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ORIGINAL ARTICLE

DOMINANT RISK FACTORS FOR THE INCIDENCE OF "ACUTE RESPIRATORY INFECTION" "ARI" IN TODDLERS

Faktor Risiko Yang Dominan Terhadap Kejadian "Infeksi Pernapasan Akut" "Ari" Pada Balita

Johannes Bastira Ginting[1], Nazila Anggraini[2], Bella Syukriyah Syaputri Pasaribu[3], Rehan Nur[4], Buenita[5]
[1]Department of Bachelor of Public Health, Faculty of Public Health, Prima University Indonesia, North Sumatra, 20118, Indonesia, johannesbastiraginting@unprimdn.ac.id
[2]Bachelor of Public Health Study Program, Faculty of Public Health, Prima University Indonesia, North Sumatra, 20118, Indonesia, nazilaanggraini6@gmail.com
[3]Bachelor of Public Health Study Program, Faculty of Public Health, Prima University Indonesia, North Sumatra, 20118, Indonesia, bsyuk386@gmail.com
[4]Bachelor of Public Health Study Program, Faculty of Public Health, Prima University Indonesia, North Sumatra, 20118, Indonesia, rehannnur05@gmail.com
[5]Department of Bachelor of Public Health, Faculty of Public Health, Prima University Indonesia, North Sumatra, 20118, Indonesia, buenitaskm@gmail.com
Corresponding Author: Johannes Bastira Ginting, johannesbastiraginting@unprimdn.ac.id, Prima University Indonesia, North Sumatra, 20118, Indonesia

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ABSTRACT

Background: Acute Respiratory Infection (ARI) is a contagious illness affecting diverse age groups, including toddlers, and is among the top ten reasons for Community Health Center visits. **Purpose:** This study aims to analyze the influence of dominant risk factors on the incidence of ARI in toddlers. **Methods:** This study used an observational, analytic-cross sectional approach, at Puskesmas Kampung Lalang, Medan, in 2023. The total population was 394 toddlers (aged 0-59 months). In the determination of the number of samples using the sample size estimation formula, 198 samples were obtained by purposive sampling. Data analysis used Chi-Square test and Multiple Logistic Regression Enter Methods, with a significance level of 95%. **Results:** The results showed that the variables of Vitamin A administration (OR = 0.27, 95% CI: 0.10-0.77) and immunization status (OR = 0.36, 95% CI: 0.14-0.93) were associated with a decreased risk of ARI in toddlers. In contrast, exclusive breastfeeding (OR = 2.35, 95% CI: 1.11-5.01) was associated with increased risk, while the physical environment of the house (OR = 2.92, 95% CI: 1.28-6.64) was associated with increased risk of ARI. **Conclusion:** Vitamin A administration and immunization reduce the risk of respiratory tract infection among under-fives at Puskesmas Kampung Lalang. Exclusive breastfeeding and home conditions increased the same risk. Improving these risk factors is essential to reduce the prevalence of childhood respiratory infections in the area.

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ABSTRAK

Latar Belakang: *Infeksi Saluran Pernapasan Akut (ISPA) adalah penyakit menular yang mempengaruhi beragam kelompok umur, termasuk balita, dan merupakan salah satu dari sepuluh alasan utama kunjungan ke Puskesmas.* ***Tujuan:*** *Penelitian ini bertujuan untuk menganalisis pengaruh faktor risiko dominan terhadap kejadian ISPA pada balita.* ***Metode:*** *Penelitian ini menggunakan pendekatan observasional, analitik-cross sectional, di Puskesmas Kampung Lalang, Medan, tahun 2023. Jumlah populasi sebanyak 394 balita (usia 0-59 bulan). . Penentuan jumlah sampel menggunakan rumus estimasi ukuran sampel , diperoleh 198 sampel dengan teknik purposive sampling. Analisis data menggunakan Uji Chi-Square dan Multiple Logistic Regression Metode Enther, dengan tingkat signifikansi 95%.* ***Hasil:*** *Hasil penelitian menunjukkan bahwa variabel Pemberian Vitamin A (OR = 0,27, 95% CI: 0,10-0,77) dan status imunisasi (OR = 0,36, 95% CI: 0,14-0,93) terkait dengan penurunan risiko ISPA pada balita. Sebaliknya, ASI eksklusif (OR = 2,35, 95% CI: 1,11-5,01) berkaitan dengan peningkatan risiko, sedangkan lingkungan fisik rumah (OR = 2,92, 95% CI: 1,28-6,64) berhubungan dengan peningkatan risiko ISPA.* ***Simpulan:*** *Pemberian Vitamin A dan imunisasi menurunkan risiko infeksi saluran pernapasan pada balita di Puskesmas Kampung Lalang. ASI eksklusif dan kondisi rumah meningkatkan risiko yang sama. Perbaikan faktor risiko tersebut penting untuk mengurangi prevalensi infeksi saluran pernapasan pada anak di wilayah tersebut.*

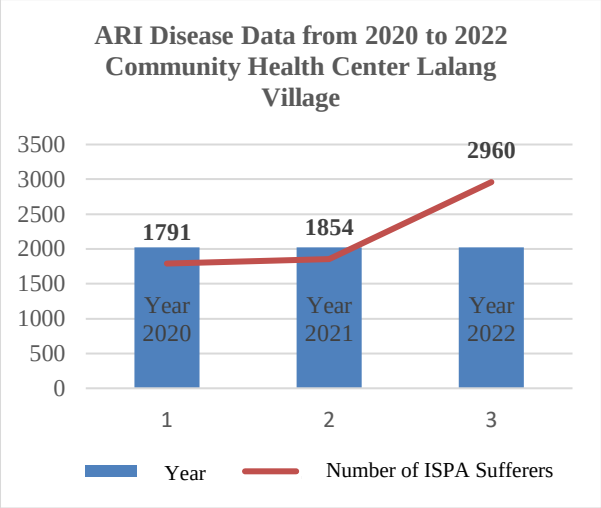
INTRODUCTION

Acute Respiratory Infection (ARI) is a significant driver of morbidity and mortality from infectious diseases worldwide. In Indonesia, environmentally-related diseases are still the leading cause of death (1), with under-five mortality reaching more than 4 million cases annually (2). According to the Indonesian Ministry of Health, the under-five group is divided into three groups: infants (0-2 years), toddlers (2-3 years), and preschoolers (over 3 to 5 years). Toddlers is a term that refers to children ranging in age from 0 to 59 months. Toddlerhood, as a vulnerable phase, increases the risk of developing infectious diseases such as ARI due to the formation of antibodies and respiratory organs of toddlers that are not yet fully mature and optimal (3).

The high incidence of ARI can be caused by various factors, including the physical condition of houses that do not meet health standards. Suboptimal ventilation, high occupancy density, absence of ceiling on the roof, use of plank walls, dusty floors, and the presence of smokers in the house are some of the factors that play a role. All of these factors can potentially negatively affect the health of the house's occupants, especially toddlers (4). In addition, the lack of immunization status of under-fives, who are not age-appropriate and have never been immunized, is a factor leading to inadequate immunization protection in the body (5). Exclusive breastfeeding for the first six months of life was also identified as a risk measure to reduce the incidence of ARI in infants (6).

In the context of ARI, family economic conditions play a significant role because they are related to food consumption patterns, nutritional status, and housing conditions influenced by family income (7). Education level is also an important factor, where individuals with good economic conditions tend to receive and access information more efficiently, which can improve knowledge and awareness and family health (8). Parents' knowledge about ARI has an essential impact on shaping habits and supporting the health of children under five (9). Initial surveys in the Lalang Village Health Center working area showed an increase in ARI cases yearly, as seen in patient visit data from 2020 to 2022 (Figure 1). Based on the above background, this study aims to determine and analyze the dominant risk factors for the incidence

of ARI in toddlers at Community Health Center Lalang Village, Medan.



Source: Secondary Data from Lalang Village Community Health Center

Figure 1. Number of ARI diseases based on Community Health Center Lalang Village, Medan City visits from 2020 to 2022

METHODS

This type of research is quantitative with an analytical Cross-Sectional design at the Lalang Village Health Center in 2023. The population was 394 toddlers; determining the number of samples using the Slovin formula obtained as many as 198 models, with a purposive sampling technique using the following inclusion criteria:

1. Mothers who have toddlers who have/are experiencing ARI.
2. Reside in the working area of the Lalang Village Health Center.
3. Willing to be a respondent and exclusion.

Exclusion Criteria:

1. Mentally challenged mother, unable to read and write.
2. The subject refused to be used as a respondent.

Independent variables in this study are gender variables (male and female), vitamin A administration history variables, government regulations for children aged 6-11 months must get vitamin A 1 time, and 12-59 months of age two times (never, according to standards if following government regulations, not according to standards if not following the provisions). Immunization status variable, seen from the requirements of the Ministry of Health of the Republic of Indonesia (2017), primary immunization with the condition that the baby has received Hepatitis B immunization 1x, BCG 1x, DPTHB-Hib 3x, Polio 4x, and measles 1x (incomplete and complete).

Exclusive breastfeeding variable (yes, if breast milk is given during infant age 0-6 months without additional food, no if breast milk and extra food are provided during infant age 0-6 months. Feeding pattern (Poor if the number of meals, amount of food, and feeding schedule were not following the daily amount of food and reasonable if the number of meals, amount of food, and feeding schedule were following the daily amount of food). Ventilation (ineligible if there is no ventilation and it is not open; eligible if there is ventilation and it is open). Wall type (ineligible if made of wood, tepas, plywood, and eligible if made of plastered bricks). Roof type (not eligible if the roof is made of asbestos or zinc and eligible if the top is made of clay) (10). Type of flooring (not eligible if the floor is not waterproofed or not tiled/tiled and eligible if it is waterproofed, plastered, and tiled or tiled) (11).

Cigarette smoke (not eligible if active smokers smoke in the house, which can cause toddlers to become passive smokers, and eligible if no family members smoke, if any, but active smokers do not smoke in the house) (12). Economic status (Not eligible if insufficient for basic needs and feeding children under five. Suppose the total monthly family income is Rp. ≤ 2,800,000, - and Eligible if it is sufficient for basic needs and feeding children under five. Suppose the total monthly family income is Rp. > 2,800,000).

Education is the mother's latest level of education (13). Knowledge results from a person's understanding through sensing particular objects, especially knowing about ARI (14). The dependent variable is the incidence of ARI in toddlers, said to be ARI if there are symptoms of fever, cough, runny nose, sore throat, and shortness of breath for 7-14 days and vice versa (15). Data analysis used bivariate (Chi-Square) and Multivariate (Multiple Logistic Regression entry method), with a confidence level of 95%. This study used the ethical principles of practicality, confidentiality, and justice and obtained an honest permission letter with the number 040/KEPK/UNPRI/X/2023.

RESULTS

Based on Table 1, with Chi-Square bivariate test to test the relationship between independent and dependent variables. The results showed that the nine independent variables showed a significant association with a p-value ≤ 0.05, namely in the

variable of vitamin A administration (0.01), immunization status (0.02), exclusive breastfeeding (0.01), and the physical environment of the house (0.01). The variables of gender (0.04), feeding patterns (0.12), economic status (0.14), knowledge (0.10), and education (0.91) had a p-value > 0.05, so there was no significant relationship in the incidence of ARI. Variables that had a p-value ≤ 0.03 were continued for multivariate testing.

Table 1
Analysis of the relationship between Bivariate Test Results (Chi-Square) risk factors for the incidence of ARI in Toddlers) at Community Health Center Lalang Village, Medan, Year 2023

Variable	Category	Incidence of ARI		Total	*df*	*p-value*
		Yes	No			
Gender	Male	74 37.37%	17 8.59%	91 45.96%	1	0.42
	Female	82 41.41%	25 12.63%	107 54.04%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Vitamin A administration	Complete	105 53.03%	37 18.69%	142 71.72%	1	**0.01**
	Incomplete	51 25.76%	5 2.53%	56 28.28%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Immunization Status	Complete	101 51.01%	35 17.68%	136 68.69%	1	**0.02**
	Incomplete	55 27.78%	7 3.54%	62 31.31%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Exclusive breastfeeding	Not exclusively breastfed	87 43.94%	14 7.07%	101 51.01%	1	**0.01**
	Exclusive breastfeeding	69 34.85%	28 14.14%	97 48.99%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Feeding Pattern	Less Good	49 24.75%	8 4.04%	57 28.79%	1	0.12
	Good	107 54.04%	34 17.17%	141 71.21%		
	Total	156 78.79%	42 21.21%	198 100.00%		

(*Continued*)

Table 1
Continued

Variable	Category	Incidence of ARI		Total	*df*	*p-value*
		Yes	No			
Physical Home Environment	Not Eligible	129 65.15%	27 13.64%	156 78.79%	1	**0.01**
	Eligible	27 13.64%	15 7.58%	42 21.21%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Family Economic Status	Not Eligible	108 54.55%	24 12.12%	132 66.67%	1	0.14
	Eligible	48 24.24%	18 9.09%	66 33.33%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Mother's Knowledge	Less Good	93 46.97%	19 9.60%	112 56.57%	1	0.10
	Good	63 31.82%	23 11.62%	86 43.43%		
	Total	156 78.79%	42 21.21%	198 100.00%		
Mother's Education	Low	31 15.66%	8 4.04%	39 19.70%	1	0.91
	High	125 63.13%	34 17.17%	159 80.30%		
	Total	156 78.79%	42 21.21%	198 100.00%		

Source: Primary data processed by SPSS in 2023

Based on the results presented in Table 2, multivariate analysis was performed using the logistic regression test of enter method. In this analysis, variables with odds ratio (OR) values greater than one were considered risk factors. It is protective if the OR value is ≤ 1 and the physical environment of the house has an OR value of 2.92 (> one risk). The home's physical environment is the most dominant risk factor for the incidence of ARI in toddlers.

Table 2
Results of Regression Logistic Test Enter Method risk factors for the incidence of ARI in toddlers) at Community Health Center Lalang Village, Medan, Year 2023

Variables	B	SE.	Wald	Sig.	Exp(B)	95% C.I.for EXP(B)	
						Lower	Upper
Vitamin A administration	-1.30	0.53	6.03	0.01	0.27	0.10	0.77
Immunization Status	-1.01	0.48	4.44	0.04	0.36	0.14	0.93
Exclusive breastfeeding	0.86	0.39	4.95	0.03	2.35	1.11	5.01
Physical Home Environment	1.07	0.42	6.53	0.01	2.92	1.28	6.64

Source: Primary data processed by SPSS in 2023

DISCUSSION

Gender Variable

The results of this study indicate that the gender variable of toddlers does not have a significant relationship with the incidence of ARI in toddlers, with a value (p-value 0.42 > 0.05). In line with the research of Ariani & Ekawati (16), with a discount (p-value = 0.44) that there is no significant relationship between the gender variable and the incidence of ARI in toddlers at the Tanjung Baru Health Center, East Baturaja District, Ogan Komering Ulu. This happens in toddlers because many other factors support inflammation caused by entering agents into the body. Therefore, ARI can occur in anyone, both female and male.

Vitamin A Administration Variable

The results of this study are supported by Rosa (7), with a value (p-value = 0.02 ≤0.05). These results indicate a significant relationship between vitamin A and the incidence of ARI. Vitamin A deficiency is one factor that influences the incidence of ARI. Vitamin A is given to toddlers to help boost immunity and reduce infections from bacteria and viruses (17).

Immunization Status Variable

ARI is one of the diseases that can be prevented through immunization (18). There is a significant relationship between immunization status and the incidence of ARI with a value (p-value = 0.00 ≤ 0.05) states that toddlers who have received complete immunization when exposed to ARI then the toddler will not be exposed to a more severe or even death (19).

Exclusive breastfeeding variable

Breast milk contains all the nutrients babies need for growth and development and antibodies that can help babies build an immune system. Babies who get breast milk get many benefits and advantages. One is a decrease in the risk of infectious diseases, namely ARI (20). There is an association between breast milk and the incidence of ARI (21).

Feeding Pattern Variables

These counseling sessions emphasize that nutritious food does not need to be expensive but should prioritize quality for overall health. The sessions also address essential aspects such as maintaining a suitable meal schedule, selecting appropriate types of food, and ensuring the proper quantity for the toddler's consumption. This is not in line with Setiawati et al. (22) who stated the relationship between nutritional status and the incidence of ISPA at the Sukaraya District Health Center.

Home Physical Environment Variables

The physical environment encompasses factors such as the type of roof, walls, and floor in the house. Dust accumulation can occur if these components fail to meet the necessary standards. When toddlers inhale air containing this accumulated dust, it becomes a potential trigger for ARI. Inadequate room ventilation and the absence of other rooms for proper air exchange in the house exacerbate this risk. This correlation is further supported by the behavior of most respondents' families, particularly active smokers who frequently smoke near toddlers. This practice not only makes toddlers passive smokers but also serves as a triggering factor for ARI in this vulnerable age group.

Home is a place to grow and develop toddlers; if the living environment does not meet the requirements of a healthy home, the toddler becomes challenging to grow and develop and is more susceptible to the risk of disease, including ARI (23). The community can improve environmental hygiene to prevent ARI in toddlers, namely the better quality of the physical environment of the house, the smaller the risk of getting ARI (24). Therefore, attention needs to be paid to improving the physical environment of the house, which aims to reduce the incidence of ARI, especially in the Lalang Village, Medan Health Center area.

Economic Status Variable

A value (p-value = 0.48 > 0.05) indicates that there is no significant relationship between economic status and the incidence of ARI. It can be concluded that there is no financial relationship because exposure to ARI can be exposed to anyone regardless of economic status; this is because other factors cause ARI in toddlers (25). In contrast to Alfiah's research (26), the study indicates a discrepancy in the results. Alfiah's research, utilizing Chi-Square analysis, revealed a significant relationship between feeding patterns and the incidence of Acute Respiratory Infections (ARI) in toddlers at the Paccerakkang Health Center in Makassar City, with a p-value of 0.10, which is less

than 0.05. Indicates a noteworthy correlation, emphasizing that individuals with a favorable economic status and insufficient commitment to a healthy diet are more susceptible to diseases.

Knowledge Variable

The study results indicate that the variable of maternal knowledge is not significantly associated with the incidence of Acute Respiratory Infections (ARI) in toddlers, as reflected in the p-value of 0.10, which is greater than 0.05. Interestingly, it was observed that many mothers with poor knowledge still experienced ARI in their toddlers. This phenomenon can be attributed to the curiosity of mothers regarding ARI, where even those with limited knowledge might possess the skills to manage or prevent ARI in their toddlers.

There is no relationship in the variable relationship between knowledge and ARI prevention in toddlers in Rondongan and Galung Hamlets, Sumarrang Village, Campalagian District, Polewali Mandar Regency. Several factors influence a person's ability to health, such as the desire to get new health information, and the easier it is to access the sources of information obtained, the more knowledge a person has about health, either reached from other people or the mass media (27).

Education Variable

The results showed that the mother's education variable had no relationship with the incidence of ARI in toddlers, with a value of (p-value = 0.91 > 0.05). Most respondents in the mothers of toddlers have a high educational status at the high school level and up to the following level. However, the study's results found that it is not in line with the poor knowledge of most mothers in high maternal education. The results of this study are supported by Wibowo & Ginanjar (2020) with a value (p-value = 0.94 > 0.05), which means there is no significant relationship between maternal education and the incidence of ARI in toddlers in the Cipaku Health Center working area (28).

Low maternal education has a vital role in the incidence of ARI, so mothers who have difficulty in receiving information about ARI that their toddlers are experiencing, on the other hand, the higher the mother's education, the easier it is to accept new things. The better it is to act (29).

CONCLUSION

Based on the results and discussion, it can be concluded that Vitamin A administration and immunization status are associated with a reduced risk of acute respiratory infections (ARI) in toddlers at Puskesmas Kampung Lalang. On the other hand, exclusive breastfeeding and the condition of the physical environment of the house are associated with an increased risk of ARI in toddlers. Therefore, improving Vitamin A administration, immunization status, and creating a healthy physical environment are essential strategies for reducing the prevalence of ARI among under-fives in the region.

CONFLICT OF INTEREST

There is no conflict of interest in this research.

AUTHOR CONTRIBUTION

JBG, NA, BSSP, and RN contribute equally during the original draft preparation's conceptualization, methodology, analysis, and writing. BS provides advice by reviewing this article. JBG contributed to this article's writing, review, editing, and revision.

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