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A Review of Common Respiratory Tract Infections in Iranian Children: Contributing Factors and Global Comparison

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Abstract

Background: Respiratory tract infections significantly impact global child health, especially in children under five, and are primarily caused by viruses and atypical bacteria. These infections are influenced by environmental and socio-economic factors. This study reviews common respiratory infections in Iranian children, identifies contributing factors, and evaluates their status within a global context.

Materials and Methods: This narrative review involved a systematic search of major national and international databases, including PubMed, Scopus, Web of Science, WHO, Google Scholar, SID, and CIVILICA, covering studies published up to April 2025. Eligible articles in English and Persian addressing respiratory infections in Iranian children were independently screened by two reviewers based on predefined inclusion criteria. Data extraction and quality assessment were conducted collaboratively to ensure a thorough and accurate synthesis of the relevant evidence.

Results: Respiratory Syncytial Virus (RSV) was the most prevalent pathogen, detected in approximately 30% of hospitalized children, followed by Human Metapneumovirus (hMPV) at 10–20%, and Mycoplasma pneumoniae at around 4.7%. Environmental factors such as air pollution, parental smoking, and the use of solid fuels, together with socio-economic factors including poverty, limited healthcare access, and low caregiver awareness, as well as biological factors like young age, male sex, and malnutrition, significantly influence disease prevalence and severity. Asthma prevalence among Iranian children ranged from 6% to 8%, which is lower than global averages. These epidemiological patterns and risk factors largely mirror those seen in other developing countries; however, regional variations underscore the need for locally tailored intervention strategies.

Conclusion: Acute respiratory infections in Iranian children are primarily caused by RSV, hMPV, and Mycoplasma pneumoniae. Their occurrence and severity are influenced by environmental, socio-economic, biological, climatic, cultural, and healthcare factors. Therefore, targeted interventions should prioritize education, improved healthcare access, and reduction of environmental risks.

Key Words: Children, Iran, Respiratory tract infections, Risk factors, Prevalence.

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1- INTRODUCTION

Respiratory tract infections represent one of the most significant global health challenges among children, profoundly impacting morbidity and mortality in this age group. Children, especially those under five years old, are more vulnerable due to their developing immune systems, and the burden of these infections poses serious challenges for families and healthcare systems (1–6).

Multiple pathogens contribute to these infections, with respiratory syncytial virus (RSV) and human metapneumovirus (hMPV) among the most important viral agents (1, 2, 7, 8). dditionally, atypical bacteria such as *Mycoplasma pneumoniae* play a considerable role in the development of acute respiratory diseases in children (9–12).

Understanding the prevalence and distribution patterns of these diseases—considering regional variations and the environmental, social, and economic contexts specific to each country—is essential for effective health policy planning and implementation. In developing countries like Iran, factors such as access to healthcare services, biological and cultural determinants, and demographic characteristics complicate the epidemiology of respiratory infections in children (13–17).

Analyzing data on respiratory infections among Iranian children and comparing it with global statistics enhances understanding of epidemiological trends and provides a foundation for developing prevention, diagnosis, and treatment strategies tailored to the local context (18, 19). Therefore, this study aims to provide a comprehensive review of common respiratory tract infections in Iranian children, identify associated contributing factors, and evaluate the status of these diseases in a global context.

2- MATERIALS AND METHODS

2-1. Study Design

This study was designed as a narrative review aimed at providing a comprehensive examination of common respiratory tract infections among Iranian children, identifying associated contributing factors, and evaluating the status of these diseases within a global context. To gather relevant scientific literature, a systematic search was conducted in reputable national and international databases in both Persian and English. Specifically, PubMed, Scopus, Web of Science, WHO, and Google Scholar were used to retrieve English-language articles, while the Iranian databases SID and CIVILICA were searched for Persian publications. The literature search included studies published up to April 2025.

A combination of keywords related to pediatric respiratory infections—such as "respiratory tract infections in children," "acute lower respiratory infections," "pneumonia," "bronchiolitis," "respiratory syncytial virus (RSV)," "human metapneumovirus (hMPV)," "Mycoplasma pneumoniae," "atypical bacterial infections," "epidemiology," "risk factors," and "environmental determinants"—along with their Persian equivalents, were combined using Boolean operators (AND, OR) to ensure precision and comprehensiveness of the search.

2-2. Inclusion and Exclusion Criteria

Included studies comprised original research articles, systematic reviews, and narrative reviews published up to April 2025 that focused on respiratory tract infections in Iranian children or factors influencing these infections. Both Persian and English publications were considered. Studies focusing on non-pediatric populations, lacking relevant data, or without accessible full texts were excluded.

2-3. Study Selection and Data Extraction

Two independent reviewers screened studies initially by title, followed by abstract, and finally full text, based on the eligibility criteria. Any disagreements were resolved by a third reviewer serving as an arbitrator. Extracted data included pathogen types, prevalence rates, environmental and social determinants, and comparisons with global data.

2-4. Data Analysis

The extracted data were analyzed qualitatively and descriptively to capture regional variations, environmental contexts, and socio-cultural and economic factors specific to Iran. Findings were synthesized to provide a clear and comprehensive overview of respiratory infections in Iranian children, contextualized within the global epidemiological landscape.

2-5. Ethical Considerations

As this narrative review used only published secondary data, formal ethical approval was not required. Nevertheless, all procedures adhered strictly to established research ethics standards, including academic integrity, accurate citation, prevention of plagiarism, and respect for intellectual property. Copyright regulations were fully observed throughout the study.

3- RESULTS

3-1. Prevalence of the Most Common Respiratory Infections in Iranian Children:

Multiple epidemiological studies have identified three main pathogens responsible for the majority of acute respiratory tract infections (ARTIs) in Iranian children, particularly those under five years:

- **Respiratory Syncytial Virus (RSV):** RSV is the leading cause of bronchiolitis and pneumonia in young children, accounting for approximately 30% of hospitalized pediatric ARTI cases. Its prevalence peaks during the cold seasons (autumn and winter) (1, 20–22).
- **Human Metapneumovirus (hMPV):** The second most common viral agent, detected in 10–20% of viral respiratory infections, causing illnesses ranging from mild colds to severe pneumonia (8, 23–26).
- **Atypical bacterium Mycoplasma pneumoniae:** Detected in about 4.7% of children with pneumonia, it is clinically significant due to its need for specific treatment and prolonged disease duration (10, 27–30).

Other pathogens such as *Chlamydophila pneumoniae* contribute less frequently (<4%) (11, 31, 32). See **Table 1** for detailed prevalence, clinical significance, and references.

3-2. Asthma Prevalence in Iranian Children:

Asthma prevalence among Iranian children ranges from 6% to 8%, which is lower than many global averages (4, 5, 33, 34).

3-3. Factors Affecting the Incidence and Severity of Respiratory Infections in Iranian Children:

The principal contributing factors are grouped as follows:

- **Environmental factors:** Indoor and outdoor air pollution, parental smoking, use of solid fuels for cooking, and overcrowded living conditions (1, 21, 34–37).
- **Socioeconomic factors:** Poverty, limited healthcare access, low caregiver awareness, and high population density in rural and suburban areas (38–43).

- **Biological factors:** Young age (especially under two years), male gender, low birth weight, and malnutrition increase susceptibility and severity (38, 44–49).

3-4. Clinical Outcomes

Acute respiratory infections can lead to severe illnesses such as bronchitis, acute pneumonia, and ICU admission. Boys and children under two years are particularly vulnerable. Low caregiver awareness of warning signs contributes to delayed treatment and higher complication rates (7, 21, 50–52).

3-5. Comparison with Global Data

- RSV prevalence in hospitalized Iranian children (~30%) is slightly lower than global estimates (35–40%) but with comparable clinical burden (7, 21, 52).
- Asthma prevalence in Iranian children is lower than in many other countries (5).
- Pneumonia prevalence in children under five exceeds 10% in some Iranian regions, comparable to countries with similar socioeconomic conditions like certain African nations (18, 19, 48).
- Environmental risk factors such as air pollution and parental smoking are significant globally and in Iran (6, 37, 43).
- Variations in healthcare access and caregiver awareness contribute to differences in disease severity and outcomes (28, 38, 44, 53–55).

See **Table 2** for detailed comparison of prevalence rates and risk factors.

Table 1: Prevalence and Clinical Significance of Main Respiratory Pathogens in Iranian Children.

Pathogen	Prevalence in Iranian Children (%)	Clinical Importance	References
Respiratory Syncytial Virus (RSV)	~30	Leading cause of bronchiolitis and pneumonia in children under 5; major cause of hospitalization	1, 21
Human Metapneumovirus (hMPV)	10–20	Causes spectrum of illness from mild cold to severe pneumonia	8-23
Mycoplasma pneumoniae	~4.7	Atypical bacterium; prolonged disease course needing specific antibiotic treatment	27-29
Chlamydophila pneumoniae	<4	Less frequent atypical bacterial pathogen	11, 31, 32

Table 2: Comparison of Key Respiratory Disease Indicators and Risk Factors in Iranian Children versus Global Estimates.

Indicator/Disease	Iran (%)	Global Estimate (%)	References
RSV prevalence in hospitalized children	~30	35–40	7, 21
Asthma prevalence	6–8	>10 (varies by country)	4, 5
Pneumonia prevalence (<5 years)	>10 (in some regions)	Up to 9 or higher in developing countries	18, 19, 48
Environmental risk factors (air pollution, parental smoking)	High and impactful	Highly prevalent globally	6, 37, 43

RSV: Respiratory Syncytial Virus.

4- DISCUSSION

This study reviews common respiratory infections in Iranian children, their contributing factors, and situates these findings globally. Respiratory Syncytial Virus (RSV) is the predominant pathogen, causing about 30% of hospitalized cases in children under five. Human Metapneumovirus (hMPV) and *Mycoplasma pneumoniae* also contribute significantly, with prevalences of 10–20% and 4.7%, respectively. Asthma affects 6–8% of Iranian children, a rate lower than global averages. Environmental factors (air pollution, parental smoking) (1, 34, 40), socioeconomic determinants (poverty, healthcare access) (38, 41, 43), and biological factors (young age, malnutrition) (38, 44–49) all influence the incidence and severity of infections.

Despite healthcare advances, acute respiratory infections (ARIs) remain a major public health challenge in Iran, imposing a heavy burden on child health and family well-being. Although RSV prevalence is slightly below global averages (1, 21, 27), its clinical burden is severe, exacerbated by environmental risks such as air pollution and use of solid fuels, particularly in metro and suburban areas (1, 34, 40). Limited parental awareness and delays in care worsen outcomes (21, 50). Socioeconomic barriers like poor living conditions and limited healthcare access amplify vulnerability, reflecting wider patterns seen in developing countries and highlighting the need for targeted policies and interventions (39, 54). Biological risk factors, especially age under two and male gender, further increase infection severity and healthcare needs (44, 50).

Iran's asthma prevalence is notably lower than many countries (4, 5), possibly due to genetic, environmental, or diagnostic factors, which warrants future research. National epidemiological patterns resemble other developing nations, though disparities in disease burden reflect economic and healthcare infrastructure differences (18, 19, 54). Pneumonia prevalence in some regions exceeds 10%, comparable to similar socioeconomic countries (16, 18), stressing the need for intensified control efforts. Beyond medical costs, respiratory infections cause broader social impacts, such as school absenteeism and family stress (16, 56–58), underscoring the need for comprehensive prevention and education.

Challenges in Iran's healthcare system include uneven access to specialized services, limited diagnostic availability in rural areas, and insufficient public education (54, 55). Strengthening primary care, diagnostics, and community awareness is critical to reducing disease burden. Ultimately, multifaceted approaches addressing biological, environmental, social, and systemic factors—such as raising awareness, mitigating environmental risks, improving vaccination, and ensuring equitable healthcare access—are essential (1, 5-7, 26). A deeper understanding of less recognized pathogens and robust health system strengthening tailored to local contexts will be key to curbing respiratory infections and protecting the health and future of Iranian children (7, 16, 59, 60).

5- CONCLUSION

Respiratory Syncytial Virus (RSV), Human Metapneumovirus (hMPV), and the atypical bacterium *Mycoplasma pneumoniae* are the primary pathogens causing most acute respiratory infections in Iranian children, especially those under five years old. These agents contribute substantially to high incidence rates, hospitalizations, and clinical complications in this population. Alongside infectious causes, environmental factors such as air pollution and parental smoking, socioeconomic challenges including poverty and limited healthcare access, and

biological vulnerabilities—such as young age, male gender, and malnutrition—critically influence the prevalence and severity of respiratory infections.

Comparison of Iranian data with global and regional trends shows similar epidemiological patterns, particularly in other developing countries. However, local climatic, cultural, and healthcare system variations require tailored prevention and treatment strategies. To effectively reduce the burden of respiratory diseases among Iranian children, interventions must prioritize raising family awareness of symptoms, improving healthcare quality and accessibility, and mitigating environmental risk factors through targeted public health policies and community-based initiatives. These comprehensive efforts are essential to improving respiratory health outcomes for children throughout Iran.

6- CONFLICT OF INTEREST: None.

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