



Asthma Management in Low-Resource Settings: A Narrative Review

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Abstract

Asthma is a chronic respiratory disease affecting over 300 million individuals globally, with a significant burden in low- and middle-income countries (LMICs). In these regions, limited healthcare infrastructure, lack of awareness, and poor access to medications complicate effective asthma control. This narrative review presents a practical, evidence-based overview of asthma management in low-resource settings. It explores the global burden, key challenges, and feasible strategies for diagnosis, treatment, and long-term control, aiming to guide clinicians and public health professionals working in underserved areas.

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Introduction

Asthma is a leading non-communicable disease characterized by chronic airway inflammation, variable airflow obstruction, and respiratory symptoms such as wheeze, breathlessness, and cough. Despite being preventable and treatable, asthma contributes substantially to morbidity and avoidable healthcare utilization, especially in LMICs ^[1, 3, 4]. The disproportionate burden in resource-constrained settings is exacerbated by poor awareness, underdiagnosis, environmental triggers, and limited access to essential medications ^[5, 7].

This review synthesizes evidence-based recommendations and real-world adaptations for effective asthma care in low-resource settings, emphasizing simplicity, accessibility, and sustainability.

Global Burden and Epidemiology

According to the Global Initiative for Asthma (GINA), asthma affects approximately 300–400 million people worldwide, and its prevalence continues to rise, particularly among urban populations in developing countries ^[1, 4]. The World Health Survey found substantial variations in adult asthma prevalence, with LMICs accounting for the majority of the global disease burden ^[4]. In India, studies like the AP-AIM study reveal poor symptom control, frequent exacerbations, and widespread misuse of oral medications ^[5]. Underdiagnosis and undertreatment remain persistent issues, often linked to limited diagnostic tools and misconceptions about inhaled therapy.

Challenges in Low-Resource Settings

Multiple barriers hinder optimal asthma management in under-resourced areas:

- Limited diagnostic tools: Spirometry and peak flow meters are often unavailable, resulting in clinical diagnosis based on symptoms alone ^[5, 8].
- Poor medication access: Inhaled corticosteroids (ICS), the cornerstone of asthma control, are either unaffordable or unavailable in rural areas ^[3, 6].
- Low adherence: Medication adherence is hampered by lack of understanding, cost, and cultural beliefs about inhalers ^[6, 12].
- Environmental triggers: Exposure to indoor biomass smoke, outdoor pollution, and occupational allergens is higher in low-income settings ^[10].

- Healthcare workforce gaps: Shortage of trained personnel impedes consistent and guideline-based management ^[9, 12].

Diagnosis and Risk Assessment

While spirometry remains the gold standard, in low-resource settings, asthma diagnosis often relies on clinical evaluation. Recurrent wheeze, cough, nocturnal symptoms, and symptom variability are critical diagnostic indicators ^[1, 8].

Risk factors such as family history, history of atopy, exposure to tobacco smoke, and response to bronchodilators can support diagnosis. Use of validated questionnaires (e.g., Asthma Control Test) may help standardize symptom monitoring where instruments are unavailable ^[5].

Treatment Approaches

Stepwise Pharmacologic Management (Adapted from GINA and NAEPP):

- Mild asthma: As-needed low-dose ICS-formoterol or short-acting beta-agonist (SABA) with controller ICS when possible ^[1, 8].
- Moderate to severe asthma: Daily ICS or ICS-LABA combinations. Oral corticosteroids may be used during exacerbations, though long-term use should be minimized ^[1, 8].

Challenges and Adaptations

- Inhalers should be prioritized over oral therapies.
- Use of dry powder inhalers may be cost-effective where pressurized inhalers are scarce.
- Where inhaled medications are unavailable, oral theophylline or leukotriene receptor antagonists may offer partial control but with caution due to side effects ^[5, 8].

Non-Pharmacologic Strategies

- Patient education: Key to improving adherence. Simple educational tools and pictorial asthma action plans have been shown effective in LMICs ^[5, 6].
- Environmental control: Reducing biomass exposure, avoiding tobacco smoke, and using masks in high-pollution areas are feasible low-cost strategies ^[10].
- Community health workers: Task-sharing asthma education and follow-up to trained non-physician health workers is effective in underserved regions ^[12].

Examples of Successful Models

The Finnish Asthma Programme (1994–2004) demonstrated how systematic asthma control can reduce hospitalizations and improve quality of life even in resource-constrained settings, by integrating public education, standardizing treatment, and ensuring medication availability ^[11].

Similar task-shifting models, local adaptation of GINA steps, and government-led inhaler subsidy programs have shown promising results in countries like India and South Africa ^[5, 12].

Conclusion

Asthma care in low-resource settings faces numerous challenges, but practical and scalable solutions exist. Emphasizing simple diagnostic approaches, patient education, use of cost-effective inhaled medications, and task-sharing strategies can substantially improve asthma

outcomes. Policymakers and healthcare providers must adapt global guidelines into context-specific strategies to close the care gap in underserved populations.

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