SOLID WASTE SERVICES

Om Prakash Mathur

with

Sandeep Thakur

Sucharita Sen

4

SOLID WASTE SERVICES

4.1 Scope and organization

Solid waste is a major source of environmental pollution in Indian cities and towns. It is estimated that anywhere between 30–35 percent of the total waste remains uncollected from the city roads; similarly, the waste disposal services in most cities and towns are archaic and inadequate, and carry high environmental risks. The combined effect of the inefficiencies in collection, and inadequate and unsafe disposal is evident in widespread insanitation, contaminated water and high incidence of chronic respiratory and communicable diseases. Further, there is evidence to suggest that the overall environmental quality in India's cities and towns may be worsening on account of the pressures of growing urbanization and unregulated growth of cities.

Attempts to address solid waste-related environmental problems in India have focused largely on improving waste collection, by enhancing the frequency of waste collection, increasing trucking capacity, and introduction of mechanized cleaning of city garbage. In a few isolated cases, new institutional arrangements with the participation of non-governmental organizations and the private sector, have come into being for solid waste collection and management. The financing aspects of solid waste services have received little or no attention in the country. No systematic use has been made of the economic and fiscal instruments for understanding the impact of the quantum of waste. There exists neither an incentive for waste reduction, nor a penalty for excessive

waste generation or its indiscriminate dumping on roads, kerbsides, or even on the designated landfill sites.

This study is designed to gain a better understanding of the cost structure and the pattern of financing solid waste services in Indian cities and towns. It explores the options for redesigning the charging system in a way that it can have an impact on the pattern of household consumption, and consequently, on the quantum and volume of waste. An effective charging system, the study contends, is essential for reducing waste-related environmental pollution.

The study is based on reports on the existing practices of managing and financing solid waste services in Indian cities. In addition, the study has made use of the budgets and annual reports of a few municipal bodies with a view to further understand the financing aspects of solid waste services. As this study will subsequently show, data on these aspects are extremely sparse which has restricted a proper examination of such issues as the cost of land fills, response of households to alternative systems of waste disposal, and the economic factors affecting production of refuse by households. The sparseness of data has vastly limited the scope and purpose of the study, particularly in respect of estimating even the financial costs involved in solid waste collection, transportation and disposal.

4.2 Solid waste in Indian cities

Indian cities currently produce wastes in the aggregate, 100,000–110,000, metric tonnes, or a per capita average of 0.40–0.42 kg a day. These estimates are, at best, approximations in that these are based, as is the practice, on the trucking or hauling capacity of waste generated in different cities and towns. The National Commission on Urbanisation (1988), on the basis of a

sample of 40 cities of over 100,000 population found the mean per capita waste/day to be 0.27 kg (SD±0.11), and the same mean for cities in the population range of 50,000 (SD±0.08). Another survey conducted by the Operations Research Group (1989) indicates an average per capita solid waste of 0.35–0.40 kg; however, based on the trade and commercial activities in the surveyed towns and cities, actual per capita waste quantity is estimated by the same study to be higher than shown here (Table 4.1) The study also found significant variations in the amount of waste generated among cities, the low and high being 0.12 kg and 1.26 kg per capita, with the difference being explained by the nature of the economic base of the cities. Given the fact that these capacities are often lower than the quantities of waste generated, and also the fact that rag-picking in India is an actively growing industry, these figures from all cities, would be gross underestimates. The actual waste would be at least 30–40 percent higher than these figures.

Table 4.1
Number of Cities by per capita Waste Generation

Kg per capita	Number of cities	
	NCU estimate	ORG estimate
< 0.20	9	4
0.20 - 0.30	21	6
0.30 - 0.40	8	11
0.40 - 0.50	7	8
0.50 - 0.75	-	3
0.75 - 1.00	-	2
> 1.00	-	1
Total	45	35

Source. (1) Report of the National Commission on Urbanisation (1988).
(2) Operations Research Group (1989).

4.3 The institutional, regulatory and legal framework

Solid waste collection, treatment and disposal in India are a *statutory* responsibility of municipal governments; the other two levels of governments, namely, the central and state governments, have a limited role in this task. In recent years, however, as a result of the increasing recognition that wastes are a major hazard combined with the fact that wastes have important economic value, the Government of India through the MoEF have constituted a National Waste Management Council. The Council has the following mandate:

- promotion of collection, collation and publication of information regarding the availability of waste technologies, and markets for recoverable materials;

- analysis of information for overcoming constraints to use available technologies for both waste utilisation and waste minimisation and identification of areas in which new technologies need to be developed;

- offering advice to the government, industry and such other sectors on different aspects of waste management and on incentives/disincentives that may be needed to facilitate waste utilisation;

- recommendation to the government research and development schemes for developing new technologies;

- advising government on fiscal and regulatory measures to promote waste utilisation; and

- promoting awareness among the public about different

aspects of solid waste.

It is, however, too early to assess the effectiveness of this newly formed council, and the role that this council will play in this sphere.

The role of the state governments is limited to overseeing the functioning of the municipal governments' mandate to manage solid waste collection and disposal. The state governments are also responsible for financing expenditure of a capital nature, as for example, purchase of equipments, machinery, and trucks. Each state's municipal laws detail out the local governments' obligatory and discretionary functions. The provision of solid waste services is an obligatory function of municipal governments for the simple reason that it is a "public good", it is "non-exclusive", and it is "non-rivalled". This service is non-exclusive, meaning that once it is provided to a city or a community, it benefits the overall public welfare. It is also non-rivalled, meaning that any resident can enjoy the benefit of the service without diminishing the benefit to anyone else. It is not feasible to exclude from service those who do not pay, because public cleanliness and safe disposal of waste water are essential to public health and environmental protection . These laws vary from state to state. The *Gujarat Municipalities Act*, for instance, provides that the municipal councils shall make provision for cleaning of public streets and places. The Madhya Pradesh *Act* vests this responsibility partly on households by requiring them to deposit the refuse and other offensive matter in public dustbins, leaving the municipal governments responsible for collection of waste from dustbins and for transportation and disposal.

The regulatory framework in India for waste collection is dispersed. While environmental standards have been set for water and air quality in specific and general environmental laws, there exists no separate legislation for solid waste management. At

present, pollution owing to disposal of solid waste falls within the purview of the 1974 and 1977 *Water Acts*, the 1981 *Air Act*, and the 1986 *Environment Protection Act*. Hazardous wastes are regulated under the "Hazardous Waste (Management and Handling) Rules, 1989", and the manufacture, storage and import of hazardous chemicals rules, which are in different stages of implementation and which make it mandatory for organizations handling hazardous waste to take steps to ensure that all specified wastes are properly handled and disposed of. These rules also regulate the storage of hazardous substances, hazardous accidents control, and pipelines for pumping hazardous substances.

4.4 Contemporary concerns

Much of the attention in India by the central, state and local governments to environmental problems arising from solid waste has focused on the management of the increasing quantities of waste, application of technologies to solid waste disposal and recycling, and introduction of regulatory instruments. A recent study of the Central Pollution Control Board (1995) identified, for instance, the following priority areas for solid waste:

- utilisation of solid waste for resource recovery;
- selection of proper sites for waste disposal on the basis of environmental impact assessment;
- application of appropriate technology for solid waste through (a) proper design of landfills, and (b) incineration of garbage for power generation, wherever feasible;
- greater use of solid waste for anaerobic digestion/biogas generation, composting etc.;
- Use of solid waste for fuel pelletisation;

- Recycling of paper, plastic, glass, battery waste etc.; and
- Provision of facilities for disposal of hospital waste.

However, no attention has so far been placed on "charging"mechanisms for solid waste services, and assessing the possible impact that appropriate charging could have on the pattern of household consumption, the quantum of waste, and consequently on urban environment. Also, no attention has been given to proper identification of the direct and indirect costs involved in solid waste management or to mechanisms for internalising those costs. The solid waste services continue to be financed out of general taxation, mainly out of the receipts from property taxes.

4.5 Costs and charging mechanisms

Solid waste services in India are financed out of the general tax revenues raised by municipal governments. The general tax revenues of municipal governments, it needs to be noted, consist of revenue yields from property taxes, octroi (a tax on the entry of goods) where it is levied, and taxes on advertisements, non-motorised vehicles, animals and selectively on entertainment. In the inter-governmental allocation of tax powers, the more elastic and buoyant taxes are assigned to the central and state governments, leaving with municipal governments taxes that would generally be characterized by low level of elasticity and buoyancy. Thus, the yields therefrom are rarely able to keep pace with the rising citywide expenditure on basic services.

Taxes on land and property are commonly taken by municipal governments as a source of revenue. A distinguishing feature of these taxes is that the base of these taxes which happens to be the

rental value, is widely used for other service taxes as well. Thus, it is common to observe in most Indian cities and towns, a conservancy tax, latrine tax, drainage tax, sanitation tax, sewerage tax, and a fire tax, levied in the form of a surcharge on the same base as is used for property taxes. In Bombay, for instance, apart from a general property tax, there is a water tax, water benefit tax, sewerage tax, sewerage benefit tax, education cess, street tax, tree tax, employment guarantee tax and building repair tax, all levied on the rental value of properties. For the households, industry and business, comprehensive property taxes are the main taxes that serve to provide them with essential services.

There exists no specific charge or a fee for solid waste services, implying that there is no relation between waste generated and what the waste generators might pay. This way, the marginal cost of waste generation is taken to be zero. Thus, apart from a general understanding that revenues generated from the general category of taxes on conservancy, drainage, sanitation etc. will be used for the provision of solid waste services, nothing else is known about their financing. Consequently, several critically important financing aspects, such as, the behaviour of households to alternative forms of charging, the effect of the volume or weight-based pricing on the pattern of household consumption, or of tax policies on waste generation and recycling remain grey areas in the Indian context. Other aspects about which little is known relate to the extent of subsidy in the provision of these services and its effect on the overall municipal finances.

4.6 Financing solid waste services

General taxation

As pointed out earlier, there is no direct charging system for solid waste services in Indian cities and towns. These services are charged, or indeed financed, out of general taxation which, in the case of the sample covered under this study, consists of property taxes and octroi taxes where these taxes are levied. Together with property taxes are the other minor municipal taxes such as advertisement taxes and taxes on non-motorised vehicles which have little significance from the standpoint of revenue generation. Where these sources are not able to meet out the expenditure, grants made by the state governments are used.

A number of observations on the cost and financing mechanisms may be made at this stage.

- The cost data on solid waste relate primarily to establishment, repairs and maintenance, materials, and miscellaneous components. Landfill or the dumping site costs are not included in the cost data; nor are the other indirect costs particularly as these relate to depletion costs associated with landfill. Thus, the costs are grossly understated.

- The cost per tonne or on a per capita basis would also be higher if the municipal governments were collecting 80–90 percent of waste, as against the current average of 60–65 percent of the total waste. To this extent, the cost data need to be adjusted.

- The cost data on solid waste services show wide variations between cities, the explanation of which is to be found in a

number of factors, such as the methods employed in waste collection, transportation and disposal, the size of the city, and the physical characteristics of cities. The data scarcity has not permitted any analysis of the economies of scale across the services of collection, transportation and disposal.

- The solid waste services in Indian cities and towns are financed out of the general tax revenues. There is no specific charge or fee for the services. Composting as a method of disposal is carried out on a very small scale, notwithstanding the fact that the waste composition is suited for composting. Income from composting is insignificant. Also, in a number of cities, compost is a commodity that is used by the concerned departments of municipal bodies without any accounting on the income side.

- For most cities, the growth rate of the general tax revenues lies far behind the growth rate of expenditure. Property tax which is an important source of tax revenue has shown signs of stagnation and is constrained by large scale exemption of properties from tax purview and rent control acts. The rental values are hardly updated to reflect the market conditions. As a result, revenues from such taxes do not yield enough to meet the cost of such services as solid waste, street lighting, road maintenance and the like.

- On account of the existing practice of financing solid waste services out of the general tax revenue, there is no incentive or disincentive for households, industry and business to change the pattern of their consumption. It carries the strong assumption that the taxes paid by them are adequate for meeting the cost of the services.

4.7 Charging for solid waste

It is necessary to reiterate here that solid waste services in India have traditionally been viewed as "public goods". This view has been accompanied by a somewhat simplistic argument that public goods should be paid for by public funds and also delivered by public agencies. In recent years, however, there has occurred an adjustment to this view, and as pointed out earlier, this sector has been opened up, *albeit* in only a few places, to private sector participation. It recognises the proposition that there are certain aspects of solid waste services that have the characteristics of "private goods". It is this point of departure that is used here as the basis for outlining the financing options for solid waste services. The financing options as outlined here fall under two possible institutional arrangements: (i) where solid waste collection, transportation and disposal will continue to be a "public responsibility", and (ii) where these services may be provided, either in full or in part, by the private sector.

Under the assumption that it remains a public responsibility, three options appear feasible keeping in view the fact that the objectives are to gain environmental sustainability:

(i) To continue with the present system of financing the services, that is, out of the general tax revenues raised by the municipal governments. This option, if persisted, will further diminish the availability of solid waste services in Indian cities and most likely, exacerbate environmental conditions arising from solid waste.

(ii) To continue financing the solid waste services out of the general tax revenues, but introduce some basic reform measures, particularly in property taxation, so as to generate additional resources. Property tax reform is currently an important agenda in several states of the country. In the

state of Andhra Pradesh and in Patna city, the basis of determining the rental value of properties has been changed from that of "rents" to "square meter rates differentiated by the locational characteristics of different areas within cities", which has led to a substantial increase in revenue receipts from property taxes. Given the fact that the "rate basis" is simple and transparent, it offers a large potential for revenue generation from property taxes, and consequently for larger availability of funds for solid waste services. Financing solid waste services out of general taxation carries the distinct advantage of being "equitable", in that property tax payments reflect the ability to pay.

(iii) Replace the indirect charging system by a direct charging system, either with a "flat fee" or a fee determined on the basis of volume/weight of waste. Direct charging has the obvious and unique advantage of being a "charge" as distinct from a "tax", and can therefore be used directly for achieving the objective of environmental sustainability. At the same time, charging according to volume/weight is administratively costly, prone to leakages, and difficult to administer. A "flat fee" as a direct charging mechanism is iniquitous, particularly in Indian cities where intracity income disparities are extremely high, and where a large proportion of households—often as large as 30–40 percent—live in slums and squatter settlements.

Under the second assumption which in a sense, questions the efficiency gains of a purely municipal monopoly, the option will be to contract/sub-contract solid waste services or run the services in partnership with them, under different arrangements:

- To permit the private sector to operate and manage the solid waste to the extent that the private sector sets the "charge"

and payment mechanism, and bears the attendant costs including those of the landfill and dumping sites.

- To provide subsidies to the private sector in so far as these are necessary for allotting them the dumping sites and making capital investments.

These options have so far not been examined in the Indian context and it is far from clear as to how the municipal governments would deal with issues such as the refusal by households to pay for the solid waste services or to enter into agreements with the private sector. How would the municipal governments regulate the charges and limit price-setting and collusion? These issues constitute a large research agenda in the Indian context.

There is a new dimension in the matter of service financing with the setting up of Finance Commissions in each state of the country. The State Finance Commissions, set up in pursuance of the 73rd and 74th Amendments to the Constitution of India are required to decide on: (i) the taxes, duties, tolls and fees which may be assigned to, or appropriated by, the municipalities; (ii) the distribution between the state and the municipalities of the net proceeds of the taxes, duties, tolls and fees leviable by the state; (iii) the grants-in-aid to the municipalities from the Consolidated Fund of the State; and (iv) other measures that may be needed to improve the financial position of the municipalities. The issue of financing of solid waste services is vitally linked with the work of the State Finance Commissions.

Table 4.2
Solid Waste Cost-Income Data

Key indicators	Bombay	Delhi	Madras	Calcutta	Hyderabad	Bhopal
Population (million)	9.91	7.17	3.85	4.39	2.91	1.06
Solid waste (tonnes/day)	6,000	4,500	3,500	2,600	1,800	1,300
Per capita expenditure on solid waste (Rs)	79.15	85.90	60.60	46.56	37.02	38.17
Per tonne expenditure on solid waste (Rs)	429.77	367.00	185.39	158.07	105.58	222.47
Expenditure on solid waste as a % of total corporation ex-penditure (%)	13.46	20.16	21.99	-	10.63	24.54
Per capita revenue generation from solid waste (Rs)	2.33	0.78	0.05	1.48	27.45	0.63
Income from solid waste as a % of total corporation income (%)	0.38	0.18	0.02	0.50	-	0.44
Per tonne income from solid waste (Rs)	12.66	3.35	0.16	4.97	78.28	3.70
Expenditure on solid waste as a % of revenue from property taxes (%)	111.41	48.49	60.10	31.29	124.52	238.86