Solid Waste Management Practices in Two Southwest States, Nigeria: Households' Perspective

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Abstract
This paper analyzed 783 household survey questionnaires administered and complemented with photographic evidences to assess solid waste management practices in urban Nigeria. Results indicated that waste composition in cities was largely of biodegradable waste such as food remnants, vegetables and fruits and non-biodegradable waste - paper, wood, rubber, leather, plastic, metal, glass, etc. There are also indiscriminate and illegal dumping of wastes in undesignated areas such as road verges, open spaces and alleys in cities. Most solid wastes are openly burnt, with no formal separation or recycling, except the unstructured reuse of some waste materials at the household level. However, an informal sector is involved in collecting recyclable materials from solid waste. Households were dissatisfied with the service rendered by the local governments and private service providers recently involved by the State governments in the collection, disposal and management of solid waste. Over 65 percent of respondents expressed their willingness to pay, and perhaps pay more, for waste collection service only if there is going to be improvement in the service currently being provided. There are important challenges to solid waste management in the two States. These include: the proper collection and management of hospital, industries and commercial/market wastes; public education aimed at educating households and service providers on waste separation, reduction, recycling and reuse in order to optimize the waste collection system; and effective institutional and policy framework.

Keywords: *Household waste, solid waste, practice, attitudes, Southwest*

1 Introduction

Nigeria is one of the countries in the West Africa sub-region. It is located between Latitudes 4^0-14^0N and Longitude 2^0-14^0E. It is bounded by the Republic of Chad and Niger Republic in the north, Benin Republic in the west, the Republic of Cameroon in the east and by the Atlantic Ocean in the south. Nigeria has 140 million inhabitants distributed over a land area of 923,768km^2, with unevenly distributed population majority in rural area (Federal Government of Nigeria, 1997; Osinowo, 2001).

Concerns for effective and proper management of solid waste generated especially in Nigeria urban cities have continued to increase like in most urban cities of developing countries because of its health and environmental implications (Osinowo, 2001; Walling, Walston, Warren, Warshay & Wilhelm, 2004; Nwake, 2005; Longe & Williams, 2006). Serious public health problems arise due to uncollected solid waste and waste often leading to many infectious diseases including water borne diseases such as cholera and dysentery. The disposal of hazardous and medical wastes with domestic wastes poses serious health threat. Exhaust fumes from waste collection trucks, dust from disposal practices, and open burning of waste also contribute to

overall health problems. Such incidence of diseases puts additional burden on the inadequate health services available in country. The impacts of solid waste on environment is immense, from release of harmful green house gases (GHGs) to contamination of ground water, improper solid waste can wreck havoc on the environmental health. The most serious environmental problem in terms of solid wastes is the emission of GHGs (Osinowo, 2001; Walling, *et al*, 2004; Nwake, 2005; Longe & Williams, 2006; Ngwuluka, *et al*, 2009).

The problems associated with solid waste management in Nigeria are enormous. Lack of financial resources and infrastructure to deal with solid waste creates a vicious cycle; lack of resources leads to low quality of service provision which leads to fewer people willing to pay for said services, which in turn further erodes the resource base and so on (Ngwuluka, Ochekpe, Odumosu & John, 2009; Longe, Longe & Ukpebor 2009; Nabegu, 2010). In addition, is the issue of rapid growth in population and urbanisation, which increases greatly the volume of waste generated and thus the demand for waste collection service in urban cities. Another significant factor that contributes to the problem of solid wastes in Nigeria is the lack of proper collection and transportation facilities. Lack of good network of roads resulted in waste collection trucks not able to reach some places and allowing filth to build up over time (Agunwamba, et al 1998; Onibokun & Kumuyi 1999; Osinowo, 2001; Sha'Ato, et al, 2007).

Studies have shown that uncollected waste have contributed to flooding, breeding of insect and rodent vectors and the spread of diseases such as cholera, malaria, typhoid fever in Nigeria. The composition of waste are often a combination of biodegradeable and non-degradable, hazardous and non-hazardous, human and animal excreta dumped indiscriminately dumped in the streets, drainage and other unauthorized places. Collected wastes are deposited in open dumpsite and burn thus polluting the air and other resources such as water and land (Adebayo, Bamisaye, Akintan, & Ogunleye, 2006; Olufayo & Omotosho, 2007; Ngwuluka, *et al* 2009; Nabegu, 2010).

In a survey of solid waste from 201 households in Abeokuta, Ogun State (Babayemi & Dauda, (2009) found out that solid waste types include paper, nylon, wood, dust, cloth, metal scraps, electronic gadgets, bottles, food remnants and vegetables; saw dust, ashes, rubber, bones and plastics. They reported that open dump of solid waste is a common practice in among the respondents. Very few employ the service of private waste collectors to transport their solid wastes out of their compound; others directly dump their solid wastes by the road sides. The percentage of those who used other indiscriminate solid waste disposal methods like open dumping, open burning, and dumping in drainages was higher.

Attitudes of households are very important to the success of solid waste management program. Generally, attitude is a positive or negative feeling toward specific objects; it exerts an influence on behavior. Intentionally or not, behavioral decisions are frequently based upon attitudes (Ajzen & Fishbein, 1980). Recent research on municipal solid waste management has focused on household participation and attitudes regarding recycling behavior. Longe *et al* (2009) demonstrated that understanding behaviour is critical to minimizing municipal solid waste. They found that attitudes toward separation, reuse and recycling waste are one of the reasons for difficulties in waste management in Nigeria. However, in Nigeria, few studies have described and documented households' attitudes and practices toward solid waste management across States. Thus, this study examined the solid waste management practices in the urban cities of Ogun and Oyo States, Nigeria. The specific objectives are to:

1. identify the component and sources of solid waste in urban cities of Ogun and Oyo State, Nigeria
2. examine solid waste management attitudes and practices in urban cities of Ogun and Oyo State, Nigeria.

2 Method

2.1 Study Area

A total of eight local government areas randomly selected from two states in the Southwest Nigeria were used for the study. Ogun State is one of the federating thirty-six States in Nigeria. It is situated between Latitude 6.2°N and 7.8°N and Longitude 3.0°E and 5.0°E. It covers an area of 16,409.26 square kilometers of land area. It is bounded on the West by the Benin Republic, on the South by Lagos State and the Atlantic Ocean, on the East by Ondo State, and on the North by Oyo and Osun States. Four local government areas namely Ijebu-Ode local Government, Sagamu Local Government, Abeokuta South Local Government and Abeokuta North Local Government areas were randomly selected from the State.

Oyo State located on Latitude 8^0 and Longitude 4^0 East, like Ogun State was created in February, 1976 and covers a total of 28,454 square kilometers of land mass. Its capital at Ibadan is reputed to be the largest indigenous city in Africa, South of the Sahara. The State shares boundaries with Ogun State in the south and in the north by Kwara State, in the west is bounded partly by Ogun State and partly by the Republic of Benin while in the east it is bounded by Osun State. It population was estimated at 6,617,720 (2005). Four local government areas carved out from the defunct Ibadan Municipal Government in 1991 namely Ibadan North Local Government, Ibadan North East Local Government Area, Ibadan North West Local Government and Ibadan South East Local Government areas were selected from Oyo State.

A questionnaire consists of closed-ended questions which address the current status of solid waste disposal attitudes and practice in the study area was developed. This questionnaire was administered to eight hundred (800) households with one hundred per local government area. Only 783 were properly completed and were used for the analysis.

The socio-demographic characteristics of respondents revealed that about 51 percent of the respondents are males while 49 percent are females. A deliberate attempt was made to balance the number of respondents' gender wise because the problem of solid waste management has no gender coloration. The mean age of the male respondents is 41 years. About 78 percent of the male respondents are less than 50years. For the female respondents the mean age is about 30 years and 85percent of the female respondents are less than 40 years old. About 25 percent had no formal schooling. Less than 25 percent had at least completed secondary education. About 16.6 percent had post secondary education/tertiary education. 5.5 percent completed primary education, while 2.7 percent of the respondents did not complete it. The indication is that there is low level of education among the people. On the ethnic composition of the respondents', the Yoruba's constitute 74.8 percent, while the other ethnic groups made up the rest of 25.2 percent. This is not deliberate but a clear reflection of the composition of the states used. The two States are located in southwest, Nigeria which is predominantly occupied by the Yoruba ethnic group.

2.2 Results and Discussion

All respondents expressed very serious concern about the problem of solid waste in their respective communities however only 40% of those surveyed perceived that the solid waste problem could be mitigated through its segregation at its point source. Majority of respondents (60%) surveyed strongly agree that the problem of solid waste can be mitigated better if segregation is accompanied with recycling. Fifty six per cent of respondents' states that the community needs to practice waste segregation regularly. More than half (54%) of respondents perceived that instituting waste management measures are essential to help clean the community's environment.

2.3 Composition and Sources of Solid Wastes

Table 1 show that food and vegetable wastes from household and markets comprise 62% of the total generated in both states. However, household waste constitutes the largest source of solid waste generated in these urban cities, followed by market waste and industrial waste.

Table 1: Composition of Solid Waste

	Oyo State				Ogun State			
	Household	Market	Industries	Hospital	Household	Market	Industries	Hospital
Kitchen waste (e.g. food reminants)	√	√	√		√	√	√	
Plastics	√	√	√		√	√		
Scrap metals/cans	√	√			√	√		
Rubber/leather	√	√			√	√		
Glass/bottles	√	√			√	√		
Trees, wood & sawmill		√	√				√	
Clay/ceramics	√	√				√		
Car batteries		√			√	√		
Chemical waste		√	√			√	√	
Tyres		√	√			√	√	
Electronics: TV, radio, computer etc.	√	√				√		
Medical wastes				√		√		√

Figure 1: Open dumpsite in Ogun State and waste left uncollected on the road media

2.4 Waste Disposal and Management Practices

2.4.1 **Solid waste** In the two States, wastes are open dumping; uncontrolled landfills and open burning were commonly practices. Dumps sites are located along or beside major roads. In Ijebu-Ode, Ogun State, the dump site is along the Ore-Benin express road. In Oyo State, refuse spreads into the road, blocking traffic and the wastes are burnt open on the side of the road. There are also indiscriminate and illegal dumping of wastes in undesignated areas such as road verges, open spaces and alleys in cities. These methods of waste disposal make very uneconomical use of the available space, allow free access to waste scavengers, animals and flies and often produce unpleasant and hazardous smoke from slow-burning fires. Another waste management practices that was observed in both States is the dumping and burning of refuse in front or beside houses or commercial stores by residents. This practice is not restricted to… but also in designated government residential area.

Table 2: Method of Waste Disposal

	Oyo State				Ogun State			
	Ibadan North	Ibadan North East	Ibadan North West	Ibadan South East	Ijebu-Ode	Sagamu	Abeokuta South	Abeokuta North
Open dumping	√	√	√	√	√	√	√	√
Burning	√	√	√	√	√	√	√	√
Composting								
Burying								
Landfill								
Incinerator								
Recycling	√	√	√	√	√	√	√	√

2.4.2 E-waste There is no conscious effort on the state and local government to properly dispose of e-waste. E-waste is collected and disposed along with other form of waste on uncontrolled dump sites and openly burn. It is also not uncommon to see in these areas bulb of Televisions and Computer monitors and other components of these used electronic items popularly call *"Tokunbo"* in drainages and refuse dump site located in some of the markets where these items are repair and sold. This has resulted in a whole range of toxic substances released, which heavily contaminate the soil and water resources. In an informal conversation with some of the respondents especially those in the markets express ignorance of the health and environmental danger of improper treatment and disposal of e-waste. They are also unaware of how e-waste and hazardous waste is to be treated and disposed.

Figure 2: Open burning of waste at the dumpsite

2.4.3 Waste Separation and Recycling Solid wastes are not separated and no processing or recycling in any forms was done in the cities thus affecting the effectiveness and efficiency of solid waste management in both States. The lack of separation of wastes makes the composition of wastes on both legal and illegal dumpsite to contain all types of wastes including hazardous waste from hospital and industries. Although people reuse items at household level but not because they recognized it as a waste reduction and minimization strategy rather to get maximum benefit from it. It was observed that people mostly do not separate wastes at home since there is no awareness, knowledge, facilities, nor incentives to do so. They mixed up all waste in nylon bag or drum. However, few households separate of recyclable wastes such as plastics, bottles and metals which are sold to interested people, who again sell it to companies that need them. Furthermore, scavengers moved from street to street and dumpsites across the cities to pick up reusable and recyclable wastes and sell them to the recycling business outlet.

2.4.4 **Waste collection and transportation in Ogun and Oyo States** Street sweeping, collection and disposal of solid waste are primarily the responsibility of local government, while State government is responsible for the protection and conservation of natural resources and environment through the state environmental protection agencies. However, results from this study revealed that these responsibilities are not carried out as expected. Large tons of garbage is left uncollected on the street each day and after monthly sanitation exercise in the States. Majority of households were dissatisfied with the service rendered by the local governments and private service providers recently involve by the State governments in the collection, disposal and management of solid waste. Outside the government approved private service provider, some households still engage the services of informal cart pusher waste collectors who collect from house-to-house. The fees of these informal collectors are cheaper than government approved private service providers. The collected wastes are transported in open truck and tippers without cover or protective guard with waste spilling along the road to the dumpsite.

2.4.5 **Awareness and attitudes** People's attitudes and behavior towards waste management policy and program is a function of their expressed concern and perception about waste and waste management. Public concern and attitudes to waste is poor. About (62.1%) of the respondents' agree that solid waste management is a major environmental burden, while (36.9%) disagree. Just a little over half (56.7%) of the respondents agreed that improper disposal and management of wastes brings problems to public's health, while a sizeable minority (43.2%) disagree, it seem likely that this disagreement indicates a lack of knowledge of implications of improper disposal of waste affect the public health. Only 49.5% agreed that wastes are properly disposed off in the local government against 48.3% who felt the wastes are not properly disposed off. As demonstrated in Table 4, 78.3% disagreed with the statement that "waste prevention is not my responsibility".

This indicated that respondents seem conscious of the role in waste prevention. A higher proportion (75.6%) of the respondents agreed that open burning of refuse is dangerous to human health and environment, while a quarter (22.5%) disagreed with the statement. Majority (68.4%) agreed that reduce, reuse and recycle are important to waste management and (29.7%) disagreed. This suggests that households in the study areas are aware of the 3R principles as component of effective and efficient waste management. Also, (69.3%) of the respondents agreed that re-use of materials make life easy and safe

cost and (69.1%) equally agreed that waste prevention leads to better environment for present and future generations. Only about one third (30.6%) and (28.8%) respectively disagreed with each of the statement. Over half (56.7%) stated that households should be encouraged to bury the waste instead of burning it.

Table 3: Attitudes towards solid waste management

		Strongly agree	Agree	Disagree	Strongly disagree
1	Solid waste management is one of the major environmental burdens	50.4	11.7	27.0	9.9
		62.1		36.9	
2	Improper disposal and management of wastes brings problems to public's health	46.8	9.9	36.0	7.2
		56.7		43.2	
3	Wastes are properly disposed off in the local government.	29.7	19.8	41.4	7.2
		49.5		48.3	
4	Waste prevention is not my responsibility	13.5	8.1	35.1	43.2
		21.6		78.3	
5	Waste prevention is beneficial for society and environment	28.8	13.5	43.2	12.6
		42.3		55.6	
6	The quality of solid waste disposal service provided by private waste collectors is satisfactory	24.3	8.1	57.5	8.1
		32.4		65.6	
7	Open burning of refuse is dangerous to human health and environment	54.0	21.6	17.1	5.4
		75.6		22.5	
8	The 3R – reduce, reuse and recycle are important to waste management	58.5	9.9	20.7	9.0
		68.4		29.7	
9	Households should be encouraged to bury the waste instead of burning	49.5	7.2	34.2	6.3
		56.7		40.5	
10	Re-use of materials make life easy and safe cost	52.2	17.1	22.5	8.1
		69.3		30.6	
11	Waste prevention leads to better environment for present and future generations	43.0	26.1	14.4	14.4
		69.1		28.8	
12	Everybody should be responsible for waste prevention and management	50.4	16.2	23.4	10.0
		66.6		33.4	
13	It is governments responsibility to look after the environment and address solid waste problems	22.5	50.4	17.1	10.0
		72.9		27.1	

The majority of the respondents' (66.6) agreed (agree or strongly) that it is the responsibility of all a sundry to prevent and manage waste and a higher percentage (72.9%) agreed that it is governments responsibility to look after the environment and address solid waste problems. This suggests that the respondents are not sure whose responsibility.

2.4.6 **Willingness to pay for solid waste management services** The result of the respondents' opinion on willingness to pay for solid waste management services and practices is shown on Table 5.

Table 4: Percentage Analysis of Respondents' willingness

	Yes	No	Don't know
I would you be willing to pay higher fee to cover the cost of waste collection service.	508 (65.0)	129 (16.5)	146 (18.6)
I would be willing to make changes to my lifestyle choices in order to help reduce waste generated.	423 (54.0)	152 (19.4)	208 (29.6)
I would be willing to make changes to my consumption pattern in order to help reduce waste generated.	456 (58.2)	222 (28.3)	105 (13.4)
I would be willing to sort my waste before disposing them.	596 (76.1)	137 (17.5)	50 (6.4)
I would be willing to take part in the recycling programme	580 (74.1)	178 (22.7)	25 (3.2)
I would be willing to make changes to my lifestyle choices in order to help keep the environment healthy.	365 (46.6)	118 (17.1)	300 (38.3)

Sixty-five percent of respondents expressed their willingness to pay and perhaps pay more for waste collection service only if there is going to be improvement in the service currently being provided. Over fifty percent i.e. (54.0%) were willing to change their lifestyles in order to reduce waste generation. About fifty-eight percent of the respondents from both States indicated that they are willing to change their consumption pattern to help reduce waste generated while about 28.3% said that they are not willing to change the consumption pattern. 74% of the respondents indicated that they are willing to take part in the recycling programme while about 22.7% of the respondents said that they are not willing to take part in the recycling programme. About 76.1% of the respondents declared their willingness to sort waste. Forty-six percent of the respondents declared their willingness to change their lifestyle for the sake of healthy environment.

3 Conclusion

This study has demonstrated to be valuable and informative on households waste management practices in Ogun and Oyo States, two States located in the southwest Nigeria. The study has helped to establish the attitudes of households to waste and waste management. It has revealed that waste management has much to desire. Solid waste comprises of domestic waste, business and industrial waste, hospital waste, electronic waste, mechanical equipment, vehicle waste, and debris from construction activities. The study had clearly indicated that waste is generated by all stakeholders and is managed by the Government agencies or private waste collectors and lies beyond their capacity. The results showed that the households are ill-informed about various aspects of waste collection, disposal, reduction and recovery. There is little reuse and recycling of waste materials among households. They also possess attitudes and practices that are

environmentally unacceptable or unfriendly. These results throw up some important challenges to solid waste management in the two States which include: the proper collection and management of hospital, industries and commercial/market wastes; public education aimed at educating households and service providers on waste separation, reduction, recycling and reuse in order to optimize the waste collection system; and effective institutional and policy framework.

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