

Health Effects of Air Pollution



Air pollution contributes to lung disease, which causes more than 350,000 deaths annually, making it the third leading cause of death in the United States. People with chronic bronchitis, emphysema, and asthma are at risk from high pollution levels.

The American Lung Association released the following statistics in 2007:

- Approximately 34.1 million Americans have been diagnosed with asthma by a health professional during their lifetime.
- An average of one out of every 10 school-aged children has asthma.
- On high-pollution days, children with asthma are 40

percent more likely to suffer attacks than on average-pollution days.

- Asthma is the leading chronic illness of children in the United States and the leading cause of school absenteeism due to chronic illness.

Additionally, there is evidence that some people genetically have up to 10 times the susceptibility to the effects of air pollution.

Fine Particles

Fine particles, known scientifically as Particulate Matter 2.5 (PM 2.5 microns in diameter or less), are about the size of a red blood cell. They can be microscopic solids or liquid droplets. Fine particles may be emitted directly, such as by wood stoves, or formed when gases react in the atmosphere.

So small they bypass the body's normal protections, fine particles may lodge in the lungs, causing scarring and decreased lung function.

Fine particles may also pass into the blood stream and contribute to plaque buildup in arteries, increase the risk for and effects of heart disease, and enter the organs and the nervous system, including the brain.

Numerous scientific studies have linked particle pollution exposure to a variety of health problems:

- increases in respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing;
- decreased lung function;
- aggravated asthma;



Those most sensitive to the effects of air pollution are children, elderly, and those with lung and heart illnesses.

- development of chronic bronchitis;
- irregular heartbeat;
- heart attacks; and
- premature death.

Ground Level Ozone

Scientists and health professionals continuing to learn more about the harmful effects of ozone. Short term exposures affect the lungs much like sunburn: the inflammation goes away and new cells replace the damaged cells. However, these replacement cells are not exactly like those that are replaced, so it isn't a case of "everything back to normal."

Results from long-term effects of repeated ozone

exposures are not available yet, but researchers expect to see similar effects as repeated over-the-long-term skin sunburns are connected to skin cancer.

Ozone and ozone precursors (particularly nitrogen oxides) can enter the lungs as fine particles. Again, fine particles may become lodged in the lungs or pass into the bloodstream.

Sensitive populations should stay indoors when ozone levels rise during the lowa ozone season of May 1 through October 1. Ozone doesn't penetrate indoors very well, so on days when ozone levels rise into the "unhealthy for sensitive groups" range of the Air Quality Index, cut back or reschedule strenuous outside activities. Stay indoors in a well-ventilated or air-conditioned building. If you must be active outdoors, try to schedule activity before 10 a.m. or after 7 p.m.

Ozone Effects on the Environment

Ground-level ozone interferes with the ability of plants to produce and store food, so that growth, reproduction and overall plant health are compromised.

By weakening sensitive vegetation, ozone makes plants more susceptible to disease, pests, and environmental stresses.

Ground-level ozone has been shown to reduce agricultural yields for many economically important crops. In Iowa ambient levels of ozone may reduce soybean production by 15 to 20 percent.

The effects of ground-level ozone on long-lived species such as trees are believed to add up over many years so that whole forests or ecosystems can be affected. For example, ozone can adversely impact ecological functions such as water movement, mineral nutrient cycling, and habitats for various animal and plant species.



Air Toxics

Air toxics, also known as hazardous air pollutants or HAPS, are pollutants that cause or may cause cancer or other serious health effects, such as neurological, developmental, and respiratory problems as well as reproductive effects and birth defects.

Some toxic air pollutants, such as mercury, can deposit onto soils or surface waters, where they are taken up by plants and ingested by animals and accumulate through the food chain.

Animals may experience health problems if exposed to sufficient quantities of air toxics over time.

Most air toxics originate from human-made sources, including automobiles, power plants, and factories, as well as building materials and cleaning products. Some of these compounds (like mercury) may persist

in the environment and become more concentrated over time.

The EPA controls 187 air toxics and has issued rules covering 96 categories of major industrial sources, such as chemical plants. Regulations are currently being developed and implemented to reduce emissions from smaller air toxic emission sources, such as surface coating operations and metal fabrication. Controls are also being implemented for cars and trucks.

When air toxic emissions become a concern in an Iowa community, the DNR investigates the situation and collaborates with the Iowa Department of Public Health to assess risk. Communities are kept abreast of findings.

Health effects for each air toxic are at www.epa.gov/ttn/atw/hlthef/hapindex.html.



P The AQI is an index for reporting daily air quality. The higher the AQI value, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality. Most days in Iowa are in the good to moderate level. Sensitive groups are affected when the index is over 100. The daily forecast is at www.airnow.gov.

T Signs of ozone damage on leaves include flecking, stippling, bronzing and reddening. Photo courtesy of USDA.