

Trust and Cooperation among Urban Poor for Transition to Cleaner and Modern Cooking Fuel

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Abstract

A significant percentage of households in India still use firewood, kerosene and other biomass as cooking fuel. A survey on household energy consumption patterns in Hyderabad revealed that monthly expenditure of urban poor on firewood or kerosene is as much as the price of liquefied petroleum gas (LPG) cylinder. However, poorer households do not switch to the cleaner, more convenient and healthier LPG due to the high initial investments for an LPG connection. A pilot project was initiated to explore the viability of a community-based cooperative solution in pooling financial resources to meet these upfront investment cost and enable slum households to shift from kerosene and firewood to LPG. Two self-help groups were formed comprising 30 households each. The project enabled all 60 member households to obtain an LPG connection. This paper reiterates, through this pilot, that it is possible for communities themselves to come up with innovative and sustainable solutions for achieving common development goals. Trust and reciprocity amongst the community is however a prerequisite for success. Contrary to general perception, this paper also shows trust and reciprocation, though moderate, does exist in urban setting. This social capital needs to be constructively harnessed through appropriate institutional design.

Keywords: Energy Access, Cooking Fuel, Urban Poor, Collective Action, India

Research Highlights

- Monthly cost of firewood for urban poor equivalent to cost of an LPG cylinder
- High upfront cost of LPG is a major barrier for fuel transition among urban poor
- Trust and Reciprocation levels, though moderate, does exist in urban settings
- This social capital can be utilised to expand energy access among poor households

1. Introduction

Developing countries still account for a significant share of population relying on traditional biomass for cooking. Of the 2.6 billion people without access to modern cooking fuels in the world, 0.82 billion live in India (IEA, 2013). This constitutes more than two third of India's populations. The Census of India 2011 also suggests a similar trend with 67 percent of Indian households reported to use biomass based cooking fuels. The latest household energy source survey by India's National Sample Survey Office (NSSO) in 2009-10 found that 83 percent of the rural and 19 percent of the urban households still use traditional biomass for cooking (NSSO, 2012). A household energy consumption pattern survey in Hyderabad, the capital city of Andhra Pradesh in India found that 9 percent of the total households surveyed depend on firewood for cooking and this is higher (17 percent) among the slum households (Nayak et al, 2013)

The adverse impact of use of firewood and other biomass based cooking fuel on health and the (urban) environment has been widely discussed in literature (Smith, 2000; ICMR, 2001; World Bank, 2002a; UNDP/ESMAP, 2003; Laxmi et al, 2003; Mehta and Shahpur, 2004; Smith et al. 2005; Liddell and Morris, 2010). Indoor air pollution is the major driver of acute respiratory infection related morbidities and mortalities in India, accounting for more than four percent of the total morbidity in India (Smith 2000; Mehta and Shahpur 2004), making it higher than all deaths from HIV/AIDS, malaria, and tuberculosis combined (Schluger, 2010). Cooking with traditional fuels particularly impacts health of women and children who spend most of their time at home and in close vicinity of the cooking area. Cramped houses and localities where the urban poor usually live further aggravate the problem of smoke. Women often bear the task of collecting firewood from the nearby shrub or forests. Cooking with traditional fuels takes much more time than cooking with other fuels. All this, leaves very little time on hand for

women for leisure or even other income generating activities. Besides these direct impacts on the household, using biomass for cooking is an enormous threat for the environment. The smoke that is produced during cooking increases the CO₂-emissions and at the same time, the resulting deforestation decreases the ability of the eco-system to absorb CO₂ in the air.

The transition towards gas based cooking fuels like liquefied petroleum gas (LPG) and natural gas is considered as a solution to the problems discussed above (Kojima, 2011; D'Sa and Murthy, 2004). This has been emphasised in the policies and programmes of various national governments as well as international organisations. The Government of India too has a long history of universal price subsidy on LPG for domestic cooking purposes to encourage this transition (Ekholm et al, 2010; Gangopadhyay et al, 2005). However, this subsidy has limited impact on household fuel transition amongst varied levels across household income groups and rural-urban landscapes (Lahoti et al. 2012; Rao, 2012; Reddy et al, 2009; D'Sa and Murthy, 2004; World Bank, 2002b). The findings from India's 2011 census suggest that only 28.6 percent of the 247 million households in the country use LPG. NSSO survey in 2009-10 found that LPG is the primary cooking energy only for 64.6 percent of the urban and 12.1 percent of the rural households in India (TERI, 2012). Among the different factors that hindered the transition to LPG, particularly in urban areas with adequate LPG distribution network are the inability of the poor households in meeting the initial investment required for buying an LPG connection and lack of stipulated documents for identity and residence proofs. The targeted capital subsidy schemes¹ of some state Governments to meet the initial cost of buying LPG indicate the recognition of the former factor. The Economic Survey 2010-11 of Government of India also discussed the proposal of providing one-time financial assistance of Rupees 1400 to poor households for taking up LPG connections

(Government of India, 2011, p 269). Such subsidy schemes, much like any other government programmes, have limited reach and often do not reach intended beneficiary. The finding that 17 percent of the slum households in Hyderabad using firewood for cooking (Nayak et al, 2013) indicates that still a significant percentage of urban poor were not able to benefit from this capital subsidy scheme (Deepam) even after ten years of its launch. Poor households in slums in Hyderabad collect firewood either from nearby shrubs, avenue plantations or buy it from open market. Those who collect the firewood (mostly women in the household) locally spend about eight to ten hours a week for its collection and may have to walk up to 6-8 kilometres to fetch firewood. And those households who purchase the same from market are found to be spending as much or even higher amounts for cooking fuel when compared with households using LPG. This raised the question why so many households are still using firewood (or other biomass based solid fuels) instead of switching to the ‘cleaner’, ‘healthier’ and ‘more convenient’ LPG even though it is subsidized.

Looking at this specific local context in Hyderabad, this research aimed at testing whether cooperative solutions could enable households to switch to LPG without necessarily depending on the capital subsidy schemes of the government. The results from the trust experiments in eight slums in the city in 2011 strengthened the belief that this was possible and the subsequent implementation of a pilot project in two slums in Hyderabad confirmed this. The details of the study approach and methods are summarised below.

The research was carried out in Hyderabad during 2009-2012 and involved both quantitative and qualitative methods. First of all, a large scale household survey was conducted in 2010 in order to better understand overall energy use patterns in the city.

Subsequently, semi-structured and informal (group) interviews were conducted in selected slums to further understand the factors hindering the fuel switching among the urban poor households. As a second step, a trust game was implemented in eight different slums in Hyderabad to learn more about patterns of trust and reciprocity among the slum communities. Further, the presence of self-help groups (SHGs) and community-based activities was explored and cooperation patterns within the community were examined. Also, LPG distribution agencies and firewood depots were visited in order to verify price information and to discuss issues concerning access for the poor and seasonal demand-supply scenarios. Finally, a collective action based pilot project were designed and implemented in two slums in the city facilitating switching to LPG among 60 households.

The paper is structured as follows: Section 2 focuses on the rationale of community-based approaches and questions whether these can work in urban settings that are fundamentally different from rural communities. Section 3 describes the finding of the household survey conducted in Hyderabad in the course of the research and subsequent one to one and group interviews. Section 4 describes a trust game that was conducted in eight slums in the city; Section 5 reports the pilot project and results followed by summary and conclusion in section 6.

2. Trust and Collective Action in Urban Settings

While designing poverty reduction or climate change adaptation projects, national and international development cooperation often explore and opt for “community-based” approaches. Community-based initiatives are an attempt to utilise the communities’ social cohesion to implement projects that sustain over time. Specific attributes of a community can enhance the ability to cooperate. Sandler (1992), for example, argues that collective action is more likely for a smaller and a more homogenous group. The

likelihood of success of any cooperative arrangement increases with homogeneity of caste, kinship, religion and ethnicity (Grootaert, 1999; Kähkönen, 1999). When people share a common set of norms and values, practising trust and reciprocity, it is rather likely that they develop adequate rules and norms and are successful in regard to collective action (Taylor, 1987; Ostrom, 1998). In such collective initiatives the cost of project monitoring is also low. In contrast, if people come from different communities and are distrustful of one another, the difficulty of designing and sustaining effective rules is increased (Ostrom, 1998). Prior positive experience with collective action also has a bearing on successful collective action. In an experiment conducted by Mitra and Gupta (2009), trust was high amongst a group of villagers who belonged to the same community-based organisation.

It can be assumed that there would be greater level of trust amongst people in rural areas than urban areas. Often, rural communities are established over a long time with families knowing each other for generations. In India, the influence of kinship and caste institutions are important factors in rural areas with people often staying in the same place for generations. Families own land and house, which also creates an economic and cultural attachment to the place. Typically in rural communities, people are related to each other through a range of social, cultural and economic networks which facilitates regular interactions across various socio-economic. For instance, landowning households would depend on landless households irrespective of their caste for labour to till their land. The mutual dependence of households living within a village for a range of socio-economic and cultural activities makes the rural communities close knit. In the urban context, on the other hand, given the mobility of people, one can assume that social ties would be rather weak. People tend to be fairly mobile, often living on rented accommodation. Kinship and long-term relations are seldom found or developed; often

people come from different cultures and might even speak different languages. In many instances, both men and women go out to work, leaving very little time for social interactions.

To summarise, trust understood as an “[...] the expectation that arises within a community of regular, honest, and cooperative behaviour, based on commonly shared norms [...]” (Fukuyama, 1995, p. 26), might be rather difficult to be found in newly established urban areas. However, it is expected that more and more people will move to cities in future (UNFPA, 2011). With cities contributing much to the worldwide environmental degradation and with urban inhabitants suffering most from pollution, it is important to find locally adapted solutions for poverty reduction and environmental conservation. This research aimed at exploring whether cooperative solutions were possible in the urban context for development related issues, in this case access to cleaner energy and sustainable development.

3. Access to LPG among the Slum Dwellers in Hyderabad:

A household survey was conducted in 2010 and covered 798 randomly selected households from three kinds of residential locations. These locations were selected such as to cover households from all strata of the society (high and middle class as well as slum localities). In Hyderabad, like many other cities, the location of the household strongly indicates its socio-economic status and often the poorest households live in (informal) settlements scattered around the city. The objective of the survey was to collect data on various aspects of energy consumption patterns of households in Hyderabad, mainly on lighting, cooking, space cooling and water heating.²

The survey suggested disparity in energy use of the household for lighting, heating and cooking across income groups and the residential location of the households (slums,

middle and high class). The survey also revealed a ‘fuel transition in cooking’, i.e. with increasing income, families move away from traditional fuels to cleaner and efficient fuels like LPG and electricity. As evident from Table 1, with increased monthly per capita income (MCPI) of the households, use of LPG and electricity as cooking fuel increases while that of kerosene and firewood decreases. The majority of the households in the lowest two MPCPI groups use kerosene and firewood. A significant shift is evident in the use of LPG (from 61% to 90%) when the MCPI increased from less than Rs. 1500 group to Rs. 1500-3000 group.

Table 1: Distribution of households by usage of various cooking appliances across income groups

Monthly Per Capita Income Group (in Rupees)	% of Households Using				
	LPG Stoves	Kerosene Stoves	Firewood Chullahas	Electric Cookers	Microwave Oven
< 1500	61	38	30	2	1
1500-3000	90	10	5	8	2
3000-5000	96	5	1	12	8
5000-7500	100	0	3	13	28
> 7500	100	4	0	39	66
All	87	13	9	11	12

Source: Household Survey 2010

Similarly, as the pattern of cooking fuel use across the residential localities are concerned, the percentage of households using firewood declines significantly as we move from slum (17 %) to middle class and high class (only 1%). Firewood as a cooking fuel mainly reported to be used among the slum households. The use of kerosene for cooking also reported by less number of households in middle and high class localities (4 % and 3 % respectively) when compared with slum (24 %). On the other hand, the usage of modern appliances such as electric cookers and microwaves is most prominent amongst the middle and high class as shown in Figure1.

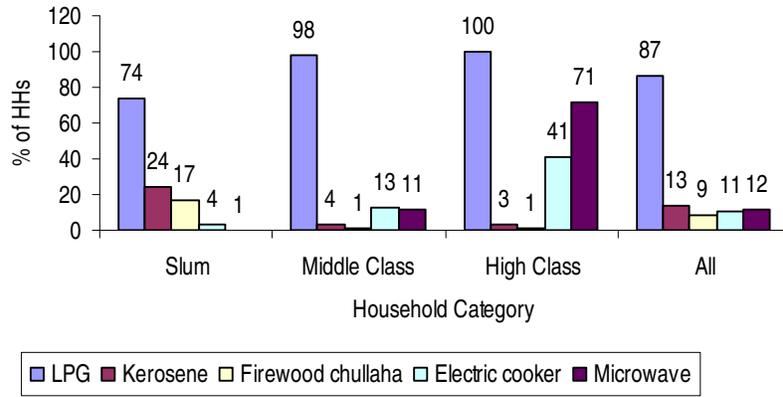


Figure 1: Distribution of households (slum, middle and high class) by usage of various cooking appliances

The trends of household expenditure on cooking fuel reveal an interesting facet to issue of access to cleaner and modern fuels. Notably the survey showed that on monthly basis households using kerosene and firewood bear costs that are nearly equal or even more than that of LPG using households. 3. These findings indicated that it is not the monthly expenditure for fuels that hinders the switch to LPG. Thus, and especially considering the opportunity costs (health, time), the question arises why so many households are still using firewood (or other biomass based fuels).

In order to further understand the factors impeding slum household's transition to the use of 'cleaner' and convenient LPG, the research team conducted several in-depth individual interviews as well as group interviews in five different slums in the city during the January-February 2011. The focus was on understanding cooking habits and preferences, specific impediments for shifting to LPG cookers and the experience of the urban poor with the Andhra Pradesh Governments' Deepam scheme.

The interviews revealed that the major impediment in shifting to LPG is the upfront lump sum cost of a connection, which households find difficult to pay. For using LPG, the household needs to pay for a stove, a regulator, security deposit for the cylinder, and

charges for registration/documents. These costs add up to an average monthly income of a slum dweller (Nayak et al, 2013). Another hindrance might be the upfront payment for the cylinder refill which the household otherwise can spread over the month by purchasing kerosene or wood on a daily or weekly basis. Similar findings have been reported by studies for other Indian cities as well (Dhingra et al, 2008).

An additional impediment for urban poor is the lack of residence proofs/identity cards that are necessary to apply for an LPG connection. Residence proof is a problem for the households living in unauthorized slums and in rented premises without any formal rent contracts. Notably insufficient awareness of the benefits of LPG or concerns regarding safety was not seen as impeding the uptake of LPG. It also emerged that many households do not avail LPG connections in the local market as they expect to benefit sometime in the future from the governments' Deepam scheme. This wait has been as long as 8-10 years for some respondents.

4. Trust and Reciprocity among Slum Dwellers as a basis for Cooperation

Since, lower levels of trust are assumed in urban settings, the team decided to conduct a field experiment to validate this in the context of slums in Hyderabad. A trust game (Berg et al. 1995) was implemented in eight slums with groups comprised of 30 to 40 people (n=270). In each slum, the players were divided into two groups of equal size: the sender group (group A) and the responder group (group B). The sender as well as the responder each received an initial endowment (x) of four tokens.⁴ Players in the sender (investor) group A could decide to keep the initial endowment or to send an amount of tokens $y = \{0, 1, 2, 3, 4\}$ to an unknown player in the responder (trustee) group B. The amount kept back turned into a private yield of player A. The amount sent out by Player

A to Player B was tripled by the experimenters and then given to the trustee. Player B thus had his initial endowment (x) of four tokens plus the tripled amount of tokens sent by the unknown player A ($3y$). Player B then decided how many tokens it wanted to keep aside and if and what amount $z=\{0,1,\dots,16\}$ it wanted to send back to Player A. All tokens kept, turned into private property of player B, all tokens sent immediately became private property of the respective player A. The amount sent (x) is used as measure for trust, the amount returned (z) as a measure of reciprocity (see appendix for trust game procedure).

The results of the game revealed that the players generated 71.5 percent of the maximum possible income. The senders earned 44.7 percent of the total generated income whereas the respondent earned 55.2 percent. The average amount sent by the sender group (Group A) is ₹ 85.82, which is around 43 percent of the initial endowment that the Group A members received. Only 5 percent of the players in Group A ($n=135$ players) decided to send their whole initial endowment and none of the players decided to send no money to players in Group B. Around 88 percent of players in group A decided to send half or less of the initial endowment. This indicates the existence of mutual trust among the slum communities, though moderate.

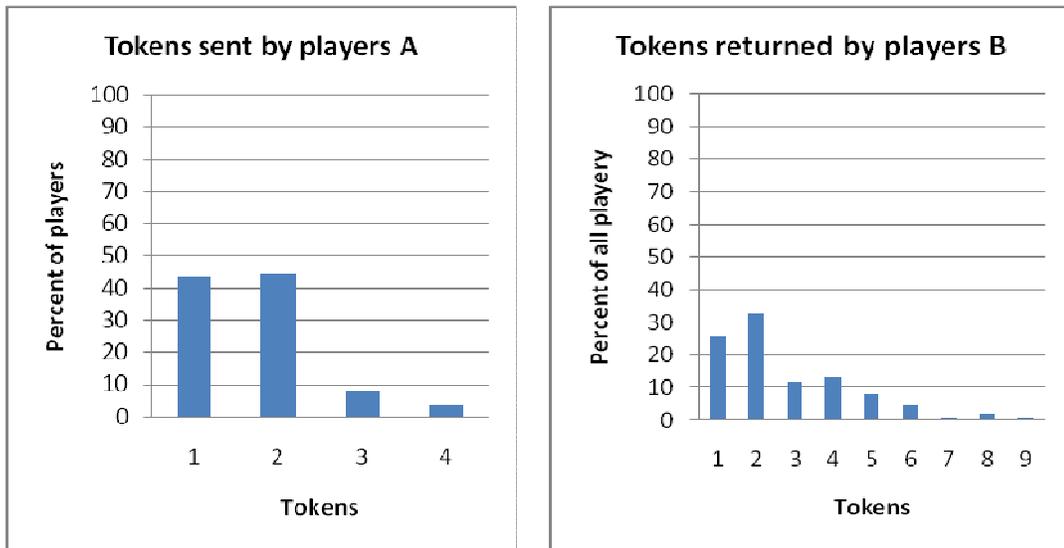


Figure 2: Trust and reciprocity among urban slum dwellers in Hyderabad, India

Another significant finding of the trust experiments was in respect of prior experience with collective action (for example Self Help Groups). Slums with prior collective action initiatives had exhibited significantly higher trust (Mann-Whitney: $z=-3.556$; $p=0.0004$) and reciprocity (Mann-Whitney: $z=-3.245$; $p=0.0012$) level than the slums without any such initiative. This led to the conclusion, that although urban communities might have rather low trust due to reasons discussed earlier, there is the effect of “learning to trust” that comes with common activities⁵. In the course of the trust experiments and earlier interview, the team also learnt that many of the slums have considerable social capital in terms of interactions and co-operation among the neighbours (Wrethmann et al, 2011).

5. The Pilot Project: Community Based Cooperation for Fuel Transition

A mix of quantitative and qualitative techniques, including the household energy consumption survey, in-depth individual and group interactions in slums, and trust experiments, all helped in understanding the research issue, and directed the team to a possible solution. To recapitulate:

1. The household energy survey in Hyderabad reiterated earlier studies that urban poor continue to use traditional fuels. The survey finding that monthly expenditure of households on traditional fuel can be as much as the cost of an LPG cylinder, suggested that there must be other factors impeding the use of LPG.
2. The informal interviews increased the specific and insights into the reasons for continual use of traditional fuel despite sufficient knowledge about its ill-impacts on health. A major impediment was the upfront cost of an LPG connection
3. The Trust Experiments established moderate levels of trust in urban slums and showed higher levels of trust and reciprocation in slums with prior experience of collective action.

The results of the Trust Experiments strengthened the view that community based action programme could work in an urban setting. It was therefore decided to implement a pilot project wherein slums households would be brought together to pool their resources to meet the upfront cost of LPG connection such that over a period of time all participating households would get a connection. Given that Trust levels were higher in slums with some experience with Self-Help-Group, it was decided to undertake pilot in slums with SHG activity. Also it was necessary that all group members had valid identity proof.

The first task was to identify a local NGO for capacity building and coordination at the field level. A local actor that is already involved in community activities and thus known by the households was considered as key and an already existing trustful relationship as one of the major enabling factor for a successful implementation of the pilot. After interactions with several agencies, the APMAS, (earlier the *Andhra Pradesh Mahila Abhivruddhi Society*), an NGO working on building technical and managerial capacity of women SHG in Andhra Pradesh was roped in as the local partner. In cooperation with

the local partner, the team visited several slums in order to examine the interest of the households in participating in the pilot. Two slums, with active SHG presence and where APMAS had prior association were selected. These were Banjara Colony (in total 479 households) and Nandanvanam (1,785 households) in the LB Nagar area of the city. Groups of 30 women each were formed from amongst them in the two slums. In Banjara Colony, less than 30 percent of the households were using LPG cookers while in Nandanvanam the proportion was slightly higher at 43 percent. All other households used fuel wood and kerosene for cooking. In Banjara Colony, the fuel wood was sourced locally whereas in Nandanvanam it is mostly purchased locally. The team interacted with local LPG dealers to assess their willingness to help in the pilot project by providing LPG connection for reduced prices.⁶ Finally two dealers in the nearby localities agreed to provide the connections subject to proper documentation and identify proofs.

APMAS organised several rounds of meetings in both slums. In these meetings, consensus was built on appropriate institutions for the cooperation. It was left to the LPG group to decide the amount to be contributed monthly and the rules of the collective action (e.g. how many LPG connections to be bought every month and in what priority will contributing households get the connection). Nevertheless, each household contributed the same amount of money for several months⁷. From the pooled resources, each month, some of the members were able to obtain an LPG connection plus the respective equipment. The group kept contributing until all member households got their LPG connection. The subsequent paragraph describes the pilot in detail.

The pilot commenced in March 2011. The LPG group started functioning in Nandanvanam in the month of March itself. The local gas dealer agreed to provide

connections to five households every month and charge Rupees 3,600 per single cylinder connection with LPG stove and other necessary accessories. The group decided to mobilise Rupees 600 from each member households every month. Thereby, every month, five households were able to obtain an LPG connection. Those beneficiary households were chosen by a lottery every month, as decided by the group. This mechanism went well for the first four month. Subsequently, the local LPG agency increased the prices for the connection. Also, in August 2011, most group members went home to their extended families for festivals and thus during this month no money was collected. Nevertheless, the group was able to cope with these (non-planned) changes in the implementation and agreed on rule adjustment. In September, each household paid Rupees 1,217 (for two months) and the remaining beneficiary households also paid the additional Rupees 62 price increase. Thus, at the end of September the whole group managed the transition to cleaner fuels. None of the households reported to have borrowed to make the monthly payments. Some of the households also had their cylinders refilled during the course of the pilot. None of the members reported any conflict within the group. Consensus on the payment mechanism was easily reached and members trusted that everyone would contribute until each household had a connection. The major effort required of the outside agent, in this case, the local NGO, was to support the initial setting up of the group. Thereafter, the group members took responsibility for all activities involved.

For the second group in Banjara colony, a similar process was followed. Here, members decided to contribute Rupees 1,200 every month, twice as much as in the first group. In May 2011, the first contributions were made and ten member households obtained an LPG connection in June, also selected by lottery. As in case of the first group, the prices for the connection increased and the households had to increase their contribution by

Rupees 200. Although all the group members in Banjara colony received a connection, the group dynamics in this colony were rather difficult. First of all, many households were not sure whether they wanted to participate in this 'collective action' and it took several rounds of meetings to finalize the list of households. This continued for more than two months and was only solved, when positive experiences from the group in Nandanavanam were reported to the potential members. Also, finding consensus on the order of beneficiaries was difficult. Some members expressed concern that households who benefit first may stop contributing.

The difference in receptivity to the pilot idea in the two slums may be explained by different socio-economic characteristics and access to alternative fuel. The households in Banjara Colony sourced firewood from the nearby shrubs and not from the market. Therefore while women in the colony had to invest time and effort in the fuel food collection, the households did not have to spend any money. In Nandanvanam, the households purchased the fuel from the market and hence were more eager to pay and switch to LPG. In addition, the Banjara colony housed a homogenous group of 'Banjara' tribal who had traditionally been receiving benefit of various free and subsidised schemes of the government. It was therefore more difficult to persuade them to pay for fuel. Households in Nandanvanam, were a heterogeneous group, not particularly benefiting from government schemes, and hence perhaps more willing.

To summarise, the transition towards cleaner cooking fuels like LPG for poor households has the potential for immediately improving the quality of the environment in urban areas, for a more efficient utilization of energy and a reduction of the deforestation in the long run. The use of LPG also helps women in engaging in other income generating activities using the time that they usually would have spent for

firewood collection or cooking. Additionally, a community-based collective action solution for individual household problems strengthens mutual trust, fosters cooperation in other spheres and enhances the social capital in the slum communities.

Besides, successfully harnessing the existing ‘social capital’ within the groups, this pilot, the surveys and informal interviews conducted in the course of this research bring out certain cultural and social observations which policy makers need to reflect upon:

- 1) Many Urban poor believe that it is the government’s obligation to the poor to provide free connections. In convincing the community to go for ‘collective pooling of resources’ for connection, the research team very often was short-charged in explaining why the connections were not being provided free of cost.
- 2) The urban poor in the slums interviewed did not feel empowered enough to approach the gas dealers even when they were in a position to pay for the connection. A few, who tried, were refused, even despite proper documentation. The gas dealers blamed this on the inadequate supply and apprehension that the connection would be resold by the poor in the open market for a margin.
- 3) It took more time to have consensus on terms of cooperation in the Banjara colony even though most people belonged to the same tribal community suggesting perhaps that in urban settings the usual factors promoting social cohesion do not hold.

6. Conclusions

Greater access to modern and cleaner energy for cooking and lighting is being considered critical for ‘achieving a range of social and economic goals relating to poverty, health, education, equality and environmental sustainability’ (IEA, 2013, pp. 87). Though several initiatives have been taken at different levels, the goal of universalizing access to modern energy is far from being achieved. The diversities in the

national and local context of this global problem demands multiplicity of approaches or polycentric approaches (Sovacool, 2011; Ostrom, 2009). In spite of the government subsidy on LPG and well-entrenched distribution network in the urban areas, India still has a significant urban population relying on traditional biomass based fuels for cooking. It is not the cost of fuel or safety concerns that hinders the access to this modern and cleaner cooking fuel, but the non-affordability of the upfront cost. Lack of proactive marketing strategies by the LPG distribution companies for example, smaller cylinders (with lower refill costs) or the opportunity to pay the upfront cost in instalments compels the poor to live with traditional fuels. The initiatives, like the capital scheme subsidy 'Deepam', have limited outreach and often do not reach the intended beneficiary.

The results of the pilot suggest that community based resource pooling can overcome the affordability problem of urban poor for transition towards cleaner and modern fuels. Importantly, by creating a community-based self-help solution in mobilizing the resources rather than using a conventional subsidy regime, the project is empowering the people to help themselves by using their own social resources. The pilot proved that urban slum dwellers can and are a strong community with well-developed social capital. Also in cities, trust, as a social institution can be an excellent driver for development.

However, this pilot model only addresses the demand side problem for fuel transition and need to be complemented by reforms in supply side management. It is important that the distribution agency also recognises the group and supports such a group until all member households get connections; otherwise the collective action can break down and may lead to conflict among the members of the group.

This collective action model of resource pooling for LPG has important policy relevance as Government of India is working on a scheme to provide one-time financial assistance of Rupees 1400 to households for taking up LPG connections (Government of India, 2011, p. 269). This proposed scheme would cover all households below poverty line and plans to provide new LPG connection for 3.2/4.2 million households annually. The annual financial outlay for this scheme is estimated to be Rupees 4,900 million. The major difficulties in the operationalization of this scheme would be targeting the right beneficiaries and raising financial resources. This community based resource pooling model can complement this proposed scheme as the assistance of Rupees 1400 (against the actual upfront cost of Rupees 3600 to Rupees 4200) will not enable many poor households to pay the remaining amount. Hence, institutionalizing such collective action initiatives has the potential to expand energy access for the urban poor.

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Appendix

The following Figure 3 illustrates the trust game procedure:

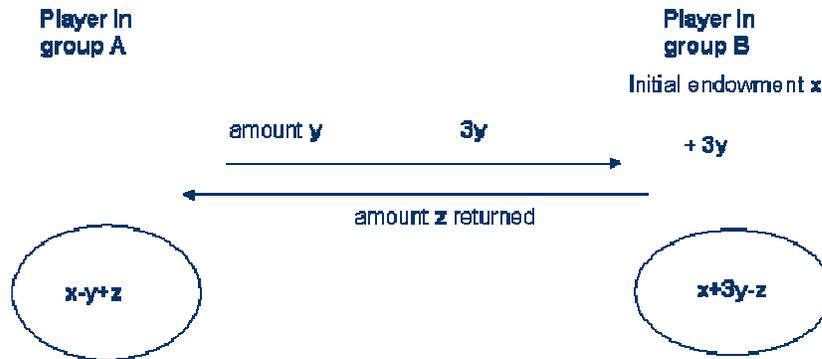


Figure 3: Trust game procedure

Thus, summarising, the individual payoff function for player A and player B respectively are:

$$g_a(y, z) = x - y + z$$

$$g_b(y, z) = x + 3y - z$$

with amount sent $y = \{0, 1, 2, 3, 4\}$ and the amount returned $z = \{0, 1, 2, \dots, 16\}$; the initial endowment of $x = 4$

Players were not allowed to communicate before their decision within the groups as well as between the groups. Groups were placed into different rooms or houses during the game. A third room was reserved for the individual decision situation where each player entered, one by one, to hand over the sealed envelopes with the amount they wanted to send to player B. These envelopes were kept by the facilitators and transferred to the responders in group B in a predetermined manner that was unknown to the players themselves. The players in group B then took their decision, also in private and with sealed envelopes. All players received their money privately and in cash.

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Endnotes

¹‘Deepam’ scheme of the Government of Andhra Pradesh and ‘Kerosene Free Delhi’ programme of Government of National Capital Territory Delhi are examples of such capital subsidy programme. Deepam, launched by the Government of Andhra Pradesh in July 1999 has the provision for a one-time cash subsidy of Rupees 1000 for Below Poverty Line (BPL) households in the state. The scheme initially aimed to cover 1.5 million BPL households (1 million rural and 0.5 million urban) and subsequently expanded further. Kerosene free Delhi, a capital subsidy scheme initiated by Government of National Capital Territory Delhi (GNTCD) in August 2012, aims at providing a one-time cash subsidy of Rupees 2000 for LPG connection to 0.35 million BPL households in Delhi. GNTCD has allocated Rupees 400 million in current financial year (2012-13) and planned to cover 0.175 million households.

² The questionnaire was divided into two sections with the first part focusing on different energy uses within the household, while the second part was designed as a choice experiment on household’s willingness to pay for an improved electricity supply. The results of the survey has been published (Rommel et al, 2010; Hanisch et al, 2010, Agarwal et al, 2013, Nayak et al, 2013)

³On an average, a slum household spent around Rupees 300 per month (with an average monthly consumption of 9.6 litre kerosene and 29 Kg of firewood) on these two fuels whereas households using LPG were paying Rupees 320 per cylinder that gets used over a month. The LPG for domestic use are subsidized by the government. (All the costs pertains to the survey period).

⁴ One token accounts for ₹50 (Indian Rupees), which corresponds to approximately € 0.59 or \$ 0.81

⁵ The challenge here is then to initiate the first collective (trust-building) activity as households themselves might not even considering such an approach based on the initial low trust among the neighbours.

⁶A single cylinder LPG connection with stove and other accessories generally costs Rupees 4200 to 4500 depending on the choice of stove. The agency had agreed to give connections to the pilot LPG groups for around Rs. 3600 with a cheaper stove.

⁷Also the option to borrow from a slum level federation (SLF) was given. SLF is a federation of Self Help Groups (SHGs) supported by the local NGO APMAS in the slums of Hyderabad. These SHGs not only act as thrift groups, but also facilitate group based income-generating and other collective activities (e.g. purchasing rice in bulk at wholesale prices and selling to member households).