Press release

More than 90% of epidemiological studies in India report adverse health associations with air pollution

New Delhi, 13 November 2026 – India has a substantial body of indigenous scientific evidence on the health impacts of air pollution, with 169 of 184 epidemiological studies reporting increased health risks associated with exposure.

A systematic literature review by the Centre for Research on Energy and Clean Air (CREA), covering peer-reviewed studies published between 1975 and 2025, followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to assess the evidence from Indian populations. The review examines the health outcomes studied, the pollutants and exposure settings investigated, and the geographical distribution of research across India.

Importantly, this evidence includes research supported by government institutions. Of the 46 government-funded studies, 44 reported increased health risks, while 77 of the 81 studies with government institutional affiliations reported adverse health associations.

The institutions involved include the Ministry of Environment, Forest and Climate Change (MoEFCC), Ministry of Health and Family Welfare (MoHFW), Indian Council of Medical Research (ICMR), Central Pollution Control Board (CPCB), All India Institute of Medical Sciences (AIIMS), Department of Science and Technology (DST), University Grants Commission (UGC), and Council of Scientific and Industrial Research (CSIR).

Among the health outcomes examined, respiratory diseases were the most frequently studied (86 studies), followed by mortality (16) and cardiovascular diseases (11). Other studies examined diabetes, pregnancy-related complications, low birth weight and impaired child growth, neoplasms, haematological disorders, neurocognitive and mental health disorders, metabolic disorders, sleep disorders, ocular diseases, chronic kidney and bone diseases, and morbidity.

The evidence extends across India, with Delhi accounting for the highest number of studies (26), followed by Punjab (13), Maharashtra (11), Uttar Pradesh (11), West Bengal (10), Tamil Nadu (9), Karnataka (8), Telangana (7) and three each in Haryana and Rajasthan. Two studies were conducted in Madhya Pradesh, and one each in Assam, Odisha, Ladakh, Gujarat, Chandigarh, Kerala, and Mizoram. The remaining studies either covered all of

India or a combination of a few states.

The studies examined multiple exposure settings, including ambient (outdoor), household (cooking, heating, and lighting fuels), indoor (smoking-related exposure and environments such as homes, schools and offices), and occupational (workplace) air pollution.

Notably, 40 studies examined rural populations, of which 38 reported at least one adverse health association, indicating that air pollution's health impacts are not confined to urban areas.

'The findings highlight the need to move beyond a city-centric approach and explicitly include rural areas through a regional, airshed-based approach in the next phase of National Clean Air Programme (NCAP 2.0),' said Manoj Kumar, Analyst at CREA.

Studies examined a range of air pollutants, with 45 investigating both particulate matter and gaseous pollutants. $PM_{2.5}$ was examined in 32 studies, PM_{10} alone in four, and both PM_{10} and $PM_{2.5}$ in 16. Other studies investigated combinations of $PM_{2.5}$ with black carbon and carbon monoxide, while seven examined gaseous pollutants such as nitrogen oxides (NO_x), sulphur oxides (SO_x), ozone (O_3) and carbon monoxide (CO) alone, and three focused on heavy metals.

Among studies examining gaseous pollutants, statistically significant adverse health associations were reported for increased mortality, acute respiratory hospital and emergency visits, asthma-related hospital admissions, and impaired lung function. Beyond their direct health effects, gaseous pollutants such as SO_x and NO_x also contribute to secondary $PM_{2.5}$ formation by undergoing atmospheric chemical reactions to form sulphate and nitrate particles, respectively. Together, these particles account for approximately one-fourth of India's $PM_{2.5}$ concentrations.

'Air pollution mitigation must adopt a multipollutant approach, addressing gaseous precursors that contribute to secondary $PM_{2.5}$ and ground-level ozone formation. This requires emission reductions at major sources, including industries, power plants, residential cooking, and other combustion activities. The long-overdue revision of NCAP should incorporate $PM_{2.5}$-specific targets along with the revision of National Ambient Air Quality Standards,' Manoj Kumar added.

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About CREA

The Centre for Research on Energy and Clean Air (CREA) is an independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions, to air pollution. CREA was founded in December 2019 in Helsinki and has staff in several Asian and European countries. The organisation's work is funded through philanthropic grants and revenue from commissioned research.

www.energyandcleanair.org.