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The Health Risks of Gas Stoves Explained

Gas stoves produce emissions that can harm human health and the environment. Experts answer questions about the dangers and how to limit them

BY TANYA LEWIS

Credit: Sean Gladwell/Getty Images

Editor's Note (5/3/23): New York State has become the first state to pass a law banning gas stoves and other gas-powered appliances in new buildings, including houses and apartment buildings. The move is intended to reduce greenhouse gas emissions, but gas stoves also pose health risks, as this article published in January 2023 explains.

The Internet has been aflame in recent days over gas stoves—specifically, over whether they are harmful to human health and can or should be banned in the U.S. But this is not a new issue.

Scientists have long known that gas stoves emit pollutants that irritate human airways and can cause or exacerbate respiratory problems. The recent furor seems to have been set off by comments recently made by Richard Trumka, Jr., a commissioner of the Consumer Product Safety Commission (CPSC), a government agency that addresses the risk of illness and injury from various products. Speaking about the commission's plans to potentially regulate gas stoves, Trumka told Bloomberg News that "any option is on the table. Products that can't be made safe can be banned."

In response, conservative politicians (and Democratic Senator Joe Manchin) pushed back strongly against what they perceived as an attempt to ban gas stoves. House Republicans even introduced legislation to prohibit the CPSC from outlawing the popular cooking appliances. The chair of the CPSC recently clarified that the commission is not planning any kind of ban but is seeking public comment to make gas stoves safer.

Scientific American spoke with several experts about the health and environmental risks posed by gas stoves. The answers below are based on their responses.

Do gas stoves produce emissions that are harmful to human health?

Gas stoves burn natural gas, which generates a number of invisible by-products. The biggest concern for human health is nitrogen dioxide (NO_2). This gas is produced when natural gas is burned at high temperatures in the presence of nitrogen in the atmosphere, according to Josiah Kephart, an assistant professor in the department of environmental and occupational health at Drexel University. "We've known for a long time that [nitrogen dioxide] has many harmful effects on health," he says.

The Environmental Protection Agency regulates outdoor NO_2 emissions, setting standards for their safe exposure limit. But there are no similar standards for indoor exposure. Nevertheless, studies dating back decades have shown harmful effects from the NO_2 in gas cooking stoves.

"Our knowledge of the health impacts of outdoor NO_2 has grown dramatically in the last 10 years, and we have found that it is much more of a health risk than perhaps we previously thought," Kephart says. And the impacts of breathing NO_2 indoors are no different from those of doing so outdoors. "It has the same effect on your body," he says.

Studies have also found that unburned natural gas leaks from stoves—and this gas contains benzene, a known carcinogen. In addition, cooking in general creates fine particulates with a diameter of 2.5 microns or less (PM2.5), a known irritant that can cause or exacerbate respiratory problems.

What are the known health effects from NO_2 exposure?

In a 1992 meta-analysis of studies on this topic, scientists at the EPA and Duke University found that nitrogen dioxide exposure that is comparable to that from a gas stove increases the odds of children developing a respiratory illness by about 20 percent. Since then, numerous other studies have documented the effects of gas stove exposure on respiratory health. A 2013 meta-analysis of 41 studies found that gas cooking increases the risk of asthma in children and that NO_2 exposure is linked with currently having a wheeze. Most recently, a study published last December found that 12.7 percent of childhood asthma cases in the U.S. can be attributed to gas stove use. (This result was found by essentially multiplying a measure of the previously reported risk of developing asthma from gas stove exposure by the proportion of children who live in housing with gas stoves.)

The American Gas Association (AGA), a natural gas industry group, issued a statement pushing back against the December 2022 study that linked gas cooking with asthma. The statement claimed the study authors did not conduct measurements of real-life appliance use and ignored some of the scientific literature on this topic. The AGA cited a separate study that found no evidence of a link between cooking with gas and asthma symptoms of diagnosis.

Scientific American also reached out to the American Public Gas Association, a nonprofit trade association, for comment but has not received a response to questions at press time.

Most of the studies on the health effects of cooking gas have been observational because it would obviously be unethical to intentionally expose children to environmental risks, says Ulrike Gehring, an associate professor at the Institute for Risk Assessment Sciences at Utrecht University in the Netherlands and a co-author of the 2013 meta-analysis. Still, some past studies have measured NO_2 concentrations in various indoor settings and have shown that people with asthma have more severe symptoms when they're exposed to higher levels of the gas. Although observational studies cannot prove that cooking with gas causes asthma, Gehring says, accounting for other risk factors such as parental asthma and secondhand tobacco smoke "increases our confidence" that it does.

In addition to acute effects such as asthma symptoms, long-term nitrogen dioxide exposure has also been linked to chronic lung disease and increased mortality in general.

Are the effects seen in both children and adults?

Though most of the relevant research has focused on children, there have been some studies on adults. Some of these investigations have found a stronger association between gas stove use and respiratory symptoms in women, suggesting that they may be exposed to more nitrogen dioxide—possibly during cooking—Gehring says.

If I already have a gas stove, what steps can I take to reduce the risks?

If you have the means, you can replace your gas stove with an electric one. The Inflation Reduction Act provides rebates of up to $840 for purchasing new

electric appliances, including stoves and cooktops. (Eligibility varies by state and income level.)

But if you can't afford to buy a new stove or if you rent an apartment and can't change the appliances, experts note that there are still things you can do to reduce your exposure risk.

If your stove has an overhead vent, you should use it every time you cook—and ideally it should vent to the outside. "You should always turn that exhaust fan on anytime that you're using your stove, no matter if you're just boiling water," says Eric Lebel, a senior scientist at PSE Healthy Energy, a nonprofit research and policy institute in Oakland, Calif. "Even if what you're cooking doesn't smell, if that flame is on, you should have the exhaust on to help reduce the concentrations of the off-gassing, or those [nitrogen oxide] by-products, in the kitchen."

Unfortunately, many people don't use their vents. They work best when they're running at full blast, which can be pretty loud, and the filter should be changed about every three months, Kephart says. And some overhead vents merely recirculate the air back into a room. If you don't have a "ducted hood" that vents to the outside, you can open a window and run a fan to increase ventilation, Lebel says. Portable air purifiers may also help, Kephart says, although they don't completely remove the NO_2.

You can reduce the amount of time you run your stove by using electric kettles and pressure cookers. You can also buy an electric cooktop; some are available for around $100 or less.

Do gas stoves produce emissions that are bad for the climate?

Yes. Burning natural gas produces carbon dioxide, the most prevalent greenhouse gas. And unburned natural gas contains another potent culprit: methane. A 2022 study by Lebel and his colleagues found that gas stoves leak this unburned methane, which is not directly harmful to human health but accumulates in the atmosphere, where it traps heat and contributes to climate change. Lebel and his team found that methane emissions from gas stoves in U.S. homes could have as much impact on the climate as half a million cars.

And the problem isn't just our stoves themselves. "We've known for years that there's methane leaks in the [natural gas] distribution system, especially in cities on the East Coast, where the infrastructure is a lot older," Lebel says. "And then, even further upstream than that, there are leaks from transmission and from production." All of those leaks add up and contribute to the climate impact of the natural gas supply chain, he adds.

What about other gas appliances?

Gas water heaters, furnaces and driers also produce emissions and could leak methane as well, Lebel says. People may not be exposed to these emissions as directly as they are when cooking on a stove, but these appliances still produce pollution. The only way to completely prevent that is to use electric appliances, Lebel says.

Should gas stoves be regulated? And if so, how?

It's unlikely that existing gas stoves will be banned outright, so if you have a gas stove and want to keep it, you can. But regulatory bodies could, for example, try to set requirements that all gas stoves be sold with a fume hood that vents to the outside or that pipes be better fitted to prevent leaks. And some cities, including New York and several cities in California, have already passed legislation requiring that gas stoves and other gas appliances be phased out in certain types of new construction.

But I like my gas stove. Doesn't it cook better?

This is a common response among people who like cooking with gas. But in some cases, this view may be influenced by paid promotions from the gas industry. Gas stoves do get hot faster than conventional electric ones. But induction stoves—a type of electric appliance that heats food by inducing an electromagnetic field—are also very fast and more energy efficient.

If you love your gas stove, you don't necessarily have to get rid of the appliance. But it's a good idea to take some precautions to reduce the risks to yourself and your household.

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