

Solid waste generation in different income groups of Gwalior city

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SUMMARY

The paper discusses the outcome of a study carried out to estimate the amount of household solid waste generated by different income groups in Gwalior 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 autumn and lower in winter.

Key words :

Income groups,
Households, Solid
waste

Every kind of human actions like commercial, domestic, recreational, agricultural and industrial etc. lead to the generation of solid wastes. The amount and nature of wastes generated differ with the activity and the height of technological improvement of a country (Garg, 2002). Still within a country, the nature of solid waste formed 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 allied problems and often open dumping of wastes provides breeding grounds for pathogenic microbes and their vectors (Jha, 1998).

Gwalior city of Madhya Pradesh, is a rapid budding city and massive quantities of Municipal Solid Wastes (MSW) are generated daily, some of which is disposed off in a dumping site located at Gwalior-Shivpuri road and the rest is indiscriminately disposed off in open spaces, water bodies, roads, by-lanes and open drains. No efficient work has so far been done to assess the amount of household solid waste generation in the city. To pack this gap in our understanding of the solid waste, disposal in the city, a survey was carried out. The data collected during this analysis are presented in the present communiqué.

MATERIALS AND METHODS

After conducting a comprehensive study

in residential areas of old town, Lashkar, Morar, City centre of Gwalior city, 10 households each were chosen 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 September 2008 to February 2009. A polythene bag of 5 kg 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 Rampal *et al.* (2002) and Benitez *et al.* (2003).

RESULTS AND DISCUSSION

The information on the household solid waste generation by various income groups of Gwalior 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 108.47g in December to 185.82g in October with an overall average of 144.44g/person/day. It was observed that the household with lowest number of family members showed the highest mean value (162.25g) per capita solid waste

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Table 1 : Average per capita per day solid waste generation (in grams) in High Income Group (HIG) during 2008

Families	Total no. of members / family	Months								
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	Mean
1	8	177.50	185.03	107.75	81.50	241.50	94.75	238.50	170.87	162.17
2	4	130.25	148.50	159.00	211.50	136.50	94.75	117.25	NA	142.53
3	6	164.00	189.33	135.66	109.00	112.33	136.83	137.66	122.33	138.39
4	8	150.25	133.50	102.30	77.12	183.37	260.37	128.50	142.75	147.27
5	7	171.85	161.71	131.85	74.71	220.42	154.57	43.85	115.42	134.29
6	4	171.50	238.50	159.00	105.25	155.25	194.75	NS	111.50	162.25
7	5	154.71	177.42	139.00	100.42	194.71	166.71	141.00	147.57	152.69
8	5	137.00	189.00	140.00	109.00	165.00	136.00	153.00	142.00	146.37
9	8	144.00	128.50	112.12	107.75	111.50	154.75	136.00	120.25	126.85
10	9	82.33	306.55	95.66	NS	179.50	64.88	95.44	97.33	131.67
	Mean	148.33	185.82	128.23	108.47	170.08	145.83	132.35	130.00	144.44

NS-Non significant

Table 2 : Average per capita per day solid waste generation (in grams) in Middle Income Group (MIG) during 2008

Families	Total no. of members / family	Months								
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	Mean
1	5	205.00	215.00	143.00	127.00	175.00	207.00	174.00	-	178.00
2	4	NS	191.50	141.00	106.00	133.50	156.50	169.00	-	149.58
3	6	126.00	147.33	104.33	86.00	121.00	144.83	NS	-	121.58
4	7	173.85	187.57	148.14	142.42	152.42	160.42	151.85	-	159.52
5	6	192.66	174.00	163.50	155.16	137.66	115.66	199.00	-	162.52
6	5	207.00	175.00	145.00	123.00	185.00	155.00	NS	-	165.00
7	3	281.00	507.33	287.00	451.00	124.33	140.66	149.00	-	277.18
8	6	196.00	201.50	154.33	132.66	144.33	182.33	150.66	-	165.97
9	7	149.57	203.28	140.20	122.42	155.28	170.42	NS	-	156.86
10	7	158.85	74.00	156.71	138.14	163.85	188.20	174.00	-	150.53
	Mean	187.77	207.65	158.32	158.38	149.23	162.10	166.78	-	168.67

NS-Non significant

Table 3 : Average per capita per day solid waste generation (in grams) in Low Income Group (LIG) during 2008

Families	Total no. of members / family	Months								
		Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	Mean
1	3	92.33	134.33	69.00	79.00	129.33	76.00	115.66	NS	99.37
2	4	166.50	69.75	96.50	61.50	132.25	32.25	NA	119.75	96.92
3	8	106.50	90.37	85.25	72.75	63.50	63.50	85.25	90.37	82.18
4	7	144.71	133.85	101.85	84.71	116.71	136.71	127.57	121.00	120.88
5	10	84.00	64.00	59.00	51.00	88.50	101.00	NS	66.50	73.42
6	6	NS	171.00	147.33	132.33	171.83	292.66	210.66	255.16	197.28
7	10	156.50	144.50	106.00	201.50	226.00	NS	166.00	138.00	162.64
8	6	172.33	182.16	132.33	104.00	157.66	NS	155.66	146.83	150.13
9	10	31.00	124.00	NS	26.50	224.70	56.00	108.00	96.00	95.17
10	8	137.75	136.00	107.75	84.00	122.25	106.00	126.50	116.00	117.03
	Mean	121.29	124.99	100.55	89.72	143.27	108.01	136.91	127.73	119.50

NS-Non significant

generation. In the (MIG) the per capita solid waste generation ranged between 149.23g in January to 207.65g in October with an overall average of 168.67g. In this group also the household with lowest number of family members (Table 2) generated the highest quantity of the solid waste (277.18g/person/day). For LIG the mean values of per capita solid waste generation fluctuated from 89.72g in December to 143.27g in January with an overall average of 119.50g/person/day (Table 3).

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).

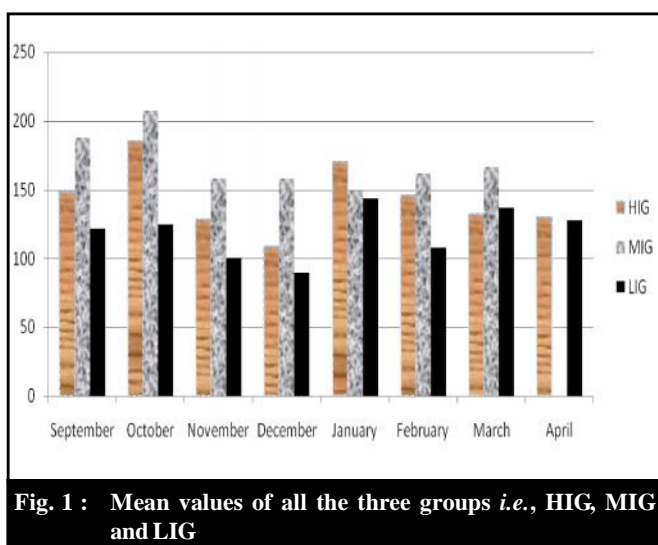


Fig. 1 : Mean values of all the three groups i.e., HIG, MIG and LIG

The provisional population of Gwalior, as projected by Census Department was 82,6919 in the year 2001. This means that on an average of all the socio-economic strata, 119.24 tons of household solid waste is generated at the rate of 144.20 g per person per day. The total quantity of household solid waste turns out to be 834.68 tons per week, 3577.2 t per month and 43522.6 t per year. However, the figures do not include the large quantities of municipal solid waste generated from commercial, industrial, recreational, street sweeping and other such activities. It is also significant to reveal here that the population figures do not include large number of people who have migrated from rural areas in the recent past. Besides the incursion of people from rural areas for socio-

economic purposes, large numbers of people are also engaged in Government, private 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 significantly.

The crisis of solid waste is mounting and threatens to become a grave 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 a 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 wastes 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 Nagar Nigam and the citizens want to solve solid waste pollution and management problem, then the following suggestions can be taken into consideration:

- Indispensable steps should be taken to perk up the condition of sweepers and the waste pickers.
- Casual waste pickers should be incorporated into 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.
- Collection of household solid waste by the municipal workers should be regularized with time punctually.
- 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.
- 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.
- Public should be encouraged for backyard composting of the biodegradable household waste.
- Private initiatives in the waste collection, disposal or utilization should be encouraged.
- Conventional methods of waste management

should be replaced by applying new appropriate strategies and technologies based on community participation.

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