

IMPACTS OF IMPROVED COOKING STOVE DISSEMINATION – EVIDENCE FROM URBAN SENEGAL

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OVERVIEW

Many developing countries more and more struggle with unsustainable biomass extraction. Deforestation in Senegal leads to annual losses of forests of 0.5 percent, which comes close to the average of Western African countries ([1], [2], [3]). According to the authors of an extensive analysis of environmental monitoring data, “an unrelenting demand for fuel, particularly in the form of charcoal, is driving an ever-growing wave of selective logging in all regions with significant woody resources” ([4]: 459). Nowadays, some 10 percent of its urban and more than 90 percent of the rural population rely on biomass as their primary fuel for cooking ([5]).

The dissemination of improved cooking stoves (ICS) is frequently considered an effective instrument to combat the detrimental effects of wood fuel usage on forest stands same as on health and disposable income of the population. Based on a survey among 620 households this paper evaluates the impacts of an ICS intervention in urban Senegal implemented by Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

METHODS

In addition to an experimental design that is being implemented in rural areas of Senegal, in this paper we employ robust cross-sectional statistical methods for the evaluation of the ICS interventions in two major cities in Senegal taking into account modern evaluation requirements (see, for example, [6] and [7]). Comparing ICS usage and non-usage the major impact indicators under research are charcoal consumption, respiratory disease symptoms, and expenditures. Since the stove dissemination has been underway for about three years, short- to medium-term impacts could be analysed.

We eliminate distorting selection biases and establish a proper counterfactual situation, mainly by accounting for distinct cooking habits. We use them as matching covariate instead of employing the more commonly used propensity score, since the equal weighting implicitly applied by propensity score matching was found to be inappropriate in the present case. Possible Instrumental Variables to control for the potential endogeneity biases proved to be inapplicable either. In addition, multivariate models are estimated controlling for observable heterogeneity between ICS owners and non-owners.

RESULTS

We first find that virtually all households in our survey use gas as major cooking fuel and employ charcoal complementarily. Charcoal is bought in the neighbourhood and firewood is almost non-existent in the survey areas. Accordingly, effects on health and gender indicators such as respiratory system diseases and time expenditures of women for wood fuel provision are low. Furthermore, while the technical efficiency increase of the ICS compared to traditional charcoal stoves determined in the laboratory is around 40 percent per meal, households effectively save 16 to 37 percent in per meal and capita terms, depending on the dish that is prepared with the charcoal stove. However, in terms of total charcoal consumption the impact is considerable: Even taking into account that 41 percent of the 78,000 ICS

disseminated by GTZ are used only irregularly for special occasions, total savings of charcoal induced by the intervention amount to 6,000 tons per year.

For an individual household, ICS acquisition amortizes in two to three months in urban Senegal. Over the time, ICS owners seem to slightly increase the total number of hot dishes prepared with charcoal. While the opportunity to do so can be considered as a positive effect of the intervention, it partly offsets the monetary savings.

CONCLUSIONS

The main implication for future ICS projects is that focusing on urban areas bears potentials for environmental benefits at comparatively low costs. Yet, in order to induce impacts on health and gender outcomes, ICS interventions have to be more clearly targeted to non-gas users who often correspond to poorer households. This targeting may e.g. come in the form of intensifying the sales channel of a traditional Senegalese variation of payment by instalments. Poorer households not only tend to use less LPG and rely more on charcoal. In addition, they use charcoal for the main dish and not only for side dishes like sauces. For main dish usage, the reduction potential when switching from a traditional to an improved cooking stove was found to be twice as high then for side dishes. Since wood fuel usage is more common in urban areas of other Sub-Saharan African countries than in Senegal, these bear even higher potentials to achieve environmental goals.

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