



Female Entrepreneurship and the Burden of House Work: A Randomised Experiment on the Role of Access to Light

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This novel experiment finds evidence that small-scale lighting solutions can help households living in off-grid rural areas to shift from farm to non-farm livelihoods, thereby helping stimulate the very first steps in the direction of economic transformation of rural communities. However, the experiment does not find evidence indicating that access to light advances the economic empowerment of women.

Introduction

Economic development and structural change are long processes involving the evolution and transformation of all aspects of the economy and society. Existing work shows that large-scale electrification has an important part to play in this transformation. However, considering a quarter of humanity lives in areas where off-grid solutions, such as solar lamps or home systems, are the only options allowing some form of energy access, there is very little research into whether, albeit commensurate to their much smaller size, these can trigger similar mechanisms of socio-economic transformation. To our knowledge, this project is one of very few recent works tackling this issue, and the only one that finds evidence of the transformative potential of small-scale lighting solutions.

Specifically, the project provides new evidence on the important question of whether interventions such as access to light, which relax constraints in relation to the number of productive hours available, can stimulate the emergence of currently pent-up entrepreneurial potential.

This question is particularly relevant to the lives and work of women. Indeed, many women in low-income countries must carry out their activities within the limited hours of daylight. Ironically, an important fraction of these hours is often devoted to collecting firewood or sourcing kerosene to ensure some basic level of lighting during the hours of dark, further reducing the time available for other uses. Additionally, necessary but less productive activities, such as cooking or cleaning the house, can crowd-out more remunerative uses of this limited time remaining. To understand how light may alter such behaviour, the research places substantial emphasis on the gender dimension within the household and on the analysis of time-use.

Intervention

We are able to identify the impact of access to light by exploiting experimental variation in solar lamp ownership among the parents of students participating in a companion randomised controlled trial on the effects of access to light on education. The latter randomly distributed solar lamps free of charge to over 2000 7th grade students across 60 schools in the Gucha South district in Kenya. We then monitored the effects of the lamps on households through a series of telephone surveys of the mothers and fathers of students.

Findings

We find that access to light contributes to a diversification in household livelihoods from agricultural to non-farm economic activities. This evidence is supported by a consistent set of results across time-use, the incidence of different productive activities, and incomes levels. Specifically, we find evidence of increases in income from non-farm activities matching reductions in farm incomes. To our knowledge, this constitutes the first robust evidence that small scale lighting source can help stimulate the very first steps



in the direction of economic transformation. In particular, it can favour household diversification toward non-farm micro-entrepreneurial endeavours by allowing an improved reallocation of activities over the course of the day.

Figure 1: Change in time use - Women

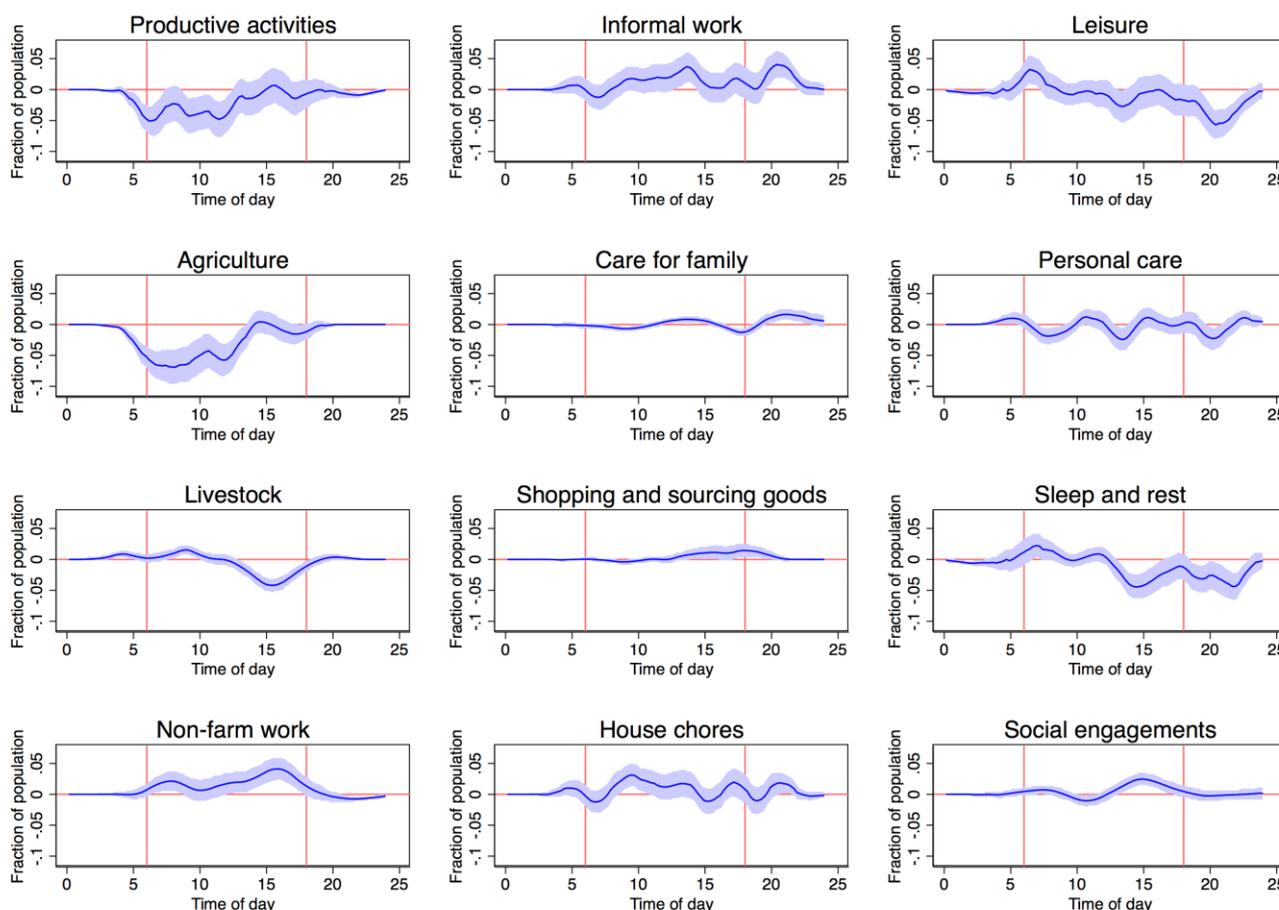


Figure 1 visualizes the effects of access to light on female time-use. Each panel displays the difference in the share of women engaged in each activity at a given time of day when comparing those with lamps with those without. A value of 0.1 would indicate that such share is 10 percentage points higher among those with lamps. Where the shaded area does not include the red line at zero, it means we are identifying a genuine difference in time-use patterns rather than that which we would expect when comparing any two randomly selected groups of women. The panels in the top row display the effects across the broad time aggregates of Productive activities, Informal work and Leisure, while the panels below each represent the effect on each of their component parts. The vertical lines represent approximate sunrise and sunset times.

Many of the panels exhibit a ‘waveform’ shape, whereby peaks are compensated by troughs at different times of day, evidencing task shifting. Specifically, we see that women increase leisure (and informal work) in the morning at the expense of productive activities, but reduce leisure time in the evenings to make time for an increase in informal work (split equally between family care and house chores). Women possessing lamps also see a notable increase in non-farm work and social engagements in the late afternoon, mainly at the expense of livestock activities and resting.

Such task shifting can be economically important if the value of a task depends on the timing when this is



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carried out. Indeed, we find evidence of income changes from farm and non-farm sources, despite primarily observing changes in the timing rather than the total time dedicated to each activity. Our overall assessment is that access to light relaxes the time-constraints faced by women, and that this appears to lead to a productivity-enhancing reallocation of tasks.

Overall however, the project delivers some sobering evidence on the gender dimension of the effect of access to light. While we do evidence that access to light allows women to extend their day into the evenings, this additional time is primarily dedicated to house chores. Importantly, we find a corresponding reduction in the incidence of house chores amongst men, who are therefore the ultimate beneficiaries of this additional time. Like men, women in treated households increase their engagement in non-farm work and social activities in the late afternoon. However, we find no evidence that access to light influences the gender distribution among those managing the non-farm income-generating activities. The effects of the intervention, therefore, do not alter, but rather emerge within, the prevailing balance of power between genders.

Conclusions and policy recommendations

As large scale electrification is a long and costly process, our results indicate that policy aiming to promote the adoption of a cheap and renewable source of energy, like a solar lamp, could be a cost-effective, immediate and scalable solution to stimulate household economic diversification and transformation. However, the results also caution us from expecting such interventions to significantly improve the economic circumstances of women specifically.

Moving Forward...

It would be important to gain greater insights into the following issues:

- Why do households reallocate the timing of economic activities if, as we have observed, this does not translate into higher overall household income?
- What complementary constraints need to be relaxed to enhance the effectiveness of access to light as a driver of basic entrepreneurship?
- How does the intra-household balance of power influence the impact of access to light on women?

Designing an intervention that addresses these questions would significantly increase our knowledge of what type of policies can foster rural entrepreneurship, especially for women.