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Information: **Dan Greenbaum** [dgreenbaum@healtheffects.org](mailto:dgreenbaum@healtheffects.org) +1 6172835904  
**Bob O'Keefe** [rokeefe@healtheffects.org](mailto:rokeefe@healtheffects.org) +1 6172836174

**NEW STUDY:**  
**AIR POLLUTION FROM MANY SOURCES CREATES SIGNIFICANT  
 HEALTH BURDEN IN INDIA**

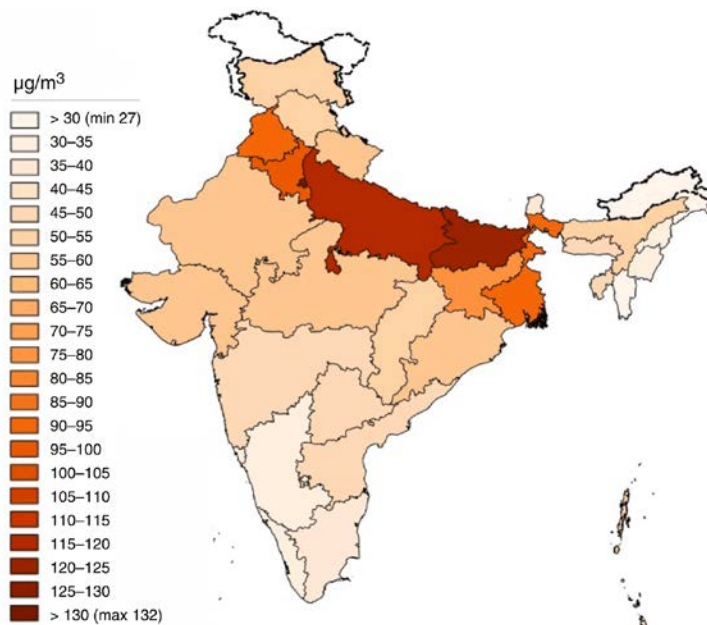
*Continued Aggressive Policy Action Could Reduce Health Impact Significantly*

A comprehensive study led by IIT Bombay, the Health Effects Institute (HEI<sup>1</sup>), and the Institute for Health Metrics and Evaluation (IHME<sup>2</sup>) has found that household burning and coal combustion were the single largest sources of air pollution-related health impact in India in 2015, with emissions from agricultural burning, anthropogenic dusts, transport, other diesel, and brick kilns also contributing significantly. A summary of the study, released today, is available in Hindi and English at [www.healtheffects.org/publication/gbd-air-pollution-india](http://www.healtheffects.org/publication/gbd-air-pollution-india), along with the full report. India has begun to implement clean fuels and pollution control programs for households, power plants, vehicles, and other sources. However, as the Indian population grows and ages, the health impacts from air pollution will increase, highlighting the challenges facing the country.

***Air Pollution a Nationwide Challenge***

Even as there has been growing attention to the air pollution levels in the National Capital Region, this new report highlights the levels of air pollution across all of India, especially the Gangetic Plain (Figure 1). Data from the 2015 Global Burden of Disease analysis, supported by Indian health evidence, suggest that these levels contribute to over 10% of all Indian deaths each year. The premature mortality attributed to air pollution contributed to over 29 million healthy years of life lost (DALYs<sup>3</sup>); overall, air pollution contributed to nearly 1.1 million deaths in 2015, with the burden falling disproportionately (75%) on rural areas.

Figure 1. Exposures to PM<sub>2.5</sub> across India, 2015.



<sup>1</sup> The Health Effects Institute is an independent, nonprofit research institute funded jointly by the U.S. Environmental Protection Agency, industry, foundations, and development banks to provide credible, high-quality science on air pollution and health for air quality decisions.

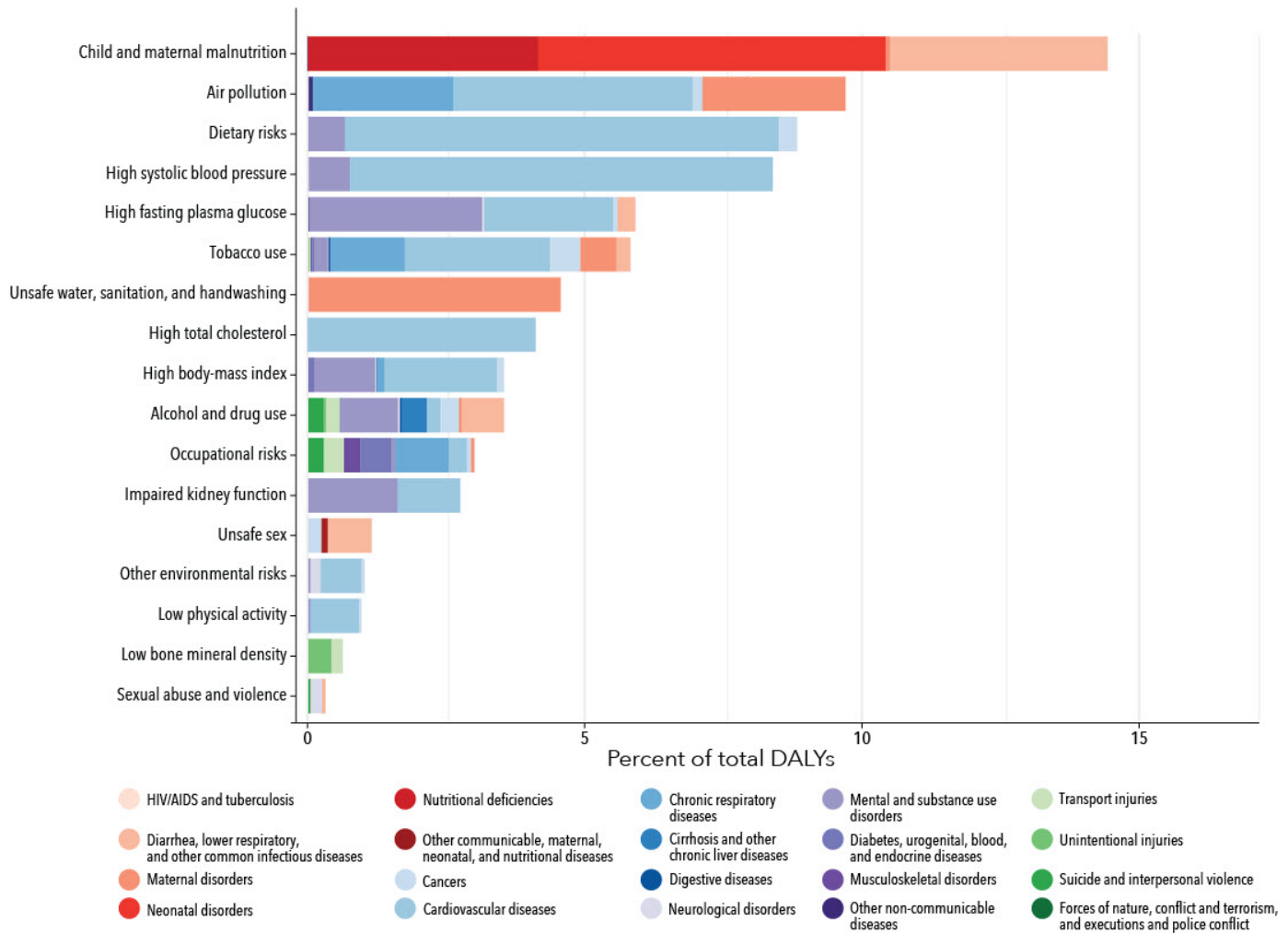
<sup>2</sup> The Institute for Health Metrics and Evaluation (IHME) at the University of Washington leads an international team of over 1600 scientists from 119 countries in conducting the Global Burden of Disease, an international effort to estimate what the world's population is dying from, and what risk factors contribute to that.

<sup>3</sup> Disability-adjusted life-years (DALYs) are a measure of years of life lost and years of life lived with a disability due to exposure to a risk factor.

## Air Pollution among the Major Risk Factors in India

This new report, published after rigorous analysis and peer review, was preceded by the comprehensive India-wide Global Burden of Disease analysis released in November 2017: *India: Health of the Nation's States*,<sup>4</sup> which identified air pollution, both outdoors and in households, as the second most serious risk factor for public health in India, after malnutrition, contributing to 6.4% of all healthy years of life lost (DALYs) in 2016 (see Figure 2).

Figure 2. Percent of DALYs attributable to different risk factors in India, 2016 (source: ICMR, PHFI, and IHME 2017).



“While India faces a number of important risk factors for death and disability, we have found that air pollution outdoors and in households is a very significant risk factor,” said Dr. Kalpana Balakrishnan, Sri Ramachandra University (Chennai) and the leader of the environment and health portion of the recent India-specific GBD analysis released in November.

## Residential Biomass Burning and Coal Emissions from Power and Industry among Leading Sources in 2015; Many Sources Contribute to Pollution and Ill Health

This new study — *Burden of Disease Attributable to Major Air Pollution Sources in India*<sup>5</sup> — provides the first comprehensive assessment conducted in India to understand exposures at national and state levels from all major sources of particulate-matter air pollution (particulate matter with an aerodynamic diameter of less than 2.5 μm, or PM<sub>2.5</sub>). It takes

<sup>4</sup> Indian Council of Medical Research, Public Health Foundation of India, and Institute for Health Metrics and Evaluation. 2017. *India: Health of the Nation's States* —The India State-level Disease Burden Initiative. New Delhi: ICMR, PHFI, and IHME.

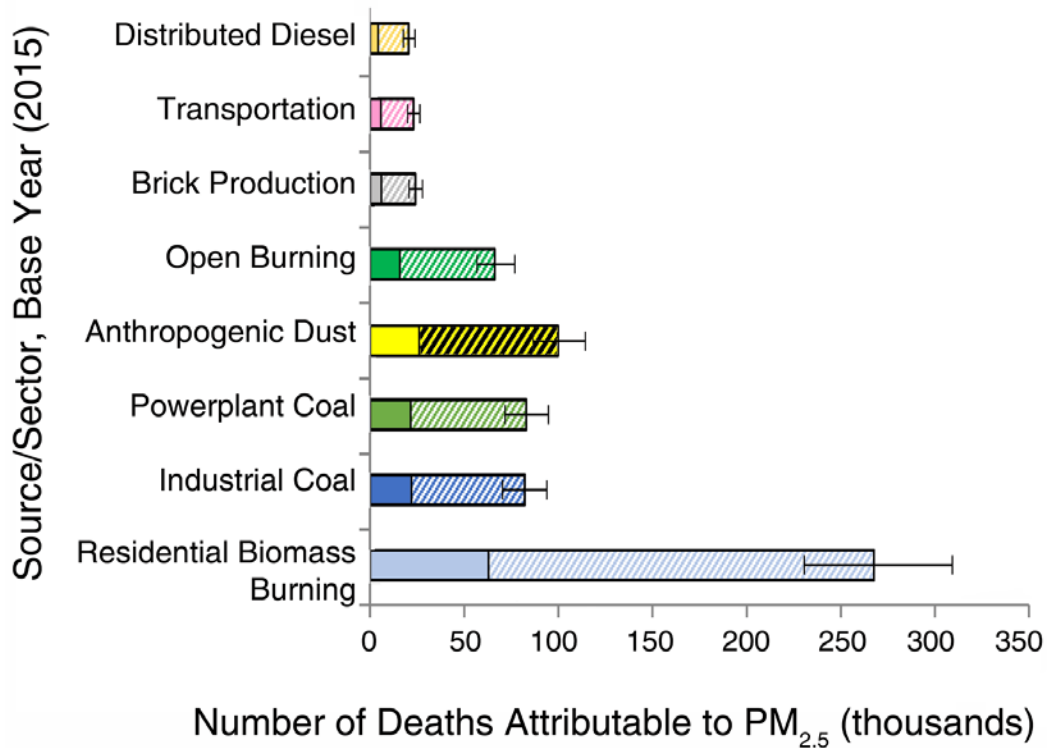
<sup>5</sup> This is the second report of the Global Burden of Disease Major Air Pollution Sources (GBD MAPS) project, a multiyear, international collaboration of IIT-Bombay, HEI, the Institute for Health Metrics and Evaluation (IHME), Tsinghua University, and the University of British Columbia.

advantage of enhanced satellite data and India’s growing network of air pollution monitors, and is the first to estimate the exposure from different air pollution sources state by state throughout India. It then builds on Indian health evidence and the GBD data to identify current and future nationwide burdens of disease attributable to each major source across India.

**Key Sources and Burdens Identified:** The study found that residential biomass fuel burning contributed to some 268,000 deaths in 2015; coal combustion from both thermal electric power plants and industry contributed to 169,000 deaths; anthropogenic dusts contributed to 100,000 deaths; agricultural burning contributed to 66,000 deaths; and transport, diesel, and kilns contributed to over 65,000 deaths in India in 2015 (Figure 3).

“This systematic analysis of emissions from all sources and their impact on ambient air pollution exposure found significant contributions from regional sources (like residential biomass, agricultural residue burning and industrial coal), underlying that from local sources (like transportation and brick kilns),” said Dr. Chandra Venkataraman, of IIT Bombay, who led the air pollution source analysis.

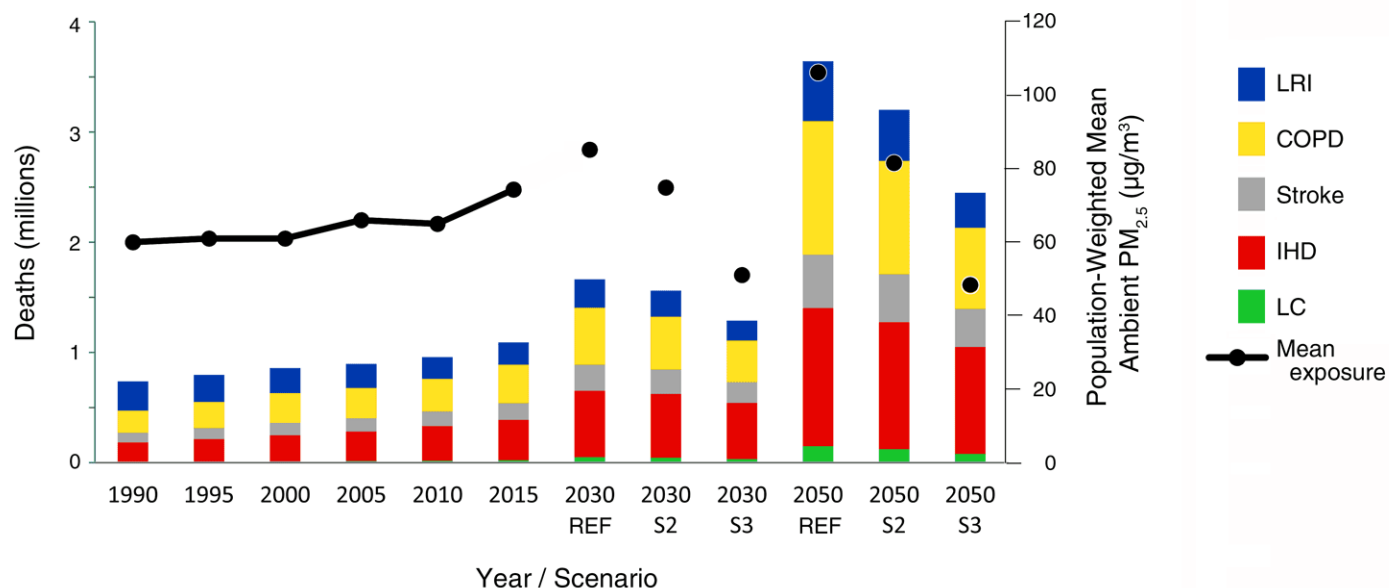
Figure 3. Deaths attributable to each major source of air pollution in India in 2015.



**Future Impacts up to 2050: Lower Air Pollution, But Continued High Health Burden**

Looking ahead, the study noted that a much larger portion of the Indian population, as it ages and grows, may be susceptible to the heart and lung disease that is tied most closely to air pollution exposure. The study evaluated three future scenarios with differing policies for energy use and pollution control. According to the study’s analysis of a 2050 scenario with no further air pollution control actions (designated REF), the health burdens would increase to over 73 million healthy years of life lost and over 3.6 million deaths in 2050 (Figure 4). However, the study analyzed two control scenarios with increasing levels of emissions reduction (designated S2, Ambitious; and S3, Aspirational) and concluded that the most active control actions (S3) could avoid over 1.2 million annual deaths in 2050 if implemented. The specific actions analyzed for each major sector are described in detail in the Report — and summarized in Table 1 below.

Figure 4. Deaths (and causes of death) attributable to PM<sub>2.5</sub> in 2015 and in 2050 under three alternative scenarios. (LRI: lower-respiratory tract infections, COPD: chronic-obstructive pulmonary disease, IHD: ischemic heart disease, LC: lung cancer)



***Substantial Source Challenges, but Many Cost-Effective Technologies Available to Reduce Risk***

This new study identifies in detail the challenges posed by the many sources of air pollution in India, especially as the population grows and ages, and economic activity accelerates, but also highlights the significant progress that can be made. “Looking ahead, the opportunities for innovative and cost-effective actions to control air pollution — some of which such as Ujjwala Yojana and Bharat Stage VI/6, are already beginning — provide an opportunity to address these potential health burdens before they grow substantially, even while at the same time improving the efficiency of the economy,” said Dan Greenbaum, President of the Health Effects Institute.

- TABLE I FOLLOWS -

Table 1. Major Source Contributions in 2015 and 2050, and Current and Possible Actions

<b>SOURCE</b>	<b>2015 Contribution to Exposure (%)</b>	<b>2015 Contribution to Burden (number of deaths, DALYs)</b>	<b>2050 Contribution to Burden (if no further action)</b>	<b>Actions Under Way</b>	<b>Actions That Can Be Taken (2050 Ambitious Scenario [S3])</b>
<b>Residential Biomass Burning</b>	23.9	270,000 deaths; 7.47 million DALYs	530,000 deaths; 10.7 million DALYs	Ujjwala Yojana LPG Program, increasing access to nearly 200 million consumers in 2017; National Solar Mission 2010, increasing access to solar lighting	LPG, piped gas, other fuels leading to elimination of biomass; shift from kerosene lighting to all solar or electric
<b>Industrial Coal Combustion</b>	7.7	82,000 deaths; 2.2 million DALYs	365,000 deaths; 7.4 million DALYs	Perform, Achieve, Trade (PAT) program	Achieve PAT in 85%–100% of industry
<b>Power Plant Coal Combustion</b>	7.6	83,000 deaths; 2.26 million DALYs	830,000 deaths; 16.8 million DALYs	Emission Limits for All New Thermal Power Plants  Efficiency and replacement of existing plants	75%–80% non-coal power generation; Move to ultra-super-critical, and integrated gasification combined cycle in all plants
<b>Open Burning of Agricultural Residues</b>	5.5	66,000 deaths; 1.8 million DALYs	203,000 deaths; 4.2 million DALYs	State Initiatives in Punjab, Haryana, UP	Field mulching to replace burning in all agricultural fields
<b>Transportation/  Other Diesel</b>	2.1  1.8	23,000 deaths; 630,000 DALYs/  20,000 deaths; 660,000 DALYs	33,000 deaths; 680,000 DALYs/  31,000 deaths; 640,000 DALYs	India Leaps Ahead, BS VI by 2020  Clean fuels to support BS VI	Enhanced Bus and Transit Options; private vehicle share drops to 40% in 2050 Full fleet replacement with BS VI
<b>Anthropogenic Dusts (construction and road dusts; fly ash; other)</b>	8.9	100,000 deaths; 2.7 million DALYs	743,000 deaths/ 15.1 million DALYs	Fly Ash Utilization program; Construction Dust requirements	Fully implemented dust and fly ash controls

