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THE ADVERSE HEALTH IMPLICATIONS OF FUELWOOD CONSUMPTION AMONG INDIAN HOUSEHOLDERS

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Overview

The inefficient combustion of biomass fuels in traditional cook stoves, which are still used by a large proportion of households in developing countries, contributes to the risk of mortality and morbidity, especially among women and young children in poorer households. Smith (2000) estimated a disease burden from indoor air pollution (IAP) in the range of 4.2-6.1 percent of the total burden of disease in rural India. Previous studies have attempted to study IAP in households and its adverse health effects using direct measurement of pollution and exposure (e.g. Ezzati et al, 2001). However, the resource intensity of such studies has posed limits on the maximum number of observations as well as the temporal distribution of such studies. More recently, a few studies have employed data from existing household surveys to economically estimate relationships between biofuel use and the health status of those using such fuels so as to relate disease to household fuel use and other characteristics. In order to examine these relationships for Indian households, for the first time we combine data from two nationally representative surveys i.e. the National Family Health Survey (NFHS), and the National Sample Survey Organisation's (NSSO) Household Consumer Expenditure Survey. In a previous study Mishra et al. (2004) have used Indian NFHS data to relate the incidence of disease with the use of unprocessed biomass fuels within households. Our contribution to this area of study is to investigate the relationship between the prevalence of certain diseases and not only the use or non-use of firewood, but the actual quantity of firewood use in Indian households. In particular, the paper aims to provide evidence of an association between quantity of firewood consumption in household cooking and the prevalence of certain diseases such as acute respiratory infection (ARI) in children, tuberculosis and cataracts in women, and indoor air pollution related deaths among all household members.

Methods

In this study, we combine data from two different national level sample surveys from India – the household expenditure survey from the (NSSO) and the NFHS. We do so by using a modified version of the Poverty Mapping Methodology (PMM) initially developed at the World Bank. While, the original PMM was developed to combine survey data with census data to estimate poverty on spatially more disaggregated levels, we modify this methodology in order to estimate the predicted consumption of actual firewood consumption from one survey and impute these values to the second survey. The objective of doing so is to impute the actual wood consumption for households for which health data is available (in NFHS) so as to be able to examine the differences, if any, in the prevalence of certain diseases, among households grouped by the amounts of fuelwood they consume.

Two different sets of estimations are undertaken in order to impute fuelwood consumption. In the first set of estimations, a logit model is employed to estimate the probability of fuelwood using households as opposed to non-users. In the second set of estimations, for those households that are estimated to be fuelwood users, we employ an OLS model to estimate the actual

amount of fuelwood consumed. The variables used to predict fuelwood consumption included location of the household, since availability of wood shows significant regional differences; actual reported patterns of energy consumption; household expenditure; socio-economic characteristics including household size, education and employment; and infrastructure and wealth of the household, as reflected in its possession of animals and of agricultural land.

Results

While the statistical accuracy of our estimates of fuelwood consumption were not very robust, interesting differences in the results relating to the prevalence of acute respiratory infection (ARI) in children, tuberculosis and cataracts in women, and indoor air pollution related deaths among all household members for households grouped according to the predicted amount of their total fuelwood consumption separately for rural and urban households, emerged from our analysis:

- Among urban households, the prevalence of ARI in children is higher among users of fuelwood as opposed to non-users. Among users, the prevalence rises with increasing amounts of fuelwood consumption. In contrast, among rural households, the prevalence of ARI in children is higher among non-users of fuelwood. However, since over 95% of rural households are users, the difference has little significance.
- As far as the prevalence of tuberculosis and cataracts among women is concerned, the analysis relating prevalence to consumption of fuelwood for urban and rural households did not reveal any distinct patterns. However, prevalence is definitely higher for households using fuelwood as opposed to non-users and the existence of a separate kitchen appears to be associated with a marginally lower prevalence of these diseases.
- Finally, looking at the IAP related deaths among all family members, deaths due to tuberculosis, bronchitis, asthma and pneumonia, all appear to be more frequent among fuelwood users as compared to non-users. In addition, for both rural and urban households, death on account of pneumonia increases with increasing quantities of household fuelwood consumption. For the other diseases, however, the evidence appears to be mixed.

Conclusions

The relationship between wood consumption and prevalence differs for the different diseases analysed and causes of death. The mixed results for the prevalence of IAP related diseases and amount of fuelwood consumption seem to suggest that while an increase in fuelwood consumption leads to higher emissions of health damaging gases and particles and could potentially increase the prevalence of IAP related diseases, higher wood consumption is associated with increasing wealth, which provides capabilities to cope with the stress of IAP and the related diseases. More affluent households probably have better access to health services. Better ventilation also makes them less vulnerable to the diseases, etc.

The methodology applied in the study opens a new area of application for combining data from different surveys and despite the poor statistical accuracy of our estimates of wood consumption, in principal, if better data were to become available more interesting and accurate results could be expected. Results from this study also seem to suggest that simple alterations in house structures, ventilation practices, building materials and cooking locations could perhaps produce relatively clean conditions, even when “dirty” biomass fuels are used. Such options are often less costly than switching to cleaner fuels or investing in clean stoves, and therefore are an effective intermediate solution for poor, rural families who have little hope of adopting cleaner fuels in the near future.