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You Are What You Breathe: Air Quality and Your Health

This fact sheet explains how air pollution is formed, how respiratory and cardiovascular systems are affected by air pollution, and how to avoid exposure to harmful air pollutants.

An air pollutant is any substance in the air that can cause harm to humans or the environment. Pollutants may be natural or human-made and may take the form of solid particles, liquid droplets, or gases. Examples of air pollutants include ozone (a primary ingredient in urban smog), particulate matter, carbon monoxide, nitrogen dioxide, and sulfur dioxide.

Breathing elevated levels of air pollutants can adversely affect human health, especially among children, the elderly, those with heart or lung diseases, and those with preexisting health conditions. Potential health problems include lung damage, birth defects, nerve damage, reduced immunity, and an increased risk of cancer and premature death.

The Idaho Department of Environmental Quality (DEQ) monitors levels of five air pollutants throughout the state and issues air quality alerts when levels impact human health.

What air pollutants are monitored?

- *Ozone* is a gas composed of three atoms of oxygen. It occurs both in the earth's upper atmosphere and at ground zero. In the upper atmosphere, ozone forms a protective layer that shields us from the sun's harmful ultraviolet rays. At ground level, ozone is formed when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. At ground level, ozone is a harmful air pollutant.
- *Particulate* matter includes a mixture of solids and liquid droplets, either as fine particles or coarse dust particles. Sources of fine particles include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. Chemical reactions of gasses in the atmosphere can also form fine particulate matter. Sources include crushing or grinding operations and dust stirred up by vehicles traveling on roads.
- *Carbon monoxide* is an odorless, colorless gas that forms when the carbon in fuels does not completely burn. Other sources include fuel combustion in industrial processes and natural sources such as wildfires.
- *Sulfur dioxide* is a colorless, reactive gas produced when sulfur-containing fuels such as coal and oil are burned.
- *Nitrogen dioxide* is a brownish, highly reactive gas present in all urban atmospheres. It contributes to formation of both ozone and acid rain. Nitrogen oxides form when fuel is burned at high temperatures.

Are these air pollutants harmful?

Respiratory and cardiovascular systems can be affected by air pollution in the following ways:

- *Respiratory Effects:* With exposure to air pollutants, airways in lungs narrow causing decreased air flow. An influx of white blood cells, abnormal mucus production, fluid accumulation, swelling, and death and shedding of cells that line airways occur, which leads to increased susceptibility to respiratory infections. Increased sickness and premature death from asthma, bronchitis, emphysema, and pneumonia can also occur.
- *Cardiovascular Effects:* With exposure to air pollution, the resulting effects on cardiovascular function include low oxygenation of red blood cells, abnormal heart rhythms, and altered autonomic nervous system control of the heart. Inflammation in arteries, veins, and capillaries occurs, leading to increased risk of built-up plaque rupturing the vessels, which could lead to chest pain or possibly a heart attack. Increased sickness and premature death from coronary artery disease, abnormal heart rhythms, and congestive heart failure can also occur.

Who is at risk and what symptoms are visible?

Children and elderly are sensitive groups that are at higher risk from air pollution, especially children with asthma or other lung diseases, or sensitivity to allergens. The elderly and others with heart or lungs diseases such as congestive heart failure, coronary artery disease, asthma, chronic obstructive pulmonary disease, or chronic bronchitis are at high risk. Symptoms to watch for include coughing, wheezing, shortness of breath, phlegm production, chest tightness, chest pains, palpitations, and/or unusual fatigue.

How can exposure to harmful air pollutants be avoided?

Watch and listen for air quality alerts in local media, especially during winter inversions and hot summer days, or log on to DEQ's website at www.deq.idaho.gov/daily-air-quality-reports-forecasts to check air pollution levels. In general, reduce risk by limiting prolonged or heavy exertion during air pollution episodes. Prolonged exertion is an activity that occurs over several hours and makes breathing slightly harder than normal. In addition to limiting prolonged exertion, cut back on intense activities that cause hard breathing. Limit activity to walking instead of jogging for half the usual time. Pay attention to breathing rate. If unusual coughing, chest discomfort, wheezing, or breathing difficulty is experienced, reduce activity level.

When planning outdoor activities, check the Air Quality Index (AQI) or local air quality alerts. Those in sensitive groups, including children, the elderly, and those with heart or lung diseases may want to cut back or reschedule strenuous outside activities once the AQI reaches the unhealthy level of 101. As the AQI level increases, the amount of outside activity should significantly decrease or be rescheduled for those in sensitive groups. Even the general population should be aware of the AQI and cut back or reschedule strenuous outside activities if the AQI level increases above 151.