

# DOMESTIC WASTE LEVELS AND AN ASSESSMENT OF THEIR CURRENT MANAGEMENT STRATEGIES IN YENAGOA METROPOLIS

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## Abstract

The quantities and types of domestic solid wastes were determined for the purposes of planning and effective management of wastes in the Yenagoa metropolis. The current status of waste management in the metropolis was also assessed to identify the problems and prospects for effective waste management. The study shows that with a per capita daily waste production of  $0.189 \pm 0.039$  kg, an average of about 28,350 kg of waste are produced daily in Yenagoa metropolis. About 83% of the wastes produced were food wastes made up mainly of yam and plantain peelings. As regards the current status of waste management, the study observed that, there was no equipment available for the management of domestic solid waste and no final dumping site for sanitary disposal of wastes was available. The major problems militating against the effective management of wastes were the lack of awareness on the part of the citizenry of the importance of proper waste disposal; the non - availability of collection points and the lack of political will of the relevant authority to meet the demands of proper waste management.

**Keywords:** Domestic waste levels, Management, Yenagoa

## Introduction

The efficiency of domestic solid waste management in many Nigerian cities has been a matter of grave concern to many environmentalists. An assessment of the prevailing quality of domestic solid waste management in many Nigerian cities can be modestly described as inadequate. According to Sada and Odemerho (1988), the bane of any effective solid waste management is the wide gap between the high levels of generation and the limited available technology and capacity for their evacuation and proper disposal. This is the

primary reason for poor waste management in many Nigerian cities whose outskirts are littered with wastes. For example, an average of 100,000kg of solid waste piled up in Benin City in 1980. This was because while about 350,000kg of solid wastes were daily generated, the maximum rate of evacuation was only 250,000kg per day (Sada and Odemerho, 1988). Furthermore, population growth, increasing urbanization and industrialization and rising standard of living have all contributed to an increase in both the amount and the variety of waste generated in most countries (UNEP, 1992).

With population increase in Nigeria, and to meet the demand for the creation of more states, the Federal Government, particularly under the military created a number of new states in the last few decades. New urban centres have therefore been developing as a result of state creation. The city of Yenagoa, the capital of the recently created State of Bayelsa, is one of such new developing urban centres. The city of Yenagoa is located between Latitude 4°50'N - 5°05'N and Longitude 6°15' - 6°30E and lies astride the Epie Creek which empties into the Nun River. Following the creation of Bayelsa State in October 1996, there has been an influx of people (traders, artisans, civil servants etc.) into the city. The population increased from 42,000 in 1991 to about 50,000 by 1996 (Bayelsa State Ministry of Finance and Economic Planning, 1998). The population is estimated to be about 150,000 today. The new status and the attendant increase in population have no doubt resulted in increased wastes production and the attendant problems of managing them.

There is presently no reported data on the quantities and types of wastes generated and their management strategies. What is more, such an assessment at the early history of the city will reveal the trend in wastes production in the course of the continued physical and population growth of the metropolis. This paper

therefore provides data concerning the quantities and types of wastes generated in the Yenagoa metropolis and also assesses their current management strategies.

### Methodology

The quantities and types of domestic waste generated were randomly sampled bi-weekly and twice monthly throughout the harvesting/post-harvesting season, planting season and pre-harvesting season. Wastes were collected in jute sacks, which were left at selected households. Four hundred (400) households, randomly selected and spread over the entire study area were sampled. Samples collected at each household were weighed in bulk with a scale with an uncertainty of  $\pm 0.005$ kg. The samples were then physically sorted and separated. The sorted samples were classified and weighed separately.

Information regarding the quantity and types of equipment and staff available for waste evacuation were obtained through oral interviews.

### Results and discussion

The wastes were classified into six different types. The types and quantities of the wastes and their percentages are shown in table 1.

Table 1: Waste types and their percentages for the sampled population

Waste type	Quantity (kg)	Percentage
Food	4,084.495	82.22
Metal	84.195	1.70
Glass	81.176	1.63
Paper	111.680	2.25
Plastics	97.443	1.96
Others (rags, battery, wood, leather)	508.301	10.24
Total	4,967.570	100

From Table 1, the study shows that about 80% of the wastes generated are food waste (biodegradable wastes). The food wastes were mainly yam and plantain peelings. This is attributed to the custom of the people whose staple foods include yam and plantain. These observations are in agreement with the findings of Izunwanne (1992) who observed that biodegradable materials were usually greater than 80% of the total wastes in Nigeria. The recorded percentages of 1.70% for metal, 2.25% for paper and 1.96% for plastics are also in agreement with the estimated 2% levels each for metal, paper and plastic in urban wastes for low-income countries (USEPA, 1995).

The quantities of the various types of wastes measured in the three sampling seasons are shown in table 2.

Table 2 shows that the quantities and types of wastes generated vary from season to season. It is observed in table 2, that food wastes account for about 88.74% in the harvesting season as compared to the figure of 70.25%, in the pre-harvesting season. Our results are in agreement

with the observation of Oluwande (1974) who noted that wastes usually vary in their quantities and characteristics with season. It is also observed that the percentages of other types of wastes such as metals, glass and others increase as the percentage food waste decreases. Paper and plastic wastes however don't appear to follow any particular pattern.

Results from the study show that a per capita quantity  $0.189 \pm 0.039$ kg of waste is generated daily in the Yenagoa metropolis. This translates into a per capita quantity of 68.985 kg per year. This figure is greater than the figure of 20kg per capita per annum estimate of Salau (1993) in Nigeria, but lower than the 0.40-0.60kg per capita per day estimate of USEPA (1995); or 0.50kg per capita per day (Cointreau, 1982) in low income countries outside Africa.

It is estimated therefore that in the Yenagoa metropolis about 10,019,250kg of wastes are generated annually. This figure is low when compared to the year 2000 projected figures of (Salau 1993) for Uyo - 20,923,000kg; Gusau - 79,835,000kg; Port Harcourt - 352,853,000kg. The comparatively low figure for Yenagoa is

Table 2: Seasonal variations of waste types in Yenagoa metropolis

Waste types	Harvesting / Post harvesting season		Planting Season		Pre-Harvesting season	
	Quantity (kg)	%	Quantity (kg)	%	Quantity (kg)	%
Food	1342.145	88.74	1698.9	86.25	1043.45	70.25
Metal	14.31	0.95	42.385	2.15	27.5	1.85
Glass	12.175	0.81	21.301	1.08	47.7	3.21
Paper	9.445	0.62	17.885	0.19	84.35	5.68
Plastics	28.05	1.85	49.343	2.51	20.05	1.35
Others	106.28	7.03	139.951	7.10	262.35	17.66
Total	1512.405	100	1969.765	100	1485.4	100

indicative of its rural status and low population.

For the purpose of evaluating the current domestic waste management strategies being employed by the authority presently managing domestic wastes in the metropolis, an inventory of equipment type and quantity, sanitary landfills, as well as personnel type and number were obtained. The results of the study show that there are no conventional methods of disposing domestic wastes. Rather, wastes are indiscriminately littered in the metropolis. This is in spite of the fact that there are 400 labourers and 70 sanitary inspectors on ground to oversee the disposal of these wastes. The available labour force averages at one labourer per 375 inhabitants/or 71kg of waste to evacuate daily. These figures compare with one labourer per 1182kg per day in Uyo and 427kg per day in Jos. The ratios suggest that waste evacuation in Yenagoa ought to be more effective than it is in Uyo and Jos. The low ratio of labourer to quantity of waste for evacuation in Yenagoa may be misleading in determining the effectiveness of waste management strategy, because of the total non-availability of equipment in the metropolis. The almost complete absence of domestic waste evacuation in the metropolis suggests that about ten million ( $10^7$ ) kg of wastes will pile up annually in the metropolis. This portends grave environmental consequences.

### Conclusion

About  $10^7$ kg of wastes would pile up in Yenagoa annually without an effective planning of waste management strategy. This is due to the lack of waste management strategy, which it itself may be a reflection of its previous rural status. Some of the problems identified to be militating against effective management of domestic wastes appear to be lack of awareness by the citizenry on the importance of proper

waste disposal, the non-availability of special collection/dump sites as well as final disposal sites and the lack of political will to put in place appropriate machinery/personnel required for good waste management.

Poor waste management gives rise to diverse environmental problems that seriously impact on human health and other forms of life. The present status of domestic solid wastes management in the Yenagoa metropolis may therefore pose detrimental consequences to the environment. Such consequences include nutrient enrichment, high BOD, microbiological pollution etc. of water bodies in the surrounding area. Studies are being carried out to assess the effect of runoff water on the Epie Creek, a water body lying astride the Yenagoa metropolis. The results of the studies will be published elsewhere.

### References

- Bayelsa State Ministry of Finance and Economic Planning  
1998. Population Statistics.
- Cointreau, S.J., 1982. Environmental management of urban solid wastes. The World Bank, Washington, DC
- Izunwanne, 1992. Solid Waste Management, a major problem of urban areas, A way out. Safeguard Magazine. Vol.20, No.1. Published by the National Industry Safety Council of Nigeria.
- Oluwande P.A. 1974. Investigation of certain aspects of refuse in Western State of Nigeria. J. of Solid Waste Management. 164: P.22-32. UK.
- Sada, P.O. & Odemerho, F.O. (eds.) 1988. Environmental issues and management in Nigerian development. P.77-82. Evans Brothers (Nig. Pub.) Ibadan.
- Salau, Ademola A., 1993. Environmental Crisis and Development in Nigeria. An Inaugural Lecture. Inaugural Lecture Series No. 13. Port Harcourt, University of Port Harcourt Publishing House pp. 24-26.

United Nations Environment Programme 1992. Wastes: Environmental Data Report 1991/92. Third Edition prepared for UNEP by the Gains Monitoring and Assessment Research centre, London, UK. p. 333-359.

USEPA 1995. Residential & Industrial Solid Waste Disposal Support Package. Ministry of Housing Spatial Planning and the Environment (VROM). The Netherlands.