

Electricity Outages and Anthropometric Outcomes of Children

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Overview

Many countries in the developing world still deal with a lack of access to reliable energy sources like electricity due to outages and poor infrastructure. The electricity prices in developing countries are relatively low to recover its costs of generation and provision. This results in under-investment in infrastructure, which usually leads to frequent outages or rolling blackouts by the electricity suppliers. Outages may have an adverse impact on the household's well-being (Ali, 2016; Meles, 2020), including the health of household members. Using household-level panel data, and a coarsened exact matching (cem) procedure this paper investigates whether there is a relationship between outages and the health of children. Specifically, I study the differences in the anthropometric outcomes of children aged 5 and below (given by the z-scores) living in households that experience frequent outages and those which do not. I find that the children living in the households with frequent outages have z-scores of height-for-age that are -0.418 units lower, and z-scores of weight-for-age that are -0.211 units lower than compared to the children living in the observationally identical households but without frequent outages.

Methods

The health status of children is measured in our study by generally-known anthropometric indicators, namely height-for-age and weight-for-age. We compute Z-scores for each child's height-for-age, weight-for-age indicators, where the Z-score is defined as the difference between the child's anthropometric value (i.e. weight and height) and the mean value of the corresponding measure for the same aged international reference population, divided by the standard deviation of the reference population.

In this study, I use the “coarsened exact matching” (cem) method. I match treatment and control groups on the various household characteristics. More specifically, matching has been done on the per capita income of the household, per capita household spending on food, household size, whether the household receives any remittances from abroad, whether the household using the stove on the solid fuels for heating, and whether it uses an outdoor clay oven (tandyr) for cooking. I also match on various location dummies. In particular, I match on each of the nine locations available in the dataset (seven regions, and two major cities), along with an indicator for whether the dwelling is located in a rural or urban area.

Next, this study I analyze the effect of electricity outages on health outcomes of children aged from 0 to 5 using the following fixed effects econometric model for each of the anthropometric outcomes of interest:

$$\begin{aligned} WAZ_{it} &= \beta_1 \text{outages}_{it} + \beta_2 X_{it} + a'_{1i} + a'_{2t} + e_{it} \\ HAZ_{it} &= \delta_1 \text{outages}_{it} + \delta_2 X_{it} + \gamma_1'_{i} + \gamma_2'_{t} + u_{it} \end{aligned}$$

Where i and t stand for household and time subscripts. Our main variable of interest (treatment indicator) is a binary indicator for the frequency of outages occurring more than once a month.

The panel nature of our data allows us to control for all observed and unobserved fixed individual characteristics via the fixed effects indicators in our regression a'_{1i} and $\gamma_1'_{i}$. The included fixed effects complement our cem matching algorithm implemented prior, as it should capture any time-invariant unobserved and/or omitted variables that can potentially invalidate our results.

My empirical specification also includes time-varying variables given by the vector X that can potentially affect the anthropometric outcomes of children. In particular, I control for the (natural logarithm of) per capita household food expenditure, (natural logarithm of) per capita income, household size and composition. The year fixed effects given by α'_{2t} and $\gamma_2'_t$ control for any aggregate time shocks.

Results

In this paper, I explore the possible links between the frequent electricity outages and the anthropometric outcomes, which serve as a proxy for the health status, of children aged 0 to 5. Using panel household-level data and coarsened exact matching technique implemented before the fixed effects regression I find that outages more than once a month have a negative, and statistically significant effect both on the height for age, and weight for age z-scores of children in the Kyrgyz households. This study documents that, on average, the height for age z-scores of children living in the households which experience frequent outages are 0.418 standard deviations behind, and weight for age z-scores are 0.211 standard deviations behind the children living in the identical household but which do not experience the frequent outages.

Conclusions

Our results indicated that frequent electricity cut-offs affecting height and weight of the children from 0 to 5 year age negatively and has significant and independent (of income) impact on household well-being.

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References

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