

# THE AIR WE BREATHE

Delhi has earned the dubious distinction of being the most polluted city in the world—a fitting title for the capital of a country where air pollution kills 115,900 people every year, as per estimates of the World Health Organization (WHO). Delhi recently recorded the world's highest annual average concentration of small airborne particles. The so-called PM2.5 particles have a diameter of 2.5 micrometres, and inhaling them poses health hazards. Outdoor and household air pollution have been routinely cited as the cause of several diseases in India. Apart from loss of life, air pollution causes heavy economic loss as well. According to the World Bank, the annual health cost of polluted air in India was around ₹5,500 crore. Delhi's share of this was around ₹1,000 crore. The government has tried to battle rising pollution levels with cleaner fuels, pollution-under-control (PUC) certificates for automobiles, source-specific emission standards, beneficiated coal in thermal power plants, and stronger public transport. That may not be enough. As more vehicles enter the roads, pollution levels are worsening and more people are paying the price.

## MAIN SOURCES OF OUTDOOR AIR POLLUTION



Vehicular pollution



Industries



Generator sets



Domestic fuel burning



Construction activities



Burning of agricultural residue

## HEALTH IMPACT

### OZONE (O<sub>3</sub>)

**WHAT:** It is formed due to the reaction of sunlight and pollutants such as nitrogen oxides and volatile organic compounds (VOCs) emitted by vehicles and factories.

**HEALTH EFFECTS:** Ozone causes eye irritation, breathing problems and lung diseases, triggers asthma and reduces lung function. Studies have found that ozone results in an increase in respiratory symptoms such as cough, throat dryness, eye and chest discomfort and headaches. It can also increase the lungs' reaction to allergens and other pollutants.

### PARTICULATE MATTER (PM)

**WHAT:** Particulate matter affects more people than any other pollutant. They are of different sizes. The total composition of PMs are sulfate, nitrate, ammonia, sodium chloride, black carbon, mineral dust and water.

**HEALTH EFFECTS:** The most health-damaging PM are the ones that have a diameter of 10 microns or less (PM10) as they can penetrate and settle deep inside the lungs. Once they enter the lungs, they restrict the availability of oxygen to lung tissues, which affects the cardiac system and may lead to heart attacks. They also cluster with bacteria of the lungs and increase the risk of blood clot formation and strokes. They ultimately result in cardiovascular and respiratory diseases and lung cancers.

### NITROGEN DIOXIDE (NO<sub>2</sub>)

**WHAT:** Major source is combustion processes like coal and diesel generation and automobile engines.

**HEALTH EFFECTS:** NO<sub>2</sub> gets absorbed into the mucous membrane of the respiratory tract and causes bronchitis and pneumonia. Besides increasing susceptibility to respiratory infections, it has also been found to impair the immune system and increase cancer risk. It is also associated with reduced lung function and rate of lung growth in children. The gas also plays a significant role in formation of other harmful gases like ozone.

### SULPHUR DIOXIDE (SO<sub>2</sub>)

**WHAT:** It is a colourless gas with a sharp odour and is a serious by-product of the combustion of fossil fuels (coal and oil) that are used for power.

**HEALTH EFFECTS:** It affects the respiratory system and functions of the lungs and causes irritation of the eyes. High concentrations of this gas cause swelling of the throat and lungs. Inflammation of the respiratory tract causes coughing, aggravation of asthma and chronic bronchitis and makes people more prone to infections of the respiratory tract.

### CARBON MONOXIDE (CO)

**WHAT:** It is a toxic gas emitted from motor vehicles and other sources due to its combustion. It is the result of incomplete combustion. Once it is released into the atmosphere, it remains there for approximately one month, before being oxidised to CO<sub>2</sub>.

**HEALTH EFFECTS:** The gas binds itself to haemoglobin, producing carboxyhaemoglobin (COHb), which affects the transport of oxygen within the blood, damaging cardiovascular and nervous systems. Concentration of COHb of approximately 5% in the blood induces a diminished oxygen-carrying capacity. At levels of 15-20%, it causes headaches and dizziness, at levels above 30%, it causes severe headaches, cardiovascular symptoms and tiredness and at levels above 40% there is a risk of coma and death.

### BENZENE

**WHAT:** Benzene is produced from the combustion and evaporation of both petrol and diesel, but especially in motor vehicles. It is a natural and persistent source (1% of total hydrocarbons) of benzene in the air. It is rapidly absorbed through inhalation and then transported by the blood to critical organs.

**HEALTH EFFECTS:** Exposure to high levels of benzene results in neurological symptoms and persistent exposure to high levels causes injury to bone marrow. Some studies have also linked benzene exposure with transient loss of memory, inability to concentrate and anxiety.



## WHY SHOULD INDIA WORRY?

India has 13 cities in the list of top 20 most polluted cities in the world according to a World Health Organization (WHO) study that monitored outdoor air pollution in around 1,600 cities across 90 countries.



## DEATHS DUE TO OUTDOOR AIR POLLUTION – BREAKDOWN BY DISEASE



## APPS TO MAP AIR POLLUTION

These smartphone applications to check real-time pollution levels:



Developed by India's ministry of earth sciences, this app will show real-time air quality of Indian cities. It will provide current and a one-to-three-day advance forecast for air quality and related health advisories. Currently it is only active in Pune and Delhi but will soon be expanded to other cities.

## Global Air Quality Index – pm2.5



This app gives air quality data for over 1,000 cities across the world. It also gives health advice in accordance with the present air quality situation.

## AQI Air Quality



The AQI Air Quality app shows a real-time air quality index (AQI) for over 2,000 cities across Asia.

# Pollution The Air We Breathe

**Camilla Rothe**



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## **Table of Contents Pollution The Air We Breathe**

1. Understanding the eBook Pollution The Air We Breathe
  - The Rise of Digital Reading Pollution The Air We Breathe
  - Advantages of eBooks Over Traditional Books
2. Identifying Pollution The Air We Breathe
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Pollution The Air We Breathe
  - User-Friendly Interface
4. Exploring eBook Recommendations from Pollution The Air We Breathe
  - Personalized Recommendations
  - Pollution The Air We Breathe User Reviews and Ratings
  - Pollution The Air We Breathe and Bestseller Lists
5. Accessing Pollution The Air We Breathe Free and Paid eBooks
  - Pollution The Air We Breathe Public Domain eBooks
  - Pollution The Air We Breathe eBook Subscription Services
  - Pollution The Air We Breathe Budget-Friendly Options

6. Navigating Pollution The Air We Breathe eBook Formats
  - ePub, PDF, MOBI, and More
  - Pollution The Air We Breathe Compatibility with Devices
  - Pollution The Air We Breathe Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Pollution The Air We Breathe
  - Highlighting and Note-Taking Pollution The Air We Breathe
  - Interactive Elements Pollution The Air We Breathe
8. Staying Engaged with Pollution The Air We Breathe
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Pollution The Air We Breathe
9. Balancing eBooks and Physical Books Pollution The Air We Breathe
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Pollution The Air We Breathe
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Pollution The Air We Breathe
  - Setting Reading Goals Pollution The Air We Breathe
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Pollution The Air We Breathe
  - Fact-Checking eBook Content of Pollution The Air We Breathe
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
  - Integration of Multimedia Elements

- Interactive and Gamified eBooks

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