

# Assessment of Urban Solid Waste Disposal System in Port Harcourt Municipal Council, Rivers State, Nigeria

Henry Chiaka Unaeze, Mercy Ebere Ndubueze- Ogaraku, Banigo, Queen Lesor

**Abstract**— This study examined urban solid waste disposal system in Port Harcourt municipal council Rivers State, Nigeria. Eighty household heads were randomly selected from the study area. Primary and secondary data were used to obtain information from well-structured questionnaire. Descriptive statistics and contingent valuation method (CVM) i.e. willingness-to-pay for a permit for waste disposal were used for the assessment. Also an actor diagram was used to show the institutional linkages in waste disposal in the study area. It was observed that the major disposal methods were open landfill, communal receptacles, and house-to-house collection. The actor diagram showed a strong linkage between the state (public institutions) and the contractors. There was also strong linkage between the contractors and the educational sub-system. But the linkage between NGOs, individual sub system and the state were weak, while the linkage between household sub system, collection point and contractors were very strong. It was only 35% of the sampled respondents that were willing-to-pay ₦100 (as a permit for 50kg of waste generated). The major constraints encountered by the respondents, were lack of awareness on proper waste disposal, indiscriminate dumping of waste in drainages, which in-turn blocks the drainage system which finally leads to flooding etc. Pre-dominant solid wastes were residential domestic wastes, industrial waste and hazardous wastes. Government should enact waste management laws with stiffer penalties on offenders to ensure compliance and encourage institutional articulations among various institutions that are involve in waste management systems. Finally government should also sensitize the Public on the benefits of proper waste management practices.

**Index Terms**— Disposal Systems; Urban Solid Waste; Port Harcourt Municipal council; Rivers, State.

## I. INTRODUCTION

Urban waste can be defined as any unwanted or unusable material produced by urban households and industries (hazardous or radioactive waste). Urban waste has been one of the major causes of environmental degradation in Africa. According to the United Nations Habitat Watch, African city populations will more than triple over the next 40 years. African cities are already inundated with slums, a phenomenon that could triple urban populations and spell

disasters, unless urgent actions are initiated (Wale, 2015). As a result, the quantity and generation rate of solid wastes in Africa have increased tremendously and this calls for the need to salvage the situation before it gets out of hand. Waste management in Africa is faced with numerous challenges (Bello, 2016). Urban waste management in Nigeria is constitutionally, the responsibility of the third tiers of government that is, the local government (Federal Republic of Nigeria, 1999). Waste generation in Nigeria is alarming and it has not been effectively and efficiently managed due to some factors like poor disposal facilities, lack of funds to manage waste management agencies due to embezzlement, political disparity and so on. Nigeria with growing population exceeding 170 million was one of the largest producers of urban waste in Africa. A recent estimate by government projected that by 2020, 46% of Nigerians will live in urban areas. Pointing strongly in this direction, is a known fact that many erstwhile villages are already transiting to urban centers, as more population concentrate in them (Wale, 2016). Port Harcourt popularly known as the 'Garden City' is the capital of Rivers State, of Nigeria. The city has now been changed into a garbage city because of indiscriminate dumping of wastes around the city. The city is occupied by residential buildings, companies/industries, farmlands, public/commercial buildings (like schools, market and religious centers). The waste produced by these entities are not properly disposed and managed and as such it has led to environmental degradation (Josiah and Akuro, 2004). Although, urban waste has some usefulness, for example aluminum, papers, iron objects, plastics and scraps, can be re-cycled to produce new products, for example 100kg of empty cans are sold for ₦3,000. Also does agricultural waste from urban farming can be used for compost manure to fertilize the soil and increase crop yield. It is a fact that man's survival on planet earth absolutely depends on his environment. Unhealthy environment always leads to unhealthy human existence. Therefore indiscriminate urban waste disposal is a problem to the environment and a problem to the society. In Port Harcourt city, there are problem of illegal dumping of wastes on water bodies, drainage system and road sides, which led to drainage blockage and flooding when it rains. This flood water can lead to collapse of electric poles, buildings and erosion on farm lands. In addition, when they are poorly disposed especially liquid (excreta) and solid waste (food scraps) from households and industries can cause serious health hazard through the spread of infectious diseases, obstruct traffic flow and cause ground water contamination. Also, unattended waste lying around attracts

Henry Chiaka Unaeze, Department of Agricultural Economics and Extension, Faculty of Agriculture, University Of Port Harcourt, Rivers State, Nigeria.

Mercy Ebere Ndubueze- Ogaraku, Department of Agricultural Economics and Extension, Faculty of Agriculture, University Of Port Harcourt, Rivers State, Nigeria.

Banigo, Department of Agricultural Economics and Extension, Faculty of Agriculture, University Of Port Harcourt, Rivers State, Nigeria.

Queen Lesor, Department of Agricultural Economics and Extension, Faculty of Agriculture, University Of Port Harcourt, Rivers State, Nigeria.

flies which in turn perches on our foods, also do rats and other creatures that crawl into our homes. These wastes also produce unpleasant odors which causes air pollution. But most of these problems can be avoided if sufficient funds are made available with effective public participation processes, coupled with unbiased Political parties' affiliation. With all these recommendations it becomes pertinent to ask the following questions: what are the respondents' socio-economic characteristics, what are the institutional linkages in waste disposal in the area of study, what is the specific amount, respondents are willing-to-pay for a permit in waste disposal, what are the major constraints encountered in waste disposal in the area of study. This paper will provide detailed answers to these questions.

II. METHODOLOGY

Port Harcourt city is a local government area of Rivers State which lies in the heart of the Niger Delta region of Southern Nigeria. It is one of the 23 local government areas created for Rivers State. Port Harcourt covers an area of 109km<sup>2</sup> (42sq km) with a population of 538,558 as recorded by the census done in 2006. It is situated 52km southeast of Ahoada and about 40km northwest of Bori. It is bounded to the south by Okirika, to the east by Eleme, to the north by Obio-Akpor and to the west by Degema. The population of this study covers all the 14 communities in Port Harcourt that is all residential, commercial, and industrial areas.

III. RESULTS AND DISCUSSIONS

**Socio-economic Characteristics of households and institutions in the study area.**

From table 1 below shows that majority (85.0%) are male while (15.0%) are females. This shows that most households are male gender. According to the report from the demographic and health survey (DHS) program 83% of households in Nigeria are headed by men while 17% are headed by women. Also only 45.0% of the sampled respondents are between the ages of 40-49 years with a mean age of 45. This shows that the respondents are in their active

age and has the ability to participate in the waste disposal programs in the study area. In addition, majority (83.61%) is married and only 1% is widowed. This shows that more waste will be generated in the study area due to the fact that more of the respondents are married. Furthermore, 58.8% had secondary education, while 20.0% are University graduates, 16.3% had primary education and only 5% had no formal education. Income distribution shows that, majority of the respondents (62.5%) earns an average monthly income above ₦25,000 and only 1.3% earns ₦5000-₦10,000. It was observed that respondents whose average monthly income was enhanced are more willing-to-pay for waste disposal permit. However majority (70.0%) of the respondents have small household size of 1 to 3 persons, while only 2.5% have large household sizes. Families of large households' size produce more waste compared with families with small households' size. The mean household size is 5 persons.

Majority of the institutions sampled, that are involved in urban waste disposal are privately owned institutions (60.0%) while 40.0% are state owned (public) institutions. This has shown that majority of the waste disposal agencies are owned by private contractors. Also only (60.0%) of the privately owned institutions has staff strength of 20 and less while government owned institutions have staff strength of above 50 persons. The contribution of staff strength towards institutional effectiveness was strongly emphasized by Unaeze and Okoye (2016). They clearly stated that staff strength was a significant institutional factor which contributes positively to the cost of running climate change adaptation and mitigation strategies in which waste management is one of the strategies. In addition 60% of the waste disposal institutions have been in existence for 10 years. These are mainly private institutions while 40% of state owned institutions have been in existence for 21-30 years. Finally, 80.0% of the state waste management institutions have an annual budget above 301 million naira (₦824655.54) and only 20.0% of the private institutions have annual budget below 100 million naira (₦273,972).

**Table 1: Distribution of Respondents and Institutions according to their Socio-Economics Characteristics in the Study Area.**

No.	Variable	Frequency	Percentage	Mean
1	<b>Gender</b>			
	Male	68	85.0	
	Female	12	15.0	
	<b>Total</b>	<b>80</b>	<b>100</b>	
2	<b>Age</b>			
	20 to 29 years	8	10	45
	30 to 39 years	12	15	
	40 to 49 years	36	45	
	50 to 59 years	20	25	
	60 years and above	4	5	
	<b>Total</b>	<b>80</b>	<b>100</b>	
3	<b>Marital Status</b>			
	Single	15	4.72	
	Married	57	83.61	
	Divorced	3	10.83	
	Widowed	5	1.00	
	<b>Total</b>	<b>80</b>	<b>100</b>	

<b>4</b>	<b>Years spent in School</b>			
	0	4	5	7
	6	13	16.3	
	12	47	58.8	
	16	16	20	
	<b>Total</b>	<b>80</b>	<b>100</b>	
<b>5</b>	<b>Average Monthly income (N)</b>			
	5,000 to 10,000	1	1.3	22015.65
	10,000 to 15,000	11	13.8	
	15,000 to 20,000	8	10	
	20,000 to 25,000	10	12.5	
	Above 25,000	50	62.5	
	<b>Total</b>	<b>80</b>	<b>100</b>	
<b>6</b>	<b>Household size</b>			
	1 to 3	56	70	
	4 to 7	18	22.5	
	8 to 11	4	5	
	Above 11	2	2.5	
	<b>Total</b>	<b>80</b>	<b>100</b>	
<b>7</b>	<b>Institution type</b>			
	Private	3	60	
	State	2	40	
	<b>Total</b>	<b>5</b>	<b>100</b>	
<b>8</b>	<b>Institutions' staff strength</b>			
	20 and below	3	60	
	Above 50	2	40	
	<b>Total</b>	<b>5</b>	<b>100</b>	
<b>9</b>	<b>Number of years of existence of the institution.</b>			
	10 and below.	3	60	
	11 to 20	2	40	
	<b>Total</b>	<b>5</b>	<b>100</b>	
<b>10</b>	<b>Institutions' annual budget.</b>			
	Below 100 million	1	20	
	Above 301 million	4	80	
	<b>Total</b>	<b>5</b>	<b>100</b>	

**Source: Field Survey, 2018.**

#### IV. INSTITUTIONAL LINKAGES IN WASTE DISPOSAL IN THE STUDY AREA.

The diagram below shows the actor's linkage level in solid waste disposal in the study area. Looking at the diagram, it depicts a strong linkage between the state (state institutions) and the contractors. This is because the state (Rivers state environmental protection agency) makes use of these contractors in disposing waste in the study area. There was also strong linkage between the contractors and the education sub-system. These educational sub-systems employ the services of these contractors for waste disposals. There was also strong linkage between the contractors, collection points and household- sub-systems, since contractors engaged in collecting wastes from collection points and house-to-house collection. Most of the problems caused by waste disposal in the city start from the collection points. These points are mostly besides the open drainage, where these wastes

disposed easily find their way into the drainage system causing blockage and flooding. Lack of incinerators and receptacles at collection points are responsible to this unguided waste disposal practices. And this could be curtailed by engaging agents who will supervise how wastes are disposed based on types (plastics, organic, iron and so on). Other linkages on the above diagram show weak linkages, because there was no direct relationship between them. Between the state and educational sub-system, there was no linkage in form of training, seminars, discussion classes, that should have hinged on improving the techniques of waste management systems in the study area. Also linkage between NGOs and individual sub system with state are weak. This was due to the fact of inactiveness of NGOs in waste management practices in the city. In summary, government should fund researches on waste management systems in the educational sub-system so as to form a strong linkage.

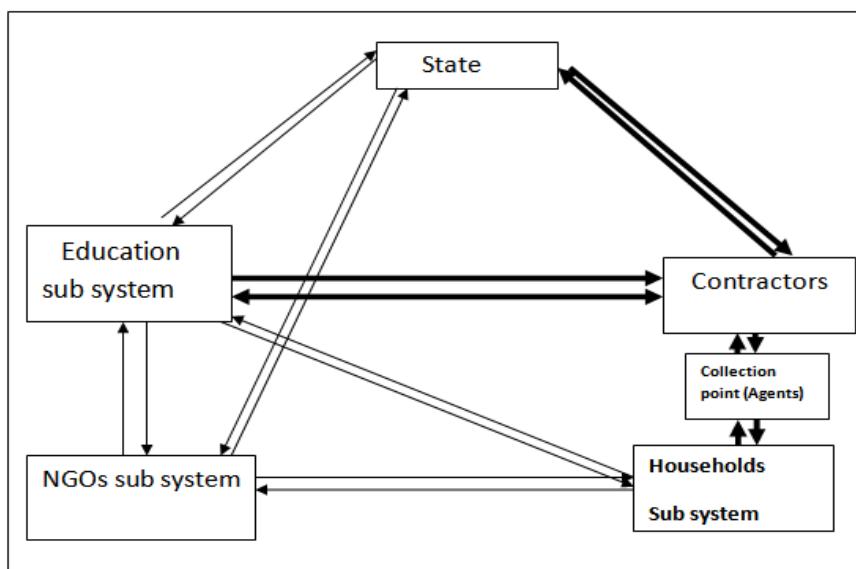


Figure 1

Source: Field survey, 2018

Weak Linkage  
Strong Linkage

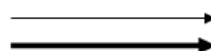


Fig 1. Actor Linkage Map showing linkage level among the actors in urban solid waste

The diagram below shows the actor’s linkage level in solid waste disposal in the study area. Looking at the diagram, it depicts a strong linkage between the state (public institutions) and the contractors. This is because the state (Rivers State Environmental Protection Agency) makes use of contractors in disposing waste in the study area. There is also strong linkage between the contractors and the education sub-system. These educational sub-systems employ the services of these contractors. There is also a strong linkage between the contractors, collection points and household-sub-system; because some of these contractors engage in collecting wastes from collection points at the same time engages in house-to-house collection of wastes.

Other linkages on the above diagram show weak linkage, because there is no direct relationship between them. Between the State and educational sub-system, there was no institutional articulation, which is a linkage in form of

seminars, discussion classes, training and so on that hinged on improving the techniques of waste management systems in the study area. Also linkage between the NGOs and the individual sub system and between NGOs and state are weak. This is because there are no NGOs involved in waste disposal in the study area. In summary, government should fund researches on waste management systems in the educational sub-system so as to form a strong linkage.

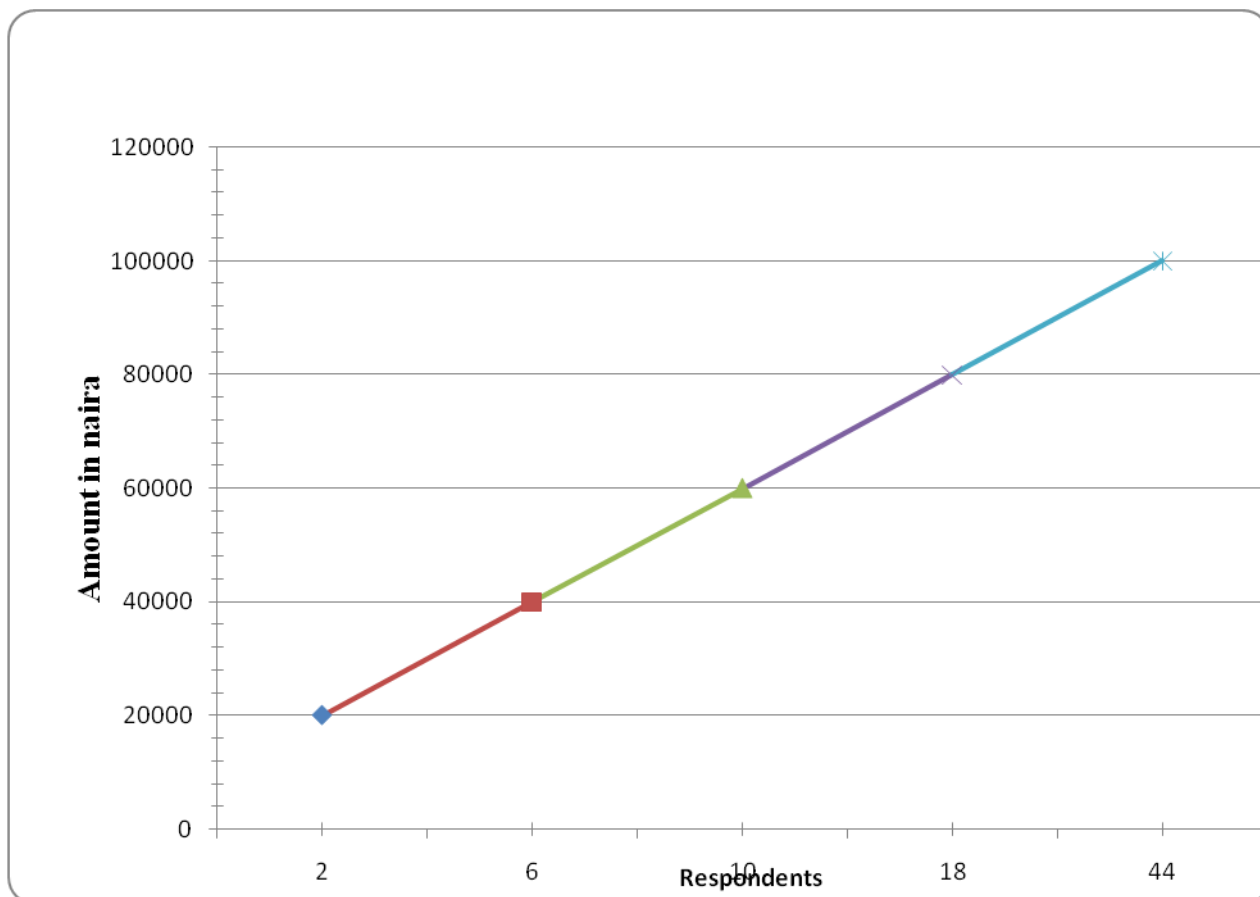
V. AMOUNT, RESPONDENTS ARE WILLING-TO PAY FOR A PERMIT IN WASTE DISPOSAL.

The table2, below shows that only 35% of the sampled respondents are willing-to-pay ₦100 for 50kg of waste generated. This implies that Government should institute waste permit in the study area.

Table 2: Distribution of Respondent’s willingness-to-Pay for waste management permit in the study area.

Amount in naira (₦) respondents are willing-to-pay for different kg of waste.	Frequency	Percentages
₦100 (50kg)	28	35
₦80 (40kg)	12	15
₦60 (30kg)	8	10
₦40 (20kg)	6	7.5
₦20 (10kg)	26	32.5
<b>Total</b>	<b>80</b>	<b>100</b>

Source: Field survey, 2018



**Figure 2: Graphical representation of the respondent’s willingness-to-pay for waste disposal in the study area.**

**Figure 2**

**Source: Field, survey 2018**

Figure 2 above depicts a graphical representation of respondents indicated on the horizontal axis; against the amount in naira they are willing-to-pay for their waste disposal on the vertical axis. This gives a supply curve which that shows that the higher the quantity of waste generated the higher the amount respondents are willing-to-pay for their disposal.

**VI. MAJOR CONSTRAINTS ENCOUNTERED IN WASTE DISPOSAL IN THE AREA OF STUDY**

The table below shows the types of constraints encountered in waste disposal in the study area. Multiple responses were recorded as respondent records more than one constraint. Only 40.0% of the sampled respondents encountered blockage of drainagesystem, which resultedfrom

indiscriminate dumping of waste causing flooding when it rains. Poor urban planning contributes 28.3% as some houses are built along water ways obstructing free flow of run off waters. Institutional articulation and access, contributes 9.2%, as institutions and households are not properly linked to exchange ideas of waste management practices. Political party differences contribute 8.3%;as contracts to dispose waste are given to party members or loyalists.Otherconstraints include lack of disposal sites and unsteady funds to contractors.

Constraints encountered	Frequency	Percentages
Lack of disposal site/incinerators.	5	4.2
Unsteady funds to contractors	3	2.5
Blockage and Open drainage system	48	40.0

Political party differences	10	8.3
Lack of institutional articulations & access.	11	9.2
Bad attitude of Port Harcourt residents to waste management.	9	7.5
Poor urban planning	34	28.3
<b>Total</b>	<b>120</b>	<b>100</b>

Source: Field Survey, 2018

Multiple responses recorded

#### VII. CONCLUSION AND RECOMMENDATIONS.

Institutional articulation and access should be encouraged among various actors in the wastes management system. Governments should funds researches on the best practices of waste management system and establish efficient incinerators and solid waste recycling plants in order to create jobs for unemployed youths. Finally government should also sensitize the Public on the benefits of proper waste management practices in the study area.

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