# Public Satisfaction towards Solid Waste Management Services in Chhattisgarh: A Comparative study

Ms. Shweta Shriwas[1], Dr. S. Srinivas Rao[2], Dr. Rahul Sharma[3]
*Department of Management studies[1], Department of Management Studies & Research[2], Department of Management studies[,3,], LCIT Group of Institutions[1], MATS University[2], Dr. C. V. Raman University[,3]*
*Email: shweta.shrivas0914@gmail.com[1], drsrao@matsuniversity.ac.in.2*

**Abstract-**Waste generation and improper waste handling is a universal problem around the world. Unscientific waste disposal and unawareness of waste recycling is multiplying this social issue. A systematic approach is needed to practice an effective waste management system which consists of waste collection, transportation, disposal and treatment. The problem cannot be solved by the local authorities alone whose responsibility is to make the city clean. However, in this research study public satisfaction towards municipal authority's role on waste management is evaluated and major cities of Chhattisgarh i.e. Raipur and Bilaspur are selected for identifying the public satisfaction towards cleanliness of the city and finding the better city among them. A survey was conducted through structured questionnaire with the help of various parameter like waste collection frequency, waste handling containers, behavior and neatness of crew members, Public monitoring and various other were selected for measuring the effectiveness of services provided. Public have given their opinion on the basis of their daily waste handling management system and their observation and problems faced on the present system. It was found that Raipur is better city than Bilaspur in terms of waste management services. Both the city were satisfied with above parameters mentioned Raipur respondents were highly dissatisfied with the transparency in management system whereas Bilaspur respondents were highly dissatisfied with the problem faced by improper cleaning of nearest disposal sites.

**Index Terms-** *Waste Management service; Public Satisfaction; Chhattisgarh*

## 1. INTRODUCTION
Rapid urbanization and increasing living standard is the root cause of generation of waste. The gap between waste generation and handling is the root cause of improper waste handling system, (Yakubu, 2013). Solid waste is generated daily but its collection and disposal is done either alternatively, weekly or even fortnightly. Waste management is a process of collecting, transporting and disposing of waste generated by household, commercials complex, hotels and institutes (Jacob, 2012). The objective of solid waste management is to reduce the quantity of solid waste disposed off on land by recovery of materials and energy from solid waste (Vavra, 1997). The scope of MSWM encompasses planning and management systems, waste generation processes, and organizations, procedures and facilities for waste handling (Ezebilo, 2011). Public awareness and reinforcement in sanitation laws can minimize the problem to a greater extend (Babayemi, 2009).

Cleaning required integrated approach which involves society (the waste generator) and municipal authorities (the waste handlers) together to participate into a common process of waste management. One needs to study daily municipals working mechanism for waste collection and other related duties. General public also carries some responsibility towards their environment, society and future generation (Zikri, 2012). Adverse affects of improper waste management gets carry forward to the generations ahead (Kaushal, 2012).

In India like other developing counties ULBs are responsible for providing municipal services to their area, (Yakubu, 2013).Chhattisgarh was part of M.P. till 1 Nov, 2000. It is the 10th largest state of the country. It has 27 districts and the Capital city of the state is Raipur. In 2014-15 the GSDP was 2, 10,192crore and 64,442 was the per capita income. Here best practices in waste management are rarely found. Most of the municipalities in India are directly disposing community waste to open dumping. One of the waste management techniques which is windrow composting is commonly found in the state. However, after Swachha Bharat Mission has started, municipalities have started door –to-door collection of garbage. Awareness ensures people's participation in the collection, segregation and disposal of garbage which is the basic and essential part of community based waste management model. One of the active stakeholders are NGOs, their involvement of NGOs in working on various environmental programmers and encouragement is needed (Kumar, 1999). Open burning and dumping is illegal yet commonly practiced in the country due to weak policies framed in this respect.

## 2. CONTRIBUTION OF THE STUDY
Garbage, waste or trashes are neglected areas of the society. They mountains of city garbage destroy the aesthetic value of the city and they spread foul smell

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around the surroundings. Daily Street sweeping and keeping the surroundings clean is undertaken by the local authorities who are Municipal Corporation. This paper has tried to compare the work level satisfaction for the Municipal Corporations in the city of Raipur and Bilaspur. Researchers have given their study report on wormy composting and alternative usages of wastages. A comparison study has not been used yet in C.G. for waste management practices.

## 3. OBJECTIVES OF THE STUDY
- To analyze the level of public satisfaction on cleanliness by their municipality.
- To find out the better city in term of waste management services provided by them.

## 4. LITERATURE REVIEW
Cherian, Jacob, (2012), have found in their research paper that various socio economic factors cost effectiveness, willingness to pay gets affected by the models used for waste management in, "Management Models of Municipal Solid Waste: A review focusing on socio-economic factors. Community driven model brings public participation in waste handling program through primary segregation. Corporation driven models are cost incursive.

Yalmu (2012), It was found that in order to get rid of dirt one has to focuses on house to house waste collection for regular cleanliness. It should be done on Daily basis and if possible twice a day so that kitchen waste can be utilized for livestock before getting rotten. "Solid Waste Management Baseline study in Kapilvastu Municipality (Nepal),'

Yakubu (2013), A survey was conducted with 12 structured questions to access the household satisfaction against the waste management services rendered by ULBs to them. It has found that householders are largely satisfied with collection frequency and types of vehicles used, protective clothes used by workers. Moderately satisfied with Solid Waste Management Company rendering services and highly dissatisfied with the regular monitoring and prompt response to their complaint in the research paper, "Householders' satisfaction towards solid waste collection services of Zoomilion Ghana Ltd. In Wa, Ghana."

Kaushal, Varghese, Chabukdhara, (2012) have showed in their research paper about the worried situation towards rapid increase in waste generation due to urbanization in, "Municipal Solid Waste Management in India – Current state and future challenges: A review," with the help of trend analysis the major concern is on increasing per capita waste generation and the heaps of garbage dumped unscientifically

easily found in the outskirts of the city from various decades. Mountains of garbage are polluting ground water level through leachate. Due to excessive heat generated because of dumping and emission of harmful gases creates air pollution. Acres of land decrease the aesthetic of town's high ways.

Babayemi, (2009) has discussed in his research about the importance of public awareness over minimizing of unscientific waste disposals like burning & open dumping in "Evaluation of Solid Waste Generation, Categories & Disposal Options in Developing Countries : A case study of Nigeria" Mendes, Santos, Nunes, Teixeira have found improvement in the municipal services of Portugal through Balance Score Card in their research paper "Evaluating Municipal Solid Waste Management performance in regions with strong seasonal variability" When people were made awarded with the pros and cons of illegal burning of waste and its adverse affect on health, then huge reduction the open dumping and burning was found.

## 5. METHODOLOGY USED
For analyzing the problems and satisfaction of people with respect to the entire waste management system adopted by the local government of the cities, a descriptive research is carried out in Raipur and Bilaspur, the two major cities of Chhattisgarh is selected as the study area. The two study area is considered as Quota and a sample of 100 respondents was selected for this study which comprises equal number of respondents from each city selected on random basis. For collecting responses a structured questionnaire is drafted and field investigation has been done in both the quotas where data is collected by the researcher through personal interviews with the selected respondents.

## 6. RESULT AND DISCUSSION
The data collected from the field survey is fed in Excel and SPSS for further analysis.

### (a) Demographic details
The total number of respondents for the research study was taken as 100. 50 samples were collected from both the cities. Out of which 56% were male and 44% were females from Bilaspur, whereas it was 48% male and 52% females from Raipur. It shows almost equal participation from both the category. It was found that majority respondent (64% from Bilaspur and 54% from Raipur) belongs to the age group of 25-40. 12% from Bilaspur and 30% from Raipur belongs from below 25 years of age. 24% from Bilaspur and 16% from Raipur belongs to the age category of 40-60. Most of the respondent (36% from Bilaspur and 34% from Raipur) was P.G. qualified. 12% from Bilaspur and 30% from Raipur were Graduate. 28% from

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Bilaspur and 20% from Raipur were Higher Secondary passed. Only 12% from Bilaspur and 8% from Raipur have passed High school. 46% from Bilaspur and 34% from Raipur were able to get their annual family below 2,50,000. 28% from Bilaspur and 44% from Raipur could get their annual family income in between 2,50,000 to 5,00,000 whereas, 26% from Bilaspur and 22% from Raipur gets their income above 5,00,000 annually. Lastly 36% from Bilaspur and 44% from Raipur were found to be the owner of the house they are presently living, whereas 64% from Bilaspur and 56% from Raipur were living as tenants in the rental house. Overall, the respondents were found to be genuine from both the cities and it was fair enough to conduct the survey which can be found in Table 1 given in Appendix.

Table 1: Demographic details of the Respondents

| Demographic | | Bilaspur | | Raipur | |
|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % |
| Gender | | | | | |
| | Male | 28 | 56% | 24 | 48% |
| | Female | 22 | 44% | 26 | 52% |
| Age | | | | | |
| | Below 25 | 6 | 12% | 15 | 30% |
| | 25-40 | 32 | 64% | 27 | 54% |
| | 40-60 | 12 | 24% | 8 | 16% |
| Education | | | | | |
| | Upto High School | 12 | 24% | 8 | 16% |
| | Higher Secondary | 14 | 28% | 10 | 20% |
| | Graduate | 6 | 12% | 15 | 30% |
| | P.G. & Above | 18 | 36% | 17 | 34% |
| Family Income | | | | | |
| | Below 25000 | 23 | 46% | 17 | 34% |
| | 2,50,000 -5,00,0 | 14 | 28% | 22 | 44% |
| | Above 5,00,0 | 13 | 26% | 11 | 22% |
| | | | | | |
| Residential Status | | | | | |
| | Owner | 18 | 36% | 22 | 44% |
| | Rental | 32 | 64% | 28 | 56% |

### (b) Frequency Analysis

Table 2 presents the analysis of the entire questionnaire in the form of comparison among the responses collected from both the cities. It was found that that 30% respondent from Bilaspur and 32% respondent from Raipur were dissatisfied and 34% respondent from Bilaspur and 44% respondent from Raipur were satisfied with the frequency of waste collection. None of the respondent remained neutral in this category. 40% respondent from Bilaspur and 26% respondent from Raipur were dissatisfied with the vehicle and equipments used for waste collection, whereas, 46% respondent from Bilaspur and 54% respondent from Raipur from satisfied for the same

reason. Very few Bilaspur 2% and Raipur 4% remained neutral in this section. 32% Bilaspurians and 66% Raipurians were satisfied with the behavior of the crew member working for garbage collection. Bilaspur 26% and Raipur 10% was neutral for behavioral aspect. 28% respondent from Bilaspur were very much dissatisfied with the nearest disposal site created by urban local bodies for secondary waste collection point, whereas, 52% Bilaspurians and 46% Raipurians were dissatisfied for the same reason. 56% respondent from Bilaspur and 18% respondent from Raipur dissatisfied with the handling of waste done by the municipality, whereas, 14% Bilaspurians and 23% Raipurians were dissatisfied for the same reason. Only 34% respondent from Bilaspur and 38% Raipurians were satisfied with the way their complaints were given responses, whereas, 20% Bilaspurians and 42% Raipurians found that the way their complaints were not responsive properly so they were dissatisfied. 50% respondent from Bilaspur and 48% respondent from Raipur satisfied with the cleanliness of their locality done by the municipality, whereas, 20% Bilaspurians and 30% Raipurians were dissatisfied with it.64% respondent from Bilaspur and 50% respondent from Raipur satisfied with the neatness of the crew coming for collecting door-to-door garbage, whereas, 20% Bilaspurians and 32% Raipurians were dissatisfied with it. Dissatisfied respondent were 64% & 38% from Bilaspur and Raipur respectively for user charges collected for waste collection. Only 8% respondent from Bilaspur were satisfied but 42% respondent from Raipur were satisfied with the amount collected from them. Most of the respondent i.e., 78% from Bilaspur and 46% from Raipur remained neutral for the workshop conducted on the cleanliness. Respondent were found unhappy with the monitoring and inspection made for sanitation. Therefore, 28% respondent from Bilaspur and 38% respondent from Raipur dissatisfied and with the public monitoring.40 % Bilaspurians and 28% Raipurians remained neutral for this reason. 66% and 52% respondent from Bilaspur and Raipur respectively remained neutral about the transparency of services in municipality. 16% Bilaspurians and 42% Raipurians were dissatisfied with it. Bilaspur 26% and Raipur 28% were satisfied with the services provided by the municipal corporation. Bilaspur 46% and Raipur 34% were neutral for this question. 20 % Bilaspurians and 28% Raipurians were dissatisfied with the services provided to the residents. 50% respondent from Bilaspur and 34% respondent from Raipur remained neutral for the treatment of employees. 24 28 24% Bilaspurians and 28% Raipurians were satisfied with the way municipal employee's treat them.

Table – 2: Frequency analysis of Bilaspur and Raipur

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| S.N | Particulars | Bilaspur | | | | | Raipur | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | V.D (%) | D (%) | N (%) | S (%) | V.S (%) | V.D (%) | D (%) | N (%) | S (%) | V.S (%) |
| 1 | Frequency of waste collection | 9 (18) | 15 (30) | 0 (0) | 17 (34) | 9 (18) | 2 (04) | 16 (32) | 0 (0) | 22 (44) | 10 (20) |
| 2 | Vehicle & equipment used | 1 (02) | 20 (40) | 1 (02) | 23 (46) | 5 (10) | 1 (02) | 18 (36) | 2 (04) | 27 (54) | 5 (10) |
| 3 | Behaviour of crew | 2 (04) | 6 (12) | 13 (26) | 16 (32) | 4 (08) | 1 (02) | 8 (16) | 5 (10) | 33 (66) | 3 (06) |
| 4 | Nearest disposal site | 14 (28) | 26 (52) | 0 (0) | 6 (12) | 4 (08) | 4 (08) | 23 (46) | 9 (18) | 13 (26) | 1 (02) |
| 5 | Handling of waste | 0 (0) | 28 (56) | 7 (14) | 14 (28) | 1 (02) | 2 (04) | 18 (36) | 6 (12) | 23 (46) | 1 (02) |
| 6 | Response to complaint | 4 (08) | 10 (20) | 13 (26) | 17 (34) | 6 (12) | 1 (02) | 21 (42) | 10 (20) | 19 (38) | 0 (0) |
| 7 | Cleanliness of Area | 1 (02) | 10 (20) | 1 (02) | 25 (50) | 13 (26) | 1 (02) | 15 (30) | 2 (04) | 24 (48) | 6 (12) |
| 8 | Neatness of Crew | 1 (02) | 10 (20) | 2 (04) | 32 (64) | 0 (0) | 1 (02) | 16 (32) | 6 (12) | 25 (50) | 2 (04) |
| 9 | Charges of collection | 7 (14) | 32 (64) | 2 (04) | 4 (08) | 5 (10) | 2 (04) | 19 (38) | 5 (10) | 21 (42) | 14 (28) |
| 10 | Workshop on cleanliness | 0 (0) | 3 (06) | 39 (78) | 8 (16) | 0 (0) | 1 (02) | 9 (18) | 23 (46) | 6 (12) | 1 (02) |
| 11 | Public monitoring | 3 (06) | 14 (28) | 20 (40) | 12 (24) | 1 (02) | 2 (04) | 19 (38) | 14 (28) | 15 (30) | 0 (0) |
| 12 | Transparency of services | 1 (02) | 8 (16) | 33 (66) | 8 (16) | 0 (0) | 1 (02) | 21 (42) | 26 (52) | 0 (0) | 2 (04) |
| 13 | Services provided | 4 (08) | 10 (20) | 23 (46) | 13 (26) | 0 (0) | 4 (08) | 14 (28) | 17 (34) | 14 (28) | 1 (02) |
| 14 | Treatment of employees | 1 (02) | 9 (18) | 25 (50) | 12 (24) | 3 (06) | 1 (02) | 18 (36) | 17 (34) | 14 (28) | 0 (0) |

Paired sample t-test has been conducted on the 14 items of the questionnaire to know and compare the mean differences among the different items in Bilaspur and Raipur city. From the above given table it was clearly revealed that on majority of parameters, there exist no significant mean differences among the opinion of the people regarding management and collection of waste materials Bilaspur and Raipur city. A significant mean difference is observed in few cases i.e. Nearest disposal sites (t value = -2.419, p = 0.019) which shows that people of Raipur were more satisfied in compare to people of Bilaspur with respect to nearness of the dumping sites, Charges of collection of waste (t value = -3.337, p = 0.002) which shows that people of Bilaspur were more dissatisfied regarding charges of waste collection as compared to Raipur and Transparency in Services (t value = 3.012, p = 0.004) which shows that people of Bilaspur city were more satisfied with respect to the transparency in the services provided as compared to the people of Raipur. All the rest of dimensions do not shows any significant mean differences among the people of Bilaspur and Raipur with respect to the entire system of collection and management of waste.

Table 3: Paired sample test

**Paired Samples Test**

| | | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | Frequency of Waste Collection - Frequency of Waste Collection | -.4000 | 1.6162 | .2286 | -.8593 | .0593 | -1.750 | 49 | .086 |
| Pair 2 | Vehicled and equipments used - Vehicled and equipments used | .0000 | 1.5649 | .2213 | -.4447 | .4447 | .000 | 49 | 1.000 |
| Pair 3 | Behaviour of crew - Behaviour of crew | -.1200 | 1.2395 | .1753 | -.4723 | .2323 | -.685 | 49 | .497 |
| Pair 4 | Nearest Disposal Site - Nearest Disposal Site | -.4800 | 1.4032 | .1984 | -.8788 | -.0812 | -2.419 | 49 | .019 |
| Pair 5 | Handling of waste - Handling of waste | -.3000 | 1.4743 | .2085 | -.7190 | .1190 | -1.439 | 49 | .157 |
| Pair 6 | Response to complaints - Response to complaints | .2800 | 1.5654 | .2214 | -.1649 | .7249 | 1.265 | 49 | .212 |
| Pair 7 | Cleanliness of area - Cleanliness of area | .3200 | 1.6956 | .2398 | -.1619 | .8019 | 1.334 | 49 | .188 |
| Pair 8 | Neatness of crew - Neatness of crew | .0600 | 1.5960 | .2257 | -.3936 | .5136 | .266 | 49 | .791 |
| Pair 9 | Charges of collection - Charges of collection | -.7200 | 1.5258 | .2158 | -1.1536 | -.2864 | -3.337 | 49 | .002 |
| Pair 10 | Workshop on cleanliness - Workshop on cleanliness | .1600 | .8172 | .1156 | -.0722 | .3922 | 1.385 | 49 | .172 |
| Pair 11 | Public monitoring - Public monitoring | .0400 | 1.1945 | .1689 | -.2995 | .3795 | .237 | 49 | .814 |
| Pair 12 | Transparency in services - Transparency in services | .3400 | .7982 | .1129 | .1132 | .5668 | 3.012 | 49 | .004 |
| Pair 13 | Services provided - Services provided | -.0200 | 1.1337 | .1603 | -.3422 | .3022 | -.125 | 49 | .901 |
| Pair 14 | Treatment of employees - Treatment of employees | .2600 | 1.1747 | .1661 | -.0739 | .5939 | 1.565 | 49 | .124 |

**(c) Paired Sample Test**

# 7. CONCLUSION AND SUGGESTIONS

The study shows that Bilaspur was dissatisfied with the nearest disposal sites, which means the community disposal sites are not regularly transported to the dumping yard. Dirty and unhygienic surrounding creates dissatisfaction among the residents. If the nearest disposal sites are open dumping then it should be collected regularly which can decrease the foul smell of waste and if the community bins are kept then it should be emptied periodically. User charges collected for providing C&T facility for household waste also shows dissatisfaction among Bilaspur. It should be revised according to the volume of waste generated & size of the house. User charges should be collected only if the door -to –door collection of garbage is provided. Municipal Corporations are entertaining most of the complaints due to which public realize that there is enough transparency in the management of ULBs of Bilaspur. Although Raipur is providing better serves than Bilaspur yet it seems to be dissatisfied with the transparency in its management system.

The main objective of the paper was to access the better city in terms of waste management. The study concluded that Raipur is more satisfied with waste management services than Bilaspur. Another objective was to study the public satisfaction towards the waste management services provided. It was found that both Raipur and Bilaspur was Satisfied with Frequency of waste collection, Vehicles and equipment used to collect garbage and street sweeping, Behavior and Neatness of their Crew members while they are on duty means they are well spoken and properly dressed

with gloves, boots and other necessary kit. Regular public monitoring was found poor in both the cities. But due to transparency in management, Bilaspur is able to put their complaints entertained effectively. Highly dissatisfaction is observed in the nearest disposal sites of Bilaspur. It has to be cleaned and monitored regularly.

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