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An Assessment of Causes and Effects of Domestic Waste in Owerri, Imo State Southeastern Nigeria

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Abstract:- This work is aimed at investigating the causes and effects of domestic waste in Owerri ,Imo State. The study covers three local Government Areas which includes: Owerri Municipal, Owerri West and Owerri NorthLocal Government Area respectively. Majority of domestic waste are generated from markets such as World Bank Market, Relief Market, Douglas Market, Amakohia Market, New market, Building Materials Market, Naze and residential homes. The waste disposal methods adopted includes: burning, landfills and open dumping. Domestic waste are always collected at the various collection centers for disposal and recycling purposes. The dominant causes are: Non availability of Collection centers, Indiscriminate dumping of waste by citizens while the effects of domestic waste are as follows: defacing the environment, blocking of the drainage system, and pollution of the environment. The way forward is that the managers of domestic waste in Owerri (ie Environmental Transformation Commission, ENTRACO) should make the collection centers accessible to all residence, sensitization of the general public on the danger of dirty environment.

Keywords*: Domestic, Waste, Effects, Causes.*

I. INTRODUCTION

The increase in population and the use of non-biodegradable waste such as plastic bottles, sachet water etc in Owerri has posed a serious challenge in the management of domestic waste from the point of collection to the point of disposal. In as much as many of the waste can be recycled, the process of waste collection has made it difficult because both those that recyclable and non- recyclable are collected together instead of collecting separately. Although the Imo State Government is initiating a process of waste extraction for the purpose recycling on each dumpsite. Moreover the use of unauthorized persons on the dump sites should be discouraged because of the presence of toxic materials such as batteries. However, waste from the hospitals should professionally managed before releasing them to the public to avoid spread of diseases. These notable cases have to do with the domestic waste close to homes where the impacts such as odors and changes in the water quality.

The present situation in Owerri will improve if and only if sealed dumpsite is adopted else the situation will worsen in years to come because as population increases, the volume of domestic waste will also continue to increase.

The challenge of collection and disposal of Domestic Waste will continue to increase because of both the attitude of the Government and Citizens which will continue to pose great danger to the general public.

This waste is generated as consequences of household activities such as the cleaning, cooking, repairing empty containers, packaging, huge use of plastic carry bags. Many times these waste gets mixed with biomedical waste from hospitals and clinics. There is no system of segregation of organic, inorganic and recyclable wastes at the household level. Door-to-door collection is rarely practiced community collection bins are poorly managed and are usually no more than open dumps on the roadside.

The improper handling and management of Domestic Waste from households are causing adverse effect on the public at large and this deteriorates the environment.

The main aim of the study is evaluates the causes and effects of domestic waste in Imo state.

- To find out the sources and types of domestic waste in imo state.
- To evaluate the causes of domestic waste in Imo state.
- To determine the effects of domestic waste in imo state.
- To discover various ways of domestic waste disposal in imo state.

II. LITERATURE REVIEW

The handling of Domestic Waste in Nigeria should be carried out collectively i.e both individual and the Government respectively. Attention must be directed towards evacuation of domestic waste on the streets, markets and various houses. During evacuation, emphasis should be waste classification into various categories of wastes.. The indiscriminate dropping of waste along highways, markets, and offices should be discouraged by setting up taskforce at all levels of Government. Government should focus on essential policies as the the one mentioned above to instill discipline in the society. Moreover various states should be supported financially in the management of this important project which will largely impact in our environment and eventually reduce the spread of deadly diseases such as malaria and typhoid. The evacuation of waste should be properly handled by sensitizing the general public on the needs and consequences of dirty environment.

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III. ROOT CAUSES OF DOMESTIC WASTE IN IMO STATE

The following are the causes of poor Domestic Waste management in Imo State include:

Negligence of waste management from Government and her citizens. Inadequate allocation of funds by Government to tackle waste management is one of the fundamental issues facing evacuation of waste especially in the area equipments for collection.

- Non availability of funds which leads to citizens purchasing non bio-degradable items which are not easy to dispose off.
- Inadequate personnel to handle waste collection disposal.
- Poor information on recycling of waste in the study area.
- Lack of dumping sites where to deposit the Domestic waste. This is because the issue of waste management is new in the country. It wasn't considered to be a problem before.
- Lack of sensitization programs on the need for timely collection and proper disposal of waste.
- Ineffective methods of refuse collection due to poor budgetary allocation. In study area facilities such as trucks that carry the waste from the various locations are not properly covered such that the collected waste fall off the road while being transported.

IV. SOURCES AND TYPES OF DOMESTIC WASTE

Source	Typical waste generators	Types of Domestic waste
Residential	Single and multifamily dwellings	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, metals, ashes, special wastes (e.g., bulky items, consumer electronics, white goods, batteries, oil, tires), and household hazardous wastes.).
Industrial	Light and heavy manufacturing, fabrication, construction sites, power and chemical plants.	Housekeeping wastes, packaging, food wastes, construction and demolition materials, hazardous wastes, ashes, special wastes.
Commercial	Stores, hotels, restaurants, markets, office buildings, etc.	Paper, cardboard, plastics, wood, food wastes, glass, metals, special wastes, hazardous wastes.
Institutional	Schools, hospitals, prisons, government centers.	Same as commercial.
Construction and demolition	New construction sites, road repair, renovation sites, demolition of buildings	Wood, steel, concrete, dirt, etc.
Municipal services	Street cleaning, landscaping, parks, beaches, other recreational areas, water and wastewater treatment plants.	Street sweepings; landscape and tree trimmings; general wastes from parks, beaches, and other recreational areas; sludge.
Process (manufacturing, etc.)	Heavy and light manufacturing, refineries, chemical plants, power plants, mineral extraction and processing.	Industrial process wastes, scrap materials, off-specification products, slay, tailings.
Agriculture	Crops, orchards, vineyards, dairies, feedlots, farms.	Spoiled food wastes, agricultural wastes, hazardous wastes (e.g., pesticides).

V. VARIOUS WAYS OF DISPOSING DOMESTIC WASTE

A. Sanitary landfill

Landfill is the process of collecting refuse waste and burying them in an open area located far away from human settlements.. This is very affordable and much easier method to dispose domestic wastes. Landfill area must be well enclosed to avoid waste been blown away by wind, infestation of rats, mice etc. Leakages from waste can also be avoided by means of concrete and cements. Orfano, 2018 Landfill should be carried out in such a way that both surface and underground water will not be contaminated.

B. The use of landfill gas

Landfill gas is a mixture of different (methane and mostly carbon dioxide) trace amount of volatile organic compound are also used at a very low quantity. Although these greenhouse gases have effects on climate change most especially methane which is 25 times more detrimental to the atmosphere and have a high influence on global warming. Monitoring techniques has been initiated in the U.S, under the Clean Air Act of 1990 to regulate and lower the concentration of gases used Agency for Toxic substances & Disease Registry.

C. Incineration/Combustion

Collected waste are been exposed to heat as to convert them to gaseous products and ash. It is a more practicable and efficient ways of disposing municipal waste as volume of waste are been reduced by 85 - 90%. This can cause environmental pollution from gaseous emission derived from combustion which contains micro-pollutants from incineration stack but still can be reduced by filters.

D. Recycling

This is a method that involves the collection and re-use of Domestic waste generated such as glass bottles, stainless steel, food and drink cans, metals etc. The waste to be recycled needs be collected in a separate waste bins and can

even be sorted out in a recycling facility area. The process makes the environment cleaner; minimize air and water pollution and it save resources for future use.

VI. LOCATION OF THE STUDY AREA

The work was carried out in Owerri (i.e Owerri Municipal,Owerri West and Owerri North Local Government respectivly).. The estimated population is about 602,964 as of 2006 (Federal Republic of Nigeria Official Gazette, 2007) and is coverd by an area of approximately 120 square kilometers .Owerri has two two Rivers at its boarders namly: Otamiri River and Nworie River respectively. Important educational institutions in Owerri include Imo State University, Federal University of Technology Owerri, Imo State Polytechnic Umuagwo, Federal Polytechnic, Nekede, Alvan Ikoku Federal Collage of Education and Federal College of Land Resources Oforola.

VII. RESULTS AND DISCUSSION

This study revealed that the average quantity of solid waste generated in Owerri Town in 2020 was 0.58kg per capita per day bringing a total of 325,669kg per year. This result corresponds with the one obtained by Nwoke (2018) in his study in Owerri which was 0.55kg per capita per day. Our result is also close to those obtained by Bello *et al* (2016) that put the average waste generated per capita per day in Nigeria at 0.56kg. However, when compared with results obtained from studies carried out in other Nigerian towns, things turned out to be quite different. For example, the per capita waste generation rate was 0.71kg in Ado-Ekiti and 0.73kg at Ibadan (Wahab, 2015), 0.49kg at Mubi (Mshelia, 2015), 0.48kg at Yola (Limar and Ngar, 2015), 0.68kg at Abuja (Imam et al, 2007); and 0.53kg in Kano (Naberu and Mustapha, 2014). With these variations in the results obtained by various studies in different towns, it may appear an over-exaggeration to place the average per capita waste generation rate in Nigeria between 0.65 and 0.95kg as suggested by Ike, Ezeibe, Anijiofor and Nik-Dand (2018). The lower mean of this estimate does not even capture the per capita waste generation rate of most towns.

Also, when the results obtained in Owerri are compared with those obtained in other Sub-Saharan African cities, it may surprise that the former shows slightly higher records.

For example, it was 0.45kg per capita per day in Freetown, Sierra Leone (Sanko, Yau and Tran, 2014), 0.48kg in Sekondi- Takoradi in Ghana (Nyankso, Fer-Baffor and Gorkay-Miah, 2015), but generally below the average of the European Union of 1.7kg per capita per day. (Halkos and Petrou, 2018).

These results generally show that variations in the average waste generation rates may be due to certain factors including total population, local habits, socioeconomic characteristics, consumption patterns, seasons of the year, recycling culture among others.

Generation rates vary even within urban districts. As in the case of Owerri, for example, Owerri Municipal district generates more waste due to its high population density, but these waste contain more of putrescibles (77%) higher than the other two districts. World Bank Housing Estate, occupied mainly by medium and high income earners generates more of papers, bottles, and cans but with less biogenic materials (68%) due to their high consumption of manufactured and packaged products.

The average waste generation rate at household level may also be attributed to high litter habits observed along the streets of Owerri. Observation shows that Owerri Municipal district that houses the Central Business District, with different commercial activities, warehouses and eateries, experience high level of street littering (Tetlow Road, Douglas Road, Wetheral Road, Rotibi, etc). As observed by Nkwocha and Okeoma (2009) 5 out of 10 objects littered in the town were ―food related‖, while 8 out of 10 objects were ―trade related‖.

While the former are made up of banana peels, maize husks, orange peels, fruits, the latter are made up of polythene bags, sachet water waste, food packaging materials, etc. The fact that household members litter these waste and do not take some of their purchases home tend to affect the per capita waste generation rate at household level in all the districts of the town. It may also interest to know that some households remove some of the items generated and keep them for future use. For example, it was observed that items such as old newspapers, and beer bottles were not usually included in the quantity of waste generated per day by many households in Ikenegbu and World Bank Estates. Such items are sorted out either for sale or mere accumulation. This estimate also excludes the quantity of waste generated from commercial activities, markets, litters and fly-tipping in the area. It is estimated that these wastes make up 22% of all wastes generated in the town.

The characteristics of waste generated are typical of those obtained in most Nigerian towns, although the percentage of biodegradables (74%) is slightly higher than the national average of 65%. Other components of the waste generated are similar to those obtained from other studies, even though the percentage of paper (11.3%) was also slightly higher than the national average of 8% (Bello *et al*, 2016).

As regards waste disposal, open dumping remains the most practiced method, as about 72.6% of all waste generated in the town are disposed at the two approved waste dumpsites at Avu and Obinze at the outskirts of the town. These two dumpsites are located in burrow pits, surrounded by farmlands and at a distance of 8km and 10km from the town respectively.

Operational for the past 14years, these dumpsites receive commingled wastes such as biogenics, plastics, papers, bottles, sanitation waste and sometimes biomedical and miscellaneous objects. These objects are openly dumped on the site without any cover materials, as leachate seeps ceaselessly into the soil.

The waste dumps produce highly offensive odour and form breeding grounds to different disease vectors (rats, flies, birds, etc). Sometimes, the waste dumps are deliberately put on fire, especially during dry season to reduce the volume of waste.

Open burning is also practiced by households during dry and harmattan seasons, while others dump their waste at the bank of Otamiri and Nworie Rivers that flow across the town. Some households at World Bank and Ikenegbu Estates spread some of the biodegradable components in their gardens where they grow some vegetables (pumpkin, pepper, vegetables and fruits).

However, as waste treatment technologies are evolving worldwide to meet the increasing stringent requirements, land filling is becoming less viable and environmentally unfriendly. Therefore, the current crude practice of *collect and dump* adopted in Owerri over the years should be replaced with the modern ―Enhanced Waste Management Concept‖, which emphasizes prevention, reuse and recycling and considers landfills as a temporary storage facility awaiting further treatment instead of as a final solution. The waste in these secure landfills can be minded after a fixed period. As a greater percentage of waste generated in the town are biodegradables, the adoption of in-vessel composting (IVC) technology should be seriously considered as land in Owerri is becoming scarce and at a premium. Precisely, the Vertical Composting Unit (VCU), one of the most successful variants of the IVC is highly recommended. The system, which is modular and allows for addition of extra chambers, is capable of processing all organic wastes in a safe and cost-effective manner without emitting malodour or leachate, in such a way that efficiencies of time, space, energy and labour are all achieved. Besides, the compost produced can be readily sold to farmers in the surrounding communities to replace the highly demanded chemical fertilisers for cultivation of crops.

Other waste materials such as bottles, papers, plastics, etc, could also be sorted out and sold to the growing number of scavengers, who, through their well established networks buy and sell these materials to local industries. With the adoption of this modern concept, waste in Owerri can no longer be seen as useless and valueless material that should be collected and dumped in a burrow pit, but as a resource that is useful to the society.

VIII. CONCLUSION

This study has tried to determine the quantity, characteristics and methods of disposal of waste generated by households in Owerri Municipality. The study found out that the average waste generation rate per capita per day was 0.58kg; giving the total estimate of waste generated per day as 319.67tons. Biogenic materials make up 71% of all waste generated while the quantity of plastics, and papers are relatively on the increase when compared with results from other Nigerian towns. Open dumping of waste is the main waste disposal method, which is not only a source of environmental pollution but has become less adaptable in a town where land is becoming scarce due to population increase and high demand for physical development. As the major component of waste generated are biogenics, it is recommended that the reactor system of composting (Vertical Composting Unit) should be adopted in the treatment of these wastes because of its flexibility, adaptability, modularity, cost effectiveness and eco-friendliness. Farmers in rural communities around Owerri would greatly benefit from the cheap compost that may be produced from this system in the production of food crops in the area. The adoption of the modern concept in waste management will help, not only to improve the level of cleanliness in the town but will also help to optimize it potentials as a major tourist centre in the southeast region of the country.

IX. RECOMMENDATIONS

Some of the suggestions to eradicate the problem of domestic waste faced by the people**:**

- Cleanliness should be developed as a part of culture.
- There should be a change in the mindset of the people and they should avoid luxurious life style which creates more waste.
- People’s participation in the implementation of Laws and Rules should be increased by making them aware about their right and duties through legal literacy camps.
- There should be separate waste disposal policy through the Central Government and should separately allocate budget and work with the help of effective institutional arrangements at local level.
- ‘Environment’ this entry should be placed in concurrent list.
- Government should revise its policies and enact new legislation pertaining to proper disposal of Domestic Waste and providing stricter compliance provisions.

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