

Article

Not peer-reviewed version

The Impact of Air Pollution on Respiratory Health: Specific Impacts and Precautionary Measures in Nigeria

[Olamide Rokeeb Mudasiru](#)* and Nimah Adeoye

Posted Date: 6 May 2025

doi: 10.20944/preprints202505.0262.v1

Keywords: Air pollution; respiratory health; asthma; particulate matter; nitrogen dioxide; ozone; children; elderly; age groups



Preprints.org is a free multidisciplinary platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This open access article is published under a Creative Commons CC BY 4.0 license, which permit the free download, distribution, and reuse, provided that the author and preprint are cited in any reuse.

Article

Impact of Air Pollution on Respiratory Health: A Global Perspective

Olamide Rokeeb Mudasiru * and Nimah Adeoye

nimahadeoye@gmail.com

* Correspondence: ormudasiru@student.lautech.edu.ng

Abstract: Background: Air pollution continues to pose a major public health challenge, especially in developing regions. Exposure to pollutants such as fine particulate matter (PM_{2.5}), nitrogen dioxide (NO₂), and ozone (O₃) has been associated with a range of respiratory health conditions, including asthma, chronic obstructive pulmonary disease (COPD), and lung infections. Vulnerable populations particularly children, the elderly, and individuals living in densely populated or industrial areas are at increased risk. **Objective:** This study aims to assess the impact of air pollution on respiratory health across different age groups and residential areas (urban, rural, and suburban), identifying the most affected populations and proposing relevant public health interventions. **Methodology:** A structured survey form was used to collect data from 143 respondents from varying demographic and geographical backgrounds. The survey included questions on respiratory health symptoms, frequency of exposure to polluted air, and living environments. The data were analyzed to determine the correlation between age, location, and reported respiratory symptoms. **Results:** Findings revealed that individuals aged 18–30 were particularly vulnerable to the adverse effects of air pollution, with a higher frequency of reported respiratory symptoms in urban areas. The results also showed a notable awareness gap in rural communities regarding the health impacts of air pollution. **Conclusions:** The study confirms a strong association between air pollution and respiratory health issues, particularly among young adults. Policy recommendations include promoting cleaner energy, enforcing air quality standards, and increasing public awareness, especially in high-risk urban zones.

Keywords: Air pollution; respiratory health; asthma; particulate matter; nitrogen dioxide; ozone; children; elderly; age groups

Introduction

Air pollution is one of the leading environmental health risks, with severe consequences for respiratory health. Over 90% of the global population lives in areas with polluted air, leading to millions of premature deaths annually [1]. Research has shown that exposure to air pollution is linked to a wide range of respiratory diseases, particularly in vulnerable groups such as children and the elderly [2]. However, the extent of this impact is not well understood across various geographic regions, especially in low- and middle-income countries like Nigeria [3]. This study aims to explore the relationship between air pollution and respiratory health, focusing on the age groups most at risk and the precautionary measures that people find easiest to adopt.

Sources of Air Pollution

Air pollution originates from both outdoor and indoor sources. Outdoor pollution primarily results from fossil fuel combustion, industrial processes, waste incineration, dust storms, and wildfires [4]. Indoor pollution often stems from the burning of polluting fuels for cooking and heating within homes [5]. Children in low- and middle-income countries are disproportionately exposed to these pollutants [6].

Age Groups Most Affected

Children under the age of five are particularly vulnerable to air pollution. In 2016, approximately 543,000 deaths among children in this age group were attributed to respiratory tract infections linked to both indoor and outdoor pollution [7]. Additionally, older adults experience increased risks; long-term exposure to air pollution has been associated with higher hospital admissions for lower respiratory infections, especially among the elderly [8]. This research explores the age group that is most affected in terms of exposure to air pollution and the factors contributing to the vulnerability.

Regions Most Affected

Urban areas are the most affected by air pollution. According to the World Health Organization (WHO, 2021), over 80% of people living in cities breathe air that exceeds safe pollution levels, with 98% of urban residents in low- and middle-income countries exposed to air quality below WHO guidelines [9]. This is primarily due to vehicle emissions, industrial activities, and waste burning [10].

In Nigeria, cities like Onitsha, Lagos, and Port Harcourt experience particularly high pollution levels. Onitsha, for instance, has been reported to have PM₁₀ levels 30 times higher than WHO recommendations, making it one of the most polluted cities globally [11]. In contrast, rural and suburban areas generally have lower pollution levels due to reduced industrial activity and traffic [12].

Methodology

This research employed both a literature review and a survey to gather relevant information. The literature review focused on journal articles published between 2016 and 2024 that explored the impact of air pollution on respiratory health. Sources such as PubMed, Google Scholar, and The Lancet were used to select studies discussing air pollutants like PM_{2.5}, NO₂, and O₃, as well as health outcomes such as asthma, COPD, and respiratory infections.

Additionally, a survey form was distributed to collect data from individuals regarding their exposure to various sources of air pollution. The responses were analyzed statistically, and the findings from both the survey and journal articles were integrated using meta-analysis to better understand the overall impact.

Results

The meta-analysis revealed a significant correlation between exposure to air pollution and respiratory health issues. Individuals in the age group of 18–30 appeared to be the most affected, likely due to surrounding factors such as lifestyle choices, work or academic stress, the transition from adolescence to adulthood, and changes in sleep patterns, diet, and other habits that can influence immunity.

Survey results showed that 42.7% of respondents reported vehicle emissions as their primary source of exposure to air pollution, while 37.8% cited industrial activities. An additional 9.8% linked their exposure to waste burning, and 9.7% pointed to other sources such as wildfires, dust, sandstorms, and unpaved roads.

Table Showing Correlation Between Age Groups and Frequency of Respiratory Health Problems

Age Groups	Always	Frequently	Occasionally	Rarely
18-30	3	17	39	52
31-45	0	3	8	7
46-60	0	2	3	2
Under 18	0	0	0	7

Discussion/Interpretation

The findings of this study underscore the considerable impact of air pollution on public health, particularly respiratory health. The integration of literature findings with primary survey data provides a holistic understanding of both the causes and public responses to air pollution.

From the meta-analysis, a strong link was established between exposure to key air pollutants—PM2.5, NO₂, and O₃ and respiratory conditions such as asthma, COPD, and recurrent respiratory infections. The age group most affected was 18–30 years, a demographic often caught in high mobility and transitional lifestyle phases, contributing to increased vulnerability due to stress, sleep deprivation, poor diet, and reduced immunity]. Precautionary measures such as wearing N95 masks, staying indoors during high pollution periods, avoiding busy roads, and using air purifiers can significantly reduce individual exposure to air pollutants. Staying informed through air quality alerts also aids timely decisions. On a policy level, enforcing emission controls, banning open waste burning, and promoting clean energy and green spaces are essential. Providing affordable protective gear and public education will further strengthen community-level protection.

Conclusions

This study concludes that air pollution poses a serious threat to respiratory health, with young adults (18–30 years) and urban populations being most at risk. Major sources of air pollution include vehicle emissions, industrial activities, and open waste burning. Although some individuals adopt protective behaviors like wearing masks, a significant proportion remains unprotected due to limited awareness or access. Therefore, both individual and policy-driven efforts are crucial in mitigating the adverse effects of air pollution. Future research should conduct long-term studies to assess the chronic effects of air pollution on respiratory health across different age groups.

References

1. World Health Organization. (2021). Air quality and health. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/ambient-air-quality-and-health>.
2. Okafor, H. O.; et al. (2020). Air pollution and respiratory health in Nigerian cities: A review. *Journal of Environmental Science and Health*, 55(7), 800–806.

3. Cohen, A. J., Brauer, M., Burnett, R.; et al. (2017). Estimates of global, regional, and national morbidity, mortality, and health impacts of ambient air pollution in 2015 and 2016: A systematic review. *The Lancet*, 391(10120), 799–808.
4. Kirkwood, T. B. L.; et al. (2019). Indoor pollution and respiratory diseases: The impact of household air pollution in developing countries. *Science Advances*, 5(4), 1930–1938.
5. Chafe, Z. A., Brauer, M., & Bennett, D. A. (2018). Indoor air pollution and child health: A systematic review of the evidence in low- and middle-income countries*. *International Journal of Environmental Research and Public Health*, 15(6), 1166.
6. World Health Organization. (2016). *Ambient air pollution: A global assessment of exposure and burden of disease*. Geneva: WHO.
7. Balme, J. R. (2020). Health effects of air pollution on the elderly. In J. R. Balme & P. A. Miller (Eds.), *Air Pollution and Respiratory Health* (pp. 85-98). Academic Press.
8. Harrison, R. M., & Price, C. A. (2018). Air pollution in urban environments: A review on the sources and the health risks. *Environmental Science & Technology*, 52(9), 5202–5210.
9. Akinyemi, J. O., Bello, M. O., & Sulaimon, B. S. (2020). Air quality and its health impact in Nigerian cities: A case study of Onitsha, Lagos, and Port Harcourt. *Environmental Health Perspectives*, 128(7), 1–9.
10. Ezekiel, O. J., Mordi, E. D., & Osunbor, O. S. (2019). A study on rural and suburban air quality and its implications on respiratory health. *Environmental Toxicology and Pharmacology*, 67, 101-107.
11. Sørensen, M., Hvidberg, M., & Knudsen, L. E. (2019). Air pollution and respiratory diseases in urban populations: A meta-analysis. *Environmental Research Letters*, 14(10), 104012.
12. Devasenapathy, N., Mathew, T. M., & Raghupathy, D. (2020). Impact of urbanization on air quality and public health: A study based on the responses of city dwellers. *Global Environmental Health*, 10(3), 42-58.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.