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Urban households in Ethiopia use multiple fuels as they get richer

Determinants of household fuel choice in urban Ethiopia.

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Using three rounds of survey data that cover a decade, we analyze household preferences for energy types and energy choice in urban Ethiopia. We find that, during 2000-2009, households in major cities of Ethiopia used multiple fuels as their income increased. Increased fuelwood prices encourage consumption of cleaner fuels, such as electricity, while increased kerosene prices encourage solid fuel consumption. Better educated households are more likely to consume cleaner fuels. While increased incomes are associated with consumption of cleaner fuels, households did not entirely shift to consumption of modern fuels as their income increased. This suggests that an energy transition did not take place following economic growth during the study period.

Energy demand in the developing world is growing and the share of the developing world in world energy use is growing. Household energy is important in developing countries but understanding of the factors affecting household preferences and choice of domestic energy is limited. Most of the existing studies used data collected at a point in time, which do not examine household energy demand over time.

In this paper, we identify socioeconomic factors that determine household fuel choice in urban Ethiopia using three rounds of panel data. The data was collected from 2000 to 2009 (in 2000, 2004 and 2009), which corresponds to significant changes in major economic indicators in Ethiopia, such as inflation. The survey covered seven of the country's major cities - the capital Addis Ababa, Awassa, Bahir Dar, Dessie, Dire Dawa, Jimma, and Mekelle. Thus, we examine whether there is any change in the behavior of households towards their fuel choice. We also look at the issue of fuel switching, that is, the shift from consuming biomass fuels to cleaner/modern energy sources such as electricity. We do this by classifying energy into solid, mixed and clean fuels using appropriate quantitative methods.

The data show that more than 46% of the sample households use electricity, gas and kerosene as their main energy source for cooking; these are categorized as 'clean/modern energy sources' in this study. The other categories used in this study are mixed and solid fuels. The category 'solid fuel' refers to biomass energy sources such as firewood,

Key Points

- Although people are generally expected to use cleaner fuels as their income rises, there was no major shift to cleaner fuels following economic growth in Ethiopia during the decade 2000 to 2009.
- However, households use multiple fuels as they get richer.
- Households' economic status and education, as well as the price of alternative energy sources, are important determinants of fuel choice in urban Ethiopia.

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charcoal, dung and crop residues. ‘Mixed fuels’ refers to a combination of clean and solid fuels. We found that 27.2% of sample households depend on mixed energy (solid and non-solid) and 26.4% depend on solid energy as main energy sources.

Figure 1: Proportion of sample households using clean, solid and mixed energy as main energy sources by survey year

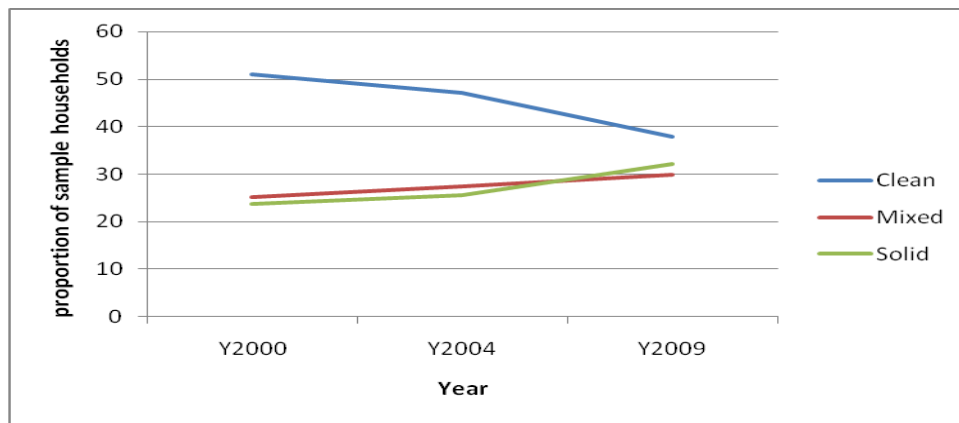
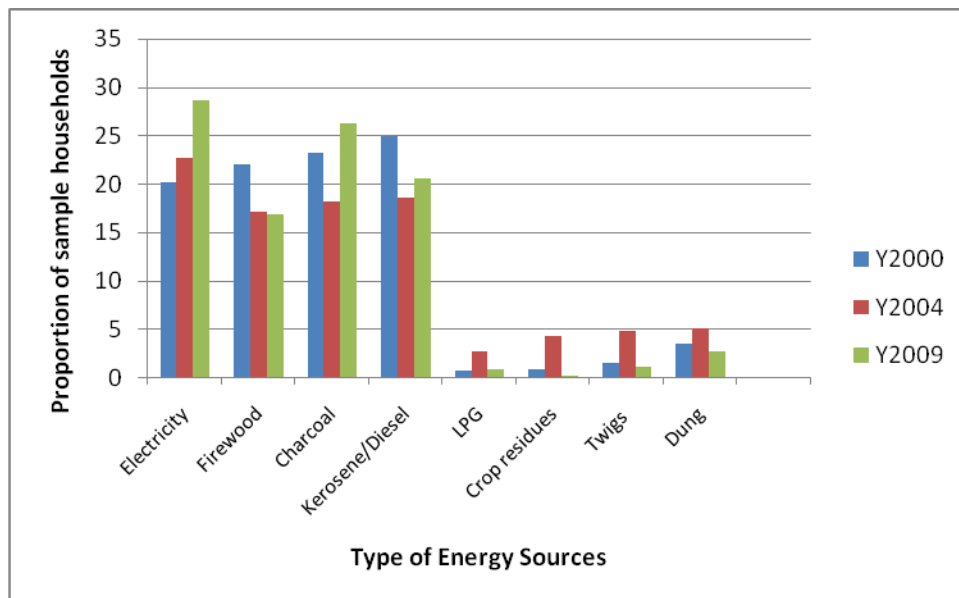


Figure 1 shows the proportion of sample households using clean, mixed and solid fuels as their main fuels by survey year. We note from Figure 1 that there is a decline in the proportion of households whose main cooking energy is clean (51.05 %, 47.9 % and 37.9 % for year 2000, 2004 and 2009, respectively). On the other hand, the proportion of households with mixed fuels is slightly increasing (25.3 %, 27.4 %, and 29.9 % for 2000, 2004 and 2009, respectively). Similar to mixed fuels, there is an increase in the proportion of households using solid fuels over the three survey years. Thus, there is a tendency for households to shift to solid and mixed fuels as main cooking energy sources.

Figure 2. Proportion of sample households using energy sources by survey year



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Figure 2 presents the proportion of sample households by specific energy type. The fuel types included are electricity, firewood, charcoal, kerosene, LPG, crop residues, twigs and dung. (Other fuel sources not included in the figure because of the small proportion of households that use them include leaves, wood residue, and biogas.) The proportion of households using electricity for cooking increased consistently over the three survey years; over a period of about a decade (2000 to 2009), the proportion increased by more than 8%. In addition, the proportion of households using firewood declined from 22% in 2000 to 17% in 2004 and then remained the same in 2009 (16.8%). In 2004, the proportion of households using non-wood biomass energy sources such as dung cakes, twigs and branches, leaves, and crop residues was higher compared to the years 2000 and 2009. The proportion of households using modern fuel sources decreased from 25% in 2000 to 18.6% in 2004 and then increased to 20.5% in 2009. On the other hand, the proportion of households who used LPG increased in 2004 compared with the year 2000 but, in 2009, decreased back to its level in the year 2000. Figures 1 and 2 together suggest that, while there is a tendency for more households to use cleaner fuels over time, more households are using mixed and solid fuels as main cooking fuels.

Figure 3. Average number of energy types used, by monthly household expenditure per person in Ethiopian Birr

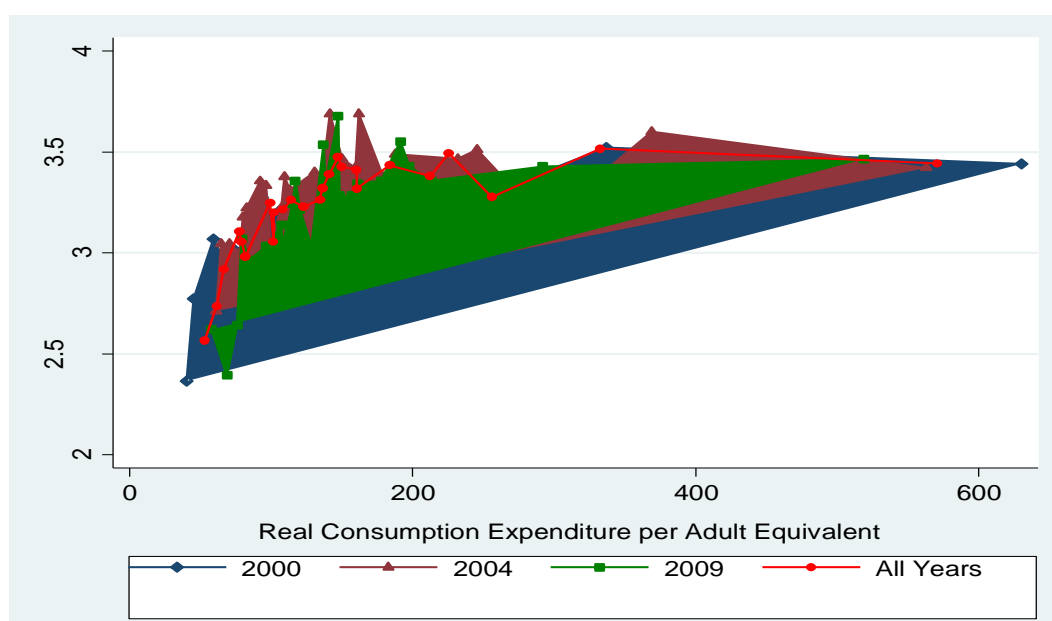


Figure 3 compares the average number of different fuels that households used to the household's monthly consumption expenditure, which is used as a measure of income because poor families tend to spend most of their income on necessities. This figure shows whether and in what direction the number of fuel types used by households changes as expenditure changes. The energy types included in Figure 3 are electricity, charcoal, kerosene, firewood and LPG. This figure shows that households use between two and four different types of fuel. The number of fuel types used did not change much during the study period. At lower levels of expenditure, households tend to increase the number of fuels they use as their income per person increases; then, after some level of income, the average number of fuels used remains more or less constant as income increases. This suggests the presence of multiple fuel use or 'fuel stacking' behaviour. The demand for different stoves/fuel types may be explained by factors such as uncertainty about the supply of fuel types, preferences for a particular type of fuel, convenience of the specific fuel type, etc. Our analysis suggests that an energy transition did not occur following economic growth in Ethiopia during the decade from 2000 to 2009.

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Conclusions

Using household level data, we analyze households' choice of fuel types in urban Ethiopia. We find that households' economic status, price of alternative energy sources, and education are important determinants of fuel choice. The results also suggest the use of multiple fuels, or 'fuel stacking behaviour'. We also find that, while increased incomes are sometimes associated with consumption of cleaner fuels, the households in this study did not shift to consumption of cleaner fuels as their main fuel sources with economic growth in the study period.

ABOUT THIS BRIEF

This brief is based on 'Household Fuel Choice in Urban Ethiopia: A Random Effects Multinomial Logit Analysis', EFD Discussion Paper DRB 13-12. (The DRB series of research briefs is associated with the EFD Discussion Paper Series.)

FURTHER READING

Mekonnen, A., and Köhlin, G.. 2008. Determinants of Household Fuel Choice in Major Cities in Ethiopia. Environment for Development Discussion Paper Series, EFD/RFF DP 08-18.

Beyene, A.D., and Koch, S.F. 2012. Clean Fuel Saving Technology Adoption in Urban Ethiopia. Energy Economics 36: 605-613.

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