

Ensuring Access to Water in Urban Households

Peeyush Bajpai*
Laveesh Bhandari*

SUMMARY

This paper deals with how urban Indian households obtain water for their daily requirements. It addresses the issue with the aim of ensuring the universal access to clean and safe water twenty-four hours a day using information collected by the NSSO in their 54th round containing more than 31,000 urban households. This is done taking into consideration the relationship between current access to water and the economic status of households.

The link between economic status and access allows the analysis of issues such as water sharing, sole access, ability to pay, need for improvements, etc. For instance ability to pay for poor households is studied in light of high level of water sharing among them. The authors also put forth a strategy for levying user charges for different economic status households.

The data reveal that poor access is accompanied with low levels of expectations of the populace. The paper stresses the need for a substantial consumer awareness campaign before embarking on any improvement program.

* The authors are working at Indicus Analytics

A. INTRODUCTION

By most standards Indian cities rate among the lowest in the world - the environment, infrastructure, land prices, and general 'livability' - all leave much to be desired. (UWSS, 1997) Increasingly, however various aspects of urban India are being paid more attention - both by policy makers and academics. One such issue of importance is related to sanitation - access to water in urban India. This paper attempts to relate the need for investment in water supply infrastructure with the requirements and economic capabilities of the households. In the process it highlights the policy issues, and impediments in ensuring access to all.

Urban local governments across India are generally considered to be in extremely poor financial health (Srivastava & Sen, 1997. Khandwalla, 1999. IPFS, 1998-99) Their revenues are low and as a result their investments and expenditures on urban services have suffered. As a result urban India has poor infrastructure and even worse services. Water supply is one such area where local governments have not been able to keep up with the increase in requirements.

Further policies have been targeted towards the provision of subsidies for consumption and not towards the cost of access. The major sufferers are the poor, for whom the connection costs are unaffordable. (WSP, 2001)

Something that would be considered to be the very basic of services - water on tap for twenty four hours a day has been unheard of for decades in most Indian towns. (ADB 1993) A large part of the households depend on their own private tube wells and pumps for their daily water needs. As a results water tables are falling at dramatic rates. It has therefore become essential that each household be provided tap water for its *sole* use. The issue then becomes how do the local governments pay for these expansion in access to water.

Note that mere access to water is not the only issue - its also important that it be available 24 hours a day and its quality in terms of cleanliness be good. Given the fact that water is a scarce resource, it is also important that it is not misused. Therefore appropriate user charges also need to be charged.

Levying user charges, however, would have to be preceded by a good understanding of Indian households' water connectivity. That is, among others, the number of sole use connections and shared connections need to be ascertained. Lack of such information may have a negative impact on the success of such actions. For instance the increasing block tariff (IBT) model is inapplicable where the water connection is shared among households, a characteristic that we show is common among the poor. The tariff rates under IBT are directly and positively related to the consumption beyond a threshold limit. The joint users end up paying a higher average price for water than the sole users. (Boland & Whittington, 2001)

Ensuring good water supply will therefore require the following:

1. Investments in improving infrastructure of obtaining and transporting water
2. Investments in improving infrastructure for water supply to the consumer
3. Levying and collecting appropriate user charges

The bulk of the expenditures would be front ended. Even if financial resources were available from external sources, they would typically require some contribution from the local governments - contribution that the large majority of local governments will not be able to ensure. Since water supply benefits end consumers it may be possible to ask them to contribute for improving infrastructure and avail of better services (on lines of the *tatkal* scheme for telephones). However, it is generally considered that since most Indians are poor, they would not be able to pay for such improvements.

We investigate this by studying the need of households for improving water access, along with their lifestyles. We find that many households would be able to contribute some amount for improvements in access to tap water. No doubt many would have to be subsidized at least in the initial stages. We also investigate households' perceptions of quality and sufficiency and find reasons to indicate that they do not expect much.

Lack of expectations, we believe, is the strongest impediment in improving water supply in urban India. Any water supply improvement program will

only succeed if society desires it, is willing to pay for it in the long run, and rewards policy makers for delivering it. Consequently a public awareness program that aims at increasing expectations would help facilitate access to water.

Another important issue that this paper addresses is the need for an evaluation of water supply requirements *prior* to any improvement program. Studies have shown that the absence of such assessment has contributed to the failure of such programs in other countries. (Hardoy & Schusterman, 2000)

The paper is based on a data set from a survey conducted by the National Sample Survey Organization in 1998 (the 54th round). More than 110,300 rural and urban households were queried on the following aspects:

- Access to drinking water
- Access to bathing water
- Access to bathroom/toilet
- Latrine and drainage
- Garbage removal

In addition there was also some household level information on their other lifestyle habits such as on commuting, access to media, etc. This allows us to link issues such as industry, occupation, religion, geography etc. with the availability of these urban services. Each issue in itself would throw light on the present situation of sanitation in Urban India and the scope for improvements.

For the purposes of this paper, we limited ourselves to 31,323 urban households. We focussed on drinking water because in our opinion it is most indicative of the issues related to water in general. Moreover, the type of queries asked about drinking water had a wider scope.

This paper proceeds as follows. Section B studies the various primary sources of water supply to urban households, how far they are located from the dwelling and whether these sources are shared. Section C categorizes households on the basis of their economic status. Section D puts forth some policy issues in light of the evidence obtained. Section E concludes.

B. THE STATUS OF DRINKING WATER ADEQUACY IN URBAN INDIA

This section reports the urban households' access of to water. In the process it attempts to determine those households whose access is poor. These are the households who would require significant investments in water supply infrastructure. The NSSO has published the results for the sanitation part of the 54th round survey. (NSSO, 1999) The report, though detailed, lacks in revealing the relationship between the present state of sanitation and the economic status of the households.

Principal Sources of Water

The bulk of the households in urban India depend on the municipal water supply for their daily needs – more than 70% depend on tap water and an insignificant number on tankers. Access to underground water is the next most important - wells, tube wells, and hand pumps, together account for more than 27% of the households' main water supply. As would be expected, other sources that include tanks, ponds, springs, rivers, canals, etc. are insignificant in urban areas.

Table 1: Main Sources of Water

	Number of Households (Millions)	Percent
Tap	33.3	70.1
Tube-wells	10.2	21.4
Wells	3.2	6.7
Tank/ Pond Reserved for Drinking	0.1	0.2
Other Tanks/ Ponds	0.0	0.1
River, Canal, Lake	0.1	0.2
Spring	0.0	0.1
Tanker	0.5	1.0
Others	0.1	0.2
Not Available	0.1	0.1
Total	47.6	100.0

About 30% of the urban households do not obtain water from their municipality/local government. However, even those households who do have some access to water from the government, have to share it with their neighbors - almost 59% of the households either share water with their neighbors or the supply is for the community.

Table 2: Right of use of water

	Number of Households (Millions)	Percent
Sole	19.6	41.3
Shared	12.7	26.6
Community	13.6	28.6
Others	1.6	3.5
Not Available	0.0	0.0
Total	47.6	100.0

In other words, only 41% have *exclusive* access to their main source of water. Exclusivity in supply is important, because that is a necessary pre-condition for imposing any user charges/taxes on water. Many of the 70% 'tapped' households have to share water from their main source. Of the 33.4 million households who have access to tap water about 54% or 18 million require some sharing.

Table 3: Right of use of tap water

	Number of Households (Millions)	Percent
Sole	15.2	45.6
Shared	8.7	26.1
Community	8.4	25.2
Others	1.0	3.1
Missing	0.0	0.0
Total	33.3	100.0

Sharing is not the only issue. The majority of the households does not have water within their dwellings (approximately 61%) and have to transport it from the main source.

Table 4: Distance from Principal Source of Drinking Water: All Urban Households

	Number of Households (Millions)	Percent
Dwelling	18.4	38.6
Premises*	12.9	27.1
<0.2 Km	15.0	31.5
0.2-0.5	0.8	1.7
0.5-1.0	0.4	0.7
1.0-1.6	0.1	0.3
>1.6 Km	0.0	0.1
Not Available	0.0	0.1
Total	47.6	100.0

*The term 'premises' means outside the dwelling but within the dwelling's compound.

It would only be natural that those who access water from wells, tanks, tube wells, etc. would not obtain water within the dwelling. But more importantly, a majority of those who have access to tap water do not have it within the dwelling but have to transport it from the source outside their place of stay (about 54%).

Table 5: Distance from principal source of drinking water: Households with taps

	Number of Households (Millions)	Percent
Dwelling	15.3	45.8
Premises	8.4	25.3
Others	9.6	28.8
Not Available	0.0	0.0
Total	33.3	100.0

In sum, not only is the penetration of municipal water supply low (about 70% of total households), it is also quite poor in terms of access. Most households that depend on tap water have to either share it with their neighbors, or themselves transport it to their dwelling, or both.

We argue that proper access requires two conditions to be fulfilled. One, the household should have the right to sole use. Only in such conditions would it be possible to levy any user charges on households. Two, the point of water supply should be ideally within the dwelling. In general the closer can water

be supplied to the dwelling, the better it would be. The table below presents the distribution of the more than 33.4 million urban households who have access to tap water.

**Table 6: Distribution of households across right to use and distance from source:
Households with taps (Millions)**

Right / Distance	Dwell	Premises	Others	Missing	Total
Sole	12.9	2.2	0.1	0.0	15.2
Shared	2.3	5.1	1.4	0.0	8.7
Community	0.1	1.1	7.2	0.0	8.4
Others	0.0	0.1	0.9	0.0	1.0
Missing	0.0	0.0	0.0	0.0	0.0
Tapped Households	15.3	8.4	9.6	0.0	33.3
Untapped Households	3.1	4.4	6.7	0.0	14.3
Total Urban Households	18.4	12.9	16.3	0.0	47.6

Barely 15.1 million (12.9 plus 2.2) households have sole access within the dwelling or premises. These are the households where it is easiest to levy user charges. Arguably, all the remaining 'tapped' 18.2 million odd households require at least some improvements in access to water. But that is not all. Another 14.3 million households do not have any access to municipal water. These also need to be provided adequate access.

Thus of the total 47.6 million urban households at least 32 million households require some or major improvements in access to water within their dwellings.

Providing access is likely to require major investments in water supply infrastructure. Consequently we term the 15.1 million households that have sole access within their dwellings or premises, as those who have a *low requirement* for such infrastructure improvements. The rest 32.5 million households are termed as *high requirement* households, in that their adequate access requires infrastructure investment.

In sum, the large majority of the households require some investment in water supply infrastructure to satisfy their requirements. These households tend to have a lower economic status as later sections will reveal.

Table 7: Distribution of households across towns and requirement for water infrastructure improvement (%)

Class of Town (Population as per 1991 Census)	Low Requirement	High Requirement	Total	Total (Millions)
Less than 50,000	23.3	76.7	100.0	13.3
50,000-2 Lakhs	29.2	70.8	100.0	12.0
2 Lakhs-10 Lakhs	37.5	62.5	100.0	10.4
More than 10 Lakhs	40.5	59.5	100.0	11.1
More than 10 Lakhs	28.6	71.4	100.0	0.7
Total	31.7	68.1	100.0	47.6
Total (Millions)	15.1	32.4	47.6	

As apparent from the table above, the requirement of tap water is a problem that spreads across all types of towns and cities, irrespective of the size. However from our perspective what is more important is the economic status of the households, since that would have a greater impact on the ability and willingness to pay.

In the next section we investigate the economic status of households to determine their ability to contribute for such investments.

C. ECONOMIC STATUS AND ABILITY TO PAY

The data set does not contain any information on aspects such as per capita monthly expenditures of households - the standard measure of economic status. Neither does it provide any information on the households' expenditure on any products. However, some household and individual level information is present that allow us to extract the following information:

1. TV ownership - The data provide details as to the type of television owned; therefore we have information whether each household has no television, black and white, or color television.
2. Newspaper subscription - Number of newspapers subscribed by a household.

3. Mode of regular commuting – Individual level information on daily commute for work or education by: foot, cycle, animal drawn transport, public transport, taxi, autos, two and four wheelers.

Based on this information we categorized households on their economic status. This involved a two step methodology. First, each household was given a value rating of 1, 2, or 3, for each of the three lifestyle categories. Therefore, each household now had a rating for each of the three categories.

Table 8: Step 1– Rating each household for each category

Lifestyle Category	Rating
<i>TV</i>	
No television	1
Black and White	2
Color TV	3
<i>Mode of Commuting</i>	
Foot or bicycle	1
Public Transport, rickshaw and animal transport	2
Owned Car, Two Wheelers, Taxi and Auto.	3
<i>Newspapers Subscribed</i>	
0	1
1	2
>=2	3

In the second stage a consolidated rating was given to each urban household by summing these value ratings. For instance a household that does not have a television, but where commuting occurs by a two-wheeler, and subscribes to a single newspaper obtains a consolidated rating of 5. These consolidated value ratings were then used to classify households as high medium and low economic status.

Table 9: Step 2 - Final rating for each household

Consolidated Rating	Number of Households (Millions)	Percent of Total	Economic Status
3	9.0	19.0	Low
4	10.3	21.6	
5	6.3	13.2	Medium
6	4.3	9.0	High
7	4.0	8.4	
8	2.3	4.8	
9	0.4	0.9	
Unavailable	11.0	23.1	
Total	47.6	100.0	

The final economic status was therefore assigned on the basis listed in the table above. For instance, low economic status households are considered to be those who do not have a TV, do not subscribe to a newspaper, and commute on foot or bicycle. Though, to account for certain idiosyncrasies, we also include in this class the households who perform better than the minimum in any one of these characteristics. Similar considerations were made for other categories.

Cross-checking the results - Phone ownership

As mentioned earlier, there are no standard measures for assessing the income/expenditure capability of the households. The methodology thus ascertains the economic status, which in a manner reflects the capability of the households. (Bhandari & Dubey, 2001) The economic status as obtained after the aggregated rating was compared with the ownership of phones. As expected, a majority of those having telephones fell in the high economic status category. While majority of those not having a phone connection belonged to the low and medium economic status. This result indicates that the variables used in classification do relate with other independent variables that highlight the economic status.

Table 10: Economic Status and Phone Ownership

Economic Status	No Telephone	Telephone	Total
Low	46.6	2.8	40.6
Medium	14.1	7.7	13.2
High	14.8	75.3	23.0
Missing	24.5	14.3	23.1
Total	100.0	100.0	100.0

We have therefore been able to stratify 37 of the 47 million urban households on the basis of their economic status. The bulk of the households, as expected, are in the economic strata who would have a low capability to pay for any capital investment for improvement of water supply at their end.

Table 11: Urban households and water supply: Economic capability and requirement

		<i>Infrastructure Requirement</i>			
		Low	High	Unavailable	Total
Economic Status	Low	3.3	16.0	0.1	19.3
	Medium	2.3	4.0	0.0	6.3
	High	6.6	4.4	0.0	11.0
	Unavailable	3.0	8.0	0.0	11.0
	Total	15.1	32.4	0.1	47.6

The next section attempts to develop a policy strategy for ensuring good water supply to all. In doing that it takes into consideration various factors - the requirement and the capability of the households as well as many other factors.

D. POLICY IMPLICATIONS

On the basis of the capability of the various households for investment as reflected from their economic status and the need for water, the crucial decision of the type of improvement has to be made.

On one extreme we have a set of households who have a high need but their economic status does not reflect their ability to make investment for improvements. Such households account for all most one-third of the total urban households. On the other extreme there is a set of high economic status households that already have adequate access - they are unlikely to pay though

they have the ability to pay. Specific strategies have to be drawn to cover all these sets of households.

1. Low need - Low economic status: These are less than 10% of all the urban households. These households have their need nearly satisfied at present. They are also not in a position to pay for improvements. Status quo needs to be maintained for these households. It would require operation and maintenance expenditure on the part of the government.

However, if any across the board rate increases are made, these households are likely to be the most vociferous protestors. Neighborhoods that contain large proportion of such households would need to be insulated from such increases.

2. Low Need - Medium Economic Status: About 2.3 million (5% of the total) urban households belong to this set. Having medium capability with a low need for improvement, they can pay nominal user charges.

They are also less likely to support price increases to finance better supply. Though they may not be as stringent protestors.

3. Low Need - High Economic Status: These comprise of about 6.6 million (14% of the total). These have the capability to pay for the provision of the present service and also for little improvements, such as availability of tap water within dwelling from premises. They are not likely to support improvements in access.

However, as is true for higher economic status groups elsewhere, they have a high inclination to pay premiums for better quality. In the case of water supply this would include cleaner water with low levels of dirt, minerals, and biological matter, as well as 24-hour water supply.

These groups would not support improvements in simple access (though they may not be vociferous protestors either). However, they are likely to be strong supporters if better quality is assured.

4. High Need - Low Economic Status: The major chunk of the total urban households, about 15.9 million, fall under this category. Their low economic status stands in the way of improvements without government subsidy. For this set of households, budgetary provisions towards infrastructure investment are essential.

These households, a third of the total urban households, may have some ability to pay user charges. However, our data is limited and we cannot make an unambiguous judgement on that front. For that purpose a study that analyses their expenditure and income patterns would be required.

This segment of the population has the most to gain by government support and would be the most vociferous supporters of water supply reform. However care would have to be taken in designing the fee structure. Some non-price constraints may have to be considered if charges are extremely low.

5. High Need - Medium Economic Status: Slightly more than 4 million households (8% of the total) fall in this category. Though they have a high need they are limited by their capability to generate funds. These households would be less likely to have the ability to pay for improvements but more likely to be able to pay the user fees. Charges for infrastructure improvements if imposed would need to be spread over a period of time.

These households would be willing supporters for improvements, provided that the burden on them is not too high.

6. High Need High Capability: There are about 4.4 million such households in urban India. These households can make one time capital investment for the required improvement and also pay any recurring charges towards maintenance of the necessary services.

These households would also be supporters of government initiative on water infrastructure investment, provided credible initiatives are taken.

Strategy Chart for Various Categories

		Requirement	
		<i>Low</i>	<i>High</i>
Economic Status	<i>Low</i>	Status Quo (3.3)	Support (16.0)
	<i>Medium</i>	Nominal Charges (2.3)	Charges Spread over a period (4.0)
	<i>High</i>	Revised Charges (6.6)	Investment & Charges (4.4)

The figures in bracket indicate the number of households in each category in millions

Involving Households - Views on contribution

The data also contains responses to queries on households' perceptions on improving sanitation in general. This also to some extent reflects their views on water supply in particular. Note that about 40% of the households are willing to contribute financially in some way. Another 30% are willing to put in their own labor for the purpose. Thus in total about 70% of the households are stating that they have some interest in improving their conditions

Table 12 - Willingness to contribute for improvements in sanitation

Neighborhood		
Contribution	Number of Households (Millions)	Percent
Money	10.2	21.34
Labor	14.6	30.69
Both	8.6	18.18
Neither	14.0	29.5
Missing	0.1	0.3
Total	47.6	100

However queries on the 'sufficiency' of water reveal a different picture - more than 80% of the households across different segments, consider that they have sufficient supply. However, the bulk of these households do not have even sufficient access as the data reveal. We argue that this is because the bulk of the population benchmarks *sufficiency* at very low levels. Therefore, it is conceivable that improvement programs do not get much public support.

The approach paper to the Ninth Plan estimates that 85% of India's Urban population has access to water supplies. However, adequate details on quality of service delivered are not generally available. While many schemes are designed for a 24-hour supply using 150/200 liters per capita per day demand, consumers experience regular shortages with only few hours supply each day. (UWSS, 1997)

Take for example Delhi. Only 20 per cent of the capital's population receive 24 hours water supply; 60 per cent obtain it for between 4-12 hrs; and the rest less than 4 hours. A small survey indicated that the majority of consumers in Delhi would be satisfied with a daily supply of 5-6 hrs/day. (ADB, 1993)

Consequently any improvement program would first have to improve the consumers' benchmarking. In other words, for improving access consumer support is essential. For that, urban consumers have to believe that 24-hour supply, universal access, and clean water, are not inconceivable but a likelihood. This we believe should be the first focus of water infrastructure improvement initiatives.

Table 13 - Perceptions of sufficiency of water supply

Sufficiency	Requirement		(Number of Households in millions)	
	Low	High	Missing	Total
Yes	13.4	27.0	0.1	40.5
No	1.7	5.4	0.0	7.1
Missing	0.0	0.0	0.0	0.0
Total	15.1	32.4	0.1	47.6

E. CONCLUSION

In almost all cities and towns in India many households do not have access to water on tap. Of those that do, most have to share it with others. Of those who do not have to share it, many have to transport it from outside their dwelling.

It is well known that even those who have water on tap for their sole consumption within their dwelling, the supply is erratic and the quality poor.

This paper first brings out the number of households involved and their economic characteristics. It then links the ability to pay with the need for water access improvement at the consumer's end. In the process it provides a framework for developing strategies that would ensure the following:

- Political support of the various segments and sub-segments of the end consumers
- Charging for the infrastructure improvements
- Levying user fees

The paper is a step in a direction where clean, 24-hour, and universal access to water is present for all. Though much more needs to be done before an all India comprehensive strategy is put in place. For instance greater details on the consumption and expenditure habits are required before levels user charges can be decided upon. Similarly a better understanding of how population growth is occurring also has to be studied. Moreover, this paper addresses only one end of the water supply process. Infrastructure improvements in obtaining and transporting water also require serious study.

We argue that improvement programs require serious strategy building prior to investments. This strategy building would have to take into consideration public support. And our results indicate that building public support would require extensive public awareness programs.

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