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Public Perception of Solid Waste Management Practices in Nigeria: Ogun State Experience

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Abstract: The effects of poor solid waste management practices in many developing countries have been identified in the literature. This study focuses on understanding the public perception and attitudes of people towards local waste management practices. Five Local Government Areas in Ogun State, Nigeria, were selected based on population, landmass, spatial location, and distribution. The study used a survey that looked into the socio-demographics, household characteristics, and standard solid waste disposal practices at the household and municipal levels. Factors such as frequency of waste collection, presence of environmental task force/protection agency, and level of effectiveness of such task force/agency were all investigated. The study verified the impact of people's attitudes towards waste management, as well as the effects of monitoring and control on the management of waste. The results showed that significant factors such as age, income, and education levels affect the perceptions, practices, and attitudes of the people towards solid waste management. An average of 36.6% of the people in the selected local governments dispose of their solid wastes at open dumps, with the majority of the residents (54.4%) still with the opinion that sanitation services are too costly and should be the prerogative of the local and state governments to carry out. These outcomes resonate that more efforts by the government and relevant stakeholders should be put into proper enforcement of environmental laws, as well as creating awareness on proper solid waste management practices in schools and public places.

Keywords: municipal solid waste; waste management; community practices; public perception; environmental laws; waste management efficiency

1. Introduction

One of the major concerns of both urban and rural communities in Nigeria is the issue of waste management. One such concern is that developing countries like Nigeria spend up to 50% of their budgets on solid waste management (SWM) but collect no more than 80% of the generated garbage [1]. Solid waste management thus emerges as one of the greatest challenges facing state and local government environmental protection agencies in Nigeria. In Nigeria, heaps of uncollected garbage pollute the environment and contribute to higher rates of diarrhoea and acute respiratory infections among people, not only those living around the garbage dumps [2]. Nigeria is projected to have a population of over 214 million people by July 2020 and 392 million by 2050 [3], and is known to be one of the largest producers of solid waste [4]. Solid waste encompasses all waste spawning from both human and animal activities. Some examples include by-products of materials such as household wastes like food leftovers, empty cartons, and polythene packages/bags that may be obligatory to be disposed of by law [5–7]. Recently, there has been an exceptional increase in the volumes of daily waste generation in the country due to various reasons, such as an increase in population, urbanization, and industrialization, as well as economic progression [7–9]. In Nigeria, 52% of the population live in urban areas and the average annual population growth rate is at 2.53% in 2020 [3].

Studies show that Nigeria generates well over thirty-two million tons of solid waste annually, of which only a low percentage (20–30%) is collected and recycled [4]. The industrialisation has metamorphosed waste management into an issue beyond control. The spate at which wastes are being generated has not been met with measures put in place by various governments. Furthermore, many urban regions lack a compelling waste management structure. As a result, most urban family units depend on indiscriminate practices like the careless dumping, burning, or burying of their solid waste within their vicinities [4,10].

The problem of waste management in Nigeria can also be accredited to the lack of public policy enabling legislation and an environmentally stimulated and enlightened public [7]. Even though laws and regulations were formulated and presented in the past, there has not been any functional infrastructure for their implementation. A case-in-point was the establishment of the Federal Environmental Protection Agency (FEPA) in 1981. The outcome of this act brought about resurgence of many states within the federation establishing their own waste management authorities for the safety and development of the environment. However, the regulations set for operations were unsuccessful because of the absence of effective sanctions, coupled with economic considerations that are deficit of knowledge of interdependent linkages among various processes involved in both human and environmental resources to mitigate the myriad of waste management challenges [11–13]. Suitable policy and organised mechanisms for execution are vital for sustaining a sound waste management system. Where the policy is weak, or there is no legitimate implementation of laws and controls or the general society is not appropriately enlightened, waste management becomes a critical challenge. Given the circumstances depicted above in numerous urban territories, diverse Nigerian urban areas have been portrayed as filthy and unsanitary [14]. It is, therefore, apparent that solid waste management remains a significant issue that requires urgent attention in Nigeria.

Lutui [15] identified five approaches that apply to the concept of waste management studies. Each of the five strategies identified by Lutui puts specific methodologies into effect and is influenced and directed by certain patterns and theoretical ideas. They include engineering, environmental, scientific, economic, and behavioural approaches. The behavioural approach, which this study hinges on, focuses on how the management of waste can be a function of various human attitudes and perceptions. Some studies employing this approach were conducted within Nigeria. A typical example is a study by [16], which investigated the attitude of urban dwellers towards disposal and management of waste in Calabar, Nigeria.

Most studies have shared different perspectives to waste management issues but the underlining factor that borders on people's perception has not been dealt with. This study, therefore, engaged the collective behaviour concept of humans and the behavioural approach to waste management studies, to understand and unveil the perceptions of the people of Ogun State towards waste management practices from the selected study areas of the state. The focus was also placed on employing public opinion, by understanding the public perception and attitudes of people towards local waste management practices in assessing the level of performance of solid waste management enforcement laws and initiatives in general across the nation. The structure and functions of effective community participation are based on peoples' perceptions. Truth be told, attitudes and perceptions greatly influence institutional and social context. Therefore, this paper is structured to take into account the study area, methodology (data collection, questionnaire administration, data analysis, observation from field survey), results and discussions, analysis of solid waste management practices and respondent perceptions, summary, and conclusion and recommendations.

2. Methodology

2.1. Study Areas

Ogun State is located in the south western region of Nigeria with coordinates, 7°00′ N 3°35′ E, having an estimated area of 16,980.55 km^2 and a population of 3,751,140, with a density of 220/km^2,

according to the last census in 2006. It borders Oyo and Osun states to the north, Lagos state to the south, Republic of Benin to the west, and Ondo state to the east. Figure 1 shows a map of Ogun State, showing its various local government areas and the selected ones in circles.
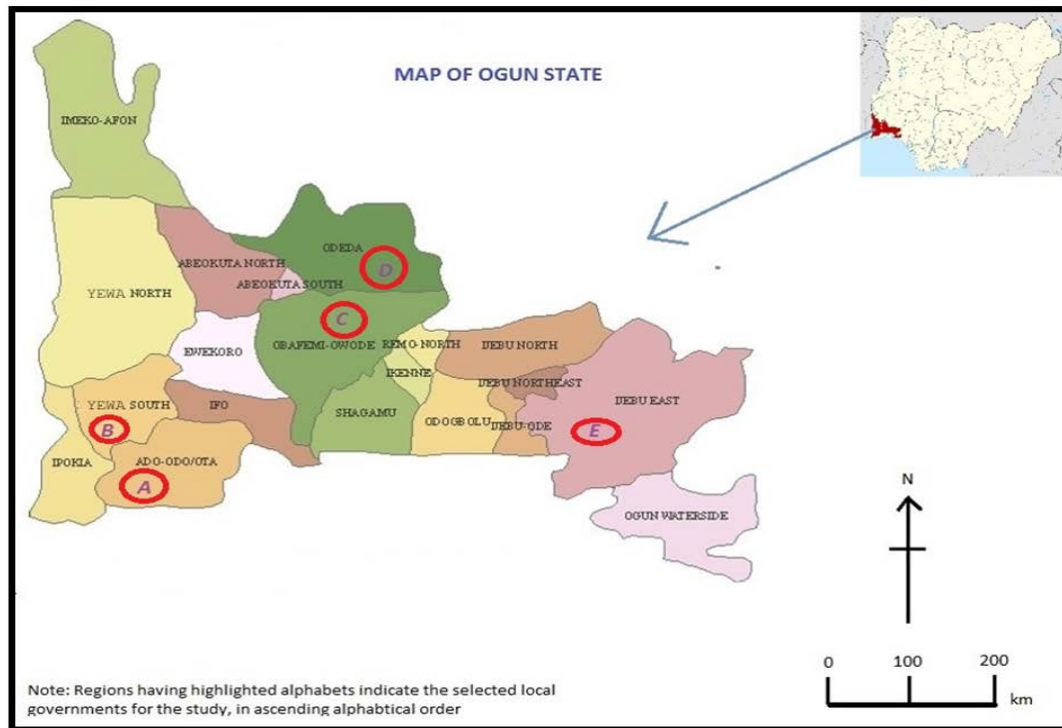
Figure 1. Map of Ogun State, showing its various local government areas. Adapted from [6].

Five Local Government Areas within Ogun State were selected for this study, and the bases of selection were on population, landmass, and spatial location. The Local Governments selected were as follows.

2.1.1. Ado-Odo/Ota

Ado-Odo/Ota has an area of 878 km^2, and its headquarters are at Ota, which borders on the Lagos metropolis. It came into existence on 19 May 1989. It has a population of 526,565, as shown by the last population census in 2006. It is home to prominent towns such as Ado-Odo, Agbara, Igbesa, Iju-Ota, Itele, Owode, and Sango Ota. The Local Government Area is famous for containing a significant number of prestigious secondary and tertiary institutions such as The Ambassadors College, Bells University of Technology, Covenant University, and a host of industrial and commercial establishments.

2.1.2. Yewa (Egbado) South

Yewa South (formerly called Egbado South) lies on the west of the state and borders the Republic of Benin. Its headquarters are at Ilaro, 6°53′00″ N and 3°01′00″ E. It has an area of 629 km^2, and its population was put at 168,850 as of the 2006 population census. Indigenes of this region speak the Yewa and Egun local dialects of the Yoruba language. It also consists of ten districts or villages: Iwoye, Itoro, Idogo, Ilaro, Owode, Ilobi, Ajilete, Oke-Odan, Ijanna, and Erinja, all headed by traditional rulers called Obas or Royal Fathers.

2.1.3. Obafemi-Owode

Obafemi-Owode is headquartered at the town of Owode Egba, 6°57′ N and 3°30′ E, and has an area of 1410 km^2. Its population was set at 228,851 (estimated at 230,000), as at the 2006 population

census. It comprises of towns and villages with a landmass of 104,787.07 hectares of agricultural land. It also shares conventional boundaries with the following local governments:

i. Odeda Local Government (North).
ii. Abeokuta South (North-West).
iii. Ewekoro Local Government (East).
iv. Ifo Local Government and Lagos State (South-West).
v. Sagamu and Ikenne Local Governments (South-East).

2.1.4. Odeda

Odeda is another local government of Ogun State, having its headquarters at Odeda, 7°13′00″ N and 3°31′00″ E, and sharing a border with Ibadan, Oyo State to the north. Odeda has a total land area of 1560 km^2 and an estimated population of 109,449, as of the 2006 population census.

2.1.5. Ijebu East/Ijebu-Ode

Ijebu East (commonly known as Ijebu-Ode) is a Local Government Area in Ogun State bordering Lagos State and Lagos Lagoon in the south. Its headquarters are at Ogbere town. It has an area of 2234 km^2 and a population of 110,196, as of the 2006 population census.

2.2. Human Activities

The majority of the selected local government areas, such as Ado-Odo Ota, Ijebu-East, and Obafemi Owode, were observed to be dominantly engaged in industrial activities, as seen by the vast number of industries discovered in those areas. All five local governments have a considerable amount of commercial spaces, although the significant difference lies in the distance between various industrial regions within each of the selected areas; hence, local governments with comparatively smaller landmasses such as Ado-Odo Ota and Yewa South were observed to contain a higher number of the commercial regions or zones. The local governments with more significant landmasses, such as Obafemi Owode, Odeda, and Ijebu-East, were observed to be majorly involved in agricultural activities. Educational institutions within these local government areas were also seen to be predominantly government-owned or public, with a handful of private schools sparsely distributed across or concentrated within strategic regions of the local government areas. The field survey carried out commenced on 4 December 2017 and was completed on 9 February 2018.

A field survey was carried out with the primary aim of obtaining primary data to extract crucial information that would facilitate the study and enhance understanding of the diverse perspectives the public holds on waste management practices in Ogun State. The convenience (availability) sampling technique was used to select locations within the study areas. This type of sampling method relies on data collection from population members that are available to participate in the survey. The data from the study was analysed using descriptive statistics. Structured questionnaires were distributed in schools, marketplaces, homes, business centres, and workshops. These were the places where the survey could be easily assessed as it is easier to meet people and interact. More so, this is where significant amounts of wastes are being generated. So, one could get on the spot information and measure/compare information given with facts on the ground. Oral interviews were adopted to gather additional information and contributions from some of the residents in general. A total number of 500 questionnaires were administered and all were ensured to be completed in the course of the survey.

2.3. Data Collection

Data was obtained primarily via a questionnaire administered to the waste generators. Structured questionnaires were distributed randomly in households, marketplaces, schools, workshops, business centres, and public places within the study area. Data collected through the questionnaire survey were on the following variables: place of disposal, method of disposal, availability of bins for storing

waste, mode of collection and payment for the group, segregation practice, and the risk of improper waste management.

2.4. Structure of the Questionnaire

The structure of the questionnaire gave the respondents the liberty to express their views. The questionnaire was classified into five major sections, which were:

Section A—General Information/Socio-demographics:

The first section of the questionnaire inquired into general information of the respondent, such as age, sex, marital status, education level, occupation, and an estimate of average annual income level.

Section B—Household Characteristics:

This section inquired into the basic household characteristics of the respondent, such as the type of residence, total number of people in the house, etc.

Section C—Waste Management Practices at the Household Level:

This section examined the standard waste management method practiced within the residence of the respondent.

Section D—Waste Management Practices at the Municipal Level:

This section examined the standard waste management method practiced in the vicinity of the residence of the respondent.

Section E—Perceptions about Waste Management Practices:

This section contained a variety of critical questions that examined, in detail, the perspective held by the respondent on the issue of waste management practices concerning his/her immediate community.

2.5. Methods of Data Analysis

The data obtained were analysed using Descriptive Statistics. The International Business Machine IBM Statistical Package for the Social Sciences (IBM SPSS 20) was used to do the analysis and to generate relevant illustrations, tables, and charts to facilitate a better understanding of the study.

2.6. Observations Made during the Field Survey

Plastics, paper, and nylon wraps are the most frequently occurring type of solid waste, according to a significant percentage of the respondents in Ado-Ota, Yewa South, and Obafemi-Owode local governments. Some respondents admitted to burning their trash, others complained about their neighbours doing the same. The reason for such, according to them, was the high charges imposed by the waste collectors and at times, their ineffectiveness. Burning of waste and open dumping were standard practices in most areas where the waste collection trucks come only once a month, or never. Figures 2 and 3 show the current situations around compounds and environments of the locations visited during the survey. Figure 3 presents an open dump where scavengers come to pick recoverable materials which eventually would be sold to local companies for recycling purposes.

Figure 2. Open Dumping at the backyard of a residential compound at Owode LGA.

Figure 3. Cross-section of a vast open dump at Ado-Odo Local Government.

3. Results and Discussion

The results are separated into three sections. The first section shows a summary of the general information and describes the socio-demographic features and household characteristics of the respondents of the survey. The second section shows a detailed breakdown of the solid waste management practices of the respondents at the household and municipal levels. The third section discusses results on the responses provided by the respondents on their perceptions of solid waste management. Analysis of the links between critical socio-demographic features of the respondents and their practices and attitudes of solid waste management is presented later in the third section. Three identified variables were vital in establishing relationships between respondents' characteristics, methods, and perceptions in this study. They include age, education level, and annual income levels. The variables selected were based on the following two of the five limitations to effective waste management identified by [17], which are social limitations (for age and education level) and economic barrier (for annual income level), respectively. Other factors investigated include gender, occupation, frequency of collection, presence of an environmental task force/protection agency, and level of effectiveness of such task force/agency

3.1. Analysis of Respondents' Socio-Demographics

This segment presents a review of the demographic, social, and economic features of the respondents, believed to be representative of the entire population of Ogun State. It is vital to discuss the socio-demographics of any survey population as this is key to creating an understanding of the perceptions of the solid waste management practices of the respondents. The household characteristics of the respondents were also assessed.

3.1.1. Gender and Age Distribution

Table 1 shows the gender distribution of the survey population. The gender distribution obtained shows that 53.4% of the respondents were female while 46.6% were male, which serves as a good representative of Ogun state population, as the females are greater in number in the survey population as well as that of the entire State [18]. Age plays a vital role in the research of social as well as environmental issues as maturity might affect the level of awareness on sanitation and environmental health [19,20]. The results in Table 2 indicate that a majority (24.8%) of the respondents were mature adults, between 35 to 44 years of age, who are expected to possess a considerable level of reasoning and understanding of the concept of solid waste management, and who were able to provide answers to the survey questions to a high degree of certainty. The results also show a nearly even frequency distribution amongst a majority of the various age brackets across all five local government areas. The low figures of those who were 55 years old and above do not in any way imply a small proportion of

older people in the study areas, it merely refers to the number of such people under the age bracket who were willing to respond to the survey during the visit period.

Table 1. Gender distribution of the respondents.

Gender		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)
Valid	Male	45	48	43	46	51
	Female	55	52	57	54	49
Total		100	100	100	100	100

Table 2. Age distribution of the respondents.

Age		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)
	0–17 years	20	20	20	18	22
	18–24 years	21	22	22	26	19
	25–34 years	25	24	26	22	24
Valid	35–44 years	27	25	26	20	26
	45–54 years	4	6	4	10	5
	55 years and above	3	3	2	4	4
Total		100	100	100	100	100

3.1.2. Education and Annual Income Levels

Education level is included to help determine how much exposure and knowledge the respondents have acquired on the subject of solid waste management. The influence of this variable can also be a vital factor which could affect the perception of the public on solid waste management (SWM) [20]. The results, shown in Table 3, show that the majority of the respondents (38%) have at least attended secondary school, followed by those having first degrees from tertiary institutions (28.2%). A few, however (9.2%), admitted to not having attained any educational qualification whatsoever. Although small, this proportion could still negatively influence the perception of such people on solid waste management in general. It is unfortunate, however, that even amongst those claiming to have attained secondary or tertiary education, some still possess lackadaisical attitudes, as seen by the indiscriminate manner in which they dispose of their solid wastes.

Table 3. Education level.

Education Level		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
	None	8	9	7	10	12	46
	Primary School	16	17	15	24	26	98
Valid	Secondary School	41	37	40	40	32	190
	First Degree	32	33	32	21	23	141
	Others	3	4	6	5	7	25
Total		100	100	100	100	100	500

The average annual income level of the respondents is another crucial variable that could affect their practice and perception of solid waste management, as seen in the economic approach to waste management studies identified by Lutui [15]. The commercial plan identifies variables such as the Income Levels of People, to determine which method of waste management they deem most suitable to engage in [15]. Of the total survey respondents, 23.4% gave no response. They were either unemployed, students, in underpaid employment, or traders who could not provide exact estimates on their revenues due to the nature of their work, while some were merely hesitant to give an answer to the question.

The data obtained shows that of the 383 respondents that could provide estimates on their income level, only 11% earn above 500,000 naira annually, while 12.8% earn below 50,000 naira. The majority of the respondents (21.6%) earn between 250,000 to 500,000 naira annually. This indicates that the majority of the respondents are low-income earners who may engage in waste management practices that may be financially inconvenient for them and this would take a negative toll on their environment (Table 4).

Table 4. Income level.

Average Annual Income Level (naira)		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
	0–50,000	6	10	13	17	18	64
	50,000–100,000	14	8	15	23	24	84
	100,000–250,000	11	15	16	14	16	72
Valid	250,000–500,000	27	24	22	19	16	108
	500,000 and above	24	20	4	4	3	55
	No Response	18	23	30	23	23	117
	Total	100	100	100	100	100	500

3.2. Analysis of the Solid Waste Management Practices

3.2.1. Responses on Methods of Solid Waste Management

The results show that at the municipal level, however, the majority (36.6%) of the respondents dispose of their solid wastes at open dumps. This condition is because numerous regions within the study areas lack proper functioning waste collection services, and as such, the residents resort to alternative practices that are often unsafe and unsanitary. The majority (62.8%) of the respondents also admitted the presence of waste collection agencies running in their communities, but 24% stated that such agencies come around just once in a month, while a majority (26.2%) said such agencies do not come at all (Tables 5–7). Agencies that focus on environmental initiatives aimed at improving the environment could serve as a vital factor to positively change people's perception of effective waste management [21,22].

Table 5. Frequent disposal methods in municipalities.

Disposal Methods in Municipalities		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
	Burning	27	29	29	34	30	149
	Burying	3	3	4	12	14	36
Valid	Waste Collection Trucks	30	30	26	22	24	132
	Open Dumps	40	38	41	32	32	183
	Total	100	100	100	100	100	500

Table 6. Presence of waste collection agencies.

Presence of Waste Collection Agency		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
	Yes	78	70	77	49	40	314
Valid	No	16	25	13	36	39	129
	Not Sure	6	5	10	15	21	57
	Total	100	100	100	100	100	500

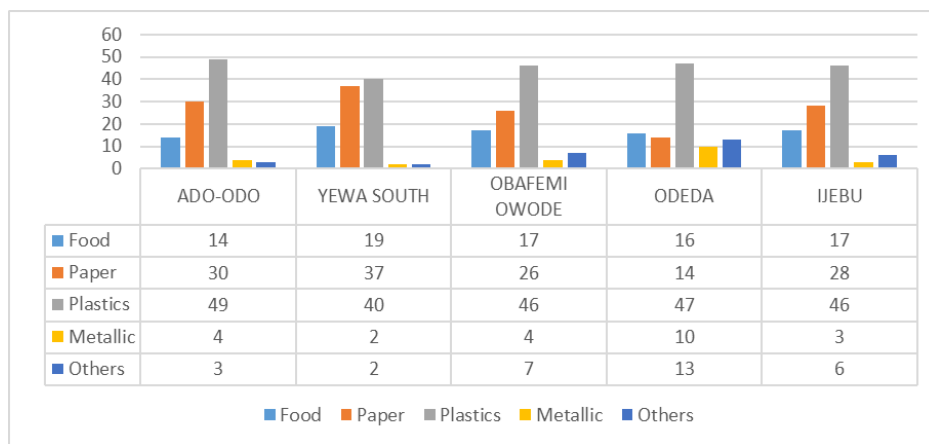### 3.2.2. Responses on the Types of Solid Waste Generated

The results show that across all five local government areas, plastics make up a majority (45.6%) of the type of solid waste generated by the respondents, followed by paper (27%), then 16.6% food wastes (Figure 4, Table 8). These statistics possibly rely majorly on the income level of the respondents,

as it is cheaper to purchase plastics and paper materials. The occupation of the respondents could also affect the solid waste generated [23]; for instance, school students and civil servants handling a lot of paperwork would most likely create higher volumes of paper waste than those working in stores or kitchens.

Table 7. Responses on the frequency of waste collection services.

Frequency of Collection		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Daily	16	19	18	8	7	68
	Weekly	20	23	22	14	15	94
	Twice/Thrice Weekly	11	8	9	6	5	39
	Every Two Weeks	12	10	12	7	7	48
	Monthly	29	32	28	20	11	120
	Never	12	8	11	45	55	131
Total		100	100	100	100	100	500

Figure 4. Responses on the most common types of solid waste generated.

Table 8. Responses on the most common types of solid waste generated.

Most Common Type of Solid Waste Disposed		ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Food	14	19	17	16	17	83
	Paper	30	37	26	14	28	135
	Plastics	49	40	46	47	46	228
	Metallic	4	2	4	10	3	23
	Others	3	2	7	13	6	31
Total		100	100	100	100	100	500

3.3. Perceptions of Solid Waste Management

3.3.1. Responses on if Solid Waste Collection Services are Efficient

This was an inquiry into whether the rate at which waste is collected meets up with the rate at which it is generated in the municipal areas. The reason was to find out whether the public waste disposal facilities get overfilled for extensive periods before collection. The result shows that across Obafemi Owode, Odeda, and Ijebu-East local governments, a majority of the respondents hold a negative perception. Some claimed a complete lack of such disposal facilities in their municipalities. However, most of the respondents at Ado-Odo and Yewa South local governments hold a positive perception (Figure 5).
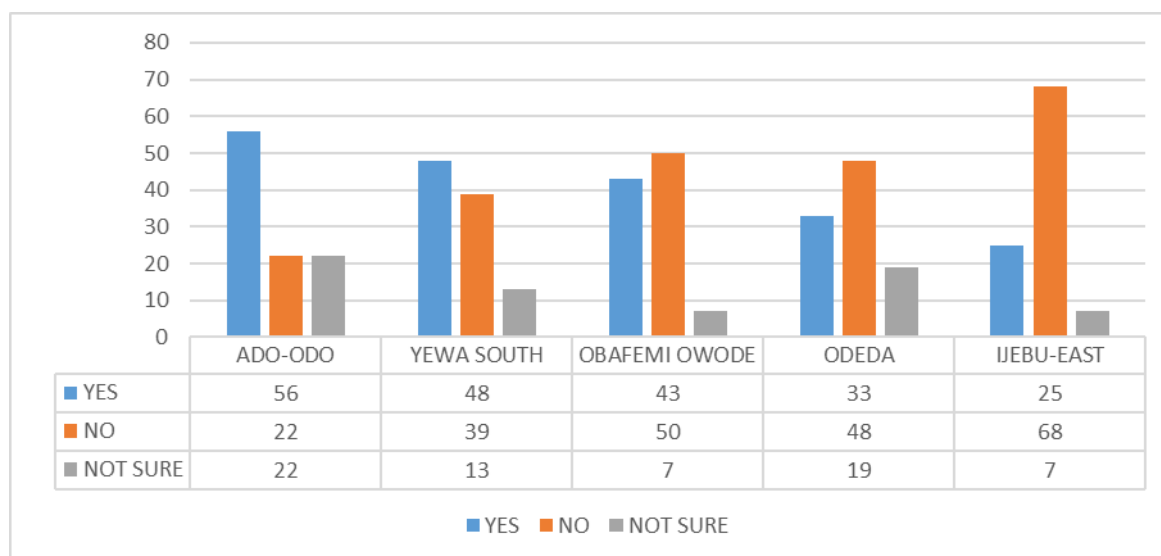
Figure 5. Responses on if solid waste collection services are efficient.

3.3.2. The Effects of Poor SWM on the Environment

Across all five local governments, the majority (38.8%) of the respondents expressed that it had posed a significant health risk to the public. Next to that were the respondents who felt it had resulted in an eyesore with the emission of foul odour into their environments. Some also complained that it had, in time, resulted in the release of leachates, which seeped into the soil and affected their groundwater (Table 9).

3.3.3. Willingness to participate in any SWM Improvement Initiative

This question looked into the desire of the respondents to participate in any improvement initiative concerning solid waste management, which could be presented to them. There was an 85.8% positive response across all five local governments on this question (Figure 6). Majority of the respondents were willing to contribute to the betterment of their environment in any way possible, regardless of their age, gender, occupation, educational or income levels, as a healthy, safe, and sanitary environment is an ideal condition desired by anyone in any given society [20].

Table 9. Responses on the effects of poor solid waste management (SWM) on the environment.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	A great risk to public health	42	40	46	30	36	194
	An eyesore—with foul odour emissions	26	21	15	28	26	116
	Groundwater contamination	16	13	18	17	14	78
	Others	1	0	1	0	2	4
	No response	15	26	20	25	22	108
	Total	100	100	100	100	100	500

3.3.4. The Cost Implications of a Municipal Solid Waste Management System

It is essential to consider the cost implications of having an effective municipal solid waste system on the public, as it could help to suggest reasons why they might engage in alternative methods [24]. The results show that although a majority (79.2%) of the residents agree that residents ought to pay levies or dues to sustain an efficient solid waste collection service in their communities, a significant

proportion (54.4%) still feel that such services are too costly for them (Figure 7). This should come as no surprise, because as stated earlier, the majority of them are low-income earners with families to take care of and bills to pay. According to one of the residents interviewed at Yewa South during the survey, the agencies incur high monthly charges on the residents for their collection services. Some complained that even after paying such fees, the collection agencies are often inconsistent in providing their obligated services. Little wonder that in a bid to avoid paying such costs and getting poor satisfaction, most of them resort to less-costly methods like burning or open dumping. Table 10 provides responses on whether dues or fees ought to be paid in order to set up an effective municipal solid waste management system.
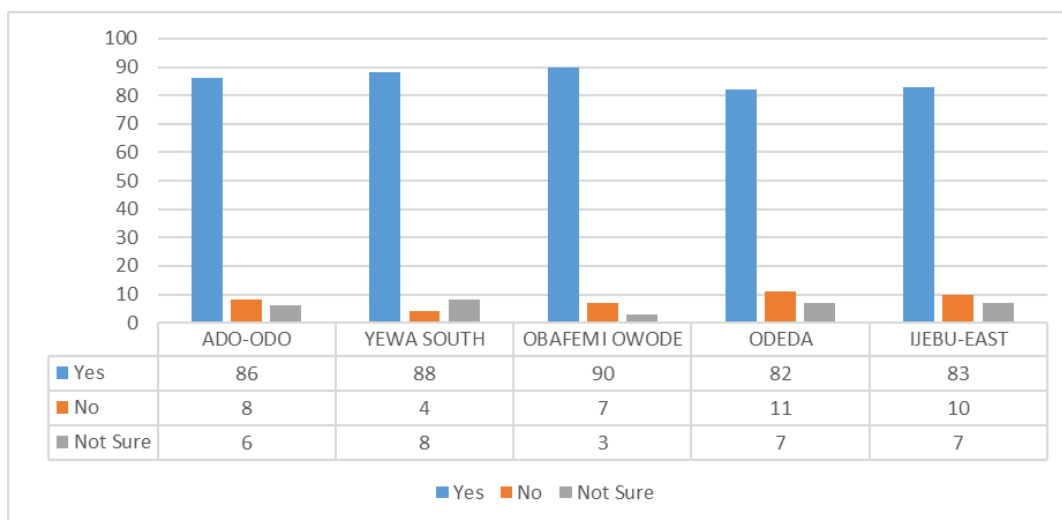

	ADO-ODO	YEWA SOUTH	OBAFEMI OWODE	ODEDA	IJEBU-EAST
■ Yes	86	88	90	82	83
■ No	8	4	7	11	10
■ Not Sure	6	8	3	7	7

Figure 6. Responses on willingness to participate in any SWM improvement initiative.

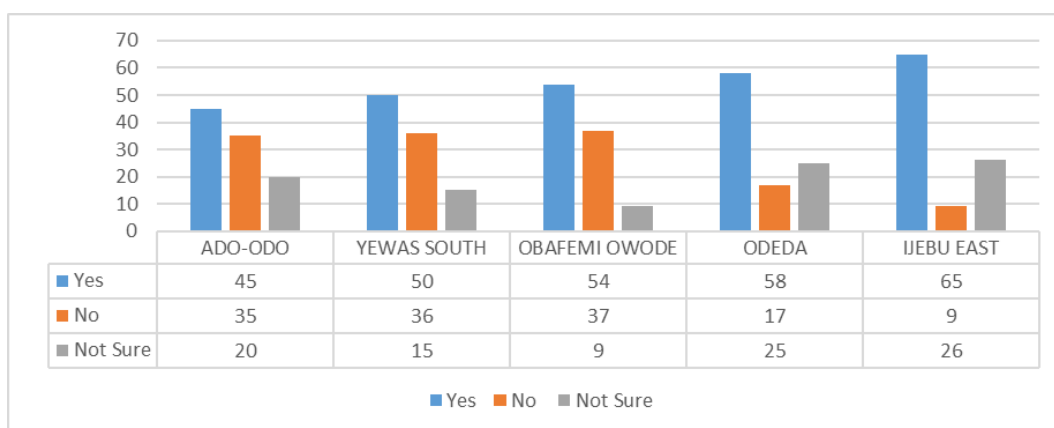|	ADO-ODO	YEWAS SOUTH	OBAFEMI OWODE	ODEDA	IJEBU EAST
■ Yes	45	50	54	58	65
■ No	35	36	37	17	9
■ Not Sure	20	15	9	25	26

Figure 7. Is SWM a costly endeavour to the community?

Table 10. Responses on whether dues or fees ought to be paid in order to set up an effective municipal SMWS.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
	Strongly Agree	48	41	37	33	29	188
	Agree	41	45	43	41	38	208
Valid	Not Sure	8	12	13	15	14	62
	Disagree	2	2	6	8	14	32
	Strongly Disagree	1	0	1	4	4	10
	Total	100	100	100	100	100	500

3.3.5. Relevance of Education and Awareness to Fostering Good SWM Practices

Knowledge is key to driving a positive influence on any issue or situation. The results of this query indicate that the majority (53.2%) agree with this notion (refer to Table 11). Awareness campaigns in public places can positively influence how they manage their solid waste as well as encourage their recycling habits [25]. Education courses or programs in schools is of supreme importance as children ought to be taught the importance, techniques, and benefits to engage in proper waste management practices at very tender ages, for such training to become a secure and regular manner of taking care of their environment as they mature [19,25]. Furthermore, by engaging in awareness initiatives, the public can be adequately enlightened on the potentially harmful risks to health and environment if they persist in such contrary waste management practices.

Table 11. Responses on the relevance of education and awareness to good SWM practices.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Yes	69	60	58	42	37	266
	No	29	34	30	45	44	182
	Not Sure	2	6	12	13	19	52
	Total	100	100	100	100	100	500

3.3.6. Perceptions on Littering, Presence of Environmental Task Forces, and Their Effectiveness

The results of this query show that 74% of the respondents hold a positive stance that littering or throwing of waste on the streets or roadsides should attract penalties in the form of imprisonment, paying of fines, or compulsory community service, if such perpetrators are caught (Table 12). Littering is a significant challenge observed in many rural and low-class urban areas within Ogun State and Nigeria as a whole [24]. It is most rampant in areas where there is an acute lack of sufficient waste disposal facilities, human resources, and proper enforcement that curbs indiscriminate practices such as littering, burning, or open dumping [4,18]. Beyond the provision of adequate waste disposal facilities and the operation of more efficient waste collection agencies, enactment of environmental laws or policies and the enforcement of such are equally important factors to consider in ensuring not only a cleaner and healthier environment, but also in shaping positive attitudes and behaviours of the public towards managing solid waste [20,22]. Proper enforcement, above all, complements any effort by a government or private individuals or corporations, aimed at the betterment of the environment. Agencies such as the Lagos State Waste Management Authority (LAWMA) and the Ogun State Environmental Protection Agency (OGSEPA) have been set up to ensure safer and more sanitary environments [7]. The results show that a majority (55%) of the respondents acknowledged the presence of ecological task forces in their communities, but of this category, only 27.2% showed a positive perception of the effectiveness of the task forces. The majority (56.4%) showed a negative impression of their effectiveness, especially at Obafemi Owode, Odeda, and Ijebu-East local governments (Tables 13 and 14). This indicates that across the five local government areas, the agencies or task forces delegated to ensuring compliance with environmental laws exhibit generally poor performance. Possible reasons for this are lack of adequate workforce, solicitation or bribery of the agents or officials, insufficient mobilization (financial and otherwise) for such agencies, and poor dedication of such officials to their jobs. As a result, members of such communities continually engage in wrongful waste management practices without fear of apprehension [26]. Figure 8 presents the views of the respondents on whether penalties be given to offenders for littering the environment.

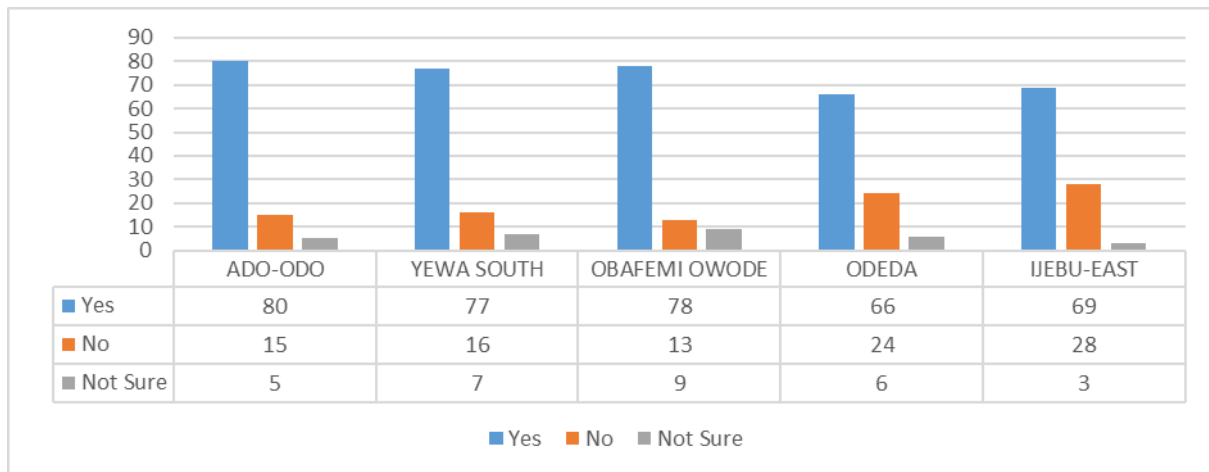**Table 12.** Perceptions of the respondents on littering.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Yes	80	77	78	66	69	370
	No	15	16	13	24	28	96
	Not Sure	5	7	9	6	3	34
	Total	100	100	100	100	100	500

Table 13. Responses on the presence of environmental task forces.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Yes	62	58	59	49	47	275
	No	30	29	31	43	45	178
	Not Sure	8	13	10	8	8	47
	Total	100	100	100	100	100	500

Table 14. Responses on the effectiveness of the environmental task forces.

	Responses	ADO-ODO (%)	YEWA SOUTH (%)	OBAFEMI OWODE (%)	ODEDA (%)	IJEBU-EAST (%)	TOTAL (%)
Valid	Very Effective	11	9	6	4	3	33
	Effective	14	11	8	6	3	42
	Moderate	10	12	9	8	6	45
	Ineffective	12	12	19	18	20	81
	Very Ineffective	6	10	18	21	19	74
	Missing	47	46	40	43	49	225
	Total	100	100	100	100	100	500

	ADO-ODO	YEWA SOUTH	OBAFEMI OWODE	ODEDA	IJEBU-EAST
■ Yes	80	77	78	66	69
■ No	15	16	13	24	28
■ Not Sure	5	7	9	6	3

Figure 8. Should littering attract penalties?

4. Summary

This study was motivated by the need to look into environmental pollution, which has been observed as one of the significant challenges prevalent in most parts of Nigeria, as well as developing countries of the world, in a bid to discover its origin, the key factors responsible, and most importantly, a way out. The research involved conducting academic surveys via distribution of questionnaires to evaluate the functionality of municipal solid waste systems in Ogun State, Nigeria, and to understand various perceptions of the public on solid waste management practices across the selected local governments in the state.

The specific objectives of the study were to:

i.   Appraise the nature of solid waste generated in the study area.
ii.   Study how individual factors (demographical, financial, psychological, or social) could affect the perception of the public towards solid waste management.
iii.   Understand the solid waste disposal practices of people in various locations within the study area.
iv.   Investigate the adverse effects of improper solid waste management on the environment and public health.
v.   Discover the willingness of the people to partake in any provided initiative aimed at improving the state of waste management in their environment.

The results of the analysis of the data shed light on several prevalent gaps in the municipal solid waste management system, which include inadequate waste disposal facilities, deficiencies in solid waste collection services, indiscriminate practices, open dumping and burning of solid waste, and a host of other challenges discussed in the fourth chapter.

Some challenges were encountered on the field survey, which included:

i.   Language barrier.
ii.   Low level of literacy of some respondents.
iii.   Hostility by some of the respondents.
iv.   Solicitation by some of the respondents.
v.   Distance of travel to some of the study areas.

5. Conclusions

The survey shows that critical factors such as age and income and education levels affect the perceptions, practices, and attitudes of the people of Ogun State towards solid waste management, with income level taking a prime position amongst the other factors. The efficiency of municipal solid waste agencies also influences the practices of the public. In regions where efficiency was low, the people resort to burning, open dumps, and burying as alternative means of disposing of their waste. The structure of solid waste management in Ogun State is handicapped by issues such as lack of proper funding, insufficient facilities and workforce, lack of an adequate number of well-engineered sanitary landfills, as well as the lack of sufficient, consistent, and affordable solid waste collection services. There is a generally poor performance when it comes to enforcement of environmental laws which dictate how people handle their solid waste. All these challenges propel many residents of the state to embrace other alternatives for managing their waste, which becomes detrimental to their health and the environment in the long run. Regarding awareness initiatives, it is evident that more effort ought to be put into creating awareness on proper solid waste management practices in schools and public places. The research shows that burning and open dumping are admittedly the most common practices engaged in by residents of the state. The results of the survey also indicate that public engagement in waste management is unsatisfactory, as most residents feel that the responsibility of efficient municipal solid waste management schemes for a cleaner and safer environment lies on the government alone. Therefore, it can be concluded that in the study area, the majority of the public hold a negative perception of solid waste management practices.

6. Recommendations

Based on the outcomes of this study, the following recommendations are therefore proposed to assist in achieving an acceptable solid waste management structure in Ogun State:

i.   Involvement of all stakeholders in the process: the general public, government bodies, as well as public and private institutions and corporations.
ii.   Enforcement of stricter waste management laws in each community.

iii.   Homes, shops, and other places of activity in the study area ought to have a proper collection of waste, which should be done daily, plus a provision of more central waste collection bins, to ease disposal and the proximity to households.

iv.   Sorting out of useful wastes should be a practice more engaged in by the people of Ogun State to encourage recycling habits, thereby lowering the volumes of waste generated or disposed of.

v.   There should be stricter enforcement of environmental by-laws regarding sanitation by the Ogun State Environmental Protection Agency (OGSEPA), wherein the laid-out penalties for violations should be meted out with urgency.

vi.   There should be environmental laws designed that mandate all property owners to see to the cleanliness of their houses and surroundings.

vii.   Increased education/awareness programs for the public on the subject of solid waste.

viii.   Adoption of a do-it-yourself attitude by the people of Ogun State to address the problem. This approach entails them engaging in constant clean-up activities, besides the mandatory monthly environmental sanitation exercise done on the last Saturday of every month.

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