World Journal of Biology Pharmacy and Health Sciences
eISSN: 2582-5542
Cross Ref DOI: 10.30574/wjbphs
Journal homepage: https://wjbphs.com/

(REVIEW ARTICLE)

The impact of climate change on pediatric respiratory health: A global call to action

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World Journal of Biology Pharmacy and Health Sciences, 2025, 21(01), 033-035

Publication history: Received on 20 November 2024; revised on 28 November 2024; accepted on 31 December 2024

Article DOI: https://doi.org/10.30574/wjbphs.2025.21.1.1107

Abstract

Climate change poses an unprecedented threat to global public health, particularly to pediatric respiratory health. Children are disproportionately affected due to their developing respiratory systems and increased exposure to environmental pollutants. This review explores the interplay between air pollution, rising temperatures, and climate-induced events such as wildfires and floods, which exacerbate respiratory illnesses in children. It emphasizes the global burden of pediatric respiratory conditions, including asthma and bronchitis, linked to environmental changes. By analyzing current evidence and highlighting successful mitigation strategies, this article calls for urgent collaborative action among policymakers, healthcare professionals, and communities to safeguard the respiratory health of future generations.

Keywords: Climate change; Pediatric respiratory health; Air pollution; Global health; Asthma; Mitigation strategies

1. Introduction

The escalating effects of climate change have brought an urgent focus on its implications for public health. Children, due to their physiological vulnerabilities and prolonged exposure periods, are at higher risk of developing severe health conditions linked to environmental changes. The respiratory system, being the primary interface between the body and the external environment, is particularly susceptible to climate-related stressors. This review investigates the connections between climate change and the rising prevalence of respiratory illnesses in children, focusing on air pollution, heatwaves, and climate-induced natural disasters.

2. Impact of Climate Change on Pediatric Respiratory Health

2.1. Air Pollution and Respiratory Illnesses

Air pollution is a significant contributor to respiratory morbidity and mortality in children. Climate change exacerbates air pollution by increasing ground-level ozone and particulate matter (PM2.5), both of which are associated with respiratory diseases such as asthma and bronchitis.

- **Evidence from Global Studies:** Studies from urban centers worldwide report a direct correlation between rising air pollutant levels and hospital admissions for pediatric respiratory conditions.
- **Mechanism:** Fine particulate matter penetrates deep into the lungs, causing inflammation, oxidative stress, and impaired lung development in children.

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2.2. Rising Temperatures and Respiratory Health

Prolonged heat exposure intensifies respiratory distress, particularly in children with pre-existing conditions such as asthma.

- **Heatwaves and Ozone Formation:** Elevated temperatures promote the formation of ground-level ozone, a potent respiratory irritant.
- **Increased Pollen Levels:** Rising temperatures extend pollen seasons, leading to higher incidences of allergic rhinitis and asthma.

2.3. Climate-Induced Natural Disasters

Wildfires, floods, and hurricanes, all aggravated by climate change, have significant respiratory health implications for children.

- **Wildfires:** Smoke from wildfires contains a mix of harmful pollutants, including carbon monoxide and PM2.5, leading to acute respiratory symptoms in exposed populations.
- **Floods and Mold Exposure:** Post-flood environments promote mold growth, which is a known trigger for respiratory allergies and asthma exacerbations in children.

3. Global Burden of Pediatric Respiratory Conditions

- **Asthma Prevalence:** Approximately 14% of children globally are estimated to have asthma, with exacerbation rates linked to rising pollution levels.
- **Mortality Rates:** Respiratory infections remain a leading cause of death in children under five, with climate change projected to worsen this burden.

4. Mitigation and Adaptation Strategies

4.1. Policy Interventions

- Enforce stricter air quality standards to reduce emissions of pollutants.
- Promote clean energy transitions to minimize the carbon footprint.

4.2. Healthcare Initiatives

- Develop early warning systems for high pollution days to reduce exposure.
- Increase healthcare access for vulnerable populations to manage respiratory conditions effectively.

4.3. Community-Level Actions

- Enhance awareness campaigns about the impact of climate change on children's health.
- Promote reforestation and green urban planning to improve air quality.

4.4. Research and Surveillance

- Invest in longitudinal studies to track the long-term effects of climate change on pediatric respiratory health.
- Develop innovative treatment strategies tailored for climate-induced respiratory conditions.

5. Conclusion

The adverse effects of climate change on pediatric respiratory health demand immediate attention. Protecting children from the compounding effects of air pollution, rising temperatures, and climate-induced disasters requires a multidisciplinary approach. Governments, healthcare providers, and communities must collaborate to implement sustainable strategies to mitigate these risks. By prioritizing pediatric health in climate policies, we can ensure a healthier future for generations to come.

Compliance with ethical standards

Acknowledgments

The author thanks colleagues and environmental researchers for their invaluable insights into this pressing issue. Special thanks to the team at Ovum Woman and Child Specialty Hospital for their support.

Disclosure of conflict of interest

The author declares no conflict of interest.

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Author's short Biography

Dr. Venugopal Reddy is a distinguished Medical Director and Pediatrician at Ovum woman and Child Speciality Hospital in Bangalore, India. With extensive expertise in pediatric care, research, and community health initiatives, he has authored nearly 100 articles in Scopus and PubMed-indexed journals. He is actively involved in improving healthcare systems, child health awareness, and maternal well-being. His work has earned him recognition as one of the top professionals shaping healthcare in India.