

An Assessment of Seasonal Variation of Waste Generation and Management in Cross River State, Nigeria

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Abstract: *The level of waste generation and management in Ugep and Ikom urban are of great concern to many scholars in environmental management. This paper attempt to assess the seasonal variation of waste generation and management in the two urban centre in Cross River State. One hundred and five copies of questionnaire were randomly distributed in each of urban centre to the residents in three major streets in the area. Information such as flash points, dump sites, types of waste and the frequency of waste disposal were captured in the questionnaire. Findings shows that there was no significant different in the seasonal variation of urban waste generation and management in the two areas under investigation which was evidenced in the tested hypothesis with high calculated value greater than the critical value of 1.56 at 0.05 level of significance. The fisher ISD test was further used to buttress the above assertion and the result indicate that family size influence the amount of waste generation in the two areas. However, the sustainability of the environment in these two areas depends on the various stakeholders in area*

Key words: *Urban environment, stakeholders, flash points, waste disposal.*

1. Introduction

In many countries of the developing world, solid wastes management has constituted a serious problem because of the low level of technology that is not sophisticated enough to handle the high rate of wastes generation (Baum, 1973). The rapid rate of urbanization and population growth in a large extend has contributed to the rate of waste generation especially in urban areas. Human population and rural-urban migration has increase through urbanization, natural increase rate and industrialization, yet the service rendered is not sizeable enough to control the high level of solid waste generated in urban areas and these has contributed to a large extent, the nuisance and the damaging effect of the urban environment (Sule, 2004). The rapid growth of the urban areas, according to David M. (1985), has resulted in increasing number of industrial establishments, and inhabitants. Increasing quantity of goods produced, increase in total income with corresponding increase in level of consumption led to substantial increase in the amount of solid wastes generated. Today, the rate at which waste is being generated is about 70% as compared to the total rate of its disposal which is 30% (Edu, 2003). No doubt Edu (2003) argued that waste could be anything which may not be directly useful or needed by man. In Nigeria, the dehumanizing effects of these circumstances in our urban lives and bighted environments has often been cited and noted as contributing causes of Nigerian

urban decay (Asuquo, 1979). Ugep and Ikom urban are not left out in this scenario despite the huge revenue allocated to waste disposal and management by the government, the rate of waste generation and management constitute a serious problem in area. (Ekpoh, 2003). Beside, areas are crowded with biodegradable and non-biodegradable waste which one cannot ascertain how they are disposed and managed hence it posed great threat to the urban environmental quality in the area. It is also surprise that the residents in these areas are ignorance of the problems associated with indiscriminate waste disposal, even when the dump sites are provided, the waste are liter around the environment. In this vein, one may ask why the residents are unable to manage their waste in an unacceptable manner, what is then responsible for the negative attitude of the people towards waste disposal and management in the area? Therefore, this paper seek to make a comparative analysis of waste generation management with specific reference to the types of types of waste, methods of waste disposal, frequency of waste disposal and waste evacuation in the areas.

2. Methodology

This study was conducted in Cross River State taking consideration two urban towns such as Ugep and Ikom. Three (3) streets each were used for this study of which sampled location were considered especially streets with flash points (i.e. where individual waste or domestic waste were empty before it is finally disposed. In Ugep the streets considered were Bikobiko, Usaja and Lekpakom while in Ikom Ochedere, Prince Niko and Bacha streets were considered. The rationale for using these major streets was base on the fact that these streets witnesses a high population and socio-economic activities which gives rise to high level of waste generation in the area. Data such as frequency of waste disposed types of waste generation and evacuation methods were obtained from the questionnaire administered to the residents in each of the urban centre. A sample population of 210 was drawn from the two areas of which 105 questionnaires each were randomly administered to residents in the area. However, the data obtained were analyzed using the One-way ANOVA.

3. Factors Influencing Solid Waste Generation

Solid waste generation is a product is brought about by many factors like population growth, urbanization, increase in per capital income, improvement in living standard of people and even technological advancement. Stren and Whyte, (1989) noted, as a result of rapid population growth and the increasing density of people and houses in major urban centres, the volumes of waste generated have grown tremendously, Unfortunately, the capacity of the municipal governments to handle this and other urban challenges is not commensurate with the rate of urbanization and the growth in magnitude of the urban problems. Piles of uncollected wastes are common in many urban centres in Africa, making the urban environment unhealthy, unclean and unattractive to investment. The greater the size of urban centres, the greater the level of environmental pollution.

This is because the inhabitants of these cities generate wastes that accentuate the size and volume of pollution. As these cities grows with increase population, the land areas decreases leaving little or not space for efficient waste disposal sites. Sule (1991). Over the last five decades, population of towns and cities in Nigeria has been on the increase by 5 percent per year. In the last ten years alone, the urban population had grown by more than 350 million people, Sule (2001). Most of these people are being drawn to the cities by the prospect of finding a better standard of living, which when achieved will result in the increase in daily consumption of food and in the rate at which people purchase good and materials thus discarding the old ones and as a result increase in solid waste generation. In the context of technological advancement, Sule (2004) noted the rich societies of the developed countries are likely to be more concern about the unfavorable effects of solid waste produced based on technological advancement than those nations in the

developing countries where poverty and hunger are the order of the day. Solid waste management is the collection, transport, processing, recycling or disposal of waste materials. The term usually relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, aesthetics, or amenity. Waste management is also carried out to reduce the materials effect on the environment, and to recover resources from them (Odum, 2007). Solid waste management practices differ for developed and developing countries, for urban and rural areas, and for residential and industrial producers. Management for non-hazardous residential and institutional waste in metropolitan areas is usually the responsibility of local government authorities, while management for non-hazardous commercial and industrial waste is usually the responsibility of the generator. Ekpoh (2003) argued that the solid management requires a more serious attention. This fact is true because, in Nigeria, inadequate attention about solid waste management has resulted in littering of waste everywhere. The nation, he added, need to pay more than usually attention about solid waste management. Well, in Nigeria, the Federal and State even the Local Government have set various solid waste management arrangements in many parts of the nation.

4. Findings

4.1 Types of waste generation

Types of waste generated in the area as shown in table I revealed that there was no significant variation in the types of waste generation in the two seasons as indicated with a maximum value of 54.28% and 50% which shows that majority of the waste generated in two seasons composed of garbage and vegetable waste while 14.75% of the waste were wood/glass and plastics. Table 1 shows that the sampled population in Ugep urban were of the opinion that garbage was the major waste generated in the area during wet season with a value of 34.28% which was on the high side compared to dry season with a value of 24.76%. This variation was wideness in Ikom urban with garbage having a low value of 17.14% during wet season compared to dry season with a high value of 27.61%. Accordingly, this situation was observed in the vegetable waste generated as presented in table 1.

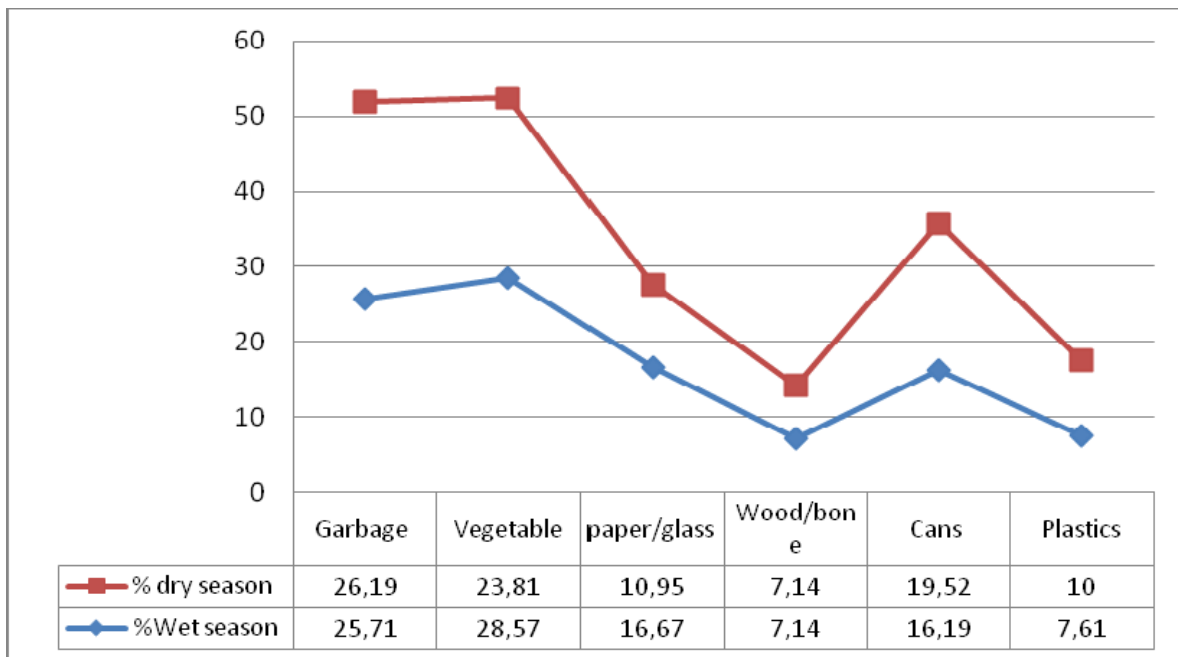
Table 1: Types of waste generated in the area

Variables	Types of waste generation Wet season				Types of waste generation Dry season				Percentage maximum Wet season	Percent age maximu m Dry season
	Ugep urban	Percentage	Ikom urban	Perce ntage	Ugep urban	Perce ntage	Ikom urban	Percentage		
Garbage	36	34.28	18	17.14	26	24.76	29	27.61	28.57	23.81+
Vegetable	30	28.57	30	28.57	29	27.61	21	20.00	-	-
Paper/glass	19	18.09	16	15.23	17	16.19	6	5.71	-	-
Wood/bone	10	9.52	5	4.75	13	12.38	2	1.90	7.14	7.14
Cans	9	8.57	25	23.80	11	10.47	30	28.57	-	-
Plastics	5	4.76	11	10.47	9	8.57	12	11.4	7.61	10.00
Total	105	100	105	100	105	100	105		+54.28 14.75	+50.00 17.14

Source: Field survey (2011)

However, the trend analysis of types of waste generation in the area presented in figure 1 shows a seasonal variation in the types of waste generated in the two areas which ranged from garbage, vegetables, paper/glass, wood/bone, cans and plastic waste.

Figure 1: Trend analysis of different types of waste generation in the area



Source: Field survey (2011)

4.2 Methods of waste disposal in the area

Table 2 which represent the methods of waste disposal shows that there is no significant variation in the methods of waste disposal in the dry season with a percentage maximum of 36.19% which indicate that waste were basically disposed in open pits and gutters. This result was also evidenced in wet season as 23.85% and 43.80% of waste generated were disposed in gutters with a variation in the methods of waste disposal as observed in a value of 45.75% compared to 41.90% which indicate that the residents in Ugep were used to disposing their waste in open pits and space during wet season which was contrary to 23.80% which shows that majority of the residents preferred dumping their waste in gutters during dry season. However, this was also obtained in dry season with 37.14% and 39.04% of the resident having the opinion that gutters and open pits constitute the major methods of waste disposal even though other methods such as backyard, cans and roadsides exist.

Table 2: Methods of waste disposal in the area

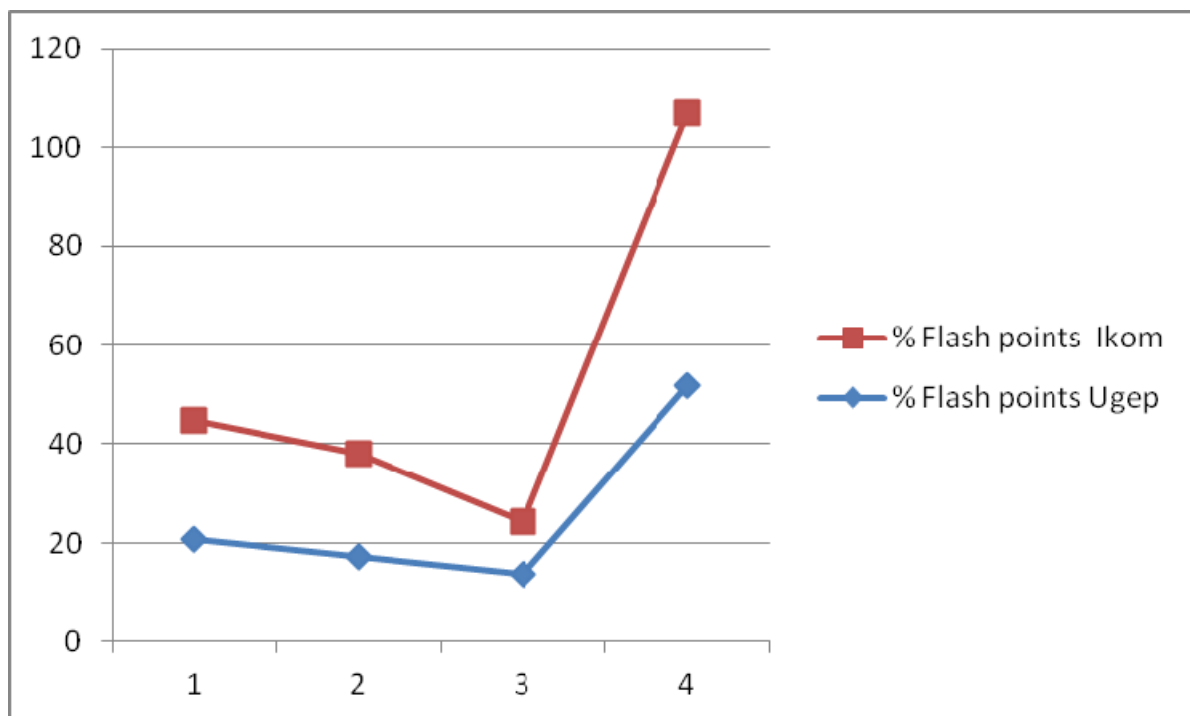
Variables	Wet season				Dry season				Percentage maximum Wet season	Percentage maximum Dry season
	Ugep urban	Percentage	lkom urban	Percentage	Ugep urban	Percentage	lkom urban	Percentage		
Waste cans	13	12.38	16	15.23	2	1.90	4	3.80	-	-
Backyards	18	12.00	5	4.76	4	3.80	6	5.71	-	-
Gutters	23	21.90	25	23.80	41	39.04	35	33.33	23.85	36.19
Pits, open space	48	45.75	44	41.90	39	37.14	37	35.23	43.80	36.19
Roadsides	3	2.85	15	14.28	19	18.09	23	21.90	-	-
Total	105	100	105	100	105	100	105	100		

Source: Field survey (2011)

4.3 Number of flash points

The number of flash points presented in figure 2 indicate the number of flash points located in both areas which varies from one another. This was observed in 55.15% flash points located in the streets in Ikom which was on the high side compared to 51.71% of the flash points in Ugep urban. Figure 2 shows that number of flash points in Prince Niko streets were high with a value of 24.13 compared to Bikobiko streets were high with a value of 24.13 compared to Bikobiko streets with a value of 20.68%. However, it was observed that Lekpakom and Ugep urban and Ndoma Egba street in Ikom recorded a low number of flash points with values of 13.79% and 10.34% respectively which shows that waste generation and management is very poor in these locations.

Figure 2: Number of flash points in the areas

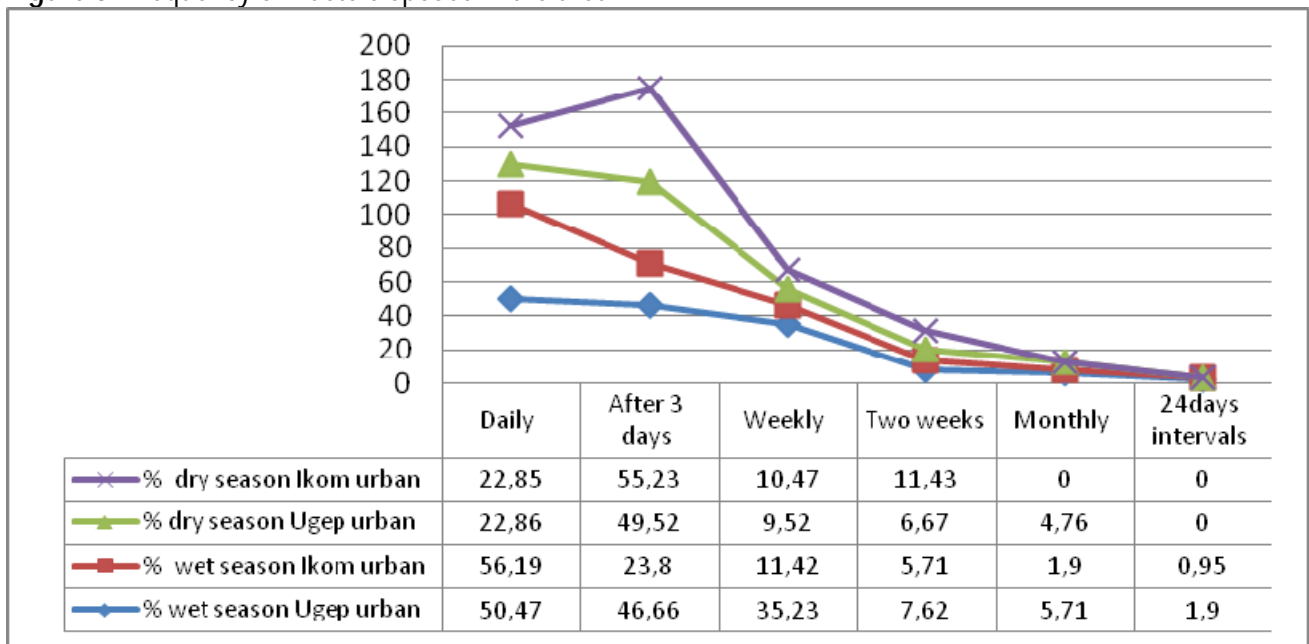


Source: Field survey (2011)

4.4 Frequency of waste generation

The frequency of waste generated presented in figure 3 indicate that 50.47% and 56.19% of the sampled population in both areas are of the opinion that waste were disposed on daily bases in both wet and dry season as also evidenced in wet season with maximum value of 48.57%. It was observed in figure 3 that majority of the sampled population are of the opinion that waste are evacuated and disposed after 3 days in both Ugep and Ikom urban with values of 49.52% and 55.23% respectively. However, a critical assessment shows that a maximum of 48.57% and 35.25% of the entire population sampled are of the opinion that waste were mostly disposed daily or after 3 days during wet season which was on the high side compared to dry season with values of 26.19% and 52.3% respectively.

Figure 3: Frequency of waste disposed in the area



Source: Field survey (2011)

5. Result analysis

Result on the analysis of the influence of family size on the rate of waste generation as shown in table 3 indicate a high calculated of 6.42 which was greater than 4.07 critical f-value at 0.05 level of significance. This result shows that family size has a significant influence on waste generation as shown in table 3. The fishers' least significance difference (LSD) post hoe test was used to assess if or not the class of family size greatly influences the amount of waste generation in the study area as presented in table 4. The LSD post hoe test shows that the significant t-values was observed between groups '1' and 2, 3, 4, 1 and 5, 2 and 3, 2 and 4; and between groups '2' and e and also significant difference between groups 1 and 2, 3 and d and between group 3 and 4. The interpretation of this result shows that there was a significant difference in the rate of waste generation between the group the t-values are significant below the diagonal as presented in the fisher's LSD test I. In each of the group, the calculated t-values was greater than the critical t-value of 1.56 at 0.05 level of significance.

Table 3: Fishers' LSD of the influence of family size on the rate of waste generation

Group	Family size	1 (n ₁ -31)	2 (n ₂ -26)	3 (n ₃ -50)	4 (n ₄ -45)	5 (n ₅ -17)
	1-2	42.03	-0.10	-6.33	-3.78	-3.20
	3-4	-0.17	41.20	-6.04	-3.35	-3.17
	5-7	-6.33*	-7.54*	43.30	0.56	0.74
	8-10	-5.44*	-6.73*	1.02	42.64	0.19
	11 and above	-3.47*	-44.0*	0.65	0.19	43.39
			Msw = 7.94			

Source: Data analysis (2011)

6. Recommendations

It was observed from the findings that accept waste generation and management is revolutionaries in the areas under investigation, the problems of waste generation and management would continue to persist. Therefore, the following are recommended if the problems of waste must be averted in the areas.

- Effective campaign should be carried out for residents to see the necessity of consciousness with regards waste disposal and management.
- Government should re-introduced the monthly sanitation in order to make the people more conscious of the purity of their surroundings.
- Government should provide adequate funds for proper execution of environmental programs . This would help secure new modern waste management technology that could help correct the negative attitude of citizens towards waste disposal and management.
- Open dump sites should be declared out of bound as they are always in a state of abuse by the people

7. Conclusion

Today, waste generation has generated great concern to many scholars in environmental studies due to its impact on the human health and sanity. The study shows that both residents in Ugep and Ikom were not conscious of the implication of poor waste management which has resulted to the poor nature of the human ecosystem in the two cities. However, since environmental enlightenment changes the people's attitudes towards waste management, there is need for urgent enlightenment programs that would help educate the people on waste management and control in the area

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