

# Determinants of Acute Respiratory Infections Incidence in Children Under Five in the Working Area of the Siak Hulu II Community Health Center in Kampar Regency

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# Determinants of Acute Respiratory Infections Incidence in Children Under Five in the Working Area of the Siak Hulu II Community Health Center in Kampar Regency

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## Abstract

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**BACKGROUND:** The incidence of acute respiratory infections (ARIs) is high among under-five children, especially in developing countries. ARIs are a leading cause of morbidity and mortality in under-five children worldwide. ARIs in children take a heavy toll on life. ARI disease ranks first in the spread of illness in the Siak Hulu II Public Health.

**AIM:** This study aims to determine the incidence of non-pneumonia ARI in children under five in the working area of UPTD Siak Hulu II.

**METHODS:** This research uses quantitative methods with a cross-sectional approach. The sample in this study was 74 children under five aged 12–59 months using the consecutive sampling technique. Data analysis used Chi-square, univariate and bivariate statistical tests.

**RESULTS:** The results showed that there was a relationship between birth weight  $p = 0.017$  and  $OR = 4.844$ , cigarette smoke exposure  $p = 0.012$ , indiscriminate snacking  $p = 0.013$ , maternal knowledge  $p = 0.016$ , and exclusive breastfeeding  $p = 0.038$ , with the incidence of non-pneumonia ARI in toddlers aged 12–59 months in the working area of the Siak Hulu II Health Center, Siak Hulu District, Kampar Regency. Respondents who have low birth weight have a 4.8 times greater risk of suffering from ARI.

**CONCLUSION:** There is a relationship between birth weight, exposure to cigarette smoke, casual snacks, knowledge of mothers, and exclusive breastfeeding with the incidence of ARI in children under five in the work area of the UPTD Siak Hulu II Community Health Center, Siak Hulu District, Kampar Regency.

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## Introduction

Acute respiratory infections (ARIs) in children are a significant public health problem, especially in developing countries. As per the World Health Organization estimates, ARI causes 3.9 million deaths worldwide each year [1]. Acute respiratory tract infection (ARI) remains a significant public health problem that is widely recognized as the leading cause of mortality and morbidity in children under five [2]. Globally, one-fifth of deaths among children under five are due to ARI, primarily pneumonia, which accounts for 18% of all under-five deaths in particular [3], [4]. ARI continues to be the single largest contributor to morbidity among children and is responsible for approximately 70% of under-five morbidity in developing countries [5]. About 3.5% of the global disease burden is caused by ARIs [6]. ARI always ranks first in the group of infants and toddlers in Indonesia. The mortality rate among this group of children in this country is around 33/1000 live births [7]. Under-five mortality due to pneumonia remains higher than child mortality caused by other preventable infectious diseases [8]. Besides, ARI is also often in the first position on the list of 10 most infections in hospitals and health

centers. Based on data from the Riau Province Health Profile (2018), the number of toddlers suffering from ARI is 43.9% with patients with ARI pneumonia by 0.79% and cough not pneumonia by 24.8% [9]. Based on data from the Kampar District Health Office in 2016, ISPA ranks first in the most extensive disease in Kampar district with 13,413 (0.17%) people, and in 2017, ARI cases increased to 59,576 (0.75%) cases. In 2018, there were 24,929 (0.29%) cases of ARI [10]. ISPA disease ranks first in the spread of illness in the Siak Hulu II Public Health Center. In 2018, the proportion of ARI cases in children under five was 1079 (26.8%) cases [11]. Based on this background, this study aims to analyze the proportions and determinants (factors) associated with the incidence of ARI in children under five in the UPTD working area of Siak Hulu II Public Health Center, Siak Hulu District, Kampar Regency.

## Methods

This study used a quantitative analytic approach that was observational with a cross-sectional

study design. The research location is in the working area of the Siak Hulu II Community Health Center, Siak Hulu District, Kampar Regency, from March to August. The study population was all mothers who have children under five aged 12–59 months who are in the working area of the UPTD Siak Hulu II Community Health Center. Of the 4016 population, 74 samples were taken using the consecutive sampling technique. The dependent variable of the study was the incidence of non-pneumonia ARI in children under five. Discernment between under five with ARI and not ARI was done by tracing medical record data and interviews with respondents.

There are five independent research variables, namely, low birth weight (LBW) known through interviews and tracing medical record data. It was recorded as LBW if birth weight <2500 g and not LBW if  $\geq 2500$  g. The second independent variable is exposure to cigarette smoke, which means whether or not under five are exposed to cigarette smoke both at home and outside the home is known through interviews. The third independent variable is indiscriminate snacking, namely, the behavior of children under five who like to snack on and parents who want to provide snacks outside without seeing whether the snacks are hygienic and suitable for consumption by toddlers which is known from the interview.

The fourth variable is the mother's knowledge, which is everything that the mother knows about the causes and prevention of ARI in children under five. It is categorized as high knowledge if the respondent can answer the questions correctly  $\geq 60\%$  and common knowledge if the answer is correct <60%. The fifth independent variable is exclusive breastfeeding, which is breast milk given when the toddler is 0–6 months of age without providing any additional food or drink other than breast milk. In this study, the validity and reliability of the questionnaire were tested. Univariate and bivariate data analysis used the Chi-square test.

## Results

### Univariate analysis

The results of the research on the frequency distribution of respondents based on birth weight, exposure to cigarette smoke, indiscriminate snacks, maternal knowledge, and exclusive breastfeeding are shown in Table 1.

Based on Table 1, it can be seen that as many as 74 respondents, there were 39 (52.7%) who did not suffer from ARI, respondents who had children under five with birth weight <2500 g were 53 (71.6%) children under five. Respondents who had children

**Table 1: Frequency distribution of respondents based on birth weight, exposure to cigarette smoke, casual snacks, knowledge of mothers, and exclusive breastfeeding**

Univariate analysis	Amount	%
ISPA accident		
Yes	35	47.3
No	39	52.7
Birth weight		
<2500 g	53	71.6
$\geq 2500$ g	21	28.4
Exposure to cigarette smoke		
Exposed not exposed	52	70.3
	22	29.3
Casual snacks		
Yes	45	60.8
No	29	39.2
Mother knowledge		
Low	50	67.6
High	24	32.4
Exclusive breast milk		
No exclusive breast milk	54	73.0
Exclusive breast milk	24	27.0

under five who were exposed to cigarette smoke were 52 (70.3%). Of the 74 respondents who have children under five, there are 45 (60.8%) who snack carelessly. Respondents who have insufficient knowledge are 50 (67.6%). Respondents who have children under five who are not exclusively breastfed are 54 (73.0%). In the recording of public opinion research reports at the Community Health Center, there is often confusion between common ARIs and non-pneumonia ARIs. According to the Guidelines for the Control of Acute Respiratory Tract Infection (ISPA), the diagnosis of non-pneumonia ARI includes common colds, pharyngitis, tonsillitis, and otitis [12].

### Bivariate analysis

The results of the study were the relationship between birth weight and the incidence of non-pneumonia ARI in Siak Hulu II Public Health Center, Siak Hulu District, Kampar Regency.

Based on Table 2, it can be seen that of the 55 respondents who have LBW as many as 31 (56.4%) are respondents with the incidence of ARI, and of the 19 respondents who have average birth weight (not LBW) as many as 4 (21.1%) are respondents with ARI incidence. The results of the Chi-square test obtained  $p = 0.017 (<0.05)$ , which means that there is a significant relationship between birth weight and the incidence of ARI in children under five.

**Table 2: Relationship between birth weight and the incidence of non-pneumonia ARI**

Birth weight	ISPA accident				p-value	OR (95% CI)
	ISPA		No ISPA			
	n	%	n	%	n	%
BBLR	31	56.4	24	43.6	55	100
No BBLR	4	21.1	15	78.9	19	100
Total	35	47.3	39	52.7	74	100

ARI: Acute respiratory infection.

Based on Table 3, it can be seen that of the 52 respondents who were exposed to cigarette smoke as many as 30 (57.7%) are with the incidence of ARI. Of the 22 respondents who were not exposed to cigarette smoke, 5 (22.7%) had a non-pneumonia incidence of ARI. The results of the Chi-square test obtained  $p$

= 0.012 (<0.05), meaning that there is a significant relationship between exposure to cigarette smoke and the incidence of non-pneumonia ARI in children under five.

**Table 3: Relationship between exposure to cigarette smoke and the incidence of non-pneumonia ARI**

Exposure to cigarette smoke	ISPA accident				Total	Value p	OR (95% CI)
	ISPA		No ISPA				
	n	%	n	%	n		
Exposure	30	57.7	22	42.3	52	100	0.012 4.636 (1.485–14.48)
No exposure	5	22.7	17	77.3	22	100	
Total	35	47.3	39	52.7	74	100	

ARI: Acute respiratory infection.

Based on Table 4, it can be seen that the 45 respondents who snack carelessly are 29 (58%) with the incidence of ARI. Of the 29 respondents who did not snack carelessly as many as 6 (25.6%) are with the incidence of ARI. The results of the Chi-square test obtained  $p = 0.013$  (<0.05), which means that there is a significant relationship between indiscriminate snacking and the incidence of ARI in children under five.

**Table 4: Relationship between casual snacks and the incidence of non-pneumonia ARI**

Casual snack	Accident ISPA				Total	Value p	OR (95% CI)
	ISPA		No ISPA				
	n	%	n	%	n		
Yes	29	58.0	21	42.0	45	100	0.013 3.938 (1.432–10.804)
No	6	25.6	18	75.0	29	100	
Total	35	47.3	39	52.7	74	100	

ARI: Acute respiratory infection.

Based on Table 5, it is known that of the 50 respondents, 29 (57.7%) had common knowledge with the incidence of ARI. Then from 24 respondents who have high expertise as many as 6 (28.6%) are with the incidence of ARI. The results of the Chi-square test obtained  $p = 0.016$  (<0.05), which means that there is a significant relationship between maternal knowledge and the incidence of ARI in children under five.

**Table 5: Relationship between mother's knowledge and the incidence of non-pneumonia ARI**

Mother's knowledge	Accident ISPA				Total	Value p	OR (95% CI)
	ISPA		No ISPA				
	n	%	n	%	n		
Loa	29	57.7	21	42.0	50	100	0.016 4.143 (1.405–12.214)
High	6	28.6	18	75.0	24	100	
Total	35	47.3	39	52.7	74	100	

ARI: Acute respiratory infection.

Based on Table 6, it is known that 30 respondents (55.6%) who did not exclusively breastfeed experienced ARI incidents. Respondents with exclusive breastfeeding were 5 (25.0%) respondents with ARI incidence. The results of the Chi-square test obtained  $p = 0.038$  (<0.05), which means that there is a significant relationship between exclusive breastfeeding and the incidence of ARI in children under five.

**Table 6: Relationship between exclusive breastfeeding and the incidence of non-pneumonia ARI**

Exclusive birth weight	Accident ISPA				Total	Value p	OR (95% CI)
	ISPA		No ISPA				
	n	%	n	%	n		
No exclusive breast milk	30	55.6	24	44.4	54	100	0.038 3.750 (1.193–11.792)
Exclusive breast milk	5	25.0	15	75.0	20	100	
Total	35	47.3	39	52.7	74	100	

ARI: Acute respiratory infection.

## Discussion

ARI is an important public health problem among children under five. The incidence of ARI in children under five is relatively high, especially in developing countries, one of which is Indonesia. The results of this study indicate that there is a relationship between birth weight and the incidence of non-pneumonia in children under five at the Siak Hulu II Public Health Center, Siak Hulu District, Kampar District. Children under five with LBW have a 4.8 times greater risk of suffering from non-pneumonia ARI compared to children under five who have average birth weight (not LBW). Pregnant women should eat nutritious food, eat fruit and vegetables, healthy food, and vitamin intake to prevent the occurrence of LBW at birth because it can put children under five at risk of ARI and other infections. Malnutrition in children has the potential to increase the risk of ARI during the first 2 years of life (Mwiru, 2013). Other factors that are positively related to ARI are male gender, LBW, working mothers, and high-risk indoor environment [4]. The results of the study also showed that there was a relationship between exposure to cigarette smoke and the incidence of non-pneumonia in children under five at the Siak Hulu II Public Health Center, Siak Hulu District, Kampar District. Children under five who are exposed to cigarette smoke have a 4.6 times greater risk of suffering from non-pneumonia ARI compared to children under five who are not exposed to cigarette smoke. Cigarettes have a very harmful effect on smokers or second-hand smoke, especially toddlers who are accidentally exposed to cigarette smoke. The impact of postpartum tobacco smoke exposure may also be enormous, leading to poorer respiratory health [13]. Environmental tobacco smoke exposure is a recognized risk factor for acute and chronic respiratory disease [14]. Ecological factors and housing standards play a significant role in the transmission of ARI to children. ARI problems are more common in urban areas, especially slum areas than in rural areas [15]. The results of this study indicate that there is a relationship between snacks and the incidence of non-pneumonia ARI in children under five at the UPTD Siak Hulu II Public Health Center, Siak Hulu District, Kampar Regency. Children under five who like to snack carelessly have a 3.9 times greater risk of suffering from non-pneumonia ARI compared to children under five who do not want to snack carelessly. Snacking habits are also an inseparable part of children's lives. Snack food in the school environment varies, such as fried, moonlight, and soft drinks. These snacks can pose a risk to health due to contamination and are not hygienic. Malnutrition influences the burden of symptoms associated with ARI [16]. The results showed that there was a relationship between maternal knowledge and the incidence of non-pneumonia ARI in children under five at the Siak Hulu II Public Health Center, Siak Hulu District, Kampar District. Children under five who



have mothers with insufficient knowledge have a 4.1 times greater risk of suffering from non-pneumonia ARI compared to children under five who have mothers with high experience. Many socioeconomic factors and other factors include children's age, household income, household conditions, parental education, maternal age, and other factors related to ARI [17]. There is a relationship between exclusive breastfeeding and the incidence of non-pneumonia in children under five at the Siak Hulu II Public Health Center, Siak Hulu District, Kampar District. Children of adolescent mothers and malnourished children were also observed to be at higher risk of developing ARI [18]. Children under five who are not exclusively breastfed have a 3.7 times greater risk of suffering from ARI compared to children under five who are solely breastfed.

Based on the researcher's analysis, most children under five did not receive exclusive breastfeeding when they were babies. It is because there are still many mothers in the working area of the Siak Hulu II Community Health Center who do not know the importance of exclusive breastfeeding. For infants 0–6 months, mothers think that breastfeeding alone is not sufficient for nutritional needs. Mothers provide additional food to babies aged <6 months; many respondents work outside the home. Then, some mothers think that formula milk is more practical than breast milk even though one of the benefits that can be provided from breastfeeding is very necessary because it can protect babies against an increase in diarrhea, respiratory infections, obesity, bladder infections, ear infections, and so on. Therefore, researchers argue that mothers should give breast milk only without giving food or drink. Preventing ISPA disease in children must be done early. Current efforts should focus on reducing ARI, one of which can be done by evaluating the impact and pneumococcal vaccine in the routine program of strengthening the immunization system [19]. Besides, it can be done improving environmental conditions can help reduce ARI in children under five in the community [20]. Group intervention efforts need to be done to prevent ARI. Community-based interventions focus on improving housing conditions, reducing fuel use, improving adequate and balanced dietary intake, including exclusive breastfeeding for infants, and early treatment for ARI [21]. Interventions such as providing smoke exits and windows in the bedroom can help reduce the burden of ARI [22].

## Conclusion

Based on the results of the study, it can be concluded that the proportion of ARI incidence in the UPTD Siak Hulu II Public Health Center, Siak Hulu District, Kampar Regency, in 2019 was 35 (47.3%) from 74 respondents. There is a relationship between birth

weight, exposure to cigarette smoke, casual snacks, maternal knowledge, and exclusive breastfeeding with the incidence of ARI in children under five in the UPTD working area of Siak Hulu II Public Health Center, Siak Hulu District, Kampar Regency.

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