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Assessment of Solid Waste Management in Idemili North Local Government Council

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Abstract **– This paper examines the implications of continuous increasing in generation of wastes despite the management processes in Nigeria with particular reference to Idemili North Local Government Council. The volume of waste generated does not actually constitute major environmental problems, but the inability of governments, individuals and waste disposal agencies to keep up with the task of proper and efficient management of waste, constitute the burden of environmental management. This has some socio economic and political implications on sustainable development, while the management of waste is a matter of national and international concern. Recent events in major cities of world have shown that the problems of waste management have become a "monster" that has aborted most efforts made by international, federal governments, state, and Local Government authorities. Questionnaires were administered with respect to demographic and waste management data in five zones of the town. The rate of waste generation was determined by using household approach, which involved sorting and weighing of wastes respectively. The data obtained were subjected to statistical analysis using ANOVA and Chi- Square tests. The results showed that there was significant variation in the composition of waste generated. The amount of waste generated per day was estimated at 23,841 kg. In general management of solid waste in Idemili North Local Government Council is not satisfactory calling for more concerted efforts in the areas of public enlightenment campaigns, regular collection and disposal of generated wastes and extension of services to cover more inhabitants of the town.**

Keywords **– Solid Wastes, Management, Environment, Idemili North Local Government Council.**

I. INTRODUCTION

Idemili North Local Government Area is in the central senatorial district of Anambra state. Idemili North Local Government Area was created in 1996. It was carved out of the former Idemili Local Government Area with its headquarters at Ogidi. Idemili North Local Government Area shares boundaries with Omagba Onitsha North Local Government Council, Nkwelle-Ezunaka, OgbunikeOyi Local Government Council, Umudioka, Umunachi Dunukofia Local Government Council, Abagana, Nimo Njikoka Local Government Counil, Neni, Adazi-aniAnocha Local Government Council, Alor, Nnobi, Oba Idemili South Local Government Council and OkpokoOgbaru Local Government Council.

It has a land area of approximately 23.756sq kilometres with projected population of 321,611 people. It is one of the largest local government areas and is made up of ten autonomous communities with 13 wards. The autonomous communities are Abacha, Abatete, Ezi-owelle, Ideai, Nkpor, Obosi, Ogidi, Oraukwu, Uke and Umuoji. Idemili North Local Government Area has about 51 primary schools, 10 secondary schools, and 16 recognized private commercial/vocational schools. Idemili North Local Government Area houses the Anambra state high court Ogidi and Anambra state building material market Ogidi.
According to Mbaneme, F.C.N et al (2012) the people of Idemili North L. G. A. are blessed with enviable cultural heritage which has been compromised by the increasing influence of modernity and urbanization, they are proud of their culture. They are also annual festivals like Emennwafor festival Ogidi that is celebrated after every planting season, Ito ogboObosi, Orumuonannunumuo Umuoji etc.

Idemili North L. G. A. is blessed with rich soil, which supports Agriculture. The populace is predominantly Yam and cassava farmers and therefore produces a lot of cassava fufu along with other food crops such as cocoyam, maize, plantain, banana, orange paw-paw coco-nut, mango, bitter-leaf, goat and poultry are also reared in subsistence and commercial quantities like EmekaOkuku farm, Idemili farm, etc at Ogidi. There are many co-operative activities handling commercial and agricultural concern including fish farming.

Map of Nigeria Showing the Position of Anambra State

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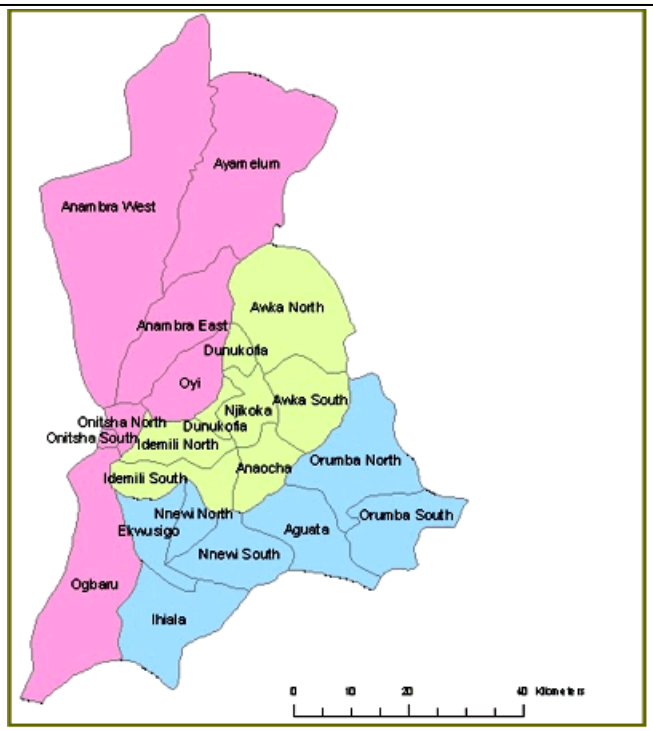

Map of Anambra State Showing the Council Areas

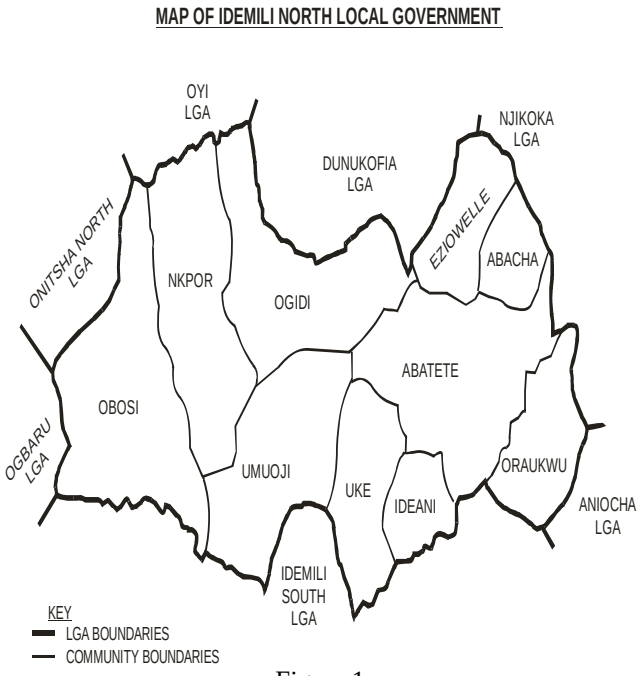

Figure 1

The increase in population is not without the attendant increase in domestic waste generation. Hudson and David (1977) observed that in every human settlement, the microscopic unit of waste generation is the household. The rate of generation in the household is related to its size, lifestyle, type and quality of housing among other socio-economic characteristics. In Nigeria, urban generated solid waste crises is highly attributed to three factors: rapid increase in population, heavy consumption pattern of urban dwellers and inefficiency of the authorities whose statutory roles include efficient refuse management (Ajadike, 2001). The Federal Ministry of Environment (2002) attributed the problem of solid waste in urban areas to the following: i) Overgrowing urban population with its characteristic increase in the rate of solid waste generation; ii) Inability of the local government councils to cope with the problem of solid waste management due to inadequate technical and financial resources; iii) Peoples belief that solid waste management is a social service and hence their unwillingness to pay for disposal charges ; iv) The inability of people to discern what constitute wastes, reusable wastes, recyclable wastes, biodegradable and non-biodegradable wastes; and v) Investment in functional waste treatment and enforcement of anti-pollution laws are given low priority in developing countries. The management of solid waste involves the processes that are undertaken to control and eliminate wastes from the environment. This essentially entails the processes of generation, onsite storage, collection, transfer and transport, processing and disposal of solid waste. (Adegoke, 1990).

II. Materials and Method

The study was carried out in five different parts ofIdemili North Local Government Area and its' environs, namely: Awada zone, Ozalla zone, Amafor West, Amafor East Amafor central and Odume zone. The method involved the administration of questionnaires to 3,000 respondents in these areas. The first part of the questionnaire sought to obtain demographic data such as age, sex, marital status, family size, educational level, occupation, income status and ethnic group. The second part was to obtain information on waste management as regards: cleanliness of the environment, disposal methods, and environmental effect of solid wastes among others. Of the 3,000 questionnaires administered 2880, were received given 96% response. Household approach was used in determining the rate of waste generation in the town. This involved sorting out and weighing wastes from selected households for five consecutive days. One household was selected from each zone. The rates were obtained by dividing the waste measured (in kg) by the number of people in the household. The average for the Council area was then obtained by adding individual rates for the different zones and dividing by the number of households used. Variation in the composition of waste was tested using analysis of variance (ANOVA), while the Chi-Square (X 2) technique was used to test for relationships between household size and amount of waste generated, educational attitude to people's waste disposal methods and income versus peoples demand for improved solid waste management.

II. Results and Discussion

Table 1 show that 57.3% of the respondents are females while 42.7% are males. Also, majority (59.1%) of the respondents fall within the economically active group (20-

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50 years). The interest here is that they have the purchasing power to consume and hence generate wastes. A good proportion of the respondents are married. But singles dominate by a narrow margin as shown in Table 2. Married life affects family size which in turn influences consumption patterns and waste generation and management. Married people encourage meals that are African in nature and minimum packaged food with attendant wastes like cellophane materials. Single people on the other hand consume more of packaged foods which generate cellophane materials as wastes.

With respect to the family size, most families have less than 5 members, or at most 6-10 persons as depicted in Table 3. Large families generate more waste than small size families.

Income status of a people is an instrumental factor in demanding for goods and services. The income status of the respondents is presented in Table 4.The table reveals that 39% of the respondents earn between 6,000.00 – 15,000.00 per month; while 38.4% of the respondents earn less than 5,000.00 per month. The rest earn above 15,000.00 per month. These figures were chosen because they represent the ranges within which peoples income fall. It is clear that low income earners (≤ 15,000.00) dominate the sample surveyed (77.4%)

The degree of a problem is visualized by the perception of the people affected or concerned. In the study area, majority of the people considered the problem of managing solid wastes as very serious (50.4%) as indicated in Table 5. In terms of cleanliness of the area, 27.5% of the people described the area as being very dirty and 37.4 believe the area is dirty (see Table 6). The preference of educated people to adopt better methods of waste disposal could be higher than illiterates, see Table 7. It is obvious from the table that most of the people who throw refuse on open land and drains are uneducated. Those who keep waste bins or burn it are mostly those with higher education.

Table 7 shows that 26.3%, 20% and 6.5% of the respondents dispose their waste on farmland, drain and street respectively. Only 17.5% of the respondents deposit their waste in refuse receptacles where they can be transferred to the designated points for ultimate disposal. This shows that solid waste disposal management fall short of expectations in urban areas of Idemili North Local Government Council Area because of use of unconventional and non- environmental friendly methods of disposal. Table 8 shows the frequency of removal of solid wastes by government agencies. Majority (49.4%) of the respondents reported that wastes are not removed from their areas. While 26.4% of the respondents said wastes are evacuated from their area on monthly basis. This delay in the removal of wastes from points of generation constitutes a potential source of pollution. According to Mbaneme F C N. et al (2012) Part of the difficulty in assessing the health effects of contamination is uncertainty about the dose-response relationship. In addition, we must realize that addressing one type of contamination does not necessarily eliminate, and may even increase, other sources of contamination. For instance, pollution of groundwater by leaching and percolation and stream waters by surface runoff. Besides delay in evacuation, public enlightenment campaigns to sensitize the public on the need to preserve the quality of the environment have not being satisfactory. Mbaneme et al (2012) maintained that many VOCs are also suspected of causing kidney and liver damage. It is important to note that even if these chemicals are not directly ingested through drinking water, they may be inhaled or absorbed into the skin due to exposure to decomposing refuse heaps.

The household solid waste composition in Idemili North Local Government Council was studied by sorting and weighing. From Table 10, it shows that the dominant materials are Polythene/cellophane (19.3%) while putrescible i.e. food remnants, fresh leaves and vegetation etc. is 16.7%. The decomposable wastes could be reused as compost manures. Others such as papers and metals are recyclable.

Table 11 shows rate of solid waste generation in the study area. Awada Layout generates 0.50 kg/p/day and is the highest for the area. While the least value of 0.44 kg/p/day was obtained in Amafor Central. On average, the rate of generation of solid waste in the study area is 0.47 kg/p/day.

III. Statistical Analysis

Hypothesis I

Ho – There is no significant variation in the composition of household solid waste generated in Idemili North Local Government Council.

The data in Table 10 was subjected to ANOVA F ratio test because of its reliability in testing variation among samples. The statistics is shown in Tables 12a and 12b. The computed ANOVA is summarized as follows:

(i) Total Variance (Total Sum of Square, TSS) = $\Sigma x^2 - \frac{(\Sigma X)2}{N} = 780$

(ii) Total Degrees of Freedom (D/F total) = N – 1 = 32 -1 = 31

(iii) Between Samples Sum of Squares (BSS) = $\frac{\Sigma X1}{nX_2} + \frac{(\Sigma \chi_2)2}{n\chi_2} + \frac{(\Sigma \chi_3)2}{n\chi_3} + \frac{(\Sigma \chi_3)2}{n\chi_3} = 5000$

(iv) Between Samples D/F = K – 1 = 8 – 1 = 7 v.

(v) Within Samples Sum of Squares, WSS = TSS – BSS = 780 -5000 = -4220

(vi) WSS D/F = D/F total – BSS D/F = 31 – 7 = 24

F-calculated = 3.34(2.55), while the value of F from table is 2.49. Hence we reject H o and H 1 because F calculated is greater than F-tabulated. This implies there is significant variation in the composition of the household solid wastes generated in Idemili North Local Government Council.

Hypothesis II

Ho – There is no significant relationship between household size and amount of wastes generated. The Chi-Square statistics was employed for this analysis. It's appropriate in this case because it compares differences

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between observed and expected (theoretical) frequencies. The values in column three below (Table 13) are obtained from Table 3. The expected frequency for a unicolumn table is given by the mean as 179.5. While Chi- Square is given as X 3 = ∑ (0-E) 3 /3 and Degree of Freedom (D/F) = N – 1 = 4 - 1 = 3

The critical value of X 2 of 2 at 0.05 level is 5.99 from table (less than 164 calculated, see Table 13). Hence we reject H o and accept H 1. This means there is significant relationship between household size and amount of wastes generated. The results of the Chi-Square test on the other parameters revealed that:

(i) Education has significant effect on the people's disposal methods.

(ii) The effect of income on willingness to pay for solid waste management services is significant

IV. Implication of Poor Solid Waste Management on the Environment

The volume of waste generated in any city is often reflection of the intensity of human activities such as population urbanization and social development, resources exploitation and unchecked technological advances. All these activities generated one form of waste or the other. And the volume of waste generated has also increased tremendously .the implication of this is that we have more waste to cope with (Adesina, 1983).

The European Union (1975) defines waste as an object the holder discards, intends to discard or is required to discard is waste under the waste Framework Directive (European Directive 75|44|ECas amended). Once a substances or object has become waste, it will remain waste until it has been fully recovered and no longer poses a potential threat to environmental health.

The UK Environmental Protection Act 1990, indicated that waste includes any substances which constitutes a scrap materials, an effluent or other unwanted surplus arising from the application of any process or any substance or article which requires to be disposed of which has been broken, worn out, contaminated or otherwise spoiled, this is supplemented with anything which is discarded otherwise dealt with as if it were waste shall be presumed to be waste unless the contrary is proved. Environment health conditions may also be indirectly affected through the pollution of ground and surface water by lactates from disposal sites.

Air pollution is often caused by open burning at dumps, and foul odours and wind-blown litter are common. Methane, an important greenhouse gas, is a by-product of the anaerobic decomposition of organic wastes in deposit sites. In addition, waste dumps may also be a source of airborne bacterial spores and aerosols. The proliferation of vermin and disease vectors depends, in part, upon indiscriminate dump sites awaiting final disposal number of natural and developmental conditions. The air emissions and leachates generated as a result of decomposition of waste may contaminate air, surface and groundwater sources; fire hazards and explosions cause public health risks as well. The emission of greenhouse gases, rats and fly infestation and nuisance effects are among the health and environmental impacts of poor solid waste management. In addition, scattering of wastes by wind and scavenging by birds, animals and waste pickers creates aesthetic nuisance. Malodour emanating due to the degradation of the waste in the dumpsite has nuisance effect and decreases the economic and social values in the locality.

Poor solid waste management has the potential of causing flooding. It provides and encourages breeding places for macro and micro-organisms which are dangerous to human health and our properties. It also encourages the spread of diseases, pollution of ground and surface waters, air pollution, land pollution and can distort the aesthetics nature of the environment. It leads to road traffic and could even result in road accident due to obstruction of traffic flow. Plate 4 shows the road traffic caused by refuse dumped on the road along UmuojiNkpor road Nkpor.

V. Recommendations

Public awareness and attitudes to waste can affect the whole waste management system. All steps in waste management starting from household waste storage, to waste segregation recycling.

Government should conduct a pilot projects and expanding awareness among the populace. It is therefore recommended that: (i) Government's effort should be intensified in the areas of awareness campaigns, provision of equipment and personnel in removing solid wastes as well as ensuring compliance with existing environmental laws. (ii) Composting the putrescible part of the wastes will be a source of raw material in organic fertilizer blending plants.

VI. Conclusion

The processes of field survey, data collection, administration of questionnaires and data analysis has been presented in this report. Based on the findings, the following conclusions are drawn:

1. Demographic variables like occupancy rate, socio-economic class and education affect solid waste management. The greater the size of the household the greater the tendency to generate more wastes.
2. Many people (64% of the respondents) believe that it is the responsibility of the government to manage solid waste and hence have care free attitude towards the management of the environment.
3. Government's management of solid waste is inadequate. This manifests in delays in collection of wastes for disposal and near absence of service in some areas. Also, public enlightenment campaigns have not been satisfactory.
4. There is significant variation in the composition of household wastes; the dominant materials are putrescible and polyphone/cellophane.

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Sir Franklyn Chukwudi Nweke Mbaneme
holds a degree in Philosophy from the University of Nigeria, Nsukka, Environmental Health Technology from College of Health Technology Anambra State, Agricultural Science from Federal Polytechnic Okoh Anambra State, Post Graduate Diploma in Public Health from Imo State University, Masters Degree in Environmental Pollution Control Technology (M. Tech.) and Geo-Environmental Technology (M. Sc.) from Federal University of Technology, Owerri, Imo State, Nigeria. He works with Health Department Local Government Service Commission, attached to Onitsha South Local Government Area Council and involve since 2009 in coordination of public awareness of menace of wastes and illegal structure programme, an organ of enlightenment and Waste management campaign of Anambra State Local Government System.
He has been involved in projects on Tuberculosis and Onchocerciasis Control in Idemili North Local Government Council, Building quality Control, Environmental Impact Assessment, Environmental Audit, waste evacuation, planning and biological treatment of waste.

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Table 1: Distribution of Respondents gender and age

Age	Males	Females	Total	%
Less than 18 years	140	560	700	24.3
18 – 50 yrs.	978	726	1704	59.1
51 yrs. and above	111	365	476	16.6
Total	1229	1651	2880	100

Table 2: Respondents Marital Status

Marital Status	Number	%
Married	1168	40.5
Single	1400	48.6
Separated	67	2.3
Widow	155	5.3
Widower	90	3.3
Total	2880	100

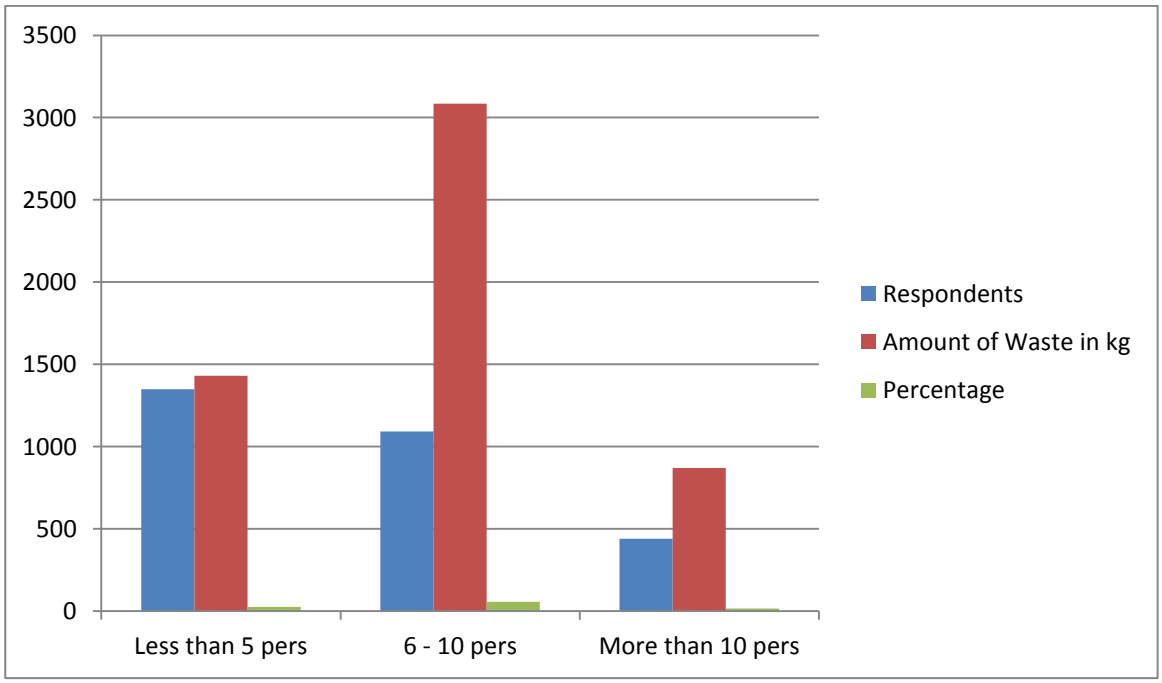

Table 3: Respondents Family Size and of Wastes Generation

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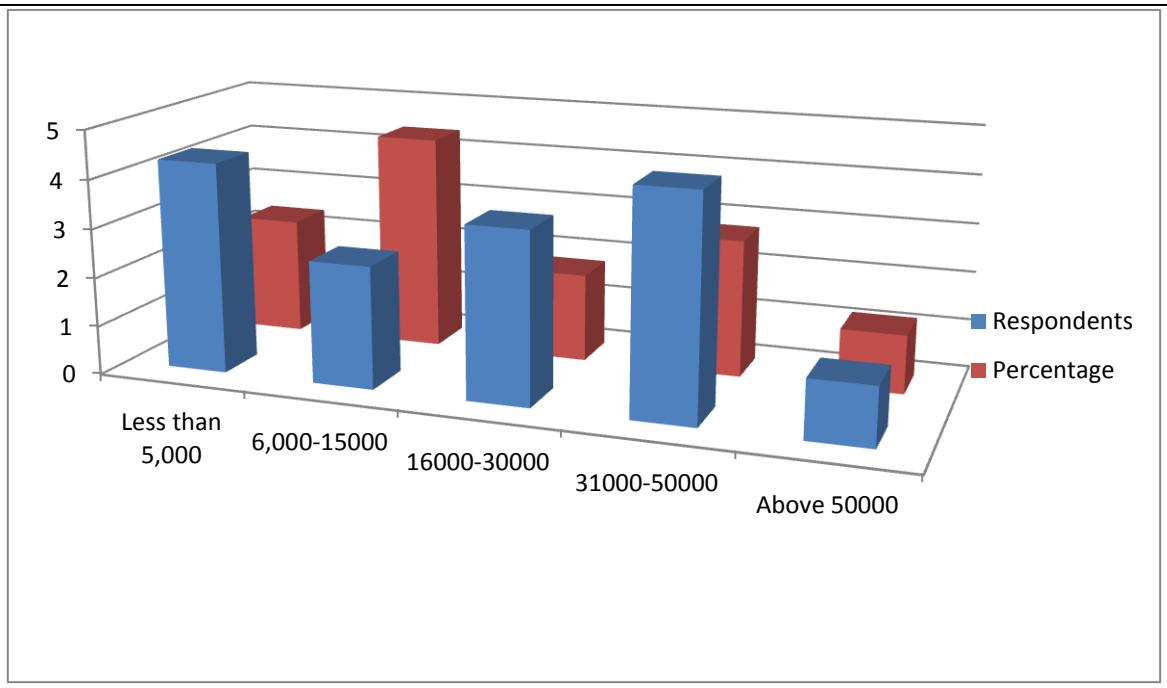

Table 4: Respondents Monthly Income Status

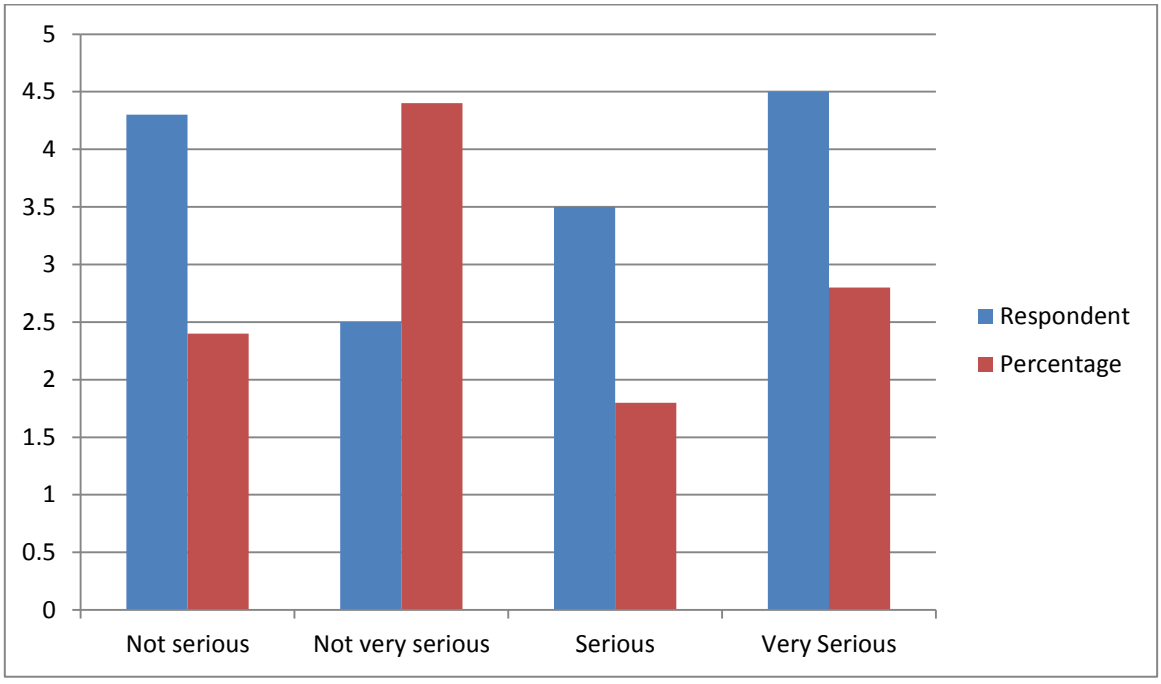

Table 5: Respondents Level of Solid Waste Management Problem

Table 6: Cleanliness of the Area

Situation	Respondents	%
Very dirty	792	27.5
Dirty	1078	37.4
Okay	780	27.1
Clean	91	3.2
Very clean	139	4.8
Total	2880	100

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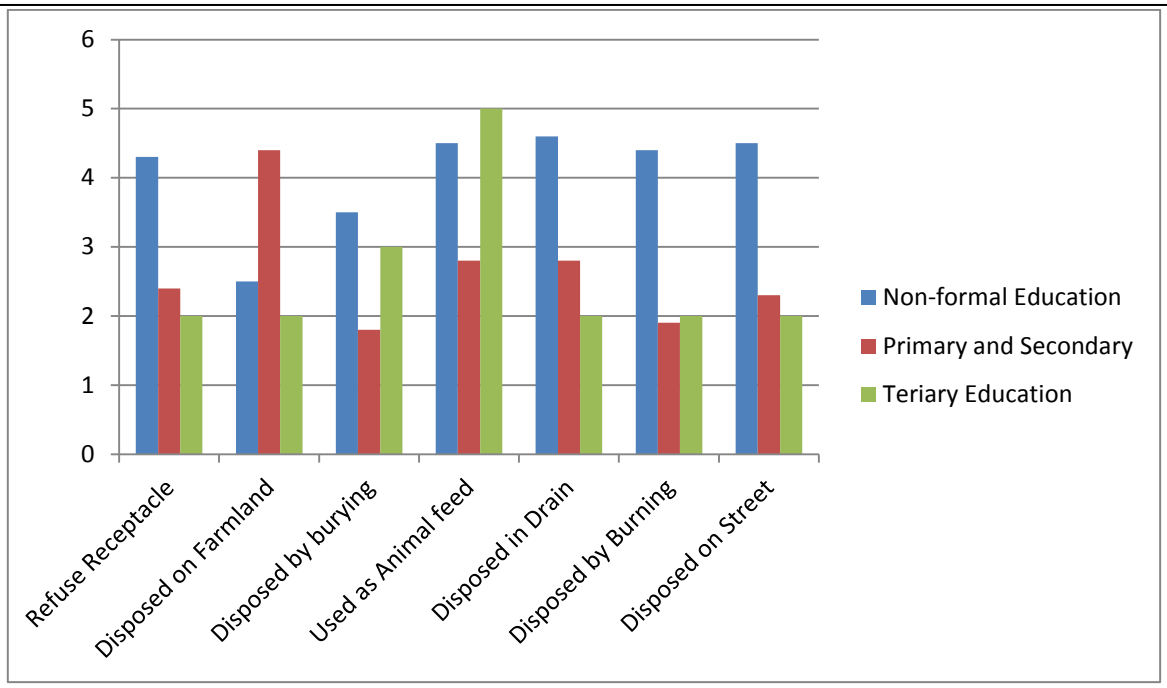

Table 7: Respondents Educational Levels and Methods of Refuse Disposal

Table 8: Frequency of Refuse Removal by Government

Frequency	Responses	%
Daily	280	9.7
Weekly	417	14.5
Monthly	761	26.4
None	1422	49.4
Total	2880	100

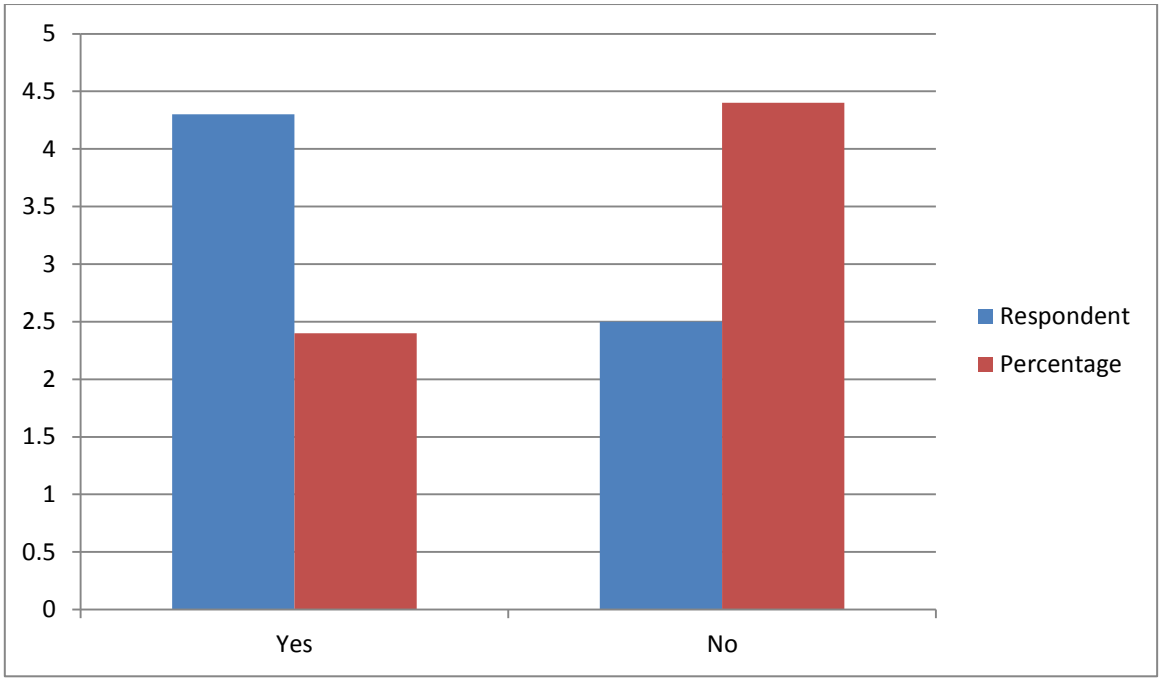

Table 9: Level of Awareness of Waste Disposal Campaign

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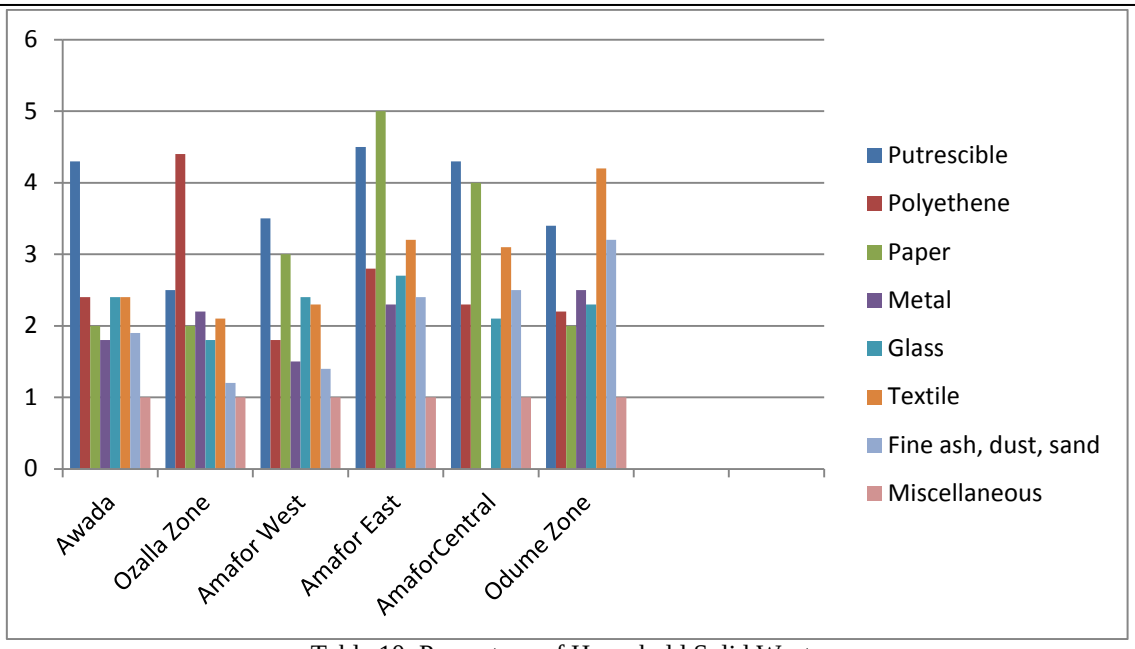

Table 10: Percentage of Household Solid Waste

Table 11: Rates of Household Solid Waste Generation

Zone	Rate (in kg/p/day
Awada	0.50
Ozzalla	0.49
Amafor West	0.48
Amafor East	0.45
Amafor Central	0.44
Odume Layout	0.48

Table 12a: ANOVA Statistic for HoI

Composition	Awada	Ozalla	AmaforEast	Odume	χ_1^2	χ_2^2	χ_3^2	χ_4^2
Putrescibles	18	20	15	16	324	400	225	256
Polythene/cellophane	17	22	20	20	289	484	400	400
Paper	10	10	14	12	100	100	196	144
Metal	20	15	9	16	400	225	81	256
Glass	15	12	8	9	225	144	64	81
Textiles	10	11	13	12	100	121	169	144
Fines (ash, dust,sand)	6	5	13	9	36	25	169	81
Miscellaneous	4	5	8	6	16	25	64	36
	$\Sigma\chi_1$=100	$\Sigma\chi_2$=100	$\Sigma\chi_3$=100	$\Sigma\chi_4$=100	$\Sigma\chi_1$=1490	$\Sigma\chi_2$=1524	$\Sigma\chi_3$=1368	$\Sigma\chi_4$=1398

Table 12b: ANOVA F- Ratio Table for Ho1

(a) Sources of Variance, (SV)		(b) Sum of Squares, (Ss)	(c) Degree of Freedom (D/F)	(d) Variance Estimate (V/E)
1	Between Samples	5000	3	
2	Within Samples	-4220	28	
3	Total Variance	780	31	

Table 13: Chi-Square Frequency Table for HoII

Household Size	Number of Responses	Amount in Kg	%
Less than 5 persons	1348	1430	26.6
6-10 persons	1092	3084	57.3
More than 10 persons	440	871.1	16.1
Total	2,880	5385.1	100

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Plate 1: Road Traffic congestion

Plate 2: Littered waste

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Plate 3: Over Filled Receptacle

Plate 4: Inadequate Refusebin

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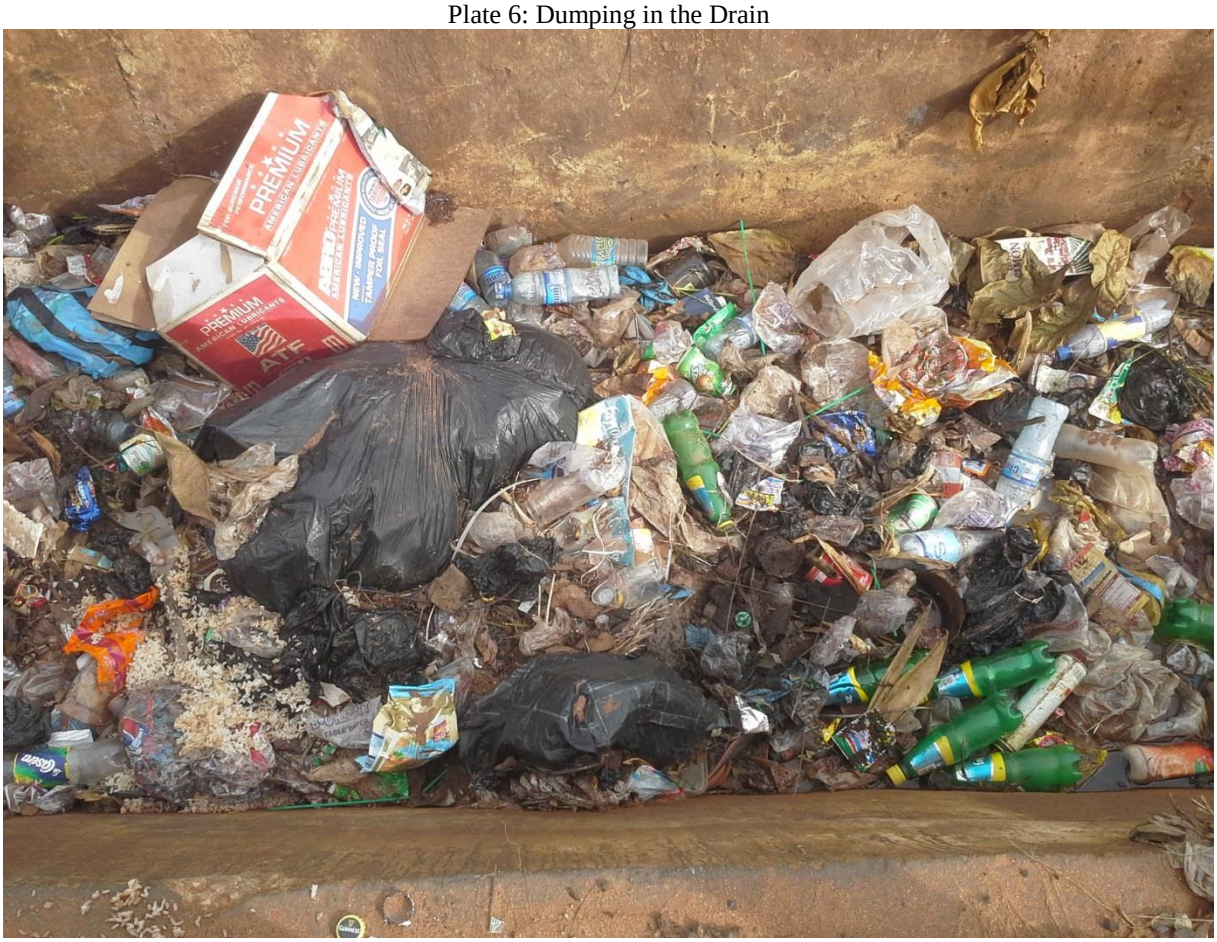
Plate 5: Poor way of Waste Transportation

Plate 6: Dumping in the Drain



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