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# Prevalence and risk factors of acute respiratory infections in children under five: A hospital-based study

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**Abstract**
**Background:** Respiratory infections, such as Acute Respiratory Infections (ARIs) and pneumonia, are major contributors to morbidity and mortality in children, particularly in low- and middle-income countries. In Iraq, these infections are notably prevalent due to factors like air pollution and overcrowding, accounting for a significant portion of child deaths. This study seeks to evaluate the prevalence and risk factors associated with respiratory infections among children at the Central Teaching Hospital of Pediatrics in Baghdad to guide public health interventions.
**Patients and Methods:** Conducted from March 2023 to March 2024, this hospital-based cross-sectional study focused on children aged 2 to 59 months. A total of 307 patients with confirmed respiratory infections were included, excluding those with chronic respiratory conditions. Data collection involved questionnaires and medical records, analyzed using SPSS version 26. The study received ethical approval, and informed consent was obtained from all participants, ensuring adherence to ethical standards and data confidentiality.
**Results:** Of the 307 children studied, 61% were male, with a median age of 15 months. Children under one year had an average of 2.4 ARI episodes before their first birthday, with symptoms persisting for about 6 days before seeking medical care. Among the ARI cases, 62% had no pneumonia, 24% had pneumonia, and 14% had severe pneumonia. Rhinitis was the most common ARI, affecting 62%, followed by pharyngitis (40%) and bronchopneumonia (28%). Co-morbidities included malnutrition (18.2%), diarrhea (9.3%), and measles-like rash (8.9%). Significant risk factors for ARI included passive smoking, history of contact with infected individuals, low maternal education, and malnutrition. Multivariate analysis highlighted passive smoking (OR 3.85), contact history (OR 3.42), low maternal education (OR 2.87), and malnutrition (OR 2.13) as significant risk factors.
**Conclusions:** The study highlights a high prevalence of ARIs among children at the Central Teaching Hospital of Pediatrics. Key risk factors include passive smoking, contact with infected individuals, low maternal education, and malnutrition, emphasizing the need for targeted interventions to reduce ARI burdens in pediatric populations.

**Keywords:** Acute respiratory infections, pediatric populations, risk factors, hospital study

## Introduction
Respiratory infections are among the leading causes of morbidity and mortality in children worldwide, especially in low- and middle-income countries [1]. In pediatric populations, respiratory infections, including ARIs, remain a significant public health concern. These infections, ranging from mild illnesses such as the common cold to severe conditions like pneumonia, bronchitis, and bronchiolitis, can have profound impacts on child health [2]. Globally, respiratory infections account for approximately 20% of all deaths in children under five years of age, with pneumonia being the single largest infectious cause of death [3]. In Iraq, where children are frequently exposed to environmental risk factors such as air pollution, overcrowded living conditions, and poor access to healthcare, respiratory infections continue to represent a substantial burden on healthcare systems, particularly in urban areas of Baghdad [4].
The high prevalence of respiratory infections in children is often linked to a variety of risk factors, which include both host-related and environmental determinants. Socioeconomic conditions, malnutrition, lack of immunization, exposure to tobacco smoke, and limited access to healthcare services are some of the prominent contributors to the spread and

severity of respiratory infections in pediatric populations [5]. Additionally, children with underlying medical conditions such as asthma, congenital heart disease, or immune deficiencies are more susceptible to severe respiratory infections, which can lead to hospitalization or even death [6]. Identifying and understanding these risk factors is crucial in designing effective prevention and intervention strategies. Central Teaching Hospital of Pediatrics, a major medical center in Baghdad, serves a large pediatric population and provides an ideal setting for studying the prevalence and risk factors of respiratory infections in children. This hospital-based study aims to assess the burden of respiratory infections among children admitted to the hospital, while also identifying the key risk factors contributing to the high rates of respiratory illness. By focusing on the pediatric population at Baghdad, this study seeks to provide valuable insights into the patterns of respiratory infections, helping to inform public health policies and guide clinical practices aimed at reducing the incidence and severity of these infections.

The significance of this research lies in its potential to address a critical gap in the understanding of respiratory infections in Iraqi children. While there have been numerous global studies on respiratory infections in pediatric populations, there is limited data specifically from Iraq [7], where the unique environmental and social challenges may exacerbate the prevalence of these conditions [8]. Moreover, understanding the local risk factors-such as air pollution due to ongoing urbanization, household exposure to secondhand smoke, and the impact of limited access to pediatric healthcare-can lead to targeted interventions that are tailored to the needs of the Iraqi population [9].

**Objectives of this study**

- To determine the prevalence of ARIs among children under five years of age attending the Central Teaching Hospital of Pediatrics.
- To identify the independent risk factors associated with ARIs in this population.

## Patients and Methods

**Study Design, Setting and Timing:** This research employs a hospital-based, cross-sectional analytical design conducted at the Central Teaching Hospital of Pediatrics in Baghdad, Iraq. As one of the largest public hospitals in the region, this facility, with its dedicated pediatric department, handles a substantial patient volume and serves as a referral center for numerous surrounding health facilities. Its extensive pediatric caseload makes it an ideal setting for studying respiratory infections in children. Data collection was carried out over a one-year period, from March 2023 to March 2024, to capture potential seasonal variations in the incidence of respiratory infections.

**Sample Population, Size, and Technique:** The study population comprised pediatric patients aged 2 to 59 months who were admitted to the Pediatric Department of the Central Teaching Hospital of Pediatrics with a confirmed diagnosis of respiratory infection during the study period. The inclusion criteria were: (1) children aged 2 to 59 months, (2) a confirmed diagnosis of respiratory infection by a qualified pediatrician, and (3) parental consent. To minimize bias, children with chronic respiratory diseases such as cystic fibrosis or congenital abnormalities were excluded from the study. A total of 307 patients were conveniently sampled and enrolled during the specified study period.

**Data Collection Tools**

In this study, a comprehensive approach was utilized to assess risk factors for respiratory infections in children. The evaluation covered several key areas: demographic information, clinical history, environmental exposures, and socioeconomic factors. Parents completed a detailed questionnaire, and clinical data were extracted from medical records. Diagnosing physicians identified cases of respiratory infections, including pneumonia, bronchitis, bronchiolitis, and upper respiratory tract infections, through clinical assessments, radiological imaging, and laboratory tests. Pneumonia cases were classified according to the Integrated Management of Childhood Illness (IMCI) guidelines [10]. The study also assessed environmental risk factors such as household overcrowding, exposure to passive smoking, history of contact with infected individuals, and breastfeeding practices. Additionally, information on the children's nutritional status, immunization history, and comorbidities was collected to provide a comprehensive evaluation of potential factors influencing respiratory health.

**Data Management and Analysis**

All collected data were entered into a secure database and analyzed using SPSS (Statistical Package for the Social Sciences) version 26. Descriptive statistics were used to summarize the demographic characteristics, clinical presentation, and environmental factors. The prevalence of respiratory infections was calculated as a proportion of the total sample. To explore the association between risk factors and respiratory infections, bivariate analyses (chi-square tests for categorical variables) were performed. Variables that showed a significant association in the bivariate analysis ($p$-value $< 0.05$) were entered into a multivariate logistic regression model to identify independent risk factors for respiratory infections. The odds ratios (OR) and 95% confidence intervals (CI) were calculated to estimate the strength of associations.

**Official and Ethical Approvals**

Prior to the commencement of the study, official approval was secured from the administration of the Central Teaching Hospital of Pediatrics, facilitating access to patient records and the pediatric department. Ethical approval was obtained in accordance with the Declaration of Helsinki. Informed consent was acquired from the parents or guardians of all participants, with the consent form providing comprehensive details about the study's objectives, data confidentiality, and participants' rights, including the right to withdraw from the study at any time without impacting the child's medical care. To protect privacy, all data were anonymized and accessible solely to the research team. Stringent measures were implemented to ensure data confidentiality and security throughout the study. This rigorous methodology ensures adherence to scientific and ethical standards, thereby providing reliable data on respiratory infections in pediatric populations in Baghdad, Iraq.

**Results**

A total of 307 children were included in this study, with a majority being male (61%, n=187). The age distribution revealed that more than half of the children (54%, n=166) were between 13 and 59 months old, with a median age of 15 months. For children older than one year, the average number of acute respiratory infection (ARI) episodes experienced before reaching their first birthday was 2.4 (SD 2.4). Additionally, children presenting with ARIs exhibited symptoms for an average of 6 days (SD 4.1) before seeking medical consultation at a health center or hospital. Among the total sample, the proportion of children under five years diagnosed with ARIs at Central Teaching Hospital of Pediatrics was 57.4% (n=176), with a 95% confidence interval ranging from 52.6% to 59.3%. This indicates that ARIs were prevalent in more than half of the participants.

The study found that among the 176 children under five years of age diagnosed with ARIs at Central Teaching Hospital of Pediatrics, 62% (n=109) were classified as having "no pneumonia" based on the IMCI guidelines. This category represents children who exhibited symptoms of ARIs without clinical signs of pneumonia. In contrast, 24% (n=42) of the children were diagnosed with pneumonia, a more severe form of ARI, indicating the presence of fast breathing or chest indrawing as per the IMCI criteria. Additionally, 14% (n=25) of the children were classified as having severe pneumonia, characterized by danger signs such as difficulty breathing or hypoxia, requiring urgent medical intervention. (Figure 1)

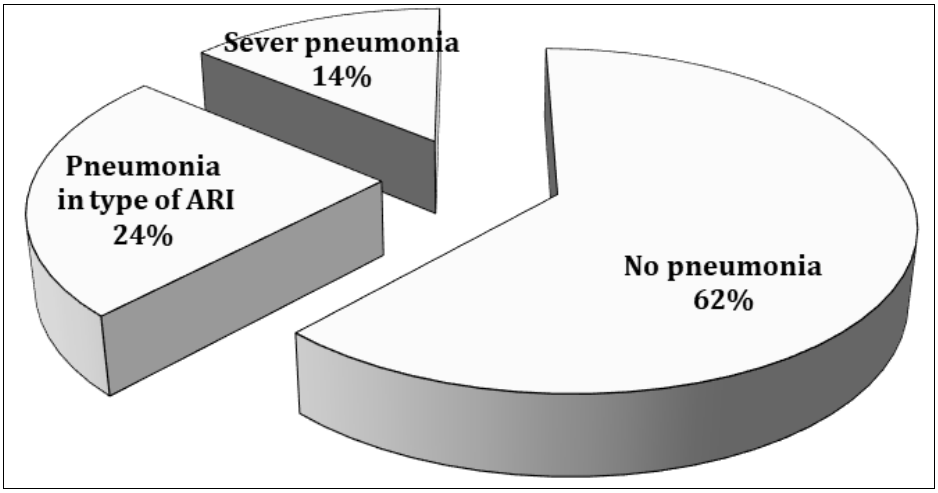


**Fig 1:** Distribution of ARIs in Children under Five Years According to the IMCI Classification

The study found that among the 57.4% (n=176) of children diagnosed with ARIs, rhinitis was the most prevalent condition, affecting 62% (n=109) of the cases. Pharyngitis was diagnosed in 40% (n=70) of the children, while bronchopneumonia accounted for 28% (n=49). Additionally, 25% (n=44) of the children had tonsillitis, and 15% (n=26) were diagnosed with acute otitis media. (Figure 2)

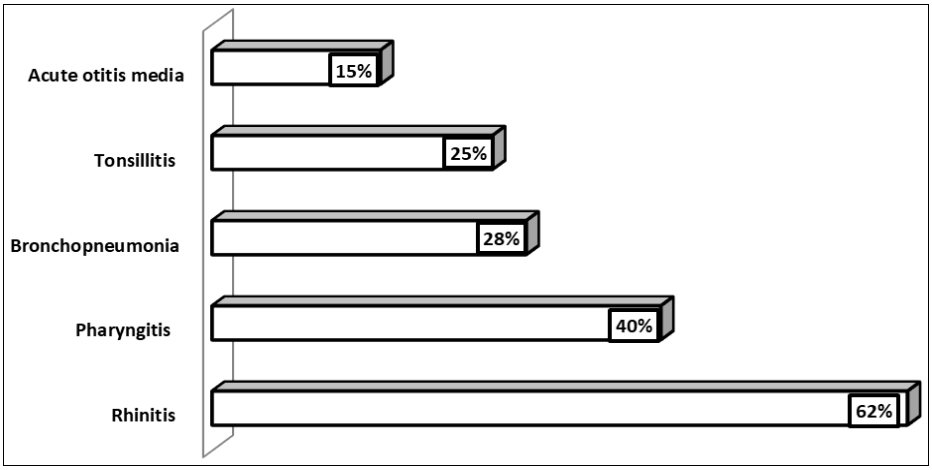


**Fig 2:** Distribution of Various Types of Acute Respiratory Infections Diagnosed by Pediatricians

The data presented in Figure 3 highlights the range of co-morbidities associated with ARIs patents (57.4%, n=176) among the studied children. The prevalence of co-existing conditions varied notably. Malnutrition was identified in 18.2% (n=32) of the children, demonstrating a significant overlap between ARIs and nutritional deficiencies. Diarrhea was observed in 9.3% (n=16) of the cases, indicating that gastrointestinal problems commonly accompany respiratory infections in this cohort. Measles-like rash was detected in 8.9% (n=16) of the children, suggesting a potential association between ARIs and viral exanthems. Additionally, congenital heart disease was present in 2.9% (n=5) of the children, representing a less frequent but critical co-morbidity linked to ARIs.

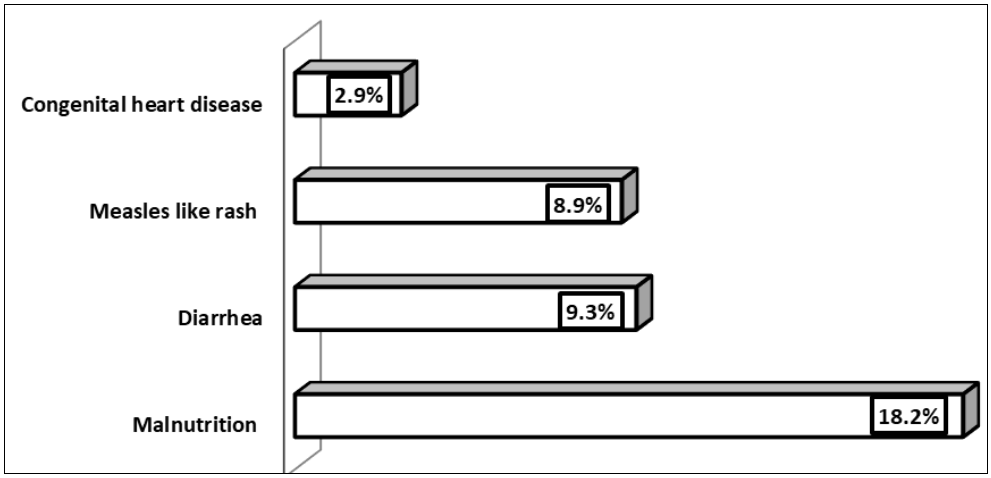


**Fig 3:** Co-morbidities Associated with ARIs

Table 1 demonstrates the association of various socio-demographic factors with acute respiratory infection (ARI) status among 307 participants, of whom 57.4% (176) had ARI and 42.6% (131) did not. The age of participants did not significantly affect ARI status (p=0.28); 54.6% of children aged 2–12 months and 59.6% of those aged 13–59 months had ARI. Gender also showed no significant association (p=0.29), with 55.8% of females and 58.3% of males affected. Birth weight was not significantly linked to ARI (p=0.54); ARI occurred in 56.4% of normal birth weight children, 61.5% of low birth weight, and 66.6% of overweight children. Mother's age was not significant (p=0.77), with 55.7% of mothers older than 20 years and 63.5% of younger mothers having children with ARI. Similarly, father's age showed no significance (p=0.32). However, the mother's education level showed a strong association with ARI (p=0.001); children of mothers with secondary or tertiary education had lower ARI rates (51.4%) compared to those with no or primary education (69.7%). Father's education also significantly influenced ARI status (p=0.019), with 54.2% of children from more educated fathers experiencing ARI compared to 65.8% of those with less educated fathers.

**Table 1:** Association of socio-demographic variables and ARI status in a study population

| Variables | ARI | | Total 307 (100.0) | P value |
|---|---|---|---|---|
| | Yes 176 (57.4) | No 131 (42.6) | | |
| **Age (months)** | | | | |
| 2–12 | 77 (54.6) | 64 (45.4) | 141 (46.0) | 0.28 |
| 13–59 | 99 (59.6)) | 67 (40.4) | 166 (54.0) | |
| **Gender** | | | | |
| Female | 67 (55.8) | 53(44.1) | 120 (39.0) | 0.29 |
| Male | 109 (58.3) | 78 (41.7) | 187 (61.0) | |
| **Birth weight** | | | | |
| Normal | 154 (56.4) | 119 (43.6) | 273 (89.0) | 0.54 |
| Low birth weight < 2.5 kg | 8 (61.5) | 5 (38.5) | 13 (4.2) | |
| Overweight ≥ 4 kg | 14 (66.6) | 7 (33.4) | 21 (6.8) | |
| **Mothers age (years)** | | | | |
| Age > 20 | 136 (55.7) | 108 (44.3) | 244 (79.5) | 0.77 |
| Age ≤ 20 | 40 (63.5) | 23 (36.5) | 63 (20.5) | |
| **Fathers age(years)** | | | | |
| Age > 30 | 127 (56.0) | 100 (44.0) | 227 (74.0) | 0.32 |
| Age ≤ 30 | 49 (61.0) | 31(39.0) | 80 (26.0) | |
| **Mother's level of education** | | | | |
| Secondary & tertiary | 107 (51.4) | 101(48.5) | 208 (67.7) | 0.001 |
| None & primary | 69 (69.7) | 30 (30.3) | 99 (32.3) | |
| **Father's level of education** | | | | |
| Secondary & tertiary | 122 (54.2) | 103 (45.8) | 225 (73.3) | 0.019 |
| None & primary | 54 (65.8) | 28 (34.2) | 82 (26.7) | |

Table 2 demonstrates the association between nutritional status, immunization, breastfeeding, and environmental factors with ARI in a population of 307 individuals, 57.4% (176 cases) had ARI, while 42.6% (131 cases) did not. Malnutrition was significantly associated with ARI (p = 0.001), with 77.5% of malnourished individuals experiencing ARI compared to 53.5% of those with normal nutritional status. Immunization status also showed a significant association (p = 0.005), where 68.7% of individuals with no or incomplete vaccination had ARI, compared to 54.3% of those up to date with the Expanded Program on Immunization (EPI). Breastfeeding history was significantly linked to ARI (p = 0.007), as 63.8% of mixed-fed children had ARI, in contrast to 53.4% of exclusively breastfed children. Passive smoking was a significant risk factor (p = 0.001), with 75.0% of passive smokers

developing ARI versus 54.7% of non-passive smokers. A history of contact with ARI cases was highly significant (p = 0.001), with 72.6% of those with contact developing ARI, compared to 47.9% of those with no contact. Lastly, overcrowding was also significantly associated with ARI (p = 0.009), as 61.4% of those living in overcrowded conditions had ARI, compared to 51.2% of those in non-overcrowded environments.

**Table 2:** Association of Nutritional Status, Immunization, Breastfeeding, and Environmental Factors with ARI in a study population

| Variables | ARI | | Total | P value |
|---|---|---|---|---|
| | Yes 176 (57.4) | No 131 (42.6) | 307 (100.0) | |
| **Nutritional status** | | | | |
| Malnourished | 38 (77.5) | 11 (22.5) | 49 (16.0) | 0.001 |
| Normal | 138(53.5) | 120 (46.5) | 258 (84.0) | |
| **Immunization status** | | | | |
| No/ incomplete vaccination | 44 (68.7) | 20 (31.2) | 64 (21.8) | 0.005 |
| Up to date with EPI | 132 (54.3) | 111 (45.7) | 243 (79.2) | |
| **Breastfeeding history** | | | | |
| Mixed | 74 (63.8) | 42 (36.2) | 116 (37.8) | 0.007 |
| Exclusive | 102 (53.4) | 89 (46.6) | 191 (62.2) | |
| **Cigarette smoke** | | | | |
| Non passive smoker | 146 (54.7) | 121 (45.3) | 267 (87.0) | 0.001 |
| Passive smoker | 30 (75.0) | 10 (25.0) | 40 (13.0) | |
| **History of contact** | | | | |
| No contact | 91 (47.9)) | 99 (52.1) | 190 (62.0) | 0.001 |
| Had contact | 85 (72.6) | 32 (27.4) | 117 (38.0) | |
| **Overcrowding history** | | | | |
| Not overcrowded | 63 (51.2) | 60 (48.8) | 123 (40.0) | 0.009 |
| Overcrowded | 113 (61.4) | 71 (38.6) | 184 (60.0) | |

Table 3 summarizes the multivariate logistic regression analysis of independent risk factors for ARI, revealing several statistically significant associations. Children exposed to passive smoking have an odds ratio (OR) of 3.85 (95% CI: 1.55–8.48, p-value = 0.01), indicating they are 3.85 times more likely to develop ARI compared to non-exposed children. Similarly, children with a history of contact with infected individuals have an OR of 3.42 (95% CI: 2.26–5.18, p-value = 0.01), suggesting they are 3.42 times more likely to contract ARI. For children whose mothers have a low level of education, the OR is 2.87 (95% CI: 1.86–4.27, p-value = 0.01), implying nearly 2.87 times higher odds of ARI. Malnourished children have an OR of 2.13 (95% CI: 1.23–3.73, p-value = 0.03), indicating about 2.13 times higher odds of ARI. These results underscore that all identified risk factors-passive smoking, contact history, low maternal education, and malnutrition-are significantly associated with an increased likelihood of ARI.

**Table 3:** Multivariate logistic regression analysis of independent risk factors for ARI

| Variables | Odds ratios | 95% CI | P- value |
|---|---|---|---|
| History of Passive smoking | 3.85 | 1.55–8.48 | 0.01 |
| History of contact | 3.42 | 2.26–5.18 | 0.01 |
| Low level of Mother' education | 2.87 | 1.86–4.27 | 0.01 |
| Malnourished child | 2.13 | 1.23 –3.73 | 0.03 |

## Discussion

The study analyzed a cohort of 307 children under five years old, predominantly male (61%), with a median age of 15 months. A significant finding was the high prevalence of ARIs, affecting 57.4% of the children. This aligns with similar research in the region, reflecting a concerning trend in ARI prevalence among young children. Among the 176 children diagnosed with ARIs, the majority (62%) were categorized as having "no pneumonia" per IMCI guidelines, meaning they displayed ARI symptoms without clinical pneumonia signs. This finding highlights a substantial burden of ARIs without severe outcomes. However, 24% had pneumonia and 14% had severe pneumonia, indicating a critical need for early diagnosis and intervention to prevent complications. In comparison, a study in Jordan reported similar patterns, with ARIs being common and a significant proportion of cases classified as pneumonia or severe pneumonia [11]. This consistency underscores the widespread nature of ARIs in this age group and the importance of early management.

The distribution of ARI types showed that rhinitis (62%) was the most prevalent, followed by pharyngitis (40%), bronchopneumonia (28%), tonsillitis (25%), and acute otitis media (15%). This distribution is consistent with other studies, such as one conducted in Saudi Arabia, where rhinitis and pharyngitis were similarly prevalent among ARI cases in children [12]. Co-morbidities were also notable, with malnutrition present in 18.2% of the ARI cases, diarrhea in 9.3%, measles-like rash in 8.9%, and congenital heart disease in 2.9%. The high prevalence of malnutrition among ARI patients echoes findings from research in Egypt, which also noted a significant overlap between malnutrition and respiratory infections [13]. The association with diarrhea suggests a multifactorial health burden, which is well-documented in similar regional studies [14].

The study revealed no significant association between age, gender, or birth weight with ARI status. However, maternal and paternal education levels significantly impacted ARI prevalence. Children of less-educated mothers had higher ARI rates, which aligns with findings from a study in Lebanon, where lower maternal education was linked to higher ARI rates [15]. This highlights the role of maternal education in child health outcomes. Nutritional status, immunization, breastfeeding, and environmental factors were significantly associated with ARI. Malnutrition was strongly linked to ARI (p = 0.001), a finding consistent with international research showing that malnutrition increases ARI risk [16]. Immunization status and breastfeeding history also impacted ARI prevalence, with incomplete vaccination

and mixed feeding being associated with higher ARI rates. This supports studies in other countries, which found that complete immunization and exclusive breastfeeding reduce ARI incidence [17, 18].

The logistic regression analysis revealed that passive smoking (OR=3.85), history of contact with infected individuals (OR=3.42), low maternal education (OR=2.87), and malnutrition (OR=2.13) were significant risk factors for ARI. These findings align with research from Pakistan and India, which identified similar risk factors for ARIs in young children [19-20]. The significant association with passive smoking highlights the need for public health interventions to reduce exposure to cigarette smoke in children.

## Conclusions

This study, encompassing 307 children, highlights the high prevalence of ARI among the pediatric population at Central Teaching Hospital of Pediatrics, with 57.4% of children under five years diagnosed with ARIs. The findings reveal significant associations between ARIs and several risk factors. Specifically, children exposed to passive smoking, with a history of contact with infected individuals, and those with low maternal education exhibited notably higher odds of ARI, with odds ratios of 3.85, 3.42, and 2.87, respectively. Malnutrition also emerged as a significant risk factor, with an odds ratio of 2.13. Additionally, the study identified high rates of specific ARI types, such as rhinitis and pneumonia, and co-morbidities including malnutrition and diarrhea. These results underscore the multifaceted nature of ARIs and highlight the importance of addressing modifiable risk factors to mitigate the burden of respiratory infections in children.

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## References

1. World Health Organization. Respiratory infections in children: Causes, treatment, and prevention. Available from: https://www.who.int/news-room/fact-sheets/detail/respiratory-infections-in-children
2. GBD 2019 Diseases and Injuries Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1223-1249.
3. Nair H, Nokes DJ, Gessner BD. Global and regional burden of hospital admissions for severe acute respiratory infections in children under 5 years of age: A systematic analysis. Lancet. 2013;381(9875):1380-1390.
4. Al-Jubouri T, Abdulrazzaq N, Zaidan S. The burden of respiratory infections in children in Baghdad, Iraq. East Mediterr Health J. 2020;26(3):245-253.
5. Liu L, Oza S, Hogan D. Global, regional, and national causes of under-5 mortality in 2000-15: An updated systematic analysis with implications for the Sustainable Development Goals. Lancet. 2016;388(10063):3027-3035.
6. Bafadhel M, Nilsson M, Simmonds M. Asthma and respiratory infections in children: Risk factors and prevention strategies. Pediatr Pulmonol. 2021;56(12):3551-3561.
7. Azzam I, Shabaan A, Ali M. Respiratory infections in children: A review of local data and public health implications in Iraq. J Pediatr Health Care. 2021;35(4):423-430.
8. Shalaby M, Abdo N, Ahmed A. Environmental risk factors for respiratory infections in children: Evidence from a study in Baghdad. J Environ Public Health. 2022;2022:4789345.
9. Al-Momani M, Al-Khader A, Al-Khader I. Acute respiratory infections among children under five years old in Jordan. J Infect Public Health. 2021;14(2):198-204.
10. World Health Organization. Integrated Management of Childhood Illness (IMCI) [Internet]. Geneva: World Health Organization; Available from: https://www.who.int/teams/maternal-newborn-child-adolescent-health-and-ageing/child-health/integrated-management-of-childhood-illness
11. Al-Momani M, Al-Khader A, Al-Khader I. Acute respiratory infections among children under five years old in Jordan. J Infect Public Health. 2021;14(2):198-204.
12. Al-Hamdan N, Al-Nehim A, Al-Ghamdi S. Prevalence and patterns of respiratory tract infections in children in Saudi Arabia. Ann Saudi Med. 2022;42(3):171-177.
13. El-Sayed M, Hassan H, Ibrahim S. Nutritional status and acute respiratory infections in children: A cross-sectional study in Egypt. Nutr J. 2021;20(1):75.
14. Ahmed S, Khan S, Ali S. The relationship between acute respiratory infections and malnutrition among children in Pakistan. BMC Pediatr. 2020;20(1):35.
15. Saliba M, Naqash M, Kourie H. Impact of maternal education on child health outcomes in Lebanon. J Public Health. 2023;45(1):89-95.
16. WHO. Malnutrition and respiratory infections in children. World Health Organization. Available from: https://www.who.int/news-room/fact-sheets/detail/malnutrition
17. Jones G, Steketee RW, Black RE. Child survival: The health impact of immunization, exclusive breastfeeding, and improved nutrition. Lancet. 2021;398(10297):173-184.
18. Eisele TP, Silveira J, Eisele TP. Breastfeeding and the risk of acute respiratory infections: A meta-analysis. Pediatrics. 2022, 149(5).
19. Anwar M, Hussain A, Shahid S. Risk factors for acute respiratory infections among children in rural Pakistan. Int. J Infect Dis. 2021;106:136-42.

20. Patel M, Dubey S, Sinha A. Environmental and socio-economic risk factors for acute respiratory infections in children: An Indian perspective. Indian J Pediatr. 2023;90(2):123-129.