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Can PM_{2.5} pollution worsen the death rate due to COVID-19 in India and Pakistan?



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There is growing evidence of a positive correlation between PM_{2.5} pollution and COVID-19, suggesting that mitigation of PM_{2.5} will be a decisive step towards easing out the lockdown over India and Pakistan. PM_{2.5} is a bothering factor for both countries experiencing the worst air pollution in the world. According to the [World Air Quality Report \(2018\)](#), 22 cities in India and two cities in Pakistan are among the world's top 30 most polluted cities ([IQAir AirVisual, 2018](#)). Recently, it has been estimated that 645,000 premature deaths in India, and 111,000 in Pakistan, are recorded every year ([Lelieveld et al., 2015](#)). The direct cost of environmental damages associated with the regional air pollution exceeds US\$ 0.5 trillion in India and US\$ 1.07 billion in Pakistan ([Sanchez-Triana et al., 2014](#); [OECD, 2014](#)).

The World Health Organization (WHO) has notified that persons of any age group, who suffer from severe underlying medical conditions, are at a higher risk of getting critically sick from COVID-19. Certain pre-conditions, including lung cancer, and the respiratory or cardiovascular disorders are triggered by air pollution, and the residents of the region with high levels of PM_{2.5} before the Corona pandemic are more vulnerable to the infection in comparison to patients in cleaner parts of the world, reports WHO. Persons suffering from cardiovascular and chronic respiratory diseases like asthma and those immunocompromised due to conditions like smoking or cancer, etc., are more susceptible to Corona virus infection ([WHO, 2020](#)). A research conducted by [Cui et al. \(2003\)](#) during the SARS (Severe Acute Respiratory Syndrome) epidemic in China highlighted that SARS, caused by a virus genetically identical to COVID-19, caused high mortality in areas with deteriorated air quality. In a recent study in China, a substantial relationship has been found between PM_{2.5} and COVID-19 infection, which was reported across 120 cities ([Zhu and Xie, 2020](#)). It was noted that a 10 µg m⁻³ increase in pollution concentration led to a statistically significant increase in daily counts of the confirmed symptomatic Corona-positive cases. [Wu et al. \(2020\)](#) at the Harvard University T.H. Chan School of Public Health have suggested that an increase of just 1 µg m⁻³ of PM_{2.5} corresponds to a 15% increase in COVID-19 deaths. Another study that establishes the relationship of higher COVID-19 mortality and morbidity to PM_{2.5} in northern Italy provides a piece of sharp evidence that persons living in an area with high levels of PM_{2.5} are more susceptible to developing respiratory diseases, which facilitate the impact of any infectious agent, especially in children and unhealthy population ([Mehmood et al., 2020](#); [Conticini et al., 2020](#)).

Recently, transboundary air pollution in this region has resulted in an exceptionally high PM_{2.5} concentration of 1000 µg m⁻³ in Lahore ([Malik, 2017](#)) and 700 µg m⁻³ in New Delhi ([Anand, 2016](#)). These levels are 40 and 28 times higher, respectively than the average daily PM_{2.5}

level of 25 µg m⁻³, as established by the World Health Organization (WHO). After May 2020, the Pakistan and Indian governments have started to ease the lockdown restrictions, which were imposed to curtail the COVID-19 pandemic. They are trying to resume normal life in the larger more substantial interest of both the nations already perturbed with their crumbling economies. Industrial productions, public transport as well as construction sites have already resumed their operation in most of the Pakistani provinces and Indian states with implementation of social distancing and personal hygiene practices. According to the WHO official COVID-19 data, India is now the 4th worst affected country by COVID-19 with more than 395,048 infected cases and 12,948 deaths till June 20. In comparison, Pakistan has so far recorded over 171,666 cases of infection with 3382 deaths.

There is a reason for the hope that the two governments can find common ground and resolve together to reduce PM_{2.5} pollution to improve the health condition of their citizens on both sides of the border. We suggest that multi-pronged efforts be urgently initiated in both the countries to avoid the worse disaster of the current pandemic in the days to follow.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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