



MUNICIPAL SOLID WASTE MANAGEMENT IN URBAN AND URBAN FRINGE AREA IN TAMIL NADU –A COMPARATIVE STUDY

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Abstract

The urban environment all over the world poses serious threat from excessive generation of solid waste. Rapid increase in production and consumption, urban society rejects and generates solid material regularly which leads to considerable increase in the volume of waste generated from several sources such as, domestic wastes, commercial wastes, institutional wastes and industrial wastes. Solid waste management is one of the most challenging issues in India than elsewhere at the global. The quantity of solid waste has also increased tremendously with improved life style and social status of the populations in urban centers. Scenario is quite different and the urban environment all over the world poses serious threat from excessive generation of solid waste. Municipal corporations of the developing countries are not able to handle the increasing quantity of waste which leads to uncollected waste on roads and other public. According to World Bank study, urban per management rate for most of the low-income countries will increase by approximately 0.2 kg per day by 2025 because of relatively high annual growth rate of GNP and urban population. The current study aims to explore the practices of Solid Waste Management and its problems among the households in one of the fast growing taluks in Tamil Nadu locating at the East Coast Region, Sirkali Town and in its extension area. The study suggested that a system approach needs to be adopted for optimizing the entire operation of Solid Waste Management encompassing segregation at source, timely and proper collection, transportation routes and types of vehicles and development and proper operation of sanitary landfill site. Further, the study area is surrounded with lot of educational institutions including colleges, which may initiate awareness and extension campaign for inculcating knowledge on suitable management strategies for solid waste management in the study area.

Keywords: *Environment, Solid Waste, Solid Waste Management, Recycle, Reuse.*

Introduction

The environment and the economy are very closely related. The environment provides us the resources for production and consumption in the economy and relieves the waste from these activities. As long as the rate of growth in real output exceeds the rate of growth of population, standard of living improves. But environmentalists view that the growth results in more pollution, a factor depletion of national resources, less open space and a general decline in the quality of life. Hence society often faces the dilemma of choosing with a clean, safe environment and economic growth. Industrial development has led to the poisoning of earth's water and sky's air. The ill effects of development have been plenty, but unlike the benefits, they are not visible. Ever increasing human population, urbanization and industrialization result in the problem of waste generation, one such waste is called solid waste, which is arising due to human and animal activities and that are discarded as useless or unwanted. Solid waste may generally be categorized as domestic, industrial, agricultural, construction-engineering, commercial and biomedical waste. The normal practice of disposing of solid waste is land filling and problems arising in land filling are generation of leachate. The leachate from land fill site would seep horizontally and infiltrate vertically to the surface water and ground water respectively and finally in contaminates both the waters. Thus it is important to manage the solid waste properly which leads to maintain the pollution free environment. Rapid population growth and urbanization in developing countries have led to the generation of enormous quantities of solid wastes and consequential environmental degradation. As estimated 7.6 million tones of municipal solid waste is produced per day in developing countries.

India, the world's second highest populated country with population exceeding a billion and one of the fastest urbanizing countries, is a land of physical, climatic, geographic, ecological, social, cultural and linguistic diversity. The annual rate of growth of urban population in India is 3.09 percent. The proportion of population living in urban areas has increased from 17.35 percent in 1951 to 26.15 percent in 1991. The number of class I cities with population exceeding 1, 00,000 has increased from 212 to 300 during 1981 to 1991. It is interesting to note that as much as 65.2 percent of the urban population is living in these class I cities. Management of municipal solid wastes continues to remain one of the most neglected areas of urban development in India as in many other developing countries. Twenty-three metro cities in India generate about 30,000 tones of waste per day while about 50,000 tones are generated daily from the class I cities. The solid waste generation has increased with the process urbanization. It is estimated that about 350 to 400 grams per day. Per capita solid waste is



generated in an average Indian town. In major metropolitan towns, the generation of solid waste is around 400 to 425 grams. In Delhi it is around 800 to 850 grams per capita per day.

Solid waste management was never taken up seriously either by public or by concerned agency or authorities and now the large amount of waste is threatening our health, environment and well-being. In solid waste, organic domestic waste poses a serious threat, since they ferment, creating conditions favourable to the survival and growth of microbial pathogens. The direct exposure to wastes can lead to diseases through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Uncollected solid waste can also obstruct storm water runoff, resulting in the formation of stagnant water bodies that become the breeding ground of disease. The direct dumping of untreated waste in rivers, seas, and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it. Although India has formulated legislation relating to municipal solid waste, hazardous waste, and biomedical waste, the compliance and awareness of rules among communities and municipalities are lagging behind.

Research Problem

Among the many current environmental problems facing us today, the management of solid waste has become the most serious problem. Even in India when the method of collection removal, storage and disposal continues to be outdated and unscientific. The new concept of recovery and technology of solid waste management is gaining awareness. The problems involved in solid waste management are enormous chiefly in terms of estimation of future needs of the large quantity of solid waste disposal. There are potential risks to health and to the environment from improper management of solid wastes. Direct health risks mainly concern workers in this field who comes in contact with the wastes.

The most obvious environmental damage caused by solid waste is esthetic that the ugliness of street litter and the destruction of the beauty of the countryside by uncontrolled dumping of solid waste. More serious, however, and often unrecognized, is the contamination of surface of ground water sources by leachates from refuse dumps. Air pollution can be caused by inefficient burning of wastes, either in the open or in incinerators putrescible organic wastes causes' odour nuisance. Hazardous solid waste can cause death or injury to human and animal life, fire hazards, explosions, and danger of concentration in the food chain. The nature of solid waste management in developing countries is changing from a low priority, localized issue to an internationally pervasive social problem.

The municipal solid wastes generated in major cities work out to be 400 to 600 grams per person per day. The rate of increasing of solid waste every year is estimated at 5 percent. This sudden increase has been attributed to the production of new products, like plastic containers for most of the house hold products. The production of plastic cans, mugs, bags, packing materials, food packing material etc. is considered to be cheaper to throw away than reclaim. With the advent of "use and throw - away" concept taking hold in style of living the generation of solid waste has been considerably increasing. Waste generations must be seen as a potential source of pollution and at the same time a loss of resources, in the form of materials and energy. As solid wastes are the major sources of causing severe health hazards, special attention is needed to study how waste are generated and managed. Hence, the study on the generation of solid wastes has become very serious concern today.

Objectives and Hypothesis

The present paper mainly aims to know the Socio Economic Status of sample respondents in the study; to analyze the opinion of the respondents regarding various Municipal Solid Waste Management practices in the study area; to explore the problems in the Solid Waste Management among the respondents in the study area; and to suggest possible measures to strengthening the Solid Waste Management in the study area. Based on these objectives the following hypothesis that there is a significant difference in the waste components between the town and its extension area; and there is household solid waste generation is directly related to the extent of house area and the family size.

Materials and Methods

To facilitate the present study multi stage random sampling technique has been adopted. In the first stage, Sirkali town and its extension area was selected as the study area, then, out of 24 municipal wards of the taluk two wards, one was from the urban limit and another one was from the Fringe area were selected. In the next stage each 120 respondents from these wards at random. Among 120 respondents, 40 respondents are from Low Income Class 40 respondents have been drawn from Middle Income Class and the remaining 40 are from High Income class in Town area conveniently.

The present study has been based on both Primary and Secondary data. Survey Method has been adopted for the primary data collection. The primary data have been collected from the 240 respondents from both Town area and Extension area of

Sirkali town. Data have been collected by personal interview from the respondents with the help of well-prepared interview schedule. Data regarding Solid Waste generation, Components, Cleaning Operations, Methods of Disposal etc., have been collected from the randomly selected respondents of each class from the study area. The secondary data were collected from Books, Magazines, Journals, Newspapers, Report, Sirkali Municipal office yearly papers, and Manuscripts. Relevant statistical tools have also been applied for analysis and interpretation of data.

Results and Discussion

The social environment is the combination of factors such as religion, caste, family structure, marital status, size of family and age, while economic environment is made up of factors such as education occupation, income etc. Among the respondents surveyed, it was found that 36.7 percent of the respondents had male headed family and only 63.33 percent had female headed family. Majority of the surveyed 82 percent of the respondents belong to Hindus and belongs to the age group of 30-50. The size of household is directly related to the quantity of waste generated in the household. Higher number of members in a family greater is the waste generation. Among the respondents, 31.7 percent were graduates and 12.05 percent had higher secondary education. Only 35.5 percent of respondents headmaster degree and other higher qualification. In the study, among the samples, 85.83 percent of respondents were employed in various private firms, 22.05 percent of respondents were government employees, and only 18.34 percent of respondents were quasigovernment. The survey revealed that the most of the respondents (33.34 percent) were earning an income in the range of Rs. 15000 – 30000 and 31 percent had earned income below Rs. 15,000. Only 1.67 percent had more than Rs. 30,000 income per month in both town and extension area.

Table: 1 Socio-Economic Status of Respondents In Urban And Urban Fringe Area

AGE	Urban Area		Urban Fringe Area	
	No. of Respondents	(%)	No. of Respondents	(%)
Less than 30	30	25.00	27	22.50
31 to 40	46	38.33	55	45.83
41 to 50	23	19.17	25	20.83
51 above	21	17.50	13	10.83
Gender				
Male	44	36.67	54	45.00
Female	76	63.33	66	55.00
Community				
OC	7	5.8	5	4.17
BC	52	43.35	56	46.67
MBC	31	25.85	31	25.83
SC/ST	30	25.00	28	23.33
Religion				
Hindu	99	82.5	86	71.66
Muslim	11	9.16	14	11.67
Christian	10	8.34	20	16.67
Education				
Primary 5-6	11	9.16	8	6.66
Secondary 7-10	13	10.84	15	12.05
Higher Sec.	15	12.05	25	20.84
UG Degree	38	31.66	41	34.16
PG Degree	43	35.84	31	25.84
Occupation				
Employed	57	47.5	57	47.5
Unemployed	14	11.6	17	14.16
Agriculture	21	17.5	19	15.84
Business	28	23.34	27	22.5
Nature of Employment				
Government	27	22.5	24	20.00
Quasigovernment	22	18.34	18	15.00

Private	43	85.83	41	34.17
Others	28	23.33	37	30.83
Income (in Rs)				
Below 10000	40	33.33	43	35.33
10000-15000	40	33.33	37	30.83
15000-20000	12	10	32	26.67
20000-25000	23	19.17	8	6.67
25000-30000	3	2.5	0	0
30000 Above	2	1.67	0	0

Source: Primary Data

Table: 2 Area Wise Management of Household Solid Waste

Sl.No	Household Municipal Solid Waste	Urban Area				Urban Fringe Area			
		No. of Respondents				No. of Respondents			
		Yes	(%)	No	(%)	Yes	(%)	No	(%)
1.	Garbage Bins	96	80.00	24	20.00	101	84.16	19	15.84
2.	Garbage Pits	71	59.17	49	40.83	63	52.5	57	47.5
3.	Recycling of wastes	49	40.83	71	50.17	62	51.67	58	48.33
4.	Preparing compost from the waste generation	68	56.67	52	43.33	66	55.00	54	45.00
5.	Throwing wastes outside the House	46	38.33	74	61.67	56	46.67	64	53.33
6.	Selling of Recyclable Wastes	71	59.17	49	40.83	60	50.00	60	50.00
7.	Dumping of wastes in the Garden	74	61.67	46	38.33	68	56.67	52	43.33
8.	Segregation of the waste at Source	79	65.83	41	34.17	79	65.83	41	34.17
9.	Collection of wastes by Sweepers at Door	94	78.33	26	21.67	96	80.00	24	20.00

Source: Primary Data

Table - 3 Methods of Handling the Solid Waste

Sl. NO.	Methods of Handling the wastes garbage disposed	Urban Area		Urban Fringe Area	
		No. of Respondents in Town Area	Percent (in %)	No. of Respondents in Extension area	Percent (in %)
1	Dumped	18	15.00	26	21.67
2	Handing over to municipal waste collects	43	35.83	48	40.00
3	Burnt	33	27.50	22	18.33
4	Dumped at Community dust bin	26	21.67	24	20.00
	Total	120	100.00	120	100.00

Source: Primary Data

The data pertaining to the Age-wise Classification of urban area respondents, the maximum 38.33 percent respondents were in the Age group of 31-40 years, and minimum 21 percent were above 51 years. In urban fringe area, the Maximum 45.83 percent respondents were in the Age group of 31 -40 years and minimum 10.83 percent were above 51 years. The Gender Wise Classification of respondents, the Maximum 63.33 percent were female and minimum 36.67 percent were male among the urban are respondents. In urban fringe area, the maximum 55 percent respondents were Female, and minimum 45 percent were male respondents. From the analysis the Community - Wise Classification of urban area respondents the Maximum 43.35 percent of respondents belong to Backward Community and Minimum 5.8 percent were other caste people. In urban fringe area the Maximum 46 percent respondents were Backward Community and Minimum 4.17 percent were other caste people. The religion wise classification of urban area respondents, the maximum 82.5 percent were Hindu respondents and minimum 8.34 percent were Christians. In urban fringe area the maximum 71.66 percent respondents were Hindus and minimum 11.67 percent were Muslims. The Educational Qualification of urban area respondents the Maximum 35.84 percent respondents studied PG Degree and minimum 9.16 percent were with Primary Education. In urban Fringe area the Maximum 34.16 percent respondents were with UG Degree and minimum 6.66 percent were with Primary Education. The occupation wise classification of urban area respondents, the Maximum 47.5 percent was employed and minimum 11.6 percent of respondents were unemployed. In urban fringe are the Maximum 47.5 percent respondents were employed and minimum, 14.16 percent were unemployed. The Nature of employment in urban area respondents, the maximum 35.83 percent were in



private and minimum 22.5 percent were in government services. In urban fringe area, the maximum 34.16 percent respondents were in private and minimum 15 percent were in quasi- government services.

It is further found that regarding the children population status of urban area, the maximum 40 percent respondents had two children and minimum 12.5 percent had three children their family. In urban fringe area, the Maximum 45 percent were without child and minimum 5.1 percent had single child in their family. The Adult population status of urban area respondents, the maximum 62.5 percent were with two adult members and minimum 12.5 percent were with single adult member. In urban fringe area the maximum 62.5 percent were with two adult members and minimum 15 percent had single adult member. The monthly income of respondents in urban area, the maximum 33.33 percent were in the monthly income level of Rs. 1000-5000 and 33.33% were in the range of 5000-10000 and minimum 1.67 percent was in the income level of Rs. 30000-35000. In urban fringe area, the maximum 33.33 percent were in the income level of Rs. 1000-5000 and minimum 2.5 percent were in the income level of Rs. 5000-10000.

The study found that opinion regarding usage of Garbage bins in urban area, the maximum 80 percent respondents was using bins and minimum 20 percent were not using such bins. In urban fringe area, the maximum 84.16 percent were using bins Minimum 15.84 percent were not using such bins. The opinion regarding usage of garbage pits in urban area the maximum 59.17 percent respondents were using garbage bins and minimum 40.83 percent were not using pits. In urban fringe area, the maximum 52.5 percent of respondents were using pits and Minimum 47.5 percent were not using pits. The method of handling the wastes in urban area the maximum 35.83 percent of respondents handing over the wastes to the municipal waste collectors and minimum 15 percent of respondents were dumping their daily wastes at their own sites. In urban fringe area, the maximum 40 percent of respondents were handing over the wastes to the municipal waste collectors and 18.33 percent were burnt at community dustbins.

The study also found that opinion regarding the recycling of wastes in urban area, the maximum 59.17 percent of respondents was not recycling the wastes and the minimum 40.83 percent were recycling the wastes. In urban fringe area the maximum 51.67 percent were recycling the wastes and 48.33 percent were not recycling. It is also observed that the opinion regarding the preparation of compost from the waste generation in urban area the maximum 55 percent of respondents were composting their wastes and minimum 45 percent were not preparing compost manures. In urban fringe area, the maximum 56.67 percent of respondents were preparing compost manure and minimum 43.33 percent were not doing this. The types of Dustbins used by the urban area respondents, the maximum 35 percent were bamboo dust bins and minimum 32.50 percent were plastic and wooden dust bins. In urban fringe area, the maximum 35.83 percent were bamboo and minimum 21.67 percent were wooden dustbins. It is observed that opinion regarding throwing wastes outside the house in urban area the maximum 61.67 percent was not throwing wastes outside and minimum 38.33 percent were throwing wastes outside the houses. In urban fringe area, the maximum 53.33 percent were not throwing the wastes and minimum 46.67 percent were throwing the wastes outside the houses. The selling of recyclable wastes in urban area the maximum 59.17 percent of respondents were selling recyclable wastes and minimum 40.83 percent were not selling such wastes. In urban fringe area the maximum 50 percent were selling the recyclable wastes and the requiring 50 percent were not selling recyclable wastes. The dumping of wastes in the garden in urban area the maximum 61.67 percent said yes and Minimum 38.33 percent said no. In urban fringe area the Maximum 56.67 percent said yes and minimum 43.33 percent said no. Dumped wastes in bin and minimum 45.83 percent dumped their wastes in pits and urban fringe the Maximum 71.67 percent dumped the wastes in bins and Minimum 28.33 percent dumped in pits.

From the analysis, it is observed that regarding the medical Expenses relating to Environment problem in urban area, the maximum 59.17 percent of respondents made a monthly expenditure on medical to the spent of Rs.100 -300 and minimum 2.5 percent spent Rs. 600 - 900 on medical Expenses. In urban fringe area the maximum 72.5 percent of respondents spent Rs. 100 -300 on medical expenses every month and minimum 27.5 percent spent Rs.300 - 600 on Medical Expenses. Expenses for mosquito meance in urban area, the maximum 38.33 percent spent Rs. 90 - 120 towards Expenses for mosquito meance and minimum 26.67 percent spent Rs.60 - 90 on Expenses for mosquito meance. In urban fringe area the maximum 54.17 percent of respondents spent Rs.30 -60 every month for mosquito meance and minimum 8.33 percent made a monthly expenditure of Rs. 10 - 30 for mosquito meance. It is further found that opinion regarding the satisfaction about the cleaning operations of municipality in urban area, the maximum 52.50 percent of respondents were satisfied with waste clearing operations and minimum 47.50 percent were not satisfied. In urban fringe area the maximum 60 percent were satisfied with the performance of municipality waste cleaning operations and minimum 40 percent were not at all satisfied. The household solid waste management practices both in urban and urban Fringe area and to analyse the opinion of the respondents regarding various municipal solid waste management practices. Therefore, the result of the study fulfilled the objective of the study.

Suggestions

People think that the management of waste in the Sirkali urban is the responsibility of the concerned Local Government and hence people are irresponsible in the management of the waste generated by them. It is appraisable to note that the Sirkali Municipal administration has been taking a lot of initiatives in managing the municipal solid waste so as to reduce negative impact on the urban environment and people. If the corporation has not been able to cope with the efficient management of this solid waste, it is due to lack of funds and inadequate equipment. Sirkali urban solid waste to be sustainably managed only if there is need for cooperation from the urban people. They should dispose their waste in dumper placer containers where it can be carefully managed by the corporation workers. There is also an absolute need for special waste collection trucks with special facilities for loading and unloading. Such equipment's will facilitate effective collection, transportation and disposal of solid waste. The sorting and segregation of solid waste could be done at the house level and it will be easier for biodegradable and non-biodegradable waste to be effectively managed by the Sirkali Urban.

This segregation could also help in resource recovery of some solid waste that could be recycled to produce fertilizers. Segregate at the source all recyclable waste, as well as biomedical waste and industrial waste, to prevent special waste from being mixed with ordinary municipal solid waste. Make available sufficient storage facilities in accordance to the quantities of waste generated. Provide covered storage facility so that waste is not exposed to open atmosphere. The willingness to pay of the public to pay for improved solid waste management programmes must be used for developing economically feasible programme strategies for solid waste management.

Conclusion

The study found that the size of household is directly related to the quantity of waste generated in the household in urban and Extension area of Sirkali. It was concluded that with in the two areas the generation of solid wastes was found maximum in urban area. From the study it is concluded that generation of wastes was maximum in High income class of urban area. Majority of the respondents opined that recycling is the best way of reducing solid waste, followed by reuse and reduce respectively. The study pointed out that absence of recycling unit, inefficiency of labour, no segregation of waste at source, effect of inefficient recycling, unclean waste dumping, absence of organized primary collection and lack of financial resources are the problems of solid waste management. It is concluded from the study that the major components of waste like paper, vegetables. Tumblers were the major components in the total wastes generated. Almost 100 percent of respondents were found to be aware of environmental problems involved in solid waste Management. The government needs to ban the usage of plastic bags and plastic products. A system approach needs to be adopted for optimizing the entire operation of Solid Waste Management encompassing segregation at source, timely and proper collection, transportation routes and types of vehicles and development and proper operation of sanitary landfill site. Further, the study area is surrounded with lot of educational institutions including colleges, which may initiate awareness and extension campaign for inculcating knowledge on suitable management strategies for solid waste management in the study area.

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