

Environmental and Behavioral Drivers of ARI Incidence in Toddlers: Insights from Darul Kamal Health Center, Aceh Besar

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Abstract. *Acute Respiratory Infection (ARI) is a disease that often attacks toddlers. This study aims to analyze the influence of the presence of family members who smoke, completeness of immunization, exclusive breastfeeding, and low birth weight (LBW) on the incidence of ARI in toddlers in the working area of the Darul Kamal Health Center, Aceh Besar, in 2023. An observational analytical method with a cross-sectional approach was used on a sample of 78 toddlers. It was found that toddlers who live with family members who smoke, have incomplete immunization, do not receive exclusive breastfeeding, or are LBW tend to be at greater risk of experiencing ARI. As many as 61.5% of the total sample of children under five experienced ARI, indicating a reasonably high prevalence in the area. Further analysis revealed that complete immunization and exclusive breastfeeding act as protective factors, while the presence of family members who smoke and LBW increases the risk of ARI in toddlers. This study emphasizes the importance of public health education regarding clean and healthy living behaviour, as well as the importance of immunization and exclusive breastfeeding in preventing ARI in toddlers. The conclusions of this study suggest the need for a comprehensive prevention strategy involving health stakeholders and the community to reduce the prevalence of ARI in children under five in the Darul Kamal Community Health Center working area, Aceh Besar.*

Keywords: *ARI, Toddlers, Smoking, Immunization, Exclusive Breastfeeding, LBW*

1. Introduction

Issues related to lung disease and respiratory disorders are at the forefront of global health challenges. According to statistics, diseases associated with the respiratory tract are the leading cause of death globally, reaching around 57 million each year. In the list of ten leading causes of death, Acute Respiratory Infections (ARI) are in third position, recording a prevalence of 6.1%, equivalent to 3.46 million cases (Indonesia, 2018; Kemenkes, 2019; Laksono, Kusri, & Laksono, 2019). Acute Respiratory Infection (ARI) is a severe public health problem, especially in the toddler age group. In Indonesia, especially in the Aceh Besar region, the prevalence of ARI in children under five still shows a significant (Erlinda, 2015; Indriana, Santi, & Arlianti, 2024; Setyaningsih & Setyawan, 2016). ARI not only causes morbidity and mortality in children but also creates an economic burden for families and the health system. In this context, the Darul Kamal Community Health Center, Aceh Besar, as a primary health care unit, has an essential role in efforts to prevent and control ARI in children under five (Sari & Ardianti, 2017).

In Indonesia, ARI consistently ranks among the 10 most common diseases. According to the 2018 Riskesdas report, the prevalence of ARI reached 19.3% (Aditianti, Raswanti, Sudikno, Izwardy, & Irianto, 2020; Hermawan, 2021; Idaiani et al., 2019). The 1-4-year age group has the highest percentage of ARI cases, reaching 25.8%. In 2014, there were 657,490 cases of ARI among children under five years old, which accounted for 29.47% of the total cases. Children aged 1-5, or toddlers, have a very high level of brain plasticity, making them very receptive to learning and enrichment processes (Wulaningsih, Hastuti, & Pradana, 2018). Environmental factors and family health behaviour are two essential aspects that influence the incidence of ARI in toddlers (Fatimah et al., 2022; Hong et al., 2023; Utara, 2021). Poor environmental quality, such as air pollution, residential density, and exposure to cigarette smoke, is known to increase the risk of ARI (Adesanya & Chiao, 2017; Ayuni, Pauzan, & Ramadhan, 2023; Chiao & Deji-Abiodun, 2020). In addition, family health behaviours such as exclusive breastfeeding practices, immunization status, and smoking habits in the household also have a significant contribution to the risk of ARI in toddlers (HIDAYANI & Km, 2020; Kolawole, Oguntoye, Dam, & Chunara, 2017; Seda, Trihandini, & Permana, 2021).

Various factors, including intrinsic and extrinsic factors, influence ARI cases in children under five years (Hasan & Radjabessy, 2017). Intrinsic factors include immunization status, nutritional conditions, and exclusive breastfeeding. Extrinsic factors include the type of floor material, level of occupancy density, window size, type of fuel used, and the presence and position of ventilation and kitchen. In research conducted by Afriani in 2020, which examined the factors that influence the incidence of ARI in children under five years old, it was found that there was a significant correlation between the use of mosquito coils, smoking behaviour by family members, residential density, and ventilation. For kitchen smoke and the incidence of ARI in toddlers (Afriani, 2020). Children aged between 1-3 years, also known as toddlers, as well as preschool children aged 3-5 years. At the toddler stage, children are very dependent on their parents to carry out basic activities such as bathing, toileting and eating. Although their speaking and walking abilities have improved, other skills are still under development and are limited (Himawati & Fitria, 2020). Research on the influence of environmental factors and health behaviour on the incidence of ARI in toddlers in the working area of the Darul Kamal Community Health Center, Aceh Besar, in 2023, aims to provide scientific evidence regarding the factors that contribute to the prevalence of ARI (Lazamidarmi, Sitorus, & Listiono, 2021). By understanding the associated risk factors, appropriate interventions can be designed and implemented to reduce the incidence of ARI among children under five in the region (Himawati & Fitria, 2020).

The research method used is observational analytics with a cross-sectional design. This approach was chosen to identify the relationship between the independent variables (environmental factors and health behaviour) and the dependent variable (the incidence of ARI in toddlers). The research sample was taken from the toddler population in the Darul Kamal Community Health Center working area, with explicit inclusion and exclusion criteria to ensure data validity. The results of this research can provide recommendations to relevant stakeholders, including local governments, health institutions and the community, to develop effective ARI prevention strategies. These strategies can include improving environmental quality, promoting healthy living behaviour, and strengthening immunization programs, all of which aim to protect children under five from the risk of ARI. Through collaborative efforts, the prevalence of ARI among toddlers in the Aceh Besar region can be minimized, thereby improving the quality

of life of children in the area.

This article aims to analyze the influence of environmental factors and health behaviour on Acute Respiratory Infection (ARI) incidence in children under five in the Darul Kamal Aceh Besar Health Center working area in 2023. The factors analyzed include family members who smoke, completeness of immunizations, provision of Exclusive breastfeeding, and Low Birth Weight (LBW). This research used an observational analytical method with a cross-sectional approach on 78 toddlers. The novelty of this research lies in the integrated analysis of various environmental factors and health behaviours that influence the incidence of ARI in toddlers, especially in the work area of the Darul Kamal Aceh Besar Community Health Center in 2023. While many previous studies may have examined individual factors such as smoke exposure, smoking, immunization, or exclusive breastfeeding, this study presents a comprehensive analysis that combines all these factors and includes the LBW variable to determine its relationship and influence on the risk of ARI in toddlers. In addition, this research provides recommendations that focus on preventive efforts and education for the community, which is an essential step in reducing the prevalence of ARI in children under five in the region.

2. Method

This research uses a quantitative approach, an observational analytical design, and cross-sectional methods. It aims to analyze the influence of environmental factors and health behaviour on Acute Respiratory Tract Infections (ARI) incidence in children under five in the Darul Kamal Community Health Center working area, Aceh Besar, in 2023.

The population in this study consisted of all toddlers registered in the working area of the Darul Kamal Health Center, Aceh Besar, in 2023, with a total of 78 toddlers. The research sample was taken using a total sampling technique, where all toddlers who met the inclusion criteria were sampled. Inclusion criteria were toddlers under five years who lived in the Darul Kamal Community Health Center working area during the research period and parents/guardians willing to participate.

The independent variables in this research include: (1) The presence of family members who smoke, (2) Immunization equipment, (3) Exclusive breastfeeding, and (4) Low birth weight (LBW).

Data was collected through questionnaires completed by parents or guardians of toddlers and a review of medical records to verify data regarding immunization, exclusive breastfeeding and LBW status. Data regarding the incidence of ARI was obtained from the medical records of the Darul Kamal Health Center. The collected data was analyzed using statistical software. The chi-square test was used to explore the relationship between independent variables and the incidence of ARI. A p-value of less than 0.05 was considered statistically significant. In addition, logistic regression analysis was carried out to determine the odds ratio (OR) and measure the strength of the relationship between risk factors and the incidence of ARI.

This research has received approval from the ethics committee at the relevant institution. All participants provided informed consent before engaging in the study. Participants' identities and personal information are guaranteed to be kept confidential and are only used for this research. This research methodology is designed to identify and analyze the influence of environmental factors and health behaviour on the incidence of ARI in children under five so that the results can provide helpful information for developing ARI prevention strategies in the Aceh Besar region.

3. Results and Discussions

Research conducted in the Darul Kamal Community Health Center working area, Aceh Besar, in 2023 showed that 48 of the 78 toddlers sampled (61.5%) experienced ARI. This indicates that the prevalence of ARI in children under five in this area is relatively high. It was also found that 47 of the 78 toddlers (60.3%) lived with family members who smoked. Statistical analysis shows a significant relationship between the presence of family members who smoke and the incidence of ARI in toddlers, with a p -value = 0.008, which indicates that toddlers who live with smokers have a higher risk of developing ARI. A total of 44 out of 78 toddlers (56.4%) had complete immunization. There is a significant relationship between the completeness of vaccination and the incidence of ARI, with a value of $p = 0.003$. This indicates that complete immunization can reduce the risk of ARI in toddlers.

Table 1 presents data regarding the frequency distribution of Acute Respiratory Infections (ARI) incidence and the presence of family members who smoke among toddlers in the Darul Kamal Community Health Center working area, Aceh Besar, in 2023, with a total sample of 78 toddlers. This provides insight into the relationship between exposure to cigarette smoke in the home environment and the risk of ARI in toddlers. The research showed that 48 toddlers (61.5%) experienced ARI, and 30 toddlers (38.5%) did not experience ARI. A total of 47 toddlers (60.3%) had family members who smoked, and 31 toddlers (39.7%) did not have family members who smoked.

Table 1. Frequency distribution of ARI incidents

No	ARI incident	f	%	The presence of family members who smoke	f	%
1	Yes	48	61,5	Yes	47	60,3
2	No	30	38,5	No	31	39,7
	Total	78	100	Total	78	100

The results show a high prevalence of ARI in the region, with more than half of the sample (61.5%) experiencing ARI. This confirms that ARI is a significant health problem among toddlers in the Darul Kamal Community Health Center working area. Nearly the same number of toddlers who experienced ARI also came from families with at least one member who smoked (60.3%). This shows that there is a strong relationship between exposure to cigarette smoke at home and the incidence of ARI in toddlers, considering that almost all toddlers who experience ARI come from homes with family members who smoke. The relationship between exposure to cigarette smoke and ARI highlights the need for interventions to reduce exposure to cigarette smoke among toddlers. Education about the dangers of smoking around children and the importance of a smoke-free home environment can help reduce the incidence of ARI.

These findings emphasize the importance of health policies and intervention programs aimed at reducing exposure to cigarette smoke in households, especially in homes with toddlers. Policies such as banning smoking in the home and health education programs about the risks of tobacco to children can be effective in reducing the incidence of ARI. In conclusion, this data shows a strong relationship between the presence of family members who smoke and the incidence of ARI in children under five, highlighting the need for preventive measures and educating the public about the importance of a healthy environment for children's growth and development.

Table 2 presents data regarding the frequency distribution of complete immunization and exclusive breastfeeding in the Darul Kamal Community Health Center

working area, Aceh Besar, in 2023, with a total sample of 78 toddlers. This data provides an overview of the region's immunization status and exclusive breastfeeding practices. A total of 44 toddlers (56.4%) had complete immunization, while 34 toddlers (43.6%) had incomplete vaccination. A total of 18 toddlers (23.1%) received exclusive breastfeeding, and 60 toddlers (76.9%) did not receive exclusive breastfeeding.

Table 2. Frequency distribution of immunization completeness and exclusive breastfeeding

No	Immunization Equipment	f	%	Exclusive breastfeeding	f	%
1	Complete	44	56,4	Exclusive	18	23,1
2	Incomplete	34	43,6	Not exclusive	60	76,9
	Total	78	100	Total	78	100

The analysis results show that more than half of the sample (56.4%) has complete immunization, which is a positive indicator of public health efforts to prevent infectious diseases in children. However, 43.6% of children under five have incomplete immunizations, indicating gaps that must be addressed to achieve broader immunization coverage in the region. Data shows that only about a quarter of toddlers (23.1%) receive exclusive breastfeeding. This figure is relatively low and shows that many toddlers in the region do not receive the full health benefits of exclusive breastfeeding, which is recommended until 6 months of age. The high proportion of toddlers who do not receive exclusive breastfeeding (76.9%) requires special attention and intervention to improve breastfeeding practices.

These results underline the importance of targeted public health intervention programs to increase the completeness of immunization and exclusive breastfeeding in the Darul Kamal Community Health Center working area. Educating parents about the importance of complete vaccination, the benefits of exclusive breastfeeding, and adequate support and facilities for breastfeeding mothers can help improve these health indicators. Collaborative efforts are needed between health workers, local governments, and communities to strengthen complete immunization and exclusive breastfeeding. Vital health education programs, support for breastfeeding mothers, and easy access to immunization services are some of the strategies that can be implemented to improve the current situation. In conclusion, the data shows significant room for improvement in complete immunization and exclusive breastfeeding in Aceh Besar. Improvements in both areas are essential to support the health and well-being of children in the region.

Table 3 presents data regarding the frequency distribution of Low Birth Weight (LBW) in the Darul Kamal Community Health Center working area, Aceh Besar, in 2023, with a total sample of 78 toddlers. This data provides an overview of the proportion of toddlers born with LBW compared to those with average birth weight. Of the 78 toddlers, 30 (38.5%) were reported to have low birth weight (LBW). Meanwhile, the remaining 48 toddlers (61.5%) had average birth weight. The entire research sample included 78 toddlers.

Table 3. Frequency distribution of low birth weight

No	Low birth weight	f	%
1	LBW	30	38,5
2	Normal	48	61,5
	Total	78	100

The significant proportion, namely 38.5%, of toddlers with LBW indicates that there are several toddlers in the Darul Kamal Community Health Center working area who are at high risk of health problems from birth, including the possibility of an increased risk of various infectious diseases such as ARI. LBW is an essential indicator of neonatal health problems and can be an early marker for potential long-term health problems in children. The majority of toddlers, namely 61.5%, were born with average weight, which is a good indicator of the health of the mother and child during pregnancy. This shows that most toddlers in the region have a healthy start in life. The high percentage of LBW requires special attention from public health officials and health service providers. To reduce the prevalence of LBW, maternal and child health intervention programs, such as adequate nutrition for pregnant women, routine pregnancy health monitoring, and health education about risk factors that can cause it, are very important.

Data shows the need for targeted public health interventions to reduce LBW rates in the Darul Kamal Community Health Center working area. Health promotion and prevention activities, including increasing access to prenatal care, nutrition for pregnant women, and health education, must be strengthened to reduce the risk of LBW and improve the general health of children under five. Thus, the importance of public health monitoring and intervention in reducing LBW rates and improving neonatal and child health in Aceh Besar, especially in the Darul Kamal Community Health Center working area, becomes very relevant and urgent.

Table 4 provides information about the relationship between the presence of family members who smoke and the incidence of Acute Respiratory Infections (ARI) in toddlers in the Darul Kamal Health Center Working Area, Aceh Besar, in 2023. This reveals how smoking behaviour in the family can affect the respiratory health of toddlers. Of the 47 toddlers who had family members who smoked, 35 toddlers (74.5%) experienced ARI, while 12 toddlers (25.5%) did not experience ARI. Of the 31 toddlers without family members who smoke, 13 toddlers (41.9%) experienced ARI, and 18 toddlers (58.1%) did not experience ARI. There were 78 toddlers, with 48 toddlers (61.5%) experiencing ARI and 30 (38.5%) not experiencing ARI. The P value is 0.0008, indicating a statistically significant relationship between the presence of family members who smoke and the incidence of ARI in toddlers. The α (alpha) value was determined at 0.05, the threshold for determining statistical significance. The Odds Ratio (OR), amounting to 4.038, shows that toddlers with family members who smoke have a 4.038 times greater risk of experiencing ARI compared to toddlers who do not have family members who smoke.

Table 4. Relationship between the presence of family members who smoke and the incidence of ARI in toddlers

No	The presence of family members who smoke	ARI				Total		P Value	α	OR
		Yes		No		n	%			
		f	%	f	%					
1.	Yes	35	74,5	12	25,5	47	100			
2.	No	13	41,9	18	58,1	31	100	0,008	0,05	4,038
	Total	48	61,5	30	38,5	78	100			

Thus, the P value is 0.0008; this result shows a very significant relationship between the presence of family members who smoke and the incidence of ARI in toddlers. This indicates that exposure to cigarette smoke at home contributes significantly to the prevalence of ARI in toddlers. The OR of 4.038 confirms that the presence of family

members who smoke substantially increases the risk of ARI in toddlers. This shows the negative impact of cigarette smoke on the respiratory health of toddlers and the importance of a home environment free of cigarette smoke. These findings strengthen the argument for public health campaigns about the dangers of smoking around children and the importance of implementing smoke-free practices at home. Efforts to increase awareness and educate parents and family members about the impact of smoking on children's health are the key to reducing the incidence of ARI in toddlers.

The research results show the importance of a home environment that is free from exposure to cigarette smoke to prevent ARI in toddlers. Health education programs aimed at reducing smoking behaviour in the home and increasing awareness about the health risks posed by cigarette smoke to children need to be strengthened and expanded. In conclusion, the presence of family members who smoke has a significant association with an increased risk of ARI in children under five, emphasizing the need for effective public health interventions and policies to create a healthier environment for children.

Meanwhile, only 18 out of 78 toddlers (23.1%) received exclusive breastfeeding. There is a significant relationship between exclusive breastfeeding and the incidence of ARI, with a p -value = 0.011. This shows that exclusive breastfeeding can act as a protective factor against ARI. As many as 30 out of 78 toddlers (38.5%) were LBW cases. Analysis showed that the presence of family members who smoked ($P=0.008$), completeness of immunization ($P=0.003$), exclusive breastfeeding ($P=0.011$), and LBW ($P=0.004$) had a significant relationship with the incidence of ARI. Further discussion of the implications of the findings and comparison with other studies.

From Table 5, we get information about the relationship between the completeness of immunization and the incidence of Acute Respiratory Infections (ARI) in children under five in the Darul Kamal Health Center Working Area, Aceh Besar, in 2023. This data provides an understanding of the role of immunization in preventing ARI. Of the 44 toddlers with incomplete vaccination, 34 toddlers (77.3%) experienced ARI, while 10 toddlers (22.7%) did not experience ARI. Of the 34 toddlers with complete immunization, 14 toddlers (41.2%) experienced ARI, and 20 toddlers (58.8%) did not experience ARI. There were 78 toddlers, with 48 toddlers (61.5%) experiencing ARI and 30 (38.5%) not experiencing ARI. The P value is 0.0003, indicating a statistically significant relationship between the completeness of immunization and the incidence of ARI in children under five. The α (alpha) value was determined at 0.05, the threshold for determining statistical significance. The Odds Ratio (OR) is 4,857, indicating that toddlers with incomplete immunization have a 4,857 times greater risk of experiencing ARI than toddlers with complete vaccination.

Table 5. Correlation between immunization completeness and the incidence of ARI

No	Immunization Equipment	ARI				Total		P Value	α	OR
		Yes		No		n	%			
		f	%	f	%					
1.	Incomplete	34	77,3	10	22,7	44	100			
2.	Complete	14	41,2	20	58,8	34	100	0,003	0,05	4,857
	Total	48	61,5	30	38,5	78	100			

Based on the analysis results, the P value of 0.0003 is very far below the α value (0.05), confirming the very significant relationship between completeness of immunization and the incidence of ARI in toddlers. This shows that complete vaccination can significantly reduce the risk of ARI in toddlers. Meanwhile, the OR value of 4.857

shows a very high risk of ARI in toddlers with incomplete immunization compared to those with complete vaccination. This emphasizes the importance of full immunization as the primary preventive measure against ARI in toddlers. These results show the importance of an effective immunization program and complete immunization for toddlers to prevent ARI. This highlights the need to increase awareness and access to complete immunization in the Darul Kamal Community Health Center working area and other areas.

According to research results, complete immunization significantly reduces the risk of ARI in toddlers. Therefore, strategies are needed to increase full immunization coverage, including education for parents, increasing access to health services, and monitoring immunization compliance. In conclusion, complete immunization is essential in reducing the risk of ARI in children under five, strengthening the argument for a broad and integrated immunization program as part of a public health strategy to protect children under five from infectious diseases such as ARI.

The results from Table 6 show data that explores the relationship between exclusive breastfeeding and the incidence of Acute Respiratory Tract Infections (ARI) in toddlers in the Darul Kamal Health Center Working Area, Aceh Besar, in 2023. Based on the results of the analysis, 18 toddlers receive exclusive breastfeeding, 6 toddlers (33.3%) experienced ARI, while 12 toddlers (66.7%) did not experience ARI. Of the 60 toddlers who did not receive exclusive breastfeeding, 42 toddlers (70%) experienced ARI, and 18 toddlers (30%) did not experience ARI. There were 78 toddlers, with 48 toddlers (61.5%) experiencing ARI and 30 (38.5%) not experiencing ARI.

Based on the results of the analysis, it shows that the P value is 0.011, indicating that there is a statistically significant relationship between exclusive breastfeeding and the incidence of ARI in toddlers. The α (alpha) value is determined at 0.05, which is the threshold for determining statistical significance. The Odds Ratio (OR), 0.214, shows that toddlers who are exclusively breastfed have a lower risk of experiencing ARI compared to toddlers who are not exclusively breastfed.

Thus, the P value is 0.011, which is smaller than the α value (0.05); this result confirms a significant relationship between exclusive breastfeeding and a reduction in the incidence of ARI in toddlers. This shows that exclusive breastfeeding has the potential to be a protective factor against ARI. An OR of 0.214 indicates that the risk of experiencing ARI in toddlers who receive exclusive breast milk is lower compared to those who do not receive exclusive breast milk. This emphasizes the importance of exclusive breastfeeding in providing protection against infections, especially ARI in toddlers. These findings underscore the importance of promoting exclusive breastfeeding by health workers as a strategy to prevent ARI in toddlers. Exclusive breast milk provides antibodies and essential nutrients that support the toddler's immune system, reducing their risk of infectious diseases such as ARI.

Based on research results, exclusive breastfeeding has been proven to significantly reduce the risk of ARI in toddlers. Therefore, recommendations to increase exclusive breastfeeding coverage through health education and support for breastfeeding mothers need to be strengthened in the Darul Kamal Community Health Center working area and other areas to improve the health of toddlers. In conclusion, these data support the evidence that exclusive breastfeeding plays an essential role in reducing the risk of ARI in toddlers, highlighting the need for public health strategies that facilitate and support exclusive breastfeeding.

Table 6. Relationship between exclusive breastfeeding and the incidence of ARI

No	Exclusive breastfeeding	ARI				Total		P Value	α	OR
		Yes		No		n	%			
		f	%	f	%					
1.	Exclusive	6	33,3	12	66,7	18	100			
2.	Not Exclusive	42	70,0	18	30,0	60	100	0,011	0,05	0,214
	Total	48	61,5	30	38,5	78	100			

The research results show a relationship between Low Birth Weight (LBW) and the incidence of Acute Respiratory Tract Infections (ARI) in toddlers in the Darul Kamal Health Center Working Area, Aceh Besar, in 2023, as presented in Table 7. This data provides critical insight into the influence of conditions at birth on the health risks of toddlers. Of the 30 toddlers with LBW, 25 (83.3%) experienced ARI, while 5 (16.7%) did not experience ARI. There were 48 toddlers with average birth weight, 23 toddlers (47.9%) experienced ARI, and 25 toddlers (52.1%) did not experience ARI. Of the 78 toddlers, 48 (61.5%) experienced ARI, and 30 (38.5%) did not experience ARI. Based on the P-Value of 0.0004, a statistically significant relationship exists between LBW and the incidence of ARI in toddlers. Meanwhile, based on the α (alpha) value, it is determined at 0.05, the standard threshold for determining statistical significance. The Odds Ratio (OR) is 5.435, indicating that toddlers with LBW have a 5,435 times greater risk of experiencing ARI compared to toddlers born with average weight.

Table 7. Relationship between LBW and the incidence of ARI

No	LBW	ARI				Total		P Value	α	OR
		Yes		No		n	%			
		f	%	f	%					
1.	LBW	25	83,3	5	16,7	30	100			
2.	Normal	23	47,9	5	52,1	48	100	0,004	0,05	5,435
	Total	48	61,5	30	38,5	78	100			

The P value of 0.0004 is much lower than the determined α value (0.05), indicating a very significant relationship between LBW and the incidence of ARI. This shows that LBW is not just an association but has a strong influence on the risk of ARI in toddlers. The OR value of 5.435 indicates that toddlers with LBW have a more than five times higher risk of experiencing ARI compared to toddlers born with average weight. This OR indicates a significant level of risk and emphasizes the importance of monitoring and providing special attention to LBW toddlers to prevent ARI. These findings underscore the importance of early health interventions for LBW toddlers, including close health monitoring, adequate nutritional support, and ARI prevention measures. Targeted strategies are needed to reduce the risk of ARI in this high-risk group, which may include earlier vaccination, education of parents about the importance of infection prevention, and improved access to health services.

Thus, the data shows that LBW is a significant risk factor for the occurrence of ARI in children under five, requiring special attention and intervention from health professionals and policymakers to reduce the prevalence and impact of ARI in this vulnerable population of children under five.

The results of this study are consistent with existing literature, which states that environmental factors such as exposure to cigarette smoke and health behaviour factors such as complete immunization, exclusive breastfeeding, and LBW conditions have a significant influence on the risk of ARI in toddlers. The presence of family members who

smoke in the house increases toddlers' exposure to air pollutants that can trigger ARI. Complete immunization is known to protect against various infectious diseases, including ARI. Exclusive breastfeeding provides optimal nutrition and antibodies for the toddler's immune system, while LBW is often associated with a weaker immune system.

This research underlines the importance of public health interventions aimed at reducing exposure to cigarette smoke in toddlers, increasing immunization coverage, promoting exclusive breastfeeding, and preventing LBW. Preventive efforts and education for parents or guardians about the importance of a smoke-free environment, complete immunization and optimal nutrition can contribute significantly to reducing the prevalence of ARI in toddlers.

Although this study's results provide valuable insight, limitations must be noted, including a cross-sectional design that cannot definitively establish causality. Future longitudinal studies and well-designed interventions are needed to understand the dynamics of this relationship better and develop effective intervention strategies.

4. Conclusions

The conclusions section should answer your research questions and explain what your results mean. In other words, the majority of the conclusions section should be an interpretation of your results.

Based on the data analyzed in the research, it can be concluded as follows:

1. There is a significant relationship between the presence of family members who smoke and the incidence of ARI in toddlers. Data shows that toddlers who live with family members who smoke have a higher risk of experiencing ARI compared to those who do not live with family members who smoke.
2. Data analysis shows a significant relationship between immunization completeness and ARI incidence. Toddlers with incomplete immunization are at a higher risk of contracting ARI than toddlers who have complete vaccination.
3. There is a significant relationship between exclusive breastfeeding and the incidence of ARI in toddlers. Toddlers who do not receive exclusive breast milk tend to be more at risk of experiencing ARI compared to toddlers who receive exclusive breast milk.
4. Data shows that there is a significant relationship between LBW and the incidence of ARI in toddlers. Toddlers with LBW have a higher risk of experiencing ARI compared to toddlers with average birth weight.

From these conclusions, it can be confirmed that environmental factors and health behaviour significantly influence the incidence of ARI in toddlers. The importance of educating the public about the dangers of smoking around toddlers, the need to complete immunizations, the benefits of exclusive breastfeeding, as well as paying attention to the risks of LBW on toddlers' health are very crucial. A comprehensive prevention strategy involving health stakeholders and the community needs to be improved to reduce the prevalence of ARI in children under five in the Darul Kamal Health Center working area, Aceh Besar.

5. References

- Adesanya, O. A., & Chiao, C. (2017). Environmental risks associated with symptoms of acute respiratory infection among preschool children in north-western and south-southern Nigeria communities. *International Journal of Environmental Research and Public Health*, 14(11), 1396.

- Aditianti, A., Raswanti, I., Sudikno, S., Izwardy, D., & Irianto, S. E. (2020). Prevalensi Dan Faktor Risiko Stunting Pada Balita 24-59 Bulan Di Indonesia: Analisis Data Riset Kesehatan Dasar 2018 [Prevalence And Stunting Risk Factors In Children 24-59 Months In Indonesia: Analysis Of Basic Health Research Data 2018]. *Penelitian Gizi Dan Makanan (The Journal of Nutrition and Food Research)*, 43(2), 51–64.
- Afriani, B. (2020). Faktor-faktor yang Berhubungan dengan Kejadian ISPA Pada Balita. *Cendekia Medika*, 5(1), 1–15.
- Ayuni, D. Q., Pauzan, P., & Ramadhan, R. (2023). Hubungan Perilaku Merokok Orang Terdekat Dengan Kejadian Ispa Pada Balita Di Puskesmas Sungai Tutung. *Nan Tongga Health And Nursing*, 18(2), 11–18.
- Chiao, C., & Deji-Abiodun, O. (2020). A global analysis of the regional variation in the symptoms of acute respiratory infection during childhood: Epidemics and their association with environmental vulnerability. *Health & Place*, 65, 102400. <https://doi.org/https://doi.org/10.1016/j.healthplace.2020.102400>
- Erlinda, V. (2015). Penerapan Model Family-Centered Nursing Terhadap Pelaksanaan Tugas Kesehatan Keluarga Dalam Pencegahan ISPA Pada Balita Di Wilayah Kerja Puskesmas Simpang Tiga Kabupaten Aceh Besar. *Jurnal Kedokteran Yarsi*, 23(3), 165–186.
- Fatimah, Massi, M. N., Febriani, A. D. B., Hatta, M., Karuniawati, A., Rauf, S., ... Farsida. (2022). The role of exclusive breastfeeding on sIgA and lactoferrin levels in toddlers suffering from Acute Respiratory Infection: A cross-sectional study. *Annals of Medicine and Surgery*, 77, 103644. <https://doi.org/https://doi.org/10.1016/j.amsu.2022.103644>
- Hasan, K., & Radjabessy, S. (2017). Hubungan tingkat pendidikan ibu balita, paritas dan status ekonomi keluarga dengan kejadian penyakit ispa pada balita di puskesmas kalumata tahun 2017. *Jurnal Serambi Sehat*, 10(3), 1–10.
- Hermawan, A. (2021). Utilisasi Kelambu Berinsektisida Pada Daerah Endemis Tinggi Malaria di Indonesia: Analisis Data Riset Kesehatan Dasar (Riskesdas) 2018. *Buletin Penelitian Kesehatan*, 49(1), 9–20.
- HIDAYANI, W. R., & Km, S. (2020). Riwayat Penyakit Infeksi Yang Berhubungan Dengan Stunting Di Indonesia: Literatur Review: Riwayat Penyakit Infeksi Yang Berhubungan Dengan Stunting Di Indonesia: Literatur Review. In *Jurnal Seminar Nasional* (Vol. 2, pp. 45–53).
- Himawati, E. H., & Fitria, L. (2020). Hubungan Infeksi Saluran Pernapasan Atas dengan Kejadian Stunting pada Anak Usia di Bawah 5 Tahun di Sampang. *Jurnal Kesehatan Masyarakat Indonesia*, 15(1), 1–5.
- Hong, S., Li, D., Wei, Y., Zheng, Y., Cai, J., Zheng, H., ... Zou, L. (2023). Epidemiology of respiratory pathogens in patients with acute respiratory tract infection in Xiamen, China: A retrospective survey from 2020 to 2022. *Heliyon*, 9(11), e22302. <https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e22302>
- Idaiani, S., Yunita, I., Tjandrarini, D. H., Indrawati, L., Darmayanti, I., Kusumawardani, N., & Mubasyiroh, R. (2019). Prevalensi Psikosis di Indonesia berdasarkan Riset Kesehatan Dasar 2018. *Jurnal Penelitian dan Pengembangan Pelayanan*

Kesehatan, 9–16.

- Indonesia, K. (2018). Profil Kesehatan Indonesia 2018 Kemenkes RI.(2019). *Profil Kesehatan Indonesia*.
- Indriana, F., Santi, T. D., & Arlianti, N. (2024). Faktor Risiko yang Mempengaruhi Kejadian ISPA Berulang Pada Balita di Wilayah Kerja Puskesmas Baiturrahman Kecamatan Baiturrahman Kota Banda Aceh. *Jurnal Kesehatan Tambusai*, 5(1), 1724–1736.
- Kemenkes, R. I. (2019). Profil kesehatan Indonesia 2018 [Indonesia health profile 2018].
- Kolawole, O., Oguntoye, M., Dam, T., & Chunara, R. (2017). Etiology of respiratory tract infections in the community and clinic in Ilorin, Nigeria. *BMC Research Notes*, 10, 1–6.
- Laksono, A. D., Kusriani, I., & Laksono, A. D. (2019). Gambaran Prevalensi Balita Stunting dan Faktor yang Berkaitan di Indonesia: Analisis Lanjut Profil Kesehatan Indonesia Tahun 2017. *ResearchGate*, March, 0–12.
- Lazamidarmi, D., Sitorus, R. J., & Listiono, H. (2021). Faktor-Faktor yang Berhubungan dengan Kejadian ISPA pada Balita. *Jurnal Ilmiah Universitas Batanghari Jambi*, 21(1), 299–304.
- Sari, N. I., & Ardianti, A. (2017). Hubungan Umur dan Jenis Kelamin Terhadap Kejadian Infeksi Saluran Pernapasan Akut (ISPA) pada Balita di Puskesmas Tembilahan Hulu. *An-Nadaa: Jurnal Kesehatan Masyarakat (e-Journal)*, 4(1), 26–30.
- Seda, S. S., Trihandini, B., & Permana, L. I. (2021). Hubungan Perilaku Merokok Orang Terdekat Dengan Kejadian Ispa Pada Balita Yang Berobat Di Puskesmas Cempaka Banjarmasin. *Jurnal Keperawatan Suaka Insan (Jksi)*, 6(2), 105–111.
- Setyaningsih, W., & Setyawan, D. A. (2016). Studi Epidemiologi dengan Pendekatan Analisis Spasial Terhadap Faktor-Faktor Risiko Penyakit Infeksi Saluran Pernapasan Akut (ISPA) pada Anak di Kecamatan Sragen. *Jurnal Keterampilan Fisik*, 1(1).
- Utara, K. M. (2021). Profil Kesehatan. *Lampung Utara*.
- Wulaningsih, I., Hastuti, W., & Pradana, A. I. (2018). Hubungan pengetahuan orang tua tentang ISPA dengan kejadian ISPA pada balita di desa dawungsari kecamatan pegandon kabupaten kendal. *Jurnal Smart Keperawatan*, 5(1), 90–101.