

ENVIRONMENTAL HAZARDS & HEALTH EFFECTS

ENVIRONMENTAL HAZARDS CAN AFFECT HUMAN HEALTH

Environmental hazards—like water and air pollution, extreme weather, or chemical exposures—can affect human health in a number of ways, from contributing to chronic diseases like cancer or to acute illnesses like heat exhaustion.

ENVIRONMENTAL HEALTH IS COMPLEX.

- There are gaps in information about how the environment affects human health.
- Some health effects are known, others are suspected.
- These health effects can be both short term (acute) and longer term (chronic).

WE KNOW SOME THINGS ABOUT ENVIRONMENTAL HAZARDS AND HEALTH EFFECTS.

Science has proven some links between health conditions and the environment. We know that:

- Poor air quality can trigger asthma attacks.
- Elevated blood lead levels in children can cause developmental disabilities.
- Vulnerable populations like the elderly and infants are most at risk for heat-related illnesses during heat waves.
- Extreme weather that causes power outages can lead to cases of carbon monoxide poisoning.

MANY LINKS BETWEEN HEALTH CONDITIONS AND THE ENVIRONMENT ARE SUSPECTED BUT NOT YET PROVEN.

Health problems with suspected links to environmental issues include:

- Certain cancers (i.e., bladder, liver)
- Asthma and other respiratory diseases
- Neurological diseases such as Parkinson's disease, multiple sclerosis, or Alzheimer's disease

- Developmental disabilities such as cerebral palsy or autism

AND, THERE IS A LOT THAT WE DON'T KNOW ABOUT THE RELATIONSHIPS BETWEEN ENVIRONMENTAL HAZARDS AND HEALTH.

More research is needed to determine how exposure is cause for health concern and what levels of exposure are safe. For most chemicals, we do not know how low level environmental exposures affect our health.

ASSESSING EXPOSURES

After being exposed to an environmental hazard, it may be possible to detect how much of a substance has gotten into a person's body. This is called **biomonitoring**.

BIOMONITORING

Most biomonitoring involves measuring the amount of a chemical or its breakdown product (metabolite) that is in a small sample of a person's blood or urine.

The amount of the chemical or metabolite in a person's blood or urine depends on the amount of the chemical that has entered that person's body. Exposure pathways include eating, drinking, breathing, and touching.

This amount represents the amount of a chemical that entered the body from all sources and through all exposure pathways combined.

IT'S IMPORTANT TO NOTE THAT BEING EXPOSED TO AN ENVIRONMENTAL HAZARD DOESN'T MEAN THAT A PERSON WILL HAVE A NEGATIVE HEALTH EFFECT.

[Illustration shows a cloud labelled 'environmental hazard'. The cloud has an arrow dropping below it labelled "Exposure to hazard". The arrow points to a family. An arrow to the right of the family is overlaid with a question mark, and that arrow points to a box labeled "Illness, injury, death".]

THE EFFECT OF AN ENVIRONMENTAL HAZARD ON INDIVIDUAL HEALTH IS INFLUENCED BY SEVERAL FACTORS:

[Illustration of 4 concentric circles surrounding a central circle labelled "Health Effect". The top circle "Dose: How much of the hazard a person is exposed to". The circle on the right: "Duration: how long a person was exposed". Bottom circle "Exposure Route: How a person came in contact with the hazard (e.g., breathing, eating, drinking, touching)". Left circle "Personal Traits: Factors like age, diet, genetics, health status, lifestyle, and sex".]

EXAMPLE: CARBON MONOXIDE POISONING

Populations are at increased risk for carbon monoxide poisoning during extreme weather events that can cause power outages. Without power, people may use charcoal or gas grills indoors to cook or keep warm. Doing this may expose them to carbon monoxide (CO) through the air they breathe. While everyone in the home may be exposed to the gas, not everyone will get CO poisoning. The likelihood of poisoning depends on the amount of CO a person is exposed to, how long a person is exposed to CO, and an individual's characteristics like age or having chronic health problems.

[Learn more](#) about CO poisoning, prevention, clinical management, and more.

[An illustration with a DANGER! label. Carbon monoxide (CO) poisoning can't be seen, can't be smelled, can't be heard, can be stopped!]

ENVIRONMENTAL HAZARDS AND HEALTH EFFECTS

The following diagram will help illustrate the point that being exposed to an environmental hazard does not mean that a person will become ill.

Likewise, being able to measure amounts of an environmental chemical in a person's blood, saliva, urine, or other body fluids or tissues does not mean that a person will become sick.

[An illustration of a flow chart. On the left is a cloud labelled "Environmental Hazard" with an arrow below it labelled "Exposure to hazard" pointing to a family. To the right of the family is a diamond shaped decision symbol labelled "Measurable in the body?" Above that decision symbol is a circled "Yes" and

below is a circled "No". Both the Yes and No circles each point to three boxes labelled "Health Effect", "Unknown Effect", and "No Health Effect".]

KNOWLEDGE CHECK 1

Read each question and click on the best answer from the choices provided.

1. Which of the following is true about environmental health?

- a. There is a lot we do not understand about the connections between the environment and health.
- b. Environmental health effects are chronic only.
- c. The most common environmental hazards are air and noise pollution.
- d. For most chemicals, we know that low level environmental exposures affect our health.
- e. None of the above

[The correct answer is a. There is a lot we do not understand about the connections between the environment and health.]

2. Which of the following influence the effect an environmental hazard can have on an individual's health?

- a. Personal traits
- b. Dose
- c. Exposure route
- d. Duration
- e. All of the above

[The correct Answer is "e. All of the above."]

THE HEALTH-ENVIRONMENT CONNECTION

UNDERSTANDING THE CONNECTION BETWEEN OUR ENVIRONMENT AND HEALTH IS IMPORTANT.

The more we know about the health consequences of an environmental hazard, the better we can protect public health through policies, education, and interventions. Let's take a closer look at the relationship between air pollution and health.

EXAMPLE: AIR POLLUTION AND HEALTH

Outdoor air quality

Since the 1950s, air quality has been a major public health and environmental concern. Local, state, and national programs have helped us learn more about the problems and how to solve them.

National air quality has improved since the early 1990s, but many challenges remain in protecting public health and the environment from air quality problems.

Particle pollution

Particle pollution, or particulate matter, consists of particles that are in the air, including **dust, dirt, soot** and **smoke**, and **little drops of liquid**.

Some particles, such as soot or smoke, are large or dark enough to be seen. Other particles are so small that you cannot see them.

Particle pollution includes:

- PM10: coarse, inhalable particles with diameters 10 micrometers and smaller
- PM2.5: fine, inhalable particles with diameters that are generally 2.5 micrometers and smaller
- Ultrafine particles that are smaller than 0.1 micrometers.

EXAMPLE: AIR POLLUTION AND HEALTH

How big is particulate matter?

[Illustration titled: "Fine Particulate Matter Size comparison", with depictions of a human hair (about 70 micrometers wide), a grain of sand (about 50 micrometers wide), PM10 (less than 10 micrometers wide), and PM2.5 (less than 2.5 micrometers wide).

Sources of particulate matter

The composition of these particles can vary based on location, season, and whether they are from primary or secondary sources.

[Illustration with two stacked boxes labelled "Primary Sources" and "Secondary Sources". Primary sources give off particulate matter directly. Examples include: forest fires, road dust, electrical power plants, industrial processes, cars & trucks. Secondary sources give off gases that react with sunlight and water in the air to form particles. Examples include coal-fired power plants, and car and truck exhaust.]

Particulate matter & health

Particles bigger than 10 micrometers can irritate your eyes, nose, and throat but do not usually reach your lungs.

Fine and ultrafine particles less than 2.5 micrometers (PM 2.5 or smaller) are the most concerning because they are most likely to cause health problems. Their small size allows them to get into the deep part of your lungs and even into your blood.

Particulate matter & health effects

Being exposed to any kind of particulate matter has been linked to:

- Increased emergency department visits and hospital stays for breathing and heart problems
- Breathing problems
- Exacerbated asthma symptoms
- Adverse birth outcomes (e.g. low birth weight)
- Decreased lung growth in children
- Lung cancer
- Early deaths

People who are at the highest risk of being bothered by particulate matter include:

- **People with heart or lung diseases** will feel the effects of particulate matter sooner and at lower levels than less sensitive people
- **Older adults** may not know they have lung or heart disease. When particle levels are high, older adults are more likely than young adults to have to go to the hospital or die because the exposure to particle pollution has made their heart or lung disease worse.
- **Children** are still growing and spend more time at high activity levels. When children come in contact with particle pollution over a long period of time they may have problems as their lungs and airways are developing. This exposure may put them at risk for lowered lung function and other respiratory problems later in life. Children are more likely than adults to have asthma and other respiratory problems that can worsen when particle pollution is high.
- **Infants'** lungs continue to develop after birth and can be affected by air pollutants.

Improving air quality improves health.

Lowering particulate matter levels would prevent deaths, mostly from heart attacks and heart disease.

According to 2012 data, a **10% reduction in PM2.5** could prevent:

- **376** deaths per year in a highly populated county, like Los Angeles County;
- Almost **1,500** deaths every year in California; and
- Over **12,700** deaths across the nation.

Centers for Disease Control and Prevention. (2018). *Introduction to Environmental Public Health Tracking*. U.S. Department of Health and Human Services.
<https://www.cdc.gov/nceh/tracking/tracking-intro.html>

