

# The Effects of Fuel-Efficient Cookstoves on Fuel Use, Particulate Matter, and Cooking Practices: Results from a Randomized Trial in Rural Uganda

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Smoky cookfires contribute to global climate change and kill approximately four million people annually. We experimentally examined the effects of a fuel-efficient cookstove on wood use, household air pollution, and cooking behaviors in rural Uganda. We tracked fuel wood use, indoor air pollution and hours cooked per day on the default cooking technology (a three stone fire – three stones placed on the ground supporting a pot under which a fire is lit) and an introduced fuel-efficient stove (an Envirofit G3300). To generate variation, we randomly staggered the delivery of a first fuel-efficient stove among a sample of households that purchased one at market price.

We expected many families to keep using their smoky stoves because most meals in this region involved cooking with two pots simultaneously. Thus, after all households had received their fuel-efficient stove and used it for at least a month, we surprised participants with a gift of a second Envirofit stove. This gift allowed us to examine how important the lack of a second cooking surface was for continued use of the traditional stove.

After delivering the fuel-efficient cookstove, fuelwood use and household air particulates (PM<sub>2.5</sub>) declined by about 12%, and by smaller percentages after adjusting for observer-induced bias. These reductions were less than laboratory predictions and fell well short of World Health Organization pollution targets. Even after we delivered a second fuel-efficient stove, most households continued to use a three-stone fire. Households used the fuel-efficient stove to heat things that cook relatively quickly, such as boiling water to make tea. They preferred three-stone fires for low-heat cooking, such as simmering dishes like beans. Future research should focus on improving the usability of fuel-efficient cookstoves like the ability to modulate temperatures and/or policies that assist consumers to shift to safer fuels like gas or electricity coupled with mechanisms to disable the existing smoky cookfire.

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