

# Electrification and Socio-economic Empowerment of Women

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After three decades of energy market deregulation, Indian electricity sector still reels under the pressure of the inability to match the demand for electricity at the household level. Post the Rajiv Gandhi Grameen Vidyutikaran Yojana, 2005, there have been significant improvements in electricity connections provided to households. However, the performance in improving the quality of electricity provided to households has been dismal; on average, six relatively poorer and populous states in India still have less than 60% of electricity hours in day. This inability to meet the demand due to poor infrastructure, transmission and grid capacity limits the opportunities for women's participation in the labor market, efficiency in home production activities, and consequently hinders their empowerment.

We gain insights into effects of the quality of electricity on women's empowerment by using a unique nationally representative gender dis-aggregated survey in India (India Human Development Survey, 2012). Under a comprehensive framework to measure empowerment and robust estimation techniques capturing the endogeneity in empowerment and electrification, we empirically explore the effects of additional hours of electricity in the household on women's socio-economic outcomes.

As empowerment is a multi-faceted concept, we use market and non-market based indicators at the individual and household level reflecting women's access to economic and social capital, agency to make and exercise their decision, and ability to achieve economic and social independence. A Nash bargaining model is used to derive testable hypothesis. The model predicts that the underlying cause of empowerment is the exhibition of strong preference for higher hours of electricity by the woman in the household, in the absence of which the household might not be willing to acquire better quality of electrification.

The issue of endogeneity at hand is: are women with strong bargaining power and economic autonomy able to acquire better electrification, or is better electrification the cause for improving their bargaining power and autonomy? In order to capture the issue of endogeneity we use an instrumental variables approach with 'average hours of electricity in the household at the district level in the state, except the district of the household'. We argue that this instrument satisfies the exclusion restriction and captures the general equilibrium effects giving us robust casual estimates that could be used to understand the magnitude of effects.

The study highlights the role of the quality of electricity in improving women's economic autonomy, decision making ability, agency, mobility, likelihood of employment, work days, work hours, fuel and water collection minutes and use of time saving energy resources at the margin of deficiency of electricity hours. The pathways to empowerment are through the labor market and respite effects of better electrification. Having electricity throughout the day allows for more efficient time allocation in household activities and labor supply, which has a positive effect on women's work days and likelihood of employment. It provides women with respite from arduous housework which can be eased if electricity is available 24\*7. In addition to these, reliable electricity allows for use of more efficient household energy resources which are time efficient and healthy.

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Given the multi-dimensional impacts of reliable electricity on women's autonomy, this study adds to the debate on considering 'electricity as a right'. On the one hand, the quality of electricity disproportionately improves women's lives and so it should be considered a right to achieve the sustainable development goal of gender equity, through equality, inclusion and participation in societies structured around grave inequalities and exclusions. On the other hand, the magnitude of our estimates are incentivizing for distribution companies as they reveal the potential benefits of providing service quality. These unaccounted margins could either be used for appropriate pricing, or could be leveraged for more support from the government.