

First comprehensive estimates of the impact of air pollution on deaths, health loss, and life expectancy reduction in each state of India

- One out of every eight deaths in India is attributable to air pollution; over half of the 12.4 lakh deaths in India attributable to air pollution in 2017 were in persons younger than 70 years.
- The average life expectancy in India would have been 1.7 years higher if the air pollution level were less than the minimal level causing health loss.
- Air pollution now contributes to more disease burden in India than tobacco use, primarily through causing lower respiratory infections, chronic obstructive lung disease, heart attacks, stroke, diabetes, and lung cancer.
- 77% of India's population is exposed to outdoor air pollution levels above the National Ambient Air Quality Standards safe limit, with the northern states having particularly high levels.
- Exposure to household air pollution due to solid fuel use for cooking is decreasing in India with the increasing provision of clean cooking fuel; this effort needs to be sustained to address the still high levels of this exposure in several less developed states.
- Systematic efforts are necessary to address the multiple sources of air pollution in India: transport vehicles, construction activity, industry and thermal power emissions, residential and commercial solid fuel use, waste and agriculture burning, diesel generators, and manual road dust sweeping.

New Delhi, 6 December 2018 – The first comprehensive estimates of deaths, disease burden, and life expectancy reduction associated with air pollution in each state of India published by the **India State-Level Disease Burden Initiative** today report that India with 18% of the global population has a disproportionately high 26% of the global premature deaths and disease burden due to air pollution. The India State-Level Disease Burden Initiative is a joint initiative of the Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI), and Institute for Health Metrics and Evaluation (IHME) in collaboration with the Ministry of Health and Family Welfare, Government of India, along with experts and stakeholders associated with over 100 Indian institutions. These research findings published in *The Lancet Planetary Health* were released today at ICMR.

On the release of these findings, **Prof. Balram Bhargava**, Secretary to the Government of India, Department of Health Research, Ministry of Health & Family Welfare, and Director General, ICMR, said "It is important to have robust estimates of the health impact of air pollution in every state of India in order to have a reference for improving the situation. Household air pollution is reducing in India, facilitated by the Pradhan Mantri Ujjawla Yojana. There is increasing political momentum in India to address air pollution. The findings reported today systematically document the variations among states, which would serve as a useful guide for making further progress in reducing the adverse impact of air pollution in the country."

Highlighting the need for collaboration in addressing air pollution, **Dr. S. Venkatesh**, Director General of Health Services, Ministry of Health and Family Welfare, Government of India, said, "The National Health Policy 2017 has listed exposure to air pollution as a significant risk factor, and calls for convergence between sectors to reduce the growing burden of chronic diseases in the country that

are often related to air pollution. We are undertaking a number of initiatives for experts to convene in order to develop strategies that would increase awareness among communities on what each one of us could do to reduce the adverse impact of air pollution on health, which would benefit from the state-specific findings reported by this study.”

“The massive adverse impact of air pollution on health is being increasingly better recognized,” said **Prof. Randeep Guleria**, Director, All India Institute of Medical Sciences. He added, “The upsurge in respiratory problems in the winter months with peak air pollution is well known, but what is now also becoming better understood is that air pollution is a year-round phenomenon particularly in north India which causes health impacts far beyond the seasonal rise of respiratory illnesses. Air pollution is now the leading risk factor for chronic obstructive lung disease in India, and a major contributor to pneumonia and lung cancer. This study provides the most comprehensive estimates of the adverse health impact of outdoor and indoor air pollution in each state of India so far, which would serve as a valuable resource for planning air pollution reduction in all parts of India.”

Dr. Tushar K. Joshi, Advisor Environmental Health, Ministry of Environment, Forest and Climate Change, Government of India, said, “Initiatives across many sectors are being undertaken in India to reduce air pollution, including adoption of renewable energy and cleaner fuels, enhancing public transport options, encouraging intelligent waste management, and adoption of recycling environmentally friendly options. These state-specific findings on the health impact of air pollution would help fine tune the air pollution control efforts across the country. The Ministry of Environment, Forest and Climate Change is fostering greater public engagement for environmental sustainability through simple individual actions by performing Green Good Deeds.”

The first author of this study, **Prof. Kalpana Balakrishnan**, Director, Department of Environmental Health Engineering, Sri Ramachandra Institute of Higher Education and Research, said, “There is increasing evidence globally and from India about the association of air pollution with premature death and disease burden. The findings in this paper are based on all available data on air pollution that were analyzed using the standardized methods of the Global Burden of Disease Study. Leading air pollution scientists from India contributed to this research. This comprehensive effort over several years has for the first time produced what we believe are robust estimates of the health impact of outdoor and household air pollution in every state of India.”

“There has been increasing consensus in recent public and policy debates in India on the need to address the adverse health impact of air pollution” said the senior author of this study, **Prof. Lalit Dandona**, Distinguished Research Professor, PHFI, and Director, India State-Level Disease Burden Initiative. “The findings in this paper that one out of every eight deaths in India can be attributed to air pollution, and that air pollution is now responsible for more disease burden in India than tobacco use, would help increase the momentum further for control of air pollution. With substantial variations between the states, the estimates of outdoor and household air pollution exposure for every state, and the state-specific number of deaths and life-expectancy reduction associated with air pollution would be useful to guide policy suitable for the situation in each state” he added.

“If there is one cause that damages the health of every person living in a region, from the newborn taking the first breath to the adult whose breath is being stolen away by damaged lungs, it is air pollution. The noxious air also damages blood vessels, causing strokes and heart attacks apart from causing cancer and cognitive loss. The health, economic and social costs of air pollution are mounting menacingly across India. Resolute actions are needed to reduce the sources of pollution across many sectors and in all regions. This study will bring to light how different states in the country are affected by air pollution related disease burden. State-level estimates of disease burden, measured periodically, will also enable us to assess the impact of remedial actions as they are implemented.” said **Prof. K Srinath Reddy**, President, PHFI.

Prof. Christopher Murray, Director, IHME, said "Air pollution in India causes not just lung disease, but also is a substantial contributing factor in cardiovascular disease and diabetes. As a result, there is enormous potential to reduce the burden of these non-communicable diseases by curbing air pollution across the country."

The findings reported in the paper published today are part of the Global Burden of Disease Study 2017. The analytical methods of this study have been refined over two decades 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 standardised comparisons of the health loss caused by different diseases and risk factors, between different geographies, sexes, and age groups, and over time in a unified framework. The key metric used for this comparison is disability-adjusted life years (DALYs), which are the sum of the number of years of life lost due to premature death and a weighted measure of the years lived with disability due to a disease or injury.

Scientific paper published today:

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*. 6 December 2018.

[http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(18\)30261-4/fulltext](http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(18)30261-4/fulltext)

First author: Prof. Kalpana Balakrishnan

Senior author: Prof. Lalit Dandona

Total authors: 76

Key findings from the paper:

- First comprehensive estimates of deaths, disease burden, and life expectancy reduction associated with air pollution in each state of India.
- One in eight deaths in India was attributable to air pollution in India in 2017, making it a leading risk factor for death in India.
- 12.4 lakh deaths in India in 2017 were due to air pollution, which included 6.7 lakh deaths due to outdoor particulate matter air pollution and 4.8 lakh deaths due to household air pollution.
- Over half of the deaths due to air pollution were in persons less than 70 years of age.
- With 18% of the global population, India suffered 26% of premature mortality and health loss attributable to air pollution globally.

- In 2017, 77% population of India was exposed to ambient particulate matter PM_{2.5} above 40 µg/m³, the recommended limit by the National Ambient Air Quality Standards.
- The mean ambient particulate matter PM_{2.5} annual exposure of 90 µg/m³ in India in 2017 was one of the highest in the world. The highest PM_{2.5} exposure level was in Delhi, followed by the other north Indian states of Uttar Pradesh, Bihar and Haryana.
- While the proportion of households using solid fuels has been improving in India, 56% of the population still used solid fuels in 2017; this proportion was higher in the less developed states with over two-thirds of the population in most EAG states using solid fuels for cooking.
- The DALY rates due to household air pollution varied 145-fold among the states of India in 2017, and it varied 6-fold for outdoor particulate matter air pollution.
- The DALYs attributable to air pollution in India in 2017 for major non-communicable diseases, which included chronic obstructive lung disease, ischemic heart disease, stroke, diabetes and lung cancer, were at least as high as those attributable to tobacco use.
- The average life expectancy in India would have been 1.7 years higher if the air pollution level were less than the minimal level causing health loss, with the highest increases in the northern states of Rajasthan (2.5 years), Uttar Pradesh (2.2 years), and Haryana (2.1 years).
- Increasing public and policy attention to the control of air pollution in India is encouraging, which needs to be sustained for effective interventions. The Pradhan Mantri Ujjwala Yojana launched in May 2016 has achieved its target of distributing LPG to 50 million poor households in August 2018, the target that was originally set for March 2019. The target has now been increased to reach 80 million households through this scheme.
- Systematic and sustained efforts are needed to address the variety of sources contributing to air pollution, which include transport vehicles, construction activity, industry and thermal power emissions, residential and commercial solid fuel use, waste and agriculture burning, diesel generators, and manual road dust sweeping.
- Variations between the states in the exposure to outdoor and indoor air pollution should be taken into account while planning policies and interventions to reduce this exposure and its health impact.

These persons could be contacted for discussion on the findings and their implications:

Prof Balram Bhargava and Dr R S Dhaliwal, Indian Council of Medical Research, New Delhi

Dr S Venkatesh, Directorate General of Health Services Government of India, New Delhi

Prof Randeep Guleria, All India Institute of Medical Sciences, New Delhi

Prof Kalpana Balakrishnan, Sri Ramachandra Institute of Higher Education and Research, Chennai

Dr Sagnik Dey, Centre for Atmospheric Sciences, Indian Institute of Technology, New Delhi

Prof Tarun Gupta, Department of Civil Engineering, Indian Institute of Technology, Kanpur

Dr Tushar K Joshi, Advisor Environmental Health, Ministry of Environment, Forest and Climate Change, Government of India, New Delhi

Dr Sundeep Salvi, Chest Research Foundation, Pune

Prof Lalit Dandona and Prof K Srinath Reddy, Public Health Foundation of India, Gurugram

About the India State-Level Disease Burden Initiative:

The India State-Level Disease Burden Initiative is a collaborative effort between the Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI), Institute for Health Metrics and Evaluation (IHME), and experts and stakeholders from about 100 institutions across India. The work of this Initiative is overseen by an Advisory Board consisting of eminent policymakers and involves extensive engagement of 14 domain expert groups with the estimation process. The Health Ministry Screening Committee at the Indian Council of Medical Research and the ethics committee of the Public Health Foundation of India approved the work of the India State-Level Disease Burden initiative.

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:

<https://icmr.nic.in/reports?title=&page=1>

<https://phfi.org/the-work/research/the-india-state-level-disease-burden-initiative/>

<http://www.healthdata.org/disease-burden-india>

[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)

Five detailed topic-specific papers were published in the *Lancet journals* in September 2018 on state-level trends of cardiovascular diseases, diabetes, chronic respiratory diseases, cancer, and suicide along with a commentary in *The Lancet* on the relevance of these findings for Ayushman Bharat:

[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)

[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)

[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)

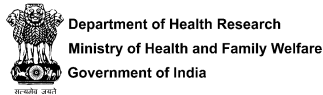
[https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045\(18\)30447-9/fulltext](https://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(18)30447-9/fulltext)

[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)

[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)

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. For more information please visit <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. For more information please visit 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. For more information please visit www.healthdata.org

For more information, please contact:

Indian Council of Medical Research

Mr. Syed Adil Shamim Andrabi

syed.adil@icmr.gov.in

Mobile: +91 9599332718

Public Health Foundation of India

Ms. Gina Sharma

gina.sharma@phfi.org

Mobile: +91 9811887088

Description of key terms

Air pollution: Air pollution is the contamination of outdoor and indoor air. The major components are ambient particulate matter pollution and household air pollution, and to a smaller extent ambient ozone pollution.

- **Ambient particulate matter pollution (commonly referred to as outdoor air pollution):** Ambient particulate matter pollution is caused by extremely small particles produced by coal burning for thermal power production, industry emissions, construction activity and brick kilns, transport vehicles, road dust, residential and commercial biomass burning, waste burning, agricultural stubble burning, and diesel generators.
- **Household air pollution:** Household air pollution is caused by burning of solid fuels such as wood, dung, agricultural residues, coal, and charcoal for cooking, and to some extent heating.
- **Ambient ozone pollution:** Ambient ozone pollution is caused by gases and volatile organic compounds emitted by transport vehicles, power plants, factories and other sources.

Disability-adjusted life-years (DALYs): DALYs are the sum of the number of years of life lost due to premature death and a weighted measure of the years lived with disability due to a disease or injury. DALYs for particular diseases are attributed to air pollution based on the available research evidence.

Socio-demographic Index (SDI): A summary measure that identifies where states, countries or other geographic areas fall on the spectrum of socio-demographic development. SDI is a composite measure based on per capita income, average educational attainment, and fertility rate, with the index value ranging from 0 to 1.

Uncertainty interval (UI): A range of values that is likely to include the correct estimate of risk exposure or health loss from a particular cause. Narrow uncertainty intervals indicate that evidence is strong, while wide uncertainty intervals show that evidence is weak.