

Air Pollution and its Impact on Children

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Pakistan ranks among the most polluted country in the world. Major cities like Karachi, Lahore, and Peshawar record high Air Quality Index (AQI) level above 300-400.¹ In Punjab smog episodes have reached AQI over 700 in some cities. Smog, industrial emission, brick kilns, burning of crops residues and fossil fuels, indoor air pollution, mining operations are to name few of the causes of air pollution.

In Karachi, the biggest metropolis with the population of over 30 million, not only smog but carbon emission from vehicles and factories, construction dust, garbage burning, indoor air pollution resulted in rise in AQI to a dangerous level. The high wind (02 miles/ hour) traps pollution near the ground during night and early morning, this together with rapid drop in temperature and rising humidity prevent pollutants from dispersing upwards.²

Fine Particle Matter (FPM) is way above 2.5 micrometres (mm), a level which directly affect air quality. FPM larger than 2.5 mm deposited in airways, results in health issues more profound in children resulting in conjunctivitis, throat irritation, coughing, difficulty in breathing, often aggravating asthma. Ground-level ozone further aggravates existing respiratory diseases.³ More frequent exposure can result in more serious health effects.

Pakistan has one of the largest children and youth Population, 40.56 % below 15 years, 64% below 30 years.⁴ Children are more vulnerable to illnesses and developmental delays as their bodies are in various developmental stages and unlike adults they consume more air, food, and water per surface area of their body weight making them more susceptible to environmental hazards.⁵ Children ability to detoxify and eliminate harmful chemicals is also weak and thus results in greater exposure to environmental toxins. All these factors increase the risk of asthma, cancers, neurodevelopmental disorders, and chronic diseases later in life. Furthermore children behaviours like frequently putting objects from hand-to-mouth and sitting while playing on the ground, increases their exposure to environmental contaminants.

Over the past 50 years, children's environments and patterns of disease have changed dramatically. Air and

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water pollution, rising temperatures, extreme weather and exposure to toxic chemicals are putting lives of millions of children at risk.

At present the key health issues children are facing in Pakistan are respiratory illnesses accounting for significant morbidity and mortality. Prolonged hospitalizations are adding economic burden on families and State. Approximately 70,000 children in Pakistan die from pneumonia every year.⁶ Air pollution is a significant risk factor.

Asthma prevalence among children in Pakistan is high, up to 20% of the paediatric population is affected. Studies have shown a significant increase from 10% in 1997 to 18% in 2006 for children aged 13-14 years, whereas 15 million children and 7.5 million adults were affected in year 2022-2023.^{7,8}

Air pollution and Global warming resulting in higher temperatures increases pollen and mould counts, exacerbating allergies and asthma. In Pakistan pollen and mould count (PM₁₀) is considerably high in big cities like Islamabad and Karachi.⁹ Dust pollution in mega cities like Karachi is a consistent, non-seasonal issue primarily driven by construction projects, poor road conditions, and industrial activity, which health expert's link to high rates of respiratory infections and allergies. The city frequently ranks among the most polluted in the world, with average PM more than 2.5. Indoor pollution from solid fuels is another major contributing factor. Children from low-income households are primarily affected as they have limited access to healthcare facilities and information. In addition lack of or incomplete immunization is further increasing the risk. Studies shows that many children who succumb to the disease have received inadequate vaccinations against pathogens like Pneumococcus and Haemophilus Influenza B (HiB).

Exposure to air and chemical pollution can negatively affect brain development, leading to lower cognitive abilities and conditions like ADHD.⁹ Developmental delays leading to Low birth weight and preterm births from prenatal exposure are the main health issues most have a strong co-relation with environmental factors like air pollution.¹⁰

Early life exposure to environmental toxins can increase the

risk of developing chronic diseases in adulthood, such as cardiovascular disease, stroke, and certain cancers. Harmful chemicals can be passed from mother to baby during pregnancy and breastfeeding. The prenatal and early childhood periods are critical, as environmental hazards can lead to complications like premature birth and disrupt foetal development.

Tangible solutions are needed to mitigate the risk of air pollution. Improving air and water quality, reducing air pollution from sources like fossil fuels and ensuring access to clean water and sanitation, steps to limit global warming to protect children from climate-related health risks are some measures to be taken immediately. Reducing hazardous chemical exposure by implementing policies to regulate chemicals disposal, reducing waste materials, and increasing awareness about hazardous substances are some key steps. Creating awareness among public to ensure healthy environment at homes, schools, and communities by taking action at a local level, such as improving waste management and planting trees and similar drives are needed.

Controlling Industrial and vehicular emission, crop and garbage burning, Improving air quality monitoring, strengthening respiratory care services are some measures needed to be taken on emergency basis. Pakistan has developed policies like the National Climate Change Policy¹¹ to address issues of air pollution and climate change through adaptation and mitigation measures. But this requires commitment and significant investment. The investment in controlling air pollution is justified, as it will primarily affects the health of our more than 50 percent population and Pakistan's future.

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References

1. Lahore Air Quality Index (AQI) and Pakistan Air Pollution available at <http://www.IQair.com/punjab/Pakistani/Lahore> cited on 21/12/2025.
2. Respiratory infections rise in Karachi amid poor air quality - Pakistan. Available at <http://www.dawn.com/news> cited on 21 Dec 2025.
3. Patrick Boyle, Ozone: An unseen health threat makes a comeback with climate change (online). AAMC News dated Aug. 6, 2024 cited on 25/12/2025
4. Pakistan is the 5th most populous country in the world available at <https://english.aaj.tv/news/330370416/pakistan-5th-most-populous-country-in-the-world-says-report> cited on 28/12/25
5. UNICEF: Children face unique vulnerabilities to environmental hazards at every stage of life (online) available at <http://www.unicef.org/report/children-face-unique-vulnerability-environmental-hazards-every-stage-of-life>. Cited on 20/12/2025.
6. Naz, L., Ghimire, U. Assessing the prevalence trend of childhood pneumonia associated with indoor air pollution in Pakistan. *Environ Sci Pollut Res.*2020; 27: 44540–44551. <https://doi.org/10.1007/s11356-020-10346-6> assessed on 14.6.2026
7. Sathya S A , Ishaan S, Om P K .Air quality and respiratory health in children .National Institutes of Health 2023;19:230040. Doi: 10.1183/20734735.0040-2023) cited 28/11/2025
8. Bibi Z, Aziz DA, Bibi A, Sultan U, Wali SM, Soofi SB. Prevalence of uncontrolled childhood asthma and its association with parental knowledge in Karachi, Pakistan. *BMJ Paediatrics Open.* 2026;10:e004293. <https://doi.org/10.1136/bmjpo-2025-004293>
9. Jiyun Lee, Hyuna Jo, and Hyeong-Moo Shin. Environmental chemical exposures and attention-deficit/hyperactivity disorder in U.S. children and adolescents: A non-targeted exposomic and mixture-based analysis, *J Hazard Mater Adv.* 2025. Available at <https://doi.org/10.1016/j.hazadv.2025.100915>. cited on 14 October 2025, Version of Record 18 October 2025.
10. Bos B, Barratt B , Batalle D. Prenatal exposure to air pollution is associated with structural changes in the neonatal brain. *Environ Int.* 2023;174:107921. doi: 10.1016/j.envint.2023.107921. Epub 2023 Apr 9. PMID: 37058974; PMCID: PMC10410199.
11. National Climate Change Policy available at: <https://www.google.com/search?q=National+Climate+Change+Polic>) accessed on 25/12/25.