Impact of Air Pollution on Human Health

Why in news?

Recently, the State of Global Air (SoGA) 2024 was released which offers a stark reminder of the significant impacts air pollution has on human health.

What is air pollution?

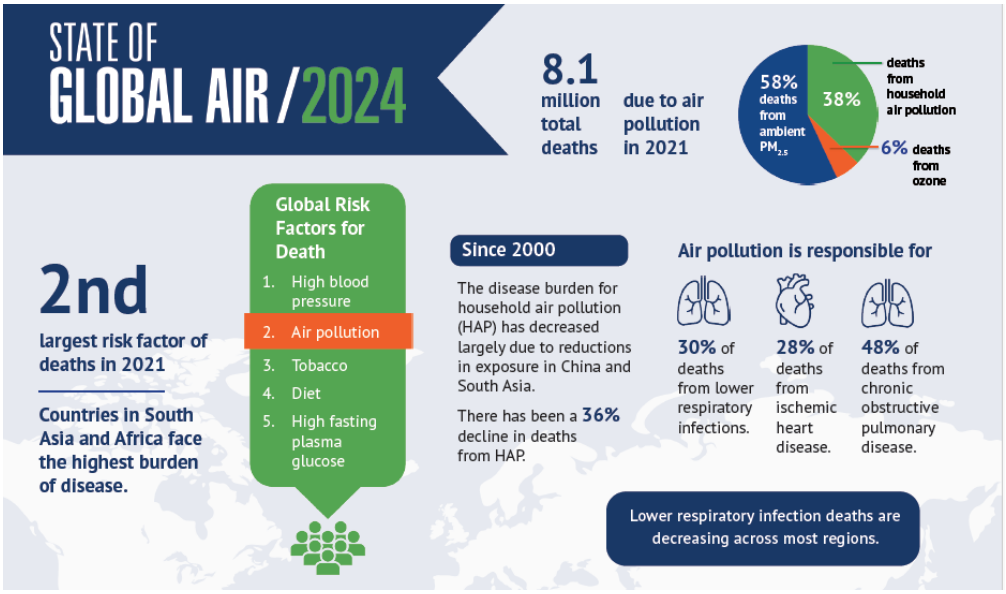
- **Air pollution** – It is contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere.
- **Common sources** – Household combustion devices, motor vehicles, industrial facilities and forest fires are common sources of air pollution.
- The major outdoor pollution sources include residential energy for cooking and heating, vehicles, power generation, agriculture/waste incineration, and industry.
- **Pollutants** - Pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide and sulfur dioxide.
- **Impact on climate** – Many of the drivers of air pollution (i.e. combustion of fossil fuels) are also sources of greenhouse gas emissions.
- **Impact on human health** - Outdoor and indoor air pollution cause respiratory and other diseases and are important sources of morbidity and mortality.
- Polluted air is a *big trigger for pneumonia* and other respiratory infections and allergic diseases in children.
- There is a strong connection between long-term exposure to *traffic-related air pollution and early death* due to cardiovascular diseases and lung cancer, asthma onset in children and adults, and acute lower-respiratory-tract infections in children.

WHO data show that almost all of the global population (99%) breathe air that exceeds WHO guideline limits and contains high levels of pollutants, with low- and middle-income countries suffering from the highest exposures.

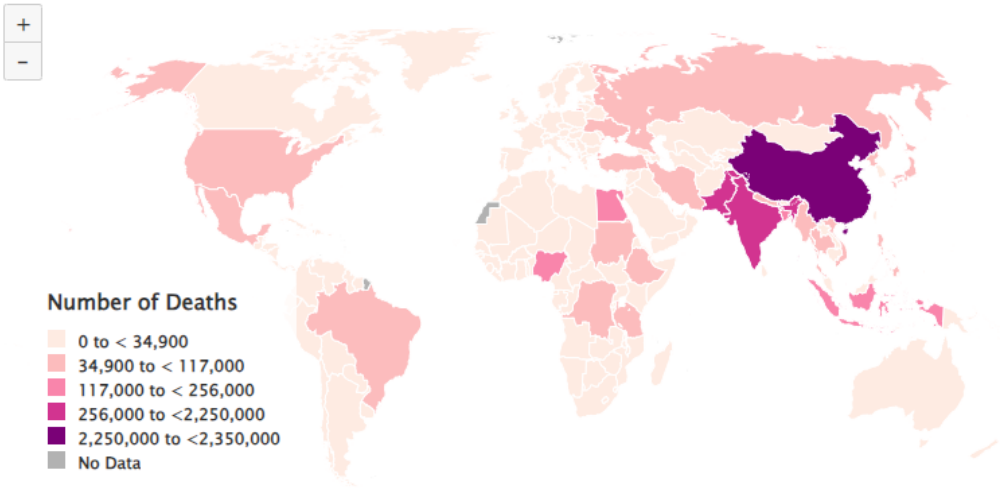
State of Global Air (SoGA) 2024

• It is an *annual tracker of health impact of air pollution*.
• **Prepared by** – It is a collaborative assessment by the
  - US-based Health Effects Institute (HEI)
  - Institute for Health Metrics and Evaluation's Global Burden of Disease (GBD) project.
• This has been produced for the *first time in partnership with UNICEF.*
• **Data source** – These results are linked to the Global Burden of Disease (GBD) 2021 report which estimated about 200 countries.
• **Assessment** – It usually assess the impact of *Particulate Matter (PM2.5) and Ozone* on human health.
• This 2024 report also covers the impact of *nitrogen oxides (NO2)*.

What are the key findings of the report?



- **During the pre-pandemic phase (1990 to 2019)** – The order of the leading global causes of death were ischemic heart disease, stroke, chronic obstructive pulmonary disorder (COPD), and lower respiratory disease.
- **Post pandemic in 2021** – Covid-19 changed the order with age-standardised mortality from COVID ranking second after ischemic heart disease, and stroke and COPD dropping to third and fourth place, respectively.
- **Impacts of air pollution on human** – It become the *second largest killer globally after blood pressure*, recording a dubious tally of 8.1 million deaths in 2021.



- **Impact on children under five years** - With *more than 700,000 deaths*, air pollution become the *second leading risk factor* after malnutrition globally.
- As many as 500,000 of these child deaths are linked to household air pollution from cooking indoors using dirty fuels in Africa and Asia.
- Polluted air is a big trigger for pneumonia and other respiratory infections and allergic diseases in children.

- **Impact of Climate Change** – It can exacerbate the health burden of non-communicable diseases, including heart and lung diseases, during heatwaves.

What is the status of pollutants causing air pollution?

- Even though *PM2.5* (both ambient and household together) *account for more than 90% of the total air pollution* disease burden, *NO2 and ozone are the growing risk* factors globally.

Status of NO2 in Air pollution

• Higher exposure to NO2 shows the growing risk *from traffic exhaust* in densely populated urban areas. • Seven of the 10 countries with the highest NO2 exposures are in the *high income countries* in West Asia. • The highest exposures to NO2 have been noted in countries with *high socio-development index*, including Singapore, Japan and Canada. • **Impact on children** – NO2 is a *leading risk factor for the development of childhood asthma*. • About 55% of 194 countries studied do not yet meet the annual WHO Air Quality Guidelines of 10 µg/m3, resulting in 42% of the world's population being exposed to unacceptable levels. • **Impact of climate** – It is a *catalyst for formation of ozone*, yet another very harmful gas. • NO2 reacts with other chemicals in the atmosphere to produce both particulate matter and ozone.
Status of Ozone in Air pollution
• Ozone levels have also *increased in South Asia.* • **Impact of Climate change** – The chemical reactions that form ozone *increase when the air is warmer*, especially during heatwaves. • Evidence shows that ozone *spikes during heatwaves* in China and Europe. • **Exposure** – The proportion of population experiencing high ozone exposures is also increasing in India, Nigeria, Pakistan, and Brazil. • **Impact on vegetation** – It can *reduce crop yields, damage biodiversity*, and undermine food security and nutrition. • **Impact on humans** – In 2021, ozone was responsible for *56% of all global ozone deaths* reported in South Asia. • Exposure to ozone is associated with an increased risk of both *acute and chronic respiratory illnesses*. • **India** – It has recorded about *237,000 ozone related deaths*. • In 2021, nearly 50% of all ozone-related COPD deaths were in India, followed by China and Bangladesh.
Status of PM 2.5 in Air pollution
• Evidently, nearly 20% of the global ambient PM2.5 is attributed to household air pollution. • **Impact on humans** – India and China have recorded 2.1 million and 2.3 million deaths respectively and together account for nearly 55% the total global disease burden from particulate matter.

What lies ahead?

- **Emulate the successful policy decisions** – There has been a 61% reduction in the age-standardised death rate from household air pollution.
- This improvement has been possible due to growing access to clean energy for cooking, grid electricity, cleaner-burning cookstoves, and cleaner fuels.
- **Tackle air pollution** – It can be done by reducing toxic emissions and greenhouse gases, which will improve public health and combat climate change.

References

1. Down To Earth| Air Pollution is 2nd Leading Risk Factor for Children

2. WHO| Air Pollution
3. State of Global Air| State of Global Air 2024 Report