

# **Solid Waste Generation, Disposal and Management in Akure, Ondo State, Nigeria**

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## **Abstract**

The generation and disposal of solid waste is an intrinsic part of any developing society when not properly manage will result to environmental land degradation and eventual threat to the physical environment. Generation of waste in large volume does not constitute a problem but inability to dispose them off on time and properly by individuals and governments. The aim of this paper is to examine solid waste generation, how wastes are dispose off and the management strategies employed in the study area. Information was obtained using a total of 250 copies of questionnaire administered to residents using random sampling technique. Descriptive statistics were used to present and analyse the data while chi-square was used to test the hypothesis. The study revealed that there are different types of waste generated and various methods used in disposing solid waste such as open dumpsite, in drains and streets, into streams and river channels, nearby bush, burning and excavation by waste management. This paper recommends that Storage bins should be provided for each household at a reasonable cost. This will make collection easy for the waste collectors, government should increase and improve on the funds allocated to waste management operators to carry out their management responsibilities and the waste management authority should educate the citizens on proper storage of waste and thus to ensure good living environment.

**Keywords:** waste generation; waste disposal; collection; management.

## **1. Introduction**

Waste is any substance or material which requires to be disposed of as being broken, worn out, contaminated or otherwise spoilt and as such lost its usefulness [1]. Waste is produced as a result of society's attempt to solve to solve other environmental problems such as water and air pollution. Some of these rising amounts of waste give rise to new problems such as sewage sludge and residues from cleaning of gases [2].

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Solid waste as described by author in [3] is any tangible and non-free flowing unwanted materials or substances that result from human activities.

Increase in urban growth as further resulted in an increase in the generation of waste from residential sites, private and public service facilities and construction and demolition activities [4]. In Africa, rapid urban growth has exacted massive pressure in cities, towns and surrounding areas [5,6]. This has led to increased urban waste generation leading to health hazard, underground water pollution and affected air and aesthetic qualities [7]. The generation of solid waste constitutes a serious environmental problem in the developing countries and also of great concern in the developed nations because of the attendant environmental challenges that cause its inappropriate handling and disposition [8].

Solid waste is one of the major waste problems in our surrounding today. The problems emanated from the fact that not all waste is biodegradable and therefore must have a specific disposal and management system. All human activities result in waste production of materials, the generation of waste is unavoidable and its management is very important. The authors in [9] observed that many of our cities and towns are increasing in population density due to rural-urban migration; this has tremendously increased the volume of waste generated in these locations, making solid waste a vital issue among these communities. When waste is improperly managed, it constitutes a menace to the environment, this threatening human health. In Nigeria, considerable volume of waste are generated at alarming rates due to increased urbanization [10].

Improper collection and disposal of municipal wastes has led to different levels of environmental challenge such as blockage of sewers, drain networks and the choking of water bodies [11]. Solid waste disposal methods include incineration, sanitary landfill, recycling, and ocean dumping and deep geological injection. Other ways are burying, burning, open dumps, controlled tipping, livestock feeding and decomposition of biodegradable solid waste [12]. The inability to properly manage these waste generated in developing countries such as Nigeria creates great concern [13]. Nigeria with a population exceeding 180million [14] is one of the largest producers of solid waste in Africa [15]. Despite a host of policies and regulations, solid waste in the country remains a huge challenge to the authorities, stakeholders and the entire public. Solid waste management remains one of the most overwhelming environmental sanitation challenges facing the country today and it has continually remained at its lowest ebb despite huge investments in the sector [16]. Solid waste management is one of the major problems facing city planners all over the world. The problem is especially slow in most developing country cities where increased urbanization, poor planning and inadequate financial resource contribute to the poor state of solid waste management [17]. Solid waste management refers to all activities pertaining to the control, collection, transportation, processing and disposal of waste in accordance with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations [8]. According to authors in [18], solid waste management is the application of techniques that ensures the orderly execution of the functions of collecting, transfer, processing, treatment and disposal of solid wastes. Solid waste management poses serious danger to the handlers and the people living around the wastes. Indiscriminate dumping of household solid waste in the street, rivers and drainages has contributed in spread of offensive odours and diseases [19]. The aim of this paper is to examine solid waste generation, how wastes are dispose off and the management strategies employed in the study area.

## 2. Materials and Methods

### 2.1 Study area

Akure is a city in South-West of Nigeria and capital of Ondo State. The region lies within Latitude  $7^{\circ}15'N$  and longitude  $5^{\circ}15'E$ . The area is located within the humid tropical climate of the forest region, which experiences two climatic seasons namely the rainy season (April-October) and the dry season (November-March). The area is underlain by the basement complex rocks of the Southwestern Nigeria.

### 2.2 Research Design

The data was gathered from primary and secondary sources. The primary source of data was gathered through the use of 250 questionnaire. The sampling technique adopted for the study is random sampling techniques. Documentary data was also acquired from books and public journals, the internet, newspapers and magazine and other published and unpublished records from government organizations and agencies. Simple descriptive, analytical and statistical tools such as tables, percentage and frequencies were used in data analysis.

## 3. Results and Discussion

### 3.1 Waste Generation and Storage Methods

Solid waste generation provides estimation of the quantity of waste created via residences over a period of time. In the study area, different materials constitute waste such as polythene bags (64.8%). The polythene comprised mainly of nylon bags and disposed sachet water packages. 6.8% are plastic (disposed buckets, jerricans, pipes and basins of different sizes) while 5.2% are papers. 4% are glass, metals, electric and electronics (discarded bottles, glass wares, radios, metal rods, pipes, wires and containers, telephones, batteries and touch light) while 5.2% are rags and pieces of clothes. 8% are biodegradable waste and 6% are can and bottles (Table 1).

**Table 1:** Waste Generation.

Type	Frequency	Percentage
Polythene bags	162	64.8
Plastics	17	6.8
Paper	13	5.2
Glass, metal, electric and electronic	10	4
Rags and piece of clothes	13	5.2
Biodegradable waste	20	8
Can and bottles	15	6
Total	250	100

**Source:** Field Survey, 2021

Solid waste storage and collection are the most serious threats to waste management in most cities [20]. There are various methods used to store wastes such as plastic bins, plastic bags, drums, aluminum can, bucket and waste basket. The study revealed that 40% of the residents used plastic bins to store their waste while 22% used

drums. Others use waste basket (16.4%), plastic bags (9.6%), buckets (8%) and aluminium can (4%) (Table 2).

**Table 2:** Methods of Solid Waste Storage.

Storage	Frequency	Percentage
Plastic bins	100	40
Drums	55	22
Waste baskets	41	16.4
Plastic bags	24	9.6
Buckets	20	8
Aluminium can	10	4
Total	250	100

**Source:** Field Survey, 2021

### **3.2 Methods of Solid Waste Disposal in Akure**

The disposal methods of solid waste used by the respondents in the study area were very unsatisfactory. The method of solid waste disposal employed by the respondents is indicated in Table 3. The study identified open dumpsite with 29.6% forming the highest way by which people in the area dispose their wastes making the area breeding place for disease vector, cause diseases and make the place dirty while 22.8% of the respondents dispose their waste into drains and streets. This acts usually cause flooding, unhygienic environment, environmental degradation and depletion as well as outbreak of disease. 18% of the respondents asserted that they disposed their waste in nearby bush within their neighbourhood and this could degrade the environment and hinder environmental livability. 12.8% of the respondents usually dump their waste into streams and river channels. This usually leads to contamination of water while 10% burn their wastes and this could lead to environmental pollution as well as the depletion of the ozone layer which in turn leads to climate change. 6.8% of the respondents make use of the waste management agent to dispose their waste.

**Table 3:** Disposal method.

Method	Frequency	Percentage
Open dumpsite	74	29.6
Bury and burn in pits	25	10
In drains and streets	57	22.8
Dumping in nearby bush	45	18
In stream/river channels	32	12.8
Excavation by waste management	17	6.8
Total	250	100

**Source:** Field Survey, 2021

### **3.3 Frequency of Waste Collection**

The frequency of waste collection in the area shows that waste is collected at various locations and intervals (Table 4).

**Table 4:** Frequency of Waste Collection.

Frequency of Collection	Frequency	Percentage
Daily	7	2.8
Once a week	51	20.4
Twice a week	98	39.2
Once in a month	45	18
Never	49	19.6

**Source: Field Survey, 2021**

The table shows that wastes are collected at different intervals. 39.2% of the respondents said that wastes are collected twice in a week while 20.4% said once in a week. 19.6% said that their wastes are not collected but they usually find a way of disposing them. 18% of the respondents said once in a month while 2.8% said daily. This implies that the rate of waste disposal is low in the study area. It also shows that the residents are exposed to solid waste for longer periods of time than necessary.

These wastes provide breeding ground for pathogenic organisms, attract insects and rodents and cause health problems to these residents (Agbede and Ajagbe, 2004).

The Ondo State Waste Management is responsible for waste collection in Akure although there are some private firms involved in management in Akure (Table 5)

**Table 5:** Private Firms Involved in Waste Management.

Agency	Area Coverage
Cleaner Environment and Associates	Ijapo Estate
Ken-Global Environmental Services	Sijuade and Ala Quarters
Jilibos Nigeria Limited	Adegbola and Okuta Elerinla
Sustainable Environmental Services	Alagbaka, Sunshine and Oba Ile Estate
A Gold International	Oshinle
Solid Waste Management Services	Oke Aro and Iro
11 <sup>th</sup> Gear Environmental Services	Bolajoko and Gaga
BCC Nigeria Limited	Ijo Mimo, Esure, Oda road, Powerline, Owe Akala, Aule, Stateline and Klub 20
FAF Environmental Services	Ajipowo, Oba Ile and Fatuase

**Source: Field Survey, 2021**

The study revealed that the areas covered by the private companies are mostly estates owned by the state and private individuals and largely occupied by both middle and high income earners. Other areas with low income earners solely depended on the Ondo State Waste Management Agency for collection of their wastes.

The general performance of the Ondo State Waste Management Agency as perceived by the residents in the study area is discovered to be mostly not satisfactory having the highest rate (50%) . 18.8 % of the respondents claimed that their performance is fairly satisfactory while 20% and 11.2% said that their performances are satisfactory and very satisfactory respectively.

#### 4. Conclusion

The findings of this study have shown that there are different types of waste generated in the area and different methods of disposing them. Wastes are generated faster than they are collected, transported and disposed. Waste management in the area are not satisfactory. It is concluded that there is need to improve on the management strategies so that waste managers would be able to effectively manage the collection and disposal of waste.

#### 5. Recommendations

In the light of the findings and conclusion drawn in the study, the following are recommended:

- i. Storage bins should be provided for each household at a reasonable cost. This will make collection easy for the waste collectors
- ii. Government should increase and improve on the funds allocated to waste management operators to carry out their management responsibilities.
- iii. The waste management authority should educate the citizens on proper storage of waste and thus to ensure good living environment.

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