FACT SHEET

Preventing and Managing Wildfire Health Effects

Poor air quality can have detrimental effects on health. Smoke and ash from wildfires are among the exposure hazards of concern.

Prevention measures and early response to symptoms are recommended, especially for those with outdoor occupations and certain vulnerable populations such as the elderly, children and people with respiratory ailments. (Trained firefighters and other first responders who wear respirators and other personal protective equipment are not covered in this Fact Sheet.)

When at risk of exposure to smoke, ash and other particulate matter from a wildfire, public health officials recommend wearing a properly fitted N95 mask with two elastic straps. When there is a seal around the nose and mouth, masks with an N95 rating (N=not oil resistant) filter out 95 percent of particles that are at least 0.3 microns in diameter. While masks with an N95 rating offer some protection from fine particles in smoke, they do not block exposure to toxic gases. Dust masks worn when cleaning house or gardening, and surgical masks used in dental and medical offices, do not provide adequate protection in smoky environments.

Masks reduce airflow. People with asthma and other types of chronic health conditions should consult their physician.

Wildfire Causes

According to the Environmental Protection Agency, the frequency, extent and severity of wildfires is increasing as the climate changes. Earlier spring melting reduces snowpack and water supplies. Wildfires are starting more easily and burning at a higher temperature than they have in the past, in some cases creating super-heated conditions that make them harder to fight, especially in remote areas.

Four critical weather elements produce extreme fire behavior: low relative humidity, strong surface winds, unstable air and drought. Fire growth periods are also associated with hot, dry and unstable weather patterns. An unusually dry airmass must also occur. In brush and timber fuels, drought becomes an important precursor by increasing fuel availability, the National Wildfire Coordinating Group (NWCC) reports.

Exposure Risks

Outdoor exposure risk increases when a temperature inversion traps smoke, other pollutants and fog (smog) close to the ground. For example, an inversion can occur when a warmer, less-dense air mass moves over a cooler, denser air mass. Local geography and climate, such as coastal communities in fog belts or urban areas located in valleys or basins surrounded by mountains, are contributing factors.

An inversion is also produced when radiation from the surface of the earth exceeds the amount of radiation received from the sun, which commonly occurs at night or during the winter when the sun is lower in the sky. Temperature

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inversions are also associated with severe thunderstorms and freezing rain.

Most wildfire-related injuries and deaths are not caused by burns but by smoke inhalation, lack of oxygen and toxic fumes from burning materials such as plastic and vinyl. Smoke can contain potentially lethal components such as:

- Particles that can lodge in the lungs, irritate eyes, and affect respiratory and digestive systems
- Toxic liquids, gases and vapors that can be inhaled or absorbed through the skin

Chemical irritants found in smoke include ammonia, carbon monoxide, chlorine, hydrogen chloride, hydrogen cyanide, phosgene and sulfur dioxide. Carbon monoxide, hydrogen cyanide and hydrogen sulfide are examples of chemicals produced in fires that interfere with the body's use of oxygen at the cellular level.

Carbon monoxide, an odorless, colorless gas, is the leading cause of smoke inhalation incapacitation and death. Sources of carbon monoxide include cars, stoves, heaters, generators, and burning charcoal and wood. Many states have statutes requiring the use of carbon monoxide detectors to help prevent fatalities.

Fire can cause incapacitation by reducing oxygen levels, either by consuming oxygen or by displacing it with other gases. Heat is also a respiratory hazard. Superheated gases burn the respiratory tract and can be fatal.

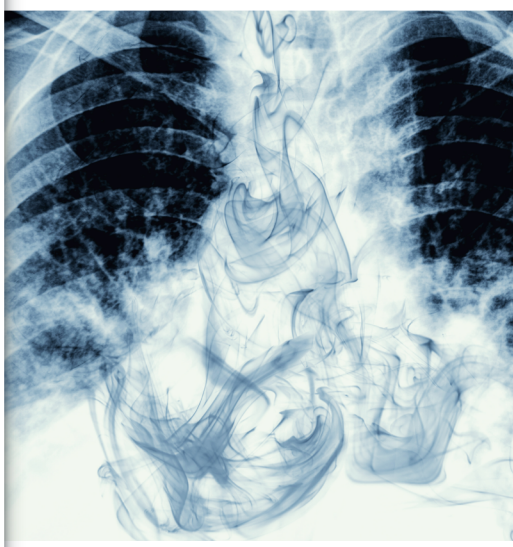
With advances in fire protection, construction techniques and product manufacturing, fire-related mass casualties in the U.S. are relatively infrequent. The vast majority of fire-related deaths and injuries occur to individuals in their homes. In the U.S., fire-related deaths increased 24.1 percent from 2010 to 2019 (U.S. Fire Administration statistics).

The National Interagency Fire Center estimates more than 72,000 U.S. communities are at risk from wildfires. In 2020, more than 58,000 wildfires burned over 10.1 million acres, and in 2019, over 50,000 wildfires burned over 4.7 million acres in the U.S. A report released in July 2021 by the California Air Resources Board said the 2018 Camp Fire that leveled the town of Paradise, CA, released unhealthy levels of particulate matter, zinc, lead and other dangerous chemicals that spread more than 150 miles. The Camp Fire destroyed about 19,000 structures and killed 85 people.

Smoke Inhalation Symptoms

Airway, breathing and circulation – the ABCs – apply when evaluating signs and symptoms of smoke inhalation. Watch for the following:

- Loss of consciousness (medical emergency)
- Nausea/vomiting
- Shortness of breath
- Chest tightness
- Coughing with or without mucus



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- Burning sensation in the throat and/or lungs
- Voice changes/hoarseness
- Tingling sensations (may be related to oxygen deficiency)
- Headache, dizziness, lightheadedness
- Confusion or irritability
- Burning sensation to the eyes, blurry vision, watery eyes

Questions that may apply during a medical assessment include:

1. What was the source and duration of exposure to smoke?
2. Is there a likelihood of exposure to burning plants such as poison oak or poison ivy? (Inhalation of plant toxins may constitute a medical emergency.)
3. Does the person with suspected exposure have a history of asthma or other respiratory diseases?

Recommended Response

In a medical emergency, follow your company's emergency assistance protocol or call 911 if you are at not at work. If you observe or experience non-emergency signs and symptoms of smoke inhalation, move to an area with clean air and seek medical advice.

In addition to wearing an N95 mask, here are 10 more ways to protect yourself:

1. As feasible, work indoors or limit outdoor exposure.
2. Avoid strenuous activity and outdoor exercise.
3. Keep windows and doors closed and use the air recirculation option in vehicles.
4. If you run an air conditioner, keep the fresh-air intake closed and ensure the filter is clean.
5. Do not burn candles or light a fire in a fireplace or wood-burning stove.
6. Increase fluid intake to the extent your personal health allows.
7. Use over-the-counter natural tears or eye drops for burning or watery eyes.
8. If you use an inhaler, make sure you carry it with you and have a prescription refill on hand.
9. Check air quality reports at www.AirNow.gov and avoid smoky areas.
10. Important: If symptoms persist or get worse, consult a medical professional.

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