MANAGING THE UNWANTED MATERIALS: THE AGONY OF SOLID WASTE MANAGEMENT IN IBADAN METROPOLISES, NIGERIA.

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Abstract

The problem of solid waste disposal in urban centres in developing countries is a major concern to governments; this problem become worrisome in Nigeria where the generation is always on the increase because of increase population pressure and some socio-economic factors. This study examines the influence of socio-economic factors on solid waste generation and disposal in Ibadan Metropolis, Nigeria. The objectives of the study are to identify the socio-economic characteristics of the people in the area, and the composition of solid waste generated, to identity the methods of disposal and relationship that exist between the socio-economic characteristics of the people and solid waste generation and disposal. Data for this study were obtained through the administration of questionnaires, direct interview and review of existing literature. The data obtained from the field was analyzed using frequency and correlation matrix. The findings show that the composition of waste generated in Ibadan Metropolis is a reflection of variation of socio-economic factors of the people. Also,the socio-economic factors such as income, age, education, occupation and building types have greater influence in the choice of methods of disposal in Ibadan Metropolis. The paper recommends the adoption of urban renewal strategy for the chaotic areas, provision of sizable fund by the government and environmental education to the people among others.

Keywords: Socio- economic Factors, Solid waste, Generation, Disposal, Ibadan metropolis

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1.Introduction

Nigerian among the other third world countries is witnessing an unprecedented growth of cities in recent time. The country's high population figure has series of implication for every aspect of people socio-economic and cultural life style. For instance, with the pressure in urban population, existing facilities such as, water electricity, road, educational institution, housing become inadequate and solid waste generation and disposal take unprecedented precarious dimension. Still on solid waste, it was estimated that about 20kg of solid waste is generated per capital per annum in Nigeria. For instance, Lagos alone generates over10,000 tones of solid waste daily (WHO 2006).The volume of solid generated sometimes over-whelmed urban administrator's capacity to plan for their collection and deposal. Attempts to solve this problem effectively have given rise to myriad of strategies involving measurable amount of capital and human resources. These strategies yielded little or no positive impact on the physical urban environment of Nigeria cities.

The resultant effects of the problems of solid waste management include the streets of managing, streams and drainages are usually blocked, unkempt environment among others. Theses contribute more to the frequently occurring flood disasters in most cities of Nigeria. Scholars in the field of environmental management such as Rushbook and Pugh (1999) Ikporukpo (1993) Adedibu (1993), Abumere (1987) and Omuta (1987) advocated that to evolve an effective solid waste management strategy, the need to carry out research on socio-economic characteristics of the residents as well as physical characteristics of different residential districts within an urban space is of paramount importance. Despite this clarion calls at various points in time, not much study have been focused at estimating the volume, composition and per capital refuse generation in Nigeria urban centres.

Adedibu (1993), for instance, opined that the nature and composition of solid waste generation is a product of the climatic and business activities of the urban centers. Abumere (1983) in his own study of solid waste generation in Ibadan, he examined the effect of socio-cultural factors on land use pattern such as housing density, eating habits etc. His finding shows that solid waste accumulation is a product of chaotic land use pattern. Also the number of household living and eating habit in a house greatly determines by the level and composition of refuse to be generated.

An assessment of the socio-economic factors that affect solid waste generation and disposal in Ibadan is of great importance in order to safeguard the city from various problems that could emanate from improper solid waste management. It is on this note that the study attempts an examination of the impact of socio-economic factors on solid waste generation and disposal by positing the case of Ibadan Metropolis.

The consequences of solid waste management problem are that urban street, streams and drainage are usually blocked given rise to flood disaster in most of the country's urban centers. The focus of

this study is the examination of the effect of socio-economic factors on solid waste generation and disposal by positing the case of Ibadan Metropolis.

2 Research Methodology

Data for this study were obtained from primary and secondary sources. The data were obtained through direct interview technique and questionnaires administration; information was sought out on the socio-economic and personal characteristics of the respondents. The questionnaires also addressed the issue of the composition and methods of solid waste storage, generation and disposal in Ibadan metropolis.

The secondary data were collected through the review of relevant literature on solid waste generation and disposal. Similarity, documents were obtained from various agencies concerning the waste management such as Environmental Unit of the Local Government councils of Ibadan metropolis. The local Government visited includes Ibadan North, Ibadan North East, Ibadan North-West, Ibadan South-East, Ibadan South West and Akinyele Local Government. Also visited were the Urban Sanitation Committee which comprises of the five local governments, environment units of the core area of Ibadan and Department of Geography, University of Ibadan. Information collected through the secondary source were the land use map of Ibadan, staff strength, equipment used for refuse storage and disposal as well as location of dumpsite in the study area.

The wards and indeed the house in the study area constitute the sampling frame. The city was divided into densities namely high, medium and low density zones. The demarcation into wards was done with the aid of Urban Land use map of Ibadan Metropolitan Area. The Map was divided into 33 density zones, 20 of which were classified as high density while medium and low densities were 7 and 6 respectively. From these densities, a sample 20% of the zones was selected using systematic random sampling technique in which one out of every five zones was taken. In all, a total of 6 zones were selected. The zone selected includes Agodi, Aperin, Orogun, and Ojo which are in high density zone. The other two Oke-Bola and Oluyole Estate are in medium and low density zones respectively.

Similarly, a systematic random sampling technique was also used for selecting the houses from where respondents were selected for the interview 10% of sample of the houses were selected for the survey in which one out of every ten houses was selected for the survey. In all, a total of 215 questionnaires was administered on 215 households in the study area. This means that one household was selected per house for the purpose of the questionnaires administration. The data collected through this medium was analysed by analytical table of frequency and correlation analysis.

3 Literature Review

Solid water has been regarded as discarded materials arising from operational activities taken place in different land use Domestic or residential waste are those that are collected from dwelling on a regular basis such waste include organic matter resulting from preparation and consummation of food. Rags, nylon and ashes are the remains after various cooking and heating process. The commercial wastes are those that arise from shops, supermarket, market and others. They include paper, carton, polythene bags, and nylon etc. The industrial wastes as well are those that arise from industries. These could be solid, liquid and sludge as well as emotive title attached to them like toxic, hazardous and special waste. They include metals, scraps, chips and grits from machine, shops, sawdust, paper pieces and glass.

The transport wastes on the other hands are large motor parts, wreckage of vehicles, tires, street refuse like dirt, containers, receptacle among others (NEST, 1991; PAI International Association, 1982). Kenneth and Huie (1983) also classified solid waste principally into three, namely; garbage, ashes and rubbish. The garbage is said to include organic matter resulting from preparation and consummation of food. Ashes include remain of cooking and heating process while rubbish may take the form of combustible such as paper, rags, woods, leaves and weeds or non-combustible such as glass and metal materials.

Scholars in the field of environment management have attracted the composition of solid waste generation and disposal to culture and climatic factors. Adedibu(1993) argued that the nature and composition of solid waste is a product of climatic and business activities in urban centre. He argued further that most of the agricultural produce such as maize, cassava, vegetables, millet are brought unprocessed during the rainy and harvesting seasons from the hereby farm. Hale (1979) used the income variable for determine the magnitude and composition of solid waste. In his own study of composition of solid waste in United State of America, he observed that high income group produced more of paper waste than the low income area which produced more essentially metals and non-paper waste on the bases of culture, Abumere (1983) carried out a surely on solid waste generation in Ibadan, he examines the effect of eating habit on the composition of the waste. He discovered that the majority of the population irrespective of their income level are used to food wrapped with leaves therefore the composition wastes generated follows the pattern of eating habit, since most of the waste comes from residential area.

Also, Adedibu (1993) contends that the composition of solid waste is freely influenced by the occupation of the resident since the majority of urban populations are farmers and many of them still hold allegiance to the rural hinterland. They usually commune between the urban and rural settlement to bring raw foods items such as maize, cassava, yam to sell in the city. The waste generated during the processing of these food items is organic matter which are left un-disposed in the city. Furthermore, various occupational activities s in urban centres such as in shops, butchery, automobile mechanic, welding, generate metals, electronic waste, rag, plastic, bones, tire, and wreckage of abandon vehicles.

The composition of refuse generated in an area determines the type of disposal method suitable for a particular form of refuse. Also the effectiveness of a collection system depends on the cooperation of households and individuals in various sectors of the city in providing containers for storing refuse in accordance with the regulation and regularly placing the materials for collection (Afon, 2003). The equipment used for collection operation is classified into two categories. The first category comprises of those equipment that facilitate the temporary storage of refuse as well as subsequent transfer of waste from point of generation to the collecting facilities. Such equipment include refuse bags, plastic basket, disposed or unused baskets, polythene bags, 200gal/ 40 liters sized of drum and others. The second category includes those facilities that require the processing of waste on the spot and such methods of disposal are incineration and sanitary land filling. Furthermore, many of the practices adopted were aimed at short term solution without sufficient regard to long term implication in the environment and sustainability (Afon, 2003). Choice of any of these methods depends on the socio-economic characteristics of the populace such as income, educational awareness, and cost of disposal. Others are the composition of waste, type of occupation, land use types and household size (Bobadoye, 2007).

The works of scholars have revealed that factors such as environment, socio- cultural and indeed socio-economic factors could affect the composition of waste generated and management techniques. These factors are more visible in big cities, hence the selection of Ibadan for this study.

4 The Study Area

The city of Ibadan is located on longitude $3^0$53'E of the Greenwich Meridian and latitude $7^0$34'N of the equator. It is located near the forest grassland; its boundary extends westward to Abeokuta, eastward to Ile-Ife, and northward to Ilorin and Southward to Lagos. The city currently covers an area of cover 500sq.km with an estimated 1992 population census figure of over 1 million people. Ibadan is the home of the Yoruba tribe who occupies the indigenous core area. Other tribes include the Hausas, Igbos, Ijaws occupying the new residential area. The metropolitan area covered by 29kms city wall and accommodates a sizeable proportion of farm, forest and river plain. The city grew up as a result of the expansion of trade, transport and communication between the city and the rest of Nigeria.

The rapid development of the city has impact on its spatial growth, the total area in 1963 was established to be 103.85sq.km according to the first comprehensive aerial photo coverage taken at that time. The city like any other Nigerian cities is characterized by chaotic land use pattern which is a reflection of poor planning in the past. The existing land use pattern shows that residential areas occupy over 60%, industrial accounts for 16.55%, commercial 17% while education institution occupying about 3.4% of the total land use.

Tremendous increases in population, uncoordinated growth of development and expansion of commercial activities have impact on socio-economic and environment set up of the city. The city has been plague with virtually unmanageable rate of refuse generation and its weak disposal method.

5. Data Analysis and discussion

Interpretation, analysis and findings of this report are discussed in subsequent sections below. Analysis of data shows the various socio-economic characteristics of the respondents which include age, sex, marital status, educational attainment, occupation, income among others. The study shows that there are more male household heads than females. This shows the extent to which men traditionally dominate the household in urban areas of Nigeria. Also revealed from the analysis are the respondents between the ages of 26 – 36 years dominating the age structures of urban households. With respects to marital status, about 65% of the respondents are married while only 35% are single. This shows that the married households are dominant in this study and could have more impact in this type of study.

The proportion of the respondents with primary and adult education is very high follows by those that claimed to have secondary/ technical/ grade II certificate. On the occupation of the respondents, trading was the basic source of earning in the study area. This is followed by civil services which accounted for 10% of the respondents. Information on the income of the household heads was very difficult to obtain due to the following reasons; of low level of education which culminates in fears of being taxed, inability to keep the record of their sales that and the majority do not even earn any fixed or regular income. Those that could come out clearly revealed that majority of the respondents are between the income levels of ₦10, 000 – ₦20, 000. On land use, more than 65% of the land are for residential, while industrial and commercial constitute more than 17% each. Only 3.3 % was allocated for public and other land uses.

Findings on the composition of waste generated in the study area shows that majority of the respondents irrespective of their level of education and occupation generate more of organic waste such as leave (use in wrapping of food) than others. This is a reflection of the eating habit of the people. This followed by polythene bag which is gradually replacing leaves in wrapping of food due to its cheapness and campaign against deforestation. Furthermore, only 21.9% and 6% of the respondents claimed to have generated carton papers, and metal waste respectively. This is a reflection of different type of occupations in the study area.

The types of equipment used by households to store solid waste in their respective home are listed as follow; baskets, receptacles, plastic and refined bag, 200 Liters steel drum size and concrete constructed basins. It was observed that 40% of the household are not using any means to store waste in their respective home. This was followed by those using disposable buckets (12.2%), plastic and refined bag (8.3%) and 6% of the respondents claimed to have been using concrete constructed basins for their waste storage especially in industries and institutions. In spatial terms, majority of the respondents that are not using any storage means are found in the indigenous core areas which are regarded as high density. They dumped their waste in nearby streams, open spaces, drainages and gutters.

Furthermore, majority of the respondents used public container placed by government agents in strategic places of the city. These containers were found in high and medium densities areas. The aim of providing these containers in these places according to our findings is to discourage the indiscriminate dumping of waste in un-authorized places of the city which characterized the high densities area. It was also discovered that 17% and 16.6% of the respondents dumped their waste in water courses and heaped in open spaces within the neighborhoods respectively, with the aim of leaving it for government to park when ever this is possible for government. On the involvement of private participation in waste management, only 14.9% of the respondents employed private waste companies to manage their waste and these are found in medium and low densities areas. The private waste management companies were found to be more effective but more expensive for the low income earners to be engaged.

5. Relationships between Socio-Economic Characteristics and Solid Waste Generation and Disposal in Ibadan.

The relationship between the socio-economic factors of the people of Ibadan metropolis with solid waste generation and disposal is best explained with the use of correlation coefficient. Correlation coefficient provides the researchers with a technique for measuring the linear relationship between two variables and produce single summary statistics that describes the strength of association between them. In this analysis, variables of solid waste generation, method of storage and disposal are used as dependent variables while the socio-economic characteristics such as age, family size, educational status, income, occupation, average monthly income and type of building are dependent variables.

Table1: Correlation between Solid Waste generation and Socio- Economic Factors

Socio – Economic Factors	**Correlation between solid waste generation**
Sex	-0.009
Age	- 0.243
Family size	-0.169
Educational status	0.346
Occupation	0.109
Monthly income	0.223
Type of building	0.263

Sources: Authors' field survey 2011

Table2: Correlation between Methods of Solid Waste Storage and Socio-Economic Factors

Socio-economic Factors	Methods of solid Waste Storage
Sex	-0.015
Age	-0.035
Family size	-0.012
Educational Status	0.257
Occupation	0.012
Monthly Income	0.127
Types of Building	0.146

Sources: Authors' field survey, 2011

Table 3: Correlation between Solid Waste Disposal and Socio-Economic Factors of Respondents.

Socio-economic Factors	Methods of Disposal
Sex	-0.115
Age	0.056
Family size	0.108
Educational Status	-0.241
Occupation	-0.089
Monthly Income	-0.265
Types of Building	-0.143

Sources: Authors' field survey, 2011

It is interesting to note the factors such as sex, age, and family size are negatively and poorly correlated with solid waste generation in the study area as revealed in Table 1. This means that educational status, occupation, monthly income and types of building are significant factors influencing the type and quantity of waste generation in Ibadan metropolis. This is interpreted thus, as people acquire more education, get better job and rise in income level, then the pattern of consumption change, thereby generate different types of waste that reflect their new way of life. Also, different type of land use generates waste that reflects their activities. For instance, it was observed from the study area that residential generates more of vegetable matter while education

and public produce paper waste. In addition, transportation, industrial and commercial produces different kinds of waste that reflect the kinds of output they produce.

Table 2 also reveals an interesting relationship between the Socio-economic factors and solid waste storage in the study area. Factors such as age, sex, and family size are negatively and poorly correlated with the methods used to store solid water by the household. This is interpreted thus; age, sex, and family size are not significant determinant factors in choosing the type of equipments for storing refuse at home. But other factors such as educational status, occupation, monthly income and types of buildings were found to be positively and fairly correlated with type of equipment for storing refuse by the households. This is interpreted thus, the more the households get educated and aware of the side effects of unmanaged solid waste, the more they are likely to make the best choice of managing their waste and keeping away from breeding of disease carrying organism. Also the type of occupations determines the choice of equipment for storing refuse by household. Land use type determines the choice of equipment for storing refuse. For instance, residential land use is more likely to use an odor free container and one that discourages breeding of disease than does by other types of land uses. Residential and industrial land uses may not necessarily use the same type of equipment for waste storage considering the type of waste, the cost and the volume involved

Table 3 also shows that age and family size determine the choice of method of solid waste disposal. For instance, as people get married, bear children, increase in family size, and get older, there is tendency to generate more waste which they cannot properly managed by themselves. They need therefore to seek for more efficient means of deposing these wastes.

5.2 Problems of Solid Waste Management in Ibadan Metropolis

Numerous problems that have contributed to solid waste accumulation have been identified in Ibadan metropolis. The core or the traditional area of the city is characterized by slum, inaccessibility, poor condition of the environment which is an evidence of improper planning in the previous years. These jointly discourage the placing of public waste container in a central area for the use of the public. As a result of this, most residents have to walk long distance before getting access to this facility. Many have to indiscriminately dump their waste in the nearby open spaces, drains and streams causing environmental hazard within the neighborhood.

Secondly, shortage of manpower both skilled and unskilled hampered the efficient management of refuse in Ibadan metropolis. The shortage of staff makes environment law and orders to be ineffective in the core area. The staffs are needed to educate the populace and enforce law on the people. More so, lack of maintenance on the vehicle used to offload the refuse deposited in the container also hampered the effectiveness of their uses. The environmental officials complained of inadequate fund to maintain their vehicle. This resulted into abandonment of waste containers without offloading them, which after sometimes led to spilling over of the

waste in these containers, thereby causing obnoxious odors and breeding of disease carrying organism.

Moreover, there is lack of cooperation between the people and the environmental health officers in charge of solid waste management. This is observed from the people who are using the containers. For instance, there where cases of sending children to empty waste into waste bin, this does not usually go well with the health officers because the children most at times pour the refuse on ground beside the collection bin, littering the environment and constituting nuisance into the environment.

The private companies complained that the local government sees them as their competitors. As such, they want to 'strangulate them'. They were faced with the problem of heavy tax levied on them by the government.

6 Recommendation

A beautiful and functional environment is not only for the glory of government but for every citizen. To achieve this, more proactive measures must be put in place. Firstly, the government should employ an urban renewal strategy in the core area so as to implement effective environment policy in the area. Urban renewal strategy will pave way for the accessibility of refuse disposal vehicles to the core areas and also allow the public container to be placed appropriate and accessible for the use of large majority of people. Additional hands are needed to complement the existing number of staff that is employed in enforcing environmental laws in Ibadan metropolis. Moreover, the residents should be enlightened in the way the public containers are to be used. The environmental education should stress on the set of people that can use the container instead of the young children and the adolescents.

The government should vote sizeable amount of money for refuse management in the city. These amounts should cover the education of the people, training and workshop. There should be adequate provision for the maintenance of vehicle and purchasing additional one to complement the existing stock.

A comprehensive survey should be carried out in the city to cover areas such as the quantity of waste generated daily, the number of people in a particular locality and the types of waste generated in different zones. The knowledge of these will help government to prepare a comprehensive master plan for solid management.

More so, the private companies that are specializing in waste management should be encourage by given the tax free holiday and supplying spare parts at a subsidized rate for the maintenance of their vehicles. Lastly, since most of the refuse are organic, they can be easily converted into organic fertilizer and sell to the public for agriculture and horticultural purpose. Government should seek for this technology, to convert the waste to wealth for the overall development of our cities and the agricultural sectors in general.

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