

PROBLEMS OF SOLID WASTE MANAGEMENT IN NIGERIA (CASE STUDY OF JALINGO METROPOLIS, TARABA STATE)

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Abstract: The study aimed to evaluate the problems of solid waste management in Nigeria particularly in Jalingo Metropolis. This descriptive study used a survey questionnaire supported by interviews. 32 respondents were randomly selected. The Data collected were processed and treated using percentage, mean, Analysis of variance and frequency count. The population for this study is employees of Taraba State Ministry of Environment and Urban Development. The population figure for the study was 32 respondents, comprising of Taraba State Ministry of Environment and Urban Development staff from various departments Since the population for the study was not large, and data could be collected from all the respondents, the researcher adopted the convenient sampling technique to successfully complete the study. All 32 respondents were used for this study. From the study, several problems are experienced in solid waste management in Jalingo Metropolis that include: Inadequate service coverage (some people not given service), Lack of legislation, to enforce measures and capability, difficulty to locate and acquire landfill site data for this study was collected from the respondents through the use of questionnaires. Other information was collected from text books, journals and other secondary sources of data. Findings from the study revealed that wastes are not properly managed in some dumping Site within Jalingo Metropolis, Taraba State, poor solid waste management leads to flooding, poor solid waste management which makes the environment unhealthy, strategies have been put in place for proper solid waste management in some dumping Site within Jalingo Metropolis, Taraba State.

Keywords: Waste Management, Jalingo Metropolis.

I. INTRODUCTION

Solid waste comprises all the wastes arising from human and animal activities that are normally solid, discarded as useless or unwanted. The cities of third world countries are growing at very rapid rates compared to those in the developed nations. For instance, a UN-Habitat report observed that Africa is the fastest urbanizing continent having cities like Cairo, Lagos, Nairobi, Kinshasa among others growing at fast rates that would make them triple their current sizes by the year 2050 (UN-Habitat, 2010). Such high rate of growth of cities has implications for the provision of urban infrastructural services to prevent the proliferation of urban slum. The increasing growth of cities, therefore, has implications for municipal waste management among other social services required in the urban communities. Data from many of the cities shows inadequacy in urban social services like shelter, provision of safe drinking water and efficient management of solid wastes. The cities are therefore littered with 'mountains' of rubbish in landfills and open (in most cases illegal) waste dumps which are covered with flies and thus serve as breeding grounds for rodents and mosquitoes which are carriers of diseases.

Nigeria's major urban centres are today fighting to clear mounting heaps of solid waste from their environments. These strategic centre of beauty, peace and security are being overtaken by the messy nature of over flowing dumps unattended heaps of solid wastes emanating from household or domestic or kitchen sources, markets, shopping and business centres.

City officials appear unable to combat unlawful and haphazard dumping of hazardous commercial and industrial wastes which are a clear violation of the clean Air and Health Edicts in our environmental sanitation laws, rules and regulation.

A United Nations Report (August 2004) noted with regret that while developing countries are improving access to clean drinking water they are falling behind on sanitation goals. At one of its summit in 2000 (Uwaegbelun 2004) revealed that The World Health Organization-(WHO 2004) and United Nations International Children Education Fund- (UNICEF 2004) joint report in August 2004 that: "about 2.4 billion people will likely face the risk of needless disease and death by the target of 2016 because of bad sanitation". The report also noted that bad sanitation – decaying or non-existent sewage system and toilets- fuels the spread of diseases like cholera and basic illness like diarrhea, which kills a child every 21 seconds.

Cities are the engines of economic growth, but the environmental implications of such growth need to be assessed and managed better. The critical and most immediate problems facing developing countries and their cities are the health impact of urban pollution that are derived from inadequate water services, poor urban and industrial waste management, as well as air pollution, especially from particulates which constitutes part of solid waste.

Among the pressing environmental and public health issues in Nigeria today is the problem of solid waste generation and disposal. The problem of solid waste management is a historical one because man's existence is inextricably linked to the generation of waste. The problem is becoming intractable as many cities in developing countries cannot keep pace with urbanization, pollution, and the increasingly concomitant generation of garbage due to changing life styles and consumption patterns.

It is expected that government would in due course arrive at the means to combat solid wastes and reduce their negative impact on area residents and the perception of our cities as being dirty, chaotic, and full of traces of rotting or fermenting garbage that emit odours harmful to the human body. Obviously, the timely removal of accumulated solid wastes requires much more than our governments at all levels are presently engaged in. Further plans, policies and programs would need to be put on a more permanent basis in order to combat the dastardly effects of environmental degradation. Understandably, it would require effective mobilization of resources such as involving all stakeholders in regular counter measure to suppress uncontrolled solid wastes generation and irregular disposal outside city confines altogether.

surrounding bushes indicate a clear pattern of non-enforcement or non-implementation of existing environmental sanitation laws.

Irregular and unplanned dumping of solid wastes, especially at night, which are often in gross violation of relevant rules and regulations continue to hinder plan preparations and effective land use delineation which were expected to usher in a beautiful, clean and orderly environment. Consequently, there remains a huge gap between policy formulation, execution and implementation which exacerbate the problem of solid waste management in Nigerian cities which necessitate the need to evaluate the problems of solid waste management in Nigeria by the researcher.

The deterioration of the Nigerian urban environment in terms of irresponsible dumping and accumulated solid waste is most apparent in our growing cities today. The dehumanizing effects of these circumstances in our urban lives and blighted environment have often been cited and noted as contributing causes of the Nigerian urban decay, (Asuquo, 1979).

As population increases, as more people move to this few primate cities in search of better life, the generation and disposal of waste becomes a major public issue effecting both health and the aesthetic value of urban centre Oldnira (1995), argued that one of the major environmental health problems facing Nigerian especially in the major cities is poor waste management. Edu (2003) stated that waste is the greatest physical problem that persistently poses a grave challenge to man on earth. The indiscriminate dumping of waste along streets, market places, residential axis in Port-Harcourt constitutes nuisance which causes serious health hazard, as dumping leads to percolation to pollute ground water supplies, breeding ground for such annoying and disease bearing organisms, such as rats, cockroaches, flies, etc.

Uchegbu (1998), in his words said man unguided development and ineffective solid waste management in urban centres of Nigeria has resulted to urban degradation and outbreak of diseases like cholera, malaria, typhoid, bronchial disorders, etc.

The problem with waste disposal is multi-facet in nature, as most of our cities have been overtaken by mountainous heaps of refuse on roadway, streets, and drainages. This phenomenon can be traced to several factors that includes poor institution framework for waste management by the government, inherent rural attitude of most urban dwellers, poor state

of public infrastructure and high urban poverty among others, (Okpechi 2007). Waste are indiscriminately dumped on the streets, drain ages, backyards. This becomes a major problem as the aesthetic nature of the place is reduced. Waste obstructs traffic and even lead to accident especially at night when visibility is poor. Indiscriminate dumping of waste along mile one (1) axis of Diobu, leads to flooding during the raining season, as well as property loss. Inadequate funding is another important factor militating or acting as a major problem of waste disposal. The cost of labour, purchase and maintenances of vehicles involved in the collection and disposal of waste has risen so high that many sanitation agencies are already finding it difficult to collect and properly dispose all the collected wastes, (Agunwanba, 2003). It was in this context that Uchegbu (1988), argued that the problem of waste disposal in our cities has gone beyond individuals and communal effect, and therefore charges the government to be more committed in making our cities safe and habitable for all.

Mabogunje (1974), pointed out that solid waste problem in emerging urban centres in Nigeria is a consequence of drastic change occurring from rural habits, norms and values of the people to those of urban civilization. As most people residing in the cities still patronize their bad habit of backyard dumping. He later argued that they are related to lack of public awareness and enlightenments.

II. WASTE MANAGEMENT METHODS

Waste management is a comprehensive, integrated and rational system approach towards the achievement and maintenance of acceptable environment quality. Fred (2004), Modern method of waste dispose has emerged in response to the recognition of environmental impact of uncontrolled waste disposal. Ekpoh (2009), as simple dumping and burning of waste is no longer fashionable because of the environment and health concern.

The untraceable nature of waste disposal in most of the Nigerian cities required the knowledge of expertise on urban planning and environmental engineers, who are charged with the mortal responsibilities of assigning different land use to appropriate measures capable of reducing the volume of waste before transportation to the incinerator or landfill site. Agunwamba (2003), basically there are various methods of waste management, these include incineration, sanitary land fill, recycling, open dump, etc.

Incineration is a process where combustible wastes are burned at temperature high enough (900-1000^oc or 2650-1830^of) to consume all combustible materials, leaving only ash and non-combustibles to be disposed off in a land fill. Under ideal condition, incineration may reduce the volume of waste by 75% to 95%, modern incineration method has electrostatic precipitators, dual scrubbers and filter to reduce the volume of waste to at least 99% of most organic materials (Anger and least smith 1998).

Burning waste causes irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary disease, acute/ chronic respiratory disease. The healthy people experience shortness of breath, sore throats, and breathing difficulties, dizziness, headaches, etc. It is responsible for fluids collection in the lungs and fibrotic changes, growth effects DNA, immune and reproductive system. Land fill process is designed to concentrate and contain refuse without creating a nuisance or hazard to public health or safety, (Daniel and Keller 1995). The idea is to confine the waste, reduce it to the smallest volume and cover with compacted soil to prevent insects, rodents, seagulls, and avoid ground water percolation.

The open dumping method is the most common and widely used in development countries. It involves dumping of the waste in a designated sport which is uncovered. Ekpoh (2003), open dumps are unsanitary, unsightly and generally smelly, with foul odour as they attract rats, insects, flies, snakes, etc. Composting is a biochemical process in which organic materials such as lawn clipping and Kitchen scraps decompose to a rich solid like material. It is a process of rapid, partial decomposition of moist solid organic waste by aerobic organisms. This is a popular technique in Europe and Asia, where intensive farming centre's a demand for the compost. It involves the use of natural microbial organism to decompose the organic fraction of waste. Composting is aerobic and produces primarily carbon dioxide, while anaerobic processes produce methane. Such gas contributes to global warming.

Recycling is the reprocessing of discarded material into new, useful product; the ultimate objective is to reduce the amount of waste that must be disposed in landfill or incinerator. It is a way of refilling or re-using of old material that may be considered useless, that has no further use by the consumers, for example, old aluminum cans and glasses bottles are usually melted and recast into new cans and bottles.

infecting organisms (Odiere 1993).

III. METHOD USED

This study used a survey questionnaire supported by interviews. 32 respondents were randomly selected. The Data collected were processed and treated using percentage, mean, Analysis of variance and frequency count. The population for this study is employees of Taraba State Ministry of Environment and Urban Development (ME & UD). The population figure for the study was 32 respondents, comprising of Taraba State Ministry of Environment and Urban Development staff from various departments such as operations, finance, administration. Since the population for the study was not large, and data could be collected from all the respondents, the researcher adopted the census sampling technique to successfully complete the study. All 32 respondents were used for this study.

The researcher used the convenience sampling which is the non-probability sampling technique because the researcher selected the easiest population members from which to obtain information (Dawson, 2002), Hence during the process the researcher had chosen Staff of Taraba State Ministry of Environment and Urban Development.

The questionnaire comprises of respondents' profile in terms of age, sex, marital status, educational background, knowledge about solid waste management., knowledge about risk factors associated with improper waste management.

IV. RESULTS AND DISCUSSIONS

Solid waste collection and Storage in Jalingo Metropolis:

The solid waste is collected from different sources/establishment by various methods in Jalingo Metropolis. This includes primary collection (from household to collection points) or secondary collection (collection from the household level, collection centres and open spaces and roadside i.e. illegal mini dumps) and is to its final disposal. ME & UD is solely responsible for secondary

There are approximately 2,653 dust bins placed in Jalingo Metropolis as source of primary collection, these are cylindrical, semi-cylindrical and rectangular bins with 2-10 m³ capacity placed in Ministries, Agencies, Hospitals, Schools, Parastatals etc. The collection of waste from the dust bins is planned in accordance with the frequency of container becoming full as of the time of this study. The present location of the dust bins and the waste collection point have been classified into daily collection, weekly once collection, weekly twice collection as design by Ministry of Environment and Urban Development

In addition, there are 23 dumper placer containers (Rollon, Roll-off) used as primary collection containers in commercial areas and bulk generator. All the dust bins (metal bin, plastic bin, plastic bags, oil drum etc.) are frequently used as individual containers for storage while Roll-on, Roll-off are frequently used as communal containers for storage with the collection frequency to be thrice weekly corresponding to 35.1% of total waste generated (Table 3). In Jalingo metropolis, door-to-door waste collection as in high-income areas is partially practiced, communal collection is also partly practiced and in this regard, households dispose waste in enclosures located along roadsides. At these points, considerable time is spent for waste collection since waste has to be raked and shovelled in to the truck. In low-income areas, where most settlements are not planed, the main collection system used is communal collection.

Here handcarts (wheel barrows) are used to dispose the waste either at the primary collection points or at the municipal collection points.

Table 1: Waste Collection and Disposal by Ministry of Environment and Urban Development

Waste Collection Agent	Waste Collected (tons/day)	Percent of Total Waste Collected
Agencies Involved: Ministry of Environment and Urban Development	35.10	65.00
Private Contractors	-	-
Collection through Recycling (Scavengers)	2.70	5.00
Total	37.80	70.00

Source: Field Experiment by Author, November, 2017

Data for this study was collected from the respondents through the use of questionnaires. Questionnaires were shared to all 32 respondents of the organization, and field surveys through responses to questions in the questionnaire served as the main source of primary data for this study. This research was compiled based on both theoretical and empirical research

with in depth insights on problems and challenges facing solid waste and pollution management The solid waste from the different segment of society was collected, mixed and one kilogram (1 kg) sample was prepared by using quartering method. Secondary source of data includes municipality information, direct observation, photography of selected sites and personal interview were embarked upon. Questionnaire was administered to determine how each of the ministries and agencies in Solid Waste and Pollution Management (SWPM) participate or cooper-ate in solid waste collection services, disposal methods and how their waste was generated.

Traditionally, the government was the sole provider of almost all basic services such as water supply, electricity, roads, and health's services with solid waste management inclusive etc. The adoption of such a conventional approach led to inadequate infrastructure services delivery (Kyessi, 2009). Despite several intervention measures put in place since the early 2000(s), such as partnership with private contractors, and civil societies organizations, yet several problems are experienced in solid waste management in Jalingo Metropolis that include:

- Inadequate service coverage (some people not given service)
- Lack of authority to make financial and administrative decision
- Lack of financial resources.
- Lack of vehicles and equipments/existing once frequently breaks down
- Lack of capability to maintain/repair vehicles/equipments
- Lack of legislation, to enforce measures and capability.
- Rapid urbanization outstripping service capacity
- Uncontrolled proliferation of squatter settlements
- Difficulty to locate and acquire landfill site
- Poor public cooperation
- Lack of qualified private contractors
- Control of contractual service being difficult

Unfortunately, at the site, scavengers collect valuable components of MSW informally. In addition, various animals such as dogs, goats, sheep and cows consume organic components of the waste. Such inadequate disposal methods and practices lead to problems that impair human and animals' health (Figure 2 and 3). Environmental problems resulting from MSW include: No action to control insects, rodents and other vectors, no consideration for leachate control, unfavorable odour at sites, air pollution due to burning of waste etc

There are a few formal systems of material recovering in Taraba. However, there is a wide reuse of plastics, bottles, papers, cardboard, cans for domestic purposes. This practice is highly common among the poor in the city. The greatest problem is the lack of local or national markets for the recyclables (Yhdego, 1995). The waste in developing countries contains so much moisture that combustion can only be enacted and maintained on the addition of fuel. This leads to a low calorific value and combustible components of solid waste in Nigeria, thereby

making incineration uneconomical in conjunction with high cost of construction and maintenance (Ogwueleka et al, 2009). Hence, suggests that composting could be a very viable recovery alternative which is practically applicable in Jalingo Metropolis.

Most of the rural areas in Taraba State use food from households to feed animals where the waste are home composted and used to condition the soil. Composted material could be used as fertilizer. As it was recorded, composting programme is not well practice in Nigeria with Jalingo inclusive, but rather back yard composting was practiced. Composting is the decomposition of organic materials under controlled condition of temperature, humidity and pH under aerobic biological process. To encourage its practice, Non-Governmental Organization (NGOs) internationally based tried to sponsor small scale composting in Nigeria but the practice has not or less significant impact in Nigeria. Hence, windrow composting been least expensive and most appropriate for the socio-economic and climatic conditions of developing countries with Jalingo inclusive is recommended for waste reduction and recovery (UNEP-IETC, 1996).

18 respondents which represent 56.2 percent of the population strongly agreed that Wastes are not properly managed in Jalingo, Taraba state. 10 respondents which represent 31.2 percent of the population agreed that Wastes are properly managed in Jalingo, Taraba State. 2 respondents which represent 6.2 percent of the population were undecided while the remaining 2 respondents which represent 6.2 percent of the population disagreed that Wastes are not properly managed in Jalingo, Taraba state.

The challenges faced by the waste sector/department of the state can therefore be summarized as:

- ❖ Altering consumption patterns to reduce waste generation
- ❖ Changing behaviour to encourage waste separation at sources
- ❖ Integrating waste recycling systems into the existing and future waste management systems
- ❖ Breaking the link between economic development and environmental impacts of waste
- ❖ Finding alternative waste treatment technologies to reduce the need for disposal at landfills. The solid waste quantities generated have been increasing due to a rise in the population rate, especially during the last 15 years. It has increased from 28 tons/day in 1998 to 54 tons/day in 2011.

Disposal System:

In Nigeria, like most developing countries, wastes are commonly dumped in open dumps, uncontrolled landfills where a waste collection service is organized. Dumps are located along or beside major roads (Ogwueleka et al, 2009). In Jalingo, Taraba State, there are two (2) dumpsites which are 3 km away from the city along Wukari/Jalingo road (WK/JLB/pit) and Jalingo/Yola Road (JL/YLAB/pit) with disposal starting in 1991 and at present, they are used up or filled. Open dumping of waste cannot be considered as a long-term environmental method of disposal. The dangers of open dumping are many health hazards to scavengers at the dump sites, pollution of ground water, spread of infectious diseases, highly toxic smoke from continuously smoldering fires and foul odours from decomposing refuse. In addition, refuse spreads into the road, blocking traffics, culvert within the metropolis and the wastes are burnt open on the side of the road. Waste can be disposed in several ways but sanitary landfill is the only land disposal option that enables control and groundwater contamination. Sanitary landfills require much greater initial investment and hence higher operating costs than controlled dumps. Sanitary landfill is not practiced in Taraba State but open dumping is the most commonly practiced. There is no landfill regulation or standard that provides a basis for compliance and monitoring. Wastes in open dumps are set on fires in order to reduce the volume of the wastes. The activities associated with the management of solid wastes from the points of generation to final disposal have been grouped into the functional elements as waste reduction, waste generation, re-use, storage, collection, transfer/transport, processing/recovering, recycling and disposal. By considering each fundamental element separately, it is possible to:

- ✓ Identify the fundamental elements and
- ✓ Develop, when possible, quantifiable relationships for the purpose of making engineering comparisons, analysis and evaluations.

Access to Waste for Collection:

Many source of waste might only be reached by roads or alleys which may be inaccessible to certain methods of transportation due to their width, slope, congestion or surface. This is especially critical in unplanned settlements such as slums or low-income areas in Jalingo and thus largely affects the selection of equipment.

Environment Problems Resulting from Solid Wastes:

Traditionally, the government was the sole provider of almost all basic services such as water supply, electricity, roads, and health's services with solid waste management inclusive etc. The adoption of such a conventional approach led to inadequate infrastructure services delivery (Kyessi, 2009). Despite several intervention measures put in place since the early 2000(s), such as partnership with private contractors, and civil societies organizations, yet several problems are experienced in solid waste management in Jalingo Metropolis that include:

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Figure 1: Picture of a Dumpsite at Nyamusalla within the Jalingo Metropolis

Finally accumulation of garbage on streets, on open spaces and on compounds forms another problem associated with MSWM. Despite of some interventions that were intended to improve solid waste management in many areas of the metropolis, there are still high rates of uncollected solid waste. It is a common sight in Taraba today to see heaps/accumulation of festering waste dumps in our communities. All sides of residential apartments, the drains, the highways, corners of major or and minor streets, underdeveloped plots of land have all become waste dumps for many households. This makes waste to increase in a geometrical progression and collection and disposal at an arithmetical progression (Akinwale, 2005).

Solid Waste Reduction and Recovery in Jalingo:

There are a few formal systems of material recovering in Taraba. However, there is a wide reuse of plastics, bottles, papers, cardboard, cans for domestic purposes. This practice is highly common among the poor in the city. The greatest problem is the lack of local or national markets for the recyclables (Yhdego, 1995). The waste in developing countries contains so much moisture that combustion can only be enacted and maintained on the addition of fuel. This leads to a low calorific value and combustible components of solid waste in Nigeria, thereby making incineration uneconomical in conjunction with high cost of construction and maintenance (Ogwueleka et al, 2009). Hence, suggests that composting could be a very viable recovery alternative which is practically applicable in Jalingo Metropolis.

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V. CONCLUSION AND RECOMMENDATION

Findings from the study revealed the following;

- ✓ Wastes are not properly managed in Jalingo, Taraba state.
- ✓ Poor solid waste management leads to flooding.
- ✓ Poor solid waste management does not make the environment healthy.
- ✓ Strategies have been put in place for proper solid waste management in Jalingo, Taraba state.
- ✓ Solid waste management has not been effective in Nigeria.

Based on the finding of this study, the following recommendations can efficiently improve current problems of Solid Waste Management in Jalingo Metropolis:

- ✓ Construction of closed community depots or secondary collection centres for in accessible areas
- ✓ Recycling and composting activities should be encouraged
- ✓ Establishment of appropriate policies, legal frameworks and financial management for municipal waste management
- ✓ Provision of landfills liners, leachate collection systems, roll-on/roll-off control systems, final covers, ground water monitoring systems and gas collection systems
- ✓ The sites should be properly fenced
- ✓ The site should be made in such a way that insects, rodents and other vectors could be controlled
- ✓ The site should be devoid of open burning and prohibit scavenging
- ✓ Awareness campaign should be enhanced in community by govt. and NGO
- ✓ Government should adopt the new method/option for waste collection and disposal such as Waste-to-Wealth or Trash-to-Treasure known as Integrated Solid Waste Management (ISWM)

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