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### **Household Solid Waste Disposal and Management in Raipur City of Chhattisgarh, India: A Perspective Study**

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#### **ABSTRACT:**

The problems of waste generation and management have become a serious issue of concern to many scholars in environmental studies as well as a common citizen. This paper critically examines the attitude and behavior of urban dwellers to waste disposal and management, which is the vital problem of India. Because of lack of awareness of Indian people. Planning for urban solid waste management requires an assessment of many complex inter related matrices, such as transportation system, land use pattern, urban growth and development, and public health considerations etc. The authors discuss the complex problems of the solid waste management system in Raipur. The management structure of the Division of Solid Waste Collection and Disposal was completely reorganized to take advantage of and to supplement these major organizational changes.

**KEY WORDS:** Household waste disposal, environmental degradation, recycling, solid waste management, Dumping ground, Pollution

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## **INTRODUCTION:**

The problem of waste generation and management in most cities especially in developing one has become one of the intractable environmental problems facing urban centers. This situation could be attributed to low level of technology that is not sophisticated enough to handle the high rate of waste generation<sup>1</sup>. Solid waste management and disposal is an alarming problem in Raipur (Chhattisgarh). Waste generation has witnessed an increasing trend parallel to the development of industrialization, urbanization, and rapid growth of population. The problem has become one of the primary urban environmental issues. Enormous amount of waste is generated daily from household and its management is a huge task. The prevailing scenario for solid waste final disposal is usually a matter of transporting the collected waste to the nearest available open space and dumping it. However, only a fraction of waste were properly collected and transported. Sometimes it is burnt to reduce its volume and to minimize attraction of animals and vermin and also to retrieve recyclable items<sup>2</sup>. The study make an attempt to assess the existing solid waste management system of Raipur city and the environmental aspects associated with the current practice of final disposal of solid wastes.

### ***Source and Characteristics of Solid waste***

Raipur Municipal solid waste is normally comprised of food wastes, construction wastes, street sweepings, abandoned vehicles and appliances, and treatment plant residues. The composition of solid waste as collected may vary greatly depending upon geographical region and season. Quantity and composition of solid waste vary greatly for different municipalities and time of the year. Factors influencing the characteristics of Solid waste are degree of urbanization and industrialization.

### ***Handling of Solid Waste***

Waste is usually handled in four stages under the Waste Management Project at Green:

- **Generation** -Analyze and reduce the sources of waste
- **Collection**- Identify and improve systems of collection
- **Segregation**- Identify & evaluate existing processes and put in force more efficient ones
- **Treatment**- Identify & evaluate current systems and put in force more efficient ones

## **OBJECTIVES:**

The objective of the present work was as under:

- To study the awareness of household solid waste management of Raipur city.
- To study the household solid waste management of Raipur city.

- To study the concerned about environmental issues regarding to household solid waste and disposal of Raipur city.
- To study the willingness to participation in household solid waste management of Raipur city.

## **MATERIALS AND METHOD:**

The Raipur Metropolis is divided into 70 wards. Wards are not homogenous but heterogeneous in terms of population density and land use patterns. All the wards can be categorized into five main groups i.e. North, South, East, West and Centre, each zone have 14 wards, settlement and land use pattern. 5 wards (36%) out of the 14 of East zone were selected for field study. The study was based on primary information from east zone (21.2514° N, 81.6296° E) 125 households was collected using a structured schedule. Schedule consists of seven sections: Household Solid Waste Management; Concerns about Solid Waste Management; Willingness to participate; Solid Waste Management Attitude Scale and Demography.

### ***Demographic Profile of Study Area***

As per 2011 census, 63.50 % population of Raipur district lives in rural areas, villages. The population living in rural areas is 2,580,583 of which males and females are 1,288,567 and 1,292,016 respectively. In rural areas of Raipur district, sex ratio is 1003 females per 1000 males whereas child sex ratio data of Raipur district is 980 girls per 1000 boys. Child population in the age 0-6 is 387,005 in rural areas of which males were 195,416 and females were 191,589. The child population comprises 15.17 % of total rural population of Raipur district. Literacy rate in rural areas of Raipur district is 70.47 % as per census data 2011. Gender wise, male and female literacy stood at 82.18 and 58.83 percent respectively. In total, 1,545,714 people were literate of which males and females were 58.11 percent and 41.89 percent respectively.

## **RESULT & DISCUSSION:**

This study is done in the Raipur City of Chhattisgarh, India by taking 125 households. The data reveals Household Solid Waste Management; Concerns about Household Solid Waste Management; Willingness to participate; Household Solid Waste Management Attitude Scale and Demography. The details shown below tables:

**Table -1: Demographic Profile of Study Area**

<b>Demographic Profile</b>		
<b>Residential Status</b>	<b>N (%)</b>	<b>Total</b>
Urban Regular	100 (80%)	125 (100%)
Urban Slum	25 (20%)	
<b>Income group Status*</b>		
Lower Income Group (3,301 - 7,300 per month)	52 (42%)	125 (100%)
Middle Income Group (7,301 - 14,500 per month)	25 (20%)	
Higher Income Group (14,501 and above per month)	48 (30%)	
<b>Educational Status</b>		
Illiterate	1 (1%)	125 (100%)
Primary	1 (1%)	
Middle	15 (12%)	
Higher Secondary	42 (34%)	
Under Graduate	48 (38%)	
Post Graduate	11 (9%)	
Professional	7 (5%)	
<b>Marital status</b>		
Married	98 (78%)	125 (100%)
Unmarried	25 (20%)	
Widow	2 (2%)	
Separated	0	
Remarriage	0	

\*Source: Report of the Technical Group (11th Five Year Plan: 2007-12) on Estimation of Urban Housing Shortage

Table -1 shows that in east zone of Raipur city 80% reside in Urban regular and 20% reside in urban slum area. About half population belongs to Lower Income Group (42%), followed by Higher Income Group (38%) and Middle Income Group 20%. As per marital status two third of respondent are married (78%) in study population. Educational level revealed that 38.4% are Under Graduate followed by Higher Secondary educated and Middle pass (12%). About 20% were Post Graduate and professional degree holder. Only 2% were primary and below primary education.

Table -2: Concerned about Environmental Issues

	Concerned				Not Concerned				No opinion				Total
Concern about the current state of the environment	No.	Percent		No.	Percent		No.	Percent		No.	Percent		
	21	17%		47	37%		57	46%					100%
	Automobile exhaust (%)		The individual person (%)		Factories (%)		Cutting down trees (%)		Mining (%)	Household garbage (%) and others (%)			
Being considered as the major issue that affects the environment	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
	69	55%	13	10%	11	9%	7	6%	5	4%	20	16%	100%
	No effect (%)		Some effect (%)				A lot of effect (%)		No opinion (%)				
Individual effect on the environment	No.	%	No.		%		No.	%		No.	%		100%
	8	6%	95		76%		13	11%		9	7%		
	Concerned				Not Concerned				No opinion				Total
Concern about the current state of the environment	No.	Percent		No.	Percent		No.	Percent		No.	Percent		
	21	17%		47	37%		57	46%					100%
	Automobile exhaust (%)		The individual person (%)		Factories (%)		Cutting down trees (%)		Mining (%)	Household garbage (%) and others (%)			
Being considered as the major issue that affects the environment	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
	69	55%	13	10%	11	9%	7	6%	5	4%	20	16%	100%
	No effect (%)		Some effect (%)				A lot of effect (%)		No opinion (%)				
Individual effect on the environment	No.	%	No.		%		No.	%		No.	%		100%
	8	6%	95		76%		13	11%		9	7%		

Table -2 shows that 46% of population has no opinion of the current state of the natural environment but have a shallow knowledge on what constitutes the natural environment and 55% of population considered automobile exhausts the major issue that affects the environment followed by 10% of sewage pollution. The individual person believed that 76% of population has some effect on the environment of the study area in east zone population of Raipur city.

Table -3: Household Solid Waste Management

Method of household garbage storage		Closed container (%)		Open container (%)			Plastic bags (%)		Other (pile in the yard) (%)		total		
		No.	%	No.	%	No.	%	No.	%				
		53	42%	18	15%	35	28%	19	15%	100			
Type of garbage		Burn (%)	Bury (%)	Dump In river /gully (%)	Dump in yard (%)	Dump on road (%)	EHO Dump site (%)	Garbage truck (%)	Recycle (%)	Reuse (%)	Compost (%)	Other (%)	
Food waste	No	23	9	6	0	0	0	4	2	1	10	55	125
	%	18%	7%	5%	0%	0%	0%	3%	2%	1%	8%	44%	100
Yard trimmings	No	43	12	2	3	4	0	50	4	0	4	3	125
	%	34%	10%	2%	2%	3%	0%	40%	3%	0%	3%	2%	100
Paper/card board	No	48	10	8	2	0	0	36	1	20	0	0	125
	%	38%	8%	7%	2%	0%	0%	29%	1%	15%	0%	0%	100
Plastic	No	4	0	4	9	3	0	29	4	59	3	8	125
	%	3%	0%	3%	7%	3%	0%	23%	3%	48%	3%	7%	100
Metals	No	2	7	6	6	5	0	50	3	37	2	7	125
	%	2%	6%	3%	3%	6%	0%	40%	2%	30%	2%	6%	100
Glass	No	2	2	0	6	5	0	63	7	32	1	7	125
	%	1%	2%	0%	5%	4%	0%	50%	6%	26%	1%	6%	100

Table -3 shows that about half of population are (42%), reported that most of their household garbage are stored in a closed container, while some (15%) store theirs in an open container, few (28%) in plastic bags and others (15.2%) pile garbage in the yard. Garbage truck constituted the major method of household garbage disposal by population of east zone of Raipur city (31%). Many others (20%) make use of the reuse garbage disposal and very few of the respondents made use of other methods such as: composting, recycling, dumping, EHO dumpsite etc of the study area in east zone of Raipur city.

**Table -4: Issues of Concerns about Household Solid Waste Management**

Issue of concern	Concerned (%)		Not concerned		No opinion		Total
	No.	%	No.	(%)	No.	(%)	
Health risk related to burning garbage	106	85%	9	7%	10	8%	<b>100</b>
Illegal dumps polluting water bodies	92	74%	26	21%	7	5%	<b>100</b>
Diseases related to improper storage and disposal	84	67%	21	17%	20	16%	<b>100</b>
Flooding due to garbage blocking drains and gullies	98	78%	25	20%	2	2%	<b>100</b>
Reduction of natural resources we buy and use	41	80%	12	10%	12	10%	<b>100</b>
Services provided by garbage truck	76	61%	28	22%	21	17%	<b>100</b>
Litters	82	66%	34	27%	9	7%	<b>100</b>
Illegal dumping	64	51%	51	41%	10	8%	<b>100</b>
Presence of rats	80	64%	25	20%	20	16%	<b>100</b>
Garbage in Raipur local government	80	64%	27	22%	18	14%	<b>100</b>

Table -4 shows that people concerned higher percent on health risk related to burning garbage (85%) reduction of natural resources we buy and use (80%), and illegal dumps polluting water bodies (74%). People were not concerned higher percent on illegal dumping (41%), litters (27%) and services provided by garbage truck (22%). People have no opinion higher percent on services provided by garbage truck (17%), diseases related to improper storage and disposal (16%) and presence of rats (16%) in the study area in east zone of Raipur city.

**Table -5 Willingness to Participation in Household Solid Waste Management**

Participation in Solid waste Management	Yes (%)		No (%)		Don't know (%)		Total
	No.	%	No.	%	No.	%	
Willingness to participate in Composting	115	92%	7	6%	3	2%	<b>100</b>
Willingness to participate in Recycling	95	75%	28	23%	2	2%	<b>100</b>
Willingness to separate material for collection	81	65%	30	24%	14	11%	<b>100</b>
Willingness to pay for pickup for recycling materials	62	50%	44	35%	19	15%	<b>100</b>
Willingness to participate in composting programs	85	68%	23	18%	17	14%	<b>100</b>
Willingness to return plastic bottles to stores	59	47%	56	45%	10	8%	<b>100</b>
Willingness to purchase less throwaway products	77	62%	31	25%	17	13%	<b>100</b>
More information on the reduction of garbage	65	52%	37	30%	23	18%	<b>100</b>
Willingness to carry garbage to skiff	49	39%	52	42%	24	19%	<b>100</b>
Willingness to build skiff for the community	73	58%	38	31%	14	11%	<b>100</b>
Willingness to maintain skiff	76	60%	40	33%	9	7%	<b>100</b>
Average		<b>61%</b>		<b>28%</b>		<b>11%</b>	

Table -5 shows that people higher percent on willingness to participate in composting (92%), recycling (75%) and participate in composting programs (68%). People higher percent on not willingness to return plastic bottles to stores (45%), carry garbage to skiff (42%) and pay for pickup for recycling materials (35%) in the study area in east zone of Raipur city.

## **CONCLUSION:**

The study reveals that the uncollected wastes are dumped in open spaces and streets which clog the drainage system creating serious environmental degradation and health risks in the city<sup>3</sup>. Raipur Municipal Corporation is a local authority for Raipur. Raipur is having about 147 sq. km. The activity is governed by municipal solid waste rules, promulgated under the Environment (Protection) Act, 1986. These rules require scientific processing & disposal of entire municipal solid waste generated in the city. The approximate quantity of municipal solid waste generated in Raipur is about 600 Metric Tons per day. One of the major problems experienced by the Raipur Municipal Corporation is inadequate collection in solid waste. It is suggested that daily door-to-door collection of waste should be done. The main drawback for such conditions is the location of the bins. Further, Vehicles owned by the corporation are inadequate in number with no proper route mapping. Some of these drawbacks can be overcome using upgraded new equipments and more rational methods for managing and collection of solid waste. It has been observed that Public-private partnership has proven to be one of the biggest achievements for a better household solid waste management system that could be successfully implemented in other cities. This survey project has been able to provide an indication of the current household solid waste management in Raipur by focusing on the residents surrounding east zone of study.

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