

Air Pollution: Challenges to Human Health in Pakistan

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According to the 2019 report of the Lancet Countdown on Health and Climate, air pollution which is mainly caused by fossil fuel burning is being exacerbated by the changing climate and it has had a serious impact on human health.¹ According to the 2023 World Air Quality Report published by IQAir, Pakistan is ranked the second most polluted country in the world.² Almost all Pakistanis live in areas where average levels of particulate air pollution far exceed the guidelines set by WHO.³

Pakistan's contribution to global warming is less than 1%, however, its impact on human health in the country is enormous. Global warming is the result of environmental pollution mainly caused by emission of greenhouse gases (GHGs) such as carbon dioxide, methane, nitrous oxide, ozone, and perfluorocarbons. According to the Global Climate Risk Index, Pakistan has been ranked the 5th most vulnerable country to climate change.⁴ This is further supported by unseasonal rains, melting of glaciers, frequent spells of heatwaves, and droughts as the mean temperature of the country has increased by 1.5 degree Celsius over the past 70 years.⁵

A recent report by the Energy Policy Institute at the University of Chicago indicated that air pollution decreased average life expectancy in Pakistan by 3.8 years, while in most polluted areas of the country, the decrease in life expectancy was 7 years.³ According to this report, pollution due to particulate matter in the air and smog appeared to be the major cause of increased mortality. A recent study has shown an association of high ambient temperature with increased prevalence of intimate partner violence against women in low and middle-income countries of South Asia including Pakistan.⁶ This shows that the behaviour of people is seriously affected by climate change and air pollution.⁶

Air pollution is a public health emergency in Pakistan. It has been estimated that over 128,000 deaths occur in Pakistan due to air pollution illnesses.⁷ Most of these deaths are due to particulate matter (PM 10 and PM 2.5) in the air. This particulate matter arises mainly from vehicle emissions, demolition work, power generation, and industrial activities such as the manufacturing of cement, textiles, marble, ceramics, etc.

Moreover, burning of crop residues, construction work, dust and sandstorms, and brick kilns further add to particle pollution. According to the world bank report, it is estimated that there are about 22,000 premature adult deaths in Pakistan annually due to air pollution.⁸

In 2019, it was observed that in Pakistan there was not a single day in the whole year when PM 2.5 concentration was not well above the WHO and National Quality Standards.⁸ In those areas of Pakistan where there are industrial states, the extent of particulate matter pollution was even higher. For example, a study by Asghar *et al.*, indicated that ambient air quality in Haripur city was at a high risk due to Hattar Industrial State.⁹ The effects of particulate matter pollution on human health are quite alarming. This pollution leads to respiratory disorders and cardiovascular problems, especially among the most vulnerable population such as children and elderly people. The very fine particulate matter (PM <0.1) is even more injurious as these particles can easily get into the bloodstream and transport to various organs of the body. There is plenty of evidence that the prevalence of chronic obstructive pulmonary disease (COPD) and asthma is very high in many areas of Pakistan.¹⁰

A study by Ghani *et al.*, reported that 18% of residents in Karachi suffered from chronic respiratory symptoms.¹¹ A systematic review and meta-analysis of studies on prevalence of COPD in eight South Asian countries revealed an estimated prevalence of COPD and chronic bronchitis to be 3.6% in Pakistan.¹²

There is an evidence to suggest that there is a close relationship between air pollution and cancer. Due to the absence of a population-based cancer registry in Pakistan, reliable data about the incidence and prevalence of lung cancer are not precisely known. However, the data from Karachi Cancer Registry and Punjab Cancer Registry provide some information. It is estimated that 5% of all new cancer cases belong to lung cancer and it has been rated as the second most common cancer in men and third most common cancer in both genders combined in Pakistan.¹³ During smog in the winter season and high density of pollens and allergens in spring, the incidence of hay fever, allergies, rhinitis, and eye diseases is remarkably increased.^{14,15}

The above-mentioned lines of evidence highlight the major illeffects of air pollution in Pakistan. However, the most intriguing question is "How to avoid and minimise exposure to these pollutants, especially fine particulate matter?". This is of extreme importance for public health at large. In a long-term (1974-2009) study in USA, it was estimated that if the annual level of particulate matter pollution could be reduced by 1 $\mu\text{g}/\text{m}^3$, then nearly 34,000 premature deaths could be avoided.¹⁶ This shows that immediate steps would be needed to cut down the particulate matter pollution in developing countries such as Pakistan. The challenging part is that

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most people living in developing countries are unaware of the hazards of particulate pollution.

Various steps are needed to protect the population of Pakistan from the harmful effects of air pollution. Awareness should be created among the masses about the devastating effects of particulate matter pollution. Campaigns should be initiated to reduce the exposure such as wearing masks and reducing outdoor activity during periods of high pollution. Air quality monitors, especially those of PM 10 and PM 2.5, should be installed in every major city, so that proper measures can be adopted to minimise the exposure. There should be strict implementation of the laws pertaining to emissions from vehicles and factories and the burning of stubbles after the harvest. The risk of wildfires should be reduced by the efficient management of forests in the country. Use of renewable energy resources such as solar energy, wind energy, hydropower, and electrical energy should be promoted to reduce the reliance on fossil fuels. Seminars should be conducted at academic institutions and other forums to spread more awareness among the students so that some of them could embark on research projects for easy adaptation of alternate energy and development of mitigation strategies. Policymakers and major stakeholders should be invited to these seminars for better allocation of resources to make Pakistan green. It is also to be impressed upon the government to create green spaces within the country to reduce air pollution and make Pakistan clean and green. In congested mega-cities, with limited green spaces, rooftop plantations of buildings should be encouraged to reduce air pollution. Research has shown that at least 9 m² of green space should be available to everyone.¹⁷ It is incumbent upon all stakeholders to rise to the occasion and provide the people of Pakistan with clean, green, and healthy environment.

Due to climate change, environmental pollution, especially air pollution is increasing in Pakistan. Among the air pollution, particulate matter pollution is the most injurious to human health. Decreased life expectancy and increased violent behaviour of people appear to be some of the consequences of very high air pollution in cities of Pakistan. The promotion of renewable energy to decrease reliance on fossil fuels and the creation of more green spaces are urgently needed in the country for better physical and mental health of future generations in Pakistan.

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