Research article Available online www.ijsrr.org ISSN: 2279–0543

International Journal of Scientific Research and Reviews

Characterization of Solid Waste at Gosa Dumpsite, Federal Capital Territory, Abuja

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ABSTRACT

Open dumping of municipal solid waste is common in developing countries with its composition varying from one municipality to another. When waste is not properly disposed we have cases of clogging of channels leading to flooding, soil, air, water pollution and epidemics. Abuja, being the capital of the most populous nation in Africa, serves as the gateway to the country for foreign investors such that poor form of the city can hinder rapid growth of the nation's economy. It is of great importance that it becomes a model city hence the need to analyze the Federal Capital Territory, Abuja Solid waste dumpsite, to determine the composition of solid wastes and possible methods applicable for waste reduction. To achieve this Twenty (20) sack bags of 10kg each from transect of 2 sqmwhich was randomly thrown 10times and collected from the waste stream was examined in the dumpsite. This was done for 24 months. Sorting and Segregation into organic material, paper, plastics, rubber, glass, metals, textiles was done and weighed to determine its fraction and the independent samples T – test at a 95% confidence level was employed to carry out differences in the amount of waste across both seasons. It was observed Food /putrescible (47.1% - 57.1%), Textile (0.4% - 4.7%), paper (9% - 15.7%), glass/ceramics (1.8% - 5.5%), plastics (12.1% - 21.3%), metals (2.2% - 5.7%), rubber (0.9 % - 7.1%) Wastes are usually collected from source without sorting**.** It is recommended since over 50% of waste is biodegradable it could be composited and used for organic manure.

KEY WORDS: waste, food/ putrescible, dumpsite, biodegradables

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INTRODUCTION

The increasing amount of waste generations and their improper disposal have great social costs and is an issue of concern as solid waste is a serious environmental problem in both developing and developed countries. Waste is the generation of undesirable substances which is left after an item is used It can be considered as nothing but useful material at the wrong place.[1] Every material in this world is useful. It is man's ignorance that he considers certain things as waste and other things as useful [2]

Among the identified anthropogenic factors, researchers Dodman*et al.*, 2011[3]and Lamond*et al.*, 2012 [4]observed that improper solid wastes disposal frequently lead to blockages in drainage and watercourses causing practicable negative effects on the environment in particular urban pluvial flooding, epidemics, clogging of channels, pollution by emissions into surface water and groundwater, air as well as soil resulting in risks to human health and property[5]. Across the world, flooding which is caused by climate change, human population explosion leading to poor waste disposal and urbanization has been on the increase [6].

The solid wastes may be biodegradable or non-biodegradable. The biodegradable solid wastes are agricultural wastes, food wastes, paper, food processing by products, manure, yard wastes etc. The non-biodegradable wastes include plastics, metals, synthetic materials, polythene, radioactive wastes [7].

Solid waste is generated in very large amounts and dumped in open landfills without proper consideration of precautions and sorting out the recyclables wastes. The waste is just collected and dumped in open grounds. The people at high risk due to improper solid waste disposal are waste collectors, workers, scavengers and children. When waste is not disposed properly like hospital waste and things that have been used for infectious diseases like tuberculosis etc are not properly handled, this can lead to an epidemic. Also, rainfall or surface water passes through these open landfills containing all sorts of municipal, hospital, industrial and toxic waste containing heavy metals like Cd, Cr, Cu, Fe, Ni, Pb, Zn. It percolates with water into the ground and ultimately joins the groundwater.

The problem of solid waste is not just that of generation nor collection but also that of disposal and its effects on the quality of soils and plants. The open dumping of solid waste apart from being unsanitary and unaesthetic creates breeding space for rodents, flies, mosquitoes and other disease carrying vectors. Open waste dumping, among other methods of solid waste disposal constitute serious problems and health risk [8].

MATERIALS AND METHOD:

Description of Study Area

The Federal Capital Territory was created by Decree number 6 of 1976, to overcome the numerous challenges that had made Lagos very expensive and a nightmare in terms of population, administration, traffic, expansion, infrastructure development and other urbanization issues. Abuja became the nation's capital and seat of government on December 12, 1991.it has a land area of 8,000 km2. It falls within latitude 7° 25' N and 9° 20° North of the Equator and longitude 5° 45' and 7° 39'andIt shares boundary with Kaduna State, Niger State, Nasarawa State and Kogi State (www.fct.gov.ng)

Twenty (20) sack bags of 10kg each from transect of 2 sqm which was randomly thrown 10times and collected from the waste stream was examined in the dumpsites. This was done monthly for 24 monthsSorting and Segregation into organic material, paper, plastics, rubber, glass, metals, textiles was done and weighed to determine its fraction. The materials and resources used at the dumpsite for data generation were manual measuring scales for weighing the wastes, sack bags for all the sorting categories and gloves.

RESULTS AND DISCUSSION

Table 1 shows the composition of Gosa dumpsite for wet season. The total waste sample was 2000kg; out of which food waste constituted 53%, plastic waste 16.2%and the least in composition was textile 1.5% while the composition of Gosa dumpsite for dry season, food waste constituted 54.3%,plastic waste(17.3%)and the least in composition was Rubber 1.5%.

Table 1: Municipal Solid Waste Characterization of Gosa Dumpsite (AMAC)

S/N	Waste Type	Wet Season		Dry Season	
		Mass (Kg)	Percentage (%)	Mass (Kg)	Percentage (%)
1	Food Waste/ Putrescible	1,060	53	1,086	54.3
2	Textile	30	1.5	94	4.7
3	Paper	260	13	240	12
4	Glass/ bottles	110	5.5	88	4.4
5	Plastics	324	16.2	346	17.3
6	Metals/ ceramic	112	5.6	66	3.3
7	Rubber	68	3.4	30	1.5
8	Others	36	1.8	50	2.5
	Total	2000	100	2000	100

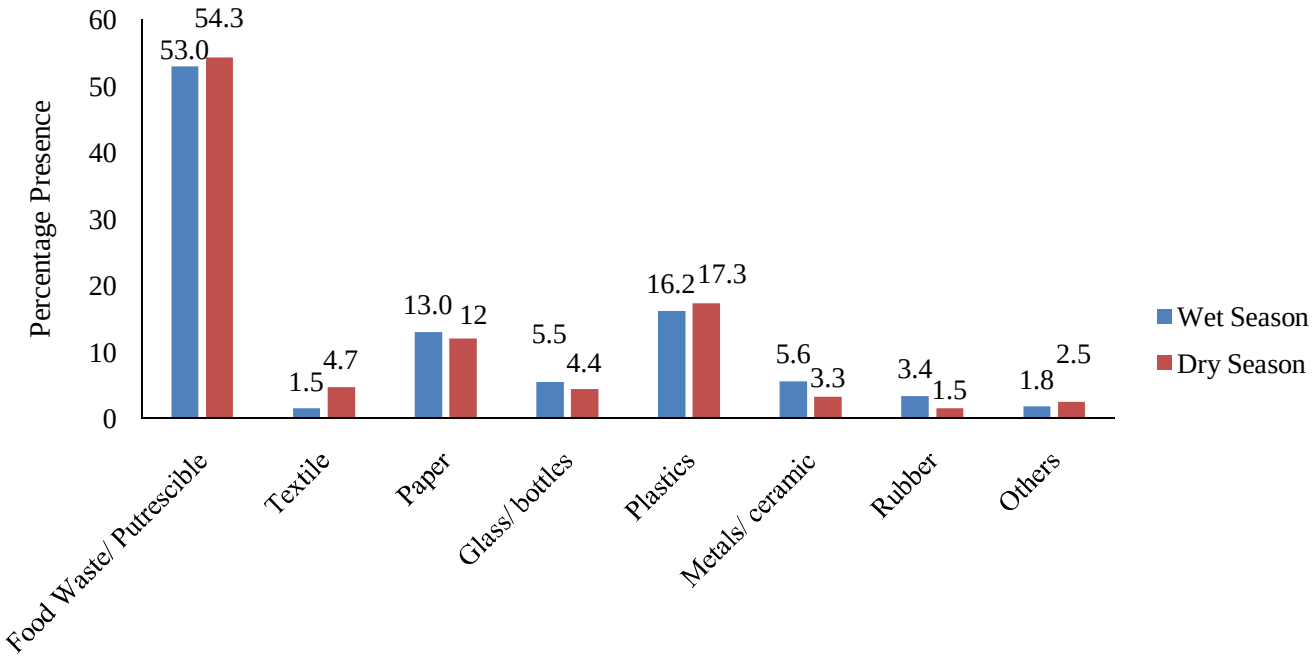

Figure 1: Municipal Solid Waste Characterization of Gosa Dumpsite

P – value> 0.05 (i.e. p – value greater than 0.05) implies no significant difference in the amount of waste across both seasons

P – value< 0.05 (i.e. p – value less than 0.05)implies a significant difference in the amount of waste across both seasons.

All the p – values obtained from the t – test (as shown in the table below) are greater than 0.05 therefore, we conclude that the amount of each waste type in one season does not differ significantly from its corresponding amount in the other season.

Table 2: Independent Samples T – Test Comparison between Wet and Dry Seasons at 95% Confidence Level

S/N	Type of Waste	Wet Season (Kg)	Dry Season (Kg)	P – Value
1	Food Waste/ Putrescible	1056.00 ± 38.95	1048 ± 73.77	0.83
2	Textile	22.67 ± 7.97	27.00 ± 33.86	0.77
3	Paper	245.67 ± 39.12	280.67 ± 32.51	0.12
4	Glass/ bottles	91.67 ± 23.98	80.00 ± 25.14	0.43
5	Plastics	339.33 ± 45.16	342.00 ± 55.97	0.93
6	Metals/ ceramic	93.67 ± 30.02	86.67 ± 19.00	0.64
7	Rubber	91.33 ± 40.47	73.00 ± 40.79	0.45
8	Others	59.67 ± 45.51	63.33± 44.34	0.89

Data presented as Mean ± Standard deviation

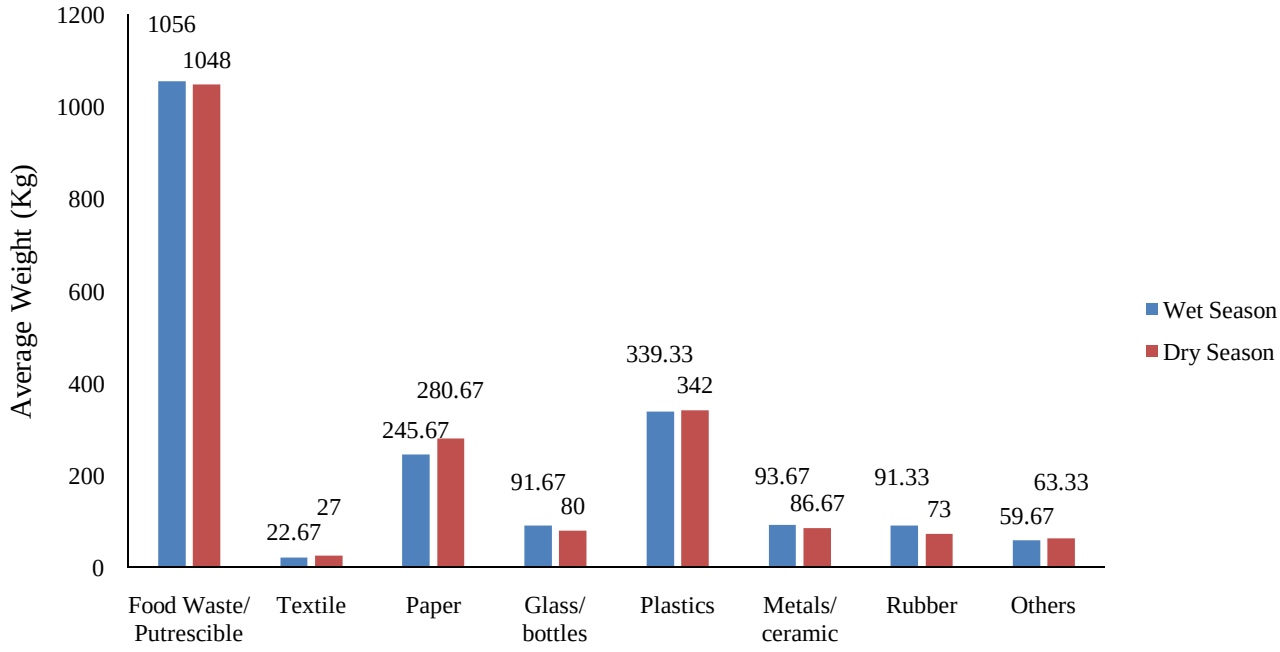

Figure 2: Average weight of Wastes in Wet and Dry Seasons

CONCLUSIONS

Composition for solid waste produced in FCT during the wet and the dry season of 2017/ 2018 shows that the waste is heterogeneous in composition and made up of biodegradables(67%) and non-biodegradables(33%)Food /putrescible (47.1% - 57.1%), Textile (0.4% - 4.7%),paper(9% - 15.7%), glass/ceramics (1.8% - 5.5%),plastics (12.1% -21.3%), metals (2.2% - 5.7%); rubber (0.9 % - 7.1%) Wastes are usually collected from source without sorting .It is recommended that since averagely over 50% of waste is biodegradable, if properly sorted at point of collection, it could be composited and used for organic manure.

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