IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2

Bronchial Asthma: A Comprehensive Academic Review

Osmonova Gulnaz zhenishbaevna, Anjali Mishra, Mohd Arman Khan
OSH State University, Kyrgyzstan

Abstract: *Bronchial asthma is one of the most common chronic respiratory diseases in children worldwide. It is characterized by chronic airway inflammation, reversible airflow obstruction, and airway hyperresponsiveness. Pediatric asthma significantly affects physical activity, school attendance, and quality of life. Early diagnosis and appropriate management are crucial to prevent long-term complications and improve outcomes. This article reviews the epidemiology, etiology, pathophysiology, clinical presentation, diagnosis, management, complications, and prevention of bronchial asthma in children.*

Keywords: *Bronchial asthma*

I. INTRODUCTION

Asthma in children is a chronic inflammatory disorder of the airways that leads to recurrent episodes of wheezing, breathlessness, chest tightness, and cough. Symptoms are often worse at night or early morning and may vary over time.

According to the World Health Organization, asthma is one of the leading chronic diseases in children globally. Pediatric asthma contributes significantly to emergency visits, hospital admissions, and school absenteeism.

Unlike adults, diagnosing asthma in young children can be challenging due to difficulty in performing lung function tests and overlapping symptoms with viral infections.

Epidemiology

Asthma prevalence varies across countries due to environmental, genetic, and socioeconomic factors. Urbanization, air pollution, and lifestyle changes contribute to rising prevalence in developing nations.

Key epidemiological points:Common in children and young adults.Higher prevalence in individuals with atopic disorders.Increased incidence in urban populations compared to rural areas.Mortality is relatively low but preventable with proper treatment.The Global Initiative for Asthma (GINA) provides global strategies for improving asthma management and reducing mortality.

Interpretation:

The majority of children with asthma (nearly 3 out of 4) receive care in a doctor's office, suggesting regular follow-up and primary care involvement.A significant proportion (14.2%) depend on clinics or health centers, possibly indicating public healthcare usage.

Emergency department (3.4%) usage reflects acute exacerbations or poor asthma control in a subset of children.

4.7% without a usual place of care is concerning because continuity of care is crucial for chronic diseases like asthma.

From the chart:

Doctor's office: 74.7%

Clinic/Health center: 14.2%

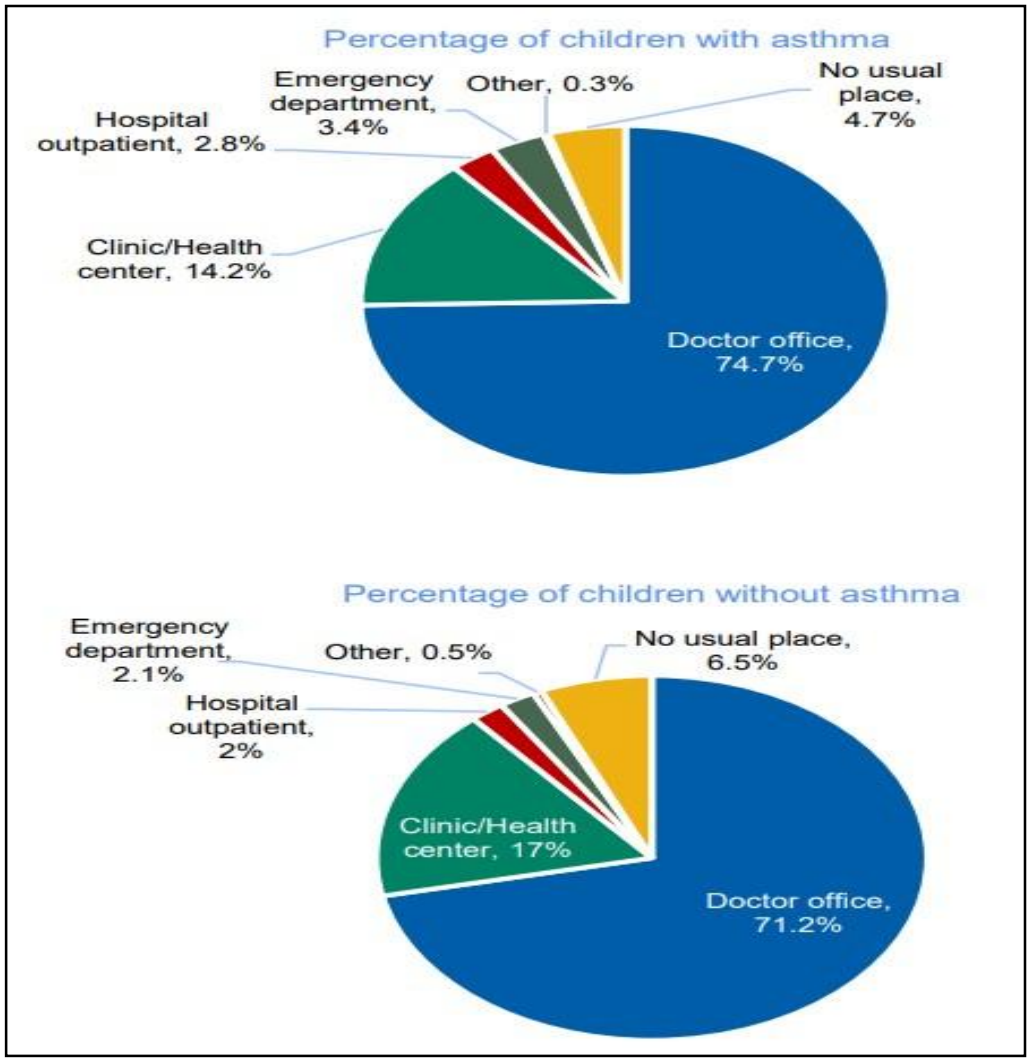
Emergency department: 3.4%

Hospital outpatient: 2.8%

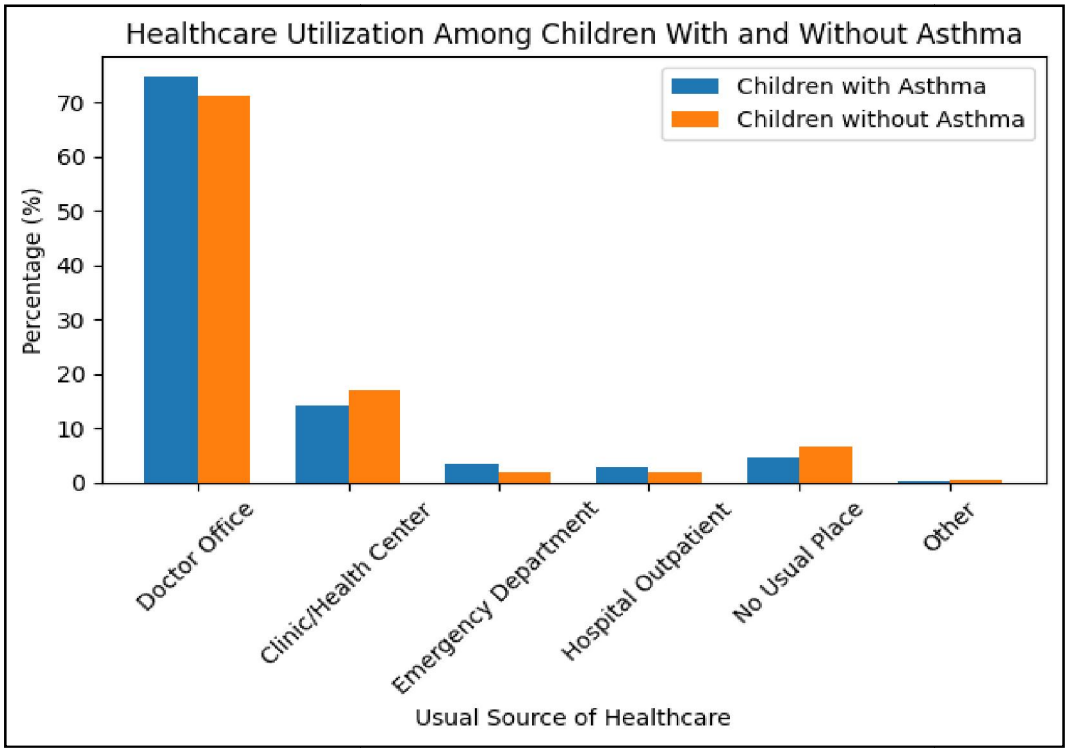
DOI: 10.48175/568

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2

No usual place of care: 4.7%
Other: 0.3%



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2



Etiology and Risk Factors

Asthma results from a multifactorial interplay of host and environmental factors.

1. Genetic Factors

Family history of asthma or atopy

Genetic polymorphisms affecting immune response and airway function

2. Environmental Factors

Indoor allergens (house dust mites, molds)

Outdoor allergens (pollens)

Tobacco smoke exposure

Air pollution

Occupational sensitizers

3. Host Factors

Atopy

Obesity

Gender (more common in boys in childhood; more common in females in adulthood)

4. Triggering Factors

Respiratory infections (viral)

Exercise

Cold air

Emotional stress

Certain medications (e.g., NSAIDs)

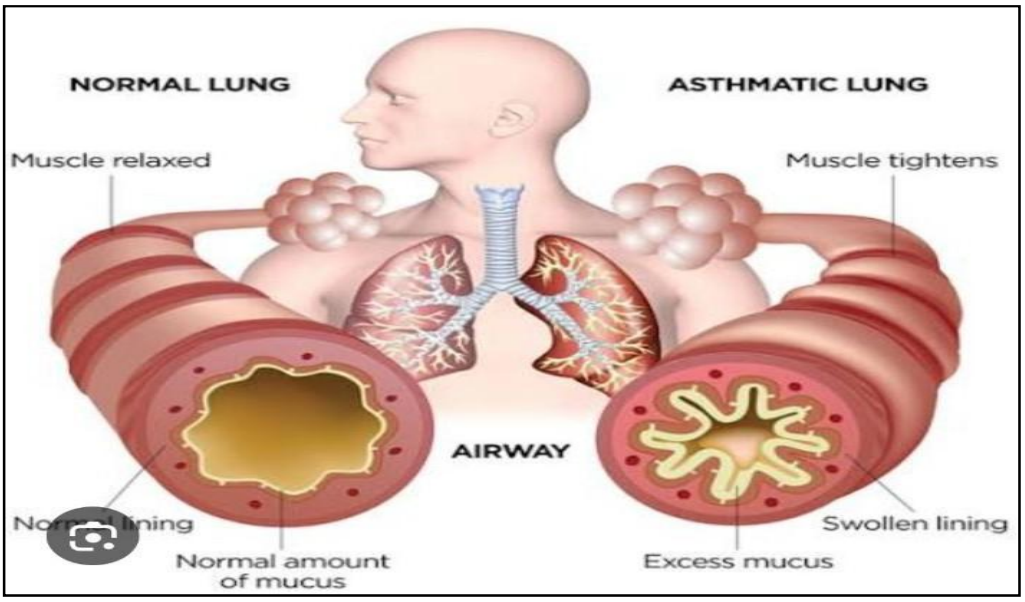
IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2

Pathophysiology

Bronchial asthma in children is a chronic inflammatory disorder of the airways characterized by airway hyperresponsiveness, reversible airflow obstruction, and recurrent respiratory symptoms. The underlying pathophysiology begins with exposure to triggers such as allergens (dust mites, pollen, pet dander), viral infections, or environmental irritants, which activate the immune system in genetically predisposed children. This leads to a T-helper 2 (Th2)–mediated immune response, resulting in the release of cytokines such as interleukin-4 (IL-4), IL-5, and IL-13. These cytokines promote IgE production by B cells and recruitment of eosinophils and mast cells into the bronchial mucosa. Upon re-exposure to allergens, IgE-coated mast cells degranulate, releasing histamine, leukotrienes, and other inflammatory mediators. These substances cause bronchial smooth muscle contraction (bronchospasm), increased vascular permeability leading to mucosal edema, and excessive mucus secretion. In children, the smaller airway diameter makes them particularly vulnerable to significant airflow limitation even with mild inflammation. Repeated inflammatory episodes may lead to airway remodeling, including subepithelial fibrosis, smooth muscle hypertrophy, and goblet cell hyperplasia, which can contribute to persistent airflow limitation over time. The combination of inflammation, bronchoconstriction, and mucus plugging results in the characteristic symptoms of wheezing, cough, dyspnea, and chest tightness seen in pediatric asthma.

Key Processes:

Airway Inflammation
Infiltration by eosinophils, mast cells, and T lymphocytes.
Release of inflammatory mediators.
Bronchoconstriction
Contraction of bronchial smooth muscle.
Narrowing of airways.
Mucus Hypersecretion
Increased mucus blocks small airways.
Airway Hyperresponsiveness
Exaggerated narrowing in response to stimuli.



IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 3, February 2026 Impact Factor: 8.2

Clinical Features

Asthma presents with episodic symptoms that vary in frequency and intensity.

Symptoms

Wheezing

Shortness of breath (dyspnea)

Chest tightness

Cough (often nocturnal)

Symptoms worsen:At night or early morning With exposure to triggers During respiratory infections Signs Expiratory wheeze ,Prolonged expiration ,Tachypnea

Use of accessory muscles in severe attacks

Severe asthma may present with:

Silent chest

Cyanosis

Altered mental status

Diagnosis

Asthma diagnosis involves clinical evaluation and objective lung function testing.

1. Clinical History

Recurrent episodes of wheeze and breathlessness Trigger-related symptoms Family history of atopy

2. Physical Examination

Wheezing on auscultation Hyperinflated chest (in chronic cases)

3. Spirometry

Diagnostic criteria include:

Reduced FEV_1

Reduced FEV_1/FVC ratio

Significant reversibility after bronchodilator (increase in $FEV_1 \geq 12\%$ and 200 mL)

4. Additional Investigations

Peak Expiratory Flow Rate (PEFR)

Serum IgE levels

Peripheral eosinophilia

Allergy testing

The National Heart, Lung, and Blood Institute provides detailed diagnostic guidelines.

Management

Asthma management includes pharmacological and non-pharmacological approaches.

1. **Non-Pharmacological Management**

Trigger avoidance

Smoking cessation

Patient education

Vaccination (influenza, pneumococcal)

2. **Pharmacological Management**

A. Reliever Medications

Short-acting β_2-agonists (SABA)

B. Controller Medications

Inhaled corticosteroids (ICS)

Long-acting β_2-agonists (LABA)

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2

Leukotriene receptor antagonists
Theophylline
C. Stepwise Approach
Treatment is adjusted according to severity and level of control.
GINA recommends:
Low-dose ICS-formoterol as both maintenance and reliever therapy in many patients.
Avoidance of SABA-only therapy due to increased risk of severe exacerbations.
D. Severe Asthma
Oral corticosteroids
Biologic therapies (e.g., anti-IgE, anti-IL-5 agents)

Complications
Status asthmaticus
Respiratory failure
Pneumothorax
Airway remodeling
Reduced quality of life
Poorly controlled asthma increases hospital admissions and healthcare costs.

Prevention
Primary Prevention
Avoidance of tobacco smoke
Reduction of environmental pollution
Secondary Prevention
Early diagnosis
Regular controller therapy
Tertiary Prevention
Preventing complications
Improving adherence
Asthma action plans
Education plays a central role in preventing exacerbations.

Prognosis
Most patients achieve good control with appropriate therapy. Childhood asthma may remit in adolescence, though some cases persist into adulthood. Poor adherence, continued exposure to triggers, and lack of education worsen outcomes.
Many children experience improvement during adolescence.
Some may continue to have asthma into adulthood.
Early control improves long-term lung function.
Poor adherence increases risk of severe exacerbations.

II. CONCLUSION

Bronchial asthma in children is a chronic inflammatory airway disease that significantly affects quality of life and healthcare systems worldwide. Early recognition, appropriate pharmacological therapy, trigger avoidance, and parental education are essential for effective disease control.
With proper management, most children with asthma can lead normal, active lives, attend school regularly, and participate in physical activities without limitations.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 3, February 2026
Impact Factor: 8.2

REFERENCES

[1]. World Health Organization. Asthma Fact Sheets and Global Reports. Geneva: WHO; Latest update.
[2]. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention. Latest Annual Update.
[3]. National Heart, Lung, and Blood Institute. Expert Panel Report 3 (EPR-3): Guidelines for the Diagnosis and Management of Asthma.
[4]. National Institute for Health and Care Excellence. Asthma: Diagnosis, Monitoring and Chronic Asthma Management (NICE Guidelines NG80).
[5]. American Academy of Pediatrics. Clinical Practice Guidelines on Pediatric Asthma.
[6]. American Thoracic Society & European Respiratory Society. International ERS/ATS Guidelines on Severe Asthma.
[7]. Centers for Disease Control and Prevention. Asthma Surveillance Data and Pediatric Asthma Statistics.
[8]. British Thoracic Society & Scottish Intercollegiate Guidelines Network. British Guideline on the Management of Asthma.
[9]. Nelson Textbook of Pediatrics. Latest Edition.
[10]. Harrison's Principles of Internal Medicine. Latest Edition.
[11]. Davidson's Principles and Practice of Medicine. Latest Edition.
[12]. International Study of Asthma and Allergies in Childhood (ISAAC). Worldwide Variations in the Prevalence of Asthma Symptoms.
[13]. European Academy of Allergy and Clinical Immunology. Pediatric Asthma and Allergy Guidelines.
[14]. American College of Allergy, Asthma & Immunology. Practice Parameters for the Diagnosis and Management of Asthma.
[15]. Global Allergy and Asthma European Network. Epidemiological Reports on Pediatric Asthma