Assessment of Domestic Waste Management in Oba-Ile, Akure, Nigeria

Owolabi Babatunde Oluwaseyi[1, *], Adedeji Adeyemi Adewumi[2], Olowu Job Olaniyi[1]

[1]Department of Urban and Regional Planning, Federal University of Technology, Akure, Nigeria

[2]Department of Urban and Regional Planning, Federal University of Technology, Minna, Nigeria

Email address:

babatundeoluwaseyi@yahoo.com (Owolabi Babatunde Oluwaseyi)

[*]Corresponding author

Abstract: Increase in waste generation has brought alongside serious environmental challenges associated with improper waste disposal, especially domestic waste which are often discarded in different ways. Hence, towards a sustainable human health and her environment this study investigated and identified issues influencing waste management in Oba-Ile, Akure, Ondo State, Nigeria. Both primary and secondary data types were employed in the study; primary data were collected through the administration of questionnaires and personal observation was carried out. Secondary data were sourced from existing literature; which include published and unpublished materials, dissertation and term papers and also base map of the study area. Data collected were analysed using descriptive statistical methods which included frequency counts demonstrated with tables and charts. Findings from the study shows most of the respondents give their waste to waste collectors for disposal while others dispose their wastes themselves (either by burning, use of incinerator, dispose in nearby bush, dispose into drainage or by burying); the fee charged by waste collectors is moderate but more people will like to patronize the waste collectors if the fee is reduced; it takes respondents minimal time (to and fro) to reach the nearest dumping unit as most of them spend less than 5minutes; the major problem encountered by residents of the study area is inadequate storage facilities; lack of technical know-how, inadequate/inappropriate waste disposal vehicles, poor customer service, inconsistency of waste collectors and high charges; waste collectors come to collect waste once in two weeks but in an interview with a resident in the study area, waste collectors fail to come (sometimes) which makes waste accumulate resulting into an unhealthy environment. The study hereby recommends public enlightenment and education, enforcement of certain law, increase in waste collection frequency, agency in charge of waste management in Ondo State should introduce initiatives on how waste should be collected, a recycling unit should be designed in the estate so that the waste generated will be recycled and produce some better materials that would be useful for the entire humanity.

Keywords: Domestic, Management, Waste

1. Introduction

Waste, referred to by many terms such as rubbish, trash, refuse, waste, junk, and litter, encompasses items that are deemed undesired or lacking use. In the field of biology, waste refers to the undesirable chemicals or poisons that are eliminated from living organisms, including but not limited to urea, perspiration, and excrement. Litter refers to garbage that has been inappropriately discarded. There is a clear correlation between waste and human growth, including both technical and social aspects [12]. The prevalence of waste management challenges is seeing a rise. In recent years, experts from both industrialised and developing nations have shown a keen interest in this phenomenon. However, waste management in industrialised nations is adequately addressed via the successful implementation of consistent waste policies. In contrast, trash management in developing countries, such as Nigeria, is not effectively addressed owing to the absence of consistent waste policies and their correct

execution. Solid waste management has emerged as the foremost environmental concern confronting urban areas in Nigeria.

Municipal Solid Waste (MSW) mostly comprises residential waste, including domestic garbage, alongside a portion of business waste [5]. This encompasses a range of activities, including the strategic planning, financial management, and execution of programmes aimed at regulating the production and storage of solid waste. Additionally, it involves the collection and transportation of waste from its point of origin to designated treatment facilities, and ultimately, the environmentally and socially responsible disposal of waste. Household trash is produced as a result of many domestic activities, including but not limited to cooking, sweeping, cleaning, fuel combustion, repairs, and gardening. Additionally, the scope of this category includes used items or materials, such as previously worn garments, outdated furnishings, decommissioned equipment, glass, paper, metal containers, and antiquated books and newspapers [10].

The insufficient waste management practises in the majority of urban populations in Nigeria are well acknowledged. Nevertheless, it is important to note that the situation exhibits variability across different cities and administrative levels [9]. Significant efforts have been devoted to the development of effective waste management practises in Akure, the capital city of Ondo State. The establishment of the Ondo State Garbage Management Authority in 1999 was intended to provide regulatory oversight and supervision over the management of municipal solid waste throughout all areas within the state, including Akure, the capital city. The Ondo State rubbish Management Authority in Akure is involved in several activities, such as the provision of rubbish disposal containers, street cleaning, waste collection, transportation, and cooperation with private waste collectors. Despite the establishment of the Ondo State Waste Management Authority in 1999, scholarly research has indicated that the current characteristics of solid waste management in the state encompass insufficient collection methods, inadequate coverage of the collection system, and improper disposal of solid waste [15]. The rate of garbage creation has been steadily increasing due to factors such as income, population, and economic expansion, which have had a significant impact on the content of waste.

Furthermore, the quantity of garbage generated exhibited variations based on factors such as seasonal patterns, social dynamics, cultural influences, industrial output, waste material demand in the market, and degree of urban development [15]. The city of Akure, serving as the capital of the state, has seen unregulated population expansion. Consequently, this has led to a rise in garbage production, resulting in the deterioration of the urban environment and the creation of unfavourable living circumstances for its inhabitants. The management of waste has become a

prominent environmental concern in metropolitan areas, sparking discussions and analysis in academic, economic, and media circles. Over time, it has evolved into a distinct field of study. Notwithstanding the substantial expansion in content and overall knowledge, the waste management infrastructure in the urban areas of developing countries has either deteriorated significantly or is completely absent.

The subject's theoretical framework delineates seven primary constituents of the waste management system. The waste management processes included in this study include waste creation, storage, collection, transfer, transport, processing, and disposal, as identified by [12]. Once waste is generated inside residential premises, it is essential to implement effective management strategies that provide simple disposal. The management of waste materials involves a series of procedures related to the treatment and separation of rubbish, with the ultimate goal of storing them in specified receptacles for later collection [11]. The waste storage process involves the methodical management of waste items until the party or organisation accountable for their production places them in a suitable container for future collection. Storage containers include a diverse range of choices, including black garbage bags, rigid plastic bins, skips, metal bins, informal bags, and bulk containers. Waste receptacles demonstrate diversity in terms of their design, dimensions, and component materials. Hence this the aim of this study is to assess how domestic wastes are being managed in Oba-Ile, Akure with a view of proffering sustainable waste management techniques. The Objectives are to; investigate the waste management practices of the households; identify the challenges experienced by households regarding their waste management and explore ways in which the municipality can contribute to good household waste management and waste disposal practices.

2. The Study Area

2.1. Location

Oba-Ile is situated in Akure North Local Government Area of Ondo State, the town is located within 6°95' and 7°15' North of the equator and longitude 5°15' and 5°40' East of the Greenwich meridian (Figure 1). Akure, a city in Nigeria, has historical significance as a traditional Yoruba town that predates the arrival of British colonial administration in the region. Akure is geographically surrounded by many major towns within the state, including Idanre to the South, Owo to the East, Iju/Itaogbolu to the North, and Ile-Oluji to the West. The urban form of the city has undergone transformations throughout the years, leading to its current state and the associated land issues, which are comparable to those encountered in other medium-sized metropolitan areas in Nigeria.
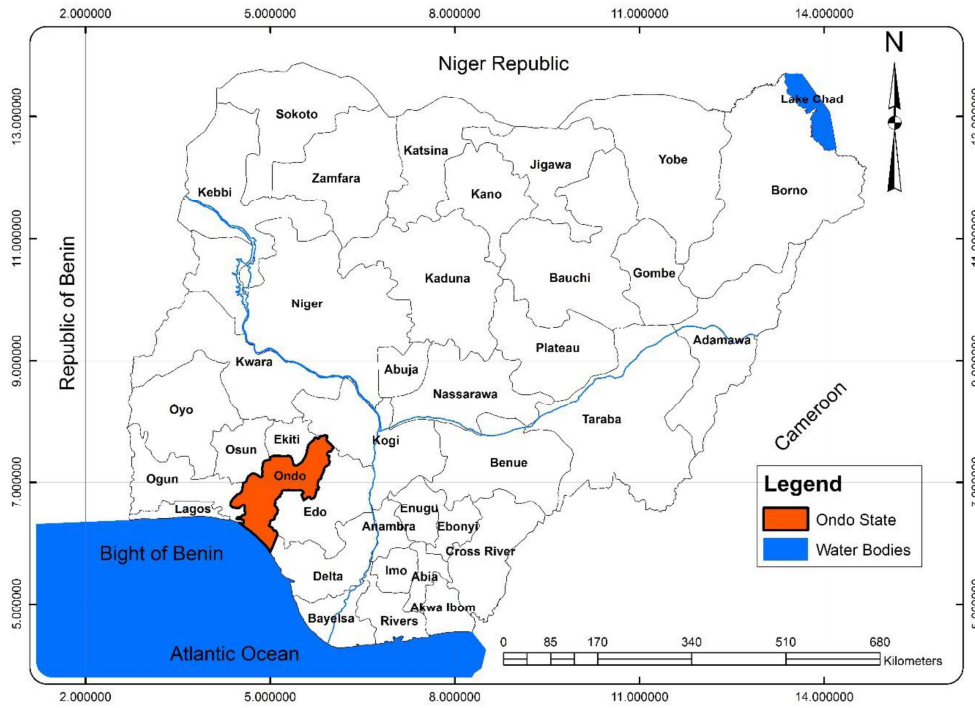
Source: Ondo State Ministry of Physical Planning and Urban Development, 2021.

Figure 1. *Map of Nigeria Showing Ondo state.*
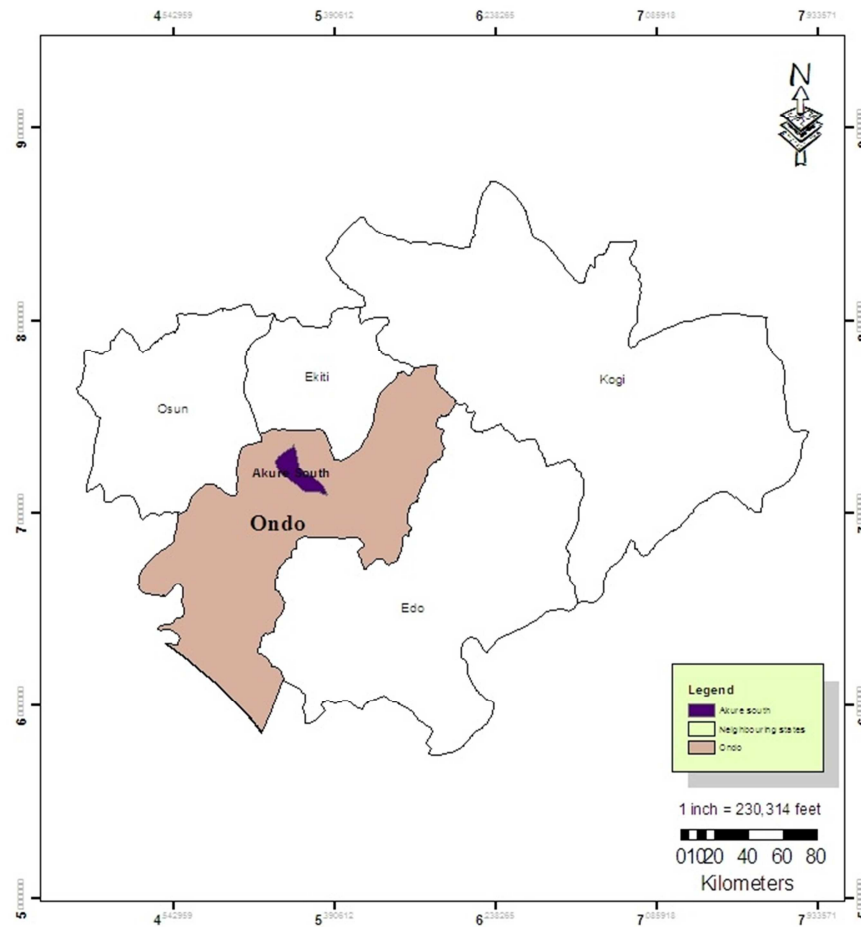
Source: Ondo State Ministry of Physical Planning and Urban Development, 2021.

Figure 2. *Map of Ondo State Showing of Akure South Local Government Area.*

2.2. Population

Since its designation as a state capital in 1976, Akure has experienced a notable rise in its political influence, which has subsequently facilitated its rapid growth and stimulated socio-economic activities. This has consequently led to the expansion of its spatial boundaries, increasing from approximately 16 square kilometres in 1980 to around 30 square kilometres in 2000, as documented by the Ministry of Works, Lands and Housing in 2000. The urban population had a notable increase, rising from 38,852 individuals in 1952 to 71,106 people in 1963. According to the DHV report in 1985, the estimated population of the area was 112,850 in 1980. Subsequently, the Ondo State of Nigeria report in 1990 indicated that the population had increased to 157,947 by that year. According to the 1991 census, the population of Akure was recorded to be 324,000. According to the data provided by the Federal Government of Nigeria in 2007, the population of Akure was reported to be 353,211, occupying a land area of 331km². By the year 2015, it is estimated that the population of Akure would reach around 1.8 million people. The estimated number is anticipated to arise as a consequence of the influence of industrial expansion. The state has lately been designated as an oil-producing state, whilst Akure has been classed as a Millennium Development City. It is anticipated that these many elements would have a significant impact on the demographic expansion of the city. Akure saw a heightened pace of development and had more significant challenges in comparison to other municipalities in Ondo State after its establishment as a state capital in 1976 [2]. According to the 2006 Population Census, the city's population is recorded as 353,211, occupying a land area of 331 km².

3. Literature Review

The process of waste management or waste disposal encompasses a comprehensive range of activities and measures that are necessary for the effective handling of trash from its initial generation to its ultimate disposal [13]. This encompasses many activities such as the gathering, conveyance, processing, and elimination of waste, in addition to the oversight and governance of these processes. Furthermore, it comprises the whole legal and regulatory framework pertaining to waste management, including guidelines on recycling practises, among other related aspects. The term typically encompasses various forms of waste, which may arise from activities such as raw material extraction, raw material processing into intermediate and final products, consumption of final products, and other human endeavours [13]. This includes waste from municipal sources (residential, institutional, commercial), agricultural activities, and social sectors (health care, household hazardous waste, sewage sludge) [7]. The primary objective of waste management is to mitigate the detrimental impacts of trash on human health, the natural environment, and visual appeal.

There exists a lack of uniformity in waste management practises throughout many countries, including both developed and developing nations. Additionally, disparities may be seen across different locations, such as urban and rural areas, as well as between different sectors, including residential and industrial sectors [3]. Cities in emerging economies and economies in transition have significant challenges in waste management, particularly in relation to depleted garbage collection services and the poor management of unmanaged dumpsites. These difficulties are progressively deteriorating over time. The presence of governance issues further complicates the scenario. The management of waste in the aforementioned nations and cities is a persistent problem characterised by many difficulties stemming from inadequate institutional capacity, chronic lack of resources, and fast urban growth. The treatment of trash is influenced by a multitude of obstacles, compounded by a limited comprehension of the many elements that contribute to the hierarchical structure of waste management.

Waste Generation and Management in Akure

The quantity of solid waste produced in Akure has shown a consistent upward trend, with estimates indicating a rise from around 60,000 metric tonnes annually in 1996 to 75,000 metric tonnes in 2006. This escalation may be attributed to factors such as population growth, as well as the expansion of industrial and commercial activities within the region. The population of Akure had a significant growth from an estimated 283,108 individuals in 1996 to roughly 983,211 individuals in 2016. A feasibility study on waste management in Ondo State was done by the government in 2000 [8]. The findings of the research indicate that the primary sources of garbage are homes, abattoirs, poultry farms, piggeries, marketplaces, and small-scale companies. The collective daily creation of waste from these sources amounts to 280 tonnes. The comprehensive evaluation indicated that about 80% of the overall waste consists of organic materials, with plastic/nylon accounting for 15.72% and metal comprising around 1% [1]. In recent times, there has been a significant surge in the proportion of plastic and paper materials within the recycled waste stream. The cause may be attributed to the significant demand for sachet water resulting from the scarcity of potable water in Akure, coupled with the escalating utilisation of packaging materials like polyethylene terephthalate (PET) bottles and bags. It is worth mentioning that a significant amount of the present valuable industrial solid waste consists of recyclable plastic garbage, which mostly originates from sachet water producing enterprises.

4. Methodology

The study was carried out in three distinct stages: data collection, analysis, and post-analysis, respectively. The first stage involves the collection and compilation of relevant

information and data. Significant data, including both primary and secondary sources, was collected in this study to facilitate the research process.

Research Population

This refers to all the people, agencies and ministries that are relevant to the study. The research population for this study includes; the inhabitants of Oba-Ile in Akure North LGA of Ondo State, Officers in the Ministry of Environment and Ondo State Waste Management Authority (ODWMA) interviewed in the course of this study. The total number of buildings in the study area was 3,035 (as shown in Figure 3). With a total building of 3,035 and an average household size of 5 [14], an estimated population figure of 15,175 are in Oba-Ile.
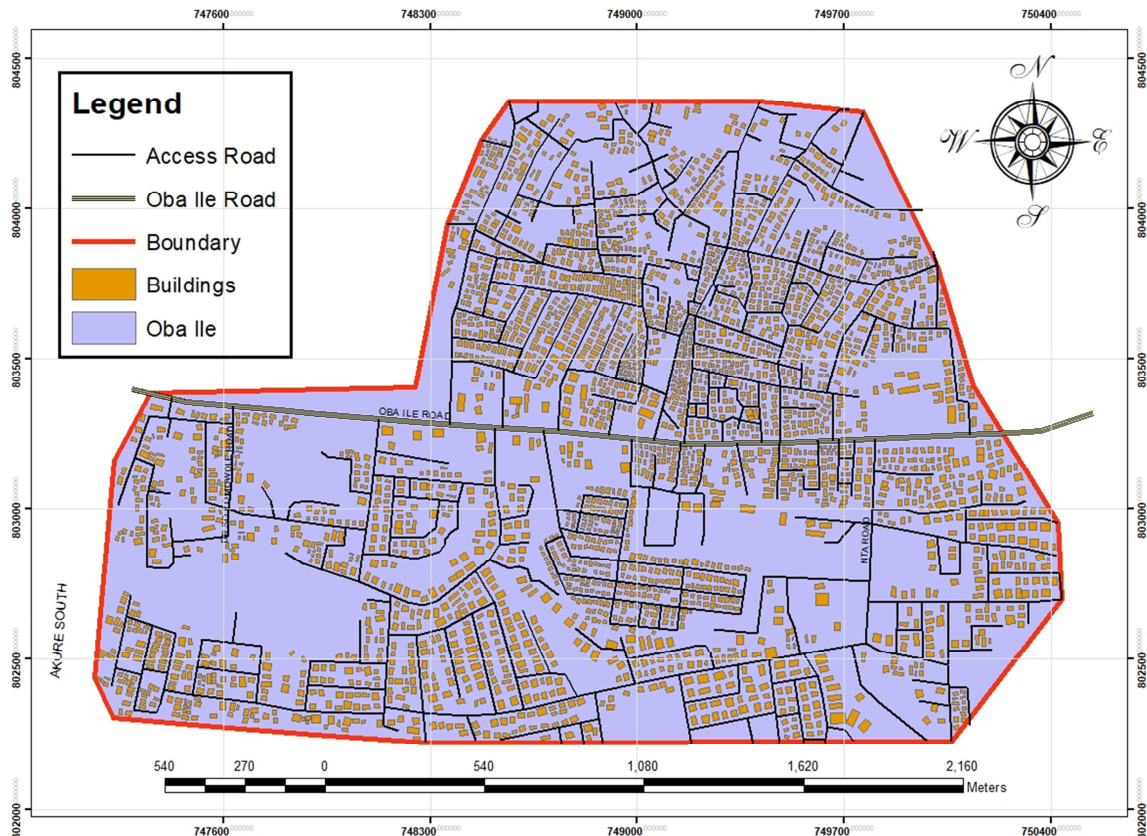

Figure 3. *Buildings in the study area.*

The sample size is the number of population elements that were selected for this research. In line with this, one percent (1%) of the sample frame (15,175) was adopted. This is in line with the assumption of [4, 6] that a larger population permits a smaller sampling ratio for an equally good sample because, as the population grows, the return in accuracy for sample size shrinks. The percentage of sample frames picked determined the number of copies of the questionnaire administered in the study area. The total number of questionnaires administered in the study area amounted to 152. This number was easy to manage, and it gave a true representation of the study area. The data obtained from the field survey work would be analysed using descriptive and inferential statistics. It would be analysed using the Statistical Package for Social Science (SPSS 16.0) version, pie charts, and bar charts. Descriptive statistics would be used in evaluating the value of independent variables in the data set.

5. Data Analysis

5.1. Waste Collector in the Building

Waste collectors in the buildings of respondents were assessed, analysed, and presented in Figure 4. 23.0% of the respondents use waste bins; 69.1% of the respondents make use of roadside containers; and 7.9% of the respondents dig holes to collect their waste. This helps us know how residents of the study area store their waste temporarily before disposal. Figure 5 show one of the roadside containers used for temporarily storing waste before disposal.
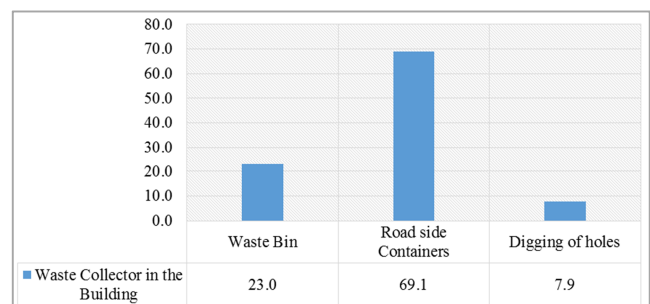

	Waste Bin	Road side Containers	Digging of holes
Waste Collector in the Building	23.0	69.1	7.9

Figure 4. *Waste Collector in the Building.*

Figure 5. Roadside Container.

5.2. Method of Waste Disposal

The various methods that were adopted by respondents for disposing of their waste were assessed and analysed. According to the survey (as interpreted in Table 1), 16.4% of respondents burn their waste at a designated location (as shown in Figure 7), 3.3% of respondents make use of an incinerator, 11.2% of respondents dispose their waste in nearby bush, 1.3% of respondents dispose their waste into drainage when it is raining, 0.7% of respondents bury their waste, and 67.1% of the respondents make use of waste collectors (Figure 6 shows a truck collecting waste in the study area). It was discovered that some of these respondents still dispose of their waste in an unhealthy way, thereby causing harm to the environment.

Table 1. Method of Waste Disposal.

Method of Waste Disposal	Frequency	Percentage (%)
By Burning	25	16.4
Use if Incinerator	5	3.3
Nearby bush	17	11.2
Moving River	0	0
Disposing into drainage	2	1.3
Burying	1	0.7
Waste Collectors	102	67.1
Total	152	100.0

Figure 6. Truck Collecting Waste in the Study Area.

Figure 7. Dump Site Used by Resident of the Study Area.

5.3. Rate of Fee Collected

Accessing the fee collected by waste collectors became necessary because most of the respondents make use of the services of waste collectors to dispose of their waste. According to Figure 8, 30.9% of the respondents are of the view that the fee collected is relatively high, 47.4% of the respondents are of the view that the fee is moderate, and 21.7% of the respondents feel that the fee collected by the waste collected is relatively low. The higher the fee collected, the higher the level of patronage, and vice versa.
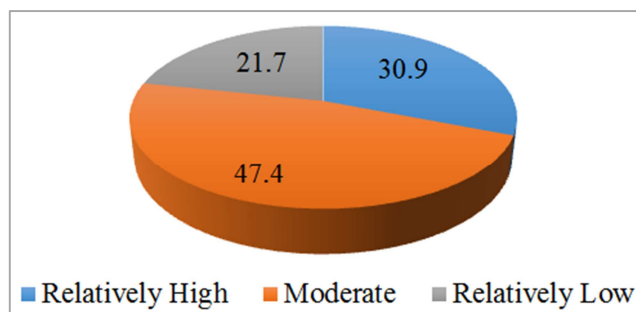

Figure 8. Rate of Fee Collected.

5.4. Waste Collection Time Interval

The time interval of waste being collected was assessed, analysed, and interpreted in Figure 9. 37.5% of the respondents said waste collectors come once a week, 1.3% said they come twice a week, 51.3% said they come once every two weeks, and 9.9% of the respondents said they come once a month.
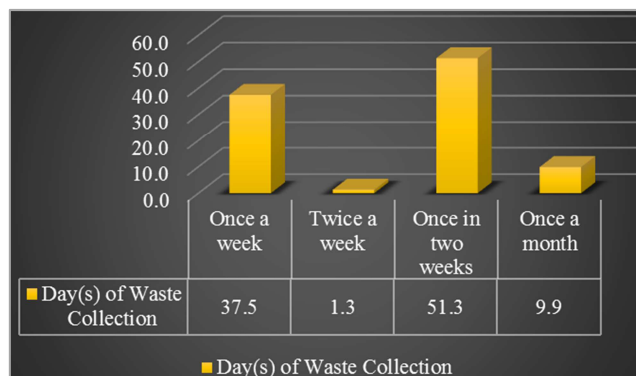

Figure 9. Day(s) of Waste Collection.

5.5. Neatness of the Environment

Respondents were asked to rate the neatness of their environment so as to know how and where to improve. According to Figure 10, 28.9% of the respondents said their environment is very neat; 42.8% of the respondents said their environment is neat; 21.1% said their environment is dirty; and 7.2% of the respondents said their environment is very dirty. Though the largest percentage of respondents said their environment is dirty, there is a need to take note of the dirty environment for necessary and urgent actions.
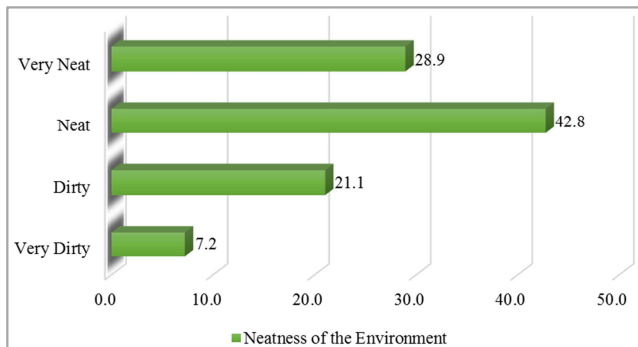
Figure 10. *Neatness of the Environment.*

5.6. Major Problem Encountered

The major problem encountered by respondents in disposing of their waste was assessed, analysed, and presented in Table 2. It was discovered that the major problem encountered by most of the respondents in disposing of their waste is an inadequate storage facility (34.9%), followed by other problems that include a lack of technical know-how, an inadequate or inappropriate waste disposal vehicle, and poor customer service (27.6%), followed by inconsistency among waste collectors (20.4%) and high charges (17.1%).

Table 2. *Major Problem Encountered.*

Major Problem Encountered	Frequency	Percentage (%)
Inadequate storage facility	53	34.9
High charges	26	17.1
Inconsistency of waste collectors	31	20.4
Others	42	27.6
Total	152	100.0

5.7. Awareness of the Dangers of Improper Disposal of Waste

Respondents were also asked if they were aware of the dangers attached to improper disposal of waste; the result is shown in Figure 11. 73.7% of the respondents are aware of the dangers of improper waste disposal, while 26.3% are not. This implies that 26.3% of the respondents contribute greatly to improper waste disposal because they are not aware of the dangers attached to improper waste disposal.
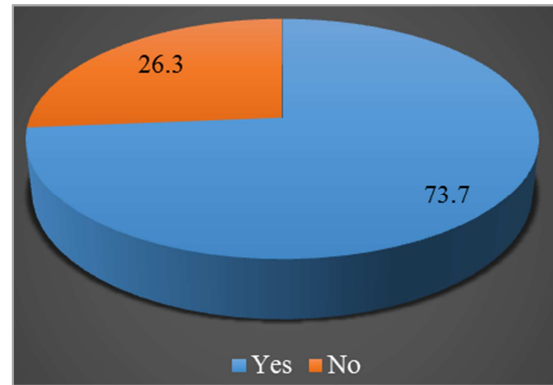
Figure 11. *Awareness of the Dangers of Improper Disposal of Waste.*

6. Conclusion and Recommendation

The study was conducted to assess domestic waste management in Oba-Ile, Akure, Ondo State. Some of the findings of this study includes: most of the respondents give their waste to waste collectors for disposal while others dispose their wastes themselves (either by burning, use of incinerator, dispose in nearby bush, dispose into drainage or by burying); the fee charged by waste collectors is moderate but more people will like to patronize the waste collectors if the fee is reduced; the major problem encountered by residents of the study area is inadequate storage facilities; lack of technical know-how, inadequate/inappropriate waste disposal vehicles, poor customer service, inconsistency of waste collectors and high charges; waste collectors come to collect waste once in two weeks but in an interview with a resident in the study area, waste collectors fail to come (sometimes) which makes waste accumulate resulting into an unhealthy environment. Everyone is aware that the environment as a whole can never be perfect. Upgrading the environment brings a new look to the environment, known as the urban renewal process. The study area was in poor condition at the time of this research, but with some advancement in order to make the estate grow bigger and cleaner in aspects of waste management, The study hereby recommends that the Ondo State Government should pay more attention to waste management by training and retraining members of staff, providing adequate and efficient waste collection vehicles, and reducing (if possible) charges (which will encourage more patronage). Also, a recycling unit should be designed in the estate so that the waste generated will be recycled and produce some better materials that would be useful for the entire human race. Also, there should be public awareness and education on the dangers of improper waste disposal methods and an unkempt environment, as it was discovered that there were people who disposed of waste in an unhealthy manner and there were people who did not know the dangers attached to improper waste disposal. Making principles and laws to guide waste disposal in the study area will assist in determining how waste should be managed in the area and how these laws should be enforced. Also, a recommendation of principles binding and guiding waste in Nigeria should be enacted so as

to put a control on the waste production of the estate. Also, the agency in charge of waste management in Ondo State should introduce initiatives on how waste should be collected in the study area.

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