



Energy poverty among urban street vendors in India: Evidence from Patna, Bihar[☆]



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ABSTRACT

Rapid urbanization in the developing world underscores the policy challenge of urban energy poverty. This article investigates patterns of energy poverty in Patna, the capital of the state of Bihar in India. Informed by the field research, our emphasis is on inadequate lighting among street vendors. A survey of 1000 street vendors in the metropolitan area reveals high levels of energy poverty, with vendors being forced to choose between inadequate lighting and expensive power from diesel generators operated by local entrepreneurs. The survey also shows that vendors consider improved lighting a top priority and believe that improved lighting could expand their business and attract customers. While vendors are generally aware of solar panels, a few are using this technology in the marketplaces. The results reveal the need for new policy interventions that either promote grid access for the informal economy or seek new alternatives, such as solar lighting, to diesel generators.

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Introduction

Since most studies of energy poverty focus on rural areas (Cabral et al., 2005; Barnes, 2007; Zerriffi, 2011; Sehgal et al., 2014; Akpan et al., 2013) the problem of energy access in urban areas is frequently overlooked. At a time of rapid urbanization across the developing world (Montgomery, 2008), this omission presents a problem for policy formulation. Marginalized slum dwellers and people employed in the informal sector also suffer from energy poverty (Hosier and Kipondya, 1993; Mwampamba, 2007; Baruah, 2010; Parikh et al., 2012), and the high population densities of urban centers make them potential targets for policy interventions. Together with rapid urban growth and the exponential growth of slums, the opportunities available for cost-effective policy interventions call for new empirical evidence on energy poverty among the urban poor.

This article contributes to this effort by providing detailed survey evidence on energy poverty and priorities among street vendors in Patna, the capital of the state of Bihar in India. The city's metropolitan area comprises a population of about two million people and suffers from high levels of energy poverty. According to the 66th round of the National Sample Survey of India in 2010, only 73% of the interviewed

urban households in the Patna district had electricity at home. Although Patna's electricity access levels are much higher than in the surrounding rural areas of Bihar (Oda and Tsujita, 2011), inequities within Patna are significant. Few people participating in the informal economy have access to grid electricity, whereas wealthier shop owners can rely on electric power for their lighting, electronic, charging and cooling needs. The lack of reliable electricity supply prevents the urban poor from improving their livelihoods and saving money.

To understand energy poverty among street vendors, in early 2014 we conducted a baseline survey of 1000 vendors in 24 marketplaces in Patna and the neighboring satellite town of Hajipur. The 45-minute survey was based on a comprehensive canvassing of the marketplaces for vendors who participate in the informal economy regularly, and it contained detailed questions on the energy situation, with a particular emphasis on lighting. The survey was conducted in January–February 2014 among a random sample of vendors who were present at the marketplaces at daytime. The survey contained detailed questions on the livelihood, business, community, and energy access of the vendors.

Adding to a growing body of literature on electrification and microenterprises (Neelsen and Peters, 2011; Peters et al., 2011; Akpan et al., 2013; Grimm et al., 2013), the survey highlights the high degree of energy poverty among street vendors. Based on our fieldwork, we found that the lack of adequate lighting was by far the most common energy problem that the vendors faced. If vendors are to sell their products at night, they need a reliable and bright light. Customers avoid vendor carts that are in the dark, both because they are worried about their own security and because they cannot easily evaluate the quality of the products sold. This problem is critical for vendors that sell fruit,

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sweets, and means. Vendors that sell services, such as tailoring, also need a bright light to be productive in their line of business.

The vendors lack access to grid electricity for reliable and affordable lighting, pay a high cost for inferior alternatives, are dissatisfied with their current lighting solutions, and consider improved lighting a top priority for improving their business. At the same time, there was considerable variation among vendors in their situation. More experienced and profitable vendors chose to pay a high cost for access to a diesel generator as a stopgap measure, while female vendors seemed to suffer more from the lack of inadequate lighting than their male counterparts. The gender effect is particularly important insofar as it supports the interpretation that female vendors are generally worse off than male vendors. In the case of lighting, an additional explanation could be that female vendors have more reason to be concerned about safety problems that weak lighting creates.

These results have both academic and policy significance. For academic researchers, they identify an understudied area in the growing field of energy poverty, that of the urban informal economy. The interest in urban energy poverty has grown in recent years (Baruah, 2010; Parikh et al., 2012), but there are few recent efforts to capture systematically the extent of energy poverty among participants in the informal economy. Earlier efforts, such as Barnes et al. (2005) have focused on households and are, in any case, by now largely outdated.

In recent years, a few important studies have investigated the lighting issue for street vendors in particular. Yaqoot et al. (2014) conduct a survey of street vendors and centralized solar charging stations in the city of Dehrrun in India. Based on data from 150 survey respondents, they find that vendors are willing to pay a sufficiently high daily fee to cover the operating costs of a centralized solar charging station. We conduct our survey in a different area, use a much larger sample of vendors, and analyze energy poverty in a more comprehensive fashion. Rao et al. (2009) discuss a pilot project on the implementation of a centralized charging station in the city of Mysore in India. They argue that the pilot was largely successful because of careful coordination between a local bank, a non-governmental organization, a technology provider, and the street vendor community. Our survey provides descriptive results on the problem of energy poverty in a large metropolitan area and characterizes the demand for further solar interventions. Singh (2009) conducts a survey of three marketplaces in the city of Kanpur in India, finding that financial access is a key impediment to greater adoption of solar technology. We analyze a much larger sample of vendors and study energy poverty for various subgroups of the population, such as males and females. In a departure from all three studies mentioned in this paragraph, we also document and evaluate the widespread use of diesel generators in the marketplaces, along with vendor perspectives on why and how improved lighting would contribute to their business.

For policymakers, our findings underscore the need for urban energy interventions. Simple measures, such as the provision of adequate electricity infrastructure in busy marketplaces, could encourage small businesses to grow and become more profitable. For example, 87% of the vendors that we surveyed reported that they expect more customers with better lighting. Given the importance of street vendors in the economies of many developing countries, and certainly India, such small business growth could be a significant engine of growth and poverty alleviation. Our findings show that lighting solutions are a major impediment to improved profitability and livelihoods. The municipal corporation could offer electricity connections to street vendors against a small lease. In densely populated marketplaces, bright street lighting could also provide a collective solution to the problem. One additional benefit of street lighting is that it provides a collective solution to the problem of security, which turns out to be a major concern among vendors in our sample.

Another approach would be a government program to promote the use of decentralized off-grid alternatives, such as solar power. Most policy interventions and academic studies of solar technology have focused on their potential in rural areas (McEachern and Hanson, 2008; Chaurey and Kandpal, 2009; Wong, 2012; Palit, 2013; Smith and Urpelainen,

2014; Urpelainen, 2014), but our findings show that the urban solar market is also worth further investigation and pilot policy interventions. In addition to individual solar lights, there is potential for solutions such as centralized charging stations that provide lighting for a group of street vendors within a marketplace.

Energy poverty among street vendors in the Patna metropolitan area

This section describes patterns of energy poverty among urban street vendors in Patna, India. We describe both the high levels of energy poverty and the variation in the solutions that the vendors have developed to deal with their lack of energy access. Patna is a city with a population of approximately two million in the metropolitan area. While there are no comprehensive formal surveys of street vending in the city, our canvassing exercise suggests that tens of thousands of people participate in street vending in the metropolitan area. To study energy poverty, we conducted a random survey of 1000 vendors, asking them an extensive array of questions about their business and their energy profile. In the next two sections, we discuss the methodology used to conduct the survey as well as present basic descriptive statistics.

Methodology

The data for our study were collected in January–February 2014 in Patna, India, by the survey company MORSEL India. In collaboration with the NGO Nidan, we mapped all marketplaces in the city and the neighboring small town of Hajipur. We found a total of 51 marketplaces. Of these, we selected 24 for the purposes of the study based on three requirements. First, the marketplace should not be under the threat of immediate eviction by the municipal corporation. Second, the marketplace should have at least 30 regular vendors for the survey. Third, the marketplace should not pose a risk of violence to the enumerators. We also excluded one marketplace because we did a pilot study there and wanted to avoid contamination effects.

The vendors chosen to participate in this study sell vegetables, fruit, grain, sweets, garments, and street food. Many vendors also provide services such as tailoring, barbering, or repairs. In practice, the key form of energy poverty for street vendors is the lack of adequate lighting. We did not interview people who owned actual shops, since these shopkeepers are part of the formal economy and have access to basic infrastructure. The low quality of lighting reduces customers, causes safety problems, and prevents vendors from selling after sunset.

In the 24 marketplaces chosen, a comprehensive mapping exercise located a total of 1916 street vendors. Of the street vendors on this list, we interviewed a random sample of 1000 vendors. The survey lasted approximately 45 min and was conducted in Hindi, a language that all vendors spoke, by experienced enumerators who were fluent in the language. Exact question wordings for all results reported are included in the Appendix. In exchange, we paid a modest compensation of INR 10 (~USD 0.16) for their participation.¹ The response rate was above 95%, as is typical in the Indian context. To the extent possible, the surveys were conducted during the slow business hours between 11 AM and 5 PM. The Nidan staff accompanied the survey enumerators to the marketplaces to ensure the collaboration of the local leaders.

Data analysis

Basic descriptive statistics underscore the marginalized nature of the community. Although a street vendor runs a business, only 64% of them could read and write Hindi. Median household income per month was INR 7000. With a median household size of six people, this is less than INR 1200 (~USD 19) per person. The comparison to the urban median

¹ Exchange rate of 61.9 INR for 1 USD on January 1, 2014, at the beginning of the survey.

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