Knowledge on Household Biodegradable Waste Management in Bangalore City

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Abstract: Waste is not seen as a resource that can be refined or recycled and thereby generate wealth. Instead, it is often treated as the evil leftover that needs to be eliminated. This indiscriminate disposal with little concern leads to many health and environment problems. The objectives of the study were to elicit information on quantity and composition of household waste generated by households in Bengaluru city, to identify the influencing factors on waste generation, to elicit information on the knowledge of waste management at household level from selected homemakers. The sample households for the study were identified through multistage selection. 20 households each from the 40 wards identified were selected randomly for the study. Thus, 800 households were selected for the baseline data collection of the study with the help of questionnaire. Intervention programme was conducted for a period of one month to 80 homemakers through posters, lectures, power point presentation and group discussion regarding role of individuals in waste management. Education has been known to be an empowering tool for people at both the household and society levels. Intervention programme increased the knowledge of the homemakers from moderate to adequate level. Adequate knowledge on the influence of improper waste disposal may encourage people to adopt positive waste management practices.

Keywords: Biodegradable Waste, Waste Management, Knowledge, Demographic Characteristics, Association, Intervention Programme

1. Introduction

The status of development of a country may be categorized in several ways. With respect to its impact on solid waste management, the status of development is categorized on the basic management adapted to the nature and quantities of waste generated and to the availability of technology for handling and processing it UNEP, (2005).

Indian cities will be the locus and engine of economic growth over the next two decades, and the realization of an ambitious goal of 9 percent–10 percent growth in GDP depend fundamentally on making Indian cities much more liveable, inclusive, bankable, and competitive. The income level of the people is the most important factor for waste generation rates (Medina, 2010; World Bank, 2012). Suggested other factors of importance for the waste generation rate is the degree of industrialisation, public habits, local climate and level of urbanization (World Bank, 2012). Solid waste generation is suggested by UNEP to reflect the lives of people and the activities in the country. With that

perspective the waste generation would be a combined function of the living standards of the inhabitants and the region's natural resources (United Nations Environment Program, 2005). Our city is littered with uncollected solid waste and no public place or street is free of litter. Though much recycling takes place by rag pickers and waste collectors, a lot is left to be disposed off. To keep cities clean, citizen involvement is essential to sort waste at source and minimize waste that needs to be collected and disposed. Programme should be implemented to obtain citizens' cooperation planning commission (2007). Whenever the community has been involved from planning stage, the programme has always become sustainable. While our programme have elaborate guidelines for community involvement, it is obvious that field-level adoption is far from satisfactory planning commission (2007).

The degree of community sensitization and public awareness is low. There is no system of segregation of

organic, inorganic and recyclable wastes at household level. Hence, this study was taken up to create community awareness about the likely imperilment of poor waste management and the rudiments of handling the waste through segregating of biodegradable waste material like kitchen & garden waste from other waste generated in the household. This will help in promoting effective management of solid waste generated through proper practices of storing in a separate bag or a bin installed at their respective houses. Also the biodegradable fraction of the waste could be recycled through composting.

2. Objectives

The objectives of the study were to elicit information on quantity and composition of household waste generated by households in Bengaluru city, to identify the influencing factors on waste generation, to elicit information on the knowledge of waste management at household level from selected homemakers.

3. Methodology

The sample households for the study were identified through multistage selection. First four zones namely east, west, south and Bommanahalli were selected from the total of eight zones of Bengaluru. 20 households each from the 40 wards identified were selected randomly for the study. Thus, 800 households were selected for the baseline data collection. Questionnaire was the tool used to collect the required information. A handout on various methods of waste management at household level was developed and handed over to the participating respondents. Intervention Programme for a period of one month was conducted on 10 percent of the total sample comprising of 80 homemakers through Posters, Lectures, PowerPoint presentation and group Discussion regarding role of individuals in waste management

4. Results and Discussion

The major portion of the municipal solid waste of Bengaluru city consists of organic or biodegradable waste (60%). This was followed by recyclable waste in the form of plastics (14%), and paper (12%). Small quantities of other recyclable waste generated are glass, metal, card board, rubber, bio medical waste and miscellaneous. The Biodegradable waste which when mixed with other types of neither waste neither decomposes completely nor can the recyclables can be recycled as it is contaminated with organic waste.

Waste management is a complex process that requires a lot of information from various sources such as factors on waste generation and waste quantity forecasts. It was observed that 35.9 percent of the homemakers are in the age group of 26 – 35 years while 26 percent of them are in the age group of 36 - 45 years (Table 1a).

Table 1a. *Socio-Demographic Characteristics of the Homemakers (N = 800)*

Category	Respondents	
	Number	Percent
Age group (years)		
16-25	167	20.9
26-35	287	35.9
36-45	209	26.1
46+	137	17.1
Educational level		
Up to 5th Std	80	10.0
6-10th Std	182	22.7
PUC/Diploma	201	25.1
Graduate	249	31.1
PG/Professional	88	11.1
Number of Children		
None	183	22.9
One	197	24.6
Two	297	37.1
Three	123	15.4
Occupational Status		
Government	30	3.7
Private	200	25.0
Self Employed	75	9.4
Professional	31	3.9
Homemaker	464	58.0

Source: Field Study

Table 1b. *Socio Demographic Characteristics of the Homemakers (N = 800)*

Category	Respondents	
	Number	Percent
Household Size (Members)		
2 - 3	206	25.7
4 – 5	520	65.0
6+	74	9.3
Family Income/Month		
Rs. 2,001 – 5,000	201	25.1
Rs. 5,001 – 15,000	236	29.5
Rs. 15,001 – 25,000	169	21.11
Above 25,001	194	24.3
Type of Family		
Nuclear	592	74.0
Joint	156	19.5
Extended	52	6.5
Type of House		
Independent house	290	36.2
Compound House	180	22. 5
Row	131	16.4
Storied	123	15.4
Apartment	76	9.5
Type of Ownership		
Own	418	52.2
Rented	253	31.6
Leased	107	13.4
Quarters	22	2.8

Source: Field Study.

With regards to the educational qualification of the samples, all the respondents had some form of formal education. Occupational status of the surveyed families revealed that in more than half of the households, the women were full time homemakers. The numbers of children per household in 37.1 percent of the families were two children and one child in 24.6 percent of the households.

When operations related to promotion of waste

management systems are considered it is observed that generation of waste and planning was found to be influenced by different factor. The household size was found to be relatively small across the sample with 4 -5 members in 65 percent of the households followed by 2 -3 members in 25.7 percent of the households (Table 1b).

The income of the families ranged from Rs 2,000 to above Rs 25,000. The sample households were almost equally distributed between the different income groups. It was revealed that 36.2 percent of the families were residing in independent houses. With regards to ownership of the house, it was observed that a little more than half of the surveyed households lived in own houses followed by tenants (31.6%).

It was found that, kitchen waste mostly consisting of biodegradable waste like vegetable peels, spoiled food and fruits, and food remains after consumption, are generated daily in 90.7 percent of the households (table 2). Narayana (2009), observed that unlike in western countries, the solid waste of Asian cities is often comprised of 70-80% organic matter, dirt and dust. Sivakumar (2010) observed that the food waste is usually the predominant component in the waste stream due to the habit of fresh food consumption and composition of all

other types of waste are low in all households

Table 2. *Type of Waste Generated in the House (N = 800)*

No	Type of Waste @	Waste Generated (%)			
		Daily	Monthly	Occasional	Total
1	Kitchen	90.7	2.0	7.3	100
2	Plastic	46.0	26.0	28.0	100
3	Garden	13.8	34.9	51.3	100
4	Metal	5.0	21.8	73.2	100
5	Tins	4.5	21.9	73.6	100
6	Cans	7.9	19.6	72.5	100
7	Glass	11.0	30.5	58.5	100
8	Ceramics	6.1	15.8	78.1	100
9	Paper	40.9	30.8	28.3	100
10	Books	19.5	29.4	51.1	100
11	Newspaper	31.3	35.6	33.1	100
12	Textiles	7.5	23.8	68.7	100
13	Electronic Items	5.4	12.5	82.1	100
14	Others	6.3	5.9	87.8	100

Source: Field Study, @ Multiple Responses.

Table 3. *Source of Knowledge on Segregation of Waste (N = 800).*

Type of Media @	Usefulness of Source (%)					Preferential Ranking
	Full Extent	Partial Extent	Not at all	Total	Average	
Electronic media	50.4	40.4	9.2	100	70.6	1
Print media	23.6	52.1	24.3	100	49.7	8
Meeting/Lectures/Talks	23.4	52.9	23.7	100	49.9	7
Family/Relatives/Members	35.3	52.5	12.2	100	61.6	5
Friends/Neighbours	40.9	46.6	12.5	100	64.2	4
Self Motivation	46.0	48.8	5.2	100	70.4	2
Health Personnel	47.9	38.5	13.6	100	67.2	3
Others	16.6	70.1	13.3	100	51.7	6

Source: Field Study, @ Multiple Responses.

It was found from table 3 that, 70.6 percent of the households got information from electronic media in the form of internet, radio and audio tapes played by BBMP waste carrier vehicles. 50.4 percent of the households felt that the information given is complete enough for them to

understand about waste segregation and its uses. The results corroborates with the findings of Afroz, Hanaki and Tuddin, (2010) that the majority obtained their knowledge about recycling from newspaper and television

Table 4. *Knowledge about Waste and its Disposal (N = 800).*

Aspects @	Response	Respondents (%)	
		Yes	No
Knowledge about Waste disposal	Waste generation can be reduced	17.4	82.3
	Willing to know about household waste management	27.1	72.9
	Want to learn composting waste at home	22.3	77.7
	Waste can cause Environmental Problems	10.3	89.7
	Waste can cause health problems	13.1	86.9
Awareness on how BBMP disposes waste	Landfills	51.4	48.6
	Incineration	77.0	23.0
	Composting	68.3	31.7
	Others	86.0	14.0

Source: Field Study, @ Multiple Responses.

Majority (89.7%) of the households did not know that waste can cause environmental problems (table 4). Negative response was obtained from 86.9 percent of the households with regards to health problems caused due to improper

waste disposal techniques. This finding contradicts with Yoada, Chirawurah and Adongo (2014) study that 83% of the respondents were aware that improper waste management contributes to disease causation like malaria and diarrhoea.

Table 5a. *Association between Demographic characteristics and Knowledge level on Waste Management (N= 800).*

Characteristics	Category	Sample (n)	Knowledge level				χ^2 Value
			Moderate		Adequate		
			N	%	N	%	
Age group (years)	16-25	167	63	37.7	104	62.3	4.76 NS
	26-35	287	128	44.6	159	55.4	
	36-45	209	74	35.4	135	64.6	
	46+	137	56	40.9	81	59.1	
Educational level	Up to 5th Std	80	45	56.3	35	43.7	45.55*
	6-10th Std	182	98	53.9	84	46.1	
	PUC/Diploma	201	73	36.3	128	63.7	
	Graduate	249	65	26.1	184	73.9	
	PG/Professional	88	40	45.5	48	54.5	
Occupational status	Government	30	10	33.3	20	66.7	2.40 NS
	Private	200	75	37.5	125	62.5	
	Self employed	75	29	38.7	46	61.3	
	Professional	31	15	48.4	16	51.6	
	Home maker	464	192	41.4	272	58.6	
Number of Children	None	183	64	35.0	119	65.0	10.64*
	One	197	76	38.6	121	61.4	
	Two	297	116	39.1	181	60.9	
	Three	123	65	52.9	58	47.1	
Combined		800	321	40.1	479	69.9	

Source: Field Study, * Significant at 5% Level, NS : Non-Significant.

It can be inferred from table 5a that whatever the age and occupation of the homemakers knowledge does not have any effect on the waste management at household level. This findings to certain extends negates the findings of Nguyen (2010) were Negative correlation was found between household size and positive correlation between Age, education, family income and number of children in the household.

It was found that education and number of children has statistically significant influence on knowledge associated with waste management. This finding corresponds with the finding of Samuel (2006), found that level of education had statistical significant influence on the knowledge of environmental sanitation. Jatau (2013) implied that level of education has statistically significant influence on the knowledge of improper waste management on health. Otitoju (2014), disclose education is a powerful tool that should be used towards building a more sustainable society. The way humans respond and co-operate on waste management issues is influenced by their education. Individuals need to be given the necessary knowledge in the scheme in order to ensure maximum participation.

Table 5b. *Association between Demographic characteristics and Knowledge level on Waste Management (N= 800).*

Characteristics	Category	Sample (n)	Knowledge level				χ^2 Value
			Moderate		Adequate		
			N	%	N	%	
Household size (members)	2-3	206	87	42.2	119	57.8	3.53 NS
	4-5	520	198	38.1	322	61.9	
	6+	74	36	48.7	38	51.3	
Family Income/ month	Rs.2,001-5,000	201	108	53.7	93	46.3	25.49*
	Rs.5,001-15,000	236	96	40.7	140	59.3	
	Rs.15,001-25,000	169	51	30.2	118	69.8	
	Above Rs.25,000	194	66	34.0	128	66.0	
Type of Family	Nuclear	592	221	37.3	371	62.7	11.24*
	Joint	156	81	51.9	75	48.1	
	Extended	52	19	36.5	33	63.5	
Type of House	Apartment	76	33	43.4	43	56.6	4.58 NS
	Storied	123	46	37.4	77	62.6	
	Row	131	58	44.3	73	55.7	
	Compound house	180	79	43.9	101	56.1	
	Independent	290	105	36.2	185	63.8	
Type of Ownership	Own	418	170	40.7	248	59.3	14.03*
	Rented	253	93	36.8	160	63.2	
	Leased	107	41	38.3	66	61.7	
	Quarters	22	17	77.3	5	22.7	
Combined		800	321	40.1	479	69.9	

Source: Field Study, * Significant at 5% Level, NS : Non-Significant.

It can be established that as the family income increases better the knowledge the homemakers will possess on waste management (table 5b). Ezebilo and Animasaun (2011) imply that respondents who have more money were more likely to pay more for private solid waste management services.

People who have more money often have more capacity to consume food that are packaged in quick to disposal containers are more likely to be affected when solid waste services are ineffective.

Table 6. Knowledge level of Homemakers on Waste Management (N = 80).

Knowledge Level	Category	Classification of Respondents				χ^2 Value
		Pre test		Post test		
		Number	Percent	Number	Percent	
Inadequate	≤ 50 % Score	29	36.3	0	0.0	
Moderate	51-75 % Score	41	51.2	21	26.3	70.25**
Adequate	> 75 % Score	10	12.5	59	73.7	
Total		80	100.0	80	100.0	

Source: Intervention programme, ** Significant at 1% level, χ^2 (0.01, 2df) = 15.086.

Knowledge level of the homemakers before and after participation in the intervention programme was assessed (table 6). It can be observed that, in pre interventions, 36.3 percent of the homemakers were having score of less than 50% indicating that the homemakers possessed inadequate knowledge. Post intervention revealed that the knowledge level increased to moderate level (26.3%) and adequate knowledge (73.7%). Chi-square analysis revealed that in the post intervention; the homemakers had enhanced information on household waste management.

5. Conclusion

Various kinds of waste are generated by the households on a daily basis. It was found that kitchen waste comprising of biodegradable waste was generated every day in majority of the houses. Electronic media was the main source for disseminating knowledge on waste segregation followed by self motivation with a concern for environment. The overall message received through the different sources for waste segregation was reduction and recycling of waste. Age, education and occupation of the homemakers, household size, type of family and type of ownership had positive significant influence on the knowledge level of homemakers on waste management. Post intervention programme, the knowledge on household waste management increased from moderate to adequate level.

Acknowledgements

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