ARI in the work area of the Putri Ayu Health Center.

The results of this study show that CTPS (Hand Washing with Soap) habits is a factor related to the incidence of ARI in children aged 6–10 years. Children who routinely perform CTPS are proven to have a lower risk of experiencing ARI than children who do not have the habit of washing their hands properly. From the results of the analysis, a p value = 0.049 was obtained, which means that there is a significant relationship between CTPS habits and the incidence of ARI in school-age children.

The habit of CTPS has many benefits in preventing disease transmission, including ARI. CTPS can remove dirt, viruses, and bacteria that stick to hands after activity, play, or after contact with a dirty environment. Thus, CTPS is one of the simple, inexpensive, but very effective steps to prevent

the spread of infectious diseases. According to WHO, good CTPS practices can reduce the risk of respiratory infections by up to 23% (Khadka & Dani, 2020).

This study is in line with research conducted by Rachmawati which stated that children who do not have good CTPS habits are 2.4 times greater at risk of suffering from ARI than children who have good CTPS habits (p = 0.014).(Rachmawati et al., 2021) The same thing was also shown in Hidayat & Nurhayati's research, that the habit of washing hands with soap is able to break the chain of disease transmission, including ARI, because it prevents the entry of pathogenic microorganisms through the mouth, nose, and eyes (R. Hidayat & Nurhayati, 2020).

In addition, research by Sari, et al. also supports these findings with results (p = 0.001), which show that CTPS intervention in school-age children was able to reduce the incidence of ARI by up to 30% in one month of observation. This proves that CTPS is a very important preventive behavior in an effort to reduce the incidence of ARI.(D. A. Sari et al., 2022).

However, different results were shown by Putri's study which obtained a score (p = 0.312), which means that there was no significant association between CTPS and the incidence of ARI.(M. Putri et al., 2019) This difference may be caused by other factors that are more dominant, such as the nutritional status of the child, the ventilation condition of the house, the smoking habits of the parents in the house, and the density of the dwelling which can affect the rate of transmission of ARI.

Based on interviews, people in the work area of the Putri Ayu health center tend to not meet the requirements because people have a lazy habit of washing their hands using soap, causing the entry of pathogenic microorganisms through the mouth, nose, and eyes. Therefore, health promotion about the importance of CTPS needs to be encouraged, both in the family, school, and community, as a preventive effort to reduce the incidence of ARI in children.

2. The relationship between smoking habits and the incidence of ARI in the work area of the Putri Ayu Health Center.

The results of this study show that smoking is a factor related to the incidence of ARI in children aged 6–10 years. Children who live in the same house with smoking members have a greater risk of experiencing ARI than children who live in residences without smoking members. From the results of the analysis, a value of p = 0.000 was obtained, which means that there is a significant relationship between smoking and the incidence of ARI in children aged 6-10 years.

The more often a person smokes in the house, the higher the likelihood of children experiencing ARI. Children are at high risk of exposure to secondhand smoke when indoors, especially because of the habit of family members who smoke when they get together, such as when watching TV or talking. If a family member consumes more than one cigarette a day, an enclosed home environment can increase the likelihood of children being exposed to secondhand smoke as passive smokers.(Sasongko & Aripin, 2019)

The results of this study are in line with the findings of Salma Atiyah Ningrum who reported that children who live at home with smoking parents have a 3.5 times greater risk of suffering from ARI than children who live in smoke-free homes (p < 0.01).(Ningrum, 2021) In addition, Handayani's research also supports these findings with results (p = 0.004), which show that interventions to reduce exposure to cigarette smoke in the home can reduce the incidence of ARI by up to 30% during the two-month observation period.(Handayani, 2022)

Although Susanto's research showed different results (p = 0.154) so that it did not find a significant relationship, it is most likely influenced by confounding factors such as good home ventilation, low occupancy density, and relatively better nutritional status of children.(A. Susanto, 2021) But overall, most studies consistently conclude that smoking habits at home are the main risk factors for ARI in school-age children.

Children who live with family members who smoke become passive smokers, regardless of the study's findings. Cough, and cold are symptoms of respiratory tract diseases in children under the age of five in the study in the work area of the Putri Ayu health center. Therefore, promotive and preventive efforts through education on the dangers of cigarette smoke, the implementation of smoke-

free homes, and the control of environmental risk factors need to be improved to protect children from respiratory infections.

3. The relationship between temperature and the incidence of ARI in the work area of the Putri Ayu Health Center.

The results of this study show that room temperature is not related to the incidence of ARI in children aged 6–10 years. From the results of the analysis, a value of p = 1,000 was obtained, which means that there was no significant relationship between the condition of home temperature and the incidence of ARI in school-age children. Thus, neither houses with temperatures in the comfortable or uncomfortable range provided a meaningful difference in the risk of ARI in this study.

In theory, the ideal room temperature according to the Indonesian Ministry of Health (18-30°C) can support respiratory health because it affects air humidity and occupant comfort. Too high a temperature can increase humidity and support the growth of microorganisms, while too low a temperature can irritate the respiratory tract and decrease immunity.(Permenkes, 2023)

The results of this study are in line with Susanto's showing that room temperature does not have a significant relationship with the incidence of ARI (p = 0.317).(A. Susanto, 2021) The difference in results was reported by Wulandari who found that children who lived at home with a temperature that did not meet the standard (≥ 32°C) were at a higher risk of experiencing ARI (p = 0.029). This suggests that the influence of temperature on ARI can vary, depending on other accompanying environmental factors, such as humidity, ventilation, and lighting (Wulandari, 2020b).

Overall, the place of observation research was conducted in the work area of the Putri Ayu Health Center, according to the results of this study, several home environments with unqualified temperatures. This is caused by several other factors such as the environment around the settlement. This indicates that room temperature is not the main factor that determines the incidence of ARI in school-age children. Therefore, public health interventions should be prioritized on factors that have proven to be more significant, such as controlling residential density, improving ventilation, and reducing exposure to cigarette smoke. However, temperature still needs to be considered in an effort to create a healthy home because it affects the comfort, productivity, and quality of life of the residents of the house.

4. The relationship between humidity and the incidence of ARI in the work area of the Putri Ayu Health Center

The results of this study showed that air humidity was not associated with the incidence of Acute Respiratory Infection (ARI) in children aged 6–10 years (p=0.462). This means that despite variations in humidity in the child's living environment, these factors have not been shown to significantly increase the risk of ARI. ARI in children is more influenced by other factors, such as the quality of home ventilation, exposure to cigarette smoke, air pollution, nutritional status, and the cleanliness of the residential environment.

In theory, according to the Indonesian Ministry of Health, air humidity plays a role in human breathing comfort. Too high humidity (>70%) can increase the growth of microorganisms (bacteria, fungi, and viruses), while too low humidity (<40%) can irritate the respiratory tract and weaken immunity.(Permenkes, 2023) However, this study did not find a significant relationship, so it can be interpreted that the variation in humidity at the study site was still within normal limits and not extreme enough to cause respiratory health effects in children aged 6–10 years.

The results of this study are in line with the research conducted by Putri who obtained a score (p=0.441), showing that air humidity is not the main risk factor for the occurrence of ARI in elementary school children. They explained that the incidence of ARI is more closely related to housing density and poor ventilation, because these conditions cause unsmooth air circulation and prolong children's exposure to pollutants or microorganisms in the house.(A. Putri et al., 2021)
However, the results of this study are different from Hidayat's research which found a significant relationship between air humidity and the incidence of ARI (p=0.018). The study explained that in areas with very high humidity, the growth of mold and house dust is more prone to occur, increasing

the risk of children experiencing recurrent ARI. These differences in results can be influenced by the geographical and climatic conditions at different research sites.(M. Hidayat et al., 2020)
The differences in findings between these studies show that the influence of humidity on ARI is contextual. In the tropics with relatively stable humidity, this factor has little effect. However, in areas with extreme humidity fluctuations (very high or very low), the effect of humidity on children's respiratory health can be more pronounced.

The condition of the house is mostly squeezed with other residences in the work area of the Putri Ayu Health Center, causing sunlight to not be able to enter through the window. Thus, it can be concluded that air humidity is not the main factor associated with the incidence of ARI in children aged 6–10 years at the study site. Other factors such as home ventilation, smoking habits in the house, the use of solid fuels, and environmental sanitation are more dominant in triggering the onset of ARI.

5. The relationship between ventilation and the incidence of ARI in the work area of the Putri Ayu Health Center

The results of this study show that ventilation is a factor related to the incidence of ARI in children aged 6–10 years. From the results of the analysis, a value of p = 0.044 was obtained, which means that there is a significant relationship between ventilation and the incidence of ARI. Children who live in homes with unventilated conditions have a higher risk of developing ARI compared to children who live in homes with good ventilation.

Ventilation plays a role in keeping the house in optimal humidity and improving air cleanliness. High humidity in the room can be caused by poor ventilation and it is a good medium for disease-causing bacteria to grow.

This study is in line with research conducted by Kartini showing a relationship between home ventilation and the incidence of ARI in elementary school children in the working area of the Tarakan Health Center, Wajo district, Makassar city with a value of p=0.000. The results of the study explained that houses with good ventilation (ventilation area of at least 10% of the floor area) are able to reduce the incidence of ARI, because air circulation is smooth so that the air quality in the house is healthier.(Kartini et al., 2019)

The results of this study are also supported by Sari and Rahmawati who found that children who live at home with poor ventilation have a 2.5 times higher risk of suffering from ARI than children who live in a home with good ventilation (p=0.001). According to the study, unqualified ventilation can increase the humidity of the room, thereby triggering the growth of bacteria, viruses, and fungi that can cause respiratory tract disorders.(N. Sari & Rahmawati, 2020)

However, the results of this study are different from the research conducted by Wijayanti, et al. which obtained a value of p=0.214, which means that there is no significant relationship between home ventilation and the incidence of ARI in school-age children in Yogyakarta City. This is due to other factors that are more dominant such as occupancy density, smoking habits in the house, and the use of cooking fuels that are not environmentally friendly. Thus, although ventilation plays an important role, other environmental factors also affect the risk of ARI in children.(Wijayanti et al., 2019)

Based on the results of this study and several previous studies, it can be concluded that good home ventilation is a protective factor for the incidence of ARI in children aged 6–10 years. At the research site, there are still people who do not meet the ventilation requirements. As a result, the community's house has air pollution and will become a place for bacterial microorganisms to develop in the house. Efforts to improve home ventilation, such as enlarging window openings, improving the cross ventilation system, and getting used to opening windows every morning, are very important to prevent the occurrence of ARI in children.

6. The relationship between housing density and the incidence of ARI in the work area of the Putri Ayu Health Center

The results of this study show that housing density is a factor related to the incidence of ARI in children aged 6–10 years. Children living in high-density housing have been shown to have a greater

risk of experiencing ARI than children living in low-density housing. From the results of the analysis, a value of p = 0.033 was obtained, which means that there is a significant relationship between residential density and the incidence of ARI in school-age children.

High housing density can increase the risk of disease transmission, including ARI, because the close distance between individuals facilitates the spread of droplets and microorganism particles in the air. In addition, homes with overcrowded occupants usually have poor air circulation, limited ventilation, and high humidity, creating an ideal environment for the growth and spread of bacteria and viruses that cause ARI. A congested home environment is associated with an increased risk of respiratory infections due to high exposure to indoor pollution and limited exchange of clean air.(Fitriyah, 2016)

This study is in line with research conducted by Salma Atiyah Ningrum (2021), which found that children living in homes with a population density of more than 2 people per room were 2.8 times more at risk of suffering from ARI compared to children living in low-density homes (p = 0.008). That the condition of houses with dense housing can increase the frequency of contact between individuals and increase the chances of transmission of ARI disease in the family.(Ningrum & Ardillah, 2021)
In addition, research by Handayani, et al. (2022) supports these findings with results (p = 0.017), which show that home environmental improvement interventions, such as improving ventilation and reducing room density, were able to reduce the incidence rate of ARI by up to 27% in the two-month observation period. This proves that the physical factors of the house, including occupancy density, have an important role in determining the health of the child's respiratory tract.(Titi Saparina L & Rasni Intan, 2021)

However, different results were shown by Susanto's (2019) research which obtained a value (p = 0.281), which means that there is no significant relationship between residential density and the incidence of ARI.(H. Susanto et al., 2019) This difference may be caused by confounding factors, such as family health behavior, children's immunization status, and parents' smoking habits in the home which can more dominantly influence the occurrence of ARI.

In the community at the research site, the density of unqualified housing is higher, there are some people who still use houses whose occupancy density is more than one family or more than 10m2 per person which can consequently cause the transmission of ARI to occur in the house. Therefore, promotive and preventive efforts, such as public education about the importance of ideal housing density, improving the quality of home ventilation, and controlling environmental risk factors, are needed to reduce the incidence of ARI in children.

7. The relationship between lighting and the incidence of ARI in the work area of the Putri Ayu Health Center

The results of this study showed that indoor lighting was not associated with the incidence of ARI in children aged 6–10 years (p = 1,000). This means that lighting conditions, both natural and artificial, do not directly affect the occurrence of ARI in children. ARI is more often caused by other factors such as indoor air quality, ventilation, occupancy density, exposure to cigarette smoke, and environmental conditions around the house.

Although insufficient lighting can have an impact on room humidity and trigger the growth of microorganisms, this study has not been shown to be significantly associated with ARI. This can happen because school-age children (6–10 years old) mostly do activities outside the home during the day so indoor lighting exposure is not a dominant factor in their respiratory tract health.

This study is in line with research conducted by Suryani which found that lighting was not related to the incidence of ARI in elementary school children (p = 0.615).(Suryani et al., 2020) Another study by Putri and Lestari also showed a similar thing, that lighting only plays a role as an additional environmental factor but not a major factor influencing the incidence of ARI.(R. Putri & Lestari, 2021) In contrast, Wulandari's study found that good natural lighting was associated with a reduced risk of ARI (p = 0.021).(Wulandari, 2020a) These differences in results suggest that the role of lighting on

ARI may be indirect, and its effects may vary depending on the environmental conditions of the house, the behavior of the occupants, and exposure to air pollution from the outside.

The working area of the Putri Ayu Health Center is a densely populated area with houses close to each other, but most of the houses still have access to natural light during the day through windows or small openings. Although natural lighting is not always optimal, the light that enters is generally still enough to help reduce excess moisture in the room. This means that although room lighting is one of the indicators of a healthy home, in the context of the incidence of ARI in children aged 6–10 years, lighting is not a significant factor. More influential factors are ventilation, air quality, and family habits in maintaining house cleanliness.

CONCLUSIONS

Based on the results of this study on factors associated with the incidence of Acute Respiratory Infections (ARI) among children aged 6–10 years in the working area of Putri Ayu Public Health Center in 2025, it can be concluded that several behavioral and household environmental factors are significantly associated with ARI incidence.

Behavioral factors related to ARI incidence include handwashing with soap and smoking habits of family members. Children living in households with poor handwashing practices and exposure to cigarette smoke indoors have a higher risk of developing ARI. Among all factors, smoking habits showed the strongest association, with children exposed to cigarette smoke having nearly seven times higher risk of experiencing ARI.

In addition, household environmental factors significantly associated with ARI incidence were occupancy density and household ventilation. High residential crowding and inadequate ventilation increase the risk of ARI transmission among children. Meanwhile, household temperature, humidity, and lighting were not found to be significantly associated with ARI incidence in this study.

Overall, this study indicates that ARI incidence among children is influenced by a combination of behavioral and environmental factors. Therefore, preventive efforts should focus on improving clean and healthy living behaviors, particularly proper handwashing practices, reducing indoor smoking, and improving household environmental conditions such as ventilation and residential crowding.

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