

Wood Smoke & Your Health: What you need to know



BC LUNG
FOUNDATION



Ministry of
Environment and
Climate Change Strategy

Residential wood smoke is a major source of air pollution in BC, especially fine particulate matter (PM_{2.5}). The pollutants in wood smoke are known to affect health.

Heating a home with wood is still a common practice, particularly in rural BC. Many people think wood is an environmentally friendly fuel since it comes from a renewable source. While it's true that wood is renewable, when it's burned in wood stoves and fireplaces it releases significant amounts of harmful substances.

An old uncertified wood stove can emit 50-70 grams of particulate matter in an hour. Newer models emit less PM_{2.5} but even the cleanest wood stoves pollute local airsheds far more than other home heating options like electricity or natural gas.

Wood smoke caused by residential wood burning is a major concern in many communities across BC. Measurements show that in many BC communities wood smoke is one of the largest sources of PM_{2.5}. Even in Metro Vancouver where wood heating is less common, wood burning accounts for nearly one-third of PM_{2.5}. Wood smoke is a contributor to poor air quality in most areas of the province. The hardest hit are valley communities where temperature inversions may prevent wood smoke from dispersing.

The smoke from wood burning affects everyone in the community, not just those who burn wood. When wood smoke levels are high in a community, people are exposed to it both indoors and outdoors. Pollutants enter buildings through cracks and leaks and are drawn in by ventilation system.



What pollutants are in the wood smoke?



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Wood smoke is a complex mixture of solids, gases, and liquids. It contains hundreds of pollutants, including some that can cause adverse health impacts.

Fine Particulate Matter (PM_{2.5})

PM_{2.5} consists of tiny solid or liquid particles that are easily inhaled deep into your lungs. Once there, PM_{2.5} can damage the lung tissues and aggravate lung disease. Even at very low levels, exposure to fine PM_{2.5} can be harmful to your health.

Volatile Organic Compounds (VOCs)

VOCs are gases that are emitted from burning wood. They include a variety of chemicals that may have short- or long-term adverse health effects. VOCs such as benzene, acrolein, and dioxins, are known to cause cancer. Formaldehyde can cause coughing, headaches, eye irritation, and increased asthma symptoms.

Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are chemicals produced when materials such as wood are burned. Short-term exposure to PAHs can cause eye and skin irritation, nausea, vomiting and inflammation. Long-term exposure has been linked to cancer and organ damage.

Carbon Monoxide (CO)

CO is a colourless, odourless, poisonous gas that replaces oxygen in your blood. Inhaling it can cause fatigue, headaches, dizziness, nausea, and confusion. In severe cases, it can lead to unconsciousness and death.

Nitrogen Dioxide (NO₂)

NO₂ can lower resistance to lung infections. It can irritate the upper airways and cause shortness of breath, especially in people with lung diseases like chronic obstructive pulmonary disease (COPD) and asthma.



Who is affected by wood smoke?



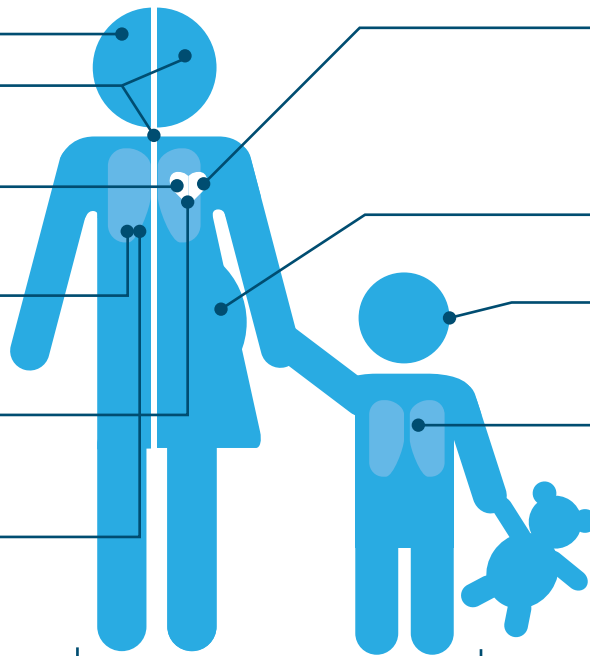
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Wood smoke affects everyone. There are groups of people who are more susceptible to the effects of wood smoke:

- Infants and children
- Elderly people
- People with heart and lung conditions
- Outdoor workers
- Pregnant people
- People with diabetes

Short-term health effects

- Headaches
- Irritated eyes and throat
- Increased risk of heart attack or stroke
- Irritated airways and reduced lung function
- Increased incidence of irregular heartbeat
- Worsening of lung conditions like COPD and asthma



Long-term health effects

- Increased risk of a heart attack or stroke and increased blood pressure for those with risk factors for heart disease
- Babies born pre-term or with low birthweight
- More respiratory illness and middle ear infections in children
- Decreased lung function in children
- More severe and frequent asthma and COPD symptoms
- More emergency room visits and hospitalization because of asthma or COPD
- Premature death



What can you do?



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Consider replacing your wood burning appliance with a non-wood burning one.

Heat Pump

Heat pumps are energy efficient options for both heating and cooling. They can provide two or three times the heat of electric baseboards for the same electricity. Although heat pumps are more expensive to install, they can provide air conditioning in summer as well.

Electric Fireplace

Electric fireplaces are relatively cheap to purchase and emit no pollution. They can be installed anywhere, plug into a regular electrical outlet, and do not require a vent or chimney. Electric fireplaces have similar efficiency to electric baseboard heaters and are therefore less efficient than electric heat pumps.

Pellet Stove

Pellet stoves burn wood pellets. They emit less greenhouse gas than burning fossil fuel, such as natural gas. They generate some smoke, but they are far more efficient and clean burning than wood stoves. Pellet stoves can be installed anywhere a wood stove is used and have much of the same ambiance. When installed with backup power they can continue to work during power outages.

Gas Fireplace

Gas fireplaces emit less PM_{2.5} pollution than a wood stove but do emit greenhouse gas that contribute to climate change. Natural gas fireplaces are safe and efficient if installed properly.

RELATIVE EMISSIONS OF FINE PARTICULATE MATTER



Wood Burning Fireplace
28 lbs



Uncertified Woodstove
4.6 lbs



EPA Certified Woodstove
1.4 lbs



Pellet Stove
0.49 lbs



Oil Furnace
0.013 lbs



Gas Furnace or Stove
0.0083 lbs



Electric Heat
Zero annual pollution



VERY DIRTY

VERY CLEAN

When the air is smoky, you can reduce the amount of smoke you breathe by:

- Choosing a less strenuous activity like walking instead of jogging
- Exercising indoors
- Closing windows, vents, doors, and plugging drafts
- Using air cleaners with HEPA filter in your home.

If wood smoke is a problem in your neighborhood, contact your local government and your local health authority.

Some local governments have enacted bylaws to reduce smoke and to deal with problems such as illegal burning. If you suspect burning of prohibited materials, you can also contact BC's Report ALL Poachers and Polluters (RAPP) line, toll-free at **1-877-952-7277**. If you live in Metro Vancouver, please visit Metro Vancouver's Make An Air Report Quality Complaint website or call **604-436-6777**.

Source: Average emissions (lbs/MMBtus of heat output) for hear source type. Data from US EPA.