

A Recipe for Success? Randomized Free Distribution of Improved Cooking Stoves in Senegal

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Overview

Almost 2.6 billion people in developing countries rely on traditional biomass-based fuels, mostly firewood, for their daily cooking purposes (IEA, 2012). Biomass usage for cooking purposes is associated with various negative effects on living conditions. According to the World Health Organization (WHO), two million people die every year due to household air pollution – more deaths than are caused by malaria or tuberculosis (WHO, 2009a; Martin *et al.*, 2011). Apart from health effects, firewood needs to be collected and hence firewood usage entails a heavy work load that is mostly borne by women. Not least, if the woodfuel is not extracted sustainably, firewood or charcoal usage also contributes to deforestation – a serious problem particularly in arid countries.

Improved cooking stoves (ICS) are frequently considered an effective remedy for these problems. In September 2010, the *Global Alliance for Clean Cookstoves* was launched under the auspices of the *United Nations Foundation*. The objective of the Alliance is to encourage 100 million households to adopt clean cooking stoves by 2020.* The effectiveness of ICS dissemination and their usage has hardly been evaluated rigorously. Little is known about why people may or may not use ICS, about the extent to which simple ICS reduce health hazards and if other socio-economic benefits can be confirmed in large field tests. It is the purpose of this paper to close this research gap.

Methodology

The present paper is the first Randomized Controlled Trial (RCT) on ICS usage in Africa. The ICS, a portable clay-metal stove, was randomly distributed among 250 households in 12 villages in rural Senegal. The randomization was done in November 2009. We conducted two follow-up surveys in November 2010 and March 2013. According to laboratory tests, the randomized ICS is expected to save around 40% of firewood compared to traditionally used open fire stoves. We examine firewood consumption, time use, and self-reported respiratory disease symptoms as impact indicators in both the treatment and the control group. The experimental set-up enables us to preclude selection biases that often afflict evaluation studies. The whole study was designed and conducted in cooperation with the ICS

* See World Bank (2011) for a more detailed discussion of different types of improved cooking stoves and Martin *et al.* (2011) for a recent overview on the improved stoves and air pollution policy debate.

dissemination programme of the Government of Senegal, which receives technical support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)[†].

Results

The first finding is that ICS take-up was close to 100% among the randomly assigned households. This comes as a surprise, since it is often argued among development practitioners that people would not use ICSs for which they have not paid. A pre-condition for this high take-up rate is probably that the particular ICS used in this RCT has been adapted to the needs and habits of the local population. The firewood savings were found to be statistically significant and substantial. We also observe a reduction in firewood collection time, but this is only borderline significant. Furthermore, we find that cooking duration is decreased significantly by over 20%. In addition, the cooking process is facilitated so that the time the cook needs to be in direct proximity to the cooking spot is reduced. Together with an increase in outdoor cooking, this leads to an evident reduction in exposure to harmful smoke. Consequently, we also find a clear indication of a decrease in respiratory disease symptoms and eye problems, with a drop of around 9 percentage points each for the women responsible for cooking.

Conclusion

Altogether, the substantial and statistically significant impacts on different levels of indicators including positive external effects such as reduced deforestation and household air pollution substantiate the efforts that the international community dedicates to the dissemination of ICSs. The almost universal take-up among randomly assigned ICS owners suggests that if they have an easy opportunity to obtain an ICS people also use it. However, these high usage rates do not yet mean that households are also ready or able to pay for the ICS. The interplay of cash and credit constraints, the women's role in the household and the lack of information raise doubts about whether households would be able and willing to pay the market price for ICSs, even if the stoves were readily available on the market.

In combination, the high take-up and the positive external effects of ICS usage observed in this study would suggest – if they can be confirmed elsewhere – that more direct options of ICS promotion like subsidies should be reconsidered.

[†] GIZ provides technical assistance on behalf of the German Federal Ministry for Development and Economic Cooperation (BMZ) and is one of the largest bilateral development agencies in the world.

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