

# **Role of Public Participation for Management of Solid Waste, with Respect to Quantity of Waste Generation, Collection and Transportation in Kalaburagi City, Karnataka, India**

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**ABSTRACT:** Public participation for waste collection process is directly proportional to municipal solid waste management in effective manner. Based on the public attitude and willingness towards waste management was carried out in Kalaburagi city. Data were collected 100 household of Kalaburagi city on randomly with focusing socio-economic factors are to be carried out with personal interview through general views of questionnaires. Obtained results, about 87% of household wastes are not segregated at source and 94% of households are generates waste daily and about 91% of household are preferred to daily waste collection at door to door. No households will gives amount for waste collection to the waste collector at door to door services. Implementation of strict rules and regulation for proper management of solid waste with public involvement and violation ever seen, penalty will be collects from violent person, either stakeholder or public. Providing compensation for positive attitude of workers and good effort on waste handling, will be promotes workers interest towards waste. Conducting public awareness programs for household peoples are more knowledge about waste and their treatment and presence of their active participation are makes clean, healthy and sustainable ecosystem.

**KEYWORDS:** Attitude, awareness, collection, community, management, process, solid waste, treatment.

## **I. INTRODUCTION**

In recent decades, generation of waste has been tremendously increasing in its quantity over a confined space and will occupies large amount of land and most of the waste will disposed in coastal belt for billion tons per day. In India, management of Municipal Solid Waste (MSW) through proper knowledge and techniques of waste collection and its processing will mitigate wastes in quantity. Management of solid waste constitutes major problem in most of the developing countries and management authorities are facing problem with solid waste (Abba, *et al.*, 2001; Ogwueleka, 2009). Developed and developing nations, in urban waste collection techniques and management practices are differing from country to country and regions to regions. Developing countries were contributes excess of population growth with booming economy and living standards may accelerated in quantity of waste generation (Minghua *et al.*, 2009). Waste generation is global concern at increasing environmental degradation and public health problems. Impact of open disposal and landfill are also varying with region to region and depending on composition of waste generation (Suberu *et al.*, 2012). Uncontrolled population and unplanned urbanization in developing countries are facing serious issues of health aspects (UNEP, 2004).

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Municipal authorities, usually managing waste handling process in urban cities, may challenge task for providing a healthy environment to peoples due to lack of skilled staff and financial resources (Singh *et al.*, 2014) and authorities are practices of effective management of solid waste to care taken of public health and safety aspects (Hiremath & Naik, 2017).

In cities, domestic waste collected is often by local government authorities, private organizations or other private companies. Waste collection and its process are consumes lot of time with manpower for segregation. Initial stage process are not done in properly which will causes adverse impact on environment like, degrading quality of air, water and which leads climate change. Solid waste management authorities are facing problem in managing waste processes and transportation due to high cost of process and lack of funding, instruments with improper handling techniques (Guerrero, Maas, & Hogland, 2013).

Community participation towards waste collection and source level segregation for individuals are vital role for managing municipal waste. Municipal authorities are failed in efficient operating of municipal waste and also bringing awareness about proper handling of waste and good practice of storing waste into separate bins with segregating wet and dry of individual households (Asnani, 2006). Improper and lack of basic facility for collection of waste at source level at regular basis are results, disposed in open land, drain, streets and near water bodies will creates unhealthy environment at surrounding vicinity. In developing countries waste management challenging task and most commonly used unscientific processes and setup their minds to conventional methods over limited access for its efficiency. Urban Local Bodies (ULB's) are having main responsibility for keep city to the public vicinity by adopting the garbage disposal standard protocol. ULB's responsibility has direct relationship with current environmental issues.

Willingness to pay for the managing waste treatment services are very important for making success from actively involving private authorities participation are more effective. The willingness of pay are have both positive and negative impact on reliability of solid waste management strategy (Epp and Mauger, 1989).

Public participation will be the major role for collection of waste at source level and its treatment processes are effective and efficient with urban waste management authorities. Public private partnership is also play a vital role for managing municipal wastes. ULB's are promotes to public for actively participation and discussions, brings awareness about their responsibilities at individuals, values of cultural activities and their support towards waste process may results healthy and clean environment.

## II. MATERIALS AND METHODS

### STUDY AREA

Kalaburagi city is one of the fastest growing cities in Karnataka and city is well known for historical background and monuments which can build during Bahumani kings. City famous for tourist places which are Sri Sharana Basaveshwar temple, Khwaza Bande Nawaz Dargah and Buddha Vihar. Kalaburagi is earlier known as Gulbarga and having well administrative capital city with large commercial hub and regional place for 6 districts of Hyderabad-Karnataka region. Kalaburagi city is also known as Sun City and famous for 'Toor Daal' cultivation in larger amount and supplies to various parts of country. City located at geographical range between 17°20'19.8"N and 76°50'08.3"E. Rapid urbanization and migration of peoples from village to city for individual requirements and floating population may leads to wide spreading of city.

Population of the Kalaburagi city is about 5, 43,147 according to 2011 census and city covers a surrounding area about 64 sq. km. The Population of 2001 census is 4, 30,108 and in 1991 census is 3, 03,139. The average population growth rate of Kalaburagi city over last 3 decades from 1981-2011 is 3.56% (Census 2011).

Kalaburagi city is situated in Deccan Plateau and the elevation of the city range from 300 to 750 meters above mean sea level. Weather condition of the city is mainly categorized into 3 main seasons; summer starts from February to mid-June and it is followed by south-west monsoon, which spans from June to September, heavy rainfall occurs during these days up to 750 mm. It is followed by winter season span is October to mid-January. The highest temperature in summer for this region was recorded 44°C.

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## METHODOLOGY

In this research process, the important stage of researcher is to be collection of data for both primary and secondary methods. The data will carry values of both qualitative and quantitative. In order to collect the research's objectives, collecting information of existing waste collection practices in individual households and public attitude on the waste collection current system gathered. The assessment was conducted for general perception of respondents on household waste management system. Sample of respondents of 100 households are selected at randomly and respondents are categorized into their socio-environmental condition: sex, age factor and their educational background status. Data collection are based on direct interview with a set of questionnaires and individual performance of the respondents to focus group in order to obtain information based on their opinion, attitude and participation towards household waste handling and management. At present condition of waste management and willingness to pay for such waste of management processes.

## III. RESULT AND DISCUSSION

### Present Condition of Solid Waste Management in Kalaburagi City:

Solid waste management practices in Kalaburagi city over large population are difficult to handle waste and its end processes. In city, the overall population according to 2011 census 5.43 lakhs and the area of city covers 64 sq kms. Solid waste generation per capita per person 380 grams and overall city generated wastes approximately 243 tons/ day and out of these 200 tons of waste are collected in regular basis and disposed into landfill site by Kalaburagi Municipal Corporation. Wastes are disposed into engineered pit covered with HDPE liner and avoiding to percolating the leachate and control to ground water pollution (DPR, 2014).

Existing condition of waste collection efficiency in city was about 82% and door to door collection processes are best practiced in all 55 wards. Characteristics of waste generation at individual source level were differing from one another with changing lifestyle, culture and religion factors.

### Socio-economic factors of individual respondents

Information collected of individual respondent (gender, age, education and size of household) attitude and perception towards waste management and willingness for pay to door to door collector workers.

**Table 1:** Table contains Socio-economic factors of individual respondents.

Variables	Respondents	Percentage
<b>Gender</b>		
Male	62	62%
Female	38	38%
<b>Age</b>		
20-30	16	16%
31-60	70	70%
Above 60	14	14%
<b>Religion</b>		
SC	16	16%
ST	4	4%
I-A	5	5%
II-A	21	21%
II-B	5	5%

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III-A	19	19%
III-B	25	25%
GM	5	5%
<b>Education</b>		
Illiteracy	18	18%
Primary	24	24%
Secondary	31	31%
PUC	18	18%
Degree	8	8%
Degree Above	1	1%
<b>Household Size</b>		
Single	0	0%
2 – 3 peoples	2	2%
4 – 5 peoples	28	28%
6 – 7 peoples	44	44%
7 – 8 peoples	17	17%
More than 8 peoples	9	9%

### Public participation of household waste management

Public involvement and their attitude depending towards individual household waste management will be results positive or negative sign of indication. Individual difference is differing from people to people and also their attitude. The table 2 represents attitude of individual response over household waste management with likes, dislikes or neutral responses.

**Table 2:** Represents Public participation and individual responses

Attitude	Respondents	Percentage
<b>Type of waste Generation</b>		
Dry	22	22%
Wet	5	5%
Mixed	73	73%
<b>Recycling of waste</b>		
Yes	3	3%
No	97	97%
<b>Segregation of Waste</b>		
Yes	13	13%
No	87	87%
<b>Type of Waste Storage</b>		
Polythene bag	9	9%
Separate plastic bin	13	13%
Common plastic bin	76	76%

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Cotton box	2	2%
<b>Frequency of Waste generation</b>		
Daily	94	94%
Once in 2 days	6	6%
Twice in week	0	0%
Once in a week	0	0%
<b>Quantity of waste generation</b>		
0.5 – 1 kg	70	70%
1 – 2 kg	26	26%
2 – 3 kg	2	2%
3 kg above	2	2%
<b>Methods of waste collection</b>		
Thrown to Open area	3	3%
Self depositing to community bins	1	1%
Burning	1	1%
Door to door vehicle available	83	83%
D-D vehicle available at nearby road	9	9%
<b>Willingness to Pay charge</b>		
Yes – monthly	5	5%
No	95	95%

### Public awareness on waste management

Waste management at root level was much important thing to make hygienic and healthy condition of environment around us. Creating healthy life is difficult job for stake holders – Municipalities, NGO's, civic agencies and rag pickers are has play vital role in making successful dream of clean environment. Apart from stakeholders, public involvement and their positive attitude are more helpful to managing waste and educate the neighborhood public for individual responsibilities of everyone. Conducting awareness program related to waste management and adverse effect of improper management will make difference and easy to understands the concept and the table 3, detail information carry regarding waste management of stakeholders and public attitude towards waste processes.

**Table 3:** Information of Public attitude and perception of willingness

Activity	Respondent	Percentage
<b>Overflowing of community bins</b>		
Yes	3	3%
No	13	13%
Don't know	84	84%

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<b>Frequency of waste collection by Corporation</b>		
Daily	1	1%
Once in 2 days	1	1%
Don't know	98	98%
<b>Method of waste transportation</b>		
By Tractor	0	0%
By Jeep	0	0%
By Compactor	7	7%
Don't know	93	93%
<b>Any awareness program related to Municipal solid waste</b>		
<b>If Yes</b>		
By Corporation	3	3%
By Media	4	4%
By friends and neighbors	6	6%
<b>If No</b>		
Lack of illiteracy	4	4%
Lack of communication	4	4%
Lack of awareness programs	79	79%
<b>Existing waste management by Corporation</b>		
Satisfied	93	93%
Not satisfied	7	7%
<b>Opinion of existing management</b>		
Good administration	91	91%
Poor management/admin	9	9%

Concept of waste management with stakeholders and public feedback about waste management practices are obtained the results of individual respondents. According to the analysis of public interview about social background, attitude, perception and their willingness with set of questionnaires. Maximum number of male gender are responding and about 70% of middle age peoples (range 31-60 yr) and 14% of senior citizen were responding through good communication and interesting to attend maximum set questions with reliable answers of their knowledge. Education of respondents 82% are literacy and maximum completed Pre University Course (PUC) and 18% of illiterate respondent found. Members in respondent family are to be found maximum 6 to 7 peoples of about 44% and minimum 2 to 3 peoples are found 2%, that shows the city having more number of nuclear family and results population increases with waste generation.

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Public attitude and their involvement are partially helpful to managing waste. At every individual respondents waste segregation are play an vital role but the fact is about household level 73% are generates both (wet and dry) waste and 3% of respondents are practiced of recycling waste and about 87% of household not done segregation at source. If segregation of waste are practiced at source level like; biodegradable and non-biodegradable waste in separate bins, result saves lot of time at disposal activity and easy to treat and process according to their characteristics.

Storage method of household waste at individual levels of about 76% common plastic bins are used and frequency of waste 94% of household generates regularly and quantity of waste generates per day 1 kg of about 70% houses. According to Kalaburagi city waste generation per capita per day 380 grams and 44% of households found 6 – 7 members and will results more quantity of waste generation.

Waste collection methods are achieved 100% of door to door collection in all 55 wards of Municipal Corporation and public responding towards door to door collection of about 83%. Some few peoples are practiced waste disposed at open dumping and some of peoples are complaining with collection practices of about door to door vehicle will not covers all street roads and it passes with nearby roads.

About 95% of respondents are said, no charges will took for collection of household waste and some of the respondents are paid amount on monthly with maximum of 50 rupees on their interest and motivation of workers. Public attitude towards waste management and collecting information regarding individual responses were analyzed and obtained result, 87% of peoples are not segregates waste at source, about 76% of waste will kept in both wet and dry in a single plastic bin, about 97% of peoples don't know recycling practices.

Public participation are plays vital role in waste management process and treatment after door to door collection at individual households. Household waste generates once will stored at bin and handover to municipal authorities of door to door collection vehicle. Once vehicle pass through concern premises are finishes job but it will not shows good attitude for waste processes. About 98% of peoples fail to know about frequency of waste collection by Municipal Corporation and 84% of peoples are not seen nearby community bins. Waste transportation to landfill site with compactor vehicle for secure disposal in Kalaburagi city and peoples are responding of about 93% is not having idea about waste transportation.

Respondents are satisfied about 93% of existing waste management system and 91% peoples are accepted good administration of municipal corporation and their efforts. In other part, most of the peoples are not having proper knowledge about waste treatments, handling and process. About 82% peoples are found literacy with median value of secondary education and a person are educated and behaves like an uneducated because of lack of awareness and lack of communication.

## IV. CONCLUSION

Waste management practices at every individual with proper knowledge about waste generation and its segregation at source level are more effective for transportation and reliable to dispose off. Segregation at source are plays an vital role and in present practices, waste are stored into mixed with single bin and quantity of biodegradable waste are more, will gradually increases anaerobic digestion with resulting green house gases to the environment. This study reveals that most of the households feel that lack of awareness programs conducted to the residential premises and lack of non-execution of laws on polluter's and not charged any penalty over irresponsibility of waste management. Thus suggest that, strict laws are implemented to waste treatment process and give compensation to households those who are actively involving and adopted recycling, segregation process.

Overall awareness programs and communication between public and stakeholders are easily understands and learn the concepts of waste management and solving quarries of public opinions are much reliable. Public supports are more significant nature with waste process in systematic manner and create clean, healthy and sustainability in environment.

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