

# Solid Waste Generation in Different Income Groups of Srinagar City

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## ABSTRACT

The paper discusses the results of a study carried out to estimate the quantity of household solid waste generated by different income groups in Srinagar city. The findings revealed that Middle Income Group was generating more household solid waste than the High Income Group and the Low Income Group produced the least. The waste generation was relatively higher in summer and early autumn.

*Key words:* Income groups, Households, Solid waste.

## INTRODUCTION

All kinds of human activities like domestic, commercial, recreational, industrial and agricultural etc. lead to the generation of solid wastes. The quantity and nature of wastes generated vary with the activity and the level of technological development of a country (Garg, 2002). Even within a country the nature of solid waste produced varies depending upon the climatic conditions, seasons, living standards, food habits, etc. Poor practices of collection, transportation and disposal of wastes in developing countries in general and in India in particular result in pollution and the related problems and often open dumping of wastes provides breeding grounds for pathogenic microbes and their vectors (Jha, 1998).

Srinagar city, the summer capital of Jammu and Kashmir State, is a fast growing city and huge quantities of Municipal Solid Wastes (MSW) are generated daily, some of which is disposed of in an open dumping site located at Achan – Saidapora and the rest is indiscriminately disposed of in open spaces, water bodies, roads, by-lanes, and open drains. No systematic work has so far been done to assess the quantity of household solid waste generated in the city. To fill this gap in our understanding of the solid waste disposal in the city a survey was carried out. The data collected during this survey are presented in the present communication.

## MATERIAL AND METHODS

After conducting a thorough survey in residential areas of Nageen, Lal Bazar and Sadrabal-Kanitar localities of Srinagar city, 10 households each were selected from High Income Group

(HIG), Middle Income Group (MIG), and Low Income Group (LIG). Total number of members and other socio-economic characteristics of each family were recorded. The average per capita per day household solid waste generation was measured by taking weight of the samples from each household once in a month from May to December 2004. A polythene bag of 5kg capacity was provided to each household early in the morning for keeping the solid waste and the wastes collected over a 24 hour period were weighed on the spot the next day in the morning. The methodology followed was that of Gaxiola (1995), Rampal *et al.*, (2002) and Benitez *et al.*, (2003).

## RESULTS AND DISCUSSION

The data on the household solid waste generated by various income groups of Srinagar city are summarized in Tables 1, 2, and 3, whereas the mean values of all the three groups are given in Fig. 1. The data showed that per capita per day household solid waste generation by HIG (Table 1) ranged between 109.47g in December to 180.15g in October with an overall average of 144.11g/person/day. It was observed that the household with lowest number of family members showed the highest mean value (162.67g) per capita solid waste generation. In the MIG the per capita solid waste generation ranged between 148.27g in June and 208.65g in October with an overall average of 168.32g. In this group also the household with lowest number of family members generated the highest quantity of the solid waste (275.47g/person/day). For LIG the mean values of per capita solid waste generation fluctuated from 90.72g in December to 137.91g in July with an overall average of 119.60g/person/day.

**Table 1: Average per capita per day solid waste generation (in grams) in High Income Group (HIG) during 2004.**

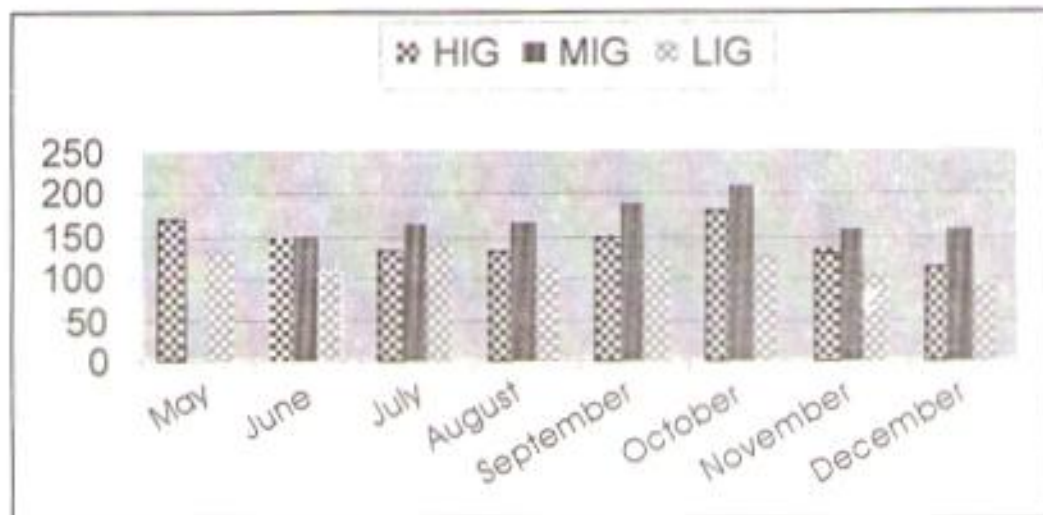
Families	Total no. of members/family	Months								Mean
		May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
1	4	156.25	193.75	NA	112.50	172.50	237.50	160.00	106.25	162.67
2	4	137.50	93.75	116.25	NA	131.25	147.50	160.00	212.50	142.67
3	9	160.50	63.66	94.44	98.33	83.33	305.55	96.66	NA	131.81
4	8	184.37	259.37	127.50	143.75	151.25	132.50	103.30	78.12	147.52
5	7	221.42	153.57	42.85	116.42	172.85	160.71	132.85	75.71	134.54
6	8	112.50	153.75	135.00	121.25	145.00	127.50	113.12	108.75	127.10
7	8	242.50	93.75	237.50	171.87	178.50	137.50	108.75	82.50	156.60
8	5	166.00	135.00	152.00	143.00	138.00	168.00	141.00	110.00	146.62
9	7	195.71	165.71	140.00	148.57	155.71	176.42	140.00	101.42	152.94
10	6	113.33	135.83	136.66	123.33	165.00	188.33	136.66	110.00	138.64
	<b>Mean</b>	<b>171.00</b>	<b>144.83</b>	<b>131.35</b>	<b>131.02</b>	<b>149.33</b>	<b>180.15</b>	<b>129.23</b>	<b>109.47</b>	<b>144.11</b>

**Table 2: Average per capita per day solid waste generation (in grams) in Middle Income Group (MIG) during 2004.**

Families	Total no. of members/family	Months								Mean
		May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
1	5	-	184.00	156.00	NA	206.00	176.00	144.00	122.00	164.66
2	7	-	162.85	189.20	175.00	157.85	75.00	155.71	137.14	150.39
3	4	-	132.50	157.50	170.00	NA	192.50	140.00	105.00	149.58
4	6	-	136.66	116.66	200.00	191.66	175.00	162.50	154.16	162.37
5	7	-	154.28	171.42	NA	148.57	204.28	139.20	121.42	156.52
6	3	-	123.33	141.66	150.00	280.00	508.33	275.00	450.00	275.47
7	5	-	174.00	208.00	175.00	204.00	216.00	142.00	126.00	177.85
8	7	-	151.42	161.42	152.85	172.85	188.57	147.14	141.42	159.38
9	6	-	143.33	183.33	151.66	195.00	202.50	153.33	131.66	165.83
10	6	-	120.00	145.83	NA	125.00	148.33	103.33	85.00	121.24
	<b>Mean</b>	-	<b>148.23</b>	<b>163.10</b>	<b>167.71</b>	<b>186.77</b>	<b>208.65</b>	<b>156.22</b>	<b>157.38</b>	<b>168.32</b>

**Table 3: Average per capita per day solid waste generation (in grams) in Low Income Group (LIG) during 2004.**

Families	Total no. of members/family	Months								Mean
		May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	
1	6	156.66	NA	156.66	145.83	173.33	181.16	133.33	105.00	150.35
2	10	225.00	NA	167.00	137.00	157.50	143.50	107.00	202.50	162.78
3	6	170.83	291.66	211.66	254.16	NA	170.00	148.33	133.33	197.13
4	3	128.33	75.00	116.66	NA	93.33	133.33	70.00	80.00	99.52
5	8	62.50	62.50	86.25	89.37	107.50	89.37	86.25	73.75	83.31
6	10	223.70	55.00	109.00	95.00	32.00	123.00	NA	27.50	95.02
7	10	87.50	100.00	NA	65.50	85.00	63.00	60.00	52.00	73.28
8	4	131.25	31.25	NA	118.75	167.50	68.75	97.50	62.50	96.78
9	7	115.71	135.71	128.57	120.00	145.71	132.85	102.85	85.71	120.88
10	8	121.25	105.00	127.50	115.00	138.75	135.00	108.75	85.00	117.03
	<b>Mean</b>	<b>130.14</b>	<b>107.01</b>	<b>137.91</b>	<b>113.41</b>	<b>122.29</b>	<b>124.04</b>	<b>101.55</b>	<b>90.72</b>	<b>119.60</b>



The study revealed the MIG to be the highest producer of solid waste than HIG followed by LIG. This can be attributed to the fact that most of the family members of HIG were government employees or involved in business and therefore engaged in outdoor activities during day time. Most probably it was this variable which resulted in less production of waste in the houses of HIG. The differences found in the quantity of waste generated by almost all the three groups (HIG, MIG, and LIG), were of fair degree (Fig. 1).

The provisional population of Srinagar, as estimated by Census Department was 11,83,493 in the year 2001. This means that on an average of all the socio-economic strata, 170.42 tons of household solid waste is generated at the rate of 144 grams per person per day. The total quantity of household solid waste turns out to be 1192.94 tons per week, 5112.60 tons per month and 62203.30 tons per year. However, the figures do not include the large quantities of municipal solid waste generated from commercial, industrial, institutional, recreational, street sweeping and other such activities. It is also pertinent to mention here that the population figures do not include large number of people who have migrated from rural areas in the recent past. Besides the influx of people from rural areas for socio-economic purposes, large number of people are also engaged in governmental, private sector and institutional activities residing in residential quarters and rented houses are not included in the census data. If their number is also quantified and included in the total population figure, the quantity of household waste generated may increase considerably.

The problem of solid waste is growing and threatens to become a serious source of environmental pollution because waste generation is on an increase in relation to population growth. It was also due to the lack of proper coverage of residential areas by municipal workers that the waste generated in all the groups studied was found being disposed on roadsides. In a section of HIG area, however, it was observed that a worker employed by an

NGO used to collect the waste from households but he too was found to dump it at a collection point on the by-lane of same households for irregular municipal collection. In MIG area, the municipal sweepers, according to the residents, irregularly collect the waste from households, which were otherwise thrown on the roadsides. In LIG areas the waste generated was observed altogether thrown or disposed on roadsides.

## SUGGESTIONS

The present study reflects that if the Srinagar Municipal Corporation (SMC) and the citizens want to solve solid waste pollution and management problem, then the following suggestions can be taken into consideration:

- Collection of household solid waste by the municipal workers should be regularized with time punctuality.
- Necessary steps should be taken to improve the status of sweepers and the waste pickers.
- Informal waste pickers should be incorporated in to formal sector as they can play an important role in reduction and recycling of solid waste. They should also be encouraged to collect waste directly from households instead of foraging in garbage dumps.
- Public should be encouraged for backyard composting of the biodegradable household waste.
- Private initiatives in the waste collection, disposal or utilization should be encouraged.
- Effective management of solid waste requires the cooperation of general public, hence there is an urgent need of mass awareness campaign regarding the proper solid waste management.
- Conventional methods of waste management should be replaced by applying new appropriate strategies and technologies based on community participation.
- There is a need to carry out regular studies of characterization and quantification of household solid waste in the communities of all socio-economic strata.

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