



Assessment of nature and types of solid wastes Generated in Nassarawa Local Government Area, Kano

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ABSTRACT

Solid waste disposal is a problem of both developed and developing countries of the world. Every person is a potential producer of waste and also a contributor of such serious environmental hazards and the way and manner such generated solid waste is handled or disposed of is surely a different phenomenon. The aim of this work was to achieve a sustainable solid waste management system in Nassarawa Local Government Area of Kano State, Northern Nigeria. It assessed the type of solid waste generated in the area and suggests possible measures to tackle the problem. This study used two main sources to capture the information needed namely: primary and secondary sources. 296 questionnaires were distributed to a target population of 587,712 and among which only 282 questionnaires were retrieved back for analyses, eleven wards were randomly selected. One copy of the questionnaire was forward to

Kano ministry of environment. The sampling techniques used were Convenience, Random, Probability and Purposive sampling procedures. The characteristics of the municipal solid waste were determined in terms of the components, average mass (kg) and percentage generated per district. The AEPB is faced with constraints like lack of institutional framework, inadequate budgetary provision, inadequate bylaws and regulations and insufficient information on the quantity and composition of the solid waste. It is suggested that adequate financial provision, proper waste legislation, training and re-training of staffs and community full participation in waste management should be encourage while formal composting and recycling facilities should be setup.

The finding of this research revealed that the implication of waste on environment and health depend on the nature of the waste dispose. Therefore, medical and industrial waste especially waste from industries dealing with harmful chemicals in their production are highly dangerous to both environment and health of people around the areas where these hazardous waste are dispose. While domestic waste have less implication on both environment and health compare to that of the later. The dominant wastes generated in Nassarawa local government are domestic wastes. The research recommended hazardous waste should be treated with extra care in order to minimize its effects on environment and health for sustainable solid waste management.

Key words: solid waste types and component solid waste disposed in Nassarawa L.G.A.

I. Introduction

One of the major problems facing growing cities in developing world is that of coping with the wastes generated. Waste is every one's business. We all produce unwanted by products and residues in nearly everything we do, but the type of waste generated differs. The environmental problem of waste disposal is both simpler and complicated and also depends on the type of waste

generated. Waste disposal has environmental and health effects, on the other hand the level of the effect differs with regard to the types of waste dispose. Cities are very much worried with the increasing challenge of solid wastes in particular and this worry is seemingly not being settled, an estimated 20kg of solid waste for instance is been generated per capita per annum in Nigeria. This is equivalent to 2.2 million tons a year (A. B. Nabegu 2010). Therefore, as population continues to increases and urban areas continue to expand, and solid waste generated in the country are expect to increases over the years. The cities are center where industrial productions are concentrated. They are also centers of high consumptions and consequently waste generation. One of the visible problems facing most cities in Nigeria is disposing huge quantities of solid waste are accumulated in urban areas because of urbanization (A. B. Nabegu 2010).

Since the beginning, human kind has been generating waste, be it bones and other parts of animals they slaughter for their food or the wood they cut to make their fire. With the progress of civilization, Jatau (2013) noted that the waste generated became complex in nature. At the end of the 19th century the industrial revolution saw the rise of the world of consumers (Dhayagode et al., 2011).

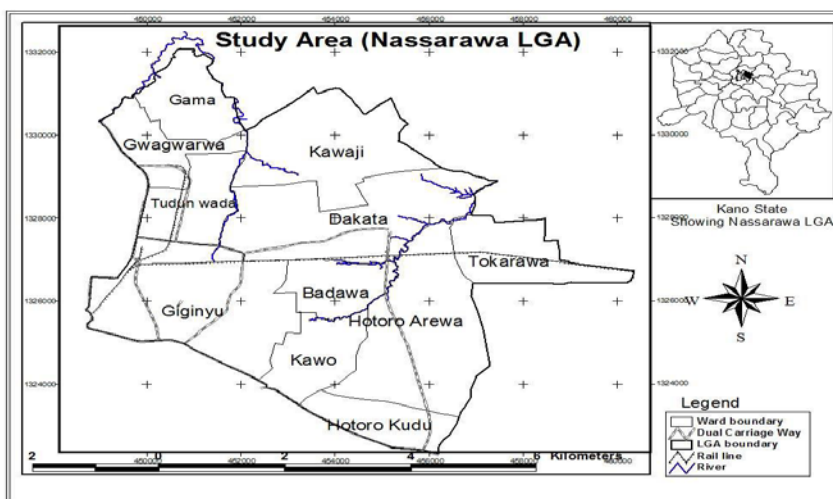


Source Foday 2013

II. Study Area

The study area lies between latitude 11.960 to 12.040 North and longitude 8.530 to 8.610 east. The area bounded to the North by Ungogo L.G.A, to the South by Tarauni L.G.A, to the West by Fagge L.G.A and to the East by Gezawa and Dawakin Kudu L.G.As. According to 2006 census population record Nassarawa Local Government has a population of 596,669.

The spatial scope of the study is restricted to Nassarawa local government area of Kano state, Nigeria. Nassarawa area is selected because it is a growing area just like other areas in developing cities and as such is facing a bigger problem of managing its solid waste effectively. Contextually, the study is focused on assessing different types of solid waste generated in Nassarawa L.G.A., about 50% of solid waste generated in the area comes from domestic sources. However, the scope of the study is very wide and it covered the territory of the whole Nassarawa L.G.A., the area has eleven (11) wards namely: Dakata, Gwagwarwa, Kawaji, Tudun wada, Gama, Tokarawa, Giginyu, Kawu, Badawa, Hotoro North and Hotoro South wards.



Source: Ministry of Land and Physical planning Kano (2013)

III. Solid Waste

The word solid waste has been defined in a different way by varieties of authors. Solid waste is a generic term used to describe the things we throw away. It includes things we commonly describe as garbage, refuse and trash. The U.S Environmental protection Agency (EPA) regulatory definition is broader in scope, it includes any discarded item, things described for reuse, recycle, or reclamation, sludge's and hazardous wastes. The regulatory definition specifically, excludes radioactive wastes and in situ mining waste (Mackenzie et al., n. d). Solid waste are those waste materials which occur from human and animal activities and which are not easily carried away with water or air i.e. these are solid or semi-solid in nature (Rani et al., 2012). Solid wastes could be described as non-liquid and non-gaseous products of human activities, considered as being useless. It could take the forms of refuse, garbage and sludge (cited by Babayemi, 2009).

IV. Solid Waste Generation

According to Momoh and Oladebeye (2010) waste generation are those activities in which material identified as no longer of value are either throw away or gathered together for disposal. Waste generation encompasses activities in which materials are identified as no longer being of value and are either throw or gathered together for disposal (Jibril et al., 2012). Municipal solid waste is also generated by human and animal activities that are discarded as useless or unwanted waste (Khajuria et al., 2010). However, illiteracy and lack of public awareness contribute towards the generation of municipal solid waste.

According to Lilliana et al., (2012) and Otoniel (2001) researched out that the quantity of solid waste generation is dynamic and heterogeneous and is mostly determined by socioeconomic status of a society. Feniel and Marc, (2009) searched out that rapid urbanization and change in

consumption of many cities in developing countries has led to increase in waste generation and this has confirmed by Khajuria et al., (2010) that the generation of municipal solid waste in developing Asian countries increases with the rapid urbanization and accelerated economic development with rapidly growing advanced technological societies. Jibril et al., (2012) wrote that waste generation rate ranged from 0.66kg/cap/day in urban area to 0.44kg/cap/day in developed countries, and this is highly influenced by the population income. In Nigeria 25 million tons of municipal solid waste are generated annually (Jibril et al., 2012).

Nigerian cities generate solid waste at an alarming rate such that in most cases, the volume of waste generated is often more than the city system could absorb or handle. In fact the volume of solid waste, tend to grow with increasing population and consumption in Nigeria (Sunday, 2010).

Nigeria as 2005 generates 0.58kg solid waste per person per day (Babayemi and Dauda 2009). Sunday, (2010) wrote that the volume of solid waste generated in some Nigeria cities from 1980 to 2010 is an indication that the volume of solid waste generation has increase over the years, for instance solid waste in Lagos city range from 625,399kg in 1980 to 1,570,215kg in 2010, Ibadan range from 350,825kg in 1980 to 998,894kg in 2010, Kano range from 319,935kg in 1980 to 823,563kg in 2010, Kaduna 257,639kg in 1980 to 767,568kg in 2010, Warri in 1980 range from 67,477kg to 401,654kg in 2010, Jos in 1980 range from 99,871kg to 416,750kg in 2010, Oyo 12,508 in 1980 to 43,126 in 2010 etc. (Source: federal ministry of Housing and Environment, the state of environment in 29 states.

Nigeria, Monograph series, No2 Lagos, Sunday, (2010) and Tobore, (2012) observed that, the rate of waste generation in Lagos (with estimated population over 10 million in 2012) the rate is 9,000 tons/day (Lagos state Waste Management Authority, LAWMA), In Kano state (with

estimated population over 9.5 million in 2012), the rate is 3,849 tons /day (Bayero university, Kano consultancy unit).

V. Type of solid waste base on source

Depending on their source the solid waste may of different type such as (I.F. Gaya et-al 2018)

- Residential waste
- Industrial
- Institutional
- Construction and demolition
- Municipal services

There are four types of solid waste such as;

1. Industrial waste: These are types of waste generated from industries result from processing and manufacturing, these wastes includes chemical waste and packages waste, industrial waste other than mining and minerals production.
2. Demolition waste is waste debris from destruction of building, roads, bridges or other structures. Debris differs in composition, but the main components, by weight, in the US include concrete, wood products, asphalt shingles, brick and clay tile, steel, and drywall. There is the potential to recycle many elements of demolition waste.
3. Institutional waste is waste produced from institutions such as schools, hospitals, or prisons. These include waste not typically found in households but also hazardous wastes in some circumstances
4. Municipal waste is a pool of various solid wastes by towns and cities from different types of household's activities.

VI. Characterisation of wastes

Solid waste are characterize on basis of the following parameters; (I.F. Gaya et-al 2018)

1. by their sources
2. by the type of waste produced
3. by generation rate and consumption

VII. Features of solid waste

1. Corrosive waste; these are waste that include acid or bases that has the ability of corroding metal containers e.g. tank
2. Ignitable waste; these are wastes that can create fire under certain situation. Example oil waste and solvent
3. Reactive waste; these waste are unstable in nature, they cause explosions, e.g. toxic fumes when heated
4. Toxic waste; these are wastes which are harmful when ingested or absorb (I.F. Gaya et-al 2018).

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Table 1: Typical Waste Generation Facilities, Activities and Location Associated with Various Source of Solid Waste

| Sources type | Typical location | Types of solid waste |
|--------------|------------------|----------------------|
|--------------|------------------|----------------------|

| | | |
|------------------------------|---|--|
| Sources | Single family and multiple family dwellings, low medium and high rise apartment | Food waste, rubbish, ashes, special wastes |
| Commercial/Municipal | Stores, restaurants, markets, office buildings, hotels, print shops, auto repair shops, medical facilities and institution. | Food wastes, rubbish, ashes, demolition and construction wastes, special wastes, occasionally hazardous wastes |
| Industrial | Construction, fabrication, light and heavy, manufacturing, refineries, chemical plants, lumbering, mining, demolition | Food wastes, rubbish, ashes, demolition and construction wastes, occasionally hazardous wastes. |
| Open area | Street alleys, parks, vacant plots, playgrounds, beach, highway, and recreational area. | Special wastes, rubbish. |
| Treatment plant sites | Water, wastes water, and industrial treatment processes. | Treatment plant waste principally composed of residual sludge. |
| Agriculture | Field and row crops, orchards, vineyard, feedlots and farms. | Spoiled food wastes, agricultural wastes, rubbish, hazardous wastes |

It is the world's poor regions that are mostly affected by inadequate supply of good water quality (Agarwal and Narain 1999; Karn and Harada 2001). For instance, although Nepal is rich in water resources, its people are not getting enough water to meet their needs nor is the available water potable. The State of Environment (SoE) Report of Nepal (2001) identified water pollution as the most serious public health issue in Nepal, with most of the pollution load from human activities, especially domestic sewage, as already reported by Devokta and Neupane (1994). Inadequate management of water resources may lead to an increase in their degradation.

VIII. Components of Solid Waste

Solid waste consists of many different materials. Some can burn some cannot, some can be recycle, some cannot. Therefore, a detailed understanding of the composition of solid waste will indicate the management method that will be used. Solid waste composed of combustible and non-compostable materials. The combustible include paper rags, cartons, boxes, wood, furniture, tree branches and so on and may be store for long periods of time.

Non-combustible is materials that cannot be burned at ordinary incineration temperature of 700 to 1,100oc.It is the inorganic portion of refuse, such as tin cans, heavy metals, glass, ashes and so on (Mackenzie et al., n. d). Having understood the concepts, sources, types and components of solid waste, this led the discussion on solid waste management in the next section.

Nabegu (2008) researched out that per capita generation of MSW in Kano metropolis indicates a range from 0.75 in the suburban area, 1.2 in the city to 1.7kg/day in the G.R.A, the variation is due to the differences in the economic and income status of the different residential zone (Nabegu, 2008).

Knowledge on types and the components of SW generated will inform management to use the suitable technique to effectively deal with the various components in SW. Technique includes: Source separation, recycling, and composting can be used depending on the component of waste in the waste stream.

Table 2: Types of solid waste Generated in Nassarawa L.GA

| Type of waste | Frequency | Percentage (%) |
|---------------|-----------|----------------|
|---------------|-----------|----------------|

| | | |
|----------------------|-----|-------|
| Plastic waste | 113 | 40% |
| Food waste | 59 | 20.9% |
| Ash waste | 58 | 20.6% |
| Paper waste | 17 | 6% |
| Wood waste | 14 | 5% |
| Glass waste | 9 | 3.2% |

According to REMASAB, the commonest types of waste generated in the area were Plastics, Food and it was observed from the analyses of the sample that seven different types of waste were discovered. These are: Food scrap, Plastics, Metal, Paper, Ashe, Wood and Glass.

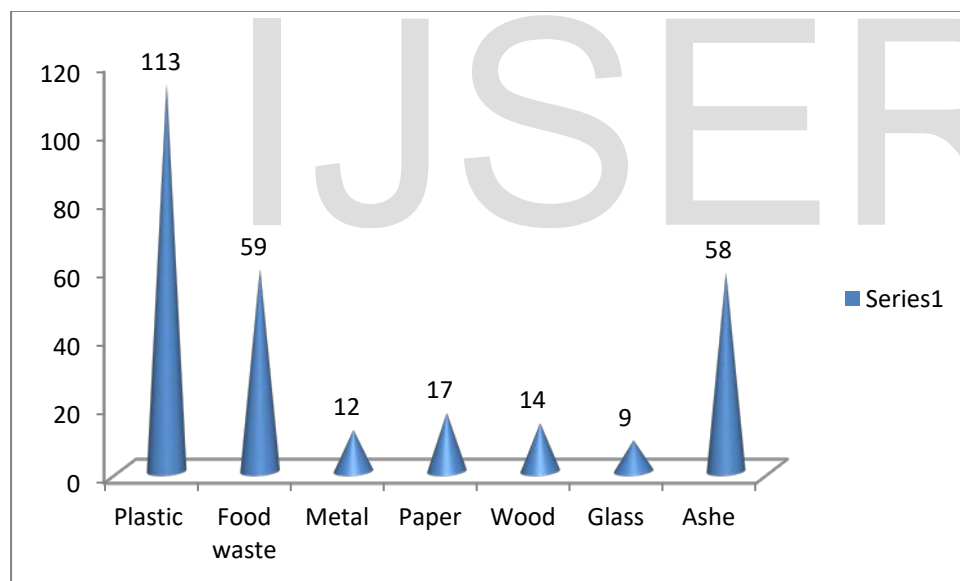


Figure 5.4: Major Components of Waste Generated

Chart above shows that Plastics waste accounted the highest percentage of about 40% (113) of all the waste generated in the area under survey, follows by Food waste 20.9 percent (59) and Ash which constituted 20.6% (58) and the least component of waste was Paper 6 % (17), Wood

5% (14) and Glass 3.2% (9) respectively. More so, the next segment explained on how the residents disposed of their solid waste generated.

The Kano State Refuse and Management Sanitation Board (REMASAB, 2013) listed the following solid wastes problems:

- a. Large quantities of undesignated refuse dumps have been created especially on our central roads, making the area awkward and create an eyesore.
- b. Our drainages, gutters and other water passage were turn to be refused collection centers thus causing flood during the rainy season and a vectors breeding places sometimes lead to unpleasant odor due to stagnant of the water.
- c. Lack of waste recycling factory in the state is also another factor contributing inappropriate managing and disposal of waste.
- d. Some of these refuse centers were also turned to be a public toilets or carcass disposing area thus polluting the environment.
- e. Incomplete and abandoned structures and vehicles are also other key areas of problems encounters for effective solid waste management and thus threatening the life and environment of the general public.

Conclusion

The research was conducted to assess the types and components of solid waste generated in the Nassarawa L.G.A. The residents mostly dispose food waste, plastics and ash as their waste. Out of the total solid waste generated at Nassarawa L.G.A. the result of this research revealed plastic waste account for the highest solid waste generated with 40% (113) follows by food waste 20.9% (59) and Ash which constituted 20.6% (58), Paper 6 % (17), Wood 5% (14) and the least is Glass with 3.2% (9). Type of solid waste generated in a particular place is one of the factor determine their effects on health and environment. For example domestic waste such food waste, plastic

waste and ash are less harmful to environment and health, compare to industrial and clinical waste which are more harmful to health and environment.

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