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Study of Waste Management in Solid Waste Collection and Evacuation in Delta State of Nigeria

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ABSTRACT

Waste management has been a problem in Delta State even with the presence of government agencies saddled with the responsibility of waste management. The Research objective of this paper is to study the role of Delta State Waste Management Agency in solid waste collection and evacuation. The authors used a descriptive research design for the collection of quantitative data in the study area. The paper used the quantitative method that made use of a survey design. This was done through the questionnaire that was used to collect data from a sample consisting of 290 respondents. A simple random sampling method was used to select the respondents that participated in the survey. The study made use of an analysis of variance to test the hypothesis formulated for the research. A t-test calculated value of (4.447>3.182) established that solid waste collection, Delta State Waste Management Agency under the board does not have a coordinated approach to waste management across the state. Based on the findings of the study, researchers concluded that there are variations in the management of waste in the study areas. It was recommended that there should be a time-tested approach to waste management by the agency to find out what works and thereafter derive a policy framework to enforce its implication alongside the regular monthly environmental sanitation.

Key words: Agency, Evacuation, Solid Waste, Waste Management.

1.0.INTRODUCTION

The outcome of indiscriminate disposal of solid wastes expose human to environmental degradation such as in flooding, drainage obstruction, widespread of infectious diseases, cholera, diarrhea, typhoid fever, waterway blockage which leads to infestation of flies, ticks and breeding of mosquitoes that cause malaria and other plagues (Yongsi, 2008). In most remote parts of Nigeria like Delta State, Lagos, Oyo State and Abuja, it has been noticed that heaps of littering solid wastes dumps are in virtually all market areas, outskirts of the cities and even on roadsides for weeks without devising any adequate means of solid wastes collection either by private sector or government. Policy makers in the country have neglected some areas and fail to carry out a thorough inspection during environmental sanitation (Aliu, 2017).

There is no doubt that every responsive government ensures public health policy implementation of her citizens. This is based on the fact that a nation with healthy labour force will be productive and increase its gross national product. Nevertheless, "the management of municipal solid waste poses various challenges to many countries of the world at varying intensities (Akande & Olorunnisola, 2018)." For instance, in Delta State, the case is even shoddier in the urban areas where there seem to be an overflow of solid wastes due to demographic realities and the phenomenon of rural-urban migration as the case of Asaba which is the capital of Delta State. Sule (2004) stated that "human population and rural-urban migration has increased through urbanization, natural increase rate and industrialization, yet the service rendered is not sizeable enough to control the high level of solid waste generated in urban areas and these have contributed, to a large extent, about 70% vis-à-vis the total rate of its disposal which is 30% (Edu, 2003).

This is why it is essential to involve identified stakeholders during policy formulation, particularly the bills that bother on public health during a public hearing of the legislative arm of Delta State. In Delta State, the neglect of filled refuse bins in recent time has its effect on the inhabitants. Many areas around the homes are littered with domestic refuse sewage waste, garbage and other solid wastes from industrial operations. Industrial operations are characterized by generation of large volume of solid wastes in the form of solid, liquids and gases. Some of these solid wastes are toxic with negative impacts on our environment, land, water and air. To ensure a clean and safe environment, the Delta State Government established Delta State Waste Management Agency (DSWMA) in 2004 to monitor the environmental quality and to ensure a refuse-free environment. However, despite the

government efforts at making the environment clean in Delta State, people seem to be careless about their environment (Olowoporoku, 2017).

Despite the staggering solid waste management policy implementation by the Waste Management Agency in Delta State, the poor solid waste management is global and a bane to the development of any city, particularly in the Third World Countries (WHO, 2020). Besides, the diseases and toxic conditions inherent in and derived from solid waste products, the presence of solid waste degenerates and degrades the aesthetic value of a city. They harbour flies, fleas, mosquitoes, rats and other disease vectors, which result to Malaria, Filariasis, Yellow fever, and among others are disturbing and embarrassing to visitors and residents (WHO, 2020). There is no doubt that the majority of these solid waste comes from domestic sources, and are characterized by household solid waste ranging from food solid waste, paper, polythene bags, textiles, wood, glass and plastics, yet there has not been enough public education on the proper disposal of solid waste especially in approved dump sites in Delta State. The indiscriminate disposal, improper management, and lack of maximizing the use of solid wastes in the state has been perceived to be poor, hence the Research objective of this paper is to study the role of Delta State Waste Management Agency in solid waste collection and evacuation.

2. STUDY AREA

Geographically, Delta State is located between latitudes 5^0 00^{11} and 6^0 00^{11} north of the equator and longitudes 5^0 00^{11} and 6^0 45^{11} East of the Greenwich meridian see (fig. 1), with a total land area of 18.050 sq. km and an estimated population of four million, ninety-eight thousand, two hundred and ninety-one (4,098,291) people (Federal Republic of Nigeria Official Gazette, 2007). The state is made up of twenty-five (25) Local Government Areas (LGAs); twelve (12) major urban centers with Asaba as the capital city and Warri as her largest commercial city and the most populated in the state.

Figure 1 Geographical Location of Delta State

2. SOLID WASTE MANAGEMENT IN DELTA STATE

Solid waste management has been one of the greatest challenges facing urban cities mostly developing countries. Delta state is one of the states in Nigeria faced with the problem of solid waste management often characterized by inefficient collection method, improper disposal, and inadequacy of solid waste transportation. Some other factors militating against efficient solid waste management in the state are solid waste reduction technology at source, non-recycling of solid waste, lack of repairs and legislative bottleneck, inadequate solid waste disposal vehicles and poor town planning coupled with rapid population and urbanization have all conspired to add to the solid waste congestion in the streets with grave implication for environmental sustainability and economic development (Ogwueleka, 2013).

Delta State was created in 1991 and the State's solid waste management board started its solid waste management activities in 2004. The Board, since inception, has been managing solid waste in 16 towns within the state. Currently, the Board operates one temporary dumpsite each in these towns except in one where it operates two. These temporary dumpsites are the

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closest things to landfills that are in existence. Most of them are reclaimable burrow pits where the refuse is regularly pushed by bulldozers to fill the pits and burnt in the open (DSWMB Report 2012). The existing solid waste management system in Delta State is quite rudimentary, inefficient and unsustainable. The challenges encountered by the board include poor state of equipment and trucks in the face of an increasing demand for solid waste management services across the state.

The types of solid wastes generated are mostly from domestic, agricultural, fishing, commercial, industrial and trading activities, as well as human/animal fecal deposits. Generally, in the location within the rural and urban areas, the identified refuse disposal methods in the communities include: open dumping, bush dumping, Rivers, streams/creeks and swamps and organized collection. In some parts of the urban area of Asaba, Sapele, Warri, Uvwie, Udu, and Ughelli, domestic solid wastes, commercial/trading center solid wastes are collected in Bins, plastic basins or buckets, nylon bags, and paper cartons. The State Solid waste Management Board in collaboration with some Private Sector Partners (Solid waste Collectors) collect these solid waste from residence, markets, industries and healthcare facilities with the use of trucks for onward disposal at designated dumpsites. While Asaba has a government-approved dumpsite, Uvwie, Udu and Warri have none but make use of land owned by indigenes (Private dumpsite) that collect payment from the Private Sector Partners (PSPs).

The State's major towns and cities accounts for the bulk of solid waste materials generated in the State. The types of solid waste found in these towns and the State in general are those typical of urban settlements devoid of proper solid waste disposal systems and majority of its dwellers living in areas designated as slums. These solid waste materials include papers, plant/ vegetable solid wastes, metal scraps, glass materials/bottles and plastics/ rubber products. Of these solid waste materials, plastics, rubber and polythene products pose a great challenge to the State in terms of proper disposal as it is the most widely used packaging material and its long degradable lifespan. The method of solid waste disposal generally practiced in the State is the Landfill method which is visibly seen located in various parts of the State with some towns having up to five landfill sites. Incineration is also carried out not as a form of recycling (down-cycling) but as a way of reducing the volume of solid waste on the landfill sites (Egun, 2009).

Recycling level in the State is very minimal. Currently, metal scraps, aluminium and glass materials/ bottles are the only solid waste materials collected for recycling in the State by the glass and steel company in Delta State as they are considered economically viable. Solid waste papers and paper products, clothing materials, drink cans, plastics and rubber products are left to their natural fate or been incinerated at the dumping sites. This can be attributed to the fact that the production of new ones from their basic raw materials which is readily available in the State is cheaper and more cost efficient (Egun, 2009). Due to the overwhelming volumes of solid waste generated, the Asaba district of Delta State Solid waste Management Board cannot satisfactorily collect and dispose the large quantity of solid waste generated and as a result, there has been a gradual degeneration in the management of household solid waste in residential areas (DSWMB report, 2012).

4.0. Theoretical Framework

The Environmental Citizenship Model

The Environmental Citizenship Model (ECM) model was proposed by Hungerford and Volk (1990). The Hungerford Volk Model arrays three stages of educational involvement ranging from first exposure (entry) to real involvement (empowerment), and then suggests that each stage has certain knowledge and attitude characteristics. In the Environmental Citizenship Model, Hungerford and Volk grouped the variables that influence whether a person takes action into three categories. These are;

- Entry-level variables—such as general sensitivity to and knowledge of the environment
- Ownership variables—including in-depth knowledge, personal commitment, and resolve
- Empowerment variables—such as action skills, locus of control, and intention to act. This theory is vitally important because of its potential to evolve a citizenry that is touched with the feelings of the environment, who will bear its burdens to the extent of possessing skills that can enable them to act in the interest of the environment.

This theory is vitally important because of its potential to evolve a citizenry that is touched with the feelings of the environment, who will bear its burdens to the extent of possessing skills that can enable them act in the interest of the environment. One popular environmental variable for instance is that of solid waste. This theory could become applicable such that whether it be purchase of goods or undertaking of services, one thing will be paramount in the minds of the citizens and agents of government such as Delta State Waste Management Agency; sustainability of the environment. Similarly, when it comes to the generation, disposal and management of solid wastes; citizens and the state waste management agency will be most concerned with a sustainable manner of solid waste generation and management hinged on avoidance, reduction, re-use and recycling. In application, the Hungerford-Volk Model identifies numerous variables required to be an environmentally literate citizen such as education and a waste management culture inculcated through the practice of waste management. Secondly, the model provides a basis for the classification and separation of environmental literacy variables according to their importance either as a major variable or a minor variable. Also, the model provides a framework/scale to identify the level of government provision of waste management practice, such that one can tell if a citizen is in the entry level.

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5.0 RESEARCH METHODOLOGY

The paper adopts the quantitative method in the collection and analysis of data. This involves the use of the questionnaire as the instrument of data collection from the respondents comprising of staff of Delta State Waste Management Agency in the state. The study employed the descriptive survey method to sample the opinion of the respondents. A sample of 290 was obtained comprising of the state waste management agents (see table 1). This was done using simple random sampling method. Descriptive statistics such as frequency and averaging models were used to analyse the data.

Table 1: Sample Size and Distribution of Questionnaire

	Questionnaire Distributed	
Sampled Location	**Number of Respondents**	**Percentages (%)**
Asaba	50	17.2
Warri	48	16.6
Ughelli	55	19.0
Agbor	30	10.3
Jedo	27	9.3
Abraka	20	6.9
Agbarho	20	6.9
Ozoro	20	6.9
Sapele	20	6.9
Total	**290**	**100**

Source: Fieldwork, 2022

6.0. Discussion of Results/Findings

Table 2: Delta State Waste Management Agency played any key role in solid waste collection and evacuation

Response	Number of Respondents	Percentages (%)
Yes	101	40.4
No	149	59.6
Total	**250**	**100**

Source: Fieldwork, 2021

Data presented in table 2 revealed that 40.4% of the total respondents confirmed that Delta State Waste Management Agency have played key role in solid waste collection and evacuation while 59.6% do not agree. This is an indication that Delta State Waste Management Agency plays key role though not substantial in solid waste collection and evacuation.

Table 3: Waste Management Agency educate households on proper waste disposal

Response	Number of Respondents	Percentages (%)
Yes	96	38.4
No	154	61.6
Total	**250**	**100**

Source: Fieldwork, 2021

Data presented in table 3, shows that 61.6% of the respondents agreed that Waste Management Agency educate households on proper waste disposal while 38.4% of the respondents did not agree. This implies that Waste Management Agency has poorly educated most households in Delta State on proper waste disposal.

Table 4: Payment of charges for removal of household solid waste

Response	Number of Respondents	Percentages (%)
Yes	161	64.4
No	89	35.6
Total	**250**	**100**

Source: Fieldwork, 2021

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The table 4, shows the charges the respondents pay for removal of household solid waste. It was observed that 64.4% of the respondents pay charges for solid waste removal in their households while 35.6% of the respondents do not pay any charges since most of the households in these categories dump waste behind their houses and in most cases they bury them or burn them.

Table 5: The Frequency of Waste Management Agency evacuate/clear solid waste from houses daily, weekly, or monthly

Frequency	Number of Respondents	Percentages (%)
Once a day	46	18.4
Once a week	101	40.2
Twice a week	46	18.4
Once a month	33	13.2
Twice a month	24	9.6
Total	**250**	**100**

Source: Fieldwork, 2021

Table 5 shows that 18.4% of the respondents dispose their waste once a day, 40.2% said once a week, 18.4% of the respondents said they dispose their waste twice a week, 13.2% said once a month and 9.6% dispose waste twice a month indicating that majority of the respondents dispose their waste on daily basis. It was observed that waste management practice is common among Delta State residents.

Table 6: T-test Statistics

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
Constant	3.661	.823	1.309	4.447	.011	1.375	5.946
Sapele	-9.722	2.188	-1.298	4.443	.011	-15.798	-3.646
Warri/Jedo	.023	.246	.018	.094	.930	-.661	.707
Abraka/Ozoro	1.000	.000	1.089	4.365	.	1.000	1.000
Ughelli/Agbarho	1.000	.000	.898	.995	.	1.000	1.000
Asaba/Agbor	1.000	.000	1.013	.609	.	1.000	1.000

Source: SPSS Output, 2021

Data presented in Table 6 showed that there is significant difference in the method of solid waste collection and waste management practices in Delta State since the t-calculated value (P>4.447) is greater than the t-tabular value of 3.182. It was observed that the solid waste methods differ in Sapele (4.443) as compared to other towns in Delta State such as Abraka and Ozoro (4.365), Ughelli and Agbarho (.995), Warri and Jedo (.094), Asaba and Agbor (.609) indicating that solid waste collection and management practices by the Delta State Waste Management Agency differs across major towns and cities in Delta State, Nigeria.

Table 7: ANOVA

	Sum of Squares	df	Mean Square	F-Cal.	Sig.	F-Tabular
Between Groups	1984.000	4	496.000	2.872	.246[b]	2.776
Within Groups	.000	0	.			
Total	1984.000	4				

Source: SPSS Output, 2021

From Table 7, the F-calculated value of 2.872 (P>2.872) is greater than the F-Tabular value of 2.776 at 0.05 level of confidence. Therefore, there is significant difference in the method of solid waste collection and waste management practices in Delta State.
The result of the analysis obtained revealed, that the t-calculated value (P>4.447) is greater than the t-tabular value of 3.182 at 0.05 level of significance. Also, the result showed that the F-calculated value (2.872) is greater than F-Tabular value (2.776) at 0.05 level of confidence indicating that there is significant difference in the method of solid waste collection and waste management practices in Delta State. This is fundamental to understanding the relationship between the environment and the trends of indiscriminate solid waste disposal and thus, their impact on the natural environment as observed Anyakora, et al (2004) and Atubi (2011). This is also in line with the findings of Adesanya, et al. (2009) who observed that environmental hazards created by pollution has increased the spread of respiratory diseases resulting to the emergence of non-communicable diseases

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resulting to cases of ill health in Nigerian Cities. This finding further conforms to that of Anyakora, et al (2004) who found out that improper waste disposal has serious implication on the natural environment, human health, agricultural productivities, ecological system and social infrastructure. This also conforms with the findings of Anderson (2002), Akpovi (2005), Ogbobi (2010), and David (2014), who found out that the volume of waste generation in Nigerian cities is growing at alarming rate which have adverse effect on the natural environment leading to environmental pollution.

7. POLICY IMPLICATIONS

There should be tested methods of solid waste collection and evacuation across the state. This is to bring up the best methods which could be employed across riverine areas, highlands, as well as urban and rural areas in the state. This is to be effectively pursued through policy framework to see to it that it is methodically followed in order to rid the state of solid waste management problem that is fast becoming a big environmental, and health issue.

Conclusion

The paper submits that Delta State Waste Management Agency is involved in solid waste collection and evacuation in the state but that across the state, the waste management practices varies across towns in the state. This possibly make it almost impossible to have a uniform approach that works in the towns in Delta State. This equally affects policy on environmental sanitation as there is no synergy in the methods dispensed across towns in the state.

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