

Cooking Impacts on Indoor Air Quality, Health, and Climate

Indoor Air Pollution from Cooking

Cooking is an important part of our everyday lives. Did you know that cooking also contributes to indoor air pollution? It's important to use proper exhaust ventilation to help remove pollutants.

Cooking on all stove types produces fine particulate matter (PM_{2.5}), which is a mixture of particles that can be inhaled deep into the lungs. Decades of research shows long-term exposure to PM_{2.5} increases the risk of premature death in people with existing heart or lung disease. Long-term exposure is also linked with an increased risk of developing chronic heart and lung conditions, impacts on brain health, and adverse birth outcomes. Short-term exposure to PM_{2.5} can worsen existing heart or lung conditions and can increase hospitalization among these populations.

Indoor Air Quality Impacts of Gas Stoves

Gas stoves can produce nitrogen dioxide (NO₂). Some NO₂ may be all around us from sources like traffic pollution, but using gas stoves increases it indoors. A 2006 study¹ in Massachusetts and Connecticut found homes with gas stoves had, on average, nearly 3 times higher NO₂ than homes with electric stoves over a 1-2 week period. According to EPA, NO₂ levels in homes with gas stoves are 1.5-4 times higher than in homes with electric stoves. Cooking with gas stoves can lead to indoor NO₂ levels that exceed EPA's health standards for outdoor NO₂ concentrations. (There are no EPA indoor standards.)

Indoor NO₂ can make asthma and other breathing problems worse for children. The same 2006 study found that pollution from gas stoves more than doubles the odds of wheezing and shortness of breath for kids with asthma living in multifamily housing. Further, a 2011 study² from New Zealand found kids with asthma who live with higher NO₂ levels use their inhalers 14% more often.

In addition to NO₂, gas stoves release other pollutants. When gas stoves are on for long periods of time, carbon monoxide concentrations can build to unsafe levels. Install carbon monoxide alarms and check them regularly. Never use a gas stove or oven for heating your home and have gas appliances serviced every year.

Climate Impacts of Gas Stoves

Natural gas is mainly methane. At the levels emitted from gas stoves, methane isn't generally a direct health threat but is a potent greenhouse gas, 84 times more effective at trapping heat than carbon dioxide over 20 years. Gas stoves typically use far less natural gas than water heaters and furnaces. Since methane contributes 20% of Washington state's greenhouse gas emissions, reducing reliance on all natural gas appliances is environmentally beneficial, in addition to improving public health.

Disparities in the Impacts of Gas Stoves and Cooking Pollution

The risks of pollution from cooking and gas stoves are exacerbated by existing inequities. These include disparities in air pollution exposure, rates of chronic conditions, and housing that in part result from structural racism.

On average in Washington, Black and Asian people are exposed to higher levels of PM_{2.5} compared to other groups. This increases their risk of cooking- and gas stove-related health impacts, due to their higher overall pollution burden. Based on 2014 data, Black people were exposed to levels of PM_{2.5} over 1.3 times higher than white people, and Asian people were exposed to levels 1.5 times higher.

People with asthma are at higher risk of health impacts from gas stoves. American Indian/Alaska Native adults have the highest asthma rates (18%), while Black and Pacific Islander adults also face elevated rates (11%) compared to other groups.

Indoor cooking pollution is often more concentrated in smaller homes, with Black and American Indian/Alaska Native households occupying a larger share of units under 1,000 square feet, leading to higher pollution burden for these households. Homeownership enables easier modifications like switching the type of stove and installing or improving kitchen exhaust systems. As a consequence, it is generally easier for white households in Washington to make these changes, with a homeownership rate over 2 times that of Black households, 1.5 times the rate of Hispanic households, and 1.3 times the rate of American Indian and Alaska Native households.

How to Reduce Health Impacts of Indoor Air Pollution from Cooking and Gas Stoves

Ventilating a space with sufficient air flow dilutes indoor contaminants. A fan that exhausts to the outside is critically important to control cooking pollution, including pollutants generated by igniting burners, heating oil, and cooking food. Additionally, replacing gas stoves with electric stoves eliminates gas stove-specific pollutants like NO₂. Many homes do not have any form of kitchen exhaust, which is important for indoor air quality with any kind of stove.

Range hoods are one type of kitchen exhaust that consists of a fan, usually with a screen, placed above a stovetop. Range hoods either draw air up through ducting and exhaust it elsewhere, or they recirculate air back into the kitchen (also known as a ductless or recirculating hood).

It is important that kitchen exhaust is ducted to the outside and not into the attic or crawlspace. A professional can determine this. Recirculating hoods are generally much less effective than ducted hoods in removing pollution from cooking. Higher airflow exhaust is needed for gas stoves compared to electric stoves to remove pollutants from gas and cooking itself.

Tips to reduce indoor air pollution from cooking:

- Use a range hood every time you cook.
- Cook on the back burners when possible.
- Use the maximum airflow setting of the hood.
- Lower the cooking heat when possible.
- Follow the manufacturer instructions to maintain your hood, including regularly washing the metal screens.
- If you have a recirculating hood, replace the filters, per manufacturer instructions.
- If you do not have an exhaust fan, open a nearby window.



A ducted range hood (above) ideally sends air outside. A recirculating range hood (below) does not send air outside.



Additional Resources

- [Combustion Pollutants in Your Home Guidelines, California Air Resources Board](#)
- [Indoor Air Pollution from Cooking, California Air Resources Board](#)
- [Indoor Air Quality, Washington State Department of Health](#)

¹ 2006 study: Belanger, Kathleen, et al. "Association of indoor nitrogen dioxide exposure with respiratory symptoms in children with asthma." *American journal of respiratory and critical care medicine* 173.3 (2006): 297-303.

² 2011 study: Gillespie-Bennett, J., et al. "The respiratory health effects of nitrogen dioxide in children with asthma." *European Respiratory Journal* 38.2 (2011): 303-309.

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email doh.information@doh.wa.gov.