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Banavath Ranga Naik
Assistant Professor, Kuppam Engineering College, Kuppam–517425, Andhra Pradesh, India.

Anapati Mythri
M.Tech, Kottam Karunakara Reddy Institution, Kurnool-518002, Andhra Pradesh, India.

Correspondence
Banavath Ranga Naik
Assistant Professor, Kuppam Engineering College, Kuppam–517425, Andhra Pradesh, India.

Municipal solid waste management – A case study on Kurnool town

Banavath Ranga Naik and Anapati Mythri

Abstract
Environmental degradation due to indiscriminate disposal and dumping of solid waste from the community is receiving more and more attention in recent years. Lack of funds with municipality and indifference of public, aggravate the problem of solid waste disposal in Indian towns. The present study is based on the data collected from the formal systems (Municipal Corporation) of Kurnool city. The quantity of Solid waste generated is calculated based on the vehicle trip, population. The average quantity of Solid waste produced in Kurnool per day is 256.505 metric tons per day. Opinion poll is conducted with 300 residents in Kurnool town of different areas. The findings of opinion poll reveal that there is a need to organize awareness programs for the public as well municipal workers about the best practices in Solid Waste Management.

Keywords: Municipal solid waste, Environmental degradation, degradation of environment, Kurnool town

1. Introduction
Municipal solid waste (MSW) is defined to include refuse from households, waste from commercial establishments, and refuse from institutions, market waste, yard waste and street sweeping (world bank 1994). Waste is an unavoidable by-product of human activities, economic development, urbanization and improving living standards in cites. The increase in quantity and complexity of waste generated in municipalities and notified areas have become serious concern for government departments, pollution control agencies, regulatory bodies and also the public in India. Inefficient management, utilization and disposal of this solid waste are an obvious cause for the degradation of environment in India.
Improper disposal of this waste generated leads to spread of communicable diseases, causes obnoxious conditions, pollutes all vital components of living environment (air, water & soil) and spoils the biosphere as a whole. Cleanliness is a major factor that influences development of any Nation, which otherwise hampers due to improper disposal of solid waste. Urban society rejects and generates solid materials regularly due to rapid increase in production and consumption. Solid waste management is a subject of vital importance for the protection of environment, maintenance of good health and quality of the life of the people who aspire to enjoy. This is the most essential service, which every citizen experts from a local government. Solid waste management service is practically non-existent in rural areas and very deficient in urban areas
The effect of improper solid waste management is still afresh in our minds, the bubonic plague that occurred in Surath (Gujarat) in 1994, which claimed many casualties and crores of rupees of revenue loss. Since then, India has been trying for a renewed focus on improving the Solid waste management. The increasing level of urbanization in the developing countries gives rise to concentration of people and growth of slums, commercial centers and industries, which generate a large amount of solid waste.
"Pollution "is the term that is most often heard in a highly populated country like India and now it has become the utmost duty of every citizen of our country to protect the environment. But the protective measures are not properly implemented due to various reasons. This not only interface the ecosystem prevailing but also causes serious ill effects like health hazards in human being and animals.

Kurnool like many other cities is one of the growing cities in Andhra Pradesh with dense traffic and narrow lanes and bye lanes. Like any other developing cities, considerable amount of solid waste is being generated every day. It appears that the city is not having proper Solid Waste Management, which is evident from News items. For a proper Solid Waste Management public cooperation is also essential. But the present scenario of Kurnool city indicates the lack of public cooperation. So, it prompts for a systematic study to evaluate the current methodology adopted for Solid Waste Management as well the level of understanding by the public about their role towards the good Solid Waste Management implementation. Hence the present study is taken up to study the present solid waste Management practices of Kurnool City. The Objectives of the present study are to collect the data regarding solid waste quantity, storage, collection and disposal methods are prevailing in Kurnool city, to study the present management methodology, to know the level of understanding about Solid Waste Management in the public and to suggest any improvements if required for present Solid Waste Management practice of the city.

2. Study Area

Kurnool is the headquarters of the district of the same name, and is situated between a latitude of 15°50' North and latitude of 78°50' east south of Tungabhadra at the confluence of the Tungabhadra and hundri rivers at an altitude of about 300m above the mean sea level. NH-7 linkage is 210km away from Hyderabad City.

3. Methodology

3.1 Quantity of Solid Waste

Quantity of solid waste is essential for designing and monitoring the performance of various sub- systems of solid waste management. The quantity of municipal solid waste is usually expressed on per capita basis and this includes the waste produced from residential and commercial areas. The per capita waste quantity depends on the various factors such as the standard of living, food habits and the extent of commercial activities. The solid waste quantity in general increases with the standard of living.

The per capita refuse from different areas in Kurnool is calculated based on the quantity of waste transported per trip and the number of trips made per day by which volume of waste generated per day is found.

3.2 Data Collected From Kurnool Municipal Corporation

The data pertaining to Kurnool Municipal Corporation is collected from Kurnool municipal corporation authorities are solid waste management hierarchy, division wise areas and population data**,** division wise dust bins data**,** Sanitation profile of Kurnool and existing status of sanitation, vehicular data**,** vehicle management procedure and collection frequency.

3.3 Field Survey

An extensive field survey is conducted during the month of December 2012 and January 2013 in all the 12 divisions to collect the following data.

1. The various sources of solid waste
2. The segregation and storage practice adopted at the source of generation, mainly houses.
3. The community storage facilities provided (i.e. Dustbins)
4. The mode of transport from house to community dust bins
5. Number of dust bins provided, the frequency of collection and the fate of dust bins.
6. To mode of transport from storage bins to disposal site and the frequency of collection.
7. Precautions or safety method practiced by the sanitary workers.
8. Number of vehicles engaged for transport and monitoring process adopted for the vehicle routing and transport.
9. Disposal method.
10. The disposal mode and hygienic conditions prevailing at the disposal site.

3.4 Opinion Poll

The opinion poll was conducted:

1. To get an idea about how the solid waste management is going on in Kurnool town and to know how far the public are aware of the management.
2. To know how far the public are aware about the hazards due to improper disposal of solid waste.

The following are the questions that were posed to the public to extract the required information.

3.5 Questionnaire

1. Name, Age, Gender, Qualification, 2.No. of members in the family, 3. Residential address, 4.Are you using dust bins (Y/N): (A) If no, where do you dispose your waste? (B) If yes, after how many days do you dispose your waste?, 5.Does the municipality clear the dust bins regularly (Y/N): (A) If no, did you complained about their irregularity? (B) If yes, do you have any idea of frequency of collection of waste?, 6. Are you ready to dispose your waste through private services?, 7. Do you have any idea about the hazards due to improper disposal of solid waste?, 8. Are you taking any precautions to avoid the ill effects due to improper management of solid waste?, 9. Do you require any awareness programmers on proper solid waste management methodologies?, 10. Are you interested in Segregation? (Y/N) and 11. Are you satisfied with the present Solid Waste Management?

4. Results and Discussion

4.1 Quantification:

The quantity of refuse depends mainly on population of the town, their habits, level of economic development, geographic location, weather and social conditions. It has been found that as the personal income rises, kitchen wastes decline but the paper, metals and glass wastes increased. For the transportation of Solid waste three types of vehicles are used in Kurnool town. They are:

1. Full sized tractor with a volume of 6.5cu.m.
2. Half sized/ normal tractor with a volume 2.7cu.m.
3. Dumper placer with a volume of 2.90cu.m (each dumper placer can carry 2 dumper bins and each dumper bin is with a volume of 1.45cu.m).

The quantity of Solid waste produced in Kurnool town is calculated based on the number of trips made by each vehicle in a week. The data about the type of vehicle, number of trips made in a week are tabulated in table 1 along with the volume data.

Table 1: Division wise details of no. of trips with respect to collection of solid waste in a week

Division	Type of vehicle		Day wise trips for each vehicle							Total no of trips in a week	Total Volume of vehicles/ trip	Volume of solid waste in cum/week	Average Volume of solid waste in cum/day
	Full sized	Half size	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Sunday				
1	2	1	1	3	2	2	2	1	2	13	15.7	204.1	29.157
2(a)	2	1	2	3	3	3	3	2	3	19	15.7	298.3	42.61
2(b)	1	2	2	3	3	3	3	2	3	19	11.9	226.1	32.3
3	3	0	2	3	3	3	3	2	3	19	12.5	237.5	33.93
4	2	1	2	3	3	3	3	2	3	19	15.7	298.3	42.61
5	1	2	2	2	2	2	2	2	2	14	11.9	166.6	23.8
6	2	1	2	3	3	3	3	2	3	19	15.7	298.3	42.61
7	2	2	2	1	2	2	2	2	2	13	18.4	239.2	34.17
8	2	2	1	2	2	2	2	2	2	13	18.4	239.2	34.71
9	3	1	1	3	3	3	3	2	3	18	22.2	399.6	57.08
10	2	2	1	2	2	2	2	1	2	12	18.4	220.8	31.54
11	1	2	2	2	2	2	2	1	2	13	11.9	154.7	22.1
12	2	1	2	3	3	3	3	2	3	19	15.7	298.3	42.61
												3044.7 cu.m	434.95 cu.m

Note: From feb-8/2013 to feb-14/2013(week)

4.2 Results from Field Survey and Opinion Poll

An extensive field survey is conducted right from storage to disposal of solid waste. Opinion poll was conducted to 300 residents in Kurnool town out of which 33% were un educated, 67% are educated. Male population is 77% and female population is 23%. The survey shows that 67% of Kurnool population is aware of the frequency of collection of waste. The people have better idea about the frequency of the collection and there also aware of hazards caused by the improper SWM. The results of the opinion poll are shown in pie charts shown below.

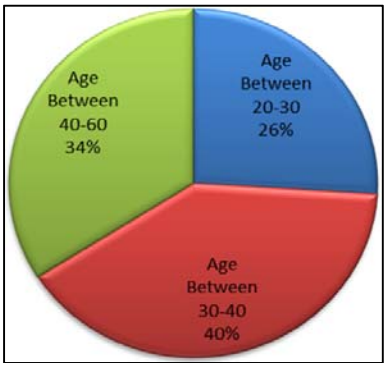

Fig 1: Age Wise Distribution

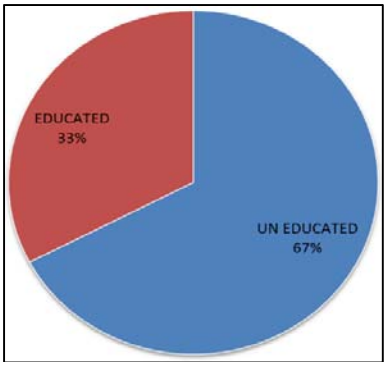

Fig 2: Education Percentage

All the age group people are responsible for good solid waste management practice. Hence all the age group people are considered. This is clear from the pie chart shown in FIG.1, which indicates the age wise distribution is equal in age groups of 20-30 years, 30-40 years and 40-60 years.

Educated people are more responsible to create awareness among the common people about the importance of segregate on of solid waste and it is safe disposal. With this view 67% of the sample consists of educated group. The composition of the group with respect to education of the group with respect to education is presented in FIG.2.

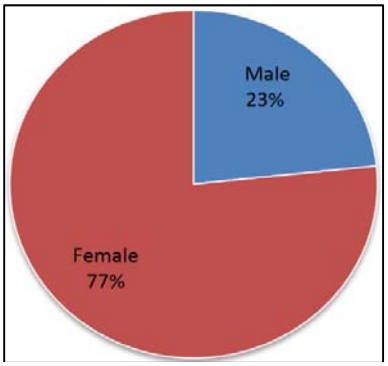

Fig 3: Gender Percentage

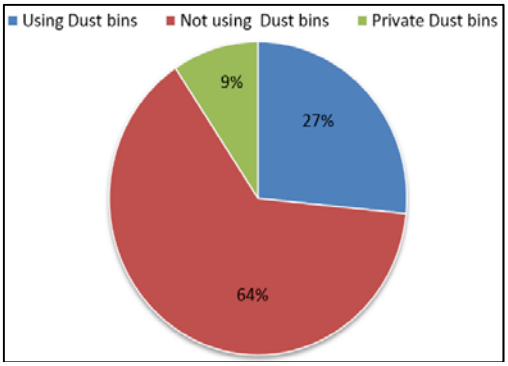

Fig 4: Percentage of People

4.2.1 Using Dust Bins

For proper segregation, recycle, reuse and dispose of Solid waste, women play a key role. It complimented that Indian women are good managers in Solid waste management. Therefore, the sample group is dominated by female (i.e.77%). The gender distribution is presented in FIG.3.

The usage of public dust bins by the people is depicted in FIG.4 chapter 5from the chart it is clear that majority of people are utilizing the services of Municipal dust bins (i.e.64%), whereas 27% of the people are using the open sites

as dust bins. A small group of 9% is using their own bins like Restaurants, Private hotels and Institutions. From this data it can be concluded that, there is a need for the awareness programs about the best practices in SWM, so that all the people be sensitized to make use of the dust bins in a right way or to segregate the waste at source and to dispose properly.

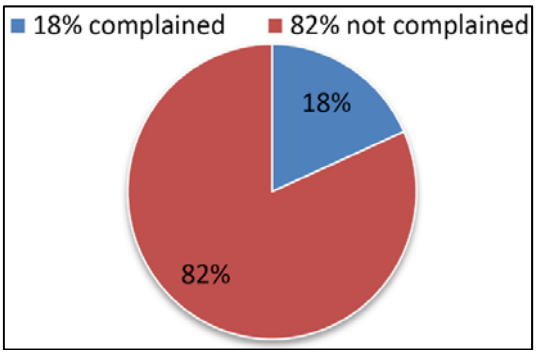

Fig 5: Willingness towards Complaints

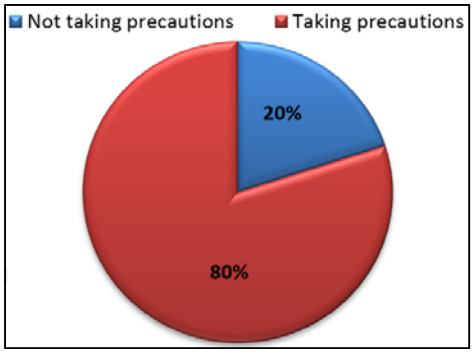

Fig 6: Percentage of People Taking Precautions

It is observed from the FIG.5, that the majority of people are not willing to complaint about shortfall in the services. This is clear evidence about the mindset of people, that all the time public blame the government by neglecting their role. From the FIG 6, it is clear that percentage of people taking precautions is 80% this is due to fact that the people are well aware of organic and inorganic waste and their effects and are ready to take precautions. And the remaining 20% of people do not take precautions due to lack of awareness on the type of waste that is generated.

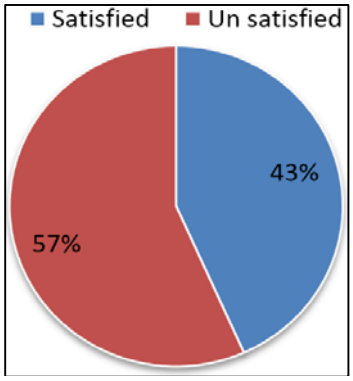

Fig 7: Percentage of People Satisfied With Municipal

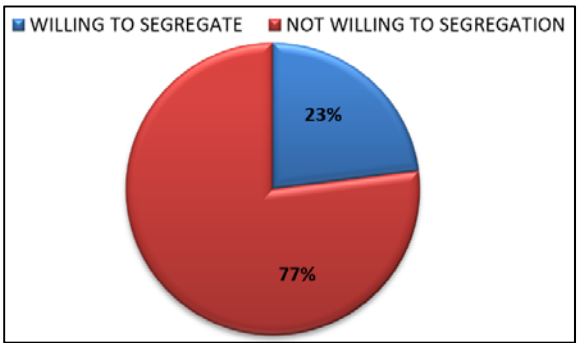

Fig 8: Percentage of People Willing To Segregate

4.2.2 Services

From the FIG 7, it is clear that 23% of people are willing to segregate the solid waste at source and the remaining 77% of the people are not willing for segregation. This is due to fact that the people are unaware of advantage over segregation of solid waste. About the services provided by the Municipality the feedback is shown in FIG.8 It is clear that majority of people are not satisfied with Municipal SWM services. Hence there is a need to improve the services quality of SWM.

Fig 9: A View of Door-To-Door Disposal

4.3 Disposal

The disposal site of wastage is located at Gargeyapuram, which is 16 kms away from Kurnool town. The method adopted for disposal of solid waste at disposal site is an open dumping disposal method. For the disposal of wastage, 56 acres of land is used. The main reason for choosing this disposal site is because of uneven barren land and the disposal site is not harmful for surrounding agricultural and irrigated areas.

There is no proper disposal techniques adopted for the disposal of waste. Simply the waste is thrown at the location at the site by the vehicles. They are using only one bulldozer for compacting the solid waste in order to reduce the volume of waste. At the disposal site there is no implementation of segregation wastages and if proper segregation is done it can be very advantageous. There is one compost yard to an extent of 56.00 acres situated at Gargeyapuram on the way of Nandikotkur road 295 to 300 MTS of garbage is being lifted and transported from various sanitary divisions of the town to disposal yard at Gargeyapuram. Presently there is a proposal for purchasing acquiring separate lands at various places nearer to sanitary division of Kurnool and Kallur areas to provide compost yard at Gargeyapuram and also initialization of SWM plant for treatment of wastage in scientific method. So that the wastage gets disposed efficiently and gets financial benefits to the corporation.

5. Conclusion and Summary

Based on the present studies on solid wastes in Kurnool town, the following conclusions can be drawn.

- The quantity of solid waste generated per day is 256.505MTS/day or 0.55kg per capita/day.
- It can be concluded that in Kurnool town the quantities of refuse produced per capita is comparatively low to the other major cities. This may be due to the inefficient system of collection of refuse which results in low percentage of refuse coming to collection bins and disposal site.
- The survey clearly indicates that the provision of dustbins is inadequate and distribution of dustbins is neither scientific nor systematic.
- At present the transportation routes are haphazard and the transportation personal are more concerned about making trips than following a regular pattern. They should aim at clearing all dustbins or heaps of waste at least once in a week.
- Covering of wastes at all stages of storage and correction and suitable protective coverings to workers is suggested to reduce the health risks. Further, to improve the efficiency of the system introducing of hydraulic lift trailer is recommended.
- The number of vehicles engaged is also not sufficient and the tractors being old, fail frequently. So additional number of vehicles must be provided such that the wastes produced can be cleared at least once in a week without any burden.
- Public awareness to the problems associated with solid waste disposal should be created and statutory measures should be introduced for safe disposal of solid waste on the same guidelines that are been adopted for safe disposal of waste water and air pollution control.

6. References

1. Paul D. Vermi composting-2011
2. Kumar S, Bhattacharya JK, Vaidya AN, Chakrabarti T, Devotta S, Akolkar AB. Assessment of the status of municipal solid, 2009.
3. Bhide AD, Sundarshan BB. Solid Waste Management in developing countries, 1998.
4. CPCB. Status of Municipal Solid Waste Generation, Collection, Treatment and Disposal in Class 1 Cities.
5. J Theunissen, PA Ndakidemi, Laubscher CP. Potential of vermin compost produced from plant waste on the growth and nutrient status in vegetable production-2003
6. www.hikurnool.com
7. www.ourkmc.com
8. www.healthlibrary.co
9. www.envfor.nic.