BG Pulse Journal USA
ISSN:1947-2536 http://www.bgpulseusa.com/index.php/bg
BG PULSE JOURNAL

STATE OF RESEARCH ON THE INCIDENCE AND PREVALENCE OF RESPIRATORY INFECTIONS IN CHILDREN UNDER FIVE YEARS OF AGE

Author: **Murtazayeva Zilola Fakhriddinovna**
Lecturer, Department of Preclinical Sciences, Asia International University
doi:https://doi.org/10.5281/zenodo.23178278

INTRODUCTION: Respiratory infections in children remain one of the most pressing problems in pediatrics. Although acute respiratory tract infections occur in virtually all age groups, children under five years of age have relatively higher rates of morbidity, recurrent illness, complications, and hospitalization.

This is associated with the anatomical and physiological immaturity of the respiratory system in young children, the relatively narrow airways, rich vascularization of the mucosa, incomplete development of local and systemic immunity, and increased susceptibility to viral infections.

The spectrum of respiratory diseases ranges from mild upper respiratory tract infections to bronchiolitis, bronchitis, and severe pneumonia.

Although child mortality has declined substantially in recent years, infectious diseases remain a major threat to the health of children under five. According to UNICEF data published in 2026, 4.9 million children worldwide died before reaching the age of five in 2024, and lower respiratory tract infections were among the leading causes of death in this age group [1]. WHO and UNICEF data also indicate that pneumonia remains one of the leading infectious causes of death in children [1,2].

Therefore, studying the epidemiological characteristics of respiratory infections in children under five, identifying age groups and risk groups with a high incidence, and predicting severe disease are priority tasks in pediatrics.

AIM OF THE STUDY

To analyze the extent to which the incidence and prevalence of respiratory infections, their etiological structure, age-related features, and the main risk factors affecting disease development in children under five years of age have been studied in contemporary scientific literature.

MATERIALS AND METHODS

This work was conducted as a narrative review of the scientific literature. To analyze data on the epidemiology of respiratory infections in children under five years of age, articles, systematic reviews, and meta-analyses published in the international PubMed/Medline database were used, together with data from the World Health Organization (WHO), UNICEF, and the Global Burden of Disease project.

The literature search and analysis used the keywords “acute respiratory infection,” “lower respiratory tract infection,” “children under five,” “pneumonia,” “respiratory syncytial virus,” “respiratory infection epidemiology,” and “risk factors.” The main focus was placed on studies published in recent years, while selected earlier landmark studies were also reviewed to assess epidemiological trends.

RESULTS AND DISCUSSION

Global burden of respiratory infections in children under five

Acute respiratory infections are among the most common causes of morbidity in early childhood. Most cases are mild and present as upper respiratory tract infections; however, spread of the infectious process to the bronchioles and pulmonary parenchyma leads to more severe disease.

Acute lower respiratory tract infections, in particular, account for an important share of the global disease burden among children under five. Analyses based on GBD data show that morbidity and mortality associated with lower respiratory tract infections have declined over recent decades, yet these diseases remain among the major health problems in this age group [3].

The WHO guideline on the management of pneumonia in children, updated in 2024, notes that pneumonia and diarrhea together account for a substantial proportion of deaths in children under five [2].

UNICEF data likewise indicate that lower respiratory tract infections accounted for approximately 13% of deaths among children under five in 2024 [1]. This highlights not only the clinical but also the epidemiological and social significance of respiratory infections.

Age-related characteristics of respiratory infections

The frequency and severity of respiratory infections are strongly age-dependent.

During the first two years of life, airway diameter is small, bronchial walls are relatively soft, the mucosa develops edema rapidly, collateral ventilation mechanisms are insufficiently developed, respiratory muscles fatigue quickly, and immunological defense mechanisms are not yet fully mature.

Therefore, a viral infection that may present as an upper respiratory tract infection in an older child can manifest as bronchiolitis or pneumonia in an infant.

Global data on respiratory syncytial virus (RSV) clearly support this observation. According to the systematic analysis by Li et al., published in The Lancet in 2022, tens of millions of episodes of RSV-associated acute lower respiratory tract infection occurred worldwide in children under five in 2019. The greatest burden of severe disease was observed in infants, particularly those in the first six months of life [4].

This suggests that, for epidemiological assessment of respiratory infections, considering children aged 0–5 years as a single population is insufficient. From a scientific standpoint, it is more appropriate to analyze at least the following age groups separately: 0–6 months, 6–12 months, 1–2 years, and 2–5 years.

Etiological structure of respiratory infections

The etiological structure of respiratory infections in children under five is diverse.

The most important viral etiological agents include respiratory syncytial virus (RSV), rhinoviruses, influenza A and B viruses, parainfluenza viruses, adenoviruses, human metapneumovirus, coronaviruses, and bocaviruses.

In severe lower respiratory tract infections, the relative contribution of etiological agents varies depending on the child's age, geographic region, season, and the diagnostic methods used.

The international multicenter PERCH study found that viruses, particularly RSV, played an important etiological role in children hospitalized with severe pneumonia in African and Asian countries [5].

A systematic review by Shi et al. demonstrated a strong etiological association of RSV, influenza virus, parainfluenza virus, and human metapneumovirus with lower respiratory tract infection in children under five [6].

Respiratory syncytial virus

RSV is one of the leading viral causes of bronchiolitis and pneumonia in young children.

According to WHO data from 2025, RSV may be associated each year with more than 3.6 million hospitalizations and approximately 100,000 deaths among children under five worldwide. Most RSV-related childhood deaths occur in low- and middle-income countries [7].

The risk of severe RSV disease is particularly high in children born prematurely, those with low birth weight, bronchopulmonary dysplasia, congenital heart disease, or weakened immune systems.

An updated meta-analysis published in 2024 identified prematurity, low birth weight, passive smoking, the presence of other children in the household, daycare attendance, and certain chronic diseases as factors that increase the risk of severe RSV-associated respiratory infection [8].

Role of influenza viruses

Influenza viruses also account for a substantial disease burden among children under five.

According to a global systematic review and modeling study by Wang et al., published in 2020, approximately 109.5 million episodes of influenza virus-associated respiratory infection occurred in children under five in 2018. Of these, approximately 10.1 million were influenza-associated acute lower respiratory tract infections, and around 870,000 cases required hospitalization [9].

Importantly, a substantial proportion of hospitalizations and deaths occurred in infants during the first six months of life.

Thus, studies of respiratory infections in children under five should consider not only the clinical form of the disease but also the etiological agent.

Ratio of upper and lower respiratory tract infections

Most respiratory infections involve the upper respiratory tract.

In one outpatient study published in 2024, the periodic prevalence of acute respiratory tract infections among children aged 2–59 months was 36.9%. Upper respiratory tract infections were recorded in 24.8% of cases and were more common than lower respiratory tract infections [10].

However, although upper respiratory tract infections are more frequent, lower respiratory tract infections are clinically more important in terms of the risk of hospitalization and death.

Therefore, in addition to the overall incidence of disease, it is necessary to assess separately such outcomes as upper respiratory tract infections, bronchiolitis, bronchitis, pneumonia, severe pneumonia, need for oxygen therapy, transfer to intensive care, and rehospitalization.

Seasonality

Seasonality is an important epidemiological characteristic of respiratory infections.

In temperate climates, most viral respiratory infections increase during the autumn–winter and winter–spring periods. However, the seasonal peaks of RSV, influenza, rhinovirus, and other pathogens may vary by geographic region.

Attendance at preschool institutions, prolonged close contact among children in enclosed spaces, and rapid transmission of respiratory viruses by droplet and contact routes contribute to intensification of the epidemic process.

This is especially important in children aged 2–5 years.

Risk factors for the development of respiratory infections

Scientific literature indicates that a number of biological, social, and environmental factors influence both the occurrence and severity of respiratory infections.

The most important child-related factors include younger age, prematurity, low birth weight, formula feeding, protein-energy malnutrition, congenital heart defects, chronic lung diseases, immunodeficiency conditions, neurological diseases, and previous respiratory infections.

Prematurity, in particular, provides a biological basis for severe respiratory infection because of incomplete lung maturation, smaller airway diameter, and insufficient development of the immune system.

Importance of nutrition

Adequate nutrition plays an important role in the child's protection against infection.

Malnutrition weakens cellular and humoral immune responses and increases susceptibility to severe forms of respiratory infection. Therefore, underweight children and those with growth retardation should be regarded as a separate risk group.

Breastfeeding helps protect young children from respiratory and gastrointestinal infections through several immunological components, including secretory IgA, lactoferrin, lysozyme, oligosaccharides, and immunocompetent cells.

Environmental and indoor air pollution

Recent studies have paid increasing attention to environmental factors that affect the risk of respiratory infections.

Indoor smoke pollution, use of solid fuels, and passive tobacco exposure cause chronic irritation of the child's respiratory mucosa.

A systematic review and meta-analysis published in 2025 demonstrated a significant association between indoor air pollution and acute respiratory infections in children under five. Use of traditional stoves, inadequate kitchen ventilation, use of harmful fuels, and passive smoking were identified as important risk factors [11].

UNICEF's 2026 report on environmental determinants of respiratory disease in children also identified air pollution as an important factor contributing to respiratory morbidity in children [12].

Socioeconomic factors

The spread of respiratory infections is also associated with the level of economic development of countries.

In low- and middle-income countries, overcrowded housing, delayed healthcare seeking, limited diagnostic capacity, inadequate vaccination coverage, poor nutrition, and indoor air pollution increase the risk of severe disease outcomes.

A large-scale review conducted in Sub-Saharan African countries in 2023 found that the prevalence of acute lower respiratory tract infections among children under five varied across studies from 1.9% to 60.2% [13].

Such wide variation can be explained by differences in geographic conditions, age composition, diagnostic criteria, patterns of healthcare seeking, and study methodology.

Factors determining progression to severe respiratory infection

Although most respiratory infections are mild, in some children the disease rapidly progresses to lower respiratory tract involvement, hypoxemia, or respiratory failure.

Severe disease is more commonly associated with age under six months, prematurity, low birth weight, malnutrition, congenital heart defects, chronic lung disease, immunodeficiency, tachypnea at initial presentation, chest indrawing, hypoxemia, altered consciousness, and difficulty sucking or feeding.

Among these features, hypoxemia has particularly important prognostic significance.

Therefore, modern pediatrics is increasingly moving from assessment based solely on nosological diagnosis toward an approach focused on early identification of an individual child's risk of deterioration.

State of research and existing scientific gaps

Analysis of the literature shows that a large body of scientific evidence on respiratory infections in children under five has accumulated internationally.

In particular, RSV epidemiology has been studied extensively; the global burden of influenza-associated respiratory infections has been assessed; multicenter studies on the etiology of pneumonia are available; the importance of prematurity and low birth weight has been established; and numerous studies have examined social and environmental risk factors.

However, analysis of the available evidence shows that several important scientific problems remain.

First, the epidemiological indicators of respiratory infections vary substantially across regions. Therefore, findings obtained in other countries cannot be fully extrapolated to the pediatric population of Central Asia, particularly Uzbekistan.

Second, most epidemiological studies analyze "children under five" as a single group. However, children aged 0–6 months, 6–12 months, 1–2 years, and 2–5 years differ substantially in respiratory physiology, immune response, and clinical course of disease.

Third, most studies focus on individual risk factors, while models that simultaneously incorporate clinical, anamnestic, biometric, and functional parameters to estimate an individual child's risk of deterioration remain insufficiently developed.

Fourth, comprehensive epidemiological analyses of respiratory infections in children under five by age, season, premorbid background, and disease severity remain limited in Uzbekistan and its individual regions.

From this perspective, studying the incidence, structure, seasonality, and factors associated with risk of deterioration of respiratory infections using large-scale clinical data from the local population represents a promising area of research.

CONCLUSION

1. Respiratory infections are among the most common diseases in children under five, while lower respiratory tract infections remain an important cause of hospitalization and death in this age group.

2. The greatest epidemiological and clinical burden of disease falls within the first years of life, particularly infancy.

3. Respiratory syncytial virus, influenza viruses, parainfluenza virus, rhinovirus, adenovirus, and human metapneumovirus are important etiological agents of respiratory infections in children under five.

4. Prematurity, low birth weight, malnutrition, chronic diseases, passive smoking, indoor air pollution, and adverse socioeconomic conditions increase the risk of respiratory infections and severe disease.

5. Despite existing international studies, the epidemiological characteristics of respiratory infections are not uniform across geographic regions. Therefore, regional epidemiological studies should be expanded in Uzbekistan, particularly among children under five.

6. Future research should not be limited to determining the incidence of respiratory infections; rather, early and individualized assessment of the risk of disease deterioration based on integrated analysis of age, anamnestic, clinical, and functional indicators should become a priority.

REFERENCES

1. UNICEF. Levels & Trends in Child Mortality. United Nations Inter-agency Group for Child Mortality Estimation. New York: UNICEF; 2026.
2. World Health Organization. Guideline on management of pneumonia and diarrhoea in children up to 10 years of age. Geneva: WHO; 2024.
3. Troeger C.E., Khalil I.A., Blacker B.F., et al. Quantifying risks and interventions that have affected the burden of lower respiratory infections among children younger than 5 years: an analysis for the Global Burden of Disease Study 2017. Lancet Infect Dis. 2020;20(1):60–79. doi:10.1016/S1473-3099(19)30410-4.
4. Li Y., Wang X., Blau D.M., et al. Global, regional, and national disease burden estimates of acute lower respiratory infections due to respiratory syncytial virus in children younger than 5 years in 2019: a systematic analysis. Lancet. 2022;399(10340):2047–2064. doi:10.1016/S0140-6736(22)00478-0.
5. Pneumonia Etiology Research for Child Health (PERCH) Study Group. Causes of severe pneumonia requiring hospital admission in children without HIV infection from Africa and Asia: the PERCH multi-country case-control study. Lancet. 2019;394(10200):757–779. doi:10.1016/S0140-6736(19)30721-4.

6. Shi T., McLean K., Campbell H., Nair H. Aetiological role of common respiratory viruses in acute lower respiratory infections in children under five years: a systematic review and meta-analysis. J Glob Health. 2015;5(1):010408. doi:10.7189/jogh.05.010408.
7. World Health Organization. Respiratory syncytial virus (RSV): Fact sheet. Geneva: WHO; 2025.
8. Deng S., Cong B., Edgoose M., De Wit F., Nair H., Li Y. Risk factors for respiratory syncytial virus-associated acute lower respiratory infection in children under 5 years: an updated systematic review and meta-analysis. Int J Infect Dis. 2024;146:107125. doi:10.1016/j.ijid.2024.107125.
9. Wang X., Li Y., O'Brien K.L., et al. Global burden of respiratory infections associated with seasonal influenza in children under 5 years in 2018: a systematic review and modelling study. Lancet Glob Health. 2020;8(4):e497–e510. doi:10.1016/S2214-109X(19)30545-5.
10. Turyasiima M., et al. Prevalence and outpatient clinical diagnostic approaches for common acute respiratory tract infections in children under five years of age: a cross-sectional study. 2024.
11. Desye B., Geto A.K., Daba C., Berihun G., Berhanu L. Indoor air pollution exposure and acute respiratory infection among under-five children in low- and middle-income countries: a systematic review and meta-analysis of epidemiological studies. BMC Infect Dis. 2025;25:1808. doi:10.1186/s12879-025-12148-y.
12. UNICEF. Environmental determinants of respiratory disease in children. New York: United Nations Children's Fund; 2026.
13. Acute lower respiratory infections among children under five in Sub-Saharan Africa: a scoping review of prevalence and risk factors. BMC Pediatrics. 2023. doi:10.1186/s12887-023-04033-x.
14. Wang X., Li Y., Deloria-Knoll M., et al. Global burden of acute lower respiratory infection associated with human parainfluenza virus in children younger than 5 years for 2018: a systematic review and meta-analysis. Lancet Glob Health. 2021;9(8):e1077–e1087. doi:10.1016/S2214-109X(21)00218-7.