Improving access to water supply and sanitation in urban India: microfinance for water and sanitation infrastructure development

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ABSTRACT

This article summarises initial findings of a study to explore the potential of providing micro-financing for low-income households wishing to invest in improved water supply and sanitation services. Through in-depth interviews with more than 800 households in the city of Hyderabad in India, we conclude that, even if provided with market (not concessional) rates of financing, a substantial proportion of poor households would invest in water and sewer network connections.

Key words | financing, India, infrastructure, microcredit, sanitation, slums, water supply

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INTRODUCTION

A poll published recently by *The British Medical Journal* cited sanitation – the provision of safe water and excreta disposal services to households – as the "most important medical advance in the past 150 years" (British Medical Journal 2007). Yet more than 165 million people in cities of the developing world still lack access to even a minimal quantity of fresh water for their basic needs. More than twice that number – 405 million – do not have access to even the most basic sanitation services. In the dense and irregularly planned cities of low- and middle-income countries, the public health and environmental impacts of this situation are immense.

Poverty is a seemingly obvious explanation for the persistent lack of coverage with basic water and sanitation (W&S) services. Yet over the past decade, applied research in urban planning has revealed that in many settings it is the poorest of households who pay the most for such services (Zaroff & Okun 1984; Whittington *et al.* 1991). For example, because poor households must rely on alternative (and labour intensive) services, such as tankers and cart vendors, they pay prices ranging from 2 to 20 times more per litre of water as compared to households with water network connections (McPhail 1993; Kjellen 2000).

This evidence raises the question as to why poor households would choose more expensive but lower quality water and sanitation services. One important reason concerns the mismatch of W&S service pricing and financial management in low-income households. A poor family may indeed spend, over the course of a month, an amount exceeding that needed to obtain W&S network services; however, such a family often manages funds on a day-to-day basis and would find it difficult to save money so as to pay a monthly or bi-monthly utility bill (Whittington *et al.* 1999*a*). Even more daunting is the prospect of amassing the capital needed to pay an initial network connection fee, which is often the equivalent of one or two month's income for a household (Davis 2003).

In this study, we explore the potential of providing micro-financing for low-income households wishing to invest in improved water supply and sanitation services. Through in-depth interviews with more than 800 households in one city in India, we conclude that, even if

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provided with market (not concessional) rates of financing, a substantial proportion of poor households would invest in water and sewer network connections (Lovei & Whittington 1993; Whittington *et al.* 1999*b*).

DATA COLLECTION AND ANALYSIS

Data for this study were collected from the city of Hyderabad, in the southern region of India. A total of 14 different neighbourhoods within Hyderabad were included in our sample. Each study neighbourhoods is a "notified" slum comprising 200–1,000 households. The majority of households in each community do not have access to improved water supply or sanitation services as per the Joint Monitoring Programme definition. Each community is located in close enough proximity to the water and sewer networks operated by the Hyderabad Metropolitan Water Supply and Sanitation Board such that households who are willing and able to pay the cost of these services could obtain connections at this time.

The survey was carried out by 15 graduate business students following an intensive, 3-week training and pretesting period. Data were entered on handheld computers which allowed for a daily review of data and a quick transition from data collection to analysis. A total of 919 interviews were completed, with the median length of an interview being 45 minutes. Seventy-three percent of interviews were carried out in Telegu, while 27% were conducted in Hindi.

PRELIMINARY FINDINGS

Socioeconomic characteristics of sampled households

The majority of households in the study sample were homeowners who had lived in their neighbourhood for 15 years (Table 1). The typical family reported a monthly income of US$100 with five members of the household. Almost all sampled households had electricity service in the home, and 40% had either mobile or land-line telephone service.

Table 1 | Selected socioeconomic characteristics of sampled households ($n = 919$)

Percentage of households renting their homes	18%
Among owners, median reported market value of home	50,000 Rs.
Mean, median household size (persons)	5.1, 5
Mean, median number of years that household has lived in colony	17.6, 15
Mean, median number of years that household has lived in Hyderabad	25.4, 25
% with fixed line and/or cellular phone in the home	40%
% with electricity service in the home	93%
% of respondents who are literate	30%
% of female respondents	67%
Mean, median age of respondent	33.2, 32
Mean, median reported income per month	5040 Rs., 4000 Rs.
Percentage of HHs reporting annual income of < US$750	12%

In August 2007, US$1 ≈ 40 Rs.

Water supply services of sampled households

Households in the study sample use a variety of water sources, but each household typically avails itself of only one source regularly (Table 2). Almost 40% of households reported a moderate or high degree of dissatisfaction with their existing water supply situation, owing largely to the limited quantities of water their families can obtain and the considerable amount of time required to fetch water.

Sanitation services of sampled households

Almost 60% of households have access to a private toilet (Table 3); the remaining households generally defecate and urinate out-of-doors near their neighbourhoods. Almost half of households reported a moderate or high degree of dissatisfaction with their existing sanitation situation. The reasons for their dissatisfaction include both aesthetic issues (cleanliness of sanitation facilities), shame (embarrassment of using open air or public facilities) and inconvenience.

DEMAND FOR MICROCREDIT

Each household in the sample was asked about its interest in obtaining a loan of between 3,000–10,000 Rs.

Table 2 | Water supply characteristics of sampled households ($n = 919$)

Median, mean number of different water sources used by respondent's household on a regular basis	1, 1.4
% using individual household connections (own or neighbor's)	43%
% using public taps	45%
% using public borewells	32%
% receiving water from tankers	10%
% who have water stored in their homes on a regular basis	90%
% who say their family treats their drinking water on a regular basis	37%
% who say their family is "somewhat" or "very" dissatisfied with their existing water supply situation	39%
Among these households, % who said that insufficient quantity of water was a principal reason for their dissatisfaction	89%
Among these households, % who said that the time required to obtain water was a principal reason for their dissatisfaction	53%

Table 3 | Sanitation service characteristics of sampled households ($n = 919$)

% of households with individual toilets	58%
% of households using a neighbor's toilet	3%
Among households using private toilets, % who reported at least one incidence of toilet blockage in the past month	44%
% who say their family is "somewhat" or "very" dissatisfied with their existing sanitation services	47%
Among these households, % who said that poor hygienic condition of the sanitation facilities was a principal reason for their dissatisfaction	83%
Among these households, % who said that the inconvenience of using the sanitation facility was a principal reason for their dissatisfaction	79%
Among these households, % who said that embarrassment and/or lack of privacy of the facility was a principal reason for their dissatisfaction	45%

(US$75–250) in order to obtain a municipal water connection, a toilet with a sewer connection, or both. Respondents were presented with information that reflected their existing water supply and sanitation situation; for example, for a household that already possessed a water connection but did not have an individual toilet, the enumerator presented information about loans for sanitation improvements.

Details about the hypothetical microloan program were explained carefully by the enumerators, and were based on the actual WaterCredit program developed by the US-based NGO WaterPartners International. Enrolment in the program would require a family to form a "joint liability group" that included five families from the same neighbourhood. Each family would take a loan from the program and each would be required to vouch for the other members. In the event of a default by any family in the group, the other members would be required to cover that family's debt.

In addition, each family would be required to demonstrate the ability for regular saving by contributing 125 Rs. (US$3.15) each week for 8 weeks to a savings account. Only after these 8 weeks of saving would a family's application for a loan be processed.

A split-sample experiment was carried out to investigate the effects of different interest rates and repayment periods on demand for water and sanitation loans. Average monthly interest rates ranging between 1.25 and 2.5% (declining basis), and repayment periods of 18 and 24 months were randomly assigned to respondents. All respondents were also told that their loan repayments would carry a 60 Rs. (US$1.50) monthly charge that covered administrative costs as well as health insurance for the borrower's immediate family.

For each respondent who said that his/her family would be interested in taking a loan, enumerators followed up with questions about the amount of the loan desired, confirmed affordability of the monthly payment with the respondent, and probed for the motivation underlying the respondent's interest.

Across all eight of the interest rate-repayment period combinations, a substantial proportion of respondents indicated an interest in, and ability to repay, small loans for water supply and sanitation improvements (Table 4). (Each respondent received only one of these combinations, i.e. the cells in Table 4 are mutually exclusive).

Over all interest rates and repayment periods, 60% of households that said they would be interested in a loan for water and/or sanitation improvements. Among these households, 36% said they were interested in taking a loan in order to obtain a water connection, 39% to obtain a toilet with a sewer connection, and 25% to improve both services.

When asked how they felt their families' lives would improve as a result of better water supply and sanitation services, 61% said they believed their family's health would improve. One third said that improved services (particularly water supply) would save their family money, and one-quarter said that better services would save their family substantial amounts of time. In addition, 15% of respondents mentioned gaining respect from their friends and neighbours, and/or being able to invite others to visit their home, if their water and sanitation services were improved.

Among households who were not interested in taking a microloan for water and sanitation service improvements, the principal reasons cited were the requirement of the program to form joint liability groups (28%), as well as monthly payments (15%) and monthly interest rates (8%) being too high.

Table 4 | Demand for water and/or sanitation micro-loans: Percentage of respondents interested in a loan at given interest rate and repayment period ($n = 919$)

	Repayment period	
Average monthly interest rate (%)	**18 months**	**24 months**
1.25	59% "Yes"	63% "Yes"
	41% "No"	37% "No"
	$n = 113$	$n = 121$
1.67	66% "Yes"	68% "Yes"
	34% "No"	32% "No"
	$n = 116$	$n = 111$
2.1	42% "Yes"	56% "Yes"
	58% "No"	44% "No"
	$n = 92$	$n = 150$
2.5	57% "Yes"	54% "Yes"
	43% "No"	46% "No"
	$n = 120$	$n = 97$

REGRESSION ANALYSIS

Overall, the demand for credit to help low-income households improve their water supply and sanitation situation appears to be considerable among sample households. If such a program were to be implemented in Hyderabad, it would also be important to understand both the characteristics that are associated with households expressing higher effective demand for the microloan program, as well as the impact that variations in program elements, e.g. interest rates, affect stated demand for the program. We use a multivariate logit regression model to help us investigate these questions.

Table 5 presents both the measures of central tendency for the variables included in our model, as well as the

Table 5 | Regression analysis results

Variable name	Mean for data set	Coefficient
Intercept	5.84	−0.50
Monthly interest rate	2.06	−0.26*
Repayment period	21	0.01
Water satisfaction	0.61	0.09
Sanitation satisfaction	0.53	−0.54†
Family size	5.1	0.08‡
Save regularly	0.34	0.37*
Got loan past 5 years	0.14	0.24
Respondent gender	0.73	−0.15
Respondent literate	0.27	0.20
Regular expenses (1,000 Rs.)	0.69	0.19
Trust other families	0.86	0.39‡
Adjusted R^2 value		*0.24*
Number of observations		*830*

*Significant at 0.05 level.
†Significant at 0.01 level.
‡Significant at 0.10 level.

estimated coefficients. All else held equal, higher interest rates are associated with a significantly lower demand for water and sanitation loans; no significant effect of repayment period variation is observed.

Families that expressed dissatisfaction with their existing sanitation services had a higher demand for loans. Families that reported saving regularly, as well as those who have obtained a loan in the past 5 years, were more likely to be interested in availing of a microcredit program for water and sanitation improvements. Families that said they had a high degree of trust for other households in their neighbourhood were also significantly more likely to want to participate in the loan program, ostensibly because they viewed the requirement to form a joint liability group as one they could fulfil.

CONCLUSIONS

This study represents the first known investigation into the potential for microcredit to unleash latent demand for water supply and sanitation improvements among low-income households in developing countries. Whereas considerable additional analysis of these data (generated in August and September 2007) needs to be undertaken, preliminary results suggest that microlending may be an effective means of helping households in communities with existing trunk infrastructure to access improved water supply and sanitation services in their homes.

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