- Burn Wise Awareness Kit
- Video public service announcements

Smoke Detectors

Each year, about 3,000 people die in residential fires in the U.S. – mainly from smoke inhalation. A properly installed and maintained smoke alarm is one of the best and cheapest ways to be warned early of a potentially deadly fire.

Wood smoke can affect everyone, but children, teenagers, older adults, people with lung disease, including asthma and COPD or people with heart diseases are the most vulnerable. Research indicates that obesity or diabetes may also increase risk. New or expectant mothers may also want to take precautions to protect the health of their babies, because some studies indicate they may be at increased risk.

It's important to limit your exposure to smoke—especially if you are more susceptible than others:

- If you have heart or lung disease, such as congestive heart failure, angina, chronic obstructive pulmonary disease, emphysema or asthma, you may experience health effects earlier and at lower smoke levels than healthy people.
- Older adults are more likely to be affected by smoke, possibly because they are more likely to have chronic heart or lung diseases than younger people.
- Children also are more susceptible to smoke for several reasons: their respiratory systems are still developing; they breathe more air (and air pollution) per pound of body weight than adults; and they're more likely to be active outdoors.

Learn how to reduce wood smoke and lower your risk.

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Environmental effects of wood smoke

The particles in wood smoke can reduce visibility (haze) and create environmental and aesthetic damage in our communities and scenic areas – like national parks.

LAST UPDATED ON JULY 10, 2017

Click on image to enlarge

Smoke may smell good, but it's not good for you. Both short- and long-term exposures to particle pollution from wood smoke have been linked to a variety of health effects.

Short-term exposures to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections. Long-term exposures (months or years) have been associated with problems such as reduced lung function and the development of chronic bronchitis—and even premature death. Some studies also suggest that long-term PM 2.5 exposures may be linked to cancer and to harmful developmental and reproductive effects, such as infant mortality and low birth weight.

Who is at risk from wood smoke?

Related Information

Components of wood smoke:

- Particle pollution
- Benzene EXIT
- Formaldehyde EXIT
- Acrolein EXIT
- PAHs EXIT

Additional health information:

- How smoke from fires can affect your health
- How wood smoke harms your health (Washington State Department of Ecology) EXIT

Asthma resources:

- EPA Asthma website
- CDC Asthma website EXIT
- NoAttacks.org EXIT

Outreach materials:

We've made some changes to EPA.gov. If the information you are looking for is not here, you may be able to find it on the EPA Web Archive or the January 19, 2017 Web Snapshot.

EPA United States Environmental Protection Agency

Wood Smoke and Your Health

- What is wood smoke?
- Health effects of wood smoke
- Who is at risk from wood smoke?
- Environmental effects

What is wood smoke?

Carbon Monoxide Detectors

Smoke from wood that is not burned completely contains a number of chemicals, including carbon monoxide (CO).

More than 150 people die annually from CO poisoning related to the use of home heating appliances.

CO is odorless and colorless. If you use a wood stove or fireplace, install a digital CO detector, which sounds an alarm when CO levels increase. Protect Your Family and Yourself from Carbon Monoxide Poisoning.

Smoke forms when wood or other organic matter burns. The smoke from wood burning is made up of a complex mixture of gases and fine particles (also called particle pollution, particulate matter, or PM). These microscopic particles can get into your eyes and respiratory system, where they can cause health problems such as burning eyes, runny nose, and illnesses such as bronchitis. In addition to particle pollution, wood smoke contains several toxic harmful air pollutants including: benzene, formaldhyde, acrolein and polycyclic aromatic hydrocarbons (PAHs).

Health effects of wood smoke

Government of Canada Gouvernement du Canada

Avoid wood smoke

Some people use wood as their main source of heat, while others have wood stoves as a back-up. But wood smoke contains a number of pollutants that can be harmful to your health.

If you use a wood stove or fireplace in your home, there are steps you can take to reduce the health risks for you, your family, and neighbours.

Important!

Protect yourself and your family by installing smoke detectors and at least one carbon monoxide (CO) detector in your home. See Safe at Home for more information.

Wood smoke and indoor air

Wood smoke can get into your home:

- when you open the stove to add or stoke the firewood
- through leaks and cracks in faulty or poorly-maintained stoves
- from other nearby homes with wood-burning stoves

The main pollutants in wood smoke that cause health concerns are:

- **Particulate matter** - This is the term for solid or liquid particles found in the air, which help create smog. They can be very small and can travel deep into your lungs, causing breathing and heart problems.
- **Carbon monoxide (CO)** - This is a colourless, odourless gas that is poisonous at high levels. It can make you feel sick and even kill you.
- **Volatile organic compounds (VOCs)** - These are a wide range of compounds that usually have no colour, taste or smell. Some cause direct health effects, while others contribute to smog.
- **Polycyclic aromatic hydrocarbons (PAHs)** - These compounds are a health concern because they can cause cancer.

In communities where wood heating is common, wood smoke can be responsible for as much as 25% of the airborne particulate matter, 8% of the VOCs, and 7% of the CO in the air.

Wood smoke also contains small quantities of other toxic compounds, including nitrogen oxides and chlorinated dioxins. These can contribute to environmental hazards, like smog and acid rain.

Health risks

Wood smoke can cause eye, nose, and throat irritations, as well as headaches, nausea, and dizziness. It can make asthma and other breathing (respiratory) problems worse.

Smog, to which wood smoke can be a significant contributor, has been linked to severe health risks, including increased hospital admissions and even premature death.

Wood smoke can affect anyone, but these groups are especially vulnerable:

- people with heart or lung problems

- children, because their respiratory systems are still developing and they tend to be more active and inhale more air

Safety tips

Help reduce the environmental and health impacts of wood smoke by following these tips:

- **Switch your heating source**. Switch to a different source of heating, like natural gas or oil.
- **Choose a low-emission stove**. Install an "advance combustion" wood stove or fireplace insert to reduce toxic emissions. Look for appliances that have a sticker from the United States Environmental Protection Agency (EPA). This sticker certifies that the appliance emits up to 95% fewer particulates and is up to 20% more fuel-efficient than regular models.
- **Maintain your stove**. Make sure that your wood stove is well maintained and working properly. Have it inspected by a qualified professional at least once a year.
- **Clean your chimney**. Clean your chimney and flues regularly. Follow the manufacturer's instructions.
- **Use your dampers**. Allow more air (ventilation) when starting a fire, and close the dampers when the wood is well charred. This technique produces more heat, so you use less wood.
- **Burn wisely**. Avoid burning wood on days when air pollution levels are high.

The type of wood you burn and the way you store it also matters:

- **Use dry, seasoned wood**. Cut, split, and stack wood in a dry area for at least six months before burning it.
- **Let wood breathe**. Stack wood loosely in your firebox to let the air freely circulate around it.
- **Burn smaller pieces of wood**. Small pieces are more efficient and a better source of heat.

Never burn:

- wood that has been painted or chemically treated
- household garbage or cardboard (plastics, foam, and coloured ink on magazines, boxes, and wrappers produce harmful chemicals when burned)
- ocean driftwood, plywood, particle board, or any wood with glue on or in it (they all release toxic chemicals when burned)
- wet, rotted, diseased, or mouldy wood (this may expose your family to mould and spores that can harm their health)

For more information

- Burn Wise
- The basics: protect your home and family
- Order the Hazardcheck guide
- Virtual house tour

- For First Nations and Inuit
- For industry and professionals

Date modified:
2012-12-10

FAMILIES FOR CLEAN AIR

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Myths & Facts

Wood smoke is natural, so it must be okay.

We tend to think that substances that are 'natural' are harmless, but this isn't true.

Asbestos, tobacco, and uranium are just a few of the natural substances that are harmful to human health.

Even though humans have burned wood since the beginning of time, scientists have only recently discovered just how hazardous wood smoke pollution is to our health.

The negative health effects of residential wood smoke have now been extensively documented in hundreds of scientific studies. The pollution generated by wood burning has been linked to a litany of health problems that include asthma attacks, diminished lung function, respiratory ailments, heart attacks, and stroke.

Aren't there more important environmental issues to worry about?

When it comes to air pollution, not really.

In many locations, such as the San Francisco Bay Area, wood burning is the single largest source of hazardous particle pollution during winter, creating even more particle pollution than vehicles and industry.

In many areas, wood burning is also one of the most significant sources of toxins such as dioxin.

Unlike highly regulated industrial sources of pollution, wood burning occurs right in the neighborhoods where we live—sometimes right next door. This means that people can be subjected to levels of hazardous pollution from wood burning that are far higher than from any other pollution source.

Wood smoke pollution is only a problem for people with asthma.

While the pollution from wood burning is especially dangerous for those with existing health conditions, children, and the elderly, it is hazardous to the health of all human beings.

Studies have shown that even in young, healthy people, exposure to the particle pollution produced by wood burning causes inflammation of the lungs and decreases lung volume.

While the hazardous health effects of wood burning pollution increase with the levels in the air, scientists have found that there is no level of particle pollution that is not unhealthful.

The basic rule of thumb is this: if you can smell wood smoke, you're breathing pollution that is hazardous to your health.

EPA certified woodstoves are the solution.

While it is true that EPA certified wood stoves may produce less particulate air pollution than uncertified ones when new and operated according to manufacturer specifications, they produce orders of magnitude more particulate pollution than appliances that burn natural gas.

In addition, the stated performance of EPA certified wood stoves degrades with use to the point where the particulate emissions are comparable to non-certified wood stoves.

Another key issue: EPA certified wood stoves emit highly toxic dioxins at levels equal to, or even greater, than levels emitted by conventional wood burning devices.

Wood smoke rises, so what's the problem?

Most of the harmful pollutants from wood burning don't rise. They hang around at ground level for up to ten days.

On cold winter days (when people tend to burn wood) the problem is even worse, because the weather conditions create temperature inversions that put a lid over the lower atmosphere, trapping hazardous pollutants close to ground level.

I can just shut my windows and I'll be fine.

The fine particle pollutants from wood burning are so small that they infiltrate even the most well-insulated and weather-stripped homes. Scientific studies have shown that particle pollution levels inside homes reach up to 70% of the pollution levels outdoors.

> There are nationwide and local epidemiological studies showing that when particulate matter (in air pollution) goes up, premature deaths go up.
>
> – Matthew Lakin, Ph.D., U.S. EPA

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- **RECENT ARTICLES**
  - New Paper Examines Effects of Wood Smoke Pollution on Children's Health
  - More Evidence that "Clean" Wood Burning Isn't Clean
  - Catalytic Wood Stoves Shown to Increase Dioxin Emissions
  - Wood Burning Causes Climate Change: Incentivizing New Wood Stoves Isn't the Solution
  - Why Your Neighbor's Wood Smoke is Killing You
-
- **BECOME A FRIEND OF FAMILIES FOR CLEAN AIR**

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