

Research Article



The Relationship between Home Environmental Sanitation and ISPA Incidence in Toddlers in Kaleroang Village, South Bungku District, Morowali Regency

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ABSTRACT

Background: Acute Respiratory Infection (ARI) is the main cause of death in toddlers which is still a health problem in Indonesia, especially in the Kaleroang Health Center UPT work area which is increasing every year. Namely, in 2020 the prevalence of ARI cases is as much as (21.7%) in 2021 as many as (28.5%) and in 2022 the prevalence will increase (28.9%). The purpose of this study was to determine the relationship between home environmental sanitation and the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency.

Methods: This type of research is a quantitative study with a cross sectional study design. The population in this study were all mothers who had toddlers in Kaleroang Village, namely 106 people, the total sample was 84 people who were taken by random sampling . Retrieval of data using observation sheets and questionnaires. Data were analyzed statistically using the Chi-Square test.

Results: The results of this study indicate that there is a relationship between home ventilation and the incidence of ARI in toddlers with a value of X^2 counts (5.841) > X^2 tables (3.841), house occupancy density² counts (7.171) > X^2 tables (3.841), members smoking habits family X^2 counts (4,701) > X^2 tables (3,841), use of mosquito coils X^2 counts (10,903) > X^2 tables (3,841), and immunization status X^2 counts (5,409) > X^2 tables (3,841).

Conclusions: it can be concluded that house ventilation, house occupancy density, smoking habits of family members, use of mosquito coils, and immunization status are related to the incidence of ARI in toddlers in Kaleroang Village. It is suggested to the UPT Kaleroang Health Center to further increase education related to the risk of ARI transmission based on the environment.

Keywords : ARI, ventilation, occupancy, smoking habits, mosquito coils, immunization

INTRODUCTION

Acute Respiratory Infection (ARI) is an infection that attacks the upper and lower respiratory tract. This disease can attack the respiratory organs such as the nose, throat and larynx. Acute Respiratory Infection (ARI) in toddlers is one of the most common health problems and its treatment is not fully effective. The World Health Organization (WHO) estimates that 13 million children under the age of five die each year, with most of these deaths occurring in developing countries. These children usually die from acute respiratory infections (ARI), which have a mortality rate above 1 in 1000 live births in the age group under five years.¹

The World Health Organization (WHO) reports that in 2019, ARI continues to be an infectious disease that is the main cause of morbidity and death worldwide, with a death rate of 4.25 million per year. As many as 13 million children under the age of five die worldwide every day from ARI, with children aged 1-4 years making up the majority of these deaths. According to Zolanda *et al.*, (2021) three-quarters of all ARI-related deaths in children aged 1-5 years occur in poor countries in Asia and Africa, including India (48%), Indonesia (38%), Ethiopia (4.4%), China (3, 5%), Sudan (1.5%), and Nepal (0.3%).²

Indonesia is one of the developing countries with the highest ISPA rate. In Indonesia, ISPA has consistently been the leading cause of infant and under-five mortality. According to the routine reports of the ISPA Sub-Directorate, the incidence of ISPA in Indonesia for every 1000 children under five was 20.54% in 2016, 20.56% in 2017, and 20.06% in 2018.³

Based on data from the Southeast Sulawesi Provincial Health Office, there were (4.22 %), (5.39%) and (7.99%) cases of ISPA in 2019, 2020 and 2021, respectively (Southeast Sulawesi Prov. Health Office, 2021). Meanwhile, data from the Central Sulawesi Provincial Health Office shows that ISPA consistently occupies the top position, with the number of cases in 2020 totaling 21,904 (7.33 %), in 2021 there were 22,207 (9.73%), and in 2022 there were 49,513 (16.38%).⁴

Based on data from the Morowali District Health Office, the top 10 biggest diseases show that the number of ARI cases ranks first in 2022. Where the UPT Kaleroang Health Center is in first place with a total of 4,262 cases or (25%), the Fonuasingko Health Center with a total of 2,166 cases or (12 .71%), Bahomotefe Health Center with 1,970 cases or (11.56%), Bahodopi Health Center with 1,626 cases or (9.54%), Ulunambo Health Center with 1,519 cases or (8.91%), Bungku Health Center with 1,501 cases or (8.81%), Wosu Health Center with 1,298 cases or (7.62%), Laantula Health Center with 1,068 cases or (6.27%), Bahunjuang Health Center with 1,005 cases or (5.9%), Lafeu Health Center with 828 cases or (4.86%), and the lowest ISPA incidence was at the Tanjung Harapan Health Center with a total of 334 cases or (1.96%).⁵

According to statistical data from the UPT Puskesmas Kaleroang, the incidence of ARI has increased over the past three years and ranks among the ten most common diseases. In 2020 there were 3,207 cases of ISPA with a frequency of 21.7%, and in 2021 there were 4,202 cases of ISPA with a

frequency of 28.5%. The prevalence will increase to (28.9 %) in 2022 with a total of 4,262 cases.⁶

The results of an initial survey conducted in the working area of the UPT Puskesmas Kaleroang by interviewing 10 mothers of children under five showed that the majority of family members smoked and used mosquito coils. In addition, most individuals do not have sufficient ventilation in their homes. Due to the high density of houses, there are also some houses which are in bad condition. And many toddlers still haven't received complete immunizations according to an interview with a health worker . And based on the profile of UPT Kaleroang Health Center from 26 sheltered villages, the highest ISPA cases were in Kaleroang Village, and therefore this was one of the reasons why researchers conducted research in that village.

Based on the description of the problem above, the writer is interested in researching "The Relationship between Home Environmental Sanitation and ISPA Incidents in Toddlers in Kaleroang Village, South Bungku District, Morowali Regency"

METHODS

This type of research uses quantitative research with a cross sectional study design. The population in this study were all mothers who had toddlers in Kaleroang Village in January-March 2023, namely 106 people, a total of 84 samples and analyzed using univariate and bivariate analysis using the Chi-Square test with a significant level of 0.05 which was processed in the SPSS application and presented in the form of a frequency distribution table .

RESULTS

Table 1. Characteristics of Respondents in Kaleroang Village, South Bungku District, Morowali Regency

Characteristics of Respondents	f	%
Mother's age		
21-30	41	48,8
31-40	25	29,8
41-50	18	21,4
Mother's education		
SD	23	27,4
JUNIOR HIGH SCHOOL	18	21,4
SENIOR HIGH SCHOOL	11	13,1
DIPLOMA/S1	32	38,1
Mother's job		
IRT	35	41,7
Teacher	23	27,4
Farmer	26	31,0
Toddler age		

12-24 Months	31	36,9
25-36 Months	29	34,5
37-48 Months	16	19,0
49-60 Months	8	9,5

Total	84	100
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Source: Primary Data, 2023

The age characteristics of the respondents in table 1 show that of the 84 respondents the most age group was the 21-30 year age group with 41 respondents (48.8%) and the least age group was 41-50 years old with 18 respondents (21, 4%). The educational characteristics of the respondents showed that of the 84 respondents studied, the highest number of respondents were Diploma/S1 educated, namely 32 respondents (38.1%) and the fewest respondents were those with high school education, namely 11 respondents (13%).

The characteristics of the respondents' occupations show that of the 84 respondents studied, the most occupations are housewives, namely 35 respondents (41.7%) and the respondents with the fewest jobs are teachers, namely 23 respondents (27.4%). The age characteristics of the respondents showed that of the 84 respondents studied, the most under-fives were aged 12-24 months, namely 31 respondents (36.9%) and the respondents with the least under-fives were aged 49-60 months, namely 8 respondents (9, 5%).

Table 2. Distribution of Respondents Based on ARI Incidence, House Ventilation, House Occupancy Density, Family Member Smoking Habits, and Immunization Status in Kaleroang Village, South Bungku District, Morowali Regency

Research variable	n	%
ARI incident		
Suffer	53	63,1
Not Suffering	31	36,9
Home Ventilation		
Not eligible	52	61,9
Qualify	32	38,1
Residential Density		
Not eligible	69	82,1
Qualify	15	17,9
Smoking Habits of Family Members		
Smoke	65	77,4
Do not smoke	19	22,6
Use of Mosquito Burn Drugs		
Use	61	72,6
Do not use	23	27,4
Immunization Status		
Incomplete	54	64,3
Complete	30	3,7
Total	84	100

Source: Primary Data, 2023

The distribution of respondents based on the incidence of ARI in toddlers in table 2 shows that of the 84 respondents studied,

there were 53 respondents (63.1%) who had ARI, and 31 respondents (36.9%) who did not suffer from ARI. The distribution of

respondents based on house ventilation showed that out of 84 respondents, 32 respondents (38.1%) had house ventilation that met the requirements and 52 respondents (61.9%) had house ventilation that did not meet the requirements. The distribution of respondents based on the occupancy density of the houses shows that of the 84 respondents studied, there were 15 respondents (17.9%) who had a residential density that was classified as fulfilling the requirements and 69 respondents (82.1%) who had a residential density that was classified as not fulfilling the requirements. The distribution of respondents based on the smoking habits of family members showed

that of the 84 respondents studied, there were 65 respondents (77.4%) whose family members had smoking habits, and 19 respondents (22.6%) had non-smoking habits. The distribution of respondents based on the use of mosquito coils showed that of the 84 respondents studied, there were 61 respondents (72.6%) who used mosquito coils, and 23 respondents (27.4%) did not use mosquito coils. The distribution of respondents based on immunization status showed that of the 84 respondents studied, there were 30 respondents (35.7%) with complete immunization status, and 54 respondents (64.3%) with incomplete immunization status

Table 3. Bivariate analysis of the relationship between ISPA and house ventilation, house occupancy density, smoking habits of family members, use of mosquito coils, and immunization status in Kaleroang Village, South Bungku District, Morowali Regency

Variable Study	ARI incident				Total		Results Statistic test
	Suffer		Not Suffering				
	n	(%)	n	(%)	n	(%)	
Home Ventilation							
Not eligible	38	73,1	14	26,9	52	100	<i>X² Count 5.841</i> <i>X²table 3,841</i>
Qualify	15	46,9	17	53,1	32	100	<i>Phi 0.264</i> <i>OR 3,076</i>
Residential Density							
Not eligible	39	56.5	30	43.5	69	100	<i>X² Calculate 7.171</i> <i>X²table 3.841</i>
Qualify	14	93,3	1	6,7	15	100	<i>Phi 0.292</i> <i>OR 0.093</i>
Smoking Habits of Family Members							
Smoke	37	56,9	28	43,1	65	100	<i>X² Calculate 4.701</i> <i>X²table 3.841</i>
Do not smoke	16	84,2	3	15,8	19	100	<i>Phi 0.237</i> <i>OR 0.248</i>
Use of Mosquito Burn Drugs							
using	45	73,8 16		26,2	61	100	<i>X² Count 10.903</i> <i>X²table 3,841</i>
Do not use	8	34,8	15	65,2	23	100	<i>Phi 0.360</i> <i>OR 5,273</i>
Immunization Status							
Incomplete	39	72,2	15	27,8	54	100	<i>X² Count 5.409</i>

Complete	14	46,7	16	53,3	30	100	<i>X²table 3,841</i>
							<i>Phi 0,254</i>
							<i>OR 2,971</i>
Total	53	63,1	31	36,9	84	100	

Source: Primary Data

Analysis of home ventilation data with the incidence of ARI in toddlers. Table 3 shows that out of 84 respondents there were 32 whose house ventilation met the requirements, totaling 15 (46.9 %) respondents who had ARI in toddlers and whose house ventilation met the requirements did not suffer from ARI in toddlers totaling 17 (53.1%) respondents. Then, of the 52 respondents whose house ventilation did not meet the requirements, 38 (73.1%) suffered from ISPA and the house ventilation did not meet the requirements, 14 (26.9%) did not suffer from ISPA.

the chi square statistical test obtained a value of X^2 count (5.841) > X^2 table (3.841), then H_0 was rejected and H_a was accepted, which means there is a relationship between home ventilation and the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency. From the results of the phi coefficient (ϕ) test, the result is 0.264, which means that the strength of the relationship between house ventilation and the incidence of ARI in toddlers is at a weak level.

The results of the analysis using the Odds Ratio (OR) test were obtained at 3.076 . This means that house ventilation is a risk factor for the occurrence of ARI in toddlers in Kaleroang Village, Bungku Selatan District, Morowali Regency with a risk of 3.076 times greater for the occurrence of ARI in toddlers with respondents whose house ventilation does not meet the requirements compared to respondents whose house ventilation meets the requirements. While the Lower Limit value

(1.219) and Upper Limit (7.766), the OR value is considered meaningful because the lower limit value and upper limit value are more than one.

Data analysis of house occupancy density with the incidence of ARI in toddlers. Based on table 3 shows that out of 84 respondents there were 15 whose house occupancy density met the requirements totaling 14 (93.3%) of respondents who suffered from ARI in toddlers and the density of their house occupancy met the requirements not suffering from ARI in toddlers amounting to 1 (6.7%) respondents . Then of the 69 respondents whose house occupancy density did not meet the requirements of suffering from ARI in toddlers, there were 39 (56.5 %) and the density of house occupancy did not meet the requirements who did not suffer from ARI in toddlers amounted to 30 (43.5%).

chi square statistical test obtained the value X^2 count (7.171) > X^2 table (3.841), then H_0 was rejected and H_a was accepted, which means there is a relationship between the density of house occupancy and the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency . From the results of the phi coefficient test (ϕ) the result is 0.292, which means that the strength of the relationship between the density of residential houses and the incidence of ARI in toddlers is at a weak level.

The results of the analysis using the Odds Ratio (OR) test were obtained at 0.093 . This means that the density of house occupancy is not a risk factor for the

occurrence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency. With a Lower Limit value (0.012) and an Upper Limit (0.746), the OR value is considered insignificant because the lower limit value and upper limit value are less than one.

Analysis of data on smoking habits of family members with the incidence of ARI in toddlers. Based on table 3 shows that of the 65 respondents whose family members had smoking habits, there were 37 (56.9 %) respondents who had toddlers suffering from ARI and 28 (43.1%) respondents who had toddlers who did not suffer from ARI, then of the 19 respondents who were members the family has a habit of not smoking, there are 16 (84.2%) respondents who have toddlers suffering from ARI and 3 (15.8%) respondents who have toddlers who don't suffer from ARI.

Statistical test results using the Chi Square test showed that the value of X^2 counted (4.701) > X^2 table (3.841), then H_0 was rejected and H_a was accepted, which means there is a relationship between smoking habits of family members and the incidence of ARI in toddlers in Kaleroang Village South Bungku District, Morowali Regency. From the results of the phi coefficient test (ϕ) the result is 0.237 which means that the strength of the relationship between smoking habits of family members and the incidence of ARI in toddlers is at a weak level.

The results of the analysis using the Odds Ratio (OR) test were obtained at 0.248. This means that the smoking habit of family members is not a risk factor for ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency. With a Lower Limit value (0.066) and an Upper Limit (0.934), the OR value is considered

insignificant because the lower limit value and upper limit value are less than one.

Analysis of data on the use of mosquito coils with the incidence of ARI in toddlers. Based on table 3, it shows that of the 61 respondents who used mosquito coils, there were 45 (73.8 %) respondents who had toddlers suffering from ARI and 16 (26.2%) respondents who had toddlers who did not suffer from ARI, then from 23 respondents who did not use there were 8 (34.8%) respondents who had toddlers suffering from ARI and 15 (65.2%) respondents who had toddlers who did not suffer from ARI.

Statistical test results using the Chi Square test showed that the value of X^2 counted (10.903) > X^2 table (3.841), then H_0 was rejected and H_a was accepted, which means there is a relationship between the use of mosquito coils and the incidence of ARI in toddlers in Kaleroang Village South Bungku District, Morowali Regency. From the results of the phi coefficient test (ϕ) the result is 0.360 which means that the strength of the relationship between the use of mosquito coils and the incidence of ARI in toddlers is at a weak level.

The results of the analysis using the Odds Ratio (OR) test were obtained at 5.273. This means that the use of mosquito coils is a risk factor for the occurrence of ARI in toddlers in Kaleroang Village, Bungku Selatan District, Morowali Regency with a risk of 5.273 times greater for the occurrence of ARI in infants with respondents who use mosquito coils compared to respondents who do not use mosquito coils. While the value of the Lower Limit (1.882) and Upper Limit (14.777), the OR value is considered meaningful because the lower limit value and upper limit value are more than one.

Analysis of immunization status data with the incidence of ARI in toddlers. Based

on table 3, it shows that of the 30 respondents whose immunization status was complete, there were 14 (46.7 %) respondents who had toddlers suffering from ARI and 16 (53.3%) respondents who had toddlers who did not suffer from ARI, then of the 54 respondents whose immunization status was not complete, there were 39 (72.2%) respondents who had toddlers suffering from ARI and 15 (27.8%) respondents who had toddlers who did not suffer from ARI.

The results of the statistical test using the Chi Square test showed that the value of X^2 counted (5.409) > X^2 table (3.841), then H_0 was rejected and H_a was accepted, which means there is a relationship between immunization status and the incidence of ARI in toddlers in Kaleroang Village, Bungku District South of Morowali Regency. From the results of the phi coefficient test (ϕ) the result is 0.254 which means that the strength of the relationship between immunization status and the incidence of ARI in toddlers is at a weak level.

The results of the analysis using the Odds Ratio (OR) test were obtained at 2.971. This means that immunization status is a risk factor for the occurrence of ARI in children under five in Kaleroang Village, South Bungku District, Morowali Regency with a 2.971 times greater risk of developing ARI in infants with respondents whose immunization status is incomplete compared to respondents whose immunization status is complete . While the Lower Limit value (1.170) and Upper Limit (7.548), the OR value is considered meaningful because the lower limit value and upper limit value are more than one.

DISCUSSION

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According to Notoatmodjo (2003) a house with extensive ventilation does not meet health requirements, it will affect the health of the occupants of the house. This is caused by the process of exchanging airflow from outside into the house which is not smooth, so that the bacteria that cause ARI in the house do not come out. Ventilation can also cause an increase in room humidity due to the process of evaporation of fluids from the skin, therefore high room humidity will be an excellent medium for the growth of bacteria that cause ARI diseases.

Based on the results of univariate analysis, it was shown that out of 84 respondents, there were 32 (38.1 %) respondents who had adequate ventilation area. This is due to ventilation in the respondent's house, the size of the ventilation is almost average, fulfilling the requirements or good ventilation, which is $\geq 10\%$ of the floor area of the house. Then there were 52 (61.9 %) respondents who did not meet the requirements for the ventilation area, this was because the respondents did not understand the function of ventilation, where ventilation is a pathway for pollution to escape from inside the house. If there is no ventilation in a polluted room, smoke and pollution will be trapped in a room and the room will be stuffy every day so the process of getting in and out of air is not good.

The results of the bivariate analysis showed that among the 32 respondents who had adequate ventilation, there were still 15 (46.9 %) respondents suffering from ISPA. This is because there are other factors causing the occurrence of ARI in toddlers such as toddlers who often play in polluted environments so that it makes it easier for the disease to occur. Especially if there are family members who smoke and are near toddlers, there will be a risk of breathing

problems for toddlers. Then there were 14 (26.9 %) respondents under five who had a ventilation area that did not meet the requirements but did not suffer from ARI. This is due to good immune system because the respondent's toddler has received complete immunization, good nutritional status and exclusive breastfeeding for his toddler.

The results of statistical tests showed that house ventilation was associated with the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency with a weak relationship. Thus it can be concluded that respondents whose house ventilation does not meet the requirements (<10%) are related to the incidence of ARI in toddlers compared to respondents whose house ventilation meets the requirements ($\geq 10\%$) of the floor area. This is because house ventilation that does not meet the requirements can cause humidity in the room, the evaporation process will result in a lack of oxygen and an increase in the concentration of carbon dioxide which is toxic to the occupants of the house, so that it can cause ARI in toddlers.

The existence of a weak relationship between house ventilation and the incidence of ARI in toddlers is basically related to ventilation area. Respondents who have houses with ventilation areas that do not meet health requirements will have a risk of experiencing ARI, with good ventilation, fresh air will easily enter the room so that the risk of ARI occurring will decrease. Meanwhile, poor ventilation can cause high humidity and endanger health so that the risk of ISPA will increase. So to reduce the incidence of ARI, parents of toddlers whose ventilation area does not meet health requirements need to increase the ventilation

area of their house and always open the windows every morning.

This research is in line with research conducted by Salsabela Afifah Rafaditya (2021). The results showed that there was a relationship between house ventilation and the incidence of ARI in toddlers, where the p value (0.019) was smaller than the α value. < 0.05 which indicates that the relationship is significant.

Air humidity in the house will be affected by excessive occupancy density. Occupancy density is caused by the area of the room that is not proportional to the number of people living in it. This will reduce the use of oxygen and facilitate the spread of disease. High humidity is caused by sweat and human breathing. A narrow room with a large number of people in it has a higher humidity level than outside, thereby endangering health because disease spreads easily.⁷

The results of the univariate analysis showed that out of 84 respondents, there were 15 (17.9 %) respondents who had a residential density that met the requirements. This is because based on the results of measurements of the houses occupied by the respondents, they meet the requirements, that is, each occupant occupies $> 8 \text{ m}^2$ / person and is not cramped. Moderate occupancy density is one of the requirements for a healthy home, so the more densely populated a child lives, the higher the risk of transmitting ARI will be . The reason the respondent's house has excessive occupancy density is because in one house two families live, so it is not possible to compare the number of occupants with the building area of the house. In addition, there are many family members living in the house. As a result, 69 (82.1 %) of the respondent's houses did not meet the requirements for

occupancy density . Then some respondents whose economic condition is still relatively low so that they have not been able to renovate their house to become a livable house. Thus the risk of transmitting ARI will become easier due to crowded houses.

The results of the bivariate analysis showed that 14 respondents (93.3 %) had residential densities that were included in the eligible group, but their children suffered from ISPA. This is caused by a lack of ventilation thereby reducing sunlight entering the room which can eliminate the bacteria that cause ARI in toddlers. In addition, as many as 30 (43.5 %) of the under five respondents did not suffer from ISPA but had overcrowded houses which were included in the non-eligible group. This is due to the respondents' broad understanding of healthy home design, including the use of waterproof floors and good ventilation to prevent the growth of bacteria in the house.

The results of statistical tests showed that the density of house occupancy was weakly related to the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency. Thus, respondents who have a residential density that does not meet the requirements ($< 8 \text{ m}^2$) in terms of room area are related to the incidence of ARI in toddlers compared to respondents whose residential density meets the requirements ($\geq 8 \text{ m}^2$) in terms of room area. This is caused by houses that are not in accordance with the number of occupants which can cause a lack of oxygen in the room so that the immune system of the occupants decreases, then accelerates the emergence of airborne infectious diseases, one of which is ISPA.

The existence of a weak relationship between the level of occupancy density of the house and the incidence of ARI is basically related to the density of occupancy in the house. This is because if the number of occupants in one house exceeds the building area of 8 m^2 / person, the area of the building that does not match the number of occupants will cause overcrowding. So it can affect the respiratory system.

This research is supported by research conducted by Samuel Marganda (2020). Based on the statistical test between the occupancy density of the house and the incidence of ARI in toddlers using the Chi Square test shows that the p value ($0.015 < \alpha$ (0.05). This shows that there is a significant relationship between house occupancy density and the incidence of ARI in toddlers.

Smoking is a habit that may make smokers feel comfortable, but can also have negative effects on smokers and other people around them. Toddlers who are exposed to secondhand smoke by family members who smoke in the house will become passive smokers. When a cigarette is burned and smoked, the resulting smoke is referred to as primary smoke, and passive smoking is more dangerous than active smoking. And sidestream smoke refers to the smoke that comes out of the end of the cigarette (the burning part) . According to research (Hilmawan et al ., 2020) This side smoke contains more tobacco combustion products than the main smoke .8

The results of the univariate analysis showed that out of 84 respondents, 19 (22.6 %) had family members who did not smoke. According to research on mothers who have toddlers, none of the respondent's family members smoke, so it doesn't have an impact on children's respiratory diseases. However, 65 respondents (77.4 %) reported having

family members who smoke. According to research findings, the majority of mothers who have toddlers say that their children are often exposed to cigarette smoke from household members. One of them is caused by exposure to cigarette smoke in the environment around toddlers and causes ARI in toddlers. Conversely, children whose parents smoke are more susceptible to respiratory diseases such as flu, asthma, pneumonia and other respiratory diseases.

The results of the bivariate analysis showed that of the 19 respondents whose family members did not smoke, there were still 16 (84.2 %) respondents who had toddlers suffering from ISPA. This is due to environmental factors that do not support such as air pollution. Then, out of 65 respondents whose family members smoked, there were 28 (43.1 %) respondents who had toddlers who did not suffer from ISPA. This is due to several factors, such as the toddler's good immune system so that he can ward off the bacteria that cause ARI that enter through the respiratory organs from cigarette smoke , then the toddler is not near a family member who is smoking or the toddler is not at home so not exposed to cigarette smoke.

The results of statistical tests showed that the smoking habits of family members were related to the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency with a weak relationship. Thus, it can be said that respondents whose family members smoke are more likely to suffer from ARI than respondents whose family members do not smoke when they are around children or in the house because toddlers and small children are very sensitive to the effects of cigarette smoke because it can harm the cells respiratory tract cells and cells of lung tissue,

such as alveoli, if exposed in excessive numbers.

The weak relationship between smoking habits of family members and the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency is influenced by indoor air quality. Houses where family members have smoking habits have the opportunity to increase the incidence of ARI compared to houses where family members do not have smoking habits. If excessive cigarette smoke is exposed to toddlers and children, it will damage lung cells, both respiratory tract cells and lung tissue cells.

This research is supported by research conducted by Nurmala Sari (2019). Where the results of the Chi Square test the relationship between smoking habits of family members and the incidence of ARI in infants obtained a value of $p (0.0006) < \alpha (0.05)$, thus there is a significant relationship between smoking habits of family members and the incidence of ARI.

The use of mosquito coils can pose a risk to environmental health and can cause ARI. The use of mosquito coils is very risky for humans according to the Information Data Center of the Indonesian Hospital Association (PERSI) because mosquito coils contain active substances belonging to the carbamate and organophosphate groups (Fajrianti et al ., 2022) .

The results of the univariate analysis showed that out of 84 respondents, there were 23 (27.4 %) respondents who did not use mosquito coils. Based on the results of research on mothers under five in the respondent's house did not use mosquito coils so it did not affect toddlers' respiratory disorders and there were 61 (72.6 %) respondents who used mosquito coils. Based on the results of the research, most of the

mothers of toddlers said that using mosquito coils was because the home environment was surrounded by the sea, so this was one of the breeding grounds for mosquitoes. Then there are family members who often pile up/hang up clothes so that this becomes a hiding place for mosquitoes.

The results of the bivariate analysis showed that 23 respondents did not use mosquito coils, there were still 8 (34.8 %) respondents who had toddlers suffering from ARI. This is influenced by environmental factors such as polluted air pollution or the presence of family members who smoke. Then from 61 respondents who used mosquito coils, there were 16 (26.2 %) respondents who had toddlers who did not suffer from ARI. This is due to several factors, such as the good immune system of toddlers and then the placement of mosquito coils not near toddlers so that they are not directly exposed to the smoke of mosquito coils.

The results of statistical tests showed that the use of mosquito coils was associated with the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency with a weak relationship. Thus it can be concluded that respondents who used mosquito coils were associated with the incidence of ARI compared to respondents who did not use mosquito coils. This is because mosquito coils are made from synthetic chemicals, such as organophosphate and carbamate chemicals which are included in the pesticide class. Those who smell or inhale the smoke of mosquito coils will cause poisoning or can facilitate the risk of ARI incidents, especially in toddlers.

The weak relationship between the use of mosquito coils and the incidence of ARI in toddlers in Kaleroang Village, South

Bungku District, Morowali Regency is influenced by indoor air quality. Houses that use mosquito coils have the opportunity to increase the incidence of ARI compared to houses that do not use mosquito coils. Besides being able to cause ARI, the harmful substances produced from burning mosquito coils can also trigger asthma attacks and can exacerbate bronchitis.

This research is supported by research conducted by Elina Haqie (2022). There is a significant relationship between the use of mosquito coils and the incidence of ARI in toddlers as shown by statistical analysis using the Chi Square test which produces a p value of $(0.000) < \alpha (0.05)$.

A child's immunization status can contribute to the development of ARI, if a toddler does not get all the recommended vaccinations and is exposed to disease, then the disease will manifest more severely due to a weak toddler's immune system. Conversely, if a toddler with complete vaccination records is exposed to ARI, then his illness will not get worse.⁹

The results of the univariate analysis showed that out of 84 respondents, there were 30 (3.7 %) respondents whose immunization status was complete. Based on the results of research on mothers of toddlers, if there is an immunization schedule carried out by the puskesmas, respondents always follow or bring toddlers to carry out the immunization and there are 54 (64.3 %) respondents whose immunization status is incomplete. From the research results, most of the mothers of toddlers said that they did not want to bring their children to carry out immunizations, this is because if after immunization, the toddlers immediately get sick or have a fever. Therefore they don't bring toddlers anymore to carry out routine immunizations

carried out by the puskesmas. This is a lack of knowledge that post-immunization fever is not a dangerous condition but a form of the child's body's response in forming a new combined immune system from the injected vaccine, resulting in an increase in body temperature.

The results of the bivariate analysis showed that of the 30 respondents whose immunization records were complete, 14 (46.7 %) respondents still had children with ARI. This is because measles, which is a risk factor for ARI, usually occurs before ARI cases. Complete basic immunization can prevent measles, but by preventing the variables that can cause ARI, not by providing direct protection against ARI.

The results of statistical tests showed that immunization status was related to the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency with a weak relationship. Thus, it can be said that respondents with under-fives who have inadequate immunization records are more likely to be exposed to ISPA compared to respondents with under-fives who have complete immunization records. This is caused by immunological elements that make children more susceptible to ISPA and the nature of their development that socializes more with peers and the surrounding environment.

The weak relationship between immunization status and the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency is influenced by the level of confidence in the negative effects of immunization and the level of knowledge of mothers to comply with the immunization schedule regularly so that it has an impact on the weak correlation between immunization status and ARI

incidents in toddlers in Kaleroang Village, South Bungku District, Morowali Regency

This research is supported by research conducted by Deviani Fatimah (2022). There is a significant relationship between vaccination status and the incidence of ARI in children under five, according to the results of statistical analysis for this relationship which produces a p value of (0.08).

CONCLUSIONS

Based on the results of the research and discussion, it can be concluded that there is a weak relationship between house ventilation, house occupancy density, smoking habits of family members, use of mosquito coils, and immunization status with the incidence of ARI in toddlers in Kaleroang Village, South Bungku District, Morowali Regency

Based on the description of the conclusions above, the advice that can be given is that the UPT Kaleroang Health Center is expected to be able to further improve health programs, especially the ISPA eradication program by paying more attention to the importance of children getting complete and regular immunizations and providing counseling about the needs of healthy families. The frequency of ARI in toddlers will be reduced if education is carried out about the dangers of cigarette smoke and mosquito coils. For Society If the occupancy of the house is still classified as dense or does not meet the requirements, it is hoped that the community will increase ventilation in the house so that air can enter and reduce air humidity. It is also hoped that people will develop the habit of opening windows every day so that air can circulate in the room. Keep your distance from children if a family member has ARI. It is hoped that people whose family members

have the habit of smoking and using mosquito coils will not be near toddlers . It is hoped that the community, especially mothers who have toddlers, will participate in and support the routine complete basic immunization program by participating in the implementation of immunization sweeping by health workers.

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