

Inhalable Microplastics: A Rising Urban Air Pollutant with Health Risks in Indian Cities

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Inhalable microplastics (iMPs), a specific type of airborne microplastics (AMPs), are emerging pollutants in urban areas that pose significant health risks. Despite their widespread presence, the mass-based quantification of iMPs in densely populated outdoor aerial environments and the associated secondary risks are not well understood. This study investigates iMP concentrations in four major Indian agglomerations (cumulatively with more than 80 million inhabitants), revealing the highest levels in Delhi, Mumbai, Kolkata, and Chennai, measured at human breathing height (~1.5 m). AMPs concentrations tend to increase during winter and evenings, influenced by factors such as crowding, synthetic clothing, inadequate waste management, and dense air.

Using advanced Pyrolysis Gas Chromatography-Mass Spectrometry, over ten plastic polymers were identified, with polyethylene terephthalate being the most prevalent, might be from the textiles, dominated the samples. iMPs can transport (long range: HYSPLIT Trajectory Model) fine and ultrafine particulate matter (PM), toxic organic compounds, and microbes. Elevated PM levels may reduce life expectancy by many years, and the average lead (Pb) concentration further deteriorates urban air quality.

Principal Component Analysis indicated that iMP levels correlate with population density, AMPs, PM₁₀, and wind speed. The study also addresses pollutants associated with iMPs, such as PM_{2.5}, diethyl phthalate, and Pb, while highlighting the presence of modern pollutants in urban air, including persistent organic pollutants, pharmaceuticals and personal care products, and artificial fragrances. These findings stresses the urgent need for improved waste management, better clothing practices.