DOI: https://doi.org/10.54393/pbmj.v9i4.1360

PAKISTAN BIOMEDICAL JOURNAL
https://www.pakistanbmj.com/journal/index.php/pbmj/index
ISSN (E): 2709-2798, (P): 2709-278X
Volume 9, Issue 04 (April 2026)

Environmental and Geographical Determinants of Lung Cancer in Pakistan: A Growing Public Health Concern

OPEN ACCESS

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ARTICLE INFO

How to Cite:

Mehboob, R. (2026). Environmental and Geographical Determinants of Lung Cancer in Pakistan: A Growing Public Health Concern: Environmental and Geographical Determinants of Lung Cancer in Pakistan. Pakistan BioMedical Journal, 9(4), 01-02. https://doi.org/10.54393/pbmj.v9i4.1360

Lung cancer is a cancer that starts in the cells in the lungs, which is often caused by smoking or exposure to air pollution. It is defined as the uncontrolled growth of cells. There are two main types: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC) [1]. Early detection and treatment are key, but lung cancer is often diagnosed at advanced stages, which makes it challenging to treat effectively [2].

Lung cancer is a form of cancer with an incidence of 9,464 new cases in Pakistan (5.1% of all cancers). It is the third most common cancer. The mortality due to lung cancer is 8,307 deaths (7.0% of total cancer deaths). It continues to be a persistent disease with a 5-year prevalence of 12,805. The cumulative risk of developing lung cancer before the age of 75 is 0.69%. Lung cancer continues to increase in both males and females, especially in big cities like Karachi and Lahore [3].

The environmental determinants significantly influence the burden and geographical distribution of lung cancer in Pakistan. The combined effect of rapid urbanization, industrial growth, growing motorized transportation, and unsafe working conditions has led to a general increase in exposure to carcinogenic pollutants in both urban and rural areas. Furthermore, the vulnerability of high-risk communities is growing due to differences in environmental regulation and a lack of public knowledge of hazardous exposures.

Environmental exposure, such as industrial emissions, vehicle pollution, occupational risks, and indoor air pollution, is a primary factor contributing to this rise. Industrial activities and emissions from vehicle traffic are linked to the release of polycyclic aromatic hydrocarbons (PAHs), which can make people more susceptible to cancer, as noted by Rehman *et al.* [4]. They are common pollutants in urban air pollution and have a strong association with lung carcinogenesis. Likewise, Luqman *et al.* report that occupational exposure (elevated ORs 5.1 and 3.1) to pesticides and diesel exhaust is an important risk factor in agricultural workers [5]. Other environmental-lifestyle interactions that were reported were dietary patterns, especially high intake of red meat and chicken. The particulate matter exposure (PM2.5, PM10) in the Salt Range was high, as reported by Nasir *et al.* and is linked to the mortality of lung cancer, especially in adults over 30 years of age [6]. Abbas *et al.* also, through machine learning-based risk modelling, found that air pollution, tobacco smoke, benzene, and PAHs were the major environmental risk factors for lung cancer in major cities of Pakistan, such as Lahore, Karachi, and Islamabad [7]. The other key concern is indoor environmental exposure. Kausar *et al.* describe how biomass fuel use in rural households, including wood and coal burning, results in persistent levels of indoor air pollution and high exposures to particulate pollutants, which play a significant role in the burden of respiratory diseases, such as lung cancer [8].

Lung cancer in Pakistan demonstrates that the disease is strongly influenced by environmental carcinogens like outdoor air

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pollution, industrial pollution, occupational exposures, and indoor biomass fuel use, which have medical, environmental, and socioeconomic dimensions, and are associated with rapid urbanisation, industrialization, and household energy use. To conclude, a concerted and coordinated environmental health strategy is needed, with a focus on the need to regulate industrial and vehicle sources of emissions, increase occupational safety measures, and progressively move towards cleaner household fuels, as well as enhance air quality monitoring and environmental policy implementation in both urban and rural areas. Along with public health awareness campaigns and early screening programs, delayed diagnosis and poorer survival are also problems that must be addressed. The environmental burden associated with the incidence of lung cancer in Pakistan is ever-increasing and requires a concerted effort from healthcare authorities, environmental agencies, and policymakers.

REFERENCES

[1] Minna JD, Roth JA, Gazdar AF. Focus on Lung Cancer. Cancer Cell. 2002 Feb; 1(1): 49-52. doi: 10.1016/S1535-6108(02)00027-2.
[2] Tao MH. Epidemiology of Lung Cancer. Lung Cancer and Imaging. 2019 Dec: 4-1. doi: 10.1088/978-0-7503-2540-0ch4.
[3] Sheikh HS, Munawar K, Sheikh F, Qamar MF. Lung Cancer in Pakistan. Journal of Thoracic Oncology. 2022 May; 17(5): 602-7. doi: 10.1016/j.jtho.2022.01.009.
[4] Rehman MY, Taqi MM, Hussain I, Nasir J, Rizvi SH, Syed JH. Elevated Exposure to Polycyclic Aromatic Hydrocarbons (PAHs) May Trigger Cancers in Pakistan: An Environmental, Occupational, and Genetic Perspective. Environmental Science and Pollution Research. 2020 Dec; 27(34): 42405-23. doi: 10.1007/s11356-020-09088-2.
[5] Luqman M, Javed MM, Daud S, Raheem N, Ahmad J, Khan AU. Risk Factors for Lung Cancer in the Pakistani Population. Asian Pacific Journal of Cancer Prevention. 2014; 15(7): 3035-9. doi: 10.7314/APJCP.2014.15.7.3035.
[6] Nasir AH, Nawaz R, Haider R, Irshad MA. Modeling Air Pollution Health Risk for Environmental Management of an Internationally Important Site: The Salt Range (Kallar Kahar), Pakistan. Atmosphere. 2022 Jan; 13(1): 100. doi: 10.3390/atmos13010100.
[7] Abbas N, Azam M, Ali M, Malik M, Hashmi MU, Manan A. Multi-Model Machine Learning Analysis of Environmental Risk Factors for Lung Cancer. Journal of Computing and Biomedical Informatics. 2024 Sep; 7(02).
[8] Kausar A, Ahmad I, Zhu T, Shahzad H. Impact of Indoor Air Pollution in Pakistan—Causes and Management. Pollutants. 2023 Jun; 3(2): 293-319. doi: 10.3390/pollutants3020021.