

Burden of Disease Attributable to Major Air Pollution Sources in India

Summary Table 1. Future Scenarios of Energy and Emissions Control Policies

REF, or Reference Scenario

Where the sectoral energy demand is met through sectoral technology-mix evolution at rates corresponding to changes observed during 2005–2015.

S2, or Ambitious Scenario

Assumes that the technology mix will reflect (1) the energy-efficiency targets for thermal power and industry as desired in India's INDC; (2) the emissions standards in transport as proposed in auto-fuel policy; and (3) the emissions controls expected from an influx of cleaner technologies in residential, brick production, and informal industry sectors.

S3, or Aspirational Scenario

Aimed at more profound energy efficiency targets, represented by published high-efficiency–low-carbon-growth pathways in industrial, electricity-generation, and transport sectors; high rates of shifting away from traditional biomass technologies (residential and informal industry); and including a complete end to agricultural field burning.

Note: INDC refers to India's Intended Nationally Defined Contribution to greenhouse gases under the United Nations Framework Convention on Climate Change signed in Paris in 2015.

chemistry and modeling, and in health effects assessment. The list of reviewers can be found in the Contributors list at the beginning of this report. A draft final version of this report was also reviewed by experts on the GBD MAPS Steering Committee. The GBD MAPS Working Group prepared the final report in response to the comments received.

MAIN FINDINGS

THE SITUATION IN 2015

Sources Related to Human Activities Were Responsible for the Largest Proportion of the Population Exposure to PM_{2.5} in India.

In 2015, the leading contributors to ambient PM_{2.5} exposure (defined as “annual average population-weighted PM_{2.5} concentration”) were the sources associated with combustion of biomass and coal and other human activities that generate dust (Summary Figure 4). The India-wide average PM_{2.5} exposure in 2015 was 74.3 µg/m³. Residential biomass

Summary Table 2. Major Sources or Sectors Evaluated

Source or Sector Name / Subcategories of Sources or Activities Included

- **Residential Biomass**
Residential cooking, lighting, heating, and water heating
- **Open Burning**
Burning of agricultural residue
- **Total Coal**
Heavy and light industry, electricity generation
- **Industrial Coal**
Heavy and light industry
- **Power Plant Coal**
Electricity generation
- **Transportation**
Private passenger vehicles; public passenger vehicles; freight including light-duty and heavy-duty diesel vehicles; diesel railway locomotives. Shipping not included
- **Brick Production**
Traditional brick kilns (predominantly)
- **Distributed Diesel**
Agricultural pumps, agricultural tractors, and electric generator sets
- **Anthropogenic Dust**
Dust related to human activities — fugitive, combustion, and industrial production
- **Total Dust**
Windblown mineral dust and anthropogenic dust

burning contributed nearly 24% of the total (see Table 2 in the main report); coal combustion was the next largest contributor (with 7.7% from industry and 7.6% from power generation); and anthropogenic dust (dust related to human activities, including fugitive dust from roads and fly-ash from coal burning and waste burning) contributed about 9%. Also, agricultural burning contributed more than 5%, and transportation, brick production, and distributed diesel each contributed about 2%. **Windblown mineral dust contributes to ambient PM_{2.5} air pollution; however, the extent of the contribution varies greatly across India, with the most significant contribution in the northwest region.**[†]

[†] Note that, although it was not included in the set of sources related to human activities, windblown dust also arguably results in part from human activities that contribute to desertification, for example, either directly through agricultural or forestry practices or indirectly through impacts on climate.