

# **AIR POLLUTION**

# Air pollution 5th largest killer in India

New Delhi, Feb 14: Outdoor air pollution has become the fifth largest killer in India after high blood pressure, indoor air pollution, tobacco smoking, and poor nutrition, says a new set of findings of the Global Burden of Disease report. The India and South Asia-specific findings were officially released on Wednesday at a Delhi workshop jointly organised by Centre for Science and Environment (CSE), Indian Council of Medical Research and the US-based Health Effects Institute. The Global Burden of Disease (GBD) report is a world-wide initiative involving the World Health Organization which tracks deaths and illnesses from 81 causes across the world every 20 years. The new findings were released by Aaron Cohen, principal epidemiologist of the Health Effects Institute and co-chair of the GBD Ambient Air Pollution Expert Group.

The report says that about 62,000 premature deaths occur in India from air pollution-related diseases. GBD has ranked air pollution as one of the top 10 killers in the world, and the sixth most dangerous killer in South Asia. In fact, particulate air pollution is now just three places behind indoor air pollution, which is the second highest killer in India. "This is shocking and deeply disturbing news. This calls for urgent and aggressive action to protect public health," said Sanjay Narain, director general, CSE. The key finding in India states that air pollution is the fifth leading cause of death in India, with 62,000 premature deaths. This is up from 100,000 in 2000 - a six-fold increase. It is seventh leading cause behind the loss of about 8 million healthy years of life due to illness. It comes after indoor air pollution, tobacco smoking, high blood pressure, childhood underweight, low nutritional status, and alcohol use. These diseases include stroke (21.6%), chronic obstructive pulmonary disease (17.2%), ischemic heart disease (16.6%), lower respiratory infections (8.4%), and trachea, bronchitis and lung cancer (3.8%). Meanwhile, the key findings in South Asia and the world point out that air pollution related diseases cause 2.2 million deaths worldwide every year.



## Smells like ... sweet pollution

As technology advances, the sweet smell of artificial sweeteners is being used to mask the taste of pollutants. This is particularly true in the case of diesel engines, which use a mixture of diesel fuel and a small amount of urea to reduce nitrogen oxide emissions. The urea is converted into ammonia, which has a sweet smell. This is why some people describe the smell of diesel engines as 'sweet'. However, this 'sweet' smell is not a good thing, as it masks the presence of harmful pollutants. The World Health Organization (WHO) has warned that diesel engine exhaust is a known carcinogen. The sweet smell of artificial sweeteners is also used in some industrial processes, such as the production of pharmaceuticals. This is because the sweet smell is pleasant and can help to mask the taste of bitter or unpleasant ingredients. However, the use of artificial sweeteners in this way is controversial, as some people believe that they are harmful to health. The WHO has also warned that artificial sweeteners can be addictive. In conclusion, the sweet smell of artificial sweeteners is a common way to mask the taste of pollutants. While it may be pleasant, it is not a good thing, as it masks the presence of harmful pollutants. The WHO has warned that diesel engine exhaust is a known carcinogen. The sweet smell of artificial sweeteners is also used in some industrial processes, such as the production of pharmaceuticals. This is because the sweet smell is pleasant and can help to mask the taste of bitter or unpleasant ingredients. However, the use of artificial sweeteners in this way is controversial, as some people believe that they are harmful to health. The WHO has also warned that artificial sweeteners can be addictive.



Capital has more toxic particles in its air than other major Indian metros

# DELHI IS INDIA'S ASTHMA CAPITAL

DELHI has the highest levels of Respirable Suspended Particulate Matter (RSPM) among the four metros, exposing its residents to a greater risk of asthma than people elsewhere in the country.



The Times of India New Delhi, 08, May-2014

# Delhi air worst in the world

Packed With Fine Particles That Damage Heart, Lungs

Delhi has the most polluted air in the world, a World Health Organization (WHO) air quality database of 1,600 cities and 91 countries released on Wednesday shows that the concentration of PM2.5 (fine, respirable particles) is the highest in Delhi at 153 micrograms per cubic metre (µg/m³) when the WHO standard is just about 10µg/m³. The fine, particulate pollution which is considered most dangerous for health is way higher in Delhi compared with many other crowded Asian cities, including Beijing which has a PM2.5 level of 56µg/m³, Karachi (117µg/m³) and Shanghai (36µg/m³). The concentration of PM10 (coarse particles) in Delhi is about 286µg/m³, more than 14 times higher than the WHO annual mean standard of 20. Peshawar (540µg/m³) and Rawalpindi (446µg/m³) in Pakistan fare worse on this parameter. Indian cities

### SUBCONTINENT'S DIRTY AIR



Asian Cities	PM10	PM2.5
Delhi	286	153
Karachi	273	117
Dhaka	180	86
Beijing	121	56
Colombo	64	28
Jakarta	48	21
Singapore	27	17

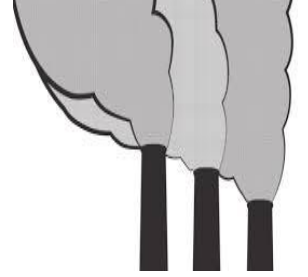
High PM2.5 is laden with microbes, WHO in said. "High concentrations of fine particulate pollution is particularly dangerous for health, as it can get deep into your lungs, and some may even get into your bloodstream. Exposure to such particles can affect both your lungs and your heart."

Small particles less than 10 micrometres in diameter (both PM10 and PM2.5) pose the greatest problems, because they can get deep into your lungs, and some may even get into your bloodstream. Exposure to such particles can affect both your lungs and your heart.



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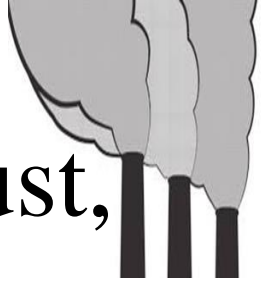
WEATHER! Max 3 24.2 Min 1.06 Moon: Friday - 1 Sun: Thursday - 3.3 Mainly clear sky. Max temperature on Thursday: 49°C. Min temperature on Wednesday: 8.1°C



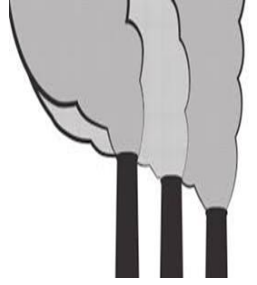
- Air pollution is the presence of chemicals in atmosphere in concentration high enough

to harm organisms, ecosystems, or human made materials or to alter climate.

- Includes gases and particulate matter.
- Gases –  $\text{SO}_2$ ,  $\text{NO}$ ,  $\text{CO}$ , hydrocarbons
- Particulate matter – smoke, dust,

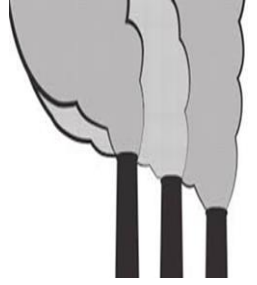


- **Natural sources** – wind blown dust, pollutants from wild fires and volcanic eruptions, and volatile organic chemicals released by some plants. Sea spray and decaying vegetation are major sources of reactive sulfur compounds in the air.
- **Human sources** – burning of fossil fuels in power plants and industrial facilities (including refineries).

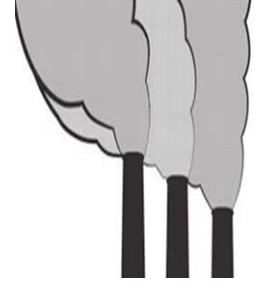


- A particular substance can be considered as air pollutant, only when its concentration is relatively high compared with the background value (low conc. that are usually considered to be harmless) and causes adverse effects.

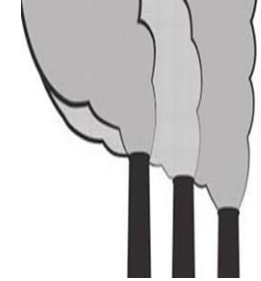
# Classification:



- according to how they are produced –
- Primary pollutants and secondary pollutants.
- **Primary pollutants** – are those released directly from the source in to air in a harmful form. Eg; particulate matter – ash, smoke, dust, fumes.  
inorganic gasses – SO<sub>2</sub>, NO, CO,

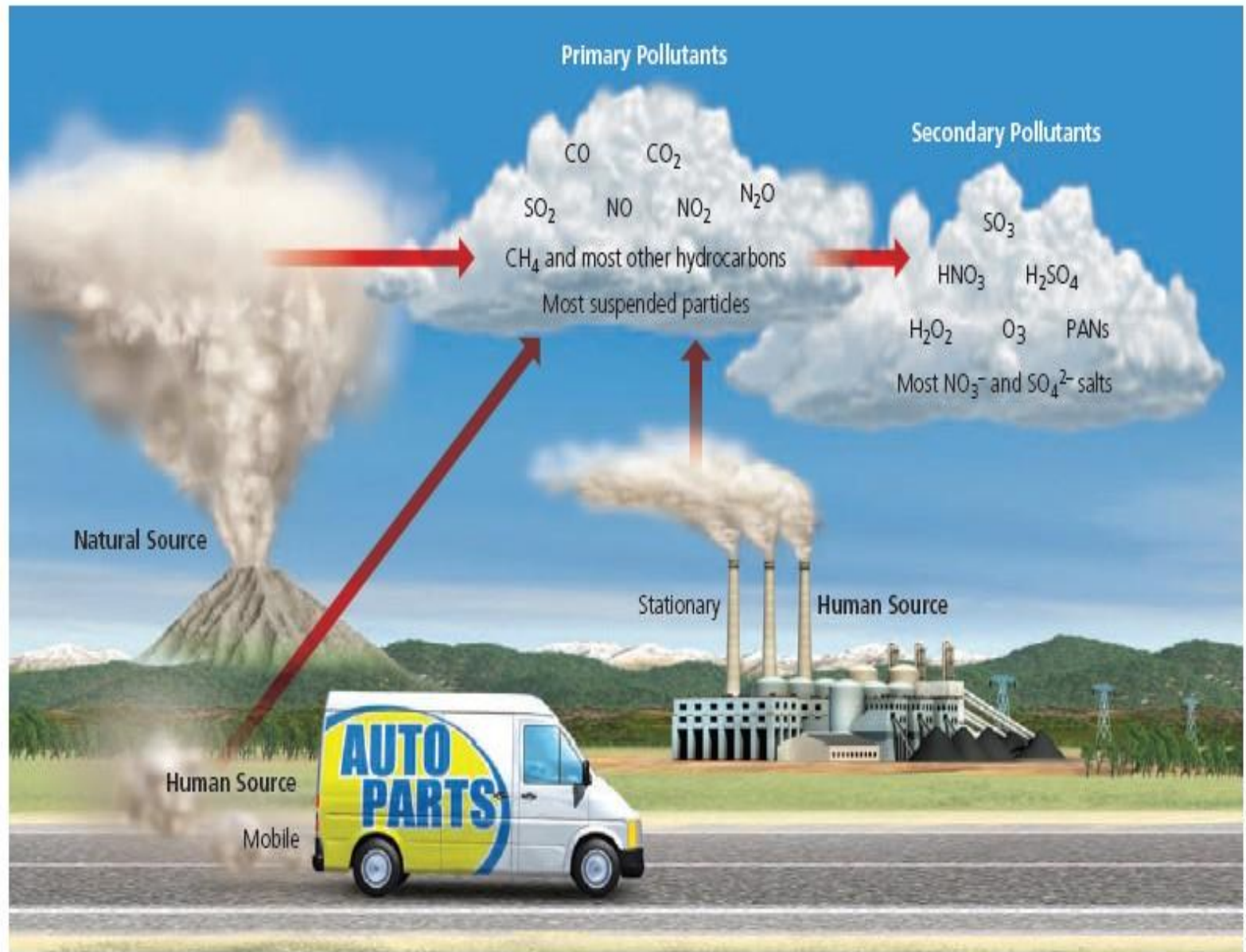


**FIGURE 16.3** Primary pollutants are released directly from a source into the air. Coal-burning power plants like this one produce about two-thirds of the sulfur oxides, one-third of the nitrogen oxides, and one-half of the mercury emitted in the United States each year.



- **Secondary pollutants** – they are converted to a hazardous form after they enter the air or are formed by chemical reactions as components of the air mix and interact.
- i.e they are formed in the atmosphere through chemical and photochemical reactions from the primary pollutants
- Eg; SO<sub>3</sub>, NO<sub>2</sub>, peroxyacetyl nitrate,





**FIGURE 15.3** Human inputs of air pollutants come from *mobile sources* (such as cars) and *stationary sources* (such as industrial, power, and cement plants). Some *primary air pollutants* react with one another and with other chemicals in the air to form *secondary air pollutants*.

**Table 16.1 Estimated Fluxes of Pollutants and Trace Gases to the Atmosphere**

		Approximate Annual Flux (Millions of Metric Tons/Yr)	
Species	Sources	Natural	Anthropogenic
CO <sub>2</sub> (carbon dioxide)	Respiration, fossil fuel burning, land clearing, industrial processes	370,000*	29,600
CH <sub>4</sub> (methane)	Rice paddies and wetlands, gas drilling, landfills, animals, termites	155	350
CO (carbon monoxide)	Incomplete combustion, CH <sub>4</sub> oxidation, plant metabolism	1,580	930
Non-methane hydrocarbons	Fossil fuel burning, industrial uses, volatile compounds from plants	860	92
NO <sub>x</sub> (nitrogen oxides)	Fossil fuel burning, lightning, biomass burning, soil microbes	90	140
SO <sub>x</sub> (sulfur oxides)	Fossil fuel burning, industry, biomass burning, volcanoes, oceans	35	79
SPM (suspended particulate materials)	Biomass burning, dust, sea salt, biogenic aerosols	583	362

\*Natural flux to atmosphere is balanced over time by capture, deposition, or decomposition of gases or SPM.