

Status of Water Supply, Sanitation and Solid Waste Management in Urban Areas

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EXECUTIVE SUMMARY

Providing water and sanitation to India's millions is a challenging task. With over 20 million people without access to safe water supply and 100 million without safe sanitation, the sheer numbers indicate the massive effort required to provide these basic services to the people of the country. Just providing access, however, will not solve the problem unless the issues of quality and adequacy are also addressed. The minimum needs should be met and the quality of the services provided should be acceptable.

The present study assesses the status of three basic services - water supply, sanitation and municipal solid waste management. It covers over 300 cities and towns in the country including all metropolitan cities and selected Class I and Class II urban centres. The study covers all the states and union territories including the capitals, excepting Patna and Gandhinagar. The study was commissioned in 1999 and the data collection work took about a year.

The main objectives of the study were to a) assess the status of water supply, sanitation and solid waste management; b) analyse the revenue receipts and revenue expenditure of these services; and c) estimate the additional capital investment requirements for full coverage of population by these services from 1999 to 2022 (at five yearly intervals). The study covers the physical and financial aspects of all the three services selected for the study. A conscious decision was taken in the study to cover only the municipal area of the urban centres and not the areas falling within the jurisdiction of other authorities such as development authorities, cantonment boards, railways etc. This was done due to the time-frame of one year for the study which did not permit data collection from different agencies for the same service. The study gives the status of these services as provided by the public agencies and does not cover private provision.

A study of this magnitude can be successful only with the cooperation of the local agencies, which gave information on various aspects of the selected services. While every effort was made to collect as accurate a data as possible, it was not always possible to check it with the records of the agency. Records are often not computerised or kept properly, making data authentication difficult. However, wherever other data sources were available, attempts were made to cross-check the data collected and verify the authenticity of figures. Despite these problems, the data provided by this study does give a broad picture of the overall situation with respect to these services in the country.

Summary of Findings

Overall, the study confirms the normal notion that the metropolitan cities are better provided for than the other size class of urban centres. The coverage of population with basic services is higher for metropolitan cities than for other size class of urban centres. The investment levels are higher in the metropolitan cities due to large concentration of population in them. This could be one of the reasons for more people flocking to metropolitan cities – due to better provision of basic amenities.

The water supply situation, though much better in metropolitan cities at an aggregate level, is reasonably good in many Class I and Class II urban centres too. The situation with respect to wastewater management is much worse in smaller urban centres than in metropolitan cities. A similar situation is obtained in respect of solid waste management where the metropolitan cities fare much better than the other size class of urban centres. Financially also, the metropolitan and larger urban centres fare much better than the smaller ones. However, there are large variations in the status of

individual urban centres with respect to these services. The study found that in some cases the smaller urban centres showed much better service provision than others. These isolated instances would be exceptions than the rule.

Water Supply

The study indicates that the overall water supply situation, when looked at the city level, is reasonably adequate in most cities and towns, the problem in many cases lies in the poor distribution infrastructure. The water crisis is often related to the poor distribution of water than the lack of water at source (e.g. Delhi). However, there are urban centres where water source itself is depleting and is unable to cater to the water requirements of the urban centres (e.g. towns of Tamil Nadu, Andhra Pradesh).

In most cities there are more households than water supply connections, indicating that either there are many shared connections or households depend upon public stand posts. The data indicates that many households have their own sources of water supply while others complement own sources of supply with that of the public agency.

Unaccounted for water (UFW) data have been the most difficult to obtain. UFW is generally an estimate worked out by the technical staff based on their perception of the situation. Most cities do not have bulk meters or meters at all the user's end. This makes the task of calculating UFW very difficult. Therefore, the figures of UFW should be taken as the best estimates that could be made by the technical staff of the water-supplying agency. Smaller size towns that supply water from nearby sources or use ground water source have indicated very small quantity of UFW. Therefore, the study indicates that the larger cities have greater quantity of UFW than smaller size class of cities.

A very small percentage of urban centres have all connections metered (e.g. Bangalore, Pune). About one-third of the urban centres covered do not have any metered connections. In many urban centres a large percentage of domestic connections are unmetered while in a little above one-fourth urban centres all non-domestic connections are also unmetered. This needs to be taken up if tariff structures are to be rationalised and made a deterrent to wastage of water.

Tariff data indicates that uniform volumetric charges and fixed charges (ferrule based etc.) are the most common methods of charging. Incremental block tariff is mostly used in the larger cities, with a few exceptions. In many cities, non-domestic connections are metered while the domestic connections are unmetered. Since meters often do not work, many cities charge fixed tariff for water supply based on the calculated consumption patterns.

Most large cities depend upon surface sources for water supply, supplementing it with ground water sources to meet the demand. However, the share of ground water increases with a decrease in city size, with smaller size class of urban centres showing greater dependence on ground water for water supply. The large investments required to supply water from surface sources could be one reason for this pattern. This also reflects in the existence of water treatment plants. While all metro cities using surface source have water treatment plants, there is a small percentage of urban centres in other size classes that use surface water but do not have water treatment plants.

There are many different types of institutional arrangements for water supply in the urban areas of the country. The most common arrangement is that the capital works are done by a state level agency and the local government does the operation and maintenance (O&M). However, there are wide variations to this arrangement. These variations range from the state level agency managing the entire water supply system in the entire state (Rajasthan) to the urban local body performing all the tasks related to water supply (Mumbai).

Privatisation or public-private partnerships are still not very common in water supply with less than one-tenth of the urban centres using private participation in this service.

Cost recovery is a major concern in water supply. While it is possible to achieve cost-recovery in water supply, the fact is that almost four-fifths of the urban centres are unable to recover even the O&M cost in this service. This indicates that while theoretically water can be treated as an economic good, there are practical difficulties in implementing decisions on raising water tariff. Water continues to be treated, as a social good and even recovering O&M cost in most cities would require political consensus.

The additional capital investment requirements for covering the entire population with water supply in the years to come is enormous, running into thousands of crores of rupees. While it may be difficult to find resources to finance such large investments, private sector participation could be encouraged. Public-private partnerships could reduce the financial burden of public agencies to some extent and bring in some financial discipline into this sector. While efforts have to be made to improve efficiency of water supply to reduce operating costs, maintenance of existing assets would help in reducing new investment requirements in the near future.

Recommendations

1. Problems of intra-city distribution should be taken up immediately by the local authorities to address the problems of water shortage.
2. Steps should be taken to initiate capacity building in urban centres for estimation of UFW. Financial assistance should also be provided to the water supplying agencies to equip them with instruments for estimating UFW.
3. Metering of connections, both for bulk supply and retail distribution, must be encouraged. Standard meters should be made available, at reasonable cost, to all urban centres for this purpose.
4. Tariff is a major concern in the water sector. Tariff should be increased at certain given intervals, indexed to inflation and power tariff.
5. Getting surface water from distant sources is proving to be very expensive. Ground water depletion can be controlled by undertaking rainwater harvesting in all urban centres. Specific programmes/ schemes should be initiated for aquifer re-charge.
6. In line with the provisions of 74th Constitution Amendment Act, the capacity of local governments should be built to manage water supply systems. The local governments should be given sufficient autonomy to decide on increase in water tariff required to cover at least O&M costs.
7. Improving cost recovery should be linked to giving grants. Financial incentives could be given to urban centres showing improved cost recovery. Technical assistance and guidance should also be provided to local authorities to improve financial performance.
8. Private sector participation in this sector should be encouraged, wherever possible. Unbundling of the service would allow private sector to participate in this service and improve efficiency levels.
9. The additional capital investments required to cover the entire urban population with water supply at the required norms will require huge investments that are not possible for the Government to provide. Therefore, public-private participation must be encouraged. New ways of financing for this sector should also be explored.

Sewerage and Sanitation

Wastewater disposal and treatment is a very major problem in most Indian cities. Non-collection of wastewater and discharge of untreated wastewater into low-lying areas or various water bodies causes severe water and land pollution problems. This situation reduces the availability of usable water for water supply.

The study indicates that while all the metropolitan cities have a sewerage system, a third- of the Class I cities and less than one-fifth of the smaller sized urban centres have a sewerage system. However, the coverage of population by the sewerage system is partial in all these urban centres.

Wastewater generation is calculated at a minimum of 80 per cent of water supplied. However, since people use their own sources of water, additional amounts of wastewater may be generated, which have been taken into account in the present study. Wastewater collection in most urban centres with sewerage system usually does not exceed about two-thirds of that generated. However, the wastewater treatment situation is quite alarming. While the smaller sized urban centres with sewerage system treat less than one-fourth of the wastewater generated, even the metropolitan cities treat only about two-fifths of the wastewater generated. Wastewater disposal is done both on land and in water body by most urban centres. Proximity to water body, local conditions and financial constraints determine the place and method of wastewater disposal.

Recycling/ reuse of wastewater is practised in very few urban centres and wherever it is done, it is mostly used for agriculture or horticultural purposes. Recycling/ reusing wastewater will reduce the demand for fresh water, thereby also postponing the capital investment requirements for water augmentation.

There is no fixed mechanism for charging for wastewater collection and disposal. The charging may be through property tax, a charge on water closet or an additional charge on water supplied.

Wastewater is not charged for in all urban centres, therefore, the cost recovery is generally very low from this service with even the metro cities showing a very small recovery rate. The situation is even worse in urban centres of smaller size. In most cities where the recovery rate has been very good, the reasons have been either due to provision of new connections (connection charges) or due to levying of sewerage/ drainage tax.

The additional capital investment required for providing safe sanitation to all in the coming years many is thousands of crores, which would be very difficult to finance. Private sector participation as well as citizen's contribution can help provide some of the additional capital investment requirements.

Recommendations

1. Rehabilitation of sewerage systems must be taken up in all the cities where the sewerage system exists but has become non-functional.
2. Wastewater treatment must be made mandatory for all sizes of urban centres. The smaller urban centres could use less capital-intensive technologies to reduce capital cost as well as maintenance cost of treatment.
3. Pollution of land or water body with untreated wastewater should be made punishable with fine.

4. Recycling/ reuse of wastewater must be encouraged. Technical and financial assistance must be provided for this, if required.
5. All agencies dealing with wastewater must prepare plans for cost recovery from this service. Private sector participation could be encouraged in managing this service to reduce public expenditure.
6. Successful examples of people's participation in contributing to the cost of construction of sewerage system (e.g. Alandur) must be examined and adopted in other urban centres of the country.

Solid Waste Management

Municipal solid waste management is an obligatory function of the urban local governments. And this is one service that remains a major problem for urban centres of all sizes.

The per capita waste generation has a positive correlation to the size class of urban centres i.e. the larger the urban centre the more the waste generated.

The collection efficiency of solid waste is much better in larger cities than in smaller urban centres. This could also be due to the motorised transportation vehicles deployed in larger cities. Some of the smaller urban centres still depend on tricycles and animal carts for waste collection. A factor that affects waste collection and transportation is the maintenance of vehicles. Poor maintenance of fleet affects collection and transportation efficiency. Vehicles, especially in smaller urban centres, are often not replaced even when there is a dire need to replace them. Lack of finances for fleet replacement is a major cause of this state of affairs.

The main method of waste disposal continues to be open dumping in most urban centres. While many urban centres have landfill sites, not all dispose their waste in these landfill sites as sometimes the sites are far away from the city and the transportation costs become prohibitive. Therefore, waste is dumped in some low-lying areas or disposed off just outside the city periphery.

Hospital waste, though should be collected separately, is collected in a combined manner in a majority of urban centres, including some of the metropolitan cities.

Solid waste management is a labour intensive activity requiring adequate staff. However, with a few exceptions, most urban centres fall short of staff for this activity. This impacts the quality of service provided.

Privatisation is much more prevalent in this service than in the other two services covered in the study. Many urban centres that have used this arrangement have been able to reduce their expenditure on this service.

Cost recovery from solid waste management is extremely poor and therefore it becomes an expenditure heavy service. Expenditure on establishment is the biggest head of expenditure on this service. Most urban centres spend over three-fourths of their solid waste management budget on establishment.

The additional capital investment requirements worked out for this service in the coming years indicate an investment of a couple of hundred crores per annum. However, these figures will need to be revised taking into account the Hon'ble Supreme Court's directives. As construction of sanitary landfills is very expensive, this would add considerably to the investment requirements.

Recommendations

1. Three 'R's of solid waste management i.e. reduce, reuse and recycle must be adopted by all urban centres. This will help in reducing the quantum of solid waste that the local governments have to deal with.
2. Efficiency of waste collection must be improved in cities by bringing about the necessary changes in the design of equipment used by sanitary staff, manpower management and planning.
3. Transportation fleet needs to be maintained well and needs to be modernised to improve collection and transportation efficiency.
4. Crude/ open dumping of waste must be completely discouraged by encouraging controlled tipping.
5. All urban centres should identify landfill sites that are usable. In order to reduce the quantity of waste that goes to landfill sites, waste treatment such as neighbourhood composting and recycling of waste must be encouraged.
6. Separate collection of hospital waste must be ensured in every city and incinerators must be installed to deal with this waste. Landfill sites should apportion an area for the disposal of hazardous waste from hospitals.
7. Private sector participation must continue to be encouraged in this sector to achieve efficiency of operations and cost reduction. However, monitoring of privatised activities should be improved in order to provide better quality of services to the people.
8. Plans to improve cost recovery from this service must be made by every local government. New sources of revenue generation must be thought of.
9. People's participation must be encouraged to keep cities clean and NGOs must be used to do IEC work in communities.

SUMMARY OF KEY INDICATORS FOR WATER SUPPLY – 1999

(Averages)

Indicators	Metropolitan cities	Class I cities	Class II towns	Total
No. of sampled urban centres	22	164	115	301
Estimated population (1999) in '000	71,429	59,123	10,473	141,025
Population coverage (%)	98	91	89	94
Per capita supply (lpcd)	182	124	83	150
Per capita domestic supply (lpcd)	148	106	69	128
% urban centres with p.c. supply below CPHEEO norm	50	40	52	46
% urban centres with p.c. supply below city norm	68	76	79	77
% supply required to be added to reach city norms	5	25	42	13
Quantity of water required to be added to reach city norms (in mld)	1397	2209	439	4045
Unaccounted for water (%)	24	16	11	21
% connections metered	60	52	39	55
Staff per 1000 connections	14.5	7.9	6.8	10.9
Cost recovery (%)	70	55	44	65
Revenue receipts (Rs.) per kl.	2.16	1.02	1.21	1.73
Revenue expenditure (Rs.) per kl.	3.09	1.88	2.44	2.66
Deficit per kl. (Rs.)	-0.93	-0.86	-1.23	-0.93
Revenue receipts per capita (Rs./annum)	149.43	48.65	39.41	100.55
Revenue expenditure per capita (Rs./annum)	214.12	89.40	77.86	153.89
Per capita deficit (Rs./ annum)	-64.69	-40.75	-38.45	-53.34
Additional capital investment requirements* (1999-2022) range between Rs. 32118 and Rs. 35420 crores or between Rs.1396 and Rs. 1540 crores per annum.				

Note: Revenue and expenditure figures are for financial year 1997-98 pc. refers to per capita

*These requirements are for covering the entire urban population, in all size classes of urban centres, till the year 2022 and are based on two different per capita estimates used for projection.

**SUMMARY OF KEY INDICATORS FOR WASTEWATER MANAGEMENT
AND LOW COST SANITATION - 1999**

(Averages)

Indicators	Metropolitan Cities	Class I Cities	Class II Towns	Total Sample
No. of urban centres with sewerage system	22	57	21	100
Population covered by sewerage system (%)	63	48	51	58
% Wastewater treated to generated	41	25	11	37
% Urban centres without STP	4	28	17	49
Wastewater discharged untreated (mld)	6483	2472	185	9140
Cost Recovery (%) – excluding outliers [#]	15	14	2	15
Cost Recovery (%) – including outliers [#]	146	29	35	127
Low Cost Sanitation (LCS)				
No. of urban centres giving LCS data	18	127	95	240
% population dependent on LCS	25	41	55	34
Additional capital investment requirements* (1999-2022) range between Rs. 52361 and Rs. 86103 crores or between Rs. 2276 and Rs. 3744 crores per annum.				

Note: All data relating to sewerage system and wastewater pertain only to urban centres having sewerage system.

[#] Cost recovery figures refer to financial year 1997-98. Outliers are those few urban centres that are showing exceptionally high recovery rate of over 100 per cent. These urban centres include those that are collecting sewage/ drainage tax or cess or those that have generated unusually large revenues from providing new connections in 1997-98.

* These requirements are for covering the entire urban population, in all size classes of urban centres, till the year 2022 and are based on two different per capita estimates used for projection.

SUMMARY OF KEY INDICATORS FOR SOLID WASTE MANAGEMENT - 1999

(Averages)

Indicators	Metropolitan cities	Class I cities	Class II towns	Total sample
No. of responding urban centres	22	164	112	298
Population coverage (%)	90	95	93	92
Per capita waste generation (grams)	500	377	297	433
Waste collection efficiency (%)	91	85	75	88
Quantity of uncollected waste (MT/ day)	3170	3383	765	7318
Crude dumping of waste (% urban centres)	64	76	79	76
Sanitary workers per 1000 population	2.8	1.9	2.1	2.4
Share of establishment exp. on the service	81	84	81	82
Cost recovery (%)	7	9	5	7
Revenue receipts per capita (Rs. /annum)	12.8	6.66	2.96	10.12
Revenue expenditure per capita (Rs./annum)	189.39	73.12	63.15	140.63
Per capita deficit (Rs./ annum)	176.59	66.46	60.19	130.51
Additional capital investment requirements* (1999-2022) are projected to be about Rs. 3954 crores or Rs. 172 crores per annum.				

Note: Revenue and expenditure figures refer to financial year 1997-98

*These requirements are for covering the entire urban population, in all size classes of urban centres, till the year 2022.