Air Quality, Health and the Environment

What is ambient air pollution?

Ambient air pollution is the composition of chemical, physical and biological agents that modify the natural composition of the atmosphere. Ambient air pollution can come from both natural and anthropogenic (man-made) sources. Some examples of natural sources of air pollution include particulate matter from forest fires, and methane that is naturally released from livestock. The main anthropogenic sources of air pollution include fuel combustion from motor vehicles, heat and power generation, industrial facilities, municipal and agricultural waste and waste incineration, and residential cooking and heating.

Air pollution can cause health problems for people that live in close vicinity to pollution sources. Often, however, pollutants are transported over long distances or across borders, leading the eventual deposition of chemicals into to land and water via precipitation. This leads to acidification, eutrophication and ozone damage on crops, among other negative consequences.

HEALTH EFFECTS OF AIR POLLUTION

Brain / nervous system
- Headache and difficulty concentrating (CO, SO_2)
- Central nervous system (PM)
- Stroke (PM)

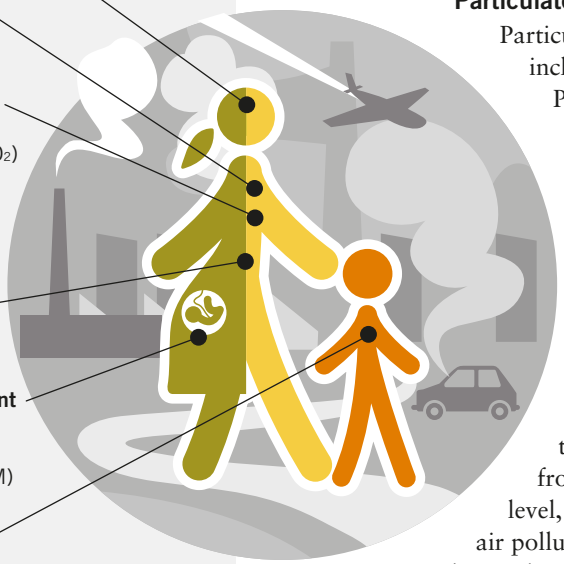
Heart / Blood
- Heart disease (PM, O_3, SO_2)
- Heart attack (PM)
- High blood pressure (PM)

Lungs
- Respiratory irritation, inflammation and infection (PM, O_3, NO_2, SO_2)
- Reduced lung function (PM, O_3, SO_2)
- Lung cancer (PM, BaP Benzo(a)Pyrene (and other PAHs))
- Chronic obstructive pulmonary disease (COPD) (PM)
- Asthma (PM)

Endocrine system
- Diabetes (PM)

Reproductive system/fetal development
- Premature delivery (PM)
- Babies with low birth weight (PM)
- Impaired physical development (PM)
- Infertility (cadmium)

Children
- Learning difficulties (PM)
- Decreased brain function (PM)
- Asthma and respiratory infections (PM)
- Asthma attacks and bronchitis symptoms in asthmatic children (NO_2)
- Cancer (PM, BaP)
- Decreased lung function (PM)



AIR POLLUTION AND CHILDREN

Air pollution affects us most when we are small, even before we are born. Pregnant women who breathe poor air are at risk for premature delivery and of having babies with low birth weight. There is also evidence that air pollution may affect neurological development in children, causing learning difficulties and poor lung and brain functions. Children who breathe poor air are more likely to suffer from asthma, respiratory tract infections and childhood cancer. Of the seven million premature deaths caused by air pollution each year globally, nearly 600,000 are children under five.

Which pollutants are found in ambient air?

Nitrogen Dioxide (NO2)

The main source of nitrogen dioxide emissions in ambient air is the combustion of fossil fuels such as coal, gas and oil, with most emissions in Europe coming from fuels used in motor vehicles.

Together with organic compounds and sunlight, nitrogen oxides contribute to the formation of ground level ozone. Deposition of nitrogen pollutants, both nitrogen oxides and ammonia, lead to acidification and eutrophication of soil and waters, and cause changes in biodiversity.

Particulate Matter (PM10 and PM2.5)

Particulate matter or particle pollution includes dust, dirt, soot and smoke. Particulate matter is generated by sources such as construction sites, unpaved roads and fires, as well as chemical reactions in the atmosphere.

Ozone (O_3)

Ozone can be found both in the earth's upper atmosphere and at the ground level.

Stratospheric ozone is good in that it shields us from harmful rays from the sun. Ozone at the ground level, however, is considered a harmful air pollutant. Ground-level ozone occurs as the result of a chemical reaction between nitrogen oxides (NOx) and volatile organic compounds (VOCs). This chemical reaction occurs when the chemicals encounter sunlight. Ozone levels are therefore often highest on sunny days.

Ozone can also damage vegetation by accelerating the aging of leaves, which causes major annual economic losses for both agriculture and forestry.

Sulphur Dioxide (SO2)

Sulphur dioxide is a pollutant that primarily comes from anthropogenic sources such as coal power plants and motor vehicle emissions.

In large parts of northern and central Europe, deposition of sulphur has caused severe acidification effects on soil and water, resulting in damage to forests, exaction of fish species sensitive to acidification.

Carbon Monoxide (CO)

Carbon monoxide is a compound that occurs naturally in the atmosphere at a level that is not harmful to humans. Natural carbon monoxide comes from sources such as fires and volcanoes. Anthropogenic sources of carbon monoxide in ambient air include motor vehicle exhaust, industry, and tobacco smoke.

Cadmium (Cd)

Emissions of cadmium to air are mainly caused by waste incineration, for example because of incomplete collection of nickel-cadmium batteries, as well as in metal production and the combustion of fossil fuels.

Some of the cadmium released into the atmosphere is absorbed in our crops. Cadmium also occurs naturally in some soils and can also be supplied with commercial fertilizers.

Benz(a)pryrene (B(a)P)

Benz(a)pyrene, is a substance included in the group of polycyclic aromatic hydrocarbons (PAH). It is accidentally formed during combustion and in industrial processes. Emissions from small-scale wood burning for heating account for a large proportion of the total emissions of B(a)P.

What are the economic costs of air pollution?

Economic costs associated with air pollution come primarily in the form of decreased labor productivity due to illness and death, increased expenditure on health, and decreased agricultural yields. The consequences premature death are amplified in regions with aging populations such as China and in Eastern Europe.

Air Quality Information and Action

What is an air quality index and how should it be interpreted?

An air quality index is a tool typically used by government institutions to communicate information about air quality to the general public. It is usually based on real time data and is updated on regular intervals. An index, by nature, is simply an indicator. The values represented by the index do not represent actual measurements of any particular pollutant, but rather reflect the result of the mathematical equation that the index is based upon.

Most air quality indexes are based upon a similar equation that takes into account whether or not pollutants are exceeding established thresholds, and whether or not more than one pollutant is exceeding a particular threshold at a given time. Range intervals, represented by different colors, correspond to health effects and the target groups that should take action to protect their own health.

When reading an air quality index, it is important to ask the following questions:

- **Where is the data coming from?**
  Some indexes model their data, while other indexes use sensor data provided by private individuals (crowd-sourced data/citizen science). While neither of these methods are inherently bad, they are not based on regulatory-grade air quality measurements and there is insufficient evidence to support their accuracy.
- **Is this index relevant for this location?**
  Indexes take into account a limited number of pollutants. It is important that an index considers the pollutants that are present in your city's air. If an index does not account for a certain pollutant that exists in high concentrations in your city's air, the index could show that the air quality is good, when in reality it is unhealthy.

Bosnian and Herzegovina air quality index

The Bosnia and Herzegovina air quality index was developed by the Federal Hydrometeorological Institute, in consultation with the Republika Srpska Hydrometeorological Institute, and supported by UNEP. It is based on official real-time data, and includes PM2,5, PM10, CO, O_3, SO_2 and NO_2.

BOSNIA AND HERZEGOVINA AIR QUALITY INDEX
Good (1–50)
Moderate (51–100)
Unhealthy for sensitive groups (101–150)
Unhealthy (151–200)
Very unhealthy (201–300)
Hazardous (301–400)

More information

For more information about the health effects at each level in the index, and for information regarding actions that can be taken to protect one's health, please see the following websites:

- http://www.fhmzbih.gov.ba/latinica/ZRAK/AQ-index.php
- https://rhmzrs.com/zivotna-sredina/kvalitet-vazduha/trenutni-podaci

Where do I find real time data in my town?

Air Quality in Sarajevo Kanton at the Public Health Institute of Sarajevo Kanton:

- https://www.kvalitetzraka.ba/

Air Quality, Hydro-met AQI App:

- https://www.appcreator24.com/app131556

You can also download it at this QR-Code