The Impact of Asset Transfers on Clean Fuel Use in India

Researchers:

Rema Hanna

Paulina Oliva

Sector(s): Environment, Energy, and Climate Change, Finance

Fieldwork: Bandhan Konnagar

Location: Murshidabad, West Bengal, India

Sample: 817 households

AEA RCT registration number: AEARCTR-0000382

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Research Papers: Moving Up the Energy Ladder: The Effect of an Increase in Economic Well-Being o...

Notes: This analysis was done by J-PAL affiliates Rema Hanna and Paulina Oliva of a randomized evaluation by Abhijit Banerjee, Esther Duflo, Raghabendra Chattopadhyay, and Jeremy Shapiro

Partner organization(s): Ford Foundation

Household reliance on dirty fuels such as solid biomass (e.g., wood, cow dung) and kerosene for cooking and lighting can have negative consequences for health and the environment. Using data from a previous randomized evaluation in rural India that tested the effect of asset transfers to low-income households on overall consumption, researchers analyzed whether an increase in household wealth led to changes in energy use. While households consumed significantly more energy after the asset transfer, they did not reduce their use of dirty fuels.

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About 2.3 billion people, mostly living in low- and/or middle-income countries (LMICs), rely on fuels such as solid biomass (e.g., wood, cow dung) for cooking and an estimated 500 million households use kerosene for lighting since these energy sources are often widely available and affordable. According to the World Health Organization (WHO), household air pollution generated by burning solid fuels and kerosene is a major contributor to respiratory diseases, including pneumonia, chronic obstructive pulmonary disease, and lung cancer[1].

Efforts to transition to cleaner and more efficient fuels have the potential to bring numerous health, environmental, and social benefits by improving air quality, as well as freeing up time used for gathering and preparing solid fuels. A common hypothesis known as the “energy ladder” posits that low-income households in LMICs shift toward better fuel as their income increases. However, it is not clear whether households truly behave in this way. As their financial situation improves, they may continue to use dirty fuels in greater quantity, especially if they are not aware of the negative health impacts of solid fuels. Can an increase in household wealth in the form of a productive asset and small cash stipend lead households to adopt cleaner fuels?

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A previous randomized evaluation, from 2006-2008 tested the effects of asset transfers on consumption levels among low-income households in Murshidabad, West Bengal, India. Bandhan, a local microfinance institution, targeted low-income households to receive productive assets (e.g. livestock) as part of a multi-faceted livelihoods program (the Graduation Approach). Researchers found that the asset transfer intervention led to a persistent rise in household income over a period of 30 months.

Fuel use was one of the main outcomes collected among other consumption categories. Before the original evaluation started, 93 percent of households in the study already used dirty fuels for cooking. Twelve percent of households, well below India's average, used electricity for lighting. Instead, most used subsidized kerosene. This provided an opportunity for researchers to use the same dataset to understand specifically how a rise in economic well-being may affect household energy consumption and composition.

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In the original asset transfer study, researchers partnered with a local NGO, Bandhan, to conduct a randomized evaluation to test the impact of an asset transfer on consumption. Researchers targeted 817 households and randomly assigned them to one of two groups:

1. Asset Transfer (429 households): Households in this group received a combination of cows, goats, or another form of non-farm asset, as well as a stipend of INR 90 (US$2.25) for a duration of 13 to 40 weeks depending on their asset choice. Households were also required to go to a weekly meeting to acquire their stipend and to save INR 10 (US$0.25) at each meeting. At the end of 18 months, participants became eligible for microloans.
2. Comparison Group (388 households): Households in this group did not receive an asset transfer.

Drawing on the original study, the researchers analyzed consumption data collected via a survey before the program started in May 2007 and immediately after the program ended (18 months post-asset transfer) as well as 30 months after the transfer. Researchers measured total and detailed fuel expenditures, light source, and stove type in order to compare households that received the asset transfer to those who did not.

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Overall fuel consumption: Among households that were randomly selected to receive the program, 35 percent refused the offer. The remaining households that received the asset transfer consumed 12.8 percent more fuel than the comparison group. This increase in fuel consumption is associated with the increase in household income as the ratio of fuel to non-fuel expenses remained constant.

Specific fuel use: Households in the asset transfer group were 4.7 percentage points more likely to report using electricity for lighting (a 13 percent increase) compared to households that did not receive a transfer. However, these households also increased kerosene expenditures. The authors also found that there was no observable shift to cleaner cooking fuels or improved stoves. Since households that benefited from the asset transfer often received livestock, there was a 10.6 percentage point increase in the use of cow dung relative comparison households. This suggests that households do not necessarily choose cleaner fuels as income rises, and may instead turn to options that are more harmful to their health depending on the readily available sources of fuel. The authors note that, at least within the income bracket in this intervention, this might be the case because participants lack information about health risks as well as the high cost of stoves that use cleaner fuels. By confirming how fuel use increases with well-being in the lowest income groups, this study adds a poverty dimension to important energy policy considerations.

Consequently, other interventions are needed to align information and incentives to increase adoption of clean fuels.

Hanna, Rema, and Paulina Oliva. 2015. "Moving Up the Energy Ladder: The Effect of an Increase in Economic Well-Being on the Fuel Consumption Choices of the Poor in India." *American Economic Review*, 105 (5): 242-46. DOI: 10.1257/aer.p20151097

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1. “Household Air Pollution.” World Health Organization. Accessed August 7, 2023. https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health.