

AIR QUALITY and HEALTH – Mindful Climate Action

We burn petroleum, coal, and natural gas for many reasons, including to produce electricity and to power vehicles. When we burn these fossil fuels, they release carbon dioxide, a greenhouse gas that contributes to climate change and persists in the atmosphere for decades. In addition, the burning of fossil fuels releases several different air pollutants. Although these tend to disperse or wash out in the rain, they still pose a threat to healthy people and an even greater threat to infants and to the elderly. Thus, reducing our combustion of fossil fuels can generate immediate benefits for health while at the same time slowing the longer process of climate change.

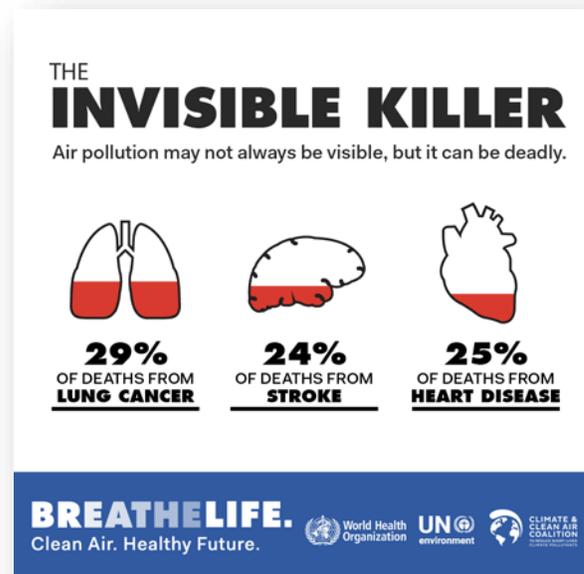
Key air pollutants include carbon monoxide, particulate matter, nitrogen monoxide, ozone (ground level), and sulfur dioxide. Here is additional information about each one:

Name (chemical formula)	Ways that it forms Human and natural causes	Health Hazard Severity depends on the level
carbon monoxide (CO)	A carbon-containing fuel is burned with insufficient oxygen, such as in a car engine or a wild fire	Interacts with hemoglobin, decreasing your oxygen supply
particulate matter (PM _{2.5})	Many sources, including fossil fuel combustion, wild fires, dust storms, and industrial processes	Can pass through the lungs into your bloodstream, causing cardiovascular irritation
nitrogen monoxide (NO)	A hot engine, hot fire, or even a bolt of lightning causes nitrogen in the air to combine with oxygen in the air	Irritates or damages your lungs and eyes
ozone (O ₃)	On a warm day, sunlight causes pollutants in the air at ground level to react and generate ozone	Irritates or damages your lungs and eyes
sulfur dioxide (SO ₂)	A fossil fuel is burned that contains sulfur as an impurity. Volcanoes release SO ₂ as well.	Burns your lungs and eyes

As the infographic on the right from the World Health Organization points out, air pollution may not always be visible, but it is deadly (1).

Here are a few additional facts about air pollution from the World Health Organization (2):

- Nine out of ten children breathe polluted air.
- Exposure to air pollution is linked to respiratory disease, cancer, and cognitive impairment in infants, children and adolescents.
- Air pollution kills 7 million people every year, 4 million from indoor air pollution.



By burning lower quantities of fossil fuels, we reduce health-damaging pollutants in the air we breathe. Cleaner air is a “co-benefit” that accompanies fossil fuel reduction. For example, replacing coal-burning electric power plants with wind and solar farms reduces greenhouse gas emissions. This replacement has a co-benefit of lowering the particulate matter, carbon monoxide, and oxides of nitrogen and sulfur in the air. Moving toward cleaner energy sources will help clean the air that we breathe, lowering emergency room visits and hospitalizations, and increase life expectancy around the world.

Remember: you need to breathe! Although you could probably survive a few days without water and several weeks without food, without air, you last only a few minutes. As an adult at rest, you take about 15 breaths each minute. If this air is polluted, you increase your risk of heart and lung disease.

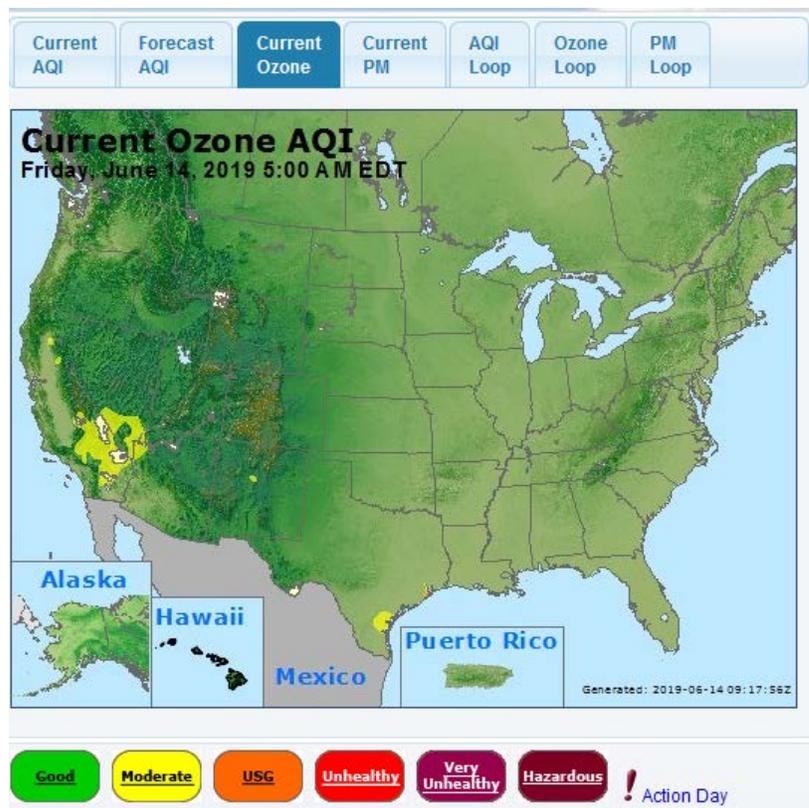
Thanks to the passage of the Clean Air Act of 1970 and its later amendments, air quality in the United States has greatly improved. However, in some large urban areas, levels of particulate matter and ozone continue to exceed the air quality standards. Wild fires also release large amounts of air pollutants.

How do you determine the quality of the air? Although sometimes you can recognize bad air because of haze or irritation in your lungs or eyes, other times the pollutants are invisible.

For this reason and others, government agencies post air quality data. In fact, you can even have alerts sent directly to you if you sign up. Local weather stations and newspapers may include air quality reports as well.

In the United States, high quality maps are posted daily at AirNow by the U.S. Environmental Protection Agency, as shown in the figure (3). This map is from June 2019, early in the morning.

These maps are conveniently color-coded. For example, on the map to the right, **Yellow** in parts of southern California indicates moderate air quality for ozone. These levels are likely to increase as sunlight and vehicles increase, possibly leading to orange or red. **Orange** indicates unhealthy air for people who are sensitive to it, and **Red** indicates unhealthy for everybody.



By checking the Air Quality Index, you can decide how best to protect yourself. For example, with higher levels of ozone, the best plan is to avoid exertion outside and to stay inside when possible. Why? Because ozone, a highly reactive substance, tends to react quickly and not persist long indoors. In contrast, if the air pollutant is particulate matter, these particles are found both indoors and out. If levels are hazardous, it may be necessary to wear a mask

that can filter out these particles or to move to another location. For example, this can be the case with the smoke from wildfires.

Many win-win strategies exist to create cleaner air, reduce carbon emissions, and improve our personal health. We can reduce the impact of automobile exhaust by driving less, using more fuel-efficient cars, or switching over to electric vehicles. Biking or walking for shorter trips or daily commutes provides additional physical activity, a co-benefit that contributes to better health. Conserving water and energy in our homes also helps reduce carbon emissions for improved air quality and health.

As society adopts cleaner energy systems, we will build a healthier world and provide a stable climate for future generations. Actions that reduce greenhouse gas emissions and short-lived air pollutants protect public health now and in the future.

References

- (1) Infographic Library, World Health Organization, United Nations, accessed June 2019, <https://breathelife2030.org/news/infographic-library/>
- (2) Air Pollution, World Health Organization, United Nations, accessed June 2019, <https://www.who.int/airpollution/en/>
- (3) AirNow, U.S. Environmental Protection Agency, accessed June 2019, <https://airnow.gov/>

FOR MORE INFORMATION, PLEASE VISIT <https://www.fammed.wisc.edu/mca/>



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