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Epidemiology of acute respiratory infection among children under five in Kenali Asam Bawah, Jambi city

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Abstract

Background: Acute respiratory infection (ARI) is a leading cause of morbidity and mortality in children under five, affecting respiratory function and long-term lung development. In Indonesia, ARI remains a significant public health concern, including in urban areas such as Kenali Asam Bawah Urban Village, Jambi City. **Objective**: This study aimed to provide an epidemiological overview of ARI among children under five based on child-related factors. **Methods:** A cross-sectional survey was conducted among 180 children aged 6–59 months, selected using a two-stage proportional-to-size sampling method. Information was collected on age, sex, exclusive breastfeeding, vitamin A supplementation, birth weight, and nutritional status. **Results:** Overall, 35% of children experienced ARI. Of the participants, 41.7% were ≤2 years old and 58.3% were >2 years old. Boys accounted for 52.2% and girls 47.8%. Exclusive breastfeeding was reported in 53.3%, while 46.7% did not receive it. Most children (80.6%) had not received vitamin A supplementation. Regarding birth weight, 12.2% were low birth weight and 2.2% macrosomic. Nutritional status showed 76.7% normal, 11.1% underweight, 2.2% severely underweight, and 10% at risk of overweight. This study provides an epidemiological overview of ARI in children under five, emphasizing the relevance of age, sex, vitamin A supplementation, and nutritional status. **Conclusion:** In conclusion, strengthening nutritional interventions and child health program may effectively reduce ARI prevalence and improve respiratory health among children under five.

Keywords: Acute respiratory infection; children under five; epidemiology; cross-sectional

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INTRODUCTION

Acute Respiratory Infection (ARI) remains a major cause of morbidity and mortality among children under five years old, who experience an average of three to six episodes of ARI each year. ARI is classified as either an upper respiratory tract infection (URTI) or a lower respiratory tract infection (LRTI). The upper respiratory tract includes the airways from the nostrils to the vocal cords in the larynx, as well as the paranasal sinuses and middle ear, while the lower respiratory tract comprises the continuation of the airways from the trachea and bronchi to the bronchioles and alveoli. However, ARI is not limited to the respiratory tract but can also have systemic effects due to the possible spread of infection or microbial toxins, inflammation, and impaired lung function [1].

ARIs in children under five can adversely affect pulmonary function, such as increased airway resistance and reduced forced expiratory flow and volume by the age of three years [2]. It can also influence the development of pulmonary vasculature and bronchoalveolar structures. According to the World Health Organization (WHO), respiratory infections primarily affect the lower respiratory system, one of which is pneumonia [3,4]. Pneumonia is a leading cause of death among children. Globally, there are more than 1,400 cases of pneumonia per 100,000 children, with the highest incidence found in South Asia (2,500 cases per 100,000 children) and West and Central Africa (1,620 cases per 100,000 children) [1]. ARIs remain a public health concern in Jambi Province, including Jambi City. According to data from Jambi City Health Office, the prevalence of ARIs has shown an upward trend from 2021 to 2023, increasing from 16.68% and 16.63% to 33.2%.

One of the key factors influencing the occurrence of ARI among children under five is the child-related factor itself. Children in this age group are considered vulnerable because their immune systems and respiratory defense mechanisms are still immature, making them more susceptible to respiratory infections. Several child-related factors have been identified as influencing ARI incidence, including exclusive breastfeeding, vitamin A supplementation, nutritional status, sex, age, and immunization status. Previous studies have shown that these factors are significantly associated with the risk of ARI among children under five [5–8].

A study by Sitanggang, H. D. (2024) analyzing the spatial incidence of ARI in Jambi City found that Kenali Asam Bawah Sub-district had the highest number of ARI cases from January to June 2024. The Local Indicator of Spatial Association (LISA) analysis also revealed that Kenali Asam Bawah consistently appeared as a hotspot area almost every month [9]. However, few studies conducted in Jambi City have specifically analyzed ARI occurrence based on child-related factors. This study is expected to provide an epidemiological overview of ARI among children under five and its distribution based on child-related factors in Kenali Asam Bawah Sub-district, Jambi City. The results can serve as valuable information for policymakers in developing prevention and control strategies for ARI in children under five in the area. Therefore, this study aims to describe the epidemiology of ARI among children under five and its distribution according to child-related factors.

METHODS

This descriptive study employed a cross-sectional design and was conducted in Kenali Asam Bawah Urban Village, Jambi City, during August and September 2025. The study population consisted of all children aged 6–59 months residing in Kenali Asam Bawah. The unit of analysis was the mother or caregiver of the child, while the unit of observation was the household environmental condition. The inclusion criteria were

children aged 6–59 months who were permanent residents of Kenali Asam Bawah, whereas the exclusion criterion was mothers or caregivers who declined to be interviewed. The main study variable was the occurrence of acute respiratory infection (ARI) among children under five, determined based on a history of diagnosis by healthcare personnel and/or the presence of ARI symptoms within the past month. Child-related factors included age, sex, immunization status, exclusive breastfeeding, vitamin A supplementation, and nutritional status. Data were collected through structured interviews and by reviewing the Maternal and Child Health (MCH) book to verify immunization records. Data were analyzed descriptively using R programming

RESULTS

The prevalence of acute respiratory infection (ARI) among children under five and the distribution of child-related factors are presented in Table 1.

Table 1. Distribution of respondents based on ARI occurrence and child-related factors (n = 180).

Variable	n	%
ARI		
Yes	63	35.0
No	117	65.0
Child's Age		
≤ 2 years	75	41.7
> 2 years	105	58.3
Sex		
Male	94	52.2
Female	86	47.8
Exclusive Breastfeeding		
No	84	46.7
Yes	96	53.3
Vitamin A Supplementation		
No	145	80.6
Yes	35	19.4
Birth Weight		
Low birth weight	22	12.2
Macrosomia	4	2.2
Normal	154	85.6
Nutritional Status (Weight-for-Age)		
Severely underweight	4	2.2
Underweight	20	11.1
At risk of overweight	18	10.0
Normal	138	76.7
Nutritional Status		
Undernourished (underweight + severely underweight)	24	13.3
Normal	138	76.7
At risk of overweight	18	10.0
Basic Immunization Status		
Incomplete	83	46.1
Complete	97	53.9
PCV Immunization		
Incomplete	92	51.1
Complete (3 doses)	88	48.9

Table 1 shows that the prevalence of ARI among children under five based on a doctor's diagnosis was 0.6%, while 34.4% were identified based on reported symptoms, resulting in a total ARI prevalence of 35%. The table also indicates that the most of children were older than two years (58.3%) and male (52.2%). More than half of the children (53.3%) had received exclusive breastfeeding, whereas most had not received vitamin A supplementation (80.6%). Most children had a normal birth weight (85.6%), owned a Maternal and Child Health (MCH) book that was regularly updated (77.2%), and had normal nutritional status (76.7%). Most children had completed the basic immunization series (53.9%), but had not completed the pneumococcal conjugate vaccine (PCV) immunization (51.1%).

Table 2. Distribution of Acute Respiratory Infection (ARI) Among Children Under Five According to Child-Related Factors.

Child-Related Factor	n	%
Age		
≤ 2 years	23	36,5
> 2 years	40	63,5
Sex		
Male	38	60,3
Female	25	39,7
Exclusive Breastfeeding		
No	34	54,0
Yes	29	46,0
Vitamin A		
No	53	84,1
Yes	10	15,9
Birth Weight		
Low birth weight	9	14,3
Macrosomia	1	1,6
Normal	53	84,1
Nutritional Status (Weight-for-Age)		
Gizi kurang	13	20,6
Berisiko BB Lebih	5	7,9
BB Normal	45	71,4
Basic Immunization Status		
Incomplete	33	52,4
Complete	30	47,6
PCV Immunization		
Incomplete	36	57,1
Complete	27	42,9
Total	63	100

Table 2 illustrates the distribution of child-related risk factors among children under five with acute respiratory infection (ARI). The data show that most children with ARI were older than two years (63.5%), male (60.3%), did not receive exclusive breastfeeding (54.0%), and did not receive vitamin A supplementation (84.1%). The majority were born with normal birth weight (84.1%) and had normal nutritional status (71.4%). In addition, more than half of the children had incomplete basic

immunization (52.4%) and had not completed the pneumococcal conjugate vaccine (PCV) series (57.1%).

DISCUSSION

This study found that the prevalence of acute respiratory infection (ARI) among children under five in Kenali Asam Bawah Urban Village, Jambi City, was 35%. In this study, ARI cases were assessed based on reported symptoms, healthcare provider diagnoses, and pneumonia diagnoses confirmed by healthcare personnel. Symptom-based ARI was determined over the past month, defined by the presence of fever accompanied by at least one other symptom (cough, cold or nasal congestion, or sore throat). The prevalence identified in this study was higher than the provincial prevalence of ARI among children under five in Jambi Province reported in the 2023 Indonesia Health Survey (SKI 2023), which ranged between 18.8% and 21.4%. However, it was lower than the prevalence reported in a study conducted in the working area of Putri Ayu Primary Health Center, Jambi City, which found an ARI prevalence of 44.3% [10].

This study found that most children under five with acute respiratory infection (ARI) were older than two years, accounting for 63.5% of cases. This finding is consistent with a study by Sitanggang H.D. (2023) in Jambi City, which reported that the majority of ARI cases occurred in children over two years old (60.4%) [11]. Similarly, Sembiring S.R. et al. [7], using data from the Indonesia Health Survey (SKI) in Jambi Province, found that the proportion of ARI cases was higher among children aged over two years (67%, or 120 out of 179 children under five). However, this result contrasts with the findings of Windi R. et al. [6], who analyzed data from the 2017 Indonesia Demographic and Health Survey (IDHS) and reported that most ARI cases occurred in children aged 0–2 years (60.7%). Several studies have shown that children under two years old are at a higher risk of ARI compared to those aged over two years [12,13]. Children under the age of two are at a higher risk of developing Acute Respiratory Infections (ARIs) due to their immature immune system and the incomplete development of their respiratory tract, both of which limit the body's ability to mount effective immune responses against respiratory pathogens, particularly during the first year of life [14,15].

This study also found that most children under five with acute respiratory infection (ARI) were male (60.3%). A previous study conducted in Jambi City in 2023 similarly reported that the most of ARI cases among children under five occurred in males (52.2%) [11]. This finding is also consistent with an analysis of the 2017 Indonesia Demographic and Health Survey (IDHS), which showed that 53.6% (383 of 715) of children with ARI were male [6]. However, this distribution differs from the results of the 2023 Indonesia Health Survey (SKI), which indicated a higher proportion of ARI cases among females (56.4%, or 101 of 179 children) [7]. Several previous studies have suggested that male children are at greater risk of developing ARI compared to females [7,12,16]. Sex can lead to biological and physiological differences in children, where boys generally exhibit a weaker immune response compared to girls. This condition may increase their susceptibility to respiratory infections [17].

This study found that most children under five with acute respiratory infection (ARI) did not receive exclusive breastfeeding (54%). A study conducted in Jambi City among children with ARI who sought treatment at public health centers similarly reported that the majority did not receive exclusive breastfeeding (65.8%) [11]. Several studies in Jambi City have shown that the coverage of exclusive breastfeeding ranges from 34.9% to 73.3% [18–20]. According to data from the 2023 Indonesia Health

Survey (SKI 2023), the prevalence of exclusive breastfeeding in Jambi Province was 66.2%, with a confidence interval of 61.9% to 73.8% [21]. A study by Barus E.B., using SKI 2023 data, found that exclusive breastfeeding was a significant risk factor for ARI among children under five. Children who were not exclusively breastfed had a 1.15 times higher risk of developing ARI compared to those who received exclusive breastfeeding (aPR = 1.151; 95% CI: 1.076–1.389) [8]. Breast milk was once considered a sterile fluid. It is the most optimal source of nutrition for newborns due to its ability to provide complete nourishment and health-promoting factors. Moreover, it contains microbiota that offer various health benefits, particularly for the infant's health and development. In addition, breast milk helps establish an appropriate immunological response to protect newborns from infections and inflammation, including Acute Respiratory Infections (ARIs) [22–24].

Furthermore, this study found that most children under five with acute respiratory infection (ARI) did not receive vitamin A supplementation (84.1%). However, this finding is not consistent with a previous study conducted in Jambi City in 2023, which reported that the majority of children with ARI had received vitamin A (75%). This coverage is considerably higher than that reported in Jambi Province based on the 2023 Indonesia Health Survey (SKI 2023), where the proportion of children who received vitamin A was 44.3% for one dose and 44.7% for two doses [21]. Several studies have shown that the lack of vitamin A supplementation is a risk factor for ARI among children under five [25–27]. Vitamin A is closely associated with the integrity and strength of the respiratory epithelial barrier, which serves as the body's first line of defense against invading pathogens. In addition, vitamin A plays an important role in the immune function of children, including antibody production, the activity of immune cells, and the regulation of the body's respone to infection [28,29].

CONCLUSIONS

This study revealed that the prevalence of acute respiratory infection (ARI) among children under five in Kenali Asam Bawah Urban Village, Jambi City, was 35%. Most ARI cases occurred among children older than two years, males, those who did not receive exclusive breastfeeding or vitamin A supplementation, and those with incomplete immunization status. Nutritional and birth weight factors also showed patterns related to ARI occurrence, with most affected children having normal weight but suboptimal nutritional and immunization profiles. Strengthening child health programs focusing on exclusive breastfeeding promotion, vitamin A supplementation, nutritional improvement, and completion of immunization—particularly the pneumococcal conjugate vaccine (PCV), is essential to reduce the burden of ARI among children under five in urban communities.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We confirm that all AI-assisted processes were critically reviewed by the authors to ensure the integrity and reliability of the results. The final decisions and interpretations presented in this article were solely made by the authors.

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