

India could meet air quality standards by cutting household fuel use

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India could make a major dent in air pollution by curbing emissions from dirty household fuels such as wood, dung, coal and kerosene, shows a new analysis led by researchers at the University of California,

Berkeley and the India Institute of Technology.

Eliminating emissions from these sources—without any changes to industrial or vehicle emissions—would bring the average outdoor [air pollution](#) levels below the country's air quality standard, the study shows. Mitigating the use of household fuels could also reduce air [pollution](#)-related deaths in the country by approximately 13%, which is equivalent to saving about 270,000 lives a year.

"Household fuels are the single biggest source of outdoor air pollution in India," said Kirk R. Smith, professor of global environmental health at UC Berkeley and director of the Collaborative Clean Air Policy Centre. "We looked at what would happen if they only cleaned up households, and we came to this counterintuitive result that the whole country would reach national air pollution standards if they did that."

Smith is co-author of a paper describing the analysis that appeared this week in the journal *Proceedings of the National Academy of Sciences*.

Americans usually associate air pollution with smokestacks and car exhaust pipes. But in many rural areas of the world where electricity and gas lines are scarce, the bulk of air pollution originates from burning biomass, such as wood, cow dung or crop residues to cook and heat the home, and from burning kerosene for lighting. As of early 2016, nearly half of the Indian population was reliant on biomass for household fuel.

In addition to generating greenhouse gases like carbon dioxide and methane, these dirty fuels kick out chemicals and other [fine particulate matter](#) that can stick in the lungs and trigger a whole host of diseases, including pneumonia, heart disease, stroke, lung cancer and chronic obstructive pulmonary disease.

"There are 3,000 chemicals that have been identified in wood smoke,

and taken at a macro level, it is very similar to tobacco smoke," Smith said.

In 2015, India's average annual air pollution level was 55 micrograms per cubic meter (ug m^{-3}) of fine particulate matter. Levels in New Delhi—by many estimates, the most polluted city in the world—often soared beyond 300 ug m^{-3} . By comparison, fine particulate matter in the San Francisco Bay Area peaked at around 200 ug m^{-3} during the 2018 Camp Fire.

Complete mitigation of biomass as [fuel](#)—which could be achieved through widespread electrification and distribution of clean-burning propane to rural areas—would cut India's average annual air pollution to 38 ug m^{-3} , just below the country's National Ambient Air Quality Standard of 40 ug m^{-3} . While this is still far above the World Health Organization (WHO) standard of 10 ug m^{-3} , it could still have dramatic impacts on the health of the country's residents, Smith said.

"You can't have a [clean environment](#) when about half the houses in India are burning dirty fuels every day," Smith said. "India has got to do other things to fix air pollution—they've got to stop garbage burning, they've got to control the power plants, they've got to control vehicles and so forth. But they need to recognize the fact that households are very important contributors to outdoor air pollution, too."

In 2016, India instituted a national program to distribute clean burning stoves and propane to 80 million impoverished households, or about 500 million people. The rationale behind this program was to prevent illness due to cooking and heating smoke trapped within the home. However, Smith hopes the study's findings will bolster support for reducing outdoor air pollution, as well. Similar programs have been successful in China, where air pollution is now on the decline in 80 cities.

"We've realized that pollution may start in the kitchen, but it doesn't stay there—it goes outside, it goes next door, it goes down the street and it becomes part of the general outdoor air pollution," Smith said.

While curbing the use of dirty household fuels will reduce emissions of health-damaging fine particulate matter, it's not clear what effect the change will have on the emissions of greenhouse gases that cause climate change, Smith says. That's because both "dirty" fuels, like biomass, and "clean" fuels, like propane, both emit [carbon dioxide](#) when burned.

And though it may come as a surprise to many Americans, air pollution from wood burning is still a problem here, too.

"Wood smoke is actually the chief cause of air pollution in the Bay Area, because we've cleaned up everything else, but we haven't done anything about fireplaces," Smith said. "And people don't even need fireplaces for heating, they just like them. I like them, too."

Co-authors of the paper are Sourangsu Chowdhury and Sagnik Dey of the Indian Institute of Technology, Sarath Guttikunda of Urban Emissions in New Delhi, Ajay Pillarisetti of UC Berkeley and Larry Di Girolamo of the University of Illinois Urbana-Champaign.

More information: Sourangsu Chowdhury et al. Indian annual ambient air quality standard is achievable by completely mitigating emissions from household sources, *Proceedings of the National Academy of Sciences* (2019). [DOI: 10.1073/pnas.1900888116](https://doi.org/10.1073/pnas.1900888116)

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