

Benefits of electric stoves on health and environment in Ecuador

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One of the most popular strategies to increase energy efficiency and reduce pollution in homes—which are responsible for approximately 10% of greenhouse gas emissions—is the transitioning from gas to

electric stoves. An international team of researchers investigated the health and environmental impacts of a program in Ecuador that put induction stoves in 750,000 households.

In the Aug. 15, 2023 online issue of the *Proceedings of the National Academy of Sciences*, researchers report that both greenhouse gas emissions and hospitalization rates likely fell at the national level over the first six years of the program.

"Our study expands the growing body of evidence suggesting that gas to electric transitions, when the grid is green, can achieve both climate and health benefits. Ecuador is a remarkable case study for this kind of large-scale transition," said lead author Carlos Gould, Ph.D., assistant professor at the Herbert Wertheim School of Public Health and Human Longevity Science at University of California San Diego.

While residential electrification is often a key component of net-carbon-zero strategies, due to presumed effects on pollution and improved health, scant research exists evaluating the potential climate and health benefits of these strategies once they have been implemented.

The aim of Ecuador's efforts to promote induction stove use was to reduce liquified petroleum gas consumption and replace it with the nation's growing hydropower-derived electricity. The "program for efficient cooking" in Ecuador enabled Gould and colleagues at Universidad San Francisco de Quito in Ecuador, Stanford University and Columbia University to assess its impact on electricity consumption, greenhouse gas emissions and health.

Between 2015 and 2021, one-tenth of Ecuadorian households installed induction stoves. Researchers analyzed 130 million monthly household utility bills during this period and estimated that the program resulted in a 5% increase in residential electricity and a 7.5% decline in liquid

petroleum gas consumption. With hydroelectricity powering the grid, the program was found to have reduced [greenhouse gas emissions](#) by a net 7% from 2015 to 2021.

"A key insight is that policies or programs that promote decarbonization could also have immediate and very large [health](#) benefits at population scale. Our study shows that these co-benefits of adopting these programs could be much larger than previously thought," said co-author Marshall Burke, Ph.D., associate professor in the global environmental policy area of the Stanford Doerr School of Sustainability's social sciences division.

The team also examined 9.6 million hospitalizations in Ecuador with data from January 2012, prior to the electrification program's launch, through March 2020 when the program was fully underway. Researchers estimated that for a location where an additional 1% of households enrolled in the program, hospitalization rates for both all-cause illness and respiratory illness would fall by 0.74 and hospitalization for chronic obstructive pulmonary disorder or COPD would fall by 2.11%.

The findings warrant close attention given the existence of similar programs globally and ambitious efforts of countries such as the Netherlands, Australia, Nepal and Indonesia that are seeking to phase households to electric cooking, said Gould.

"Residential electrification programs that aim to either ensure that new buildings do not install gas lines or to incentivize the replacement of gas appliances with electric ones are already happening in communities such as San Francisco or are targeted in the near- to medium-term future in Boston and in New York City Housing Authority buildings," said Gould.

"By evaluating Ecuador's nationwide program, we provide the first large-scale evaluation of the actual impacts of such an effort, finding clear evidence of both climate and [health benefits](#)."

Co-authors include M. Lorena Bejarano and Alfredo Valarezo, Universidad San Francisco de Quito; Brandon de la Cuesta, Stanford University; Darby W. Jack, Columbia University; Samuel B. Schlesinger; and Marshall Burke, Stanford University and National Bureau of Economic Research.

More information: Carlos F. Gould et al, Climate and health benefits of a transition from gas to electric cooking, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2301061120](https://doi.org/10.1073/pnas.2301061120)

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