

Challenges of Environmental Health in Waste Management: A Case Study of Ibadan, Oyo State

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Abstract- Improper waste management in many Nigerian cities poses serious environmental health risk to the inhabitants. Indecent disposal of household waste and poor waste management systems by State and local government creates opportunities for disease causing agents to thrive and hereby put the health of the population at risk. This study aims to identify the challenges of waste management, outline the implications of improper waste management on environmental health and seek to provide solutions. The study was conducted in Bere axis of Ibadan, the choice of the study location was informed by the prominent poor waste management in this axis, characterized by open dumpsites and landfills. Although most part of Ibadan has poor waste management systems, Bere/Oje axis is most plagued. This is partly due to the local market situated in this axis. Quantitative (secondary data) and qualitative data (key informant interviews and FGDs) were collected to answer the research questions. Secondary data were analyzed and presented using tables, charts and qualitative data were categorized and the key points presented. From the study, improper waste management was identified as a major challenge of urbanization which is prominent in Ibadan as with some other cities. It was also discovered that poor waste management poses serious risk to the environmental health of the population. Solutions proffered include citizen education on appropriate waste disposal habit, efficient Municipal Waste Management Planning and funding and sustained street sweeping and cleaning.

Indexed Terms- Environmental Health, Waste Management, Waste Disposal, Urbanization

I. INTRODUCTION

As a result of urbanization and overpopulation of Nigerian cities, waste management becomes a

challenge with increasing generation of waste and improper waste disposal system coupled with indecent waste disposal habit by inhabitants. Especially in Ibadan, Southwestern Nigeria, these negative habits have led to deposits of large amount of waste on streets, landfills, streams/oceans, and other dumpsites which becomes breeding ground for disease causing agents posing a health risk to the inhabitants with children, pregnant women, and aged populations at higher risk.

Dumping of refuse and household waste is generally seen as norm on the streets and in neighborhoods with no one trying to address it and find solution to it.

It is important to highlight these challenges of environmental health posed by improper waste management and seek to find solutions to this menace which is the aim of this study.

• Problem Statement

Improper waste management is a common challenge in most Nigerian cities which has created several health concerns as these generated wastes are dumped in an improper manner hereby serving as breeding sites for disease causing agents. In Ibadan, this menace is commonplace as it could be seen affecting the entire city. Therefore, this study aims to identify the challenges of waste management, assess the health implications, and seek to proffer solutions.

• Research Questions

1. What are the challenges in waste management of Ibadan?
2. What are the environmental health implications of improper waste disposal?
3. What can be done to improve Ibadan waste management system?

- Challenges of Waste Management

According to Ugwuanyi, & Isife, (2017), the following are the challenges of waste management.

- Physical constraints

The major constraint to waste management includes physical and economic problems. Physical constraints to waste management include lack of comprehensive planning, inadequate infrastructure, and development crisis. Comprehensive physical planning incorporates conceiving the plan and considering various aspects of the plan of the urban area in terms of waste generation and disposal.

- Inadequate infrastructure

Many Local Government Areas lack the capacity to meet infrastructural services for waste generation in rapidly growing areas. When vehicles to evacuate waste and other infrastructures are not provided or inadequate from the Local Government to the State Government, there will be problem in handling the waste generated by the populace (Agumbwamba, et al., 1998).

- Development crisis

The expansion of urban development to urban fringes poses a threat to sustainable development and management of environmental resources. Plan policies to accommodate population growth are inadequately made (Agunwamba, 1998).

- Budgeting

The Federal Government's budget for environmental protection is inadequate. This makes waste management allocation to be so negligible, leading to poor waste management. It was found that a great part of the budget (77%) was spent on collection and haulage, leaving a minor amount (23%) for waste disposal (Agunwamba, et al., 1998).

- Over population

When an area is densely populated, the quantity of waste being generated will be much. The populace disposes the waste both in approved and unapproved sites, thereby causing the problem of waste management in the urban areas (Agagu, 2009).

- Environmental education and participation

Environmental Education has been described by Eguabor (2008: 78) as: A permanent process in which individuals and the community gain awareness of their environment and acquire the knowledge, value, skills, experience, and the determination which will enable them to act individually and collectively to solve present and future environmental problems". There is no environmental education and awareness on the effect of waste disposal, which will enable the people to know how to dispose of the waste from the homes and agricultural waste (Adindu, 1990).

- Production of master plans

Master plans of Local Government Areas in Nigeria is not prepared and enforced as a guide for both private and public authorities. Such policies will protect environmentally sensitive areas and address the waste management procedures (Adedibu, 1984). It will be a control approach to environmental management and will regulate environmental degradation.

- Poverty, underdevelopment, and ignorance

Poverty, underdevelopment, and ignorance are factors that militate against environmental quality and waste management in Nigeria. This is evidenced by the piling of solid waste in various parts of the urban centers. Refuse heaps have encroached on or completely blocked roads, thereby obstructing traffic in the urban cities. Uncontrolled refuse disposal has always been associated with serious health hazards (Dharam and Vivan, 1995).

- Implications of Improper Waste Management to Environmental Health

According to Ngozi & Adebola, 2017, the adoption of open dumpsites as means of managing solid waste in many urban cities especially in the developing countries had resulted in indiscriminate disposal of solid waste in such cities. The fact that these dump sites are not properly controlled makes them major health threats to people living near those areas (Sood, 2004 cited in Sankoh, Yan & Tran, 2013). The United Nations Environment Program Agency (UNEP) (2006) stated that wastes that are not managed properly, especially solid wastes from households and communities constitute a serious health hazard which can lead to the spread of diseases.

The report further stated that unattended wastes lying around attract flies, rats, and other creatures that, in turn spread diseases. Normally, it is the wet waste that decomposes and releases a bad odor. The bad odor affects the people settled next to the dumpsite, which shows that the dumpsites have serious effects to people settled around or next to them. The groups that are at risk following the unscientific disposal of solid waste include the population in areas where there is no proper waste disposal method, especially the pre-school children, waste workers and workers in facilities producing toxic and infectious materials (Sankoh, Yan, & Tran 2013, p. 666).

Other high-risk groups include population living close to the waste dump (Aatamila *et al.*, 2010) as well as workers engaged in management of wastes. When those who directly work on the waste dumpsites and landfills are not provided with sufficient protective materials, they are exposed to health hazards. The incidence of occupational accidents in waste collection workers has been found to be higher than the general workforce (Poulsen *et al.*, 1994). This as a result of the fact that those categories of workers come in direct contact with the waste and are more likely to be affected by contaminated waste than other category of workers who are not engaged in such responsibilities.

Although, results that provide links between exposure to gases from indiscriminate disposal of waste to mortality and morbidity have been inconsistent between cities and studies, it is certain that there is risk of health hazards from such exposure (Zanobetti, Schwartz, & Gold, 2000). Studies have also shown that direct handling of solid waste can lead to contracting different types of infectious and chronic diseases by unsuspecting residents with the waste management workers directly involved in the collection of these wastes and dump site scavengers being the most vulnerable (Zirana, Tilahu, & Mberu, 2016; Nwanta & Ezenduka, 2010).

A study conducted by Yongsi *et al.*, (2008) showed that exposure to hazardous waste in dumpsites can affect human health, and most often, it is the children who are the most vulnerable to these pollutants. Direct exposure to these harmful substances at the open dump sites can lead to diseases through chemical exposure

to unsuspecting members of the public. Open dumpsites are a major problem to the environment especially to the air being inhaled. Dumpsites emit obnoxious odors and smoke that cause illness to people living in, around, or closer to them (Marshall, 1995).

According to Kola Olusanya, Omotayo and Fagbohun (2011), there are other health implications improper management of solid waste which includes contracting water-borne diseases, such as typhoid, cholera, meningitis, polio, hepatitis. These are diseases that result from water that has been contaminated by human, animal or other form of wastes. The poorly managed dumpsites can also serve as breeding ground for such vectors like mosquitoes, tsetse flies and others that infect humans with malaria, yellow fever, dengue fever, sleeping sickness and some other related diseases.

Adewole (2009) hold similar view on the vectors and possible diseases that could be contracted through exposure as a result of improper management of solid waste: flies which carry germs on their bodies and legs and also excrete them; mosquitoes breed in stagnant water in blocked drains in favorable location in cans, tyres etc. that collects rainwater; Rats: rat's spreads typhi's, salmonella, leptospirosis and other diseases they cause injuries by biting and spoil millions of tons of food. The refuse workers also face some hazards which includes parasite infection and infected cuts resulting from skin contact with refuse, other includes hazards on disposal sites; are injuries from glass, razor blades, syringes, tissue damage or infection through respiration, ingestion or skin contact (p. 175).

There are certain volatile compounds (example are ammonia, hydrogen sulphide and similar derivatives, acids of lower molecular weight, esters and other detectable oxides and oxygen) that are found in industrial solid wastes these are very dangerous as they are hazardous components. Domestic wastes which can come from cattle farmhouse and agro farmhouse wastes contribute gases like that of biogas and are also dangerous.

II. METHODOLOGY

- Study Area and Design

The study area is Beere/Oje axis of Ibadan, as this location is characterized by very visible improper disposal of waste and large amounts of solid waste on streets and marketplaces. Ibadan is located on an undulating plain with a ridge of eight quartzite hills separating the city into eastern and western sectors, situated at an average height of 200 m above sea level, that is drained by four river basins and surrounded by secondary rainforest and savannah.

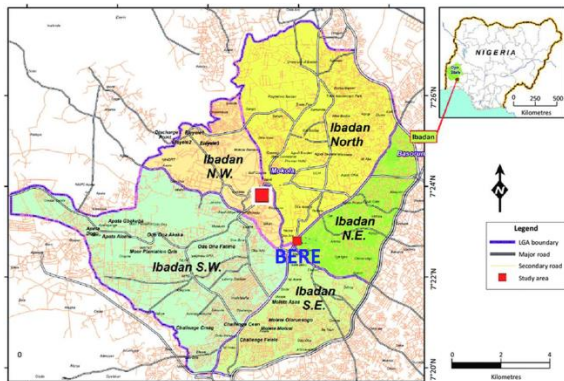


Fig 1: Map of Ibadan Showing Study Area

According to Falola (2009), Ibadan emerged as a city around 1830 at a time of political turmoil in Yorubaland, the cultural region of the Yoruba people in a search for peace and security by the Oyo refugees driven out of their homeland by the crisis that led to the fall of Oyo Empire.

Thus, Ibadan first served as a camp for refugees before it grows to a full-fledged town, and later it attained the status of a city-state with the largest population in the cultural region of the Yoruba people to represent the largest indigenous city in tropical Africa with Oyo state as the capital (one of the 36 states in Nigeria) situated 128 km northeast of Lagos and 345 km

- Sample Collection Method

Both quantitative and qualitative data were used for this study. Quantitative data were collected from secondary sources and qualitative data were collected from twenty communities in the Beere/Oje axis of the Ibadan metropolis where poor waste disposal habit was most visible. A selection of informants was interviewed based on random sampling, and a

purposive and snowball sampling approach combined with structured and unstructured interviews of key informants, focus group discussion, and observational techniques were used to elicit relevant data from population of adults who are knowledgeable and astute to the consequences and effects of improper and inadequate waste disposal methods.

- Analytical Technique

Secondary data were analyzed and presented in tables and charts while the analysis of the qualitative data collected was done by categorizing responses and noting down the main points which are presented in the results and discussion session.

III. RESULTS AND DISCUSSION

- Challenges of Waste Generation in Ibadan

Most cities in Nigeria (especially Ibadan) are faced with the twin problems of population increase and rapid expansion, a phenomenon that has brought increasing strain on the urban infrastructure with an obvious waste management problem where the existing system appears to be incapable of coping with the mountain load of waste generated and heaped on the surface.

However, in Ibadan, despite the provision of waste dumpsters (large open-topped waste container for the loading onto a special truck) at some strategic locations within the Ibadan metropolis, most are located close to residential areas, markets, farms, roadsides, and creeks. The composition of waste dumps varies widely, with many human activities located close to dump sites, especially in the core areas of the city. Hence, the growing generation of waste in Ibadan have placed city authorities with unprecedented challenges in managing the situation and according to Barrow (1995), waste and pollution are the unpleasant price paid for urbanization and industrial development. More so, within evolutionist school of thought, “space” in the guise of “the physical environment” was seen as a major factor determining the differences in levels of cultural development (Waltraud, 2006:4).



Plate 1: A part of the Ogunpa River being gradually blocked by refuse.

It is very difficult to determine the exact quantities of waste generated in Ibadan, probably due to diverse methods of calculation. However, many studies and researchers have given different estimate from their studies. For example, Maclaren International Ltd (1970) found the average per capita quantity of solid waste generated to be 0.37-0.5kg/day for the core area of the city, Oluwande (1983) estimated the average solid waste generated and its mean production rates per head for three different areas of Ibadan as 0.420kg/day in GRA;0.377kg/day in outlying areas; 0.35kg/day in the core area, Egunjobi (1986), estimated 0/32kg/day, which implies that 38 million kg solid waste was collected in 1986, using 1.6 million populations estimate for the period as yardstick. And in more recent studies conducted by Haskonning and Konsadem Associate (1994) revealed 0/6kg a day of wastes, with a density of 300kg/m³ (Onibokum and Kumuyi, 2000:8) linked to low-income towns wherein the rate of waste generation is highly influenced by population and income.

In Nigeria, 25 million tons of municipal solid waste was generated annually, and usually, waste densities and moisture are much higher in developing countries which require different technology and management systems (Cointreau et al., 1984). Hence, the density of solid waste in Nigeria ranged from 250 kg/m³ to 370 kg/m³ higher than solid waste densities found in developed countries, and as a result, a higher number of capacity of waste storage and collection facilities is required in order to reduce the effectiveness of

compaction vehicles for waste transfer (Ogwueleka, 2009:176).

Table1: Population and Solid waste generation estimates for Ibadan 1992-2000

Years	Population (X103)	Waste Generation per Year (X103)
1992	3430	751
1994	3620	754
1996	3633	797
1998	3748	821
2000	3850	845

Source: Haskonning and Konsadem Associate (1994)

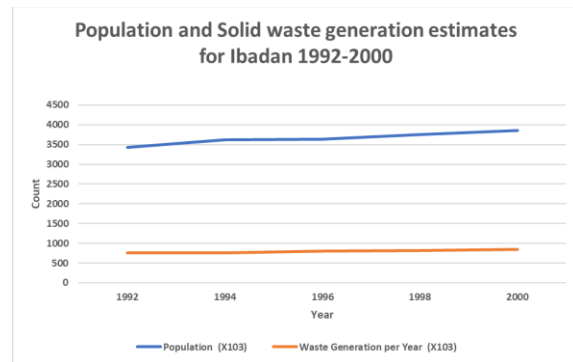


Fig 2: Population and Solid waste generation estimates for Ibadan 1992-2000

Source: Haskonning and Konsadem Associate (1994)

In Ibadan, among many other cities in Nigeria, most of the substances composing municipal solid waste are mainly from paper, leaves, bones, ash dust, vegetable matters, plastics, metals, textile, stones, rubber, and glass. And in fact, leaves and the vegetable matter constitute the bulk of the waste because raw food materials are brought to the town unprocessed and considering that Ibadan is in the heart of a rich agricultural land that has a lot of old and unplanned section, the leaves, tins, metals, paper, bone, ash dust, and stones are increasing because of the change consumption pattern of people in the city.

More importantly, different scholars have observed that there is no single method of refuse disposal that is suitable in all circumstances, because waste management has been moving from one agency to another. Thus, the choice of a particular method is

governed by local factors such as cost, availability of land and labor. However, Omoleleke (2004), Egunjobi (2005) and Ogu (2004) identified six solid waste disposal practices, such as (a.) waste dumping or throw-away culture or disposal in the nearest open space, land, or surface water, (b) burying, (c) Burning/ incineration, (d) composting, (e) land filling, and (f) recycling and reuse.



Plate 2: A side view of Bere area in Ibadan

Solutions for Proper Waste Management

1. Issues in Household Storage and Segregation of Waste

Most households, shops, and establishments throw their waste just outside their premises, on streets, in drains, in open spaces, in water bodies, and in other inappropriate places. In most cases, source segregation is not done.

Solution

- i. Citizens must be informed and motivated not to litter the streets, so they develop the habit of storing their waste at its source in at least two separate bins (one for biodegradable waste and one for recyclable waste).
- ii. Citizens also need to be educated about risks to human health and the environment and taught to separate domestic hazardous waste and infectious waste.
- iii. Municipal authorities must take concerted efforts to convince all classes of citizens to store and segregate their waste properly.

2. No System of Primary Collection

- i. Municipal authorities consider themselves responsible only for waste collection at street

collection points and do not feel it is their job to provide doorstep collection service, even though such service is now mandated in the rules.

- ii. Lack of citizen involvement in the storage of waste at source, which would facilitate primary collection from the doorstep.

Solution

- i. An assessment of the housing situation, street conditions, and geographic and topographic situation is always a prerequisite for efficient planning and decision making for primary collection equipment.
- ii. According to the Municipal Solid Waste (Management and handling) rules 2000, there are two options for primary collection: door-to-door collection at preset intervals or community bin collection (known as the bring system).

3. Irregular Street Sweeping

- i. No planning is done to ensure that all streets are swept regularly; there is no benchmark, or yardstick, prescribed by municipal authorities for street sweeping.
- ii. The street sweepers are not given appropriate tools to perform their duties effectively. They are given short-handled brooms, which necessitate constant bending and cause fatigue and loss of productivity.

Solution

- i. A schedule of street cleaning that indicates which roads require daily cleaning and which ones need to be cleaned periodically.
- ii. A program for street cleaning, keeping in view the norms of work (yardsticks) prescribed.
- iii. A timetable for cleaning of open public spaces daily or periodically.

4. Poor Secondary Storage of Waste

- i. Waste depot sites are not evenly distributed in cities and towns.
- ii. They are often very poorly designed and are not synchronized with the primary collection system.
- iii. Waste depots are not emptied on a regular basis.
- iv. Inappropriate secondary storage of waste leads to a “not in my backyard” (NIMBY) syndrome.

Solution

- i. Municipal authorities should identify suitable locations, preferably from among the existing locations of waste storage depots in the city.
- ii. Large containers ranging from three cubic meters to seven cubic meters should be placed for secondary storage of waste.
- iii. Transfer stations should be decentralized within the city, allocated to an enclosed area, and situated in the general direction of the main landfill site.

5. Issues in waste Transportation

- i. Open trucks and tractors used to transport waste are loaded manually. This time-consuming activity results in loss of labor productivity and increases the occupational health risk to workers.
- ii. The transport system is not synchronized with the secondary storage system.
- iii. Problems arise when a transport fleet is not modernized, because waste at the secondary storage system is still dumped on the ground. If the secondary storage system is modernized without an adequate fleet of modern vehicles, similar problems arise.

Solution

- i. The longer the distance to the landfill site, the more volume should be transported with each load. In case of long-haul distances to the landfill site, transfer stations are found to be most efficient.
- ii. Vehicles should be selected according to capital costs, carrying capacity, life expectancy, loading speed, local spare part availability, speed, fuel consumption, and maintenance costs.
- iii. The transport of waste can be managed and monitored centrally or through a large, decentralized arrangement. Transport can be contracted out to private operators.
- iv. The transport system must be harmonized with the secondary storage system of waste to prevent manual and multiple handling of waste.

6. Lack of Waste Treatment

- i. The MSW generated in Ibadan is, by and large, not treated but is directly taken to the open dumpsites.

- ii. Although Ibadan is known for its age-old technology of composting agricultural waste, composting of municipal organic waste is infrequent. In a few cities, however, initiatives exist for aerobically composting or vermicomposting of municipal organic waste.
- iii. However, many plants are not operated according to their installed capacity. Many plants face problems with compost marketing and find financial sustainability difficult.

Solution

- i. The municipal authorities must treat the organic fraction of waste before disposal.
- ii. The authorities are expected to set up a plan for composting waste or to adopt waste to-energy technology as may be appropriate.
- iii. Municipal authorities must assess the suitability of new technology to Indian conditions.

7. Inappropriate Disposal of Waste on Open Dumping Grounds

- i. Waste is dumped in low-lying areas that are within or outside the cities and that are designated as dumping grounds or in unauthorized areas on the outskirts of the city.
- ii. Sometimes waste is even dumped on the approach roads to rural areas, which do not have their own land for disposal of waste. Such practices result in extremely unsanitary conditions and create serious environmental degradation problems.
- iii. Because no segregation of waste at its source takes place, domestic waste of all types, infectious waste from medical facilities, and even hazardous industrial waste are deposited at dumpsites that are designated for domestic waste.

Solution

- i. The state pollution control boards are required to prescribe the criteria for site selection in terms of distance to be maintained from habitation, water bodies, highways, railways, and so forth.
- ii. The municipal authorities should follow the rules carefully when constructing an engineered landfill.

CONCLUSION

Improper waste management poses potential environmental health risks to the vulnerable populations and as such should be treated with utmost urgency and seriousness. This study has highlighted environmental health implications and provided possible solutions to the challenges of improper waste management.

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