

Solid Waste Management and its Challenges in Nigeria

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ABSTRACT

This research work identified the challenges of solid waste management in Nigeria with emphasis on Lagos State and recommended feasible solutions that will improve solid waste management in that area. The data obtained through questionnaire, observation and interview were analysed using the Chi test method. The sampling size was chosen using the random sampling technique. This method was chosen to give equal chance to the respondents being selected in the study area. From the result of the analysis, the widely adopted solid waste management practices in use include common fling in containers and disposal via government approved private sector participants/investigations (PSP/LAWMA) at a fixed financial cost. However, the inconsistency in the frequency of evacuation has been identified as a major challenge. The research therefore recommends that government should propagate awareness on source separation and recycling to reduce by about 70% the overall quantity of solid waste generated. Lagos state government should also reform evaluation cost and made it proportional to unit kilogram. The recommendation if adopted, will ensure minimization of the challenges of solid waste management in case study area.

Keywords: Solid waste, Management Practice, Private Sector Participation.

INTRODUCTION

In many rapidly growing cities, solid waste is a major source of concern owing to ineffective waste management, weak authorities and resource constraint [1,2,3]. Solid waste disposal is supply-driven but local authorities are often slow in adjusting to the demands of residential areas, industries, institutions and even streets and market places despite the various charges levied by the city council [4,5,6]. This has made most urban areas in Nigeria these days to experience an increasing rate of environmental degradation with wastes being dumped along the streets, behind and in front of homes, in water ways and along drainage channels [7,8,9, 10]. The situation appears to continue not being dealt with, due largely to the factors of urbanization, population growth, improved life style and insufficient funds to properly manage solid waste [11,12]. [8] stated that humans create the largest wastes and he suggested that it's important that once these wastes are generated, a proper way

to manage them must be put in place. [13,14] also in his research pointed to the historical beginning of increase in waste generation which he said is as far back as the sixteenth century because people changed location from rural areas to urban areas as a result of industrial revolution [15,16,17]. This movement caused a population explosion that led to a greater increase in volume of waste generation as well an increase in the variety of waste composition generated in cities [18,19,20]. In general, waste according to Noiki et al 2021 can be defined as any unwanted, castoff, rejected, excess material anticipated for recovery, reuse, reconditioning, or purified by an independent process from the same source material [21,22]. The common ground on which these researches stand is on the issue of the usefulness of the material they call waste, and this is defined by the producer of the waste generated. But managing these wastes have been a major challenge and

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according to [23], most developed countries are working towards sustaining an environment that wouldn't affect lives negatively while in most developing countries, the thought of what can be gained socially and economically happens to be the concern. Efficiency in solid waste management is key to a better environment and to better health but in developing countries like Nigeria, there are inadequacies and challenges [24,25]. On one hand, the density of population increased in these centers of congregation and therefore wastes generated per unit area also increased. On the other hand, available land for disposal of waste decreased in proportion. [26] therefore stated that solid waste management has emerged as an essential, specialized sector for keeping cities healthy and livable because even the open spaces, which usually function as corridors for fresh air supply and facilitate good air circulation in general, recreational quality for the public and the overall image of a place have been taken over by the dumping of solid waste [27].

The overall goal of urban solid waste management is to collect, treat and dispose of solid wastes generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available [28,29,30]. And to this, the "Waste Management Hierarchy" of waste

AIM AND OBJECTIVES

This study aims at identifying the problem associated with solid waste management in Thomas Estate, Ajah, Lagos State and to recommend feasible solutions that will ensure improved solid waste management in the study area by ascertaining, the enlightenment of the

Mba and Nnadi reduction, waste reusing, waste recycling and waste recovery before final disposal have been adopted by most industrialized nations as the steps for developing solid waste management strategies. As poorly managed wastes are perceived as environmental hazards of high significance, the inability of communities to manage generated wastes effectively play a major role in increasing environmental pressures [31,32,33]. And these wastes are classified using a system which comprises of waste regulations, classification, management and disposal. [34] Generally in Nigeria, solid waste management is characterized by inefficient collection methods, insufficient coverage of the collection system and improper disposal of solid waste. But Lagos state has proved itself stronger than the rest as the state started the fight against indiscriminate waste disposal systems and put in a lot of money into the sector to combat waste issues. But continuity seemed to be a major problem in the case of Lagos state waste management. The solid waste management sector therefore deserves careful attention for striking a balance between quality of service and cost effectiveness. This challenge is particularly significant for developing countries, where resources are limited but urbanization is occurring rapidly [34].

people in Thomas estate towards waste management, to determine the type of waste disposal system being practiced the most in Thomas Estate and to determine the type of waste being generated the most within Thomas estate in Ajah.

LITERATURE REVIEW SOLID WASTE GENERATION

Solid waste generation has posed a head-on problem beyond the scope of various solid waste management systems in Nigeria, as the streets experience continual presence of solid waste from commercial activities [14]. Therefore,

understanding the quantities and characteristics of the waste generated will help in developing an effective solid waste management system. The pattern of solid waste sources, generation and characteristics in Nigeria are similar to

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those of other third world countries. According to [18], the generation of solid waste is an inescapable challenge of all processes where materials are used. Extraction of raw materials, manufacture of products, consumption, and waste management all generate wastes. The main sources of solid waste generation are; Residential, Commercial and Industrial. Other activities or materials such as agricultural, street cleaning, obsolete automobiles, construction and demolition activities, health care facilities etc may also contribute to solid waste

Mba and Nnadi generation. In order to have accurate data/records of the amount of waste being generated in Lagos state, proper surveys needed to be examined. This approach will not only enhance integration of waste management system within the state but will give other interested bodies vital information on solid waste management system in Lagos state. However, it was estimated that about 9,000 metric tonnes is being generated in Lagos state on a daily bases and below table shows the records so far [26]

Table 1:Quantity of Solid Waste Generated In Some Cities in Nigeria

CITY	POPULATION ESTIMATE	ESTIMATED KG/ CAPITAL/ DAY	TONNES/ DAY	TONNES/ YEAR
Minna	346,524	0.68	235	86007
Enugu	817,757	0.74	605	220876
Birnin-Kebbi	128,403	0.65	83	30463
Lagos	21,000,000	0.92	119320	7051800
Port Harcourt	1,363,596	0.85	1159	423055
Bauchi	493,730	0.68	336	122543
Abuja	1,857,298	0.95	1764	644018
Ibadan	3,565,108	0.72	2566	936910
Kaduna	1,582,102	0.70	1107	404227
Onitsha	561,066	0.69	387	141304
Sokoto	563,861	0.68	383	139950
Jos	816,824	0.73	596	217642
Benin City	1,125,058	0.78	877	320304

Source: Population estimation (NPC,2006)

The table shows that Lagos with an estimated population of 21 million and generation rate of 0.92 kg/capita/day as at 2006, generated about 7 million tonnes of waste annually. When compared with generation rates around the world, Nigeria

in its totality of generated wastes just like most low and middle-income countries generated less waste but still wasn't able to manage its wastes effectively due to poor management practices.

WASTE MANAGEMENT AND WASTE MANAGEMENT METHODS

According to [8] Waste management is a process which combines strategic methods to efficiently regulate waste from source of generation up to the point of disposal. [13] defines waste management as a process of collecting, accumulating, treating and disposing wastes in ways that are harmless to humanity and her ecological system. In addition, [16] defines waste management as the collection, transportation, storage, treatment, recovery and finally, the disposal of waste. There has been a phenomenal increase in the volume of wastes generated daily in the country which calls for proper handling in order to protect the environment and the population [14]. Cities are having challenges in trying to keep their solid waste management system due to this increase. These systems sometimes breakdown and even collapse totally due

HISTORY OF SOLID WASTE MANAGEMENT IN LAGOS STATE

The problems of waste management became an international embarrassment to Nigeria during the pack of hosting an international festival of Art and culture FESTAC 77, when Lagos, the then Federal Capital city, was described as the dirtiest capital city in the world [18]. This embarrassment led to the emergency of first waste management agency in Nigeria established by the Lagos State Military Government in 1977. 1st April, 1977 Refuse Disposal Board was formed under Edict Nos 9, of 1977. The Board started as a centralized body where it commenced operations with Powell Duferen Pollution Control of United Kingdom as managers, and in 1980, it was changed to the waste Disposal Board and it was re-centralized in 1991 where the organization was renamed via Edict No. 55 of Lagos state. (Lagos State Government, 1988) [20]. The organization was then named Lagos State waste management Authority (LAWMA), with the sole duty of collecting and disposing municipal and industrial waste in the state. Between 1994 and 1996, LAWMA initiated the private sector

to various social, institutional, financial and technical setbacks. This brings to understanding that the available solid waste management techniques are no longer enough to deal with the quantity of generated solid wastes and that a more reliable method for waste management is required. According to [13] due to the urbanization and population explosion in developed and developing cities, the main environmental concerns have been solid waste management, sanitation and associated adverse health and environmental impacts. According to [14], a strategy for effective solid waste management is more than just cleaning the streets or collecting waste and dumping of the collected waste, as practiced by most municipalities. It requires efficient combination of various components of solid waste management in an integrated manner.

participation, both formal and informally. By 1996, a committee comprising Ministries of Environment and Physical Planning and Local Government Administration, chairman Shomolu Local Government and community Development council (CDC), Lagos state chapter submitted proposed for the establishment of Private Sector Participation in domestic refuse management [31]. The programme was then launched with 22 private operators appointed on the basis of a political ward per operator by February 1997 within Somolu and Kosofe Local Governments. Operators were licensed to collect and transport waste generated in the 22 wards of the two Local Governments. However, due to resurgence of communal depot through pick-up-points, illegal dumping of waste into water and land environment by cart pushers and individual alike, this necessitated the review of waste management and disposal system in the state. In readiness for the Lagos metropolitan Development Governance project supported by the World Bank, the

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Lagos state restructured the Lagos State waste management Authority in 2005. Since then, LAWMA had taken over the

LOCATIONS OF WASTE MANAGEMENT FACILITIES IN ETIOSA

The South-Eastern region of Lagos state is made up of Epe, Etiosa, Ibeju- Lekki and Lagos Island local government areas. Within these local government areas exists one(1) waste to wealth facility located in Epe, Three (3) other waste to wealth facilities/ centres within Ibeju-Lekki, One(1) Landfill in Epe, One(1)

Mba and Nnadi responsibility of waste management in the state.

transfer loading station within Lagos Island and One(1) WMF within Epe. These local government areas within this South-Eastern region have a total of 624.33 tonnes of collected wastes on a daily basis from 2012. The calculated collected daily waste per person is put at 0.0003 tonnes or 0.3Kg.

Table 2: Population and volume of waste collected daily in the South- Eastern region of Lagos State

Location	Population	Estimated daily waste as of 2021
EPE	323,634	142.99
ETIOSA	983,515	214.48
IBEJU- LEKKI	99,540	36.59
LAGOS- ISLAND	859,849	230.36

Source: LAWMA

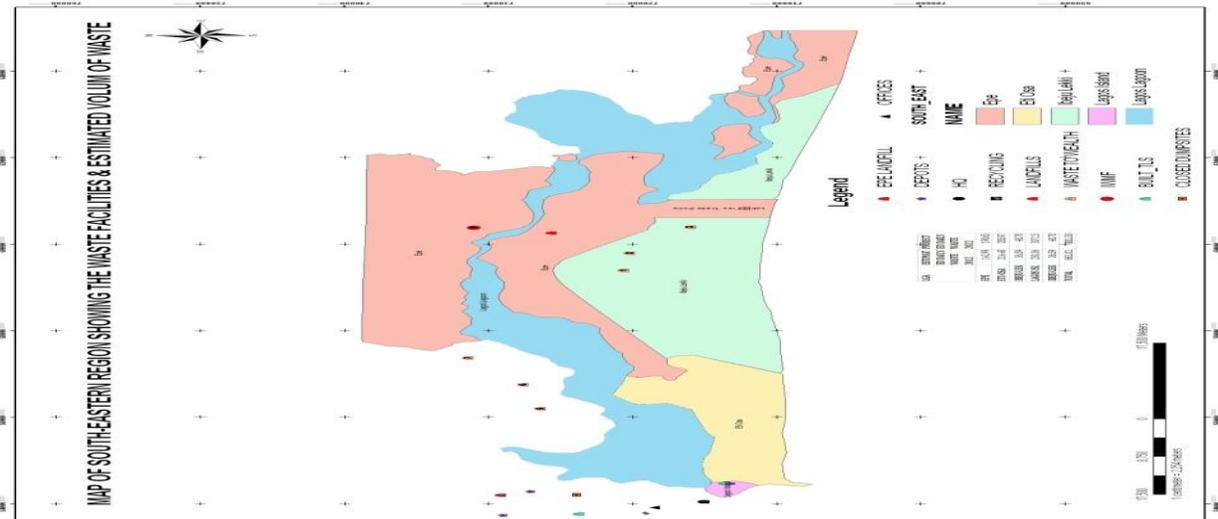


Figure 2.1 Map of waste management facilities in the South- Eastern region, Source: LAWMA

CHALLENGES OF WASTE MANAGEMENT IN LAGOS

[7], stated that solid waste management structure in the big cities of Nigeria have challenges in the disposal of their wastes. According to [8], dumping sites, incineration, recycling and composting are some of the disposal methods that have been in use for many years now but

people still dump their wastes along the roads and gutters. However, [8] stated that it's very common for solid wastes to be dumped at inappropriate places. And [12], further stressed that such indiscriminate dumping leads to the generation of leachates as a result of

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rainfall which are washed off into water bodies resulting in pollution and other environmental risks. [8] in his research mentioned that Lagos is one of the few states in Nigeria that make house to house collection services available as well as communal collection points. He reported that the state commissioned a transfer loading system to serve different areas in the state to help waste get compacted before being taken to the dump sites. [8], stated that materials and resource requirements which include purchasing waste management facilities, equipment, regular maintenance of the facilities, equipment, and payments of workers are factors that affect solid waste management. [8] noted that Lagos state among other states in the Country has made some significant progress in growing institutional capacity for solid waste management even though Adewole (2009) had revealed that there are still a lot of areas that need to be improved upon for sustainable developments to be achieved.

Generally in Lagos, waste management have certain challenges due to inadequate

Mba and Nnadi waste disposal infrastructure compared to the rising generation of wastes, weak cost recovery plan for solid waste management services rendered, and no cooperation from the public [14]. According to [11], different factors have been responsible for the challenges in solid waste management and prominent among these are Lack of financial assistance for the private operators by the government, People's lack of commitment, Lack of proper enforcement, Low level of environmental awareness, Bad planning, Population growth, Attitude to work and Corruption. Some other identified challenges of waste management include irregular waste collection, lack of funding, inadequate facilities such as landfills, incinerators, waste vehicles, absence of technical knowledge and more [14,16,18] And because of these challenges in managing solid wastes, [20] mentioned that it creates negative effects such as drain blockage, flooding, erosion, traffic congestion, soil pollution, air pollution, health problems, unaesthetic dump sites and loss of community pride.

METHODOLOGY

STUDY AREA

Thomas Estate within the Ajahs the area that our study will be conducted. It has its geographical coordinates at about latitude 6° 28' 0" North and longitude 3° 34' 0" East

central, with an elevation of 57ft and is situated within Ajah, in Eti-Osa L.G.A, Lagos State, Nigeria.

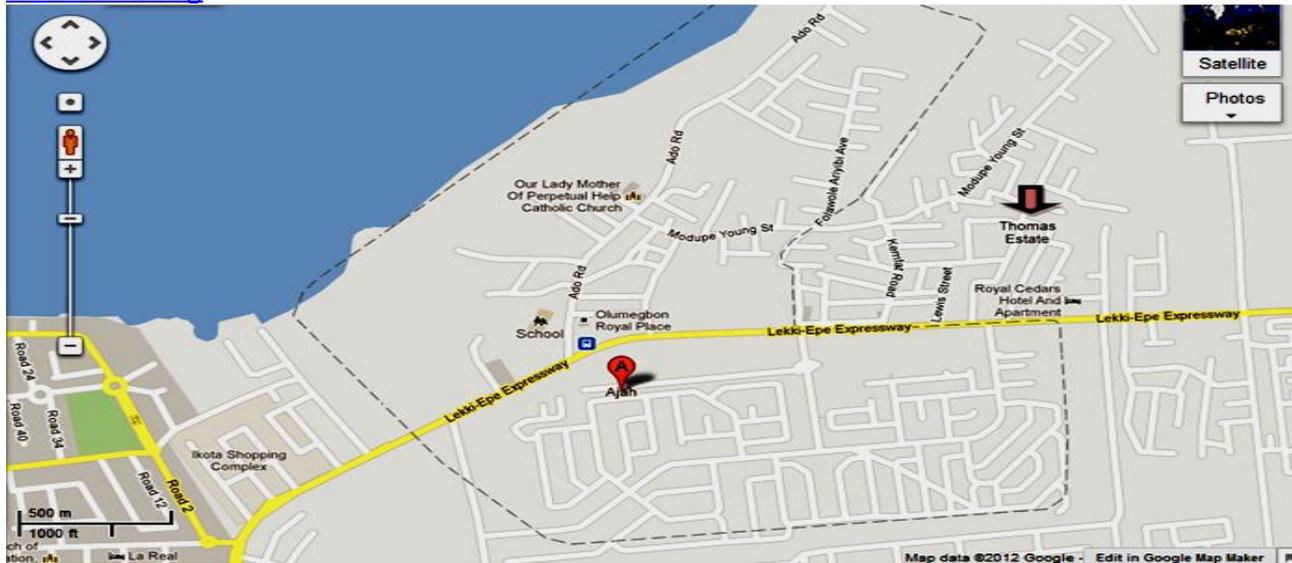


Figure 1 Street Map of Ajah showing Thomas Estate, Ajah.

Source: *Google earth*

According to the 2006 population census figures, Ajah has a population of 287,785 and covers a total area of 193.47395

square kilometers of which 43.45% are built up areas with a population density of 3,423 per square kilometer.

RESEARCH DESIGN

In order to achieve the associated aim of this research, the approach utilized in this research is a descriptive survey method and data was gotten through primary and secondary sources. The primary sources of data comprise reconnaissance survey, the use of well-

structured questionnaires and oral interviews while the secondary data sources were from available existing literature, journals, internet and publication from relevant agencies such as LAWMA

INSTRUMENT OF STUDY

The study utilizes a questionnaire on the challenges of solid waste management in Thomas estate, Ajah, This was developed by the researcher and was designed to acquire data on the background information of the respondents, the knowledge level (understanding) of the

respondents concerning solid waste disposal and its management, the respondents' communal behavioral pattern of waste management, the types generated by respondents and the current waste management practices in the areas.

RESULTS AND DISCUSSIONS

From the data analysis Carried out, the results obtained show the study population at Thomas Estate is not made up of only mature people but people with different backgrounds, culture, belief and traditions. Many are educated in one form or another within the study area but at the same time few are not but from the oral interview and site visits, the educated ones have control of the community in

terms of decision making. The results also show that the disposal management system currently in practice in the Estate is via compactor trucks operated by PSP/LAWMA. This means that the waste management authorities responsible for the area are putting in a lot of effort to curb any issue of improper waste disposal within the study area. Another result of the research shows that the people of

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Thomas Estate have a poor attitude towards waste disposal as they gather their wastes commingled and do not bother to separate the waste when generated. The LAWMA officials when interviewed said they have challenges with the waste collection from the generated source as all forms of wastes are stacked together in their bins and thrash bags and some have smelly water dripping along as they take the trash bags away. A member of the estate mentioned

Mba and Nnadi that good attitudes towards waste disposal will go a long way to better the waste management system. Finally, the result for the type of waste generated the most was food waste followed by nylon and textiles then plastic wastes. This shows that Compostable (biodegradable materials) are the most typical composition of wastes generated within Thomas Estate, Ajah as they accounted for more than 70% of the generated wastes.

CONCLUSION AND RECOMMENDATION

The study was initiated to find out the major factors that have impeded the efforts of the Lagos state Government and waste management authorities towards a better solid waste management in Thomas Estate, Ajah, Lagos. A physical survey was carried out to gather information about the issues of solid waste its generation, means of storage, collection, transfer and disposal. The results derived from the statistical analysis, it was seen that the inhabitants of Thomas Estate, Ajah were made up of both the educated and uneducated of which the educated were more in number by a large fraction and the people understand the concept of waste management within the Estate area but have an attitude problem when it comes to waste handling and storage. Also from the analysis carried out, the attitudes of the people in Thomas Estate have a negative effect on the waste management system being operated in that area. Though the waste management authorities have been satisfactorily carrying out their duties but their pick up systems have fallen a little below standard as gathered by some physical respondents and this has resulted in little waste fractions lying around some parts of the estate. In general, the waste management system in Thomas Estate, Ajah is good but improvements have to be made in the area of waste storage by the people and waste collection by the service providers as they are not consistent in their pickup days and time. All these need to be addressed immediately to prevent a

further break down of the waste management system being run presently in the estate. The study recommended an improvement on the existing solid waste management practice, the following have been recommended: That the Government at the local level and the estate committee of the estate should intensely propagate awareness on source separation for possible recycling and its environmental benefits; this will encourage composting of food and garden waste and reduce by about 70%, the overall quantity of solid waste for ultimate disposal and also enhance recycling of recyclables.

Notifications should be sent from time to time with enlightening features and an erecting of small sign posts with different waste disposal and management quotes set up at almost all junctions within the estate. Educating the public on the issue of waste management can go a long way in changing people's attitude and behaviours towards the environment and this can also be done by creating sponsored public health and environmental education programmes regularly and also make environmental education part of the education curriculum at all school levels. The waste management authority should supply refuse sacks, at highly subsidized rates to be distributed to the residents of Thomas Estate, Ajah to encourage proper bagging and enhance collection for evacuation. Also, the Lagos State government should reform waste disposal costs to make it easier for people of all

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classes to pay within and around the estate. People should also be treated as active partners in the process of change because everyone has a role to play in waste management but we all need to be aware of such roles.

Encouraging good environmental behaviour in solid waste management will also help if addressed simultaneously at all levels, starting from households, to schools, to businesses and to the society level. Also, the monthly environmental sanitation practice should be taken more seriously and the waste collection trucks

Mba and Nnadi from LAWMA/PSP should within an agreed time frame go round to collect the refuse that will be heaped on roads during the sanitation practice. A recommended monthly award to neatest streets should be instituted to encourage the people to keep their environment clean always by properly handling and storing their wastes. With all these, there should be some binding laws and enforcement by the estate committee and the Government at the local level on waste sorting and disposal.

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