



Gas Appliance Pollution Inequitably Impacts Health

Who Would Gain the Most from Electrification?



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Air pollution is the [leading environmental risk factor for early death](#), and burning fossil fuels is responsible for [one in five deaths worldwide](#).¹ Seventy million US [homes and businesses](#) burn fossil fuels like gas for cooking, water heating, and space heating and cooling.² In addition to contributing to climate change, gas appliances emit harmful combustion pollutants including carbon monoxide (CO), nitrogen dioxide (NO₂), fine particulate matter (PM_{2.5}), and formaldehyde.

Exposure to gas appliance pollution can occur indoors or outdoors and is connected to a wide variety of acute and chronic negative health outcomes. These span respiratory illness, cardiovascular disease, poor birth outcomes, and adverse childhood development.



Although exposure to gas appliance pollution is harmful to everyone, the following groups of people are at particularly high risk. Individuals may identify across one or more of these groups.

Low-Income Communities and People of Color

Many structural and institutional factors, both historical and ongoing, have perpetuated disparities in air pollutant exposure and burden of disease, often patterned by [income/wealth](#) and [race/ethnicity](#).³ These factors include but are not limited to structural racism, community disinvestment, redlining and other land-use decisions, and inequitable access to quality housing and health care. As a result, certain communities are overburdened, underserved, and [disproportionately exposed to outdoor air pollution](#) from a variety of compounding sources.⁴ Transportation, industry, and stationary sources like power plants are common polluters, but [gas combustion in residential buildings](#) is also among the largest sources of outdoor PM_{2.5} pollution disparities for people of color.⁵

At a household level, many factors also contribute to [higher levels of pollutants inside lower-income homes](#), including smaller unit size, more residents per home, inadequate ventilation, and improper use of a stove or oven for supplemental heat.⁶ These factors—compounded by existing [disparities in asthma burden](#) and other health conditions—put certain subsets of our communities at high risk of negative health outcomes related to elevated air pollution.⁷

Infants and Children

Infants and children are [more susceptible to illnesses associated with air pollution](#) than adults due to several factors: they breathe faster, tend to engage in more physical activity, spend more time outdoors, have a higher ratio of lung surface to body weight, and have less mature respiratory and immune systems.⁸ Children living in a home with a gas stove have a [42 percent higher risk of experiencing asthma symptoms](#) than those in homes without gas stoves.⁹ Even small increases in short-term exposure to NO₂ indoors can increase asthma risks for children. Childhood exposure to air pollution is linked with [aggravated respiratory symptoms](#) and [cardiovascular effects](#), with mounting evidence for [adverse brain development](#).¹⁰

Pregnant Women

Air pollutants including CO, PM_{2.5}, and NO₂ have been linked to [increased risk of adverse birth outcomes](#) impacting both the mother's health and the baby's growth and development.¹¹ These outcomes include [preeclampsia](#), [preterm birth](#), and [low birth weight](#), among others.¹² The mechanism through which pregnant women pass air pollution exposure to their baby in utero may involve the [placenta](#).¹³

Individuals with Preexisting Conditions

Exposure to air pollution can be especially damaging to organs already fighting disease, including asthma, chronic obstructive pulmonary disease (COPD), heart or lung disease, and diabetes. As a result, individuals with these [preexisting health conditions](#) may experience worsened symptoms, increased need for medication, more frequent emergency department visits, and even premature death as a result of air pollution exposure.¹⁴

Older Adults and the Elderly

Adults experience changes in [lung function](#) and [heart function](#) as they age, making [older adults and the elderly](#) particularly vulnerable to air pollution.¹⁵ Long-term exposure to air pollutants (even at relatively low levels) increases the risk of developing [respiratory and cardiovascular conditions](#), including pneumonia, heart attack, stroke, and atrial fibrillation.¹⁶ Air pollution exposure has also been linked to neurocognitive decline, including increased risk of [dementia](#) and exacerbated development of [Alzheimer's disease](#).¹⁷



The good news is that air pollution caused by burning fossil fuels is preventable. One highly impactful solution is to reduce fossil fuel use in our homes and businesses and replace gas appliances with clean electric alternatives. These electrification efforts will immediately reduce our exposure to harmful combustion pollutants and deliver significant health benefits to those most at risk.

Endnotes

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- ⁵ Christopher W. Tessum et al., "PM2.5 Polluters Disproportionately and Systemically Affect People of Color in the United States," *Science Advances*, Vol. 7, No. 18, 2021, <https://doi.org/10.1126/sciadv.abf4491>.
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- ¹⁰ Patrick N. Breyse et al., "Indoor Air Pollution and Asthma in Children," *Proceedings of the American Thoracic Society*, Vol. 7, No. 2, 2010: 102-106, <https://doi.org/10.1513/pats.200908-083RM>; Juyong Brian Kim et al., "Cumulative Lifetime Burden of Cardiovascular Disease from Early Exposure to Air Pollution," *Journal of the American Heart Association*, Vol. 9, No. 6, 2020: e014944, <https://doi.org/10.1161/JAHA.119.014944>; and Devon C. Payne-Sturges et al., "Healthy Air, Healthy Brains: Advancing Air Pollution Policy to Protect Children's Health," *American Journal of Public Health*, Vol. 109, No. 4, 2019: 550-554, <https://doi.org/10.2105/AJPH.2018.304902>.
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