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RAMPANT AIR POLLUTION IN NORTHERN INDIA AND ITS IMPLICATION ON HUMAN HEALTH

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North India is one of the most polluted parts of the world. Major Indian cities lie in this region comes under severe pollutant category. Major culprits of pollutions are incomplete combustion of various fossil fuels, they play a significant role in the poor air quality and associated major health risks in the region.

National capital Delhi one of the worst air polluted capitals in the world where millions of vehicles plying daily on the road. These vehicles contribute significantly in air pollution they discharge various toxic chemicals viz carbon mono oxide which is odourless & colourless gas harmful if inhaled large in quantity mainly cardio toxic and hypoxia to brain tissues. Other major pollutant is oxides of nitrogen yellow in colour pungent and foul-smelling gas mainly responsible for smog & acid rain. It mainly emits after burning of fossil fuels. It mainly affects respiratory organs and aggravates asthmatic patient.

Outside Delhi, national capital region (NCR) is badly affected emissions from agricultural burning and secondary organic aerosols formed from these emissions are more prevalent. Contributing to the problem is the incomplete burning of fuels like wood, dung cake, coal, and petrol. This creates harmful particles that can damage our lungs and cause various health problems. India is a vast country, and its northern part is densely populated. North India just lies immediate to south of the Great Himalayan range. In this region many vast rivers flow that blessed alluvial fertile soil to north India. Alluvial soil weak in texture and easily blow on the road side when it comes to contact of heavy traffics that also contribute major air pollution.

Other major cities around Delhi are also badly affected by air pollution Faridabad one of the worst affected it lies on the foot hills of Aravali Mountain, Gurugram, Noida & Ghaziabad also badly affected. Half of the children under 15 years severely affected by asthma and their lungs badly affected.[1]

New Delhi air quality is 10 times unhealthier as compare to London. Chinese capital Beijing severely affected by air pollution few years back but now they tremendously controlled air pollution. Gwalior another major city of north India one of the most polluted in the world.

In winter months situations aggravates because farmers of Haryana & Punjab burn stubble of the crop in the month of October and north westerly wind further worsen air pollution in these regions. The persons who do not smoke cigarette, if resides in Delhi and surrounding regions as badly affected that he might consume 45 to 50 cigarettes in a day due to high air pollution.[2]

Air pollution can reduce the life expectancy of Indians by nine years

The study says 480 million people in northern India face the most extreme levels of air pollution, and over time, these high levels have expanded to cover other parts of India.

Strong clean air policies can increase life span up to five years to people's lives.

Indian cities routinely dominate global pollution rankings and bad air kills more than a million people every year. This air pollution has spread over decades beyond the region to western and central Indian states such as Maharashtra, and Madhya Pradesh where the average person is now losing between two and a half-to-three years of life expectancy as compared to early 2000.One study shows that some cities of Maharashtra are highly air polluted.

New data from the Air Quality Life Index report by EPIC says that residents in the capital, Delhi, could see up to 10 years added to their lives if air pollution was reduced to meet the World Health Organisation (WHO) guideline.[3]

The report says that Bangladesh, India, Nepal and Pakistan, which together account for nearly a quarter of the global population, consistently figure in the top five most polluted countries on earth.

Achieving these goals would have a major impact on the life expectancy levels of Indians - it would increase the national life expectancy level by nearly two years, and three-and-a-half years for residents of Delhi. One study inferred that air quality 10 to 12 times worse than some top European countries.[4]

Human activities have an adverse effect on the environment by polluting the water we drink, the air we breathe, and the soil in which plants grow. Although the industrial revolution was a great success in terms of technology, society, and the provision of multiple services, it also introduced the production of huge quantities of pollutants emitted into the air that are harmful to human health. Without any doubt, the global environmental pollution is considered an international public health hazard with multiple facets. Social, economic, and legislative concerns and lifestyle habits are related to this major problem. Clearly, urbanization and industrialization are reaching unprecedented pace and upsetting proportions worldwide in our era. Anthropogenic air pollution is one of the biggest public health hazards worldwide, given that it accounts for about 9 million deaths per year.[5]

New Delhi is one of the most polluted capitals in the world. Flights in and out of New Delhi International Airport are often cancelled due to the reduced visibility associated with air pollution. Pollution is occurring both in urban and rural areas in India due to the fast industrialization, urbanization, and rise in use of motorcycle and other heavy vehicles. Nevertheless, biomass combustion associated with heating and cooking needs and practices is a major source of household air pollution in India. There is spatial heterogeneity in India, as areas with diverse climatological condition, population and education levels generate different indoor air qualities, with higher $PM_{2.5}$ observed in North Indian states (557–601 $\mu g/m^3$) compared to the Southern States (183–214 $\mu g/m^3$). The cold climate of the North Indian areas may be the main reason for this, as longer periods at home and more heating are necessary compared to in the tropical climate of Southern India.[6]

Major effects of air pollution on human health

Household air pollution in India is associated with major health effects, especially in women and young children, who stay indoors for longer periods, Chronic obstructive pulmany disease (COPD) and lung cancer are mostly observed in women, while acute lower respiratory disease is seen in young children under 5 years of age.

Short-term effects are temporary and range from simple discomfort, such as irritation of the eyes, nose, skin, throat, wheezing, coughing and chest tightness, and breathing difficulties, to more serious states, such as asthma, pneumonia, bronchitis, and lung and other cardio vascular diseases and even stroke. Short-term exposure to air pollution can also cause headaches, nausea, and dizziness.

These problems can be aggravated by extended long-term exposure to the pollutants, which is harmful to the neurological, reproductive, and respiratory systems and causes cancer.

The long-term effects are chronic, lasting for years or the whole life and can even lead to death. Furthermore, the toxicity of several air pollutants may also induce a variety of cancers in the long term.

Multiple cardiovascular effects have been observed after exposure to air pollutants. Changes occurred in blood cells after long-term exposure may affect cardiac functionality. Coronary arteriosclerosis was reported following long-term exposure to traffic emissions, while short-term exposure is related to hypertension, stroke, myocardial infraction, and heart insufficiency. Ventricle hypertrophy is reported to occur in humans after long-time exposure to nitrogen oxide (NO_2).

The cornea is the most sensitive structure in the human body due to numerous innervations in the ocular surface and thus is extremely sensitive to environmental agents. The eyes defend against potentially harmful external material with only a thin layer of precorneal tear film, as a result, human eyes are susceptible to the adverse effects of air pollution. Conjunctivitis, Cataract, glaucoma and macular degeneration also associated with air pollution.

Mitigation strategies for emission control in India

In India, the central and state governments have taken several steps to control air pollution and improve the ambient air quality. Various initiatives, such as the use of compressed natural gas (CNG) as an alternative fuel, the odd-even measures implemented in Delhi, the introduction of Bharat Stage VI vehicle and fuel standards, the Pradhan Mantri Ujjwala Yojana (PMUY), and the National Clean Air Programme.

The increase in private vehicles is the prime contributor of air pollution in Indian cities. Therefore, there should be some policy norms that would set a certain limit to private vehicle ownership. Second, the age of vehicles degrades the air quality and such ageing vehicles

should be phased out over a period of 10 years or so. Threshold limits should be imposed on emissions from all sources, primarily vehicles and industries, and the violators should be penalised.

Irresponsible human behaviour is also a major cause of air pollution in India. Need of hour is to educate to people and teach them what is the importance of clean air, encourage masses for plantation of trees, even house gardening should be encouraged. Stuble burning is serious problems in northern India Government & other NGOs should take necessary steps and compensate farmers. Fire crackers is also a health risk that should be discouraged and educate people about its harmful effects on human health.

Government & municipal corporation should take steps for proper disposing of garbage both wet & dry. Install fountains all around cities and plantation & forestation near cities that will certainly improve ambient air quality.

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