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Research Article

HOUSEHOLDS AND FARMERS' WILLINGNESS TO PAY FOR IMPROVED SOLID WASTE MANAGEMENT AND ITS IMPACT ON AGRICULTURE IN SOKOTO METROPOLIS

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Abstract

Sokoto metropolis had recently witnessed an alarming increase in solid waste generation which could be harness and use as improved compost. This study examines households' and Farmers' willingness to pay for improved solid waste management services and its implications to agriculture. The population used for this study consist of selected households, farmers and stakeholders of solid waste management in Sokoto Metropolis. Multi-stage sampling technique was used in selecting the study respondents. A total of 150 households across low income, middle income, high income as well as mixed commercial residential areas and 30 farmers constituted the samples for the study. Descriptive statistics and logit regression model were used in analyzing the data collected. The results revealed that all household respondents generate waste and the major challenge that impedes willingness to pay is amount charged for the improved waste management services. The logit model vindicated those respondents in high- and middle-income residential areas had increasing tendency of accepting improved refuse waste management and are more willing to pay for improved refuse waste management services. On the other hand, a reasonable percentage of the farmers are willing to accept and pay for sorted refuse waste converted to compost. The unsorted refuse waste was attributed as a cheap source for manure but it contained polythenes, metals and other hazardous element which are harmful to human health and affects crops germination and growth. The improved refuse waste converted to compost could serve as an alternative source for low cost and high-quality manure that is free from those harmful elements, to improve smallholder farmers' crops productivity. This study therefore recommends for Public-Private-Partnership to address the menace of generated waste and the possible conversion of waste to wealth.

Keywords: : Willingness to Pay (WTP), Municipal Solid Waste Management (MSWM), Agricu

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INTRODUCTION

The United Nations Environmental Program (UNEP) reported refuse waste generation as an increasing global environmental and public health problem (UNEP, 2004). Municipal waste globally, increases by at least 7% annually between 2003 and 2006 and were approximated to 1.3 billion tons per year as at 2015, and expected to increase to approximately 2.2 billion tons per year by 2025 (Hoornweg and Laura, 2005). This represents a significant increase in per capita waste generation rates, from 1.2 to 1.42 kg per person per day in the next fifteen years. Global averages however, are only broad estimates as rates vary considerably by region, country, city, and even within cities; the various types of municipal waste produced from various households‟ vary according to the standard of living in the city (Hoornweg and Laura, 2005

The term solid waste management is generally used to describe non-liquid materials arising from various consumption and production activities of people. Similarly, Municipal solid waste management (MSWM) could be referred to the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste in urban areas. The goals of municipal solid waste management are to promote the quality of the urban environment, generate employment and income, and protect environmental health and support the efficiency and productivity of the economy (Ogwueleka,. 2009).

Rapid population growth and urbanization were among the reasons attributed to the increased waste generation in most cities of the world (Medina, 2002, Ibrahim *et al.*, 2019). Solid waste has posed a serious trait to the health, livelihood and environment of people in Sokoto metropolis. Most households in Sokoto metropolis face the problem of refuse waste disposal due rapid urbanization coupled with poor waste management practices, encroachment of communal waste dumping site and inadequate designated refuse waste collection centres among others (Shamaki and Shehu, 2017; Ibrahim *et al.*, 2019). In Nigeria, solid waste management is characterized by inefficient collection methods, insufficient coverage of the collection system as well as improper disposal of solid waste (Ogwueleka,. 2009).

The continuous increase in generated waste in Sokoto metropolis has prompted the quests for enhancing municipal systems and sustainable waste management service delivery, with special emphasis on involving the private sector. The passionate issues with the new paradigm in waste management systems are conversion or recycle of these wastes into usable products. Historical and socio-economic evidences attest that farmers actively respond to soil fertility issues by the use of households refuse and manure to replenish the loss nutrient due to continuous cropping. It is against this background, this study seeks to explore the possibility of leveraging on the age-long agricultural use of solid waste *vis-a-vis* improved municipal solid waste management through

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an analysis of household willingness to pay for improved refuse waste management services and farmers willing to accept refuse waste converted to compost for use on their farms.

MATERIALS AND METHOD Study Area

This study was carried out in Sokoto metropolis, Nigeria; it is located within latitude 13° 05 - - 13.083^{0}N and longitude 5°.15 – 5.250^{0}E and at an altitude of 272m above sea level. The metropolitan area comprised of Sokoto North and Sokoto South, which is within the capital city of Sokoto State and parts of Dange-Shuni, Kware and Wamakko Local Government Areas. The demographic structure of the city is cosmopolitan with Hausa and Fulani, predominating resident in the city are people of other ethnic groups from other parts of Nigeria, especially Yoruba, Igbo, Zabarmawa, Nupe, and other minority tribes from within and outside Nigeria. The total population of Sokoto metropolis was estimated at 485,483 people based on 2010 population projection with an average annual growth rate of 2.6% and with an average density of 1000 persons per kilometer square estimated (Abdullahi, 2007).

The annual rainfall is 550mm starting in June and ending in October, the climatic conditions is characterized by hot season, particularly in March and April with highest temperatures of 45°C while a dry cold and dusty conditions succeed from November- February which brings about dirty in the surroundings. The presence of the Rima valley aids dry season farming and other agricultural activities. Occupation of inhabitants in the city is farming, trading, with a reasonable proportion of the population working in organized private and public sectors.

Sampling Technique

The study was conducted in the metropolitan area of Sokoto state in North-western Nigeria. Multi-stage sampling technique was employed to sample the study respondents. At the first stage, residential areas were categorized into four income residential areas based on the characteristic of dominant population. These four categories include: high income residential areas, middle income residential areas, low-income residential areas and mixed residential areas. At the second stage, representative sampling points was purposively selected based on the possibility of household's cooperation. The selected sampling points were: New Arkila, Old Airport, Low-Cost, Mabera, Kofar Marke, Bello way and Aliyu Jodi. Lastly, at the third stage, systematic sampling technique was employed to sample households. A total of 150 household constituted the household sample size for the study. The sampling plan is presented in table

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Table 1: Sampling Plan for the Study

Residential Characteristic	Spot Areas	Residential Sampling Points	No. of Household
High Income	Sama Road, New Arkilla, GawoNama, Ali Akilu cluster.	New Arkilla	10
Middle Income	Runjin Sambo Quarters, Giwa Low Cost, Old Airport, Bado Quarters	Airport, Guiwa Low Cost	20
Low Income	Kofar Marke, Mabera, Runjin Sambo, Gidan Igwai	Mabera, Kofar Marke,	30
Mixed	Sahara, Bello way, Aliyu Jodi, Rigiya	Bello way, Aliyu Jodi	20
Total		**7**	**150**

The farmer's respondents were purposively sampled across Fadama and Upland sites of Kwalkwalawa and Gagi based on the usage of refuse compost. Fifteen farmers from each site were interviewed. Sokoto Environmental Protection Agency (SEPA) and Get clean Sokoto were planned for the Focus Group Discussion (FGD) being the two major waste managers in Sokoto metropolite. However, SEPA declined the discussion, therefore only GET CLEAN management and workers participated for the FGD session.

Data Collection and Analysis

The study employed two set of questionnaires in the collection of data from households and farmers respectively while a check list was used for the FGD with GET CLEAN commercial waste manager on the willingness of managers to accept farmer's minimum amount to pay for their services and how efficient can they offer such services.

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Descriptive statistics in form of frequency and percentage were used to summaries the data while logit regression model was used to examine the influence of households‟ socioeconomics attribute on the willingness to pay for improved solid waste management.

The Logit Model

This is a model developed based on cumulative logistics probability function; the dependent variable (willingness to pay) is binary in nature (1 or 0). Suppose the probability of observing a value of one is expressed as :

$P_r = P(y = 1)\beta + \beta_2 x_1$

The logit model is expressed as:

$$P_r = f(Zi) = \frac{1}{1+e^{Z_i}}$$

$$= \frac{e^{Z_i}}{e^{Z_i}+1} \text{ Where } Z = \alpha + \beta X_i$$

The dependent variable [*Willingness to Pay (WTP)]* was specified as 1 if a respondent's answered "Yes" and 0 if "No". The independent variables (Xi) include:

X_1=Age (years),

X_2= Occupation (civil/public servant 1, otherwise 0),

X_3 = Household size (number),

X_4 =Educational qualification of household heads (3 Quranic Education, 4 Primary Education, 5 Secondary Education and 6 Tertiary Education)

D_1 =Residence located in High income residential area (1, otherwise 0),

D_2 = Residence located in low-income residential area (1, otherwise 0) and D_3 = Residence located in middle income residential area (1, otherwise 0).

RESULTS AND DISCUSSION Socio-economic Characteristics of Household Respondents

Table 2 presents the distribution of household respondents socioeconomics parameters that may influenced the use of improved solid waste management in the metropolis. The results revealed that 33.2%, 26.6% and 23.2 % were within the age brackets of 46 to 57; 33 to 45 and 20 to 32 years respectively. These implied the majority of households respondent were in the active age bracket. Age had been identified as factors influencing solid waste management in highly populated cities (Sridhar *et al*., 1985; Ajani, 2007 and Yusuf *et al.*, 2007).

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The household size distribution further revealed the households were relatively large with 29.8% and about 26% had household sizes of 1 to 7 and 8 to 14 persons respectively. Household Size might positively correlate with rate of refuse waste generation in the metropolis. The occupational distribution further shows 43.4% were public sector employee, 26.3% self-employed, 23.4% were artisan and only 7.60% were private sector employees. The possible influence of household size and occupation to waste generation and management could be supported by the views of Ahmed, 1997, World Bank, 2005 and Veolia Environmental Services, 2006 that there is an overall correlation between the generation of municipal solid waste, wealth and urbanization. The respondents‟ level of educational attainment revealed that 47.0% had some tertiary education, 27.8% had secondary school, while 9.30% had primary school education and 6.60% had no formal education. Educational qualification therefore may be a significant factor that may determine an individual's willingness to pay. This could be true because it relates to occupation as well as to income level.

Table 2 Socio-economic Characteristics of Household Respondents

Age range	**Frequency**	**Percentage**
20-32	38	26.6
33-45	52	33.2
46-58	35	23.2
59-71	25	17.0
Household size 1-7	45	29.8
8-14	39	25.9
15-21	14	9.2
22-28	1	0.7
No response	51	34.7
Occupation		
Private Sector Employee	13	7.60
Public Sector Employee	67	43.4
Artisan	15	23.4
Self Employed	55	26.3
Educational Qualification		
Qur‟anic education	11	7.30
Primary education	14	9.30

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Secondary education	42	27.8
Tertiary education	71	47.0
No formal education	10	6.60
No response	2	0.70

Socio-economic Characteristics of Farmer Respondents

Table 3 presents the socioeconomics of the sampled farmers, the results revealed that 33.4%, 16.7% and 13.2% of the farmers were in the age brackets of 42 to52; 31 to 41; and 20 to 30years respectively. This implied that the sampled farmers were in their active ages and well experienced to attest to the implication of refuse waste on agriculture as well as their willingness to accept improved refuse in the form of compost. Major occupations of the farmers were farming (86.7%), animal husbandry (23.3%) in addition to other jobs as civil service (20%) and trading (6.60%).

Farmers practiced both upland and Fadama crop production (53.3%) while 33.3% and 13.3% were only engaged in the *Fadama* and upland production only respectively. Vegetable, cereals and tubers were the major crop produced at the Fadama and the uplands. In addition, farmers kept livestock as a source for livelihood diversification, the result shows 53.3% of the farmers kept goat, 50% kept both sheep and cattle and only 26.7% of these farmers kept poultry. This further implied farmers use animal dung as a source of manure. Thus, major livestock kept by a farmer is important determinants against willingness to accept refuse waste converted to compost.

Table 3: Socioeconomics Distribution of Farmer Respondents

Variable	Frequency	Percentage
Age 20-30	4	13.2
31-41	7	16.7
42-52	11	33.4
53-63	8	3.00
Major Occupation Farming	26	86.7
Animal Husbandry	7	23.3
Trading	2	6.60
Civil Servant	6	20.0

Production Type Fadama	10	33.3
Upland	4.0	13.3
Fadama and Upland	16	53.3
Crop Produced Cereals	23	76.7
Vegetables	24	80.0
Tuber	7	23.3
Livestock Kept		
Cattle	15	50.0
Sheep	15	50.0
Goat	16	53.3
Poultry	8	26.7

* Multiple options allowed

Nature of Households' Waste and Willingness to pay for Improved Waste Management Services (IWMS)

Table 4 presents the nature of generated households refuse waste and the households‟ willingness to pay for improved waste management services. The results indicated that the major constituent of generated refuse waste were polythene (nylon) bags (79.5%), vegetable/kitchen wastes (77.5%), plant leave droppings (31.1%), animal dung (10.6%) and clothing material (1.3%). These implied that constituent of households generated refuse waste are biodegradable material with the exception of polythene and some clothing materials. Biodegradable materials are excellent raw material for compost as they contain a lot of valuable nutrients in the form of nitrogen, phosphorus, potassium and other elements (Hammed *et al.*, 2011). About 64% of the households expressed their willingness to accept IWMS, Households willingness to accept certain services usually influenced their willingness to pay for it. The willingness of household to separate refuse waste into the different categories (63.2%) vindicated the potential for success of waste recycling to useful product.

Difficulties faced by households in disposing waste and whether household pay someone to dispose their waste also determine the willingness to accept IWMS. The result revealed 47.7 % had difficulty in disposing their refuse waste and 64.2% were willing to pay for the waste management services. However the remaining 52.3% that do not had difficulty in disposing waste was attributed to their closeness to dumping site or used other measures like burning, burying or even dumping of waste on nearby land or uncompleted buildings which constituted greater environment nuisance. Moreover, 82.1% pay for waste disposals, Households‟ willingness

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to pay for disposal of their waste may signifies the effectiveness of the services. The household most preferred the monthly (55%), followed by daily (21.9%) and then weekly (8.6%) mode of payments for the waste disposal services.

Table 4: Distribution of Households Waste and Willingness to Pay for IWMS

IWMS Variables	Frequency	Percentage
Constituent of Waste* Polythene bags		
	120	79.5
Vegetable/Kitchen waste	117	77.5
Plant Leave droppings	47	31.1
Animal dung	16	10.6
Clothing material	2	1.3
Willingness to pay Attribute* Willingness to accept IWMS	97	64.2
Separating waste constituent	96	63.2
Difficulty in disposing waste	71	47.7
Paying for waste disposal	124	82.1
Preferred mode of Payment Daily	33	21.9
Weekly	13	8.6
Monthly	83	55.0
None	21	14,5
Amount spent on waste 100-500		
	33	28.2
600-1000	67	44.4
1500-3000	7.0	4.60
No response	34	22.5
Bid rate of ₦1500 per month		
Can Afford	73	48.3
Can‟t Afford	73	48.3
No response	4	3.3

*Multiple options allowed

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The results further depict 44.4% of the respondents reported to have paid per month for the waste disposal services between ₦600-1000, while 28.2% and 4.6% spent between ₦100-500 and between ₦1500-3000 respectively. The possibility for effectiveness of the private waste management companies warranted 48.3% to accept the bid for the payment of N1500 per month. However, a tie of the same 48.3% was observed with household that can"t affords the bid. This finding could be corroborated with the view of Horowitz *and* Mcconnell (2002) who reported that there were always disparities between willingness to accept and willingness to pay, as willingness to pay is relative to one's income or occupation level. In this scenario of improve waste management, one's occupation or income level influences his willingness to pay for the service.

Determinants of Households Willingness to Pay for Improved Solid Waste Management Services

The logit regression result (table 5) estimated the determinants of households" willingness to pay for improved waste management services shows the model significance LR ch2 (7) =19.02 ($p<0.01$) implies the model predicts the influence of socioeconomic factors on the households" willingness to pay for improved waste management services. The results further show that educational attainment and household location in other income areas relative to low-income area were statistically significant ($p<0.05$) in explaining willingness to pay. The significant variable was interpreted to mean,

Table 5: Logistic regression results for household willingness to pay (WTP) for improved refuse waste management services

No of observations	150
Log likelihood	- 88.8669***
LR chi2 (7) 19.02, Prob > chi2	0.0081
Pseudo R^2	0.0987

Variables	**Coefficient**	**Std**	**Z-statistics**	**Odd ratio dy/dx**	**Mean X**
Age	-0.0130	0.0156	-0.84	-0.0029	44.10
Household size	0.0572	0.0530	1.08	0.0127	7.60
Educ. Qualification	0.4032	0.1684	2.39**	0.0894	5.33
High income res. Area	0.2769	0.9372	0.30	0.0587	-
Low-income res. Area	-1.1307	0.4827	-2.4**	-0.2549	-
Middle income. res area	0.5392	0.5410	0.10	0.0119	-

Significant at **5% *** 1%

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Educational qualification has a positive impact on willingness to pay as the qualification of household increases above secondary school there was an increasing tendency for accepting improved waste management service. The negative sign of low-income area variable implies decreasing tendency of willingness to pay for improved waste management services. These findings concurred to Ajani, 2007 and Yusuf *et al.*, 2007) who reported similar scenario on households‟ determinants for willingness to pay for waste management services in Oyo State, Nigeria.

Farmers' Refuse Waste Usage and Willingness to Pay for Improved Refused Compost

Table 6 indicates 86.7% of the farmers used household refuse as manure on their farms. The major compositions of the refuse waste used as identified by farmers were manure (50%) Polythene bags (26.6%), plant leaves dropping (23.3%) while 20% identified vegetable waste. These major constituents of refuse are biodegradable materials with the exception of polythene and are useful in the conversion of refuse waste into compost. Moreover, 83.3% were willing to accept sorted refuse waste converted to compost for use on their farms. The prior use of unsorted refuse manure may be a significant factor for the willingness to pay for sorted and improved refuse waste converted to compost.

Table 6: Distribution of farmers on usage, perception and willingness to pay for improved refuse as manure

Refuse Variable	Frequency	Percentage
Refuse Usage		
Use refuse as manure	26	86.7
Refuse Composition Manure		
	15	50
Vegetable waste	6	20
Plant leave	7	23.3
Polythene	8	26.7
Refuse Dislike Attribute:		
polythene content	**23**	**83.3**
Hazardous element	**20**	**66.7**
Refuse like Attribute: Cheap source		
of plant nutrient	**22**	**73.4**

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Enhances soil structure			
Acceptance of improve refuse willing to Pay	25		83.3
Amount per Pick up load(₦) 1500-2000		2	6.60
2500-3000	12		40.0
No response	11		
Bid for improved refuse compost at N3500 *	12		40.0

*Pick –Up Load less added transport cost

However, 83.3% of the farmers attributed the unsorted refuse manure to contain high proportion of polythene bags and 66.7% claimed refuse to contain metallic and hazardous materials that impair the plant germination and growth. While, 63.3% termed refuse manure as very good source of manure to crops as well as enhances soil structure. These attributes of refuse manure may discourage the use of unsorted refuse and invariably encourage the use of sorted refuse compost as well as enhanced farmers willingness to pay and use it on their farms as manure. The result further revealed 40% and 6.6 % of the farmer were willing to pay between ₦2500 to 3000, and between ₦1500-2000 per pick up load respectively.

While 40% were ready to bid a „pick up" load of improved refuse compost at the cost of ₦3500 plus added transport cost and the other 60% declined for the fact that a tipper load of unsorted refuse costs N1500-4000. This finding is in line with view of Horowitz and Mcconnell (2002 and 2003), studies that directly measure monetary values for WTP often found disparity between a person's willingness to pay (WTP) for a good and his willingness to accept (WTA) compensation to forgo the same good.

Assessing the willingness of solid waste managers to provide for composting service

The focus group discussion with waste management private company Semid Global Service (Get Clean Sokoto) on the households patronage for their cleaning services as well as the company's willingness of recycle waste to improved compost and willingness to accept farmers" minimum amount for the improved refuse compost and how efficiently such services could be offered.

The discussion revealed that, the company had been in operation for over seven years with wide spread clients within the metropolis. The clients include households, financial institutions public and private business enterprises. Get Clean Sokoto manages solid wastes and promotes the idea of clean environment through proper mode of wastes collection bins and appropriate disposal to the dumping site. The company charges three

thousand naira per month for households and negotiable rate for financial institutions and businesses on the basis of the intensity of generated wastes. At present the company do not engage in re-using or recycling activities. However, company's future plans include recycling, separation and conversion of waste materials for possible re-use as a measure of costs recovery. The possibility of the company to engage in the conversion of refuse to compost for farm use and accepting farmers‟ minimum price depends on demand and production cost. The recycling plans are very capital intensive that require grant from government or on a Private-Public-Partnership arrangements that could enhance the efficiencies in solid waste management in the state.

CONCLUSION

Households in Sokoto Metropolis generate a lot of refuse wastes and majority were willing to pay for improved Solid waste management services. Educational attainment and household location in other income areas relative to low-income area were statistically significant ($p<0.05$) in explaining willingness to pay for ISWM. Farmers on the other hand, about 40% were willing to accept and pay for sorted refuse converted to compost. Improved solid wastes management systems is very capital intensive that fringe on the collection, transfer, treatment, recycling, resources recovery and disposal of solid waste. It is therefore recommended for the participation of private sector in the solid wastes management through Public-Private-Partnership for an effective and efficient service delivery in the metropolis.

REFERENCES

Abdullahi, A. M. (2007). Problems of solid waste generation and disposal in urban areas: Case study of Sokoto metropolis. B.Sc. project, Department of Geography, Usmanu Danfodio University, Sokoto.

Ahmed, Y. A. (1997). Waste generation and management. In H. I. J. Jimoh & I. P. Zifabiyi (Eds.), Contemporary issues in environmental studies (pp. 13–22). Haytec Press and Publishing Co. Ltd.

Ajani, O. I. Y. (2007). Determinants of an effective solid waste management in Ibadan metropolis, Oyo State, Nigeria. Journal of Food, Agriculture and Environment, 6(1), 152–157.

Hammed, T. B., Soyingbe, A. A., & Adewole, D. O. (2011). An abattoir wastewater management through composting: A case study of Alesinloye waste recycling complex. International Journal of Interdisciplinary Social Sciences, 6(2), 67–78.

Horowitz, J. K., & McConnell, K. (2002). A review of willingness to pay and willingness to accept studies. Journal of Environmental Economics and Management, 44(3), 426–447.

Horowitz, J. K., & McConnell, K. (2003). Willingness to accept, willingness to pay and the income effect. Journal of Economic Behavior & Organization, 51(4), 537–545.

Hoornweg, D. T. L., & Laura, T. (2005). What a waste: Solid waste management in Asia (Working Paper Series No. 1). Urban Development Sector Unit, East Asia and Pacific Region, World Bank.

Ibrahim, M., Barau, L., Alhassan, M., Gidadawa, Z. S., & Dan Galadima, H. (2019). Assessment of environmental impact of solid waste generation and disposal in Sokoto metropolis. International Journal of Scientific and Research Publications, 9(5), 376–383.

Medina, M. (2002). Globalization, development, and municipal solid waste management in the third world. Awards Medals Winners/Outstanding Research Development. Retrieved from [martin_medina_martinez_paper.pdf].

Ogwueleka, T. (2009). Municipal solid waste characteristics and management in Nigeria. Journal of Environmental Health Science & Engineering, 6(3), 173–180.

Shamaki, S. B., & Shehu, A. A. (2017). Assessment of solid waste management in Sokoto metropolis. Journal of Agriculture and Environment, 13(2), 159–167.

Sridhar, M. K. C., Bammeke, A. O., & Omisakin, M. A. (1985). A study on the characteristics of refuse in Ibadan, Nigeria. Waste Management Research, 3(3), 191–201.

Sridhar, M. K. C. (2006). From urban wastes to sustainable waste management in Nigeria: A case study. In M. F. A. Vbijaro, F. Akintola, & R. U. Okechukwu (Eds.), Sustainable environmental management in Nigeria (pp. 337–353). Mattivi Productions.

United Nations Environment Programme (UNEP). (2004). The use of economic instruments in environmental policy: Opportunities and challenges. UNEP.

Veolia Environmental Services. (2006). From waste to resource: An abstract of the 2006 world waste survey. Retrieved from http://veoliaes.com/resource.php?id=566

World Bank. (2005). Waste management in China: Issues and recommendations. Retrieved from www.go.worldbank.org/2H0VMO7ZG0

Yusuf, S. A., Salimonu, K. K., & Ojo, O. T. (2007). Determinants of willingness to pay for improved household solid waste management in Oyo State, Nigeria. Research Journal of Applied Science, 2(3), 233–239.