Empowering Change: The Effects of Energy Provision on Individual Aspirations in Slum Communities

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ABSTRACT

This paper discusses the role of energy provision in influencing the social aspirations of people living in slums. We examine factors that influence the shift in aspirations in five slum settlements using data from 500 interviews conducted in serviced and non-serviced slums from the state of Gujarat in India. The non-serviced slums did not have access to basic services namely water, sanitation, energy, roads, solid waste and rainwater management. We find empirical evidence which suggests that when basic infrastructure provisions are met, slum dwellers shift their focus from lower order aspirations to the higher order aspirations like health, education, housing and land ownership. We argue that energy provision enhances productivity and enables slum dwellers to shift their aspirations upwards. Furthermore, we test the effect of work days lost due to illness on the relationship between higher order aspirations and aspirations for energy provision. When provision of energy is low, higher work day loss dampens higher order aspirations. For policy makers, this study highlights the critical link between the infrastructure services preferred by slum dwellers and their social aspirations for growth.

KEYWORDS

Energy, Slums, Aspirations

1. INTRODUCTION

Globally, the demand of energy is increasing dramatically every year. According to the latest reports, currently over 1.3 billion people live without access to electricity and approximately 2.7 billion people do not have access to clean cooking facilities (Organisation for Economic Co-operation and Development (OECD)/International Energy Agency (IEA), 2011). The same report projects that the number of people who rely on traditional biomass fuel will rise to 2.8 billion by 2030 (OECD/IEA, 2010). In addition, the demand and supply of energy is not evenly distributed among regions and countries in the world (Global Network of Energy for Sustainable Development (GNESD), 2007). According to GNESD, there is a tendency towards lower energy provision with over 300 million households in rural and urban areas of the developing world remaining without electricity services (OECD/IEA, 2006). The current gap in energy provision is predominant in Sub-Saharan Africa and developing Asian countries like India, whose population growth rates exceed electrification rates (Barnes and Foley, 2004). In South Asia alone, 800 million people have no access to electricity (Schaengold, 2006).

The future challenge in the energy sector will be to match the existing energy gap and meet potential demand created by high population growth rates in low income countries in Asia and Africa. The per capita energy consumption is still low in developing countries when compared to developed countries, but with improved access to energy the per capita consumption will correspondingly increase (Pachauri, 2007). As household incomes cross a certain threshold, they progress on the 'energy ladder' and move to cleaner and more convenient fuels (Reddy and Reddy, 1994; Alam, Sathaye and Barnes, 1998). Consequently, the demand for cleaner fuels is

likely to increase in developing countries, wherein the per capita consumption of energy is lower than the global average (World Bank, 2006).

In India, the high rates of urbanisation result in the formation of slum settlements. The recent census reports a slum population of 93 million (Government of India, 2010). However, a prior working paper by UN HABITAT (2003) on slums places the slum population at 158 million. Slums are traditionally characterised by illegal land tenure, inadequate infrastructure, poor quality housing stock and poor neighbourhood conditions (Gulyani and Talukdar, 2008). Slums also have limited access to clean energy sources. Over the next decade, as the access to clean energy sources of fuel for cooking will increase in slums it is likely that the per capita consumption of energy will increase in countries like India which has large slum populations in urban centres. In addition, with economic growth there will be higher consumption lifestyles and high population growth rates in informal economies like slums which would increase the energy demand in urban India (Bhattacharyya and Timilsina, 2010), which will have to be matched to the supply of energy.

Though there is much discussion on the importance of energy and other infrastructure services provision for social and economic development, there is limited evidence in the causal mechanisms underlying how such factors affect individual aspirations for better livelihoods (e.g., Sen, 1999; George, McGahan and Prabhu, 2012). To address this gap, we examine the role of energy provision in influencing higher order aspirations of land, health and education provision for people living in slums in India. We analyse evidence collected through 500 household structured surveys conducted using a face-to-face interview format in Indian slums to document an *aspirational shift* from lower order aspirations to higher order aspirations after the provision of infrastructure services.

There has been a traditional focus by governments on providing housing for slum dwellers as a panacea to social problems. The flaw with this proposition, however, is that the housing solutions in isolation do not resonate with community aspirations and priorities. It is the lack of access to services which results in loss of work time and illness and detrimental factors which reduce productivity. Our study provides evidence that slum communities in India prioritise access to infrastructure services. They give higher priority to basic services because of its immediate, ameliorative effect on their lives. These basic services provide an enabling platform for slum dwellers to then strive to improve health, education and employment opportunities.

2. ENERGY DEMANDS IN SLUMS

Despite the burgeoning slum population, the dominant focus of energy policy and provision has been at the national level, with limited empirical evidence and data available at the household level in slums and informal economies (Dhingra, Ganshi, Chaurey and Agarwal, 2008). There are challenges with respect to access to slum settlements on the one hand and the lack of household data collected by governmental agencies on the other. The census of India began to include slum population figures only from its 2001 census. Since then, researchers have initiated research in this domain. Even here, while such macro data facilitate observations of patterns, there is a paucity of evidence on individual aspirations and its broader policy implications for social wellbeing.

The UK Department for International Development (DFID) funded a study covering 207 households in three slum settlements in Delhi (Scott, McKemey and Batchelor, 2003). This study showed that in slums the barriers to electricity

provision consist of high levels of bureaucracy for legal connections, financial obstacles in the form of high upfront lump sum fees, unsafe practices through illegal connections and lack of consumer friendly policies in slums. The lack of supplies and sub-standard services is a barrier for legal connections resulting in illegal connections in informal settlements (Mimmi and Ecer, 2010; Scott et al, 2003). There have been studies discussing legality of connections and theft (Depuru, Wang and Devabhaktuni, 2011; Smith, 2004; Mimmi and Ecer, 2010), consumption (Vanin, Graca, Higa, Droichi and Goldemberg, 1983; Alam et al, 1998; Shresha, Kumar, Martin and Dhakal, 2008; Mestl and Eskeland, 2009) and access (Dhingra et al, 2008; Gulyani and Talukdar, 2008; Karakezi, Kimani, and Onguru, 2008) to energy in developing countries, more broadly, with a focus on low income communities.

In such low income communities, the high proportion of illegal connections does not imply an unwillingness to pay for electricity. On the contrary, low income residents are willing to contribute to legal electricity connections (Scott et al, 2003). In Zimbabwe, 80% of the urban population has access to electricity but more than 52% of the urban poor use kerosene and fuel wood as their main sources of energy for cooking whereas 81% of others use electricity for the same purpose (Dube, 2003). The energy costs incurred by the urban poor on non-electrical sources like kerosene could cover the costs of legally subsidised electricity connection (Dube, 2003). The urban poor spend a high proportion of their income on access to energy when compared to the non-poor (Pachauri, Mueller, Kemmler and Spreng 2004; Dube, 2003). For example, in India 76% of the LPG subsidy goes to urban areas with 25% of total population, and that 52% of this urban subsidy is enjoyed by the

top 27% of households. So nearly 40% of the LPG subsidy is enjoyed by the top 6.75 % of the population (Misra, Chawla, Srivastava and Pachauri, 2005).

The urban poor in India might also be willing to pay a premium for provision of energy services (Pachauri et al., 2004; Misra et al., 2005). This implies that energy provision must align with their aspirations and priorities. As slum dwellers have limited resources, they would prioritise their investments so that the most beneficial intervention would become a top priority. Though the positive impact of energy provision on health and education is well documented (OECD/IEA, 2011; UNDP, 2011; WHO, 2006) there is a gap in the literature on how slum dwellers prioritise the provision of basic services. As income rises, a household is more likely to have access to basic amenities (Desai, Dubey, Joshi, Sen, Sharif and Vanneman, 2010). In India, access to basic services like electricity, piped water, and cooking fuels provoke extensive policy debates about the role and level of intervention and investment from the state (Desai et al, 2010). However, from a household's point of view, they are part of a family's standard of living, much like televisions, vehicles, refrigerators, and other consumer goods.

3. ASPIRATIONS AND PRIORITIES

We study the aspirational shift for people living in slums using Herzberg's two factor theory of motivation. According to Herzberg (1966), people have two sets of needs; one which helps to avoid pain and another which helps them grow psychologically. The first set, known as hygiene factors, make individuals dissatisfied when they are absent -- factors that are generally lower in the Maslow's need hierarchy (Maslow, 1943) like basic and security needs, and are extrinsic to the work itself. Whereas the second set, also known as motivators or satisfiers, gives

positive satisfaction on fulfilment and arises due to the higher level needs such as recognition, achievement, or personal growth.

For slum dwellers, we propose an analogue where hygiene needs would be represented by access to drinking water, sanitation, waste management, rain water protection, affordable energy and roads/transport. These items also represent the basic physical infrastructure required to function and survive. We classify the aspirations for hygiene needs as lower order aspirations. The satisfiers or motivators would be obtained through the provision of good health care, land tenure, ownership of housing stock and access to education for children in slums. Those assets enhance the status of slum dwellers in society and enable them to focus on improving their quality of life instead of just surviving. Correspondingly, we classify the satisfiers/motivators as higher order aspirations.

We test this proposition by examining the aspirations of slum households in serviced and non-serviced slums. We use Herzberg's motivational theory to group various components of infrastructure into higher and lower level services in the context of Indian slums. The intention is to understand the nature of services which are perceived by slum dwellers as a pre-requisite for their development. Whilst, all forms of services ranging from the physical infrastructure (water, electricity, roads) to social infrastructure (health clinics and schools) are necessary, some forms of services are more critical than the others for survival.

4. ENERGY PROVISION AND IMPACT

The World Development Report 1994 advocates that infrastructure can deliver major benefits in economic growth, poverty alleviation, and environmental sustainability- but only when it provides services that respond to effective demand

and does so efficiently (World Bank (WB), 1994). There is evidence that countries (like China) which pursue broad-based access to infrastructure services will find that economic growth is distributed relatively equally among the various groups of society, thus reducing poverty more effectively (DFID, 2002).

A strong association exists between the availability of certain types of infrastructure (telecommunications, power, paved roads, access to safe water) and per capita GDP (WB, 1994). As a country progresses from being considered a low income country to a high income country, the composition of infrastructure changes with increased inputs in power, roads, telecoms and reduction of inputs in irrigation, water, railways and sanitation. Data for 1990 suggests that, while the total infrastructure stock increases by 1% with each 1% increase in GDP, household access to safe water increases by 0.3%, paved roads increase by 0.8%, power by 1.5% and telecommunications by 1.7% (WB, 1994). Even within countries, regions that become more affluent are likely those that gain access to infrastructure (Desai et al, 2010)

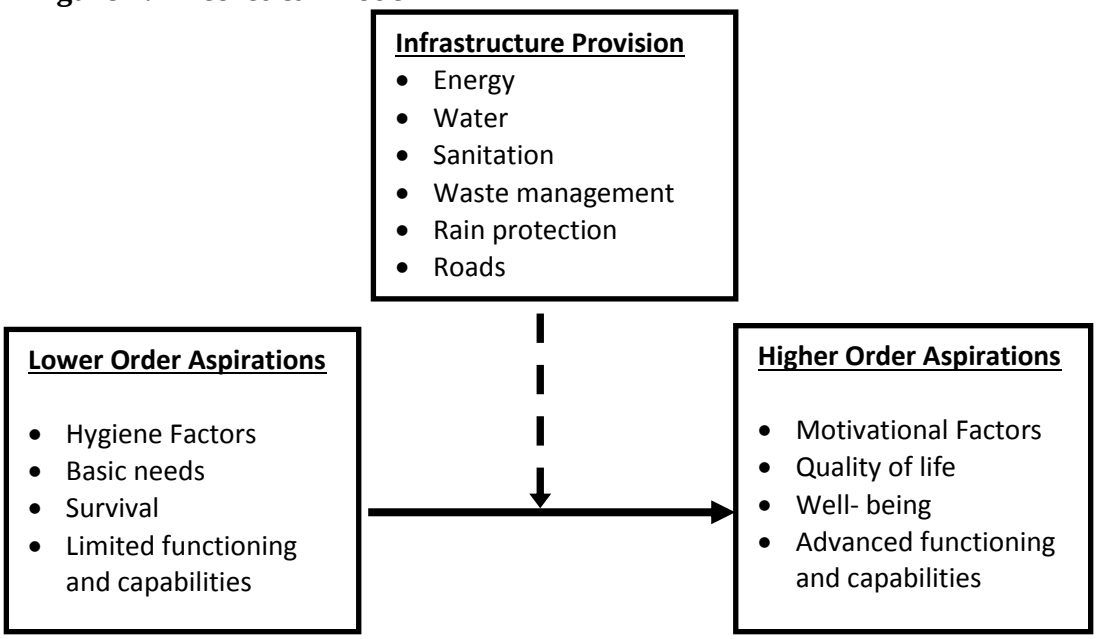
At the household level, low commercial energy use is correlated with high infant mortality, illiteracy and infertility, and with low life expectancy. The provision of affordable energy potentially has direct effects on well-being, health, education and economic opportunities for the poor (Desai et al, 2010, GNESD, 2007, Modi, McDade, Lallement and Saghir, 2006). Improvements in environmental conditions in the form of air pollution reduction, water and waste management can improve health conditions (Gulis, Mulumba, Juma and Kakosova, 2004). Access to energy improves productivity and access to labour markets for the low income communities. Slum communities in India who have limited access to basic services incur significant costs and losses as inferior environmental conditions result in poor health

thereby reducing the potential for working members of the family to enhance their income and asset base (Parikh, 2008; Parikh and Parikh, 2009; Parikh and McRobie, 2009 and Parikh, Parikh and McRobie, 2012).

The impact of energy can be considered from the perspective of an increase in capabilities. Based on Sen (1999), it can be argued that the provision of energy potentially can improve the functioning of an individual and remove barriers for income generation and participation. For low-income households, access to affordable energy improves education as improved lighting sources allow children to study longer hours (Desai et al, 2010) and also improves income as longer lighting hours provide additional income generating opportunities (Kanagawa and Nakata, 2008).

Even an incremental improvement in energy access can improve the quality of life. The report of the Advisory Group on Energy and Climate Change (AGECC 2010) calls upon the global community to provide a minimum threshold of modern energy services for both consumptive and productive uses. According to IEA (2009), an incremental access to energy can result in initially satisfying the need for consumption of fuel for lighting and cooking, leading to use of fuel for production/income generating activities which in turn leads to use of fuel for modern living and higher quality of life.

Figure 1: Theoretical Model



In Figure 1, we propose an illustrative framework which combines the improved capability and functioning argument (Sen, 1999), motivational theory (Herzberg, 1966) and threshold of service provision (IEA, 2009). The framework is directly relevant to the slum setting and combines the strengths of the human-centric approach followed in both Sen's and Herzberg's work as well as the equity perspective of the minimum threshold argument. This model is relevant not only for slums in India but has the potential to be generalised to low income communities in other developing countries.

Currently, slum communities spend time and resources to access key basic services namely water, sanitation and energy. As a result, the slum dwellers have limited function and are unable to focus on higher order aspirations. Slum dwellers are constantly fighting a battle for survival as they invest their limited resources in accessing basic infrastructure. We posit that if there is an intervention in the form of basic infrastructure provision, then slum dwellers are able to focus on higher order functionings and capabilities such as land, health improvements, attainment of

education and housing stock. Using energy provision as an example, the paper explores whether energy aspiration has a positive influence on attainment of higher order social aspirations.

5. METHODOLOGY

5.1 Population

This study draws on an approach called Slum Networking which has been used in India for in-situ slum upgrading. The upgrading is achieved through the provision of integrated household-level infrastructure in the form of water, sanitation, roads, electricity, rain water drainage (flood protection) using community resources, thereby shifting emphasis from donor support to self-sufficiency (Parikh, 2008; Parikh and Parikh, 2009; Parikh and McRobie, 2009 and Parikh et al, 2012). Water, sanitation and electricity were provided individually to each household.

Slum Networking, which started in the city of Indore, has since been extended to slums in other cities in India. Specifically, Slum Networking was implemented in the Sanjaynagar and Pravinnagar settlements in Ahmedabad in 1997 and 1996-1998 respectively and in the Ramdevnagar settlement in Baroda City in 1996. Whilst the initial project in Indore was funded by DFID, the subsequent projects have been funded through local partnerships between the slum communities, government, local businesses and local non-governmental organizations. The intervention of Slum Networking therefore has now evolved from donor funded to a self-funding model based on local public private partnerships. The work was expanded to cover more slums by Ahmedabad Municipal Corporation (AMC). As of December 2005, Slum Networking Project had reached 8,703 families making a significant contribution in the lives of 43,515 people in 41 slum communities of Ahmedabad. The community

members had paid a total of US$ 301,600 to the AMC as their contribution towards the services, something never done by slum dwellers anywhere else in India (AMC, 2005). The economic conditions in the serviced slums of Sanjaynagar, Ramdevnagar and Pravninnagar-Guptanagar (hereafter, Pravinnagar) settlements were compared with those in two control slums (Khokra and Hansol) in Ahmedabad.

5.2 Sample

Five slums in India were selected for this study. Three of the five case study slums in India (Ramdevnagar, Sanjaynagar and Pravinnagar settlements) were selected on the basis of having household water, sanitation, energy and rain water protection provided in the last ten years, and data collection was conducted for the socio-economic situation in the years of 1996 (no services) and 2006 (serviced). The data for 1996 was obtained during the interviews conducted in 2006 and based on the respondents' knowledge and experience. The same households had been living in the settlements throughout the study period. The two settlements of Khokhra and Hansol were non-serviced and evidence was collected from the dwellers there for the year of 2006. Table 1 gives details of the communities interviewed.

Table 1

Case Study Profile

Name of Case Study	Location (City, Country)	Service provisions	No. of dwelling units
Sanjaynagar	Ahmedabad, India	Yes	181 [1]
Ramdevnagar	Baroda, India	Yes	779 [1]
Pravinnagar	Ahmedabad, India	Yes	1200 [2]
Khokhra	Ahmedabad, India	No	141 [2]
Hansol	Ahmedabad, India	No	320 [2]

Source: [1] Himanshu Parikh Consulting Engineers [2] Ahmedabad Municipal Corporation, 2005

Data was collected through semi-structured interviews and 500 house interviews in the five settlements. The surveys took the form of face-to-face house interviews with questionnaires. The semi-structured interviews were conducted in all the study slums with a group of 15-20 men and women, and were used to modify and fine-tune the pilot questionnaires. The improved questionnaire was then re-piloted in one house for each case study. Random sampling techniques were used to ensure that a representative sample was interviewed. The questionnaires were used to collect both qualitative and quantitative evidence from the communities. A mixed method approach was adopted for this study. The advantage of the mixed method approach is that the quantitative evidence could be used to study access to services and their impacts. The qualitative evidence was used to understand community perceptions and priorities in the slum setting.

The questionnaires[1] were in English and the survey team was trained to ask the questions in the local language but record responses in English, which eliminated the need for translation. On average, each house interview took 40-50 minutes to complete, with a total of approximately 350 hours of cumulative interview time for the 500 interviews. Objectivity was achieved by ensuring that the questions were not leading in nature, and some questions were repeated in different sections as a check that the responses were consistent. In order to ensure an even coverage of male and female respondents, the interview timings were split between morning, afternoon and evening hours. In the non-serviced settlements, mornings were not a good time for the survey as most of the households were busy with water collection activities with women predominantly away from houses. In contrast, mornings were a good time for

[1] Copy of questionnaire is available from lead author

interviews in the serviced settlement as both men and women went to work during the day and were at home during early mornings.

5. RESULTS AND DISCUSSION

5.1 Shift in Aspirations in slums

The aspirations of slum dwellers were obtained through a ranking exercise carried out in the field as part of the household interviews. The purpose of the ranking exercise was to make an assessment of community aspirations for various components of basic services versus inputs in health and education[2]. The respondents were asked to rank 10 items (water, sanitation, roads, electricity, rain water/flood water protection, housing, education, health facilities, employment) before and after the intervention. The highest priority item was ranked as 10 and the lowest priority item was ranked as 1. As the number of responding houses for each case study varied, the summation of ranks of each item from all the houses in each case study was divided by the number of responding houses to ensure an equal comparison.

In the three serviced settlements, the respondents were first asked to rank all ten items for the current year of 2006. As the serviced areas had already been provided with basic amenities like water, sanitation, roads, electricity and rain protection those items were ranked fairly evenly by the respondents. The remainder of items namely house, land, health, education and employment were given higher priority by the respondents. The response rate for the 2006 scenario was high with 282 out of the 300 households responding. Then the same residents were asked to prioritise the same items for a hypothetical non-serviced situation for the year of 1996. The response rate for this scenario was 261 out of the 300 households.

[2] In the questionnaire the question was phrased as: Rank importance in life (1-10) with the ten items listed in a table.

Figure 2 shows the plot of aspirations (priorities) of slums dwellers combined for the three serviced slums. The plot of aspirations for the three individual slums has been discussed in another paper (Parikh et al, 2012). In the hypothetical non-serviced scenario in serviced slums respondents gave top priority to investments in water, sanitation, roads and electricity infrastructure in preference to housing, health, education and employment. This is reinforced by the reversal in priorities from infrastructure to other segments once the physical development work was done in the serviced slums.

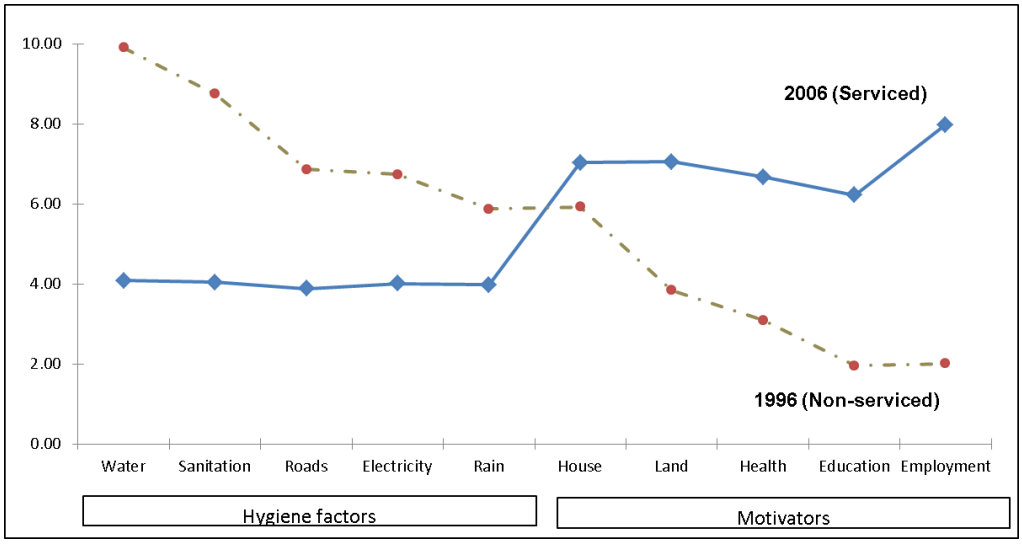


Figure 2: Aspirations of slum dwellers in serviced slums with water, sanitation, roads, electricity, solid waste and rain water protection provision (2006 actual shown in full line and hypothetical 1996 shown in dotted)
N=261 for non-serviced and N=282 for serviced scenario

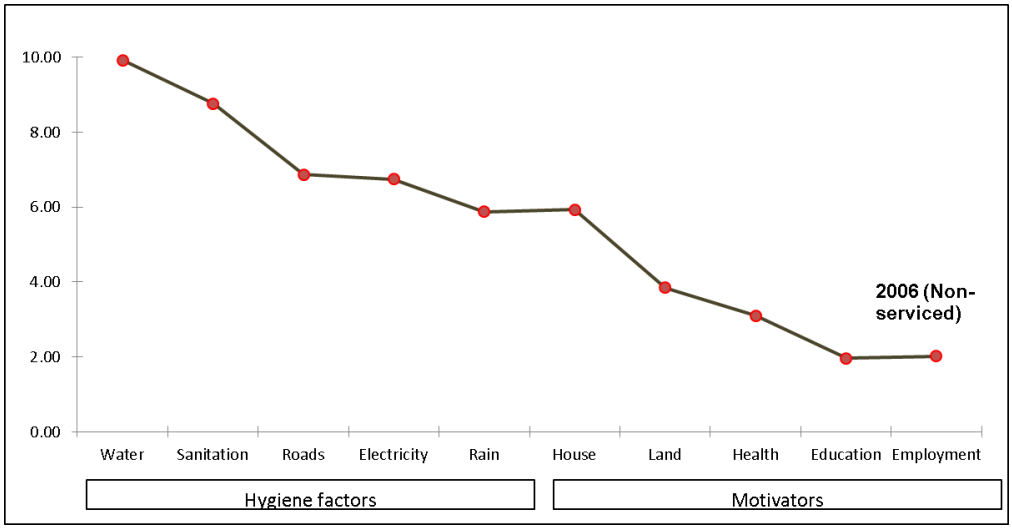


Figure 3: Aspirations of slum dwellers in non-serviced slums with no water, sanitation, roads, electricity, solid waste and rain water protection provision (2006 shown in full line)

N=187

However, in Figure 2, the evidence for the non-serviced scenario in the three serviced slums is captured through recall questions and has the risk of being biased. So we review the aspirations in nearly 200 non-serviced households in two settlements in the year of 2006. The intention is to see if the priorities and aspirations of the slum dwellers in the two non-serviced serviced slums for the year of 2006 match up with the evidence collected for the other three slums through recall questions.

Figure 3 shows the aspirations for nearly 200 households in two non-serviced slums. The plot of aspirations for the two individual slums has been discussed in another paper (Parikh et al, 2012). The respondents gave top priority to investments in water, sanitation, roads and electricity infrastructure in preference to housing, health, education and employment in the non-serviced slums. The priorities identified in Figure 3 for the two non-serviced slums of Hansol and Khokhra align with the priorities identified by the respondents in the serviced slums (Figure 2)

through recall questions. The serviced slums in Figure 2 now have access to the basic services and hence concentrate on achieving access to the higher end services of land, housing, health, education and employment.

The shift from lower end aspirations of water-sanitation-energy-roads to higher end aspirations of land, health, education and housing between the non-serviced and serviced slums demonstrates the value created by provision of basic services. As soon as lower order aspirations (basic services/hygiene factors) are provided the slum dwellers then move on to improve their quality of life through the attainment of higher order aspirations (satisfiers/motivators).

Raghavendra (2006) shows in Hyderabad, India, that a household with less than adequate service is six times more likely to choose an improved service than a household which perceives its endowments as adequate. An appreciation of positive impacts of infrastructure access seemed to emerge. In a resource constrained setting like slums with limited funding the prioritisation of services is important. Investment in the lower order services is high priority for residents as they perceive those to be necessary for their development. Access to those basic services is likely to increase productivity as time is freed up to concentrate on meeting higher level services and generation of employment opportunities (Chaurey, Ranganathan and Mohanty, 2004). The positive impact of energy provision on health and education is well documented (Energy Sector Management Assistance Programme (ESMAP), 2003; OECD/IEA, 2011; UNDP, 2011; WHO, 2006). Energy provision has been recognised to be a key driver for sustainable development in developing countries to sustain economic growth (Chaturvedi and Samdarshi, 2011)

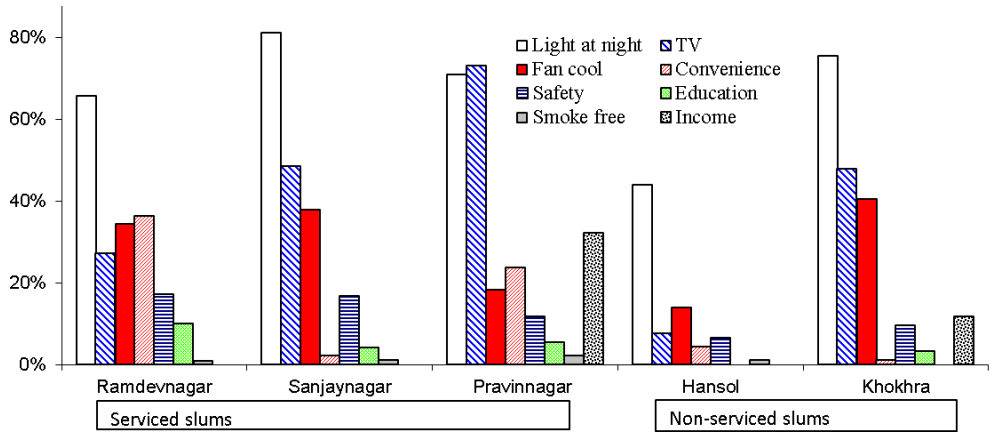


Figure 4: Perceived benefits of electricity provision
(2006 data from three serviced and two non-serviced slums)

In resource-constrained settings like slums, the benefits of basic services range from access to lighting to improvement in education. We asked respondents from the five slum communities their views on the perceived benefits of electricity provision. Figure 4 shows that, in addition to providing light and convenience, electricity provision is perceived to impact education and incomes. Electricity is perceived to be beneficial not just for lighting houses but also for powering televisions, providing a smoke free environment and improving safety. So slum dwellers aspire to the provision of electricity as energy provision results in positive outcomes which can enable slum dwellers to then improve their lives.

We use the evidence from the non-serviced slums to identify and define 'higher order aspirations'. As shown in figure 3 the aspirations for health, education and employment are ranked the lowest as communities perceive those to be less critical in the developmental process. We suggest that the combination of those three aspirations can be deemed to be higher order as they would be prioritised after all the other services are provided.

We use the composite variable of higher order aspirations and examine how the aspirations for electricity affect this composite variable in the setting of five

slums. The aspirations for electricity represent the need or gap in energy provision and hence we use aspirations for electricity as a proxy for provision in electricity services.

5.2 Analysis

Regression analysis has been used to explore aspirations, choices and decision making processes in slums. Some examples include analysis of the impact of living conditions on microenterprise (Gulyani and Talukdar, 2010), health outcomes of infrastructure intervention in slums (Butala, VanRooyen and Patel, 2010), governance in slums (Jha, Rao and Woolcock, 2008), factors influencing decision making for selection of primary schools in slums (Cameron, 2011), residential locational choices of slum dwellers (Lall, Lundberg and Shalizi, 2006) and factors influencing rents in slums (Gulyani and Talukdar, 2008).

Regression analysis is used to examine how the aspiration for provision of electricity influences higher order aspirations for the provision of land, health and education in slums. We grouped aspirations based on Herzberg's motivational theory. The combined aspirations for land, health and education was selected as the dependent variable to represent higher order aspirations and the aspirations for provision of electricity was selected as one of the independent variables[3]. The aspirations were standardised and then step wise linear regression was carried out. Table 2 shows the descriptive of all the variables used in the regression model. Out of the 500 houses interviewed, 466 households were included in the model and the remaining 34 were dropped due to partial non-responses. Table 3 lists all the variables used in the regression. All the variables are based on data from nearly 300

[3] The ranking exercise discussed in section 5.1 of this paper provided information on aspirations (priorities) for land, health and education. The summation of the aspirations for land, health and education were standardised to from the dependent variable

households in three serviced slums and 200 households in two non-serviced slums for the year of 2006. The data from the 1996 dataset was excluded from the regression analysis to avoid recall bias.

The first regression model comprises control variables such as population, medical expense, educational expenses and household income. The second model also included health and well-being related variables such as the number of work days lost due to illness, frequency of flooding, per capita disease rates and number of monthly health incidents. The third model includes variables related to the provision and access of basic services of water, electricity and use of kerosene for lighting. The fourth model examines the interaction effects between the aspirations for electricity provision and work days lost due to illness.

Table 2: Descriptive Statistics (N = 466)

Variable	Variable Name	Min	Max	Mean	Std. Deviation
Standardised aspirations for land, health and education in 2006.	AspLHE	-1.66	1.89	0.00	1.00
Population in 2006	Population	1.00	24.00	6.10	2.50
Monthly education costs in US$	EDUUSD	0.00	66.12	3.26	7.09
Monthly medical costs in US$	MEDUSD	0.00	3600.00	347.23	280.91
Monthly income in US$	INCUSD	0.00	386.00	93.01	49.33
Monthly energy costs in US$	ENERGYUSD	0.00	66.12	5.78	5.44
Number of work days lost due to illness per annum	Work days	0.00	15.00	2.39	2.74
Per capita disease rate per annum in 2006	Disease	0.00	3.00	0.37	0.30
Number of floods affecting the slum dwelling per annum	Flood	0.00	10.00	1.77	2.11
Number of health related problems/incidents per month	Health	0.00	12.00	1.50	1.80
Access to water. Yes=1, No=0	Water	0.00	1.00	0.16	0.37
Use of kerosene for lighting. Yes=1, No=0.	Kerosene	0.00	1.00	0.13	0.34
Standardised aspiration for the provision of electricity.	AspElec2006	-2.17	2.77	0.00	1.00

Table 3: Regression models predicting aspirations (land, health and education) of slum dwellers in 2006

Dependent Variable: AspLHE (Standardised aspirations for land, health and education)

Variable	**Variable Name**	Model1	Model 2	Model 3	Model 4
	(Constant)	-0.48***	0.71***	0.62***	0.54***
Population in 2006	Population	-0.03	-0.04*	-0.02	-0.02
Monthly education costs in US$	EDUUSD	0.01	0.01	0.01	0.02
Monthly medical costs in US$	MEDUSD	-0.02*	-0.01	-0.01	-0.02
Monthly income in US$	INCUSD	0.01***	0.01***	0.01	0.01
Monthly energy costs in US$	ENERGYUSD	0.03***	0.01	0.01	0.01
Number of work days lost due to illness per annum	Work		-0.05***	-0.04**	-0.04***
Per capita disease rate per annum	Disease		-0.59***	-0.32*	-0.24*
Number of floods affecting the slum dwelling per annum	Flood		-0.25***	-0.21***	-0.21***
Number of health related problems/incidents per month	Health		0.03	0.03	0.03
Access to water. Yes=1, No=0	Water			-0.18*	-0.17*
Use of kerosene for lighting. Yes=1, No=0.	Kerosene			0.05	0.02
Standardised aspiration for the provision of electricity2006.	AspElect			-0.46***	-0.63***
Standardised electricity aspiration 2006 x Incidents/month	XEnergyIncidents				0.06***
Standardised electricity aspiration 2006 x work days lost	XEnergyIWork				0.02*
F		17.74***	57.94***	84.00***	78.62***
R square		0.16***	0.53***	0.69***	0.71***

N=466

Standard errors reported below coefficients, *p<0.05, **p<0.01, ***p<0.001

For regression models 3 and 4, the standardised aspiration of electricity is negative and hence reduces the standardised aspirations of higher order aspirations for land, health and education. The higher aspirations for electricity imply the lower levels of energy provision. Consequently, a low provision of electricity reduces the higher order aspirations. This result validates the theoretical model that we presented in Figure 1 of this paper where we argue that energy provision positively influences higher order aspirations.

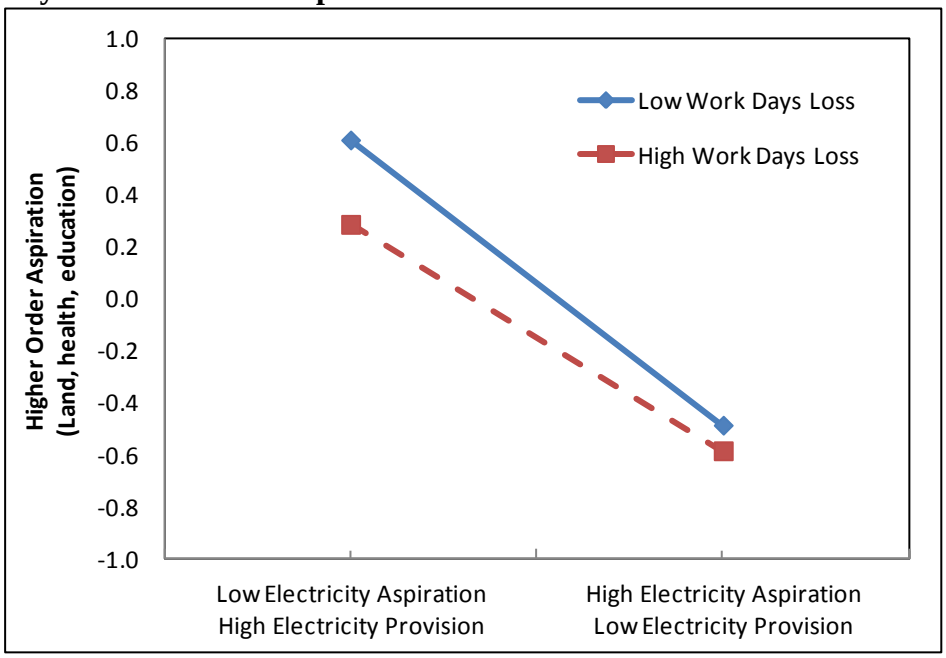
The number of work days lost due to illness also has a negative effect on higher order aspirations. So the higher number of work days lost due to illness the less likely that the slum dwellers will aspire for higher order goods. This relates to Sen's (1999) theory of capability and functioning where the work day lost due to illness represent the reduction in functioning and reflects the state of the slum dwellers at that point of time. The number of health incidents has a positive sign in all the regression models. The increase in health incidents results in an increase in higher aspirations as there is a need to achieve good health supplemented by education and land provision.

For model 4, 71% of the variance in the dependent variable of aspirations is explained by the independent variables used in the model. The effect sizes of significant individual variables were calculated using Cohen's test of mean and standard deviation. The results indicate that one unit of increase in the number of work days lost due to illness will reduce the higher order aspirations by 50%. Similarly, a one unit increase in per capita disease rates and floods result in a reduction of higher order aspirations by 24% and 47% respectively.

The interaction of electricity aspiration with the loss of work days was investigated in model 4. As slum dwellers move from low to high electricity

aspirations i.e. from high to low provision of energy higher work day loss results in a reduction in higher order aspirations. As shown in Figure 5, if the work day loss is high it means that slum dwellers expend more effort to combat those losses and cannot focus on achieving a better quality of life. When the aspiration for provision of electricity is low, this implies there is a gap in the provision of energy. In this scenario, the number of work days lost due to illness does not have a notable impact. This once again relates to our theoretical framework where we argue the benefits of infrastructure intervention in terms of improved capabilities to achieve an improved quality of life.

Figure 5: Interaction effects between aspirations for electricity provision and work days lost due to illness per annum



6. CONCLUSION

Using 500 household interviews drawn from five Indian slums, this study proffers evidence on the shift from lower to higher order aspirations. The provision of basic services including energy as a high priority aligns with their aspirations. As soon as the demand for basic services, namely, energy provision, is met the slum

dwellers in the serviced slums shift their aspirations toward higher social aspirations. The slum dwellers' aspirations were grouped through a ranking exercise and a pattern of lower and higher order aspirations emerged. The regression model reveals that higher order aspirations for the provision of health, education and housing in slums are influenced negatively by the aspiration for energy. That is, if people do not have access to energy provision, then they are less likely to aspire to higher order social needs. The lower order aspirations once met provide positive outcomes and empower slum dwellers to seek the higher order aspirations. If health conditions are inferior and there is loss in income generating/work days for slum dwellers, then it is even more challenging to achieve these higher order aspirations. The analysis validates our theoretical model (Figure 1) where we discuss the shift in aspirations due to interventions which provide access to basic services.

7. POLICY IMPLICATIONS

Interventions such as provision of basic services increase productivity and enable slum dwellers to then focus on higher order aspirations such as housing stock, provision of education and land ownership. We find that in the absence of access to basic services, slum communities prioritise basic over higher order services, suggesting a stepwise shift in aspiration levels that reflect the social development needs of these communities. Further, we examine the effect of work days lost to see how ill health and lower productivity moderates the relation between energy aspirations and higher order social aspirations in Indian slums.

The results reveal that an increase in work days lost due to illness by one unit reduces the slum dwellers aspirations by 50%. Likewise the increase of disease rate

and flood rates result in a reduction of aspiration by 24% and 47%. So providing access to basic services including access to affordable energy, water, sanitation and flood management can be used as a catalyst to shift aspirations and target community investments to improve their lives. Community assets like health clinics, schools and livelihood creation can improve lives in slums but they need to be preceded by investment in the very basic services.

From a policy perspective, the prioritisation of services that match social norms and individual aspirations in slums implies that initial government investment can be more effectively targeted towards the lower order services. In order to trigger co-investment and community investments in creating housing stock, for example, the provision of basic services like water, sanitation and energy can be used as a powerful incentive. Such targeted government interventions could empower slum dwellers to shift from inferior living conditions to a clean environment with reasonable housing, health and educational facilities.

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