POLICY BRIEF for funder "International Growth Centre" (IGC)

Policy Motivation for Research

Our research addresses the low uptake in developing countries of improved cookstoves (ICSs), a technology which has positive health and environmental impacts by reducing indoor air pollution.

The leading killer of children worldwide is acute respiratory infections, accounting for 22% of all communicable child deaths in 2004.[1] Epidemiological studies identify indoor air pollution (IAP) as a principal culprit, reporting powerful associations between IAP exposure and ARI symptoms.[2] Biomass combustion within the household is thought to be the main contributor to IAP,[3] so women who cook and the infants and children they care for are particularly affected. Despite these health hazards, half of the world's population and over 75% of South Asians continue to rely on dung, brush, and wood as their primary source of energy for cooking and heating.[4]

Biofuels in traditional cookstoves: branches, leaves, crop waste, cowdung-on-a-stick

Biomass combustion with traditional cookstoves is an important contributor to climate change as well. Other than carbon dioxide, the leading contributor to rising global temperatures is black carbon ("soot"), accounting for 18% of the increase (with CO_2 accounting for 40%).[5] In Asia and

[1] World Health Organization 2005
[2] Smith et. al. 2000, Ezzati and Kammen 2001, Ezzati et. al. 2004, Pokhrel et. al. 2005
[3] Ezzati et. al. 2004
[4] World Health Organization 2002, Ezzati et. al. 2004, Health Effects Institute 2004, Pokhrel et. al. 2005
[5] Rosenthal 2009

Africa, traditional household cookstoves that burn solid biomass fuels produce the majority of black carbon; household energy use in Africa alone will produce 6.7 billion tons of carbon by 2050.[6] Climate change activities targeting black carbon emissions can have a much more rapid impact that those focusing on CO_2 – CO_2 remains in the atmosphere for years, while black carbon lingers for only a few weeks.

Inefficient combustion of solid fuels → high CO and PM emission rates

Strikingly, simple technologies to reduce IAP and black carbon emissions exist, but efforts to promote the adoption of these "improved cookstoves" have often proven ineffective. Given the important intra-household health externalities of ICSs and the public goods nature of their environmental benefits, it is important to understand the barriers to adoption in order to effectively market ICSs to target populations.

The issue of ICSs has garnered substantial interest from policymakers and NGOs in recent years. In 2010, Secretary of State Hilary Clinton announced the formation of the Global Alliance for Clean Cookstoves, a multinational initiative backed by governments, NGOs, and private companies, with the goal of adoption of 100 million ICSs by 2020. With over $60 million in seed funding and a goal of $250 million over the next 10 years, it is critical for the Global Alliance to be able to effectively allocate this funding to target potential consumers.

Policy Impact

To address this important question, we ran a field experiment on 3000 households in rural Bangladesh, randomly varying the marketing techniques used in order to understand the key demand aversions. People in our study were not unaware of the adverse health consequences of IAP, and accordingly, providing information about health effects does not lead to any discernible change in cook-stove adoption. Second, we find that people are risk-averse about new products, and learn more from their own experience than from the experience of or information gained from outsiders. This calls for marketing schemes that give people some

[6] Rosenthal 2009, Levine and Beltramo 2009

warranty against product failures, or risk-free trial periods. Finally, we find that women value the health benefits of ICSs more than their husbands, but lack the decision-making power within their household to purchase them, even at subsidized prices. Therefore, bundling the ICS with another technology or product attribute that appeals to men may be a promising marketing strategy.

Audience

The results of our research can contribute to an efficient spending allocation strategy for developing country governments and international organizations interested in addressing the indoor air pollution issue. For example, the Global Alliance for Clean Cookstoves must decide how much of its projected $250 million in funding should be allocated to subsidizing ICSs as opposed to supporting a campaign targeting information failures, and our research can inform such a decision.

We have already submitted some of our findings, together with other lessons from existing literature, to the social marketing subgroup of the Reaching Consumers working group of the Global Alliance. These findings influenced a set of "quick wins," – strategies which the Alliance can employ immediately to promote ICS adoption and can fully implement within one year.

Implications

With nearly all rural Bangladeshis (120 million people) burning low-quality biomass in traditional stoves, which they procure for little or no monetary cost, it has been challenging to market ICSs. Our research has derived the following lessons which have implications for future policy to improve their adoption:

- Marketing in any given context should address the key demand-side aversions to stove take-up in that context, as determined by careful analysis.
- The gender marketing experiments indicate that women are more concerned with health, and men relatively more concerned with cost in their stove adoption decision. However, women lack unilateral decision-making power, and often converge to the males' decision when we compare responses to initial marketing to ultimate purchase decisions.
- Individuals place more importance on their own experiences than those of opinion leaders, especially if the technology in question is easy to understand.

In our study, most of the respondents were fairly knowledgeable about the hazards of indoor air pollution caused by traditional cookstoves, with 69% stating that IAP is more harmful than dust from sweeping. This means that in this particular context, an information gap regarding the negative health effects of indoor air pollution is not a barrier to ICS adoption, and therefore any marketing campaign focused on highlighting these effects may miss the mark, as individuals are observed to be utility maximizers, rather than health maximizers. This finding bolsters existing literature on the subject, which has found that health information campaigns in general are ineffective at spurring adoption of new technologies in developing countries.

Women prove to be more interested in health-related technologies, while their husbands are more impressed by budget-saving ones. This is apparent when offering free chimney or portable stoves to husbands and wives separately. However, women lack the authority to make purchase decisions when a positive price is charged. Furthermore, the more time women have to learn about their husband's preferences about a new technology, the more their choices converge with their husbands', as evidenced by the difference between women's initial and final acceptance of an ICS. Public policy must therefore try to exploit these differences in gender preferences absent broader changes in decision-making power within the household.

Own experience typically trumps information that potential users gather through other social marketing strategies (such as decisions of village "opinion leaders" on stove purchase). This is especially true if the technology is easy to understand, and once people have more experience with the technology. (For technologies that are more difficult to comprehend, people may rely more on external signals from agents perceived to be more informed). In addition, there is evidence that individuals find it too risky to experiment with new technologies and products. This stresses the need to re-evaluate the use of persuasion techniques that incorporate psychology and marketing research that is more appropriately used for high-risk/high-return technologies.

Brief Summary of Research

We conducted a series of intertwined experiments in rural Bangladesh to estimate the effectiveness of different interventions to promote cookstove adoption: subsidies, providing information about health benefits, marketing targeted to women (who may prefer technologies that differentially benefit their or their children's health) and to men (who have greater decision-making power), and diffusion of cookstoves through social networks to overcome aversions to changes in traditional behavior.

We offered two technologies with different salient characteristics—a chimney stove that primarily reduces indoor smoke exposure and benefits the cook's health, and an efficient combustion stove that reduces fuel consumption and benefits the household budget. The use of these experimental conditions allows us to conduct analyses of several behavioral phenomena underlying low demand. For example, offering a choice of stoves for free to husbands and wives separately reveals the true gender difference in preferences over healthy versus budget-saving technologies. Charging men and women for the stoves then allows us to study how intra-household decision-making prevents women from acting on their preferences.

Improved Chimney Stove Improved Portable Stove

Group	Name	Description	# house-holds
A	Control	Stove offered at **full price**	600
B	50% Subsidy	Stove offered at **half price**	500
C	Full Price + OL	**Full** price stove + households informed of **opinion leader** adoption decisions	500
D	Half price + OL	**Half** price stove + households informed of **opinion leader** adoption decisions	500
E	Men free	**Husband** given choice of **free** portable or free chimney stove	200
F	Women free	**Wife** given choice of **free** portable or free chimney stove	200
G	Men 85%	**Husband** given choice of **50Tk** portable stove or **250Tk** chimney stove	200
H	Women 85%	**Wife** given choice of **50Tk** portable stove or **250Tk** chimney stove	200

Implementation

Because we found that individuals continue to use traditional cookstoves despite an awareness of the negative health consequences of the indoor air pollution they cause, any marketing campaign of ICSs should not focus resources on informing the target population about those hazards. Rather, marketing should be tailored to address the specific demand-side aversions present in the target market.

Marketing must account for intra-household differences in preferences, with women typically more interested in stoves, but unable to act on their preference when they don't control the household budget. This suggests that bundling stoves with another product or characteristic that men care about might be a promising marketing strategy. One example would be a stove such as the one developed by BioLite (www.biolitestove.com/BioLite.html), which uses its own excess heat to power a cell phone charger or other electric appliances.

Our finding that individuals are risk-averse when trying new technologies, and that they learn more from their own experiences than from those of their social network is consistent with our results from a separate IGC-funded study of seasonal migration in rural Bangladesh, in which individuals who migrate to find employment during the famine season are much more likely to migrate again if they were successful the first time, and the take-up is lower in the first year if the cost of failure is larger. This suggests that offering a risk-free trial period on ICSs would encourage more people to try out the technology, which would then spur continued adoption based on their positive experiences from the improved cookstoves.

Further Reading

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