DOMESTIC SOLID WASTE MANAGEMENT IN BOSSO TOWN, MINNA, NIGER STATE

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Abstract
The study is about domestic solid waste management in Bosso town. Emphasis was generation, storage collection treatment and final disposal of solid waste. The method of research applied in this study included observation, experimental procedures, interview and questionnaires. The findings show that the waste generated amount to 972 kg/day. Problems of domestic solid water in the town results essentially from lapses or inefficiency of the body responsible for waster management was recommended which will ensure the removal of metal and metal related, plastic for recycling. The compostable waste can be disposed of by sanitary landfill.
Key words: Domestic solid waster, generation, collection, treatment, management

Introduction

One of the major national problems facing us is the need of safe handling and the proper management of domestic solid waste, hazardous and non- hazardous ones. For any growing society, the higher the growth rate, the higher the waste generation. Domestic waste has been defined "as any unavoidable materials resulting from domestic activities s for which there is no economic demand and which must be disposed off" (Salvatol 1983). Domestic solid waste increases in quality and variety as a result of increasing population, standard of living and its disposal has become a serious problem in cities in Nigeria.

Domestic solid waste accumulates in towns and cities due to land layout, which make houses in accessible to waste disposal vehicle (200) reported that "waste is a non-product residual with zero value in the current market or that which is cheaper to throw away than to utilize" of all other type of waste, domestic solid waste is the most problematic as it can be found in our cities and on the road littering the street, obstructing roads and drainage, polluting the environment and constituting a public health hazards.

This paper aimed at examining domestic solid waste management in Bosso Town with a view to evolving easier and more effective system of waste management. To achieve this, the following were examined: problems associated with the existing management techniques, sources and type of domestic solid waste, management practices and policies by the local authority, more effective method of domestic solid waste management and recommendations for proper improvement.

Domestic solid waste is generated form daily human activities at home which include environmental sanitation, food preparation, consumption of package food (traditional prepared or processed by modern methods), discharging of unwanted house hold items or unserviceable household equipment and old furnishings usually lead to huge loads of solid waste, time of year, socio – economic status of the area served and municipal responsibility method of collection.

Brief History of the Study Area

Bosso town is at the northern part of Minna the capital city of Niger State. The mean annual rainfall ranges from 1200mm to 1300mm which is distributed through the month of April to October sometimes to November. The mean annual temperature ranges from 18.21^0C to 38.12^0C in densely populated area.

Method of Collection of Waste

There are various methods of adopted in the collection of waste particularly in urban and semi-urban settlements. These are the houses – to – houses collection, it involves collection of refuse from one household container to another, normally by staff of the responsible authority or accredited private collector. There more pertinent to the designed which are used for collection in the kerbed – side collection and combination of systems of collection would have to be determined on the basis of the rate of generation; (Coad 2000)

Method of Disposal of Waste

Storage of domestic solid waste involves the use of different types of storage facilities like refuse-bins, empty drums, receptacles and other containers for storing waste after it as been generated (Aderson (1967).

Open dump: Here refuse is generated spread over a large area, providing a source of food and harbourage for rats, flies and other vermin it is unsightly, an door and smoke nuisance, a sources of explosive gases, a fire hazard a bird hazard to air craft and possible cause of water pollution.

Incineration: This is a combustion process that reduces solid waste to carbon-dioxide and other gases and relatively heat residues. This inert residue usually is disposed off by land filling.

Sanitary landfills is where the waste is expected to decomposed, the waste is spread in layers and is compacted by heavy machine before another layer is spread. This method also eliminates air pollution from obnoxious odors compared with open dump, but causes slow formation of methane gas for the decomposition of cellulose

Methodology

Several methods were employed in the collection of data for this study including:

Uses of Questionnaires: Questionnaires methods were used where question related to the subject matter of study structured on paper and administer to various people, which elicited most of the information use for this study. The questionnaires were distributed to resident of Bosso town, total of 100 questionnaires were distributed. The information obtained from the returned questionnaires was analyzed. Interview method – people were contacted on individual basis and interview of various aspect of domestic solid waste management, the implementation of strategies, achievement, obstacle and constraints faced as well as suggested ways of ensuring a sustainable system of waste management.

Observation method: Visit to public dump site to asses the manner of use and maintenance of such facilities in some part of Bosso was carried and characteristic of refuse as well as the types of waste bin use were well studied. With 20g nylon bag, every household were instructed to deposit their waste in it. After a period of 24 hours the waste bag were collected and taken to the laboratory for analyses.

Experimental Procedure

Two sets of experiments were conducted to determined important physical composition of the waste.

Determination of the moisture content

The waste from the bag was placed in a weighed pan (W1) and weighted (W2); it was then placed on a tray and kept in electronic oven for a period six (6) hours. After then, it was re-weighed (W3). This was repeated for the content of each hag Peavey et-al 1980).

The percentage moisture content was then calculated;

$$\text{Percentage moisture content} = \frac{W2 - W3}{} \times 100 \quad \text{_____ (1)}$$

$$W2 - W1$$

Determination of percentage waste composition

The count and weight method was used in determining the components of the waste. Weighted samples from the bag were placed on a table. The waste materials were the examined, identified and sorted out into seven major items. A magnet was used to extract the metal and metal related. Each fraction was then weighed and noted. The percentages waste composition was then calculated

$$\% \text{ waste composition} = \frac{Y}{W} \times 100 \quad \text{_____ (2)}$$

Where Y = weight fraction of the waste component

W = Total weight fraction of the waste.

Determination of total quantity of solid waste generated.

The total quantity of solid waste generated by household were calculated using the equation below.

$$Q = V \times N \times T$$

Where Q = total quantity of solid waste generated (Kg)

V = average quantity of solid was generated kg/person/day.

N = number of person being considered

T = time (days).

Results and Discussion

The questionnaires were structured in line with the objectives of the study. In analysis of data, simple frequencies were used and experimental result was analyzed. Fig 1 shows the domestic solid waste generation in a household waste bin, the constituents of the domestic refuse generated in the samples population reveals that remnant is high with 33.33% that is followed by metal and metal related which is 24%, paper and paper related is 16%, plastic/rubber is 8%. Figures 2 was observed that only 20% house hold separate their waste, which implies waste before disposal. Figure 3 shows that most household store their waste in plastic buckets and 34. 67 % dump their waste in open space from figure 4 it reveal that 66.76% do not have a waste storage facility, which makes them, throw their waste indiscriminately.

It was discovered that from the analysis of the questionnaire, it shows that nobody collect (either public or private sector) solid waste generated in Bosso town. These wastes are seen as nuisance to the community. The moisture content of the solid wasted generated is calculated below:

From Equation 1

$$\% \text{ moisture content} = \frac{W2\ W3}{W2 - W1} \times 100$$

$$\text{For food remnant} = \frac{97.1}{355.5} \times 100 = 27.31\%$$

Other solid waste moisture generated are calculated and summarize in Table 1. Percentage composition of the solid waste generated were calculated using equation 2

$$\% \text{ waste composition} = \frac{Y}{W} \times 100$$

$$\text{For remnant} = \frac{14}{422.5} \times 100 = 3.31\%$$

For other waste generated, it is summarized in table 2.
It could be seen that moisture content of the solid waste generated is high in food remnant because the domestic solid waste generated are more in moisture content in food ruminant and percentage composition in high in metal and metal related and low in food remnant.
The total quantity of solid waste generated by house holds can be calculated using equation 3

$$Q = V \times N \times T$$
$$Q = 0.81 \times 300 \times 4$$
$$Q = 972 \text{ kg/day.}$$

Conclusion

The result of investigation showed that domestic refuse constitute mainly of kitchen ashes, empty cans, unwanted cooked food, paper packet and cartons, plastic. It also showed that 987kg is the total solid waste generated per day in Bosso town, and it revealed the resident of the study area are not aware of the proper way of managing the solid waste in our community.

Recommendation

1. Private sector participation should be introduced for waste collection from house-to-house.
2. Uncompleted building and open plot should be under strict surveillance or fenced to discourage refuse dump.
3. There should be a well – planned layout in Bosso town so that collection vehicle can reach every-where.
4. Collection point should be constructed for the town.

References

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Appendix

Table 1. Percentage Composition and Moisture Content of Bosso Domestic Waste

Materials Waste	% Composition	%Moisture Content
Food Remnant	33.8	27.31
Metal/Metal Related	34.27	19.41
Paper/Paper Related	21.11	10.68
Plastic/Rubber	26.15	11.25
Textile	1.89	10.98
Glass/Bottles	8.28	1.32
Ash/Dust	2.51	17.24
Others	2.41	1.82