

CANCER COUNCIL POSITION STATEMENT: WOOD HEATERS & CANCER RISK

Currently, around 14 per cent of people in the Australian Capital Territory (ACT) report using a woodfire heater as their main source of heating.¹ Despite the relatively small number of households using wood heaters, smoke from residential wood heaters is the largest source of air pollution in Canberra during the winter months.² Furthermore, the health impacts of wood smoke can be worse in areas such as the Tuggeranong valley where the shape of the valley together with regular temperature inversions can hold pollutants closer to the ground.²

Overall outdoor air pollution and particulate matter in outdoor air pollution are both classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (Group 1); exposure can cause lung cancer. In addition, a positive association has been observed between exposure to outdoor air pollution and cancer of the urinary bladder.³

Indoor emissions from household combustion of biomass fuel (primary wood) have been classified by IARC as probably carcinogenic to humans (Group 2A), with the IARC working group concluding there was limited evidence for a causal association with lung cancer.⁴ Since the IARC evaluation in 2006, there have been more than 20 relevant human cancer studies published, including a larger database of cancers other than lung. Therefore, the United States National Toxicology Program is currently conducting a cancer hazard evaluation of wood smoke for potential listing in the Report on Carcinogens.⁵

The smoke from burning wood contains a range of pollutants that are widely recognised as harmful to people's health and the environment. Wood smoke is a complex mixture of gases, chemicals, and fine particles that are a product of incomplete combustion. Pollutants in wood smoke can include fine **particulate matter** (PM_{2.5}), carbon monoxide, carbon dioxide, nitrogen oxides, **volatile organic compounds (VOCs)**, and **polycyclic aromatic hydrocarbons (PAHs)**, some of which are known carcinogens.⁶

Volatile organic compounds are emitted as gases from certain solids or liquids and include a variety of chemicals that can have short- and long-term adverse health effects.⁷ VOCs in wood smoke can include the Group 1 carcinogen benzene, which causes acute myeloid leukaemia, and formaldehyde, which causes cancer of the nasopharynx and leukaemia.^{8,9}

Residential wood heating can be a major source of **PAHs** in outdoor and indoor air and is a primary source of PAHs exposure in humans¹⁰⁻¹² PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of wood, coal, gas, tobacco, or other organic materials. PAHs are widespread environmental contaminants and generally occur as complex mixtures rather than as single compounds. One of the main PAHs is benzo[a]pyrene, which is classified as a Group 1 carcinogen by IARC, while three PAHs are classified as probably carcinogenic to humans (Group 2A) and 11 have been classified as possibly carcinogenic to humans (Group 2B). Long-term exposure to PAHs increases the risk of lung cancer.¹¹

Particulate matter is the primary air pollutant of concern for human health with levels significantly increasing during winter months in the ACT due to emissions from residential wood heaters.² Airborne particulate matter with particles of aerodynamic diameter less than 2.5 micrometres (PM_{2.5}) are too small to be filtered by the nose and upper respiratory system. As a result, when people breathe in wood smoke, PM_{2.5} can penetrate deep into the lungs and enter the bloodstream where they can cause a range of health issues that can affect all systems of the body. Long-term exposure to PM_{2.5} in outdoor air pollution can increase the risk of developing lung cancer³ and has also been linked to cardiovascular disease, respiratory disease, pre-term birth, metabolic disorders, and neurological health problems.¹³

Currently, there is no known safe level of air pollution or PM_{2.5} exposure.^{14,15} It is important people limit their exposure to wood smoke, particularly if they are among those who are at greater risk of harmful health effects from wood smoke, such as pregnant women, children, older adults, and people with lung disease (e.g., asthma and chronic obstructive pulmonary disease), or cardiovascular disease.^{16,17}

In summary, inhaling wood smoke has the potential to expose people to a range of carcinogens and contribute to their risk of developing cancer, primarily cancer of the lung. However, there are many factors that impact the presence and concentration of these carcinogens in wood smoke, and therefore an individual's level of exposure to carcinogens, and any associated cancer risk.

To reduce air pollution and cancer risk from wood heaters, Cancer Council ACT recommends that people avoid burning wood (especially during high pollution days) and substitute wood burning heaters for alternative, cleaner sources of heating, such as solar panels, natural gas, or electric heating (e.g., reverse cycle air conditioning).

Cancer Council ACT encourages Canberrans to apply for the [Wood Heater Replacement Program](#), which helps you replace your wood heater with energy-efficient alternatives. If elimination and substitution of wood heaters is not viable, then we recommend people make sure the fuel burns as cleanly as possible to reduce pollution, such as burning only dry, seasoned wood that has been split, stacked, covered, and stored, and never burning garbage, plastic, or treated wood.¹⁸ For more information, visit the ACT Government's '[Burn right tonight](#)' webpage.

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