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Assessment of Residents' Perception of Municipal Solid Waste Management Practices in Akure, Nigeria

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Abstract
This paper attempts a synthesis of knowledge and practice of municipal solid waste management in Akure, Nigeria. The application of knowledge management approach and strategy is crucial for inculcating a change of attitude towards improving the management of solid waste. A set of 350 questionnaires was administered randomly to households in selected wards in the metropolis which allowed the generation of necessary information from respondents on their knowledge, attitude and practice of waste management in the city. In addition, on-spot assessment and oral discussions were held with officers of Ondo State Waste Management Board Akure to assess the challenges of waste management in the State capital. The inefficient management of waste by individuals, households, consumers and waste management companies can be attributed to inadequate information on waste management benefits, lack of producers' involvement in waste management as well as poor implementation of government policies.

Keywords: *Solid waste management, Knowledge, Practice, Akure*

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Background to the Study

One of the greatest environmental problems that pose challenge to urban centres today is waste management. Efficient management of waste is a global concern requiring extensive research and developmental works towards exploring newer application for a sustainable and environmentally sound management (UNEP 2005).

Municipal waste management is the collective process of storage, collection, transportation and disposal at dumpsites, processing, resource recovering, recycling and disposal of final waste. The indiscriminate disposal of municipal waste is increasingly becoming a prominent habit in most cities in Nigeria where wastes are usually dumped on roadsides, available open pits, drainage channels and rivers/stream channels (Babayemi and Dauda, 2009; Onwughara et al, 2010; Yakubu and Giwa, 2006). This indiscriminate disposal of solid waste is linked to urbanization, population growth, poor governance, poverty, and low level of environmental awareness (Adewuyi etal, 2009; Ogu, 2000; Yakubu and Abdulkarim, 2015) and inadequate management of environmental knowledge (Abila and Katola;] 2013). Improper solid waste management has potential negative environmental impacts such as pollution of air, soil, land; generation of greenhouse gases from landfills; health and safety problems associated with different forms of pollution (UN-HABITAT, 2010).

Collection and safe disposal of solid waste in the cities of developing countries are great challenges for the municipalities where solid wastes are indiscriminately thrown away at different open dump sites throughout the city (Al-Khatib, 2010). These open dump sites create significant environmental problems such as polluting water resources, production of methane due to decomposition of organic waste which contributes to global warming and production of strong leachates due to biological process which pollutes groundwater resources (Awomeso 2010).

An Overview of the Challenge of Waste Generation in Nigeria

Accurate data on the quantities of municipal solid waste generated in Nigeria are not easy to come by due to waste collection problems. In Nigeria, 25 million tonnes of municipal solid waste are generated annually and the waste generation rates ranged from 0.66kg/cap/day in urban areas to 0.44kg/cap/day in rural areas as opposed to 0.7-1.8kg/cap/day in developed countries (Ogwuueleka, 2009; Zerbock, 2003). Table 1 shows municipal solid waste generation for some cities in geopolitical zones in Nigeria.

Table 1: Municipal Solid Waste Generation for some Cities in Nigeria

City	Population	Waste Generation Kg/pers/day	Waste Generation (ton /month)	Waste Generation density (Kg/m^3)
Lagos	8,029,200	0.63	255,556	294
Ibadan	307,840	0.51	135,391	330
Ado-Ekiti	241,200	0.71	9,518	-
Akure	369,700	0.54	-	-
Abeokuta	529,700	0.66	-	-
Nsukka	100,700	0.44	12,000	370
Onisha	509,500	0.53	84,137	310
Aba	784,500	0.46	236,703	-
Port Harcourt	1,053,900	0.60	117,825	300
Warri	500,900	-	66,721	-
Uyo	102,400	-	20,923	-
Abuja	159,900	0.66	14,785	280
Markudi	249,000	0.48	24,242	340
Ilorin	757,400	-	-	0.43
Kano	3,248,400	0.56	156,676	290
Kaduna	1,458,900	0.58	114,433	320
Maiduguri	971,700	-	850,000	-

Source: Amber et al; (2008), Ogwueleka, (2009)

Solid waste management in Nigeria is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal of solid waste. The volume of solid waste generated continues to increase at a faster rate due to income and economic growth that have impact on the composition of wastes. More so, waste characteristics vary according to season, population, social behaviour, industrial production, size of markets for waste materials and the extent of urbanization, effectiveness of recycling and work reduction (Hoornweg *et al.,* 1999; Yakubu and Abdulkarim, 2015). Rotich et al. (2006) established a positive relationship between income levels and waste generation at the household level as high income earners consume more packaged products, which result in a higher percentage of inorganic materials such as metals, plastics, glass, and textile.

Cities population growths have consequences on increased generation of wastes which resulted in degradation in the city landscape and unhealthy living condition. Improper disposal of refuse and waste constitute serious environmental health problems to residents within the vicinity. The phenomenon can escalate the

outbreak of different kinds of epidemics, constitute clog in the wheel of progress in terms of urban environmental purity and sanitation, and cause environmental disaster and aesthetic decay.
The failure in municipal service delivery by state and local governments in many cities has often been attributed to inequity in resource allocation, low revenue collection, low service coverage, mismanagement, low regional capacities, corruption, and lack of transparency and accountability. These problems have overwhelmed the capacity of the municipalities to provide adequate and efficient waste management services in urban centres. The amount of waste produced daily is significantly increasing while the capacity and effectiveness of municipalities in providing municipal solid waste services remains undesirably low making waste management in most cities of developing countries highly unsatisfactory (Schubeller et al; 1996; UN-HABITAT 2010; Medina 2010).

Another aspect of waste generation problems in most cities of the developing world has to do with the problem of multi-level governance and jurisdictional partitioning. Rapid urbanisation and the concomitant areal expansion of cities means that these cities have more than one local government authorities within their geographical space. Oftentimes, these multiple authorities share responsibilities with the second tier of government (the State Government). The consequence of this is that there is no clear-cut designation of responsibilities as far as waste management is concerned.

Waste Management Policies and Regulations in Nigeria
The waste management policies and regulations were propagated to guide and mitigate the continuous disposal and dumping of waste to rivers, pathways, water channels and illegal dumpsites. The Federal Government of Nigeria enacted Decree number 58 for the establishment of a Federal Environmental Protection Agency (FEPA) on 30th December 1988 to achieve a set of goals. In Nigeria waste management is among the very core management of the local government, state government and federal government.

The Federal Government of Nigeria Policy Objectives includes:
i. Secure quality environment for all Nigerians for their health and well-being;
ii. Raise public awareness and promote understanding of the importance of relation between environment and development;
iii. To encourage individual and community participation in environmental protection and improvement efforts.

The local, state and federal environmental protection agencies enacted laws are similar and include the following:

i. The National Protection Management of Solid and Hazardous Wastes Regulation of 1991.
ii. The Pollution Abatement in Industries and Facilities Generating Waste Regulation of 1991.
iii. The General Guidelines for Pollution Abatement in Industries 1991 (USEPA, 2010).

In Ondo state, the main government institutions responsible for environmental protection are the Ondo State Waste Management Authority ODSWMA), state environmental protection agencies, Local Government Councils (LCGs) and the Ministry of Environment and Physical Planning (MEPP). Moreover, at the state level, the state environmental protection agencies and state waste management agencies are in charge of municipal waste management. Presently wastes are managed by each state environmental protection agency and state waste management agencies in urban cities and big towns in Nigeria. Municipal solid waste collected from the generation point are loaded into waste trucks and transported to designated dumpsites. Consequently, the collection of municipal waste by the state environmental agency requires the payment of certain amount of charges by each household. The size of an apartment determines the allocation of waste collection charges (see fig. 2). As a result of income status of people some households cannot afford the monthly payment. This financial limitation promotes indiscriminate dumping of refuse by such individuals.

Research Methodology

Both primary and secondary sources of data were used in this study. The target population was made up of household heads and officers of Ondo State Waste Management Board with the aim of generating information on waste management in Akure, the Ondo state capital. A set of 350 questionnaires was administered randomly to households in selected wards in the city which covered low density and high density areas. This allowed the generation of necessary information from respondents on their knowledge, attitude and practice of waste management in the city. In addition, on-spot assessment and oral discussions were held with officers of Ondo State Waste Management Board to assess the challenges of waste management in the state capital while at the same time information on daily solid wastes generated and waste management users charge in Akure was obtained. Information gathered was analyzed descriptively using table and percentage.

Results and Discussion

Results of data obtained from the field are presented and discussed in this section. Specifically, data on daily solid wastes generated, household charges for waste collection, type of storage bin used, willingness to participate in waste management and solid waste management attitude of respondents.

Table 2: Characterization of Daily Solid Wastes Generated in Akure

Type of Waste	Market Waste		Patrol Waste		Zone (Residential) Waste		Total
	(kg)	%	(kg)	%	(kg)	%	
Carton/Paper	271	33.3	258	31.7	286	35.1	815
Nylon	477	38.2	325	26.0	447	35.8	1249
Organic Materials	558	42.8	280	21.5	467	35.8	1305
Plastic/ Pet Bottles	27	36.0	21	28.0	27	36.0	75
Cloth Materials	55	32.4	26	15.3	89	52.4	170
Basket	10	76.9	3	23.1	-	0.0	13
Shoes	5	20.0	7	28.0	13	52.0	25
Iron/Metal	2	16.7	9	75.0	1	8.3	12
Sand/ Soil	170	19.1	432	48.5	288	32.4	890
Ash	34	39.5	39	45.3	13	15.1	86
Battery	-	0.0	-	0.0	1	100.0	1
Bottle	6	16.7	22	61.1	8	22.2	36
Others	-	0.0	1	50.0	1	50.0	2
Total	**1615**	**34.4**	**1433**	**0.6**	**1641**	**35.0**	**4689**

Source: Ondo State Waste Management Authority (ODSWMA), (2014)

Table 2 shows the volume of daily waste generated in Akure metropolis. The residential waste generated recorded the highest (1641kg), followed by market waste (1615kg) while patrol waste generated recorded 1433kg.

Table 3: Ondo State Waste Management Users Charge

Property type		Rate (Naira)
Residential	1 Bedroom flat	300.00
	2 Bedroom flat	400.00
	3 – 4 Bedroom flat	500.00
	Face to face	100.00 per room
	Duplet	600.00
Shop/Stall	Small	100.00
	Medium	200.00
	large	Direct Assessment
Commercial Outlets	Supermarket	Direct Assessment
	Electronic stores	Direct Assessment
	Pharmaceutical stores	Direct Assessment
	Hotels	Direct Assessment
	Event centres	Direct Assessment
Hospitals	Small (0-5 bed space)	200.00 per bed space
	Medium (6-10 bed space)	200.00 per bed space
	Large (11& above bed sp)	200.00 per bed space
Maternity/ Laboratories	Small	1000.00
	Medium	2000.00
Schools	100 pupils & below	20.00 per pupils
	101-200 pupils	20.00 per pupils
	Above 200 pupils	20.00 per pupils
Food Canteen	Small	300.00
	Medium	1000.00
	Large	Direct Assessment
Filling Stations	1-4 pumps	500.00 per pump
	5-6 pumps	500.00 per pump
	Above 6 pumps	500.00 per pump
Banks		10,000.00
Worship centers/ Vicarage	Small	500.00
	Medium	1,000.00
	Large	**2,000.00**

Agricultural uses	**Abattoir**	**Direct Assessment**
Motor parks/ Recreational centre		Direct Assessment
Bulk waste collection		Direct Assessment
Hawker/Squatter		Direct Assessment

Source: Ondo State Waste Management Authority (ODSWMA), (2014)

Table 3 shows the users' charges by Ondo State Waste Management Authority. The operation is strictly carried out by the waste management authority or appointed agents who ensure that user-card is presented on demand by officials of waste management authority or agents. Official or agent is expected to enter any premises to remove waste into collecting vehicle between the hours of 6.00 am and 6.00 pm and enforce compliance where necessary. For effectiveness of the operation, every occupier of household, commercial and industrial establishment is expected to (i) procure, cause to place in front of his/her house a plastic refuse bin, (ii) purchased the prescribed plastic bag/bin from Ondo state waste management authority at reasonable cost.

Table 4: Type of Storage Bin Used

S/N	Items	No. of Responses	Percentage (%)
i	Plastic bag/bin	308	39.0
ii	Metal bin / Oil drum	117	21.7
iii	Concrete bin	115	21.3
	Total	**540**	**100**

Table 4 indicated the types of storage bin commonly used in the metropolis. It is not surprising that plastic bag/bin recorded the highest percentage because it is part of the operational guideline by the state waste management authority that household/industry/commercial establishment should as a matter of fact purchase waste bag/bin at reasonable cost from the waste management board.

Table 5: Willingness to Participate in Waste Management

S/n	Item	Yes (%)	No (%)
I	If a recycling program was set up, that collected materials like plastic, paper, metals etc, would you be willing to separate these into separate bags for collection purposes?	83	17
Ii	Would you be willing to pay for pickup of these recycling materials from your home?	66	34
iii	Would you be willing to participate in a program to compost food and yard waste?	48	52
iv	If you were paid for every plastic bottle that you returned to the grocery store, would you participate in a program to return the plastic bottles?	75	25
V	Would you be willing to purchase less throwaway products (such as, plastic bottles) to help reduce the amount of garbage you get rid of, if an alternative product of the same cost was provided?	49	51
vi	Would you like more information about how and what types of garbage you can compost, reuse, and recycle in order to reduce the amount of garbage that you need to get rid of?	57	43
vii	If a concrete bin was located in your community, would you be willing to carry your garbage to it?	78	22
vii	Would you be willing to participate in building concrete bin for your community?	61	39
viii	Would you be willing to participate in the maintenance of this concrete bin?	85	17

From Table 5, respondents showed their interest and willingness to participate in waste management programme that will solve waste management problem in the state capital.

Table 6: Solid Waste Management Attitude Scale

S/n	Item	Agree	Disagree	No Opinion
I	Public education about proper garbage management is one way to fix the garbage crisis.	93	7	0
ii	I play an important role in the management of garbage in my community.	100	0	0
iii	The purchase decisions that I make can increase or decrease the amount of garbage my household must get rid of.	53	36	11
iv	I don't care that burning garbage can be bad for my health and the health of others.	26	64	10
V	People throw garbage on the streets and in the drains and gullies because they have no other means of disposing their garbage.	44	56	0
vi	Regular collection of garbage is the only solution to the garbage problem.	26	71	3
vii	Other personal issues (like crime, unemployment, and cost of living) are more important to me than a garbage-free community.	32	63	5
viii	The State/Local Government is not doing enough to fix the garbage problem.	53	42	5
ix	It is very important that the State/Local Government put recycling laws and programs in place.	55	33	12
X	Environmental education should be taught in schools.	100	0	0

Table 6 revealed the attitude of respondents on waste management as recorded on rating scale. Majority of the respondents have knowledge of waste management with good attitude to it. The State/Local Government is not seen doing enough in solving garbage problem because of the recycling law and program that have not been enforced. More so, emphasis was laid on Public education concerning proper garbage management while the need for environmental education to be taught in schools was upheld.

Conclusion and Recommendation

This study started with the process of understanding the challenges of waste management in Akure metropolis. Most wastes could be turned into new products if private companies and individuals are encouraged to source for new wealth from refuse as being practiced in advanced world through wastes recycling efforts. Thus, it is recommended that programme that sensitize and sustain the waste management concepts in the state should be encouraged. All stakeholders; the public and the private sectors should share the responsibility together. This no doubt will pave ways for improved quality of environment free from deplorable sanitary condition and reduce the threat from climate change.

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