



Household Solid Waste, Influence of City Size and Economic Class In Gujrat Punjab, Pakistan

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Abstract Now days, Solid waste management became the very serious concern world widely. The lack of responsibility of authorities as well as proper approach to manage the solid waste leads to this issue. There's no proper solution to solve this issue. The rapid increase in the population also contributes to the poor waste management services, which needs to increase the budget and no. of vehicles for effective waste management. For sustainable development and effective management, we need to implement the 3Rs concept. It encourages the segregation of waste at household level to manage the waste effectively. For this purpose, research has been done in the area of Model town in Gujrat. The research seeks to identify the methods for solid waste management. The survey performed includes the household level segregation of 20 houses. Voucher sand bags were given to the community members for guidance and awareness about the solid segregation. The maximum numbers of family members were 10 and the least were 2 members, although the seven out of twenty houses had 7 members in their family. The questionnaire was filled by 12 male and 9 females. Average income of these families was ranging from 31,000 to 60,000 and families with 8, 9 and 10 family members had their income ranging from 91,000 to 120,000. There were 15 houses with 'Masters' as highest level of education in their house. We took samples of organic waste in 5 different seal packs and found out their weight then placed these samples by using beakers into the oven for 24 hours for drying the moisture content into the organic waste. After 24 hours we placed these samples into the seal packs for further analysis.

Keywords Solid Waste, Management, Segregation, household, collection, awareness

Introduction

Today, proper management of solid waste generation is one of emerging challenge in the developing countries. An important proportion of the municipal budget is not satisfied in the cities of Pakistan [1]. Due to rapid increase in population the Municipal solid waste management services become worse and poor. Solid waste is stated that the non-liquid and non-gaseous by-products of human, and the activities are considered as the discarded materials [2]. Inadequate management of solid waste is a biggest threat to the public health especially for the urban development of Pakistan. Therefore, the management of solid waste become a serious concern globally [3].

In developing countries like Pakistan, incorrect and useless method are used for dumping of solid waste, runoff and leakage of wastewater and poor drainage system severely affect the health of citizens [4]. These types of methods and practices poorly organized the open dumps and illegal roadside dumping degrades the landscape beauty of the urban cities: pollute the natural resources like soil and water and has the potential threat to the public health [5]. Poor collection and inappropriate transportation system for collection of Municipal solid waste



management in developing world's cities which is due to increasing rate of solid waste generation and placing the high burden onto the budget of the municipal services [6-7]. Recently, sustainable development of waste is a major challenge faced by many developing countries from mega cities to small towns. Like in Pakistan most of the big and small cities are facing poor sanitation system [8-9].

In most of the countries like Beijing (China) the flammable materials, such as plastic, wood, paper, textile and food waste were almost 94.66% of Municipal solid waste in 2008 [10]. On household level the generation of solid waste generation has become major problem in recent years [11]. Improper solid waste management in Pakistan, is a main environmental and health hazards in urbanization [12-13]. This issue needs to be given priority at local authorities and also need to combine approach and is essential to adapt the management Municipal solid waste operation in the urban areas of Pakistan [14].

For sustainable and effective solid waste management, we need to implement the use of 3Rs (reduce, reuse and recycle) these tools could be proven very effective [15]. Generating rate of waste is relatively higher in most of the countries like Pakistan and the estimation of solid waste in Pakistan fluctuates between 0.283-0.612kg/capita/day with an annual growth rate of almost 2.4% per year [16-17]. By reduction of the current levels of solid waste generation and energy recovery system, that is essential step for eco-friendly waste management approaches globally. Some countries used the waste for electricity or recycling like United States and Europe recycled almost 41% of the waste. China investing the US 6.3 billion Dollar for achieving recycling is 30% of its waste for 2030 (Pakistan State Bank). More than 800 incinerators work globally in which 400 are working in Europe and 236 works in Japan. In Europe these plants produce electricity and have capacity for almost 27 million citizens [18].

Objectives

- To aware the people about the waste segregation and characterization.
- How much waste is generated per capita?
- To get knowledge that how much community is aware of the waste disposal?
- To increase consumer awareness, about waste minimization issues.
- Promote waste minimization and recycling through education system.

Materials and Methods

The survey for the research was conducted in area of Model Town City Gujrat, Punjab Pakistan. Model town situated between Chak Mubarak and Dar ul Islam colony at Airport road Gujrat which is given below in (figure 1).



Figure 1

Inefficient solid waste management is present in this town that's why we have chosen model town. Data can be collected in different ways through documents, surveys, or interviews etc. We have taken the quantitative approach with survey through questionnaires. Sampling technique which is used in this research is Simple Random Sampling. Data collection tools used in this research are questionnaires and survey. Our questionnaire contained 23 questions about demography, awareness level, level of segregation, waste generation and waste characterization. In Model Town, we have accumulated knowledge about population, total waste and



per capita waste. Welfare society is also present in that area, they collect the waste from the community on daily bases and per house gives them 200 Rupees per month. They have hired scavengers for the segregation of waste. They collect the waste from the community, but they dump the waste at roadside or at Airport road. Due to poor management of solid waste, population of this town have to face environmental and health problems like air pollution and solid waste dumping etc. We have collected the data through interview-based questionnaire from the residents of Model Town. We gave them vouchers about waste segregation and provided polythene bags in different colours like green, white and blue. Then polythene bags were collected and individual bags per house were weighed and then collective weight was taken. The bags and vouchers will help to demonstrate the segregation method in future.

Results and Discussion

In this survey, the results were determined from 21 houses. The maximum numbers of family members were 10 and the least were 2 members, although the seven out of twenty houses had 7 members in their family. The questionnaire was filled by 12 male and 9 females. Average income of these families was ranging from 31,000 to 60,000 and families with 8, 9 and 10 family members had their income ranging from 91,000 to 120,000. There were 15 houses with 'Masters' as highest level of education in their house. Other data was also collected regarding the awareness, level of segregation, waste generation, waste characterization, waste disposal and waste collection like waste bank. Apart from data, the waste was also collected from household.



Figure 2

They were informed briefly about the waste segregation process. Then the segregated waste of one day was collected from houses individually. The segregated waste bags were transported to Laboratory where further processes of waste sorting were done. Waste Sorting processes includes the characterization of waste and weighing of polythene bags individually and collectively using weighing scale and electronic weight machine. From waste sorting, it is evaluated that the heaviest waste (4.6 kg) came from the house having 5 members and masters as highest education level and the least waste (1 kg) came from the house with 6 members followed by PhD level education. It is known that the error in segregating the solid waste was low in houses with PhD degree holders as compared to the master's level i.e. they segregated the waste with more efficiency. The collective weight is 38.5 kg and individual weight is 41.6 kg, the difference in collective and individual weight is 3.1 kg. In this survey the target of the houses in Model Town was 20 but the household survey was performed with 21 houses. Total generation of waste per capita is 7.954 kg. We segregated the waste in different sacs like organic, recyclables, trash, paper, metal, medical waste, and polythene bags, ceramic, pamper and glass. The weight of plastic was 3kg, paper 2 kg, Tetra pack 2.5 kg, Metal 1 kg, Glass 1.5 kg and ceramic 0.5 kg whereas Medical waste is 1 kg, Polythene bags 2 kg, Pampers 3.5 kg and others 2 kg in different sacs. The total waste that is collected in which organic waste 17 kg, recyclables 7.7 kg and trash 8.5 kg. We took samples of organic waste in 5 different seal packs and found out their weight then placed these samples by using beakers into the oven for 24 hours for drying the moisture content into the organic waste. After 24 hours we placed these samples into the seal packs for further analysis.



Figure 2 shows that wet values of the solid waste generation which is collected by us in Model Town Gujrat. In this figure, wet values which includes 49% of the organic waste which is greater value, 29% of the recyclable waste and 22% of the trash which may be inorganic waste.

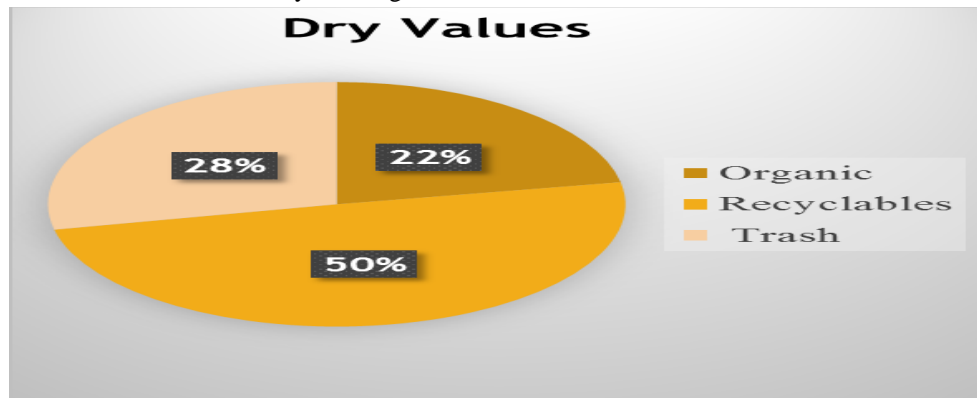


Figure 3

Figure 3 shows that dry values of the solid waste generation which is collected in Model Town Gujrat. Dry values includes 22% of the organic waste, 29% of the trash and 50% of the recyclable waste.



Figure 4

Figure 4 shows that the waste generation per capita of the Model Town Gujrat. Waste Generation per capita of Gujrat city especially in Model Town includes 16% of per person and 84% of per house.

Conclusion

The research performed on the waste management and its solution. The overall response of the survey is positive regarding the awareness level and waste segregation. The people of Model Town were already somehow aware about the waste and its effects on the environment. They acknowledged the fact that there's no proper management being done regarding the waste of our society. However, they are gladly willing to adopt the measures regarding the waste management. Even they suggested that awareness campaigns should be performed in schools where children can learn and adapt the basic waste management activities. The waste was also segregated properly in organic, recyclable and trash bags. It could be said that the education level relates with segregation level as they cooperated effectively in waste segregation and data collection.

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