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Solid waste Management in Flats of a Residential Campus in Panchli Khurd, Meerut

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Abstract
Solid waste refers to any discardable and left over material. Generation of solid waste is a natural phenomenon. Even ancient human population depending upon food available with nature must have generated some quantity of different types of wastes like wood charcoal, ashes or bones of animals hunted for food. Excretion of solid waste after digestion is a common process in all living being. Increased population has increased the amount of wastes. There are other factors like advancement in technology, electronic goods and use and throw practice which has also increased the amount of wastes to greater extent .Management of such a large amount of waste would pose serious problem. In the present study waste generated by different family size was randomly collected from different residential flats of an area Panchli, Meerut on all days of the week. A total data of ten days showed that amount of waste generated depends upon number of factors like size of family monthly income, age of family members. Family having more income spends more as compare to the family having lesser income. They consume more and therefore more waste was found to be generated by such family. About 90% of the house hold wastes are non hazardous and 75% of total wastes are renewable But still disposal site availability is a major concern. Characterization and knowledge of composition of these wastes is important so that disposal should be environment friendly. Reuse and recycling will promote the employment and economy too. Segregation of wastes is an important task for person involved. During the observation it was found that people are not paying proper attention to the types of wastes and way of disposal. Sometimes dry and wet left over of kitchen and dining and broken glass items or used plastics are in the same packet. This is dangerous for people working on segregation of these materials. This can be managed. by use of a specific dustbin having compartmentalization for dry, wet, broken glasses

Keywords: Management, Advanced Technology, Nonhazardous, Renewable, Compartmentalization, Segregation

1. INTRODUCTION

The solid waste are the discarded and left over materials generated at home, office, schools, hospitals, public places like malls, hotels, picnic spots etc. by different human activities. Waste generation is a normal process since the beginning of life on the earth. Even ancient human population depending upon food available with nature must have generated some quantity of different types of wastes like wood for fuel or bones of animals hunted for food. Life processes are characteristic feature of all

living organism. Digestion and assimilation of food is one of them. Excretion of solid waste after digestion is a common process in all living being. Increasing population and changed life style have increased the amount of solid waste on the earth. To save time and man power, use and throw practice has been adopted everywhere, it has increased the amount of solid waste also. Nowadays, with the advancement in technology electronic goods have occupied enough space in every sphere of life, from kitchen appliances, toys to communication. Management of e-waste is not only difficult but of environment concern too. Not only e -waste but other domestic wastes are also harmful. Such as peels of vegetables, fruits, and left over of dining facilitate the growth of different types of microbes. Some of these microbes are pathogenic also. Industrialization has increased consumerism also. It has also increased the amount of wastes of different kinds. Especially in urban society consumerism has become a menace. Wealthier population are consuming more and therefore generating more wastes.

Industries are bigger source of waste generation some of which causes pollution. Industrial wastes are not only hazardous but disposal and disintegration too is a serious problem as some of these wastes are not easily disintegrated by microorganisms. All types of wastes are related with environment pollution. Plastic solid wastes are also increased nowadays. Plastic disposal is serious problem. Soil fertility is largely affected by disposal of plastic wastes. Data of the World Bank survey 2012 shows that about 3 billion urban residents generate an average 1.2 billion kg/capita per day. It is expected to increase to 4.3 billion urban residents generating about 1.42 kg/capita/per day (Noora S, 2016). With the increasing population, urbanization and industrialization generation of more waste is expected (Sharma & Shah, 2001, CPCB, 2004).

Total units engaged in hazardous waste generation in India are 12584 which are located in different states and some important are mentioned as in Maharashtra 3953,Gujrat 2984 , Tamil nadu 1100 and Uttar Pradesh 1020 (R. Rajput et al.) The amount of waste generated in India is increasing day by day. To maintain the sustainability of the environment proper management of solid waste is necessary. Management of these solid wastes is costly and difficult due to its large amount, transportation cost, need of man power and disposal site. However the developed countries produce much more waste in comparison to the developing countries but they have better facilities to facilitate the solid waste management (R. Rajput et al.). The advanced technology and funds help them to promote researches for better solid waste management. According to Sharholy et al. 2008 Solid waste management is one of the major problems for megacities. The concern of everyone is necessary to promote the 3R's at home, offices and public places. It may be a source of income generation and employment. Studies shows that per capita wastes also differs in different cities In small cities where population is less waste generation is also lesser whereas in big cities waste generation is more and is related with the area and the population size. Solid waste management is one of the major problems of Indian megacities. In India the amount of waste generated per capita is estimated to increase at a rate of 1% -1.33%. A study of CPCB 2004 shows that amount of solid wastes is increasing at a higher rate in India. Solid waste amount is expected to increase significantly in the near future as the country strives to attain an industrialized nation status by the year 2020. Study shows that total quantity of waste generated in urban areas of country is about 1-1.5 lakh tones per day.

Survey conducted by CPCB, reveals that total municipal waste generated from class I and class II cities is about 18 million tones. A data of www.cpcb.nic.in shows that the ten metropolitan centres in India are producing a large amount of waste every day. It is about 25364 tones of solid wastes per day. Land fill isolates the refuse, minimize the amount of both water entering the waste and gases escaping from it. Study reveals s that the land filling is an important component of waste disposal and in India it would be widely preferred practice in coming days. It has been found that in Asia and Europe composting was a popular method of waste disposal. Work on solid waste management in India shows only 9% of solid waste is disposed as composting. Incineration may reduce the volume of waste by 75%-90%. It was observed that disposal and treatment of waste can create health hazard for neighborhood. About 90% of solid wastes in the cities and towns are disposed directly on the land. Work on solid waste management proved that recycle of plastic and other wastes is more in India as compare to other developed countries. Solid waste is treated by composting. Experiments have been conducted to develop house hold vermin composting kits. According to a data available with Asian development Bank, a house hold waste contains highest percentage of organic wastes. According to

the report generated by epa 2014, about 258 million tons of MSW were generated, in the United States. The waste generated were properly managed some amount were recycled and composted. Amount of wastes recycled was 89 million tons of equivalents to a 34.6 percent recycling rate. About 33 million tons of MSW were combusted with energy recovery and remaining 136 million were used for lands fill.

2. MATERIAL AND METHOD

In the present work the observation made and data is collected for March, April 2017. The amount and types of wastes generation in the different residential blocks of Swami Vivekanand Subharti University, Panchli Meerut have been studied. A total of 10 days data have been collected. Total amount of waste per capita/per day was calculated. Swami Vivekananda Subharti University campus includes 506 residential flats. All flats are occupied by families of 3-6 members on average. There are 52 married couple hostel fully occupied. 1100 girl students are in girl's hostel and 800 boys in boy's hostel. 180 families of 4-6 are there in 4th grade employee's residence. Total population of 4578, including men, women and children are residing in the colonies of the campus. Types of waste generated include kitchen wastes, plastics, papers, glass, metals, fabric and e-wastes. Study was carried by survey of each colony on different days of the week. An interactive session with families of different colonies was done. Door to door collection of different types of waste material of selected families was done. Garbage bags were distributed among the families of different colonies. The collected wastes material was measured categorized and percentage of different categories was calculated. A general questionnaire was also prepared to know about the family size, income and a general awareness about the waste management. The waste generated per day was calculated by dividing the mean waste generated per day by total population. Per capita waste generated was calculated for different family size and different income group.

Average family size of higher income group colonies is 4-5 and waste generate 180g/day/capita Average family size of lower income group is 4-5 and waste generate 75g/day/capita. In married couple hostel family size is 2 and waste generated is 125g/day/capita. In girls hostel waste generation per capita is 185g/day. In boys hostel it is 120g/day/ capita.

Monthly income is a second major point which affect the waste generation. The average waste generation by the family having monthly income more than 50,000 is 1.20kg/day whereas waste generation by family having monthly income 10,000 is lesser about 500-g/day. Data shows that people of higher income group consume more and therefore higher rate of generation of waste by them as compare to the people of lower income group. Household size having more number of children between ages 0-10 years also generate more waste than the family size having adults only.

However, waste generation in the campus is at a higher rate but all these are collected in a proper manner. Both types of dustbins are placed outside each colony for biodegradable and non-biodegradable wastes. 40% segregation of waste is done at the colony level. Remaining 60% wastes are segregated at the disposal site. A total 23- number of employees are there which collect the wastes from campus. Two dustbins, one for biodegradable material and another for non biodegradable material are there outside each colony. Wastes collected from each house of each colony are kept in dustbins which are then carried by the tractors. All these wastes after segregation and packaging send to Synergy Waste Management.

3. DISCUSSION

Observation shows that the waste generation is related with family size, age, number of children; monthly expenditure and income .Family having 4-6 members generate lesser amount of waste if all the members are adult whereas family having 4-6 members with two children of 0-5 age group generates more waste material. Family size having more income expends more as compare to the family size having lesser income. They consume more and therefore more waste is generated.

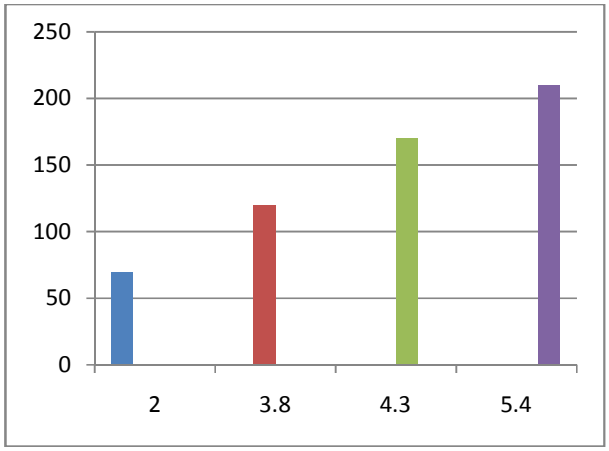

Fig. 1: Per Capita waste generation according to the Family Size

Analysis of the waste composition was also done in the present work which shows the categorization of the wastes and their percentage. It was found that there are five main types of wastes i.e. organic, paper, glass, metals and e-waste. The organic wastes were present in maximum percentage about 63%, plastics 12%, paper 15%, glass and metals 10%.

Plastic and paper waste generation is very high whether it is a house, an office or other common public places. It is increasing a lot day by day. People awareness and concern are required to reduce the load of garbage on the earth otherwise someday there will be no place on the earth to dump these. 3R's can be adopted everywhere even if it is a very small set up. People should aware while buying some products. For example if larger size packet is available only, then one must check its shelf life. Shelf life or such product should be of longer duration. This will check the wastage of the product. This would be appreciable step for to minimize the amount of waste generation. Wise and necessary consumption should be preferred. Focus should be on things considering the quality of packaging material also. It should be either biodegradable or recycled or reused.

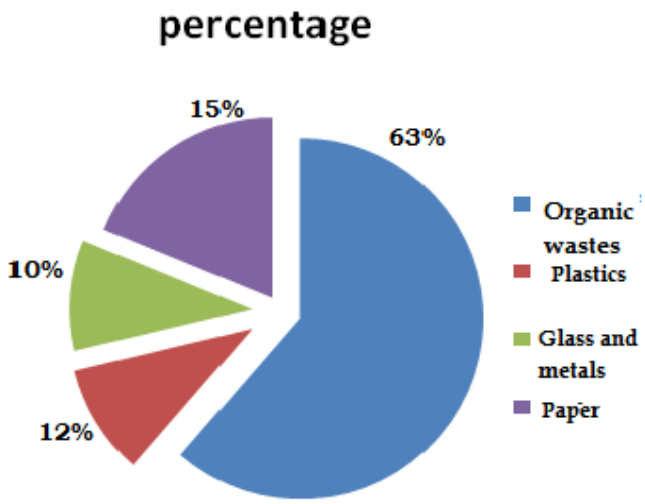

Fig. 2: Types of waste and their percentage

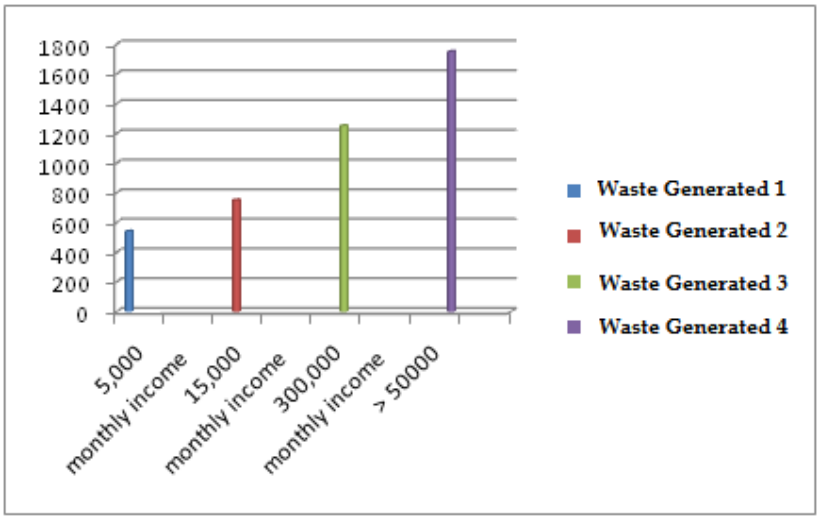

Fig. 3: Waste generated and monthly income of family

Reuse and refill are another option to reduce the waste generation. Some old clothes, books, shoes can he donated. Jars of glass and metal containers of some goods are of good quality; they may be reused or donated for storage purpose of food items. Some materials like plastic jars, chairs, jute sacks iron aluminum foil, glass jars, cans, newspapers, CFL,s, CD's can be recycled. This may be an employment for poor people. Using all these 3R's not only save the environment from unnecessary burden of garbage but also opens a new job opportunity and economic assistance to the society. The solid waste can also be used for generation of alternative energy. Biogas plant can be set up which provide enough energy for household.

6. CONCLUSION AND SUGGESTION

Solid waste generation in the campus and its characterization reveals that wastes are heterogeneous. Size and income of family are two main factors responsible for amount of waste generation. Wise and necessary utilization of things can check the waste production at the same time disposal may be environment friendly. About 90% of the house hold wastes are non hazardous. 75% of total wastes are renewable also .But still disposal site availability is a major concern. Characterization and knowledge of composition of these wastes is important so that disposal should be environment friendly. Reuse and recycling will promote the employment and economy too. Segregation of wastes is an important task for person involved. During the observation it has been found that people are not paying proper attention to the types of wastes and way of disposal.

Sometimes dry and wet left over of kitchen and dining and broken glass items or used plastics are in the same packet. This is dangerous for people working on segregation of these materials. This can be managed. Suggestion is that a specific dustbin having compartmentalization for dry, wet, broken glass items, plastics should be there for each floor of each colony. Lots of carefulness has been taken during collection of data on the personal level. It should be recorded by the personal employee of the university. Organic waste can be used for manure and composting. A workshop and seminar may be arranged for all people residing in the campus to make them understand the proper method of disposal of waste. Knowledge of reuse may reduce the load of garbage. The analysis of data and awareness of people can help in the maintenance of the healthy and sustainable environment.

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