

Comprehensive estimates of disease burden attributable to air pollution and its economic impact in every state of India in 2019

- 1.7 million deaths in India were attributable to air pollution in 2019, which was 18% of the total deaths in the country.
- Household air pollution is decreasing in India resulting in 64% reduction in the death rate attributable to it from 1990 to 2019, whereas the death rate from outdoor ambient air pollution has increased during this period by 115%.
- The economic loss due to lost output from premature deaths and morbidity from air pollution was 1.4% of the GDP in India in 2019, equivalent to INR 260,000 crores (US\$ 36.8 billion).
- The economic loss due to air pollution as a percentage of the state GDP was higher in the northern and central India states, with the highest in Uttar Pradesh (2.2% of GDP) and Bihar (2% of GDP).
- India would benefit from investing further in state-specific air pollution control strategies, as this will facilitate its aspiration of reaching a US\$5 trillion economy by 2024.

New Delhi, 22 December 2020 – The Prime Minister of India has just announced in the Global Climate Ambition Summit that India is making good progress towards increasing renewable energy and reducing polluting emissions. In this encouraging background, the **India State-Level Disease Burden Initiative** has published today a scientific paper on the health and economic impact of air pollution in *Lancet Planetary Health*, which documents the trends in health loss due to air pollution and its economic impact in every state of India using the latest improved methods and data. The findings in this paper highlight that the disease burden due to household air pollution is reducing in India but that due to ambient outdoor air pollution has increased, and that lost output from deaths and disease due to air pollution is leading to a loss of 1.4% of the GDP of the country. India has a good economic and development trajectory, which can improve further with the reduction of air pollution. The findings for each state in India in this paper show wide variations in the impact of air pollution, with the percentage of per capita GDP loss among the highest in the relatively less developed states of the country. The analysis reported in this paper suggests that air pollution control strategies titrated to the conditions and context of each state will facilitate India's intent of reducing air pollution, which will substantially benefit both the health of the population as well as the economy across the country.

Prof Vinod Paul, Hon'ble Member NITI Aayog said on the release of the findings, "This scientific paper presents the latest evidence on air pollution in India, translating the health loss to economic impact. The findings show that the economic loss due to lost productivity from deaths and morbidity due to air pollution in India is 1.4% of the GDP which amounts to 260,000 crore India Rupees. India has many ongoing major initiatives to reduce air pollution. This paper provides a robust assessment of the trends and current situation in each state, and highlights that augmenting the existing air pollution control efforts based on the specific situation of each state would be useful. Air pollution and its impact is not a matter for the health sector alone, and the solutions lie in a multi-sectoral approach with a common commitment to reducing exposure to toxic air, which is impacting the health and productivity of Indians."

Prof Balram Bhargava, Secretary to the Government of India, Department of Health Research, Ministry of Health & Family Welfare, and Director General, ICMR said “Various government schemes such as the Pradhan Mantri Ujjwala Yojana and the Unnat Chulha Abhiyan have aided in reducing household air pollution in India, the benefits of which are suggested in the reducing death rate from it as seen in this paper. Such success encourages us to enhance efforts to reduce outdoor air pollution as well.” He added “The findings in this analysis show that while 40% of the disease burden due to air pollution is from lung diseases, the remaining 60% is from ischemic heart disease, stroke, diabetes, and neonatal deaths related to preterm birth, highlighting the broad ranging impact of air pollution on human health.”

Prof Lalit Dandona, Director of the India State-Level Disease Burden Initiative, who is National Chair of Population Health at ICMR, Professor at PHFI, and senior author of this paper said, “Improved methods in this paper have led to a higher estimate of the impact of air pollution on health and disease in India than previously estimated. The economic impact of this health loss due to lost productivity is huge at 1.4% of the country’s GDP in 2019, besides a roughly estimated expenditure of 0.4% of the GDP on treatment of air pollution related diseases. The health and economic impact of air pollution is highest in the less developed states of India, an inequity that should be addressed.” He added “India has many initiatives to reduce air pollution, which can benefit further from the state-specific insights provided in this paper. Investing further in air pollution control will more than return that investment in terms of better health and economic development in India”.

Dr Pushpam Kumar, Chief Environmental Economist, United Nations Environment Programme, who was behind the conceptualization of the economic analysis in this study said “These estimates of economic loss (benefits of avoidance) as a result of air pollution across different states of India provide extremely useful insights to central and state level decision makers who would find that the investment in pollution control not only yield attractive return in terms of prevention of loss of life but achieving Sustainable Development Goals (SDGs) of good health, sustainable cities, climate action, social justice and inclusive economic growth besides others. This land mark study would help the government and private sector for channeling resources for pollution control in the country and therefore ensuring the sustainable and inclusive future for India and the world.”

Prof Christopher Murray, Director of the Institute for Health Metrics and Evaluation at the University of Washington’s School of Medicine said “This paper underscores the severe effects of air pollution on the lives and livelihoods of the more than one billion people of India. With the finding that air pollution in 2019 contributed to 18 percent of the total deaths in India, it is imperative that policy makers at the local and national levels take decisive steps to address this serious threat to public health.”

The findings reported in the paper published today are part of the Global Burden of Disease Study 2019. The analytical methods of this study have been refined over a quarter century of scientific work, which has been reported in over 16,000 peer-reviewed publications, making it the most widely used approach globally for disease burden estimation. These methods enable standardized comparisons of health loss caused by different diseases and risk factors, between different geographies, sexes, and age groups, and over time in a unified framework.

The paper published in *The Lancet Planetary Health* today:

India State-Level Disease Burden Initiative Air Pollution Collaborators. Health and economic impact of air pollution in the states of India: the Global Burden of Disease Study 2019. *Lancet Planetary Health*. 22 December 2020.

[http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(20\)30298-9/fulltext](http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30298-9/fulltext)

The following can be contacted for discussion on the findings in this paper and their implications for India:

Prof Balram Bhargava, Indian Council of Medical Research, New Delhi
secy-dg@icmr.gov.in, +91-11-26588204

Prof Randeep Guleria, All India Institute of Medical Sciences, New Delhi
director.aiims@gmail.com, +91-9810184738

Prof Kalpana Balakrishnan, Department of Environmental Health Engineering, Sri Ramachandra University, Chennai
kalpanasrmc@ehe.org.in, +91-9841020289

Prof Sagnik Dey, Centre for Atmospheric Sciences, Indian Institute of Technology Delhi, New Delhi
sagnik@cas.iitd.ac.in, +91-9873544872

Prof Gufran Beig, Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Government of India, Pune
beig@tropmet.res.in, +91-20-25904261

Prof Tarun Gupta, Department of Civil Engineering, Indian Institute of Technology Kanpur, Kanpur
tarun@iitk.ac.in, +91-512-2596447

Dr Pushpam Kumar, Chief Environmental Economist, United Nations Environment Programme, Nairobi, Kenya
pushpam.kumar@un.org, +254-728608537

Prof Lalit Dandona, Indian Council of Medical Research, New Delhi; Public Health Foundation of India, Gurugram
lalit.dandona@icmr.gov.in, lalit.dandona@phfi.org, +91-9971188236

Major Air Pollution Control Initiatives in India

- National Programme on Climate Change and Human Health
- National Clean Air Programme
- National Air Quality Monitoring Programme
- Pradhan Mantri Ujjwala Yojana
- Unnat Chulha Abhiyan
- The Air (Prevention and Control of Pollution) Act 1981, amended 1987
- 100 Smart Cities Mission
- Environment Pollution (Prevention and Control) Authority (EPCA)
- Green Good Deeds Initiative (National Green Corps programme)
- Doctors for Clean Air
- Construction & Demolition Waste Management Rules, 2016
- Sameer App
- Graded Response Action Plan (GRAP) - Delhi and surrounds
- SATAT Initiative
- National Biofuel Policy
- Promotion of agricultural mechanization for in-situ management of crop residue in the state of Punjab, Haryana, Uttar Pradesh & NCR of Delhi
- Green fire crackers
- Upgrading BS IV to BS VI
- National Electric Mobility Mission Plan 2020
- National E-Mobility Programme

About the India State-Level Disease Burden Initiative

The India State-Level Disease Burden Initiative was launched in 2015 as a collaborative effort between the Indian Council of Medical Research, Public Health Foundation of India, Institute for Health Metrics and Evaluation, and a number of other key stakeholders in India, including academic experts and institutions, government agencies and other organizations, under the aegis of the Ministry of Health & Family Welfare. Over 300 leading scientists and experts representing about 100 institutions across India are engaged with this collaborative work.

The first set of findings by the India State-Level Disease Burden Initiative on the variations in epidemiological transition across the states of India were presented in a *Report* released by the Vice-President and Health Minister of India and in a scientific paper published in *The Lancet* in November 2017:

- Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation. India: Health of the Nation's States — The India State-Level Disease Burden Initiative. New Delhi: ICMR, PHFI, and IHME, 2017.
https://main.icmr.nic.in/sites/default/files/reports/2017_India_State_Level_Disease_Burden_Initiative_Full_Report.pdf
- India State-Level Disease Burden Initiative Collaborators. Nations within a nation: variations in epidemiological transition across the states of India, 1990-2016 in the Global Burden of Disease Study. *Lancet* 2017; 390: 2437-2460. PMID: 29150201.
[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)32804-0/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)32804-0/fulltext)

These findings have received high-level policy attention, including reference to these state-level findings in the Economic Survey of India released in early 2018, which is considered one of the most important policy planning instruments in India. In 2019, the findings from this Initiative were utilised in a major government policy report for the Economic Advisory Council to the Prime Minister. Over the past three years, the following peer-reviewed open access papers and a commentary have been published in the Lancet journals describing trends of diseases and risk factors in the states of India.

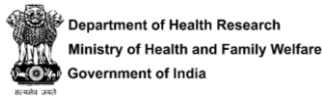
- India State-Level Disease Burden Initiative CVD Collaborators. The changing patterns of cardiovascular diseases and their risk factors in the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Global Health* 2018; 6: e1339-e1351. PMID: 30219317.
[https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(18\)30407-8/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30407-8/fulltext)
- India State-Level Disease Burden Initiative Diabetes Collaborators. The increasing burden of diabetes and variations among the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Global Health* 2018; 6: e1352-e1362. PMID: 30219315.
[https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(18\)30387-5/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30387-5/fulltext)
- India State-Level Disease Burden Initiative CRD Collaborators. The burden of chronic respiratory diseases and their heterogeneity across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Global Health* 2018; 6: e1363-e1374. PMID: 30219316.
[https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(18\)30409-1/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30409-1/fulltext)
- India State-Level Disease Burden Initiative Cancer Collaborators. The burden of cancers and their variations across the states of India: the Global Burden of Disease Study 1990–2016. *Lancet Oncology* 2018; 19: 1289-1306. PMID: 30219626.
[https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(18\)30447-9/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(18)30447-9/fulltext)
- India State-Level Disease Burden Initiative Suicide Collaborators. Gender differentials and state variations in suicide deaths in India: the Global Burden of Disease Study 1990–2016. *Lancet Public*

Health 2018; 3: e478-e489. PMID: 30219340.

[https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(18\)30138-5/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(18)30138-5/fulltext)

- Bhargava B, Paul VK. Informing NCD control efforts in India on the eve of Ayushman Bharat. *Lancet* 2018.
[https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32172-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32172-X/fulltext)
- India State-Level Disease Burden Initiative Air Pollution Collaborators. The impact of air pollution on deaths, disease burden, and life expectancy across the states of India: the Global Burden of Disease Study 2017. *Lancet Planetary Health* 2019; 3: e26-e39. PMID: 30528905.
[https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(18\)30261-4/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(18)30261-4/fulltext)
- India State-Level Disease Burden Initiative Malnutrition Collaborators. The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990-2017. *Lancet Child & Adolescent Health* 2019; 3: 855-870. PMID: 31542357.
[https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642\(19\)30273-1/fulltext](https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642(19)30273-1/fulltext)
- India State-Level Disease Burden Initiative Mental Disorders Collaborators. The burden of mental disorders across the states of India: the Global Burden of Disease Study 1990-2017. *Lancet Psychiatry* 2020; 7: 148-161. PMID: 31879245.
[https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(19\)30475-4/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(19)30475-4/fulltext)
- India State-Level Disease Burden Initiative Road Injury Collaborators. Mortality due to road injuries in the states of India: the Global Burden of Disease Study 1990-2017. *Lancet Public Health* 2020; 5: e86-e98. PMID: 31879251
[https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667\(19\)30246-4/fulltext](https://www.thelancet.com/journals/lanpub/article/PIIS2468-2667(19)30246-4/fulltext)
- India State-Level Disease Burden Initiative Child Mortality Collaborators. Subnational mapping of under-5 and neonatal mortality trends in India: the Global Burden of Disease Study 2000–2017. *Lancet* 2020; 395: 1640–58. PMID: 32413293.
[http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(20\)30471-2/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30471-2/fulltext)
- India State-Level Disease Burden Initiative CGF Collaborators. Mapping of variations in child stunting, wasting and underweight within the states of India: the Global Burden of Disease Study 2000-2017. *EClinicalMedicine* 2020; 22: 100317. PMID: 32510044.
[https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370\(20\)30061-4/fulltext](https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(20)30061-4/fulltext)

The India State-Level Disease Burden Initiative plans to continue providing comprehensive findings and projections to better inform health policy formulation and health system development across India.



The Indian Council of Medical Research (ICMR), is the apex government body in India for the formulation, coordination and promotion of biomedical and health research. It is one of the oldest medical research bodies in the world. Besides the headquarters in New Delhi, ICMR has 26 research institutes, centres and units across India. ICMR funds both intramural and extramural research in India. The priorities of ICMR coincide with the national health priorities and have the goal of reducing the total burden of disease and to promote health and well-being of India's population. As part of this agenda, ICMR is interested in improving the estimates of disease burden and risk factors in India, especially at the sub-national levels, for better health planning, policy framing and fund allocation. <http://www.icmr.nic.in>

The Public Health Foundation of India (PHFI) is a premier public health institution in India with presence across the country. It collaborates with multiple constituencies including Indian and international academia, state and central governments, multi- and bi-lateral agencies, and civil society groups. The vision of PHFI is to strengthen India's public health institutional and systems capability and provide knowledge to achieve better health outcomes for all through strengthening training, research and policy development in public health. As part of this vision, PHFI has major interest in improving the robustness of sub-national disease burden estimates to inform health action and in evaluating the impact of large-scale population health interventions. www.phfi.org

The Institute for Health Metrics and Evaluation (IHME) is a global research institute at the University of Washington in Seattle that provides independent, rigorous, and comparable measurement of the world's most important health problems and evaluates the strategies used to address them. IHME aims to identify the best strategies to build a healthier world by measuring health, tracking program performance, finding ways to maximize health system impact and developing innovative measurement systems to provide a foundation for informed decision-making that will ultimately allocate resources to best improve population health. www.healthdata.org

For more information, please contact:

Indian Council of Medical Research

Dr Lokesh Sharma
Scientist E & Media Coordinator
sharma.lk@icmr.gov.in
Mobile: +91-7567311014

Public Health Foundation of India

Ms Gina Sharma
gina.sharma@phfi.org
Mobile: +91-9811887088