

Solid Waste Management in Calabar Metropolis: Case Study of Calabar Urban Development Authority (2008 – 2017)

Dickson David Agbaji¹ and Regina Idu Ejemot-Nwadiaro*²

¹Department of Political Science, Faculty of Social Sciences, University of Calabar

²Department of Public Health, Faculty of Allied Medical Sciences, University of Calabar

ARTICLE INFO

Article No.: 032919058

Type: Research

DOI: 10.15580/GJMS.2019.1.032919058

Submitted: 29/03/2019

Accepted: 03/04/2019

Published: 30/04/2019

*Corresponding Author

Regina Idu Ejemot-Nwadiaro

E-mail: reginaejemot@yahoo.com

Keywords: Calabar Urban Development Authority (CUDA); solid waste; solid waste management; Calabar; waste disposal

ABSTRACT

The challenge of managing solid waste generally in developing countries like Nigeria and its urban cities like Calabar has shifted from ensuring minimum damage to public health and environment to the manner in which discarded resources are to be handled such that future generations are not deprived of its value. This study, therefore examined the Calabar Urban Development Authority's (CUDA) impact on the management and disposal of waste in Calabar Metropolis between 2008 and 2017. It relied on systematic qualitative content analysis of secondary sources of data, and the theory of Structural-Functionalism was adopted as the tool of analysis for the study. The paper argues that there are waste dumps by the road sides, open drains and open spaces, and paper and vegetable wastes in markets and residential areas throughout Calabar metropolis despite the efforts of CUDA to keep the town clean and green. These unintended dumps constitute an aesthetic disaster and have strategically reduced the city's long standing status as the cleanest in Nigeria. The paper, therefore, recommends the increased public awareness of CUDA's duties and collection schedules, adequate equipping and funding of CUDA, adoption of a waste separation technique, and establishment of recycling and incineration plants.

1.0 INTRODUCTION

Man's generation and disposal of waste has a long and hybrid pedigree. From time immemorial, wherever man found himself and embarked on his daily activities, he generates waste. As such, he is no closer to eradicating waste generation now than he was when he huddled around an open fire every night and lived in caves, because the production (and consequent disposal) of waste is an essential characteristic of man. Therefore, Barbalace (2003) wrote, "there has been a problem of trash from man's earliest time...it is not a trait of the 20th (and 21st) century". The challenge of managing solid waste generally in developing countries like Nigeria has shifted from ensuring minimum damage to public health and environment to the manner in which discarded resources are to be handled such that future generations are not deprived of its value (Chandak, 2010).

Nigeria today, having experienced a great increase in population rate and economic strength facilitated especially by the Industrial Revolution and the development of medical science and health care delivery system, rapid urbanization and rise in communities' living standard, has witnessed waste generation in cataclysmic proportions. This problem is further compounded by the deterioration of the Nigerian urban environment vis-à-vis the indiscriminate dumping of wastes as apparent in our growing cities. In Calabar, the Cross River State Capital, for instance, the disposal of wastes was critically disturbing as huge piles of dirt were found littering public places in unprecedented proportions. With the Calabar Urban Development Authority (CUDA) responsible for general sanitation and waste management, three levels of waste management techniques were introduced. First, it became mandatory for each household to have a standard rubber bin to store refuse at the primary level. At the secondary level, flash points or transfer stations were established with dumpsters to prevent indiscriminate dumping of refuse brought from the household. And lastly, the personnel of CUDA dispersed into twenty-six (26) cells with supervisors, trucks, and workers in Calabar would, at regular intervals (usually between 2-3 times a week depending on how densely populated the areas are) and preferably in the evening, transfer the refuse from the dumpsters at the 366 flash points in Calabar to the final disposal sites at the Lemna Road in Calabar Municipal Council. The final disposal of refuse is by land-filling.

It is against this background that this research work undertook an objective assessment of CUDA's impact on the management and disposal of waste in Calabar Metropolis between 2008 and 2016; to know whether wastes have actually been effectively cleared off the streets and disposed properly or whether the wastes have been allowed to constitute a nuisance and an aesthetic disorder; to determine the adverse effects of indiscriminately dumped waste on the environment, the health and aesthetic conditions of Calabar

Metropolis; to identify the framework for waste management (especially waste separation) in Calabar Metropolis; and to identify the factors that impede on the performance of CUDA.

1.1 Statement of the problem

It has been observed that there are waste dumps by the road sides, open drains and open spaces, and paper and vegetable wastes in markets and residential areas throughout Calabar metropolis despite the efforts of CUDA to keep the town clean and green. These untended dumps constitute an aesthetic disaster and have strategically reduced the city's long standing status as the cleanest in Nigeria. Also, ground water studies have ascertained that large chunks of garbage are buried in landfills where leachates which are often toxic substances that were disposed-off, found among solid waste migrate into the earth in the direction of ground water flow to contaminate the underground sources of water (Eni, Ubi & Digha, 2014). This makes boreholes located close to the Lemna dumpsite in Calabar Municipality and other flash points vulnerable to toxic contamination.

Further, as solid waste decomposes, chemical vapours are discharged into the atmosphere resulting to air pollution since the stench oozing out from them are unbearable and this has serious health implications like suffocation, asthmatic disorder and other respiratory conditions. These open and untended dumps which provide the perfect breeding sites for vectors such as, inter alia, rats, cockroaches, ants, dung beetles, mosquitoes, houseflies, spiders, centipedes, millipedes, snakes, scorpions, and stray dogs, are usually close to residential areas, and put the residents at high risk of diseases such as cholera, yellow fever, dengue fever, typhoid fever, Lassa fever, dysentery, malaria, microfilariae, etc., which accounts for high morbidity and mortality in developing countries. More so, when it rains, the dumped wastes are usually washed into open drains and this does not allow for the proper passage of water which will serve as breeding sites for disease-bearing organisms such as mosquitoes, tsetse flies, houseflies, etc., and causing flooding which could carry in dangerous animals such as snakes and crocodiles into residential areas, which are inimical to the well-being of human beings.

2.0 Conceptual and theoretical analysis

2.1 Waste

The menacing effects of indiscriminately generated and disposed waste attracted widespread fame globally which made scholars, institutions, and (delegates to) international conventions attempt at explaining the phenomenon in order to arrive at a sound and well developed understanding of waste. However, waste, as it pertains to the Social Sciences means

different things to different people at different times and places, unlike the universalistic meaning of concepts in the Pure Sciences. For instance, waste, as Isirimah (2002) conceived it, could be explained to mean leftovers, used products whether liquid or solid having no economic value or demand and which must be disposed or thrown away. Ogban and Akuruju (2016) are of the view that waste is any solid or liquid substance which have been thrown away by its original owner, which may be or may not be found useful by any other person but constitute nuisance to people's health and the environment when left untreated.

More so, wastes, according to the Department of the Environment of Her Majesty's Stationery Office (HMSO) (1992) cited in the Chartered Institute of Purchasing and Supply (CIPS) (2007), are "those substances or objects which fall out of the commercial cycle or chain of utility". For example, glass bottles that are returned or reused in their original form are not waste, while glass bottles banked by the public and dispatched for remoulding are waste "until they have been recovered" (Environment Information Bulletin, 1995, in CIPS, 2007). In view of the foregoing, it is safe to infer that the term is often subjective and sometimes objectively inaccurate, e.g., to send scrap metals to a landfill is to inaccurately classify them as waste, because they can be recycled.

For the purpose of this study, we conceive waste to be any material (gaseous, liquid or solid) that has been used and is no longer wanted because it has been rid of its valuable or useful parts, and if left untended will constitute a noxious influence in the society, thereby, hampering on the health of the environment and human beings.

There are many waste types defined by modern system of waste management, notably including: solid waste (our focus); hazardous waste; biomedical waste; special hazardous waste; waste water; etc. (Uwadiogwu & Chukwu, 2003; Adewole, 2009; Metz, Dandson, Bosch, Dave & Meyers, 2007). For Olaniran, Akpan, Ikpeme and Udofia (1995) cited in Udoakah and Akpan (2013) solid waste refers to domestic refuse and other discarded solid materials such as those from commercial, industrial and agricultural operations. Solid waste can contain cider, vegetables and putrescible matters, papers, leaves, metals, food product, garden waste, rags, leather, synthetic waste and rubber; and Cointreau (1982) added construction and demolition debris, dead animals, and abandoned vehicles and electronics (in Udoakah & Akpan, 2013). For Okonkwo and Eboatu (1999) solid waste is classified vis-à-vis its sources: Domestic or Residential waste; Municipal (both Residential and Commercial) waste; and Industrial waste. Adewole (2009) presented a slightly different four scale classification: Residential; Commercial; Industrial; and Institutional wastes. However, Metz et al (2007) gave theirs comprising Municipal Solid waste, Industrial waste, Agricultural waste, and Hazardous waste.

2.2 Waste management

The need to control the increasing generation of waste in society gave rise to waste management. Sometimes called waste administration, Gilpin (1996) defined waste management as purposeful, systematic control of the generation, storage, collection, transportation, separation, processing, recycling, recovery and disposal of solid waste in a sanitary, aesthetically acceptable and economical manner (in Adeniran & Oyemade, 2016). Similarly, waste management refers to the strategic combination of methods – generation, storage, collection, transportation, treatment and final disposal (landfills, recycling, incinerating etc.) – employed to efficiently regulate waste from source of generation up to the final disposal point (Igbinomwanhia, 2011, in Agbesola, 2013; Oyeniyi, 2011).

It can be deduced from these definitions that waste management is the practice of protecting the environment from the polluting effects of waste materials in order to protect public health and the natural environment. Thus, the priority of a waste management system must always be the provision of a cleansing service which helps to maintain the health and safety of citizens and their environment. It must, therefore, be added here that waste management also encompasses "preparing waste policies, monitoring, advice to stakeholders (government, industries, and the public), and regulations" (Adeniran & Oyemade, 2016:28-29).

2.3 Waste management system

For there to be an effective waste management regime, the regime's activities and plans must be strategized into a system of interdependent functions. Clark (1978) cited in Seadon (2010:1640-1641) captured this best by opining that:

"The conventional waste management approach is that waste generation, collection and disposal systems are planned as independent operations. However, all three are very closely interlinked and each component can influence the other. The planning required for these operations require a balance between the subsystems of manufacturing, transport systems, land use patterns, urban growth and development, and public health considerations."

Little wonder Clark (1978) defined that system as a set of interacting units or elements that form an integral whole intended to perform some function. In this vein, for Max-Neef (2005) waste management system involves the coordination of management between all levels and all waste streams (in Seadon, 2010).

For waste management to attain its desired end, it must possess many of the features of a living system whose parts function sequentially and harmoniously for

the survival of the whole system. The system must consist of agents (people) and schema (interpretive and behavioural rules), self-organization and emergence, and connectivity and dimensionality (feedback mechanisms) all of which must be in constant interaction with their environment and be dynamic and flexible enough to change in response to environmental change (Clayton & Radcliffe, 1996).

The uncharted volume of wastes that are visible along almost all the roads and streets of our urban neighbourhoods is an indication that the adopted strategies to cope with the inevitable by-products of development are ineffective. This has inspired scholars to research on and to identify factors influencing the elements or frameworks of the waste management system which comprise waste generation, waste separation/segregation, waste storage, waste collection and transportation, and waste treatment and disposal. In fact, it may be safe to infer here that the adherence to the waste management system will increase the potential for greater sustainability of the waste management operations.

2.3.1 Waste generation

Waste generation has been described by Australian Laboratory Services Environmental (2014) as the weight or volume of materials and products that enter the waste stream before recycling, composting, land-filling, or combustion. It can also represent the amount of waste generated by a given source or category of sources. More so, waste generation can be seen as the total quantity of all discarded materials and substances into the waste stream from homes, businesses, and from the constructive and manufacturing sectors of society.

Some scholars have attempted to determine what constitutes the parameters for the measurement of waste generation. According to Sujauddin, Huda and Rafiqul-Hoque (2008), the generation of waste is inspired by family size, their education level, and monthly income; Shekdar (2009) suggests that the quantity of solid waste generation is lower in countries with lower Gross Domestic Product (GDP). For Bogner and Matthews (2003), it includes gross domestic product, energy consumption and private final consumption (cited in Bogner, Ahmed, Diaz, Faayi, Geo, Hashimoto, Mareckowa, Pipati & Zhang, 2007). The latter is closely linked with Rosenbaum's (1974) view that solid waste is an unofficial measure of prosperity since wealthy nations produce more waste than poor ones. However, this relation is analytically fraught as opined by Uwadiogwu and Chukwu (2013). Omuta (1988) corroborated this when he wrote that what causes waste problem is not the volume produced vis-à-vis affluence but the degree of effectiveness of solid waste management. This explains why, although Americans have been quoted to be the most prolific producers of waste on earth, yet they have not produced

the filthiest cities on earth (in Uwadiogwu & Chukwu, 2013).

It is needful to note that from the observational studies carried out by the researchers, family size plays little role in the generation of waste as compared to the existence and functionality of businesses (especially bars and restaurants). A case in point was the comparison between the flash points at Mary Slessor Avenue and State Housing Estate, both in Calabar Municipality. It was recorded by the researcher that first, while the residential buildings at Mary Slessor Avenue were scanty, Government parastatals and others institutions (both private and public) like banks, a high court, a government general hospital, and so on as well as bars, restaurants and eateries like H₂O, Paladium, Potomas, De-Choice, Crunchies^{plus}, Bogobiri suya joints, and suchlike, constituted a large portion of Mary Slessor Avenue.

On the other hand, the reverse was the case at State Housing Estate, where residential buildings flooded the area. Second, it was discovered that more wastes were generated at Mary Slessor Avenue than at State Housing Estate. This information was gotten from the observation of the amount of times wastes were evacuated from their flash points at both locations. At Mary Slessor Avenue, wastes were evacuated three to four times a week, usually on Mondays, Thursdays, and Saturdays, while at State Housing Estate, waste were evacuated between two and three times weekly especially on Sundays and Thursdays. Also, in a conversation between the researchers and one of the denizens of Mary Slessor Avenue, the latter stated that:

"The amount of waste generated within the area especially owing to the weekend activities at bars and restaurants and the suya joints at Bogobiri, is so massive in volume. I basically believe that it is no coincidence that most of the flash points at the area are proximate to the bar and restaurants within the area."

In another conversation with two residents (all inhabitants of State Housing Estate) it was deduced from the duo that the wastes generated within the Estate are large (but not comparable to that generated at Mary Slessor) and are largely biodegradable comprising garden waste, left-over food, clothes, and such alike.

Added to this is the fact that many households do not have the waste bins distributed by CUDA for temporary storage of wastes at the homes or primary level. Also, it was observed that even those who have the bins did not use them for the purpose they were meant to serve. Some households have converted their waste bins to water receptacles.

2.3.2 Waste separation/segregation

Waste separation or segregation in simple terms refers to the breakup of waste (into its different compositions and/or into dry and wet or biodegradable and non-biodegradable) so that it is easier to handle, transport, process, treat, recycle and dispose (Wikipedia, org, 2018). For Lardinois and Furedy (1999), it can be

seen as the practice of setting aside post-consumer materials and household goods so that they do not enter mixed waste streams. The concept was coined in affluent societies during the 1980s in contradistinction to the recovery of resources for recycling from mixed post-consumer waste in plants called materials recovery facilities (MRFs) (see Lardinois & Furedy, 1999).

The above mentioned indices that inspire the generation of waste also influence the composition and separation of waste which Guerrero, Maas and Hogland (2013) categorized into paper, plastic, glass, food, metals, batteries, and electric and electronic waste. The importance of reliable data on both the composition and separation of solid waste for the effective planning of waste handling infrastructure has long been recognized. However, there are varied data on waste separation due to poor information management but notable of use for this study is the research carried out by Afangideh, Joseph & Atu (2012) in Calabar. For them, the different types of solid waste generated in Calabar compose of vegetables (23.33%), garbage (18.66%), paper/glass (16%), cans (15.33%), plastics (14.7%), and wood/bone (12%). It is conspicuous from their study that a majority of the waste generated in the area are biodegradable (63.97%) as against the relatively smaller amount of non-biodegradable waste (46.03%).

Despite the amount of write-ups on waste management systems, it is worth noting that deficiencies were spotted regarding the separation or segregation of waste in Calabar Metropolis. Afangideh et al (2012) attempted a categorization by forming a classificatory scheme for the different types of waste generated in Calabar: vegetables; garbage; paper/glass; cans; plastics; and wood/bone. However, it was realized that this categorization is quite vague. Certain issues arose like: what constituted garbage? If it meant biodegradable waste, were vegetables, woods and bones not biodegradable? If it meant non-biodegradable waste, should it not have been wise to classify plastics, cans and glass within garbage? Before any categorization was adopted for this study, it was needful to bear in mind that waste separation or segregation was an inherent process in the entire waste management hierarchy; from generation in the households to the final disposal.

In this vein, based on the flash points observed by the researchers and from the responses of the Director, Waste/Maintenance, CUDA (as at the time of this study), it can be authoritatively stated that "there is no waste separation in Calabar metropolis". At the various flash points that were observed, all manner of waste products from vegetable waste, food, cans, nylons, plastic containers, papers, metals, syringes, leather, construction debris, and even faeces, were gathered there for collection and disposal. He further opined that:

"CUDA officials, divided into cells, with each cell having a supervisor, truck and workers, go to their designated transfer stations, collect the wastes and transport them to the dumpsite at the Lemna Road. Scavengers do the separation of waste at the dumpsite and after that, food wastes are being pushed into a ravine because of lack of hands to turn these food wastes into fertilizer and manure."

Also, a majority of the residents the researchers discussed with affirmed that they do not separate their wastes before taking them to the flash points. While conversing with them, the researcher discovered that quite a number of them knew not what waste separation was. There is the need to separate the biodegradable wastes from the non-biodegradable wastes (most of which can easily be recycled). Little wonder the recycling industry in Calabar is absent.

This means an inherent systemic failure exists, especially that of poorly designed and produced public enlightenment campaigns (of the activities of CUDA, especially on collection schedules). This failure is bound to affect the entire waste administration system, especially waste disposal. Therefore, from the cumulative observation of the researcher, this study adopted this classification which if understood and used by the Government-cum-CUDA will help in the separation of waste since different waste bins will be provided for each of the variables categorized below:

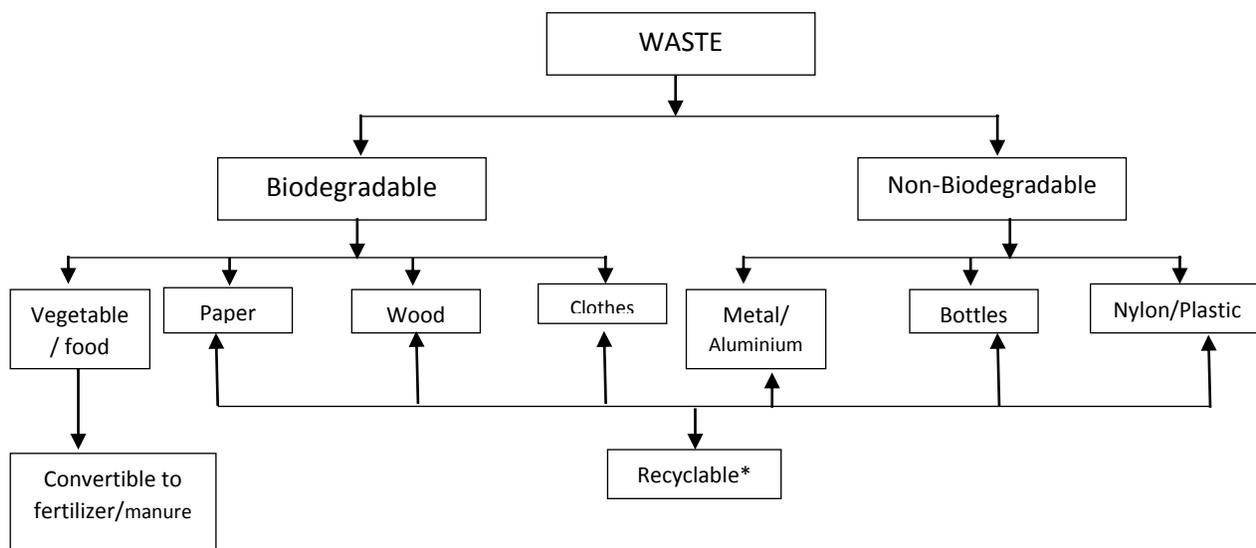


FIG. 1: Waste Classification in Calabar Metropolis
 Source: Field data by Agbaji & Ejemot-Nwadiaro (2017).

Recyclable*: What use?

These products can be recycled to make;

- i. Paper: notebooks, textbooks, newsprints, cardboards, white office printer paper, etc.;
- ii. Wood: wooden flooring, sawdust (which can also be used to make plywood), fuel (firewood), laminates, doors/windows (frames), etc.;
- iii. Clothes: processed to harden/brighten the fabric for reuse, fuel, etc.;
- iv. Metal/Aluminium: food/drink cans, windows/doors (frames), cutleries, plates, molten aluminium, etc.;
- v. Bottles/Glasses: new food/drink bottles, jars, louvers, flower vases, plates, cups, etc.;
- vi. Nylon/Plastic: plastic pipes, rubber beads, textile insulation (for thermal/fleece jackets and sleeping bags), spoons, cups, etc.

2.3.3 Waste storage

In order to avoid people discarding waste in poorly defined heaps close to dwelling areas, improved storage facilities should be provided fairly quickly. Uchegbu (2002) corroborating this added that the waste generated should be well stored for easy collection and disposal by the appropriate authority concerned. On-site storage is of primary importance because of public health concerns and aesthetic consideration (in Wokekoro & Inyang, 2007).

Waste storage can be seen as the transfer or assemblage of wastes from their point(s) of generation to available mapped out bins or small collection vehicles where they will be kept over a period of several days before they are collected and transported to be recycled or to the final disposal site(s). These available mapped

out bins or small collection vehicles are called “transfer stations” or “flash points”.

Guerrero et al (2013) analysed the factors that influence household waste disposal decision-making. Their study results show that supply of waste facilities significantly affect waste storage/disposal choice. For them, inadequate supply of waste containers and long distance to these containers increase the probability of waste dumping in open areas and road sides relative to the use of communal containers.

This premise was discovered to be quite true because from the study carried out by the researcher, residents of Atamunu Street, off Mayne Avenue Street, complained of the long distance of the only available waste bin on the street which resulted to why they burnt their waste while some other residents threw theirs into gutters whenever it rained. This practice, it was also observed, led to the blockage of the drainages on the street. As a matter of fact, whenever it rained the street and compounds become flooded making denizens and commuters experience difficulty accessing the road.

Also, as Metz et al (2007) wrote, in determining the size, quantity and distribution of the storage facilities the number of users, type of waste, maximum walking distance (or city parameters) and their safety from theft or vandalism must be considered. Since CUDA was created, it became mandatory for each house hold to have a standard rubber bin to store refuse at the primary level. At the secondary level, flash points were established with dumpsters to prevent indiscriminate dumping of refuse brought by the household (Samson-Akpan, 2009). The Director, Waste/Maintenance, CUDA, stated that there are 366 flash points in the Calabar waste map, dispersed along 26 cells.

2.3.4 Waste collection and transportation

Waste collection and transportation is one of the essential elements of the waste management process.

As a matter of fact, it is one of the most expensive (if not the most expensive) aspect of the waste management framework as it takes a remarkable share of waste management cost. According to Ogwueleka (2003), local authorities in developing countries spend between 77% and 95% of their revenue on collection and disposal, but can only collect between 50% and 70% of Municipal Solid Waste (MSW) (in Hammed, Sridhar & Wahab, 2016). To corroborate this, the Urban Development Bank of Nigeria (UDBN) (1998) noted that the collection and transportation of waste is labour and capital intensive and accounts for between 70% and 80% of total cost of waste management in Nigeria (in Imam, Mohammed, Wilson & Cheeseman, 2008).

Waste collection and transportation simply means the retrieval and movement of wastes stored at the available transfer stations to the point of treatment, recycling, or final disposal. Waste collection and transport practices are affected by improper bin collection systems, poor route planning, lack of information about collection schedule (Hazra & Goel, 2009), insufficient infrastructure (Moghadam, Mokhtarani & Mokhtarani, 2009), poor roads and number of vehicles for waste collection (Henry, Yongsheng & Jun, 2006) (cited in Murali, Vijayakumar, Ramesh & Baskaran, 2017). In Calabar, three categories of dumpsters are used for the collection and transfer of refuse at the flash points (Samson-Akpan, 2009). Additionally, the vehicles used for transferring refuse from the dumpsters are named after the dumpsters; Skid dumpsters use skid dumpster vehicle; Roll-on Roll-off dumpsters use roll-on roll-off dumpster vehicles; and Side-roll dumpsters use side-roll dumpster vehicles (Samson-Akpan, 2009). Added to these vehicles are compactor trucks and tippers.

The availability of these waste collection and transport vehicles nevertheless, from the cumulative observation of the researchers it was deciphered that a significant number of people in Calabar metropolis are unaware of the waste collection schedule of CUDA and that they do not have the waste bins distributed by CUDA for temporary storage of wastes, and these issues affect waste collection, transport practices and the final disposal of waste at the landfill at Lemna road. Little wonder, huge piles of refuse are found littering flashpoints in unprecedented proportions.

2.3.5 Waste treatment and disposal

Disposal is the “no alternative” option because it is the last functional element in the solid waste management system and the ultimate fate of all wastes that are of no further value (Guangyu, 2011). Waste treatment and disposal can be seen as the activities involved in the recovery of useful materials in the waste stream and the elimination of the quantity of produced waste components vis-à-vis the standards of environmental protection without being insulated from the natural environment. For the treatment and disposal of waste, Scarpitti and Anderson (1989) had this to say:

“...garbage is typically disposed of by burying it in landfills, burning it and sometimes even recycling it. In some cases, it is dumped into the ocean.”

Waste disposal differ from country to country. For meeting the specifications of disposal, some treatment processes modifying the physical, chemical, thermal and biological characteristics of solid wastes would be introduced like filtration, recycling, incineration, pyrolysis, open dumping, land-filling, enzymatic systems, composting, and aerobic and anaerobic treatment (Murali et al., 2017; Guangyu, 2011) In developed countries, recycling incinerators plants and recycling are rampant; though landfills are available. In urban cities of developing countries wastes are disposed in dumpsites at designated lands or ravines either government or private owned. For instance, Calabar uses the Lemna dumpsite at Calabar Municipality. Fears have aggravated among people because the dumpsite is an open dump, to borrow the words of Guerrero et al. (2013), “without leachate treatment, protection at the bottom by a geo-membrane or clay-lined layer, gases treatment nor other infrastructures needed”. There were claims that aside being an open dump, posing its own health hazards, the dumpsite had reached its maximum carrying capacity that was why piles of dirt extended to the road and blocked a section of the road leading into the area.

Also, there were complaints by some residents around the area of the coloration, odour, and taste of the water which showed that something was wrong since the test for clean and pure water were tastelessness, colourlessness, and odourlessness. In this wise, it is worthy to note the study by Eni et al (2014). According to them, “groundwater studies have ascertained that leachates from landfills migrate into groundwater (which flows from North to South) to contaminate the underlying aquifer”. Thus, as Scarpitti and Andersen (1989) opined, “...except for recycling, all of the traditional disposal methods create potential public health risks, and spoil the beauty of the land and seascape”. This recovery and recycling of resources are usually carried out by the informal sector which usually includes door to door itinerant buying of paper, metals, glass and plastics, and from scavenging.

2.4 Theoretical framework

The theory adopted for this study was the Structural-Functional approach. The basic assumptions of the structural-functional approach are that all systems have structures which can be identified, and those structures perform specific set of tasks if they are to remain in existence and maintain their relevance to the system. This goes to say that political systems as Eminue (2001) opined, “have parts and each part performs specific functions all of which contributes towards the functionality of the overall system. The non-performance of a specific function may contribute in some way to the malfunctioning of the system as a whole” (in Ebegbulem, 2010).

The structural-functional approach was an introduction to the study of political analysis propounded by David Almond and Bingham Powell. According to Eminue (2001) cited in Ebegbulem (2010), the approach “emphasizes the role of structures and functions in understanding politics and political processes and the conditions under which structures can perform and the functions could be fulfilled”. So, as Ebegbulem (2010) wrote “...in order to understand a political system, it was necessary to understand, not only the institutions but also their respective functions”.

Structural-functionalism as a theoretical framework is intended to explain the basis for the maintenance of order and stability in society and the relevant arrangements within the society, which maintain the said order and stability. Within this structural-functional framework, social processes and social mechanisms are intervening variables. Thus, as Holt (1967) wrote, “a complete description of a social system will include, therefore, a treatment of the social structures, and various functions of these structures, and of the social processes and mechanisms that must be in operation of the structures are to satisfy certain functions” (cited in Nwagwu, 2012). Thus, four concepts – structures, processes, mechanisms, functions - via which structural-functionalism seeks to describe social realities, are of particular importance.

Almond (1966) in his analysis of structural-functionalism drew on to two sources: the Parsonian Social Theory (1960); and David Easton’s Political System Analysis (1965). Hence, it was Almond’s initial idea to elaborate what Easton had called the “conversion functions”, i.e., the way in which the political system converts inputs into outputs, and like Talcott Parsons, to investigate the relationship between these functions and structures (Randall & Theobald, 1998). For Almond and Powell, on the input side are the functions of (1) interest articulation and (2) interest aggregation; while on the output side are the functions of (3) role making (4) rule application, (5) rule adjudication. They also added the functions of (6) political communication, and (7) systems maintenance and adaptation (Almond & Powell, 1966, cited in Enemuo, 1999). According to Almond, the functioning of any political system may also be viewed in terms of its capabilities defined as “the way it performs as a unit in its environment, how it is shaping its environment, and how it is being shaped by the environment” (Nwagwu, 2012; Enemuo, 1999).

The relevance of this theory for this study is best appreciated when viewed against the backdrop of the fact that the Cross River State Government created the Calabar Urban Development Authority (CUDA) with the aim that this structure will perform the functions of managing waste generation and disposal, and general sanitation, so as to keep the state clean and green. The focus on waste management at various levels of societal life has always been a point of consideration and with deficiencies spotted in the performances of the functions of the social structure, CUDA, a breakdown of the political system, Cross River State, vis-à-vis the

debilitating effects of untended wastes on the environments and human’s health, is eminent.

Another relevance of this theory is that it relates us to the processes and conditions under which CUDA operates. The government’s non-payment of CUDA workers for months, the employment of contractors to clear refuse in the state while the CUDA is still in existence, and its subsequent termination of the contracts owing to the contractors’ inability to evacuate refuse in the Metropolis, places CUDA in a position of low motivation, incapacitation and/or incompetence. This does not secure the system’s maintenance and adaptation function as stipulated by Almond and Powell (1966), and it results in the loss of funds which should have been put into CUDA to aid effectiveness/efficiency.

Basically, structural-functionalism as a broad perspective in political analysis which addresses the social structure, CUDA, vis-à-vis the functions of its constituent elements (i.e., norms, customs, objectives, roles, institutions/departments), when applied, helps in the analysis and establishment of the effectiveness and/or ineffectiveness of CUDA, and the government’s application of double-standards in the management of waste in Calabar Metropolis.

3.0 The Calabar Urban Development Authority (CUDA) and Calabar metropolis

3.1 Calabar metropolis

The history of Calabar provides an insight into one of Nigeria’s most progressive cities. Calabar is the capital of Cross River State located at the South-South region of Nigeria, which has enjoyed a very long and continuous urban history. Fondly referred to as “Canaan City”; the biblical land flowing with milk and honey, perhaps because of the aesthetic features and the warmth and hospitality of the people of the enchanting and alluring city. Calabar had the privilege of becoming the first Capital of Nigeria between 1882 and 1902 before losing that status to Lagos when the Southern and Northern protectorates were amalgamated in 1914 (Eni & Abua, 2014).

For the purpose of administration, the city was divided into Calabar Municipal and Calabar South Local Government Councils, with 10 and 12 Council Wards respectively, totalling 22 as at present. It has an area of 406km² (157sq. mi.) and a population of 371,022 (Ottong, Ering & Akpan, 2010) as at the 2006 Census. Also, it is located along the GPS coordinates of 4^o57’10”N 8^o19’30” E and between longitude 8.325000^o E and latitude 4.950000^o E (Longitude, Latitude, GPS Coordinates of Calabar, 2016). The city lies along the Calabar River, (8km) upstream from that river entrance into the Cross River estuary; it is watered by the Calabar River, the Great Kwa River and the Creeks of the Cross River.

Most historical records indicate towards Calabar gaining prominence in the early 17th Century. This was largely due to increasing trading relations between the

African tribes like the Efik and Ibibio people. Calabar turned into a major trade hub with fish, banana, cassava, palm oil and palm kernels, and other farm produce being traded around the surrounding communities and traded for European manufactured goods. Also, during this time, Calabar emerged as one of the busiest slave trading depots in Africa. However, the increasing trade eventually caught the attention of the colonial powers which were aggressively increasing their presence in Africa during this time. The city's earliest colonial rulers were the Portuguese who coined the name "old Calabar". It is worth noting that Calabar was originally known by the Efik name "Akwa-Akpa" (Afigbo, 1987) before the Portuguese and British invaded the area.

Calabar, today, is a large metropolis, covering several districts/towns like Big-Qua Town, Akim, Ikot Ansa, Ikot Ishie, Ekpo Abasi, Henshaw Town, Afukang, Mbukpa, State and Federal Housing Estates, Bakassi, Akamkpa, Ikot Omin, Obutong, Duke Town, Odukpani, Biase, etc (Andrew-Essien & Akintoye, 2012). The city has been undergoing rapid economic growth and spatial development since 1999 and the current rate of population growth has by far exceeded the 2006 census figures. The major socio-economic activity in Calabar is largely service provision, especially in a market economy. This is aptly seen in the availability of several standard hotels, resorts and amusement parks, and the city's hosting of thousands of tourists every year especially via its annual Calabar Carnival.

Presently, the city boasts of an International Museum, Botanical Garden, a Free Trade Zone, Calabar International Conference Centre (CCIC), Two Military Barracks (Eburutu and Akim), Zonal Police Headquarters (Zone 6), Margaret Ekpo International Airport and Seaport, University of Calabar (UNICAL), Cross River University of Technology (CRUTECH), Integrated Sports Stadium Complex, Cultural Centre Complex, and a Slave history which has formed parts of the several historical and cultural landmarks of the city. It also boasts of several standard Hotels, resort and amusement parks. The Tinapa Resort, a development of the Cross River State Government, lies in the north of the city besides the Calabar Free Trade Zone. The City also plays host to tourists every year via its annual carnival, which boosts the economy of the people, and showcases the cultural, political systems and location of the State. These have generated a lot of business activities which have impacted on the local economy (Esu, Arrey, Basil & Eyo, 2011). The economic growth of the city has in turn attracted a large number of persons both inside and outside Nigeria. The recently growing industrial manufacturing opportunities offered a suitable environment for the establishment of the Calabar Free Trade zone (CFTZ) and the migration of people to Calabar. Civil service and private institutions provide employment opportunities for a considerable proportion of the population (Andrew-Essien & Akintoye, 2012).

From the foregoing, Calabar, as Sule (1981) discussed, is a unique city in terms of its high degree of urbanism – preference for urban life, western-type dress,

parties, and non-agricultural interests. In fact, with its dense population, massive influx of tourists, and huge rural-urban migrant population, all yearning for sophisticated consumption, which is the very prerequisite for waste generation, Calabar experiences gargantuan levels of waste generation into the waste stream. An average individual in Nigeria generates 0.5 kg of waste per day (Oyediran, 1997 in Ekpoh, Ekpoh & Bassey, 2008). Therefore, it may be safe to infer that with a population of over 370,000 denizens and with over 1.6 million tourists as recorded during the 2016 Calabar carnival and reported by the Chairman of the Carnival Calabar Commission (New Telegraph, 2017), Calabar generates an estimated 203.9 tons of waste per day; revealing its high waste generation potentials.

In this vein, according to Afangideh, et al (2012), the rate of waste generation in Cross River and Calabar in particular is quite similar to the Nigerian figure which is placed at 70% as compared to the 30% rate of waste disposal. Little wonder different administrations within the State have tried to take the issue of waste seriously. How successful their attempts have been is an entirely different issue. In fact, anything less than this will be appalling and surprising because as Matsunaga and Themelis (2002:27) purported, "between two affluent communities, the one that possesses less land per person is bound to be more careful regarding the use of land for sites for municipal solid waste generation and disposal."

3.2 Historical background of CUDA

Statutorily, waste management was the responsibility of the Local Government Authorities as established in the 1999 Constitution. Therefore, Calabar South and Municipal Local Governments used to manage the waste generated in their jurisdictions. The Environmental Health Departments in the two Local Government Secretariats were responsible for refuse clearance and disposal assisted by the Calabar Capital City Development Authority and Environmental Task Force (Samson-Akpan, 2009). A new challenge ensued. This was the existence of the Environmental Health Departments and Laws in addition to the State Ministry that resulted in co-ordination being a challenge. As Samson-Akpan (2009) wrote, "the Environmental Health Departments and the Environmental Task Force were permitted to charge defaulters to Sanitation Court and fine them for any sanitation offenses committed based on the Military Administration Environment Sanitation Decree No. 6, Section 82 of 1984". This showed the powers of the above mentioned bodies.

Owing to this, the Cross River State Government based on the passage of the Environmental Sanitation Law of 2000 and the concomitant agreement of existing stakeholders, took over waste management from the Local Governments, and by extension, established the Calabar Urban Development Authority (CUDA). Decree No. 4 of 1990 established the Calabar Capital City Development Authority; and the Urban

(Environmental) Sanitation Law No. 8 of 2000 amended this Decree and the Authority was renamed Calabar Urban Development Authority (Samson-Akpan, 2009). Thereafter in 2004, CUDA was mandated to manage urban sanitation and waste disposal, because it was realized that the Local Government Authorities could not manage urban generated wastes because of increased waste generation owing to huge population density, lack of clear-cut policies and structures for waste management, and so on (see Samson-Akpan, 2009).

CUDA has the responsibilities of refuse evacuation and collection, sweeping of the streets and roadways, mowing of grasses in publicly owned parks and open spaces and roadways verges. The Authority planted ornamental trees and shrubs along the City streets and highways, conducted house-to-house inspections to ensure the sanitary conditions of residential, commercial and industrial areas. The Authority also embarked on public awareness campaigns to educate and inform the residents on the essence of good sanitation habits and enforces the Urban Sanitation Laws (Coker, Obo & Ugwu, 2013).

3.3 Objectives of CUDA

The objectives of the Calabar Urban Development Authority (CUDA) are divided along two continua: medium term goals/objectives; and short term strategic goals/objectives. So as to keep Calabar clean and green, CUDA also came up with the following policies:

3.3.1 Medium Terms Goals/objectives;

- a) Develop and establish programs to achieve sustainable living in an urbanized and tourism driven state;
- b) Develop an effective and efficient strategy for waste collection and evacuation, sweeping of streets and maintenance of open spaces; and
- c) Ensure compliance with urban sanitation laws and regulations for the protection of the environment and aesthetics of the city.

3.3.2 Short Term Goals/objectives;

- a) Maintain a clean, green and serene environment in Calabar metropolis;
- b) Promote a healthy living environment through public awareness campaigns; and
- c) Ensure a clean and healthy environment through the enforcement of the Urban Sanitation Laws (Coker, Obo & Ugwu, 2013).

4.0 The Calabar Urban Development Authority (CUDA) and solid waste management in Calabar metropolis between 2008 and 2017.

4.1 Role of CUDA in the administration and disposal of solid waste in Calabar metropolis

The vision of CUDA is to transform Calabar to be the cleanest and visually aesthetic city in Nigeria and the West African sub-region. Its mission is to promote a healthy environment to achieve sustainable living through efficient management of the environment; to ensure the cleanliness of the City, its streets, roadways and sidewalks, prompt maintenance of all open spaces, and ensure prompt evacuation of waste at flash points and designated places (Coker et al., 2013). To effectively undertake the above listed responsibilities the Authority is empowered to perform its functions as listed in section 8 & 9 of the Urban (Environmental) Sanitation Laws of 2000. Accordingly, the laws:

- a) Provides for the Authority to be a corporate body with perpetual power of success, common seal and shall have power to sue and be sued in its corporate name;
- b) The area of jurisdiction of Authority as specified in schedule 1 of the Law comprised Calabar Municipality and Calabar South Local Government Areas, which comprised 50 towns and villages (see Coker et al., 2013).

Subject to the provision of the enabling laws, the Authority has the power to carry out acts that facilitates the performances of its functions in fulfilling the above consent, CUDA is empowered to mobilize facilities that will enhance the attainment of its goals and objectives on such terms and conditions as may be determined from time to time.

Essentially the main thrust of Calabar Urban Development Authority (CUDA), is enhancing the aesthetic of Calabar Metropolitan Area through the timely and daily collection and evacuation of refuse, desilting of major waterways canals and drainages. The Authority beautifies major streets, roundabouts, state owned parks and open spaces by planting ornamental trees and re-grassing of streets verges. Its functions also includes; the maintenance of infrastructure in public places, roundabouts and recreational areas (Coker et al., 2013).

4.2 The challenges of CUDA in Calabar metropolis

One of the challenges to waste management and disposal in Calabar Metropolis is the wrong attitude of people towards waste disposal. The awareness in Calabar is existent, though not very effective and efficient, but some persons or households still portray poor attitude to waste management, which has often resulted in wastes being indiscriminately dumped on

open spaces, channels of drainages and even streets and roads, converting them into unsightly junk yards, unsuitable for almost any use and promoting destructive flooding especially in areas like Goldie, Mayne Avenue, MCC Road, and Barracks Road, among others

Another is financing and/or servicing requirements. Cost recovery is low owing to none or late payment of fees by households which leads to poor funding. It is worth reiterating that the Urban Development Bank of Nigeria (UDBN) (1998) noted that the collection and transportation of waste is labour and capital intensive and accounts for between 70% and 80% of total cost of waste management in Nigeria (in Imam et al., 2008). In Calabar, the then Director, Waste/Maintenance, CUDA, pointed out in a conversation with him, solid waste management costs, amounting to three hundred naira, are covered in the Urban Development Tax. A staff of the Environmental Health/Sanitation and Education unit, CUDA, corroborated this and added that:

“Though inhabitants of residential areas do not pay for solid waste management cost as this is already covered within the Urban Development Tax, commercial areas like markets and motor parks are levied the sum of fifty naira (per shop/vehicle), and these monies are collected by the market/motor park sanitation unit which clears the wastes generated within the market/motor park and dumps them in wastes bins closest to the market/motor parks as well as liaise with CUDA officials who go to evacuate the wastes.”

It is, thus, the researchers' belief that the inadequacies of individuals to pay their Urban Development Taxes (via evasion or avoidance) from which the sanitation fees are extracted, results to a low financial base to cover salaries and running cost associated with solid waste management in Calabar Metropolis.

The road condition is also a threat. Calabar has many unplanned, haphazardly constructed, narrow and uneven roads which are usually inaccessible to collection vehicles. Some of the many paved roads are devastated by pot-holes which contribute to the breakdown and high maintenance rate of waste collection vehicles. At times, these vehicles may not be properly maintained because of continuous use and wearing out of parts (Samson-Akpan, 2009). Poor funding and the lack of adequate number of trucks are at the apex of CUDA's plights. The available trucks are inadequate and easily breakdown because they are overworked.

Likewise, inadequate and/or untrained human capacity for technical issues is another issue. This may be as a result of how stressful the job is which at times leave workers stricken with severe body pains and offensive odour. To borrow from Guerrero, et al (2013),

related to this is the fact that waste workers are associated to low socio-economic status situations that result to low motivation among the solid waste employees. The government gives low priority to solid waste compared to other municipal activities with the end result of limited trained and skilled personnel being present in the midst of a vast number of highly untrained and/or unskilled personnel (Guerrero, et al., 2013).

Another challenge identified is the failure of stakeholders such as NGOs, Banks, and other corporate bodies to partner with CUDA in its waste management/disposal activities. This has resulted in a situation where the Agency is left on its own, stranded, without adequate support or motivation.

Limited space availability at the dump site at Lemna Road is another challenge confronting CUDA. Soon there will be no more space to dump refuse because the dump-site is almost full. Also, aside the fact that the dump-site has limited space available and that the roads in Calabar are in very bad shape, a major challenge plaguing CUDA is the non-payment of workers' salaries. A case in point was when the women who sweep the streets and roadsides protested against the government because they had nothing to eat since salaries were not paid and this was the primary reason CUDA officials embarked on their strike in 2016.

4.3 The impact of CUDA in the administration of waste in Calabar metropolis

The Calabar Urban Development Authority (CUDA), created by the Cross River State Government in the early 2000s, has the mandate to ensure the general sanitation and management of waste in Calabar Metropolis. The administration was both enterprising and waste conscious because there was no way rapid industrialization would not have yielded gargantuan amounts of waste. Within this period (2000-2007), the Calabar Urban Development Authority (CUDA) fared pretty well and its activities regarding the sweeping of streets and roads, waste management, and the planting of ornamented trees, earned for Calabar Metropolis the status of the cleanest and greenest City in Nigeria (Kalu, 2014). The question now is “how has the Authority fared in service delivery and government support following the end of 2007?”

Between 2008 and 2017, Cross River State witnessed two administrative eras. Within these periods, as the researchers' observational studies showed, it is believed that the Calabar Urban Development Authority (CUDA) has not fared well especially vis-à-vis service delivery and Government's support. Why are we suddenly talking of a “golden age” of the administration of waste in Calabar? Why are there lacunae of waste management in Calabar?

Yes, it is true that CUDA, as the Authority's Charter stipulates is the fundamental waste management regime in Calabar with other stakeholders like the Local Government, City Corporations (e.g., Bread of Life Development Foundation, a Nigerian Water

and Sanitation Consultancy firm commissioned in February 2010 by the European Union Water Supply and Sanitation Sector Reform Program (EU-WSSRP) and geared to assist the Cross River State water (and waste) sector reform team to develop the Cross River State Water Supply and Sanitation policy), Municipal Authorities, Non-Governmental Organizations (NGO's), households, private contractors, and the Ministries of Health, Environment and Finance (Bogner et al, 2007) serving as backup and rendering as much support as can be rendered to CUDA, but it is also true that more emphasis have been placed on waste disposal which is just an element of the waste management framework in Calabar Metropolis. Even the emphasized waste disposal has been very ineffective and inefficient in recent times. The squalid state of the town is one that is unheard of, where its inhabitants now live amidst mountains of refuse that have virtually taken over roads and the streets and making a mockery of the town that once prided itself and was acclaimed the cleanest and greenest City in Nigeria during the 2000 – 2007 (Inyang, 2016). With Egyptian pyramids kind of garbage heaps standing akimbo in most of the road-sides and open dumps and their repulsive stench capable of deforming a developing foetus, Calabar can effortlessly win an award as the dirtiest City in Nigeria (Inyang, 2016).

This problem of waste administration was relatively less than it is now but conspicuous between 2007 and 2015. However, the era after 2015 was challenged by the myriad of evidentially increasing pyramids of refuse within the metropolis (Inyang, 2016). Nine years on and the problem of waste disposal is still a thorn in the flesh of the aesthetic grandeur and environmental health of Calabar. The general feeling in Calabar and its environs is that CUDA and the Cross River State Government are not doing enough to address the debilitating situation, which may metamorphose into a major threat to the health and wellbeing of the people.

Basically, wastes are disposed in dumpsites in Cross River State at designated areas which are either owned by Government or private individuals. In Calabar, the final disposal point is the Lemna dumpsite at Calabar Municipality (an open dumpsite) with little or no recycling as a means of waste treatment and disposal. Now with the Lemna dumpsite reaching its maximum carrying capacity, the plights of the people have increased as wastes are being left for weeks unattended to or collected because the authority has little or no more space to dispose collected wastes at the Lemna dumpsite. This has resulted in wastes often being disposed in an unsustainable manner in "open dumps, streets, ravines and in other cases into drainages..." (Udoakah & Akpan, 2013)

The unregulated and indiscriminate waste disposal pattern continues to pose serious health and environmental hazards, and fears have aggravated among people. As Eni, et al (2014) wrote in their study which accessed the vulnerability of boreholes located close to Lemna dumpsite in Calabar Municipality and

other indiscriminately converted flash points to dumpsites. Borehole samples were collected from 10 designated boreholes and their physiochemical parameters were analysed and the analysis revealed that groundwater flow from the North to South, carrying along with it dissolved waste materials and leachates which infiltrates into the borehole water and contaminates it, thus, rendering it unsuitable for drinking and domestic use, and when used may cause diseases such as diarrhoea, cholera, dysentery etc. Thus, as Inyang (2016) wrote, "a recent medical report stating the treatment of at least 300 persons for diarrhoea at the University of Calabar Teaching Hospital (UCTH), might well be an indication that an outbreak of epidemic is very imminent".

Also, decomposing organic wastes in the dumpsites in Calabar attracts a vast array of animals, vermin's and flies. Flies play a major role in the transmission of faecal-oral diseases, gastro-enteritis, particularly where domestic waste contains faeces (often those of infants). For instance, at the various dumpsites as observed by the researcher in the course of this project study, houseflies, mosquitoes (which could cause yellow fever and dengue fever, malaria and microfilariae), ants, termites and dung beetles were some of the insects that were spotted. Others included spiders, centipedes, millipedes, earthworms, maggots and scorpions. The dumpsites also played host to lizards, rats, snakes and stray dogs. Thus, the transmission of a vast array of diseases is the associated risks of the indiscriminate disposal of waste in Calabar Metropolis.

5.0 CONCLUSION AND RECOMMENDATIONS

This study has discussed the issues of waste generation (which is an essential, characteristic of man), and the role of the Calabar Urban Development Authority (CUDA) in the administration of indiscriminately dumped wastes, situating these within the context of Calabar metropolis, comprising both Calabar Municipality and Calabar South Local Government Areas. It has been a much reiterated fact within this study that the presence of indiscriminately dumped waste especially by road sides, open drains and waterways, and open spaces in Calabar metropolis constitute an aesthetic disaster, facilitate flooding, the spread of diseases, and has strategically reduced the city's long standing status as the cleanest in Nigeria. As a matter of fact, it may not be out of place to opine that untended refuse dumps have assumed a defining character of Calabar metropolis in recent times, presenting cataclysmic reactions and huge socio-environmental problems within the polity, and the near destruction of what is held as cherished Calabar value, i.e., maintaining a clean and green city.

In view of this, is there still light at the end of the tunnel? One can choose to find solace in the activities of CUDA. However, it has been observed in the course of

this study that CUDA has been bastardized by a number of factors, making the agency less efficient and effective in carrying out its duty of waste management. This will continue to be the case as long as poor funding, the non-payment of worker's salaries, poor public attitude towards waste management, bad roads, bad and/or inadequate equipment, trucks and personnel to evacuate wastes, and lack of partnership from the private sector towards improving the activities of CUDA, is unchanged.

Also this study concludes that a lot of people in Calabar metropolis are unaware of the waste collection schedule of CUDA and that they do not have the waste bins distributed by CUDA for temporary storage of wastes, and these issues affect waste collection, transport practices and the final disposal of waste at the landfill at Lemna road. Little wonder, huge piles of refuse are found littering flashpoints in unprecedented proportions. Added to this is the unhealthy nature of the "open" waste landfill site at Lemna road and other flashpoints which presents grave dangers to residents who are in close proximity to the landfills and flashpoints. It is understood that these residents' underground sources of water like boreholes and wells are contaminated by toxic leachates or waste-water which dissolves into the ground at the landfill site. Consequently, the need arises for the implementation of a new waste disposal technique with the utmost sanitary concerns.

To that extent, therefore, since the findings of this research work shows that the activities of CUDA have been inefficient and ineffective in addressing the indiscriminate dumping and disposal of wastes in Calabar metropolis, the following recommendations are proposed:

- i. There is the need to increase public awareness of the activities of CUDA, its duties, collection schedules and bin collection system and the consequences of their actions regarding the indiscriminate dumping of refuses into drainages, road sides and open states. This can be done through rallies, seminars, and more effectively, through the introduction of political, environmental, or civic courses in the curricula of schools from the primary and secondary schools, up to the tertiary institutions, persistent television and radio adverts. This would ensure the social and intellectual re-engineering Calabar metropolis needs to curb the challenges faced by CUDA.
- ii. The State government needs to ensure that the Calabar Urban Development Authority (CUDA) is adequately funded and CUDA's employees are duly paid their salaries, so that it, CUDA, will work effectively and efficiently in the administration of waste.
- iii. To avert the loss of lives and properties and the carrying of dangerous animals like snakes and crocodiles into residential areas owing to flooding which accompany heavy rainfall in

Calabar metropolis, the government and residents need to ensure that wastes are evacuated on time and that refuses are not thrown into waterways because the drainages will be blocked.

- iv. As the sayings go, "a clean environment breeds healthy beings" and "health is wealth." So, there is the need for the civil society's (families, NGO's, the media, trade unions, religious organisations, academia, civil societies, etc.) via their broad based support to increase their momentum in the quest to keep Calabar metropolis clean and green by generating demand for effective measures to reduce the generation of wastes and the effective administration of the generated wastes, playing the role of whistle blower, and partnering with CUDA either via the provision of financial assistances, materials or ideas.
- v. The State government should ensure it repairs and maintain existing bad roads since a major cause of the breakdown of waste trucks is the bad road.
- vi. The creation of incentives for advanced researches, by the government and private sector, into a society for effective and efficient waste administration system and for the socio-economic and environmental development of Calabar metropolis, is necessary.
- vii. Since the majority of wastes generated in Calabar are largely biodegradable and recyclable, the government needs to provide a recycle plant as this will not only increase effective and sanitary waste disposal but will also help the government create jobs and accrue financial gains from the sales of the recycled products. Also, the food/vegetable wastes can be converted into fertilizers/manures which can be sold or given for free to farmers to boost their farm yields.
- viii. Owing to the fact that not all wastes can be recycled, it will be very useful for the State government to adopt waste incineration as a probable mechanism for waste management. The mechanism generates steam which can be used to create electricity.
- ix. CUDA needs to ensure that every household has the waste bins for temporary storage of waste, and it can do this via having a data base of houses in Calabar metropolis that already have the waste bins and those that do not. Also, those that have the bins should ensure that they use it for the purpose they were meant to serve (since it was observed that some households have converted their waste bins to water vessels).

REFERENCES

- Adeniran, A.O. and Oyemade, H. (2016). Inventory analysis of solid waste management in Ikorodu community. *Civil and Environmental Research*, 8(9), 26-38.
- Adewole, A.T. (2009). Waste management towards sustainable development in Nigeria: A case study of Lagos State. *International NGO Journal*, 4(4), 173-179.
- Afangideh, A.I., Joseph, K.U., and Atu, J.E. (2012). Attitude of urban dwellers to waste disposal and management in Calabar, Nigeria. *European Journal of Sustainable Development*, 1(1), 22-34.
- Afigbo, A.E. (1987). *The Igbo and their neighbours: Inter-group relations in south-eastern Nigeria to 1953*. Ibadan: University Press Limited.
- Agbesola, O.Y. (2013). *Sustainability of municipal solid waste management in Nigeria: A case study of Lagos (Unpublished Master's thesis, Linkoping University)*. Retrieved from <http://www.ep.liu.se/>
- Andrew-Essien, E.E. and Akintoye, O.A. (2012). Urban poverty and residential environment degradation in Calabar area of Cross River State, Nigeria. *Global Journal of Human Social Science*, 12(6), 49-55.
- Australian Laboratory Services Environmental. (2014). Waste generation: Meaning, term, and glossary definition – What is waste generation? Retrieved from http://www.caslab.com/Waste_Generation_Meaning/
- Barbalace, R.C. (2003, August). The History of waste: Do you want to be a garbologist? Retrieved on from <http://environmentalchemistry.com/yogi/environmental/wastechemistry.html/>
- Bogner, J., Ahmed M.A. Diaz, C.C., Faayi, A., Geo, Q., Hashimoto, S., Mareckowa, K., Pipati, R., and Zhang, T. (2007). Waste management. In B. Metz, D.R. Dandson, P.R. Bosch, R. Dave, and L.A. Meyers (Eds.), *Climate change (2007): Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)* (pp. 585-618). Cambridge, United Kingdom and New York, USA: Cambridge University Press.
- Chandak, S.P. (2010). *Trends in solid waste management: issues, challenges and opportunities. International consultative meeting on expanding waste management services in developing countries UNEP*, 1-22.
- Chartered Institute of Purchasing and Supply (CIPS). (2007). *How to develop a waste management and disposal strategy*. Pp. 1-27. Retrieved from https://www.google.com.ng/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjT-7Tf5bLYAhUBuhQKHbhIDBIQFggnMAA&url=https%3A%2F%2Fwww.cips.org%2FDocuments%2FAbout%2520CIPS%2FDevelop%2520Waste%2520v3%2520-%252020.11.07.pdf&usg=AOvVaw3oyFbJHiOrqIGtbcDmRS_5/
- Clayton, A. and Radcliffe, N. (1996). *Sustainability – A systems approach*. London, UK: Earthscan Publications Ltd.
- Coker, M.A., Obo, U.B., and Ugwu U. (2013). Managing sustainable development in our modern cities: Issues and challenges of implementing Calabar urban renewal programmes, 1999-2011. *Asian Social Science*, 9(13), 74-84.
- Ebegbulem, J. (2010). *Government and politics of the modern state (Enlarged Edition)*. Cross River, Nigeria: Kings View Publishing House.
- Ekpoh, I.J., Ekpoh, U.I. and Bassey, N.U. (2008). The role of environmental education and public enlightenment in urban waste management in Calabar, Cross River State of Nigeria. *African Journal of Environmental Pollution and Health*, 6(1), 7-12.
- Enemuo, F.C. (1999). Approaches and Methods to the study of politics, in R. Anifowose and F. C. Enemuo (Eds.), *Elements of Politics*. Akoka-Yaba, Lagos: Sam Iroanusi Publications.
- Eni, D and Abua C. (2014). The impact of Urban renewal on quality of life (QOL) in Calabar, Calabar, Nigeria. *Research on Humanities and Social Sciences*, 4(17)129-135.
- Eni, D.I., Ubi, A.E. and Digha, N. (2014). Vulnerability assessment of boreholes located close to Lemna landfill in Calabar metropolis, Nigeria. *International Journal of Physical and Human Geography*, 2(2), 6-15.
- Ottong, J.G., Ering, S.O., and Akpan, F.U. (2010). The population situation in Cross River State of Nigeria and its implication for socio-economic development: Observations from the 1991 and 2006 censuses. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)*, 1(1), 36-42.
- Esu, B.B., Arrey, V.M., Basil, G., and Eyo, E.E. (2011). Analysis of the economic impacts of cultural festivals: The case of the Calabar Carnival in Nigeria. *Tourismo: An International Multidisciplinary Journal of Tourism*, 6(2), 333-352.
- Guangyu, Y. (2011). Disposal of solid waste. Point Sources of Pollution: Local Effects and its Control. *Encyclopaedia of Life Support Systems (EOLSS)* (Vol. 1). Retrieved from <http://www.eolss.net/sample-chapters/c09/e4-11-03-03.pdf/>
- Guerrero, L.A., Maas, G. and Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Elsevier, Waste Management*, 33, 220-232.
- Hammed, T.B., Sridhar, M.K.C. and Wahab, B. (2016). Enhancing solid waste collection and transportation for sustainable development in the Ibadan metropolis, Nigeria. *European Journal of Research in Social Sciences*, 4(7), 23-32.
- Imam, A., Mohammed, B., Wilson, D.C., and Cheeseman, C.R. (2008). Solid waste management in Abuja, Nigeria. *Elsevier, Waste Management*, 28, 468-472.
- Inyang, B. (2016, June 20). Calabar succumbs to refuse. *This Day Newspaper*. Retrieved from

- <http://www.thisdaylive.com/index.php/2016/06/20/calabar-succumbs-to-refuse/>
- Isirimah, N.O. (2002). *Understanding the Nature, Properties, and Sources of Waste for Quality Environment*. Port Harcourt: Tom and Harry Publications Ltd.
- Kalu, N. (2014, September 19). Calabar's burden as Nigeria's cleanest city. *The Nation Newspaper*. Retrieved from <http://thenationonline.net/calabars-burden-as-nigerias-cleanest-city/>
- Lardinois, I., and Furedy, C. (1999). *Source separation of household waste materials: Analysis of case studies from Pakistan, the Philippines, India, Brazil, Argentina and the Netherlands*. Gouda, Urban Waste Series, 7.
- Longitude, Latitude, GPS Coordinates of Calabar. (2016). Retrieved from <http://www.gps-latitude-longitude.com/gps-coordinates-of-Calabar/>
- Matsunaga, K. and Themelis, N.J. (2002). Effects of affluence and population density on waste generation and disposal of municipal solid wastes.
- Metz, B., Danson, D.R., Bosch, P.R., Dave, R., and Meyers, L.A. (Eds.). (2007). *Climate change (2007): Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*. Cambridge, United Kingdom and New York, USA: Cambridge University Press.
- Murali, U., Vijayakumar, C., Ramesh, M., and Baskaran, M. (2017). An overview of hazardous waste management in India. *International Journal of Engineering and Management Research*, 7(4), 355-368.
- New Telegraph*. (2017, October 14). Carnival Calabar target 2 million tourists for 2017. Retrieved from <https://newtelegraphonline.com/2017/10/carnival-calabar-targets-2-million-tourists-2017/>
- Nwagwu, E.J. (2012). An appraisal of Economic and Financial crimes commission (EFCC): The war as giant corruption in Nigeria (1999-2007). Retrieved on August 30, 2017, from http://www.academicexcellencesociety.com/an_appraisal_of_economic_and_financial_crimes_commission.html/
- Ogban, M.E. and Akuruju, V.A. (2016). The stigmatization of residential properties due to proximity to waste dump. *IMPACT: International Journal of Research in Business Management*, 4(11), 37-46.
- Okonkwo E.M. and Eboatu A.N. (1999). *Environmental pollution and degradation*. Palladan Zaria, Kaduna State, Nigeria: Onis Excel Creations Publication Ltd
- Oyeniyi, B.A. (2011). Waste management in contemporary Nigeria: The Abuja example. *International Journal of Politics and Good Governance*, 2(2.2), 1-18.
- Randall, V. and Theobald, R. (1998). *Political change and underdevelopment: A critical introduction to third world politics (2nd ed.)*. London: Macmillan Press Ltd.
- Samson-Akpan, P.E. (2009, September). Solid waste management in Calabar, Cross River State. *Researchgate*. Retrieved from http://www.researchgate.net/publication/247773973_solid_waste_management_in_Calabar_Cross_River_State/
- Scarpitti, R.F. and Anderson, L.M. (1989). *Social problem*. New York, USA: Harper & Row publishers, Inc.
- Seadon, J.K. (2010). Sustainable waste management systems. *Journal of Cleaner Production*, 18, 1639-1651.
- Sule, R.A.O. (1981). Environmental pollution in an urban center: Waste disposal in Calabar. *Third World Planning Review*, 3(4).
- Sujauddin, M., Huda S. M. S. and Rafiqul-Hoque, A. T. M. (2008). Household solid waste characteristics and management in Chittagong, Bangladesh, *Waste Management*, 28(9), 1688-1695.
- Udoakah, Y. and Akpan, U. (2013, October). A sustainable approach to municipal solid waste management in Southern Nigeria. Paper presented at the Institute Of Electrical, Electronics Engineers (IEEE), Global Humanitarian Technology Conference (GHTC) Silicon Valley-San Jose, California USA.
- Uwadiogwu, B.O. and Chukwu, K.E. (2013). Strategies for effective urban solid waste management in Nigeria. *European Scientific Journal*, 9(8) 296-308.
- Wikipedia.org (2018). Waste sorting. Retrieved on 10 May, 2018, from https://en.m.wikipedia.org/wiki/Waste_sorting/
- Wokekoro, E. and Inyang, M.P. (2007). *Waste disposal in low-income neighbourhood and its impact on health: The case of Port Harcourt, Nigeria*. International Conference "Waste Management, Environmental Geotechnology and Global Sustainable Development (ICWMEGGSD'07 - GzO'07)" Ljubljana, SLOVENIA, August 28-30.