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Assessment of waste collection and disposal methods in Akure markets

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ABSTRACT

The management and disposal of market waste have become an issue of concern to various environmental stakeholders. The need for traders to develop positive attitudes has become imperative in view of the littering and unhealthy conditions of markets in recent years. The study investigates waste management in Akure markets with a view to providing insight into the disposal of waste in the selected areas. This study investigated waste management in Akure markets to gain insight into waste disposal practices. Systematic random sampling was adopted to administer a questionnaire to two traders in the market area while purposive sampling techniques were adopted to administer questionnaires to buyers found in the market areas. In total, two hundred and eighty-four questionnaires were administered to traders and buyers in the study areas. Findings indicate that biodegradable waste is the most generated waste in Akure markets. The waste disposal methods adopted by traders were also due to irregularities in the service of the agency concerned in waste management and the lack of storage bins. Unlawful waste disposal methods such as dumping, burning, and roadside disposal are prevalent in the study areas. To this effect, the study puts up probable measures to ensure prompt waste collection from the market by the appropriate agency and provision of disposal bins in the market areas. The management and disposal of market waste have become an issue of concern to various environmental stakeholders. The need for traders to develop positive attitudes has become imperative in view of the littering and unhealthy conditions of markets in recent years. The study investigates waste management in Akure markets with a view to providing insight into the disposal of waste in the selected areas. This study investigated waste management in Akure markets to gain insight into waste disposal practices. Systematic random sampling was adopted to administer a questionnaire to two traders in the market area while purposive sampling techniques were adopted to administer questionnaires to buyers found in the market areas. In total, two hundred and eighty-four questionnaires were administered to traders and buyers in the study areas. Findings indicate that biodegradable waste is the most generated waste in Akure markets. The waste disposal methods adopted by traders were also due to irregularities in the service of the agency concerned in waste management and the lack of storage bins. Unlawful waste disposal methods such as dumping, burning, and roadside disposal are prevalent in the study areas. To this effect, the study puts up probable measures to ensure prompt waste collection from the market by the appropriate agency and provision of disposal bins in the market areas.

Keywords: solid waste, waste collection, disposal methods, market

INTRODUCTION

Omole (2002) described a market as an approved public gathering of commodity buyers and sellers that takes place at a location that is roughly specified or restricted at a predetermined time. Market centers are essential to people's social, political, religious, cultural, and economic lives (Omole, 2002). Market grows anywhere there are goods to sell and buyers to patronize sellers. Given the importance of the market to the national economy, it is therefore pertinent to study environmental issues such as waste generation, management, etc. arising from market activities (Omole, 2002).

Solid waste is defined as materials that members of society dump that are undesired and worthless in their solid state. It is defined as any material or product that is being disposed of or will be disposed of and has no longer use or value for the owner or organization (Kolekara et al., 2016). Products that are not valuable to the owner but may still be beneficial to someone else or an organization are, in essence, considered solid trash. Waste is produced by human activity, and how it is collected, stored, and disposed of affects both the environment and human health.

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Market wastes are produced by vendors, consumers, and other individuals and has an impact on both the tranquility of the marketplace and potential human health risks. Effiom (2018) asserts that waste disposal practices are influenced by market size. Market places play a crucial role in the economic environment of every country because they are hubs for information exchange, social contact, health promotion, health education, and the sale of goods. Waste generation in markets is unavoidable due to population development in urban enclaves and a corresponding increase in market population (Worlanyo, 2013).

Research indicates that despite market traders' high level of awareness regarding market cleanliness (Abejegah et al., 2013), poor practices such as open dumping and improper disposal of market waste persist. This issue is evident in Akure in recent years, particularly around popular market areas like Oja-Oba and Afunbiowo, where market waste is carelessly discarded along major roads, resulting in unpleasant odors and potential health risks. This view was upheld by Odiana and Olorunfemi (2021) that, indiscriminate disposal of waste in Nigeria, particularly in urban areas, has not only reduced the aesthetic value of the environment but has led to the outbreak of infectious diseases like cholera, malaria, dysentery and diarrhoea.

The issue of waste management in Akure is highly urgent due to the continuous abandonment of refuses along roads sides by the traders. Some traders discharge refuse into drainage channels, blocking water flow during rainy season and ultimate closing up many drainages channel in some of the study areas. This could lead to flooding in case of heavy and continuous rainfall. Aside from the potential health risk, markets areas in Akure always come with offensive odor and poor aesthetic views because of unlawful and unhealthy waste disposals.

LITERATURE REVIEW

Kehinde and Adeola (2018) assess the waste disposal practices in Ibadan markets. Findings show that most of the traders dispose of their waste generated by dumping it on open ground. The study also revealed that some of the marketers also dispose of it by burning. Other unlawful practices like pouring it into drainages and in unauthorized locations (sites) such as the middle of the road were also evident in their study areas. In the absence of a consistent and effective solid waste collection system, waste is frequently dumped in open spaces, on access roads, and beside watercourses, causing serious health dangers. This improper waste management practice is widespread in the Akure study area, as proven by data analysis that reveals the waste management strategies used.

Amalu and Ajake (2014), in the assessment of the waste management practices in the Enugu metropolis, discovered that most inhabitants, especially those in the major markets; Ogbete market, Abakpa market, and new market disposed of their wastes at the designated waste management/dump sites. The study also revealed that traders burn their waste, and some dump it along roadsides or drainage channels. Environmental sanitation in markets is important not only from the point of view of urban aesthetics but also because of the pathogenic organisms that the liquid and solid waste contain and transmit by direct handling or by water, food, insects, or rodents (Fadamiro, 1986).

Abigo et al. (2016) also observed that the solid waste challenges seen in the larger population also exist in most Nigerian markets. These challenges include but are not limited to inefficient collection methods, insufficient coverage of the collection system, and improper disposal and treatment of waste. According to Ajama and Ofoezie (2020), research on the characteristics of market solid waste in Akure revealed that there is no formal arrangement for waste evacuation in Odopetu market, and in Oja Oba, where a management authority exists; it took over a week to evacuate waste generated and stored in more than half of the stalls, indicating poor waste management.

Ajama and Ofoezie (2020) investigated the characteristics of solid waste in the research area and concluded that there was no formalized mechanism for waste evacuation. In contrast, this study focuses on the institutional framework responsible for trash evacuation in the studied locations and the considerable obstacles that sellers confront while handling garbage.

This study provided insight into the different types of waste generated, the waste management systems used, and the institutions in charge of collecting and disposing of solid waste in the studied areas. The findings are intended to contribute to sustainable sanitation techniques adapted to the specific needs of each market type.

RESEARCH METHODOLOGY

Research Location

Akure is situated between longitude 50 14' and 50 15' east of the Greenwich Meridian and longitude 70 15' and 70 17' north of the Equator (See **Figure 1**). According to Okosun et al. (2017) Akure is roughly 350 kilometres from Lagos, Nigeria's commercial hub, and 420 kilometres southwest of Abuja, the country's capital. In Ondo State, Akure is in the Akure North and Akure South Local Government Areas. In 1976, it was designated as the Ondo State's capital. As a result, the city experienced a diverse mass of individuals and homes, including both impoverished and non-poor ones (Okosun et al., 2017). The area lies in the forest region's humid tropical climate, which has two distinct seasons: the rainy season (April–October) and the dry season (November–March).

Research Database

This study sources information from both primary and secondary sources of data in the study area to ensure the aim and objectives of the study are achieved. Primary data are data gathered on the field while secondary is information already available from other sources like journals, textbooks e.tc. Information was collected in the study area with the use of designed questions, tapes where applicable; camera to take pictures of the waste in the study areas. Information was gathered from the traders with the use of structured questions. To justify the research topic, secondary data is very vital. Secondly, data simply means information or data related to

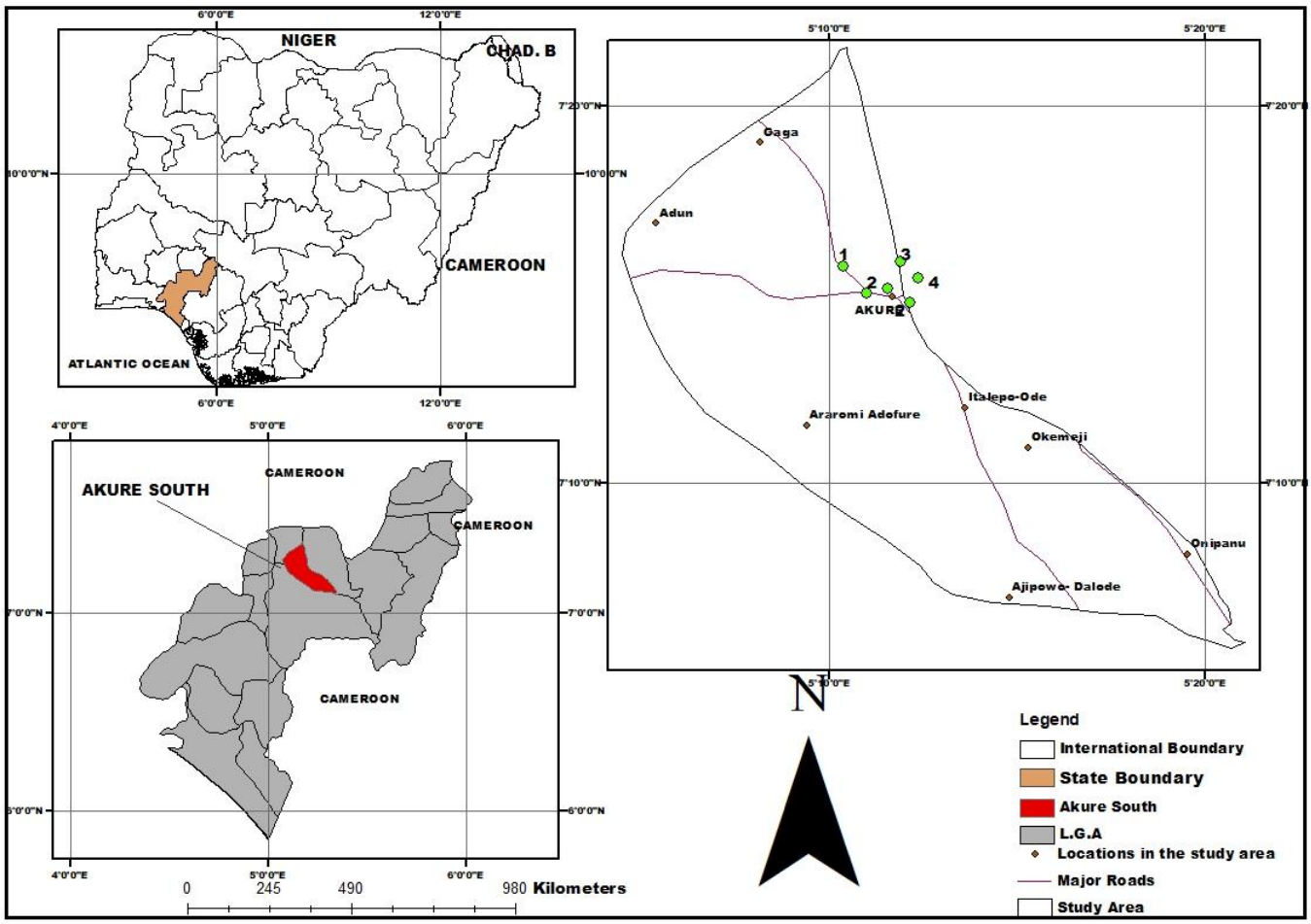

Figure 1. Map of the study area (Source: Authors, 2024)

problems under research obtained from already published works, journals, directories, maps, newspapers and magazines, textbooks, conference papers, seminar papers, dissertations, and imagery, among others. The information collected complement the primary source of data for a valid conclusion.

The sample size is a function of the total population. In other words, the sample size usually depends on the population size to be sampled. The total population under the sample area is 1,408 out of which 142 traders were selected using systematic random sampling techniques while 142 buyers were also selected. Ten per cent of the total Respondents (sellers) at each market were chosen to fill out a questionnaire. This was done to ensure respondents were chosen at regular intervals to ensure the accuracy and reliability of the data collected.

A purposive sample strategy was used to distribute questionnaires to consumers in each study location, allowing the researcher to collect data more efficiently. Engaging purchasers was critical for gathering information to compare to the data provided by sellers via their surveys. The researchers carefully chose the buyers to whom the questionnaires were given.

The data collected from the survey was subjected to both descriptive and inferential statistics. Data was analyzed with the aid of the IBM Statistical Package for Social Sciences. Descriptive analyses were used to visualize variable correlations through tables, graphs, charts, and diagrams.

RESULTS AND DISCUSSION OF FINDINGS

Socio-Economic Characteristics of Respondents

From **Table 1**, most of the respondents are within the age bracket of 41-60. This shows the categories of people that sell or buy from the markets regularly. The percentage of age 21-40 also shows that a higher percentage of the youth are into business activities, which will help to reduce unemployment, theft, and thuggery, and foster creativity. The percentage of ages below 20 is low. This is because these categories are in school or still learning the trade. The last age group is the age with little participation in economic activities due to the stress and the rigor of trading activities demands. Research findings show that most of the traders earn an average of N40, 000 per month. With the current economic reality, the amount is not enough to cater for basic amenities. This suggests that the government needs to help provide waste storage facilities since what the people earn is not enough. From **Table 1**, respondents at Oja-Oba have more income compared to others. This is because of the level of patronage as compared to other markets in the study area.

Objective one waste collection facilities in the study areas

Data analysis revealed the type of container used to collect waste in the study area (**Figure 2**). Majority of the traders in the study areas use nylon as a waste collection container (**Figure 3**). 56.7% of Afunbiowo show that they use nylon to

Table 1. Socio-Economic Characteristics of Respondents

	Afunbiowo		Ijapo		Isikan		Isolo		Leo		Nepa		Oja-oba	
Sex	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Male	13	27.5	12	75	11	24.2	4	33.3	2	28.2	14	30.7	42	37.5
Female	35	72.5	4	25	33	75.8	8	66.6	6	71.8	30	69.3	70	62.5
Total	48	100	16	100	44	100	12	100	8	100	44	100	112	100
Age	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
<20	3	6.2	2	12.5	5	11.3	1	8.3	1	12.5	3	6.8	5	4.4
21-40	15	31.2	5	31.2	16	36.3	3	25	2	25	14	31.8	43	38.3
41-60	19	39.5	7	43.7	14	31.8	6	50	4	50	22	50	59	52.6
61 above	12	25	2	12.5	9	20.4	2	16.6	1	12.5	5	11.3	5	4.4
Total	48	100	16	100	44	100	12	100	8	100	44	100	112	100
Income	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
N 20,000	8	16.6	2	12.5	5	11.4	1	8.3	2	25	4	9.1	16	14.3
N 21,000-39,999	21	43.7	5	31.3	13	29.5	3	25	3	37.5	12	27.3	16	14.3
N 40,000-59,999	10	20.8	7	43.8	18	40.9	3	25	3	37.5	17	38.6	28	25.2
N 60,000 above	9	18.7	2	12.5	6	13.6	5	41.6	0	0	11	25	52	46.2
Total	48	100	16	100	44	100	12	100	8	100	44	100	112	100
Marital Status	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Single	12	25	3	18.7	13	29.5	3	25	2	25	14	31.8	35	31.3
Married	24	50	9	56.2	25	56.8	7	58.3	5	62.5	26	59.1	66	58.9
Widowed	5	10.4	2	12.5	4	9.1	1	8.3	0	0	1	2.3	4	3.6
Divorced	7	14.5	3	18.7	2	4.5	1	8.3	1	12.5	3	6.8	7	6.3
Total	48	100	16	100	44	100	12	100	8	100	44	100	112	100

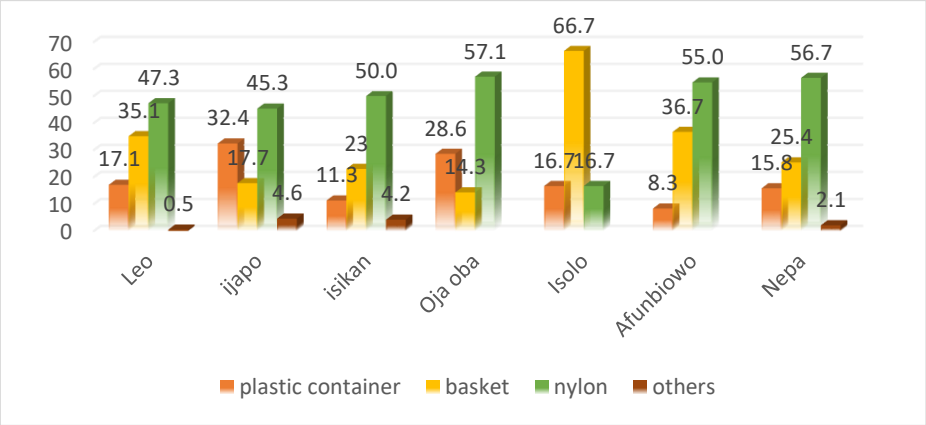

Figure 2. Type of container used to collect waste by traders in the study areas (Source: Field study, 2024)

Figure 3. Showing collected waste in the study area (Source: Field study, 2024)

store waste temporarily before disposing it when it is full. From the research conducted at the Waste Management Board Akure, it was gathered that the government does not provide storage bins for traders which is why each traders use what is available and what they can afford. Researchers gathered that most of the traders that use Nylon do so because it is relatively cheaper and sometimes it comes with the goods, they purchase unlike other storage facilities like plastic containers that they need to acquire with money. Nylon itself is a waste and a biodegrade that will eventually add to the volume of waste generated in the study areas. The response shows that basket ranks second in waste collection, facilities used in the study areas, 35.1% at Leo, 23% at Oja-Oba, 67% at Isolo and 56.7% at Nepa markets that use baskets. The percentage of respondents using plastics is not many across the study area. However, the use of plastic containers should be adopted to make the collection effective.

Figure 4. Availability storage bins in the study area (Source: Field study, 2024)

Availability of storage bins in the study area

Respondents at Ijapo and Nepa markets show that there are storage bins available in the market (**Figure 4**). Upon further interview, traders at Nepa market do not use the facility as they are directed by the Waste Management Board Authority, Akure to dump their waste along the roadside. However, there is no restriction on the use of the available waste storage facilities but for the easy access to waste collection by the waste authority, traders were directed to dump along the roadside. Upon further interview at the Waste Management Board Authority 2024, it was gathered that the board gave the directive to traders to dump along the roadside to ease the collection of waste from the markets.

Respondents from Leo, Isikan, Oja-Oba, Isolo, Afunbiowo, and Nepa markets show that there is no storage bin in the area (**Figure 5**). Information gathered from waste management authority Akure shows that the government does not provide storage bins freely to market areas however, traders can buy from the authority when they need them. This accounts for the reason why most of the managers lack storage facilities. The effect of this is improper disposal of waste in the market areas. Inadequate waste bins and distance from waste collection promote poor waste disposal in Enugu markets according to Ogunbiyi et al. (2020). This also contributes to the indiscriminate disposal of waste in Akure markets.

Figure 5. Waste disposal site at Isolo market (Source: Field study, 2024)

Methods of Waste Disposal in the Study Areas

The type of waste disposal method practice depends on the sanitary state of the environment. From the information gathered from the respondents, few of the traders dispose directly of waste disposal vans. Majority of them use other means of waste disposal. **Figure 6** shows the following, burning (50% at Leo, 28.8% at Oja-Oba, 50% at Afunbiowo and 20% at Nepa market). **Figure 6** shows that few of the traders adopt the burning of refuse in Ijapo market; this could be because of its location. Also, at Isikan, majority of traders reveal that they dump their waste outside the market along the main road, which is why there is no cause for the burning of waste by traders. For roadside waste disposal (16.7% at Leo, 76.4% at Isikan, 69.1 at Oja-Oba, 15.3% at Isolo, 76.3% at Afunbiowo and 81.7% at Nepa market). Furthermore, 91.4% at Ijapo, and 54.3% at Isolo. Most of the market under study areas do not have dumpsite or an area within the market designated for waste dumping. Waste collectors (33.3% at leo, 1.2% at Oja-Oba, and 16.8% at Isolo market). The information gathered shows that the irregularities of their operation made it difficult

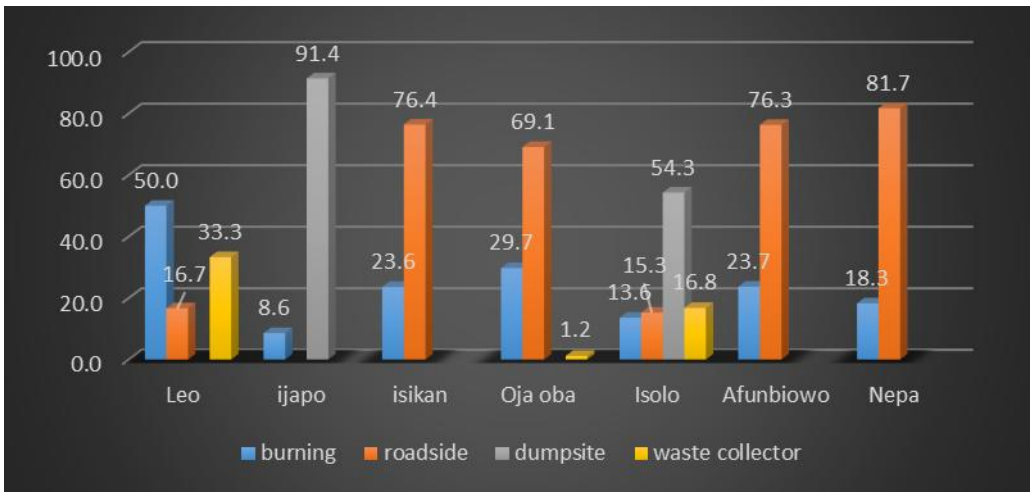

Figure 6. Waste disposal method (Source: Field study, 2024)

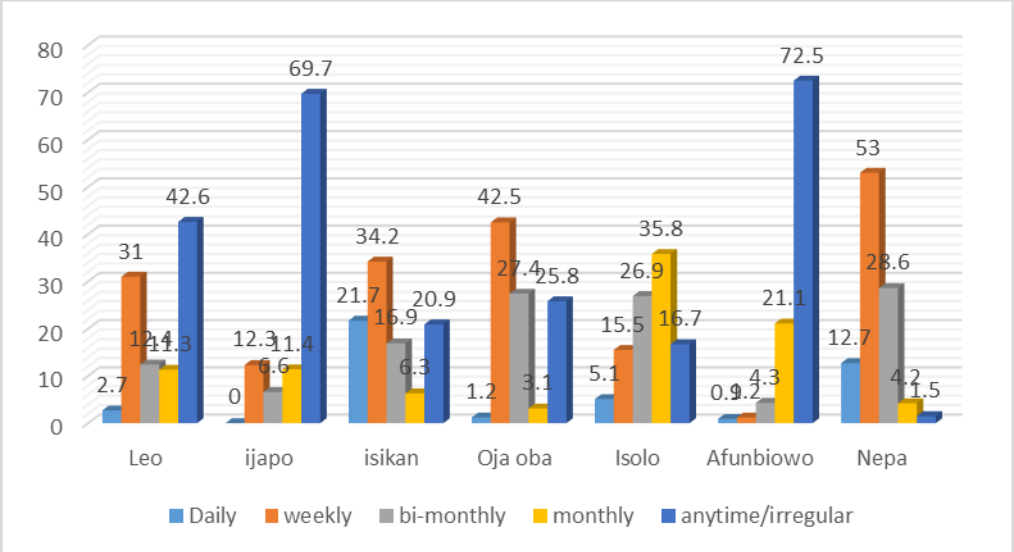

Figure 7. Frequency of waste collection (Source: Field study, 2024)

for traders to dispose of their waste directly of the waste collector. This aligned to Malombe (2012); irregular services rendered to producers of refuse by municipal councils compel them to find ways of disposing of refuse.

Kehinde and Adeola (2018) assessment of the waste disposal practices in Ibadan markets, findings show that most of the traders dispose of their waste generated by dumping it on open ground; the study also revealed that some of the marketers also dispose of it by burning. Other unlawful practices like pouring it into drainages and in unauthorized locations (sites) such as the middle of the road were also evident in their study areas. Traders reveal that the mode of waste disposal method adopted is because of the ineffectiveness of waste authorities in their market (see **Figure 6**). At Afunbiowo market, traders revealed that they had not seen the waste collector van for over four months. Also, at the Ijapo multipurpose market traders complained that they had not seen the waste authorities for more than four months. One of the traders revealed that they had to look for other means of moving the waste out of the market premises when it became unbearable.

Frequency of waste collection by waste authorities in the study areas

Figure 7 shows that major respondents at the Ijapo and Leo markets indicate that waste collectors do not have a fixed for waste collection. Traders at Ijapo markets complained that their waste is left unpacked from the compound. One of the traders submitted that the waste management authorities have not been to the market in over four months as of the time of data collection. At Isikan, Oja-Oba, Isolo, Afunbiowo, and Nepa markets, respondents show that waste management collects waste at weekly intervals. However, information gathered from the waste management authorities shows that the collection of waste is daily. This is however in contrast with the submissions of traders in the study areas. Researchers also noticed that waste is not packed daily as claimed after an inspection at one of the markets on early Sunday morning.

In addition, the bi-monthly collection of waste is prominent in the Isolo market. While some respondents also indicate that they collect waste monthly. Amalu and Ajake (2014) reported similar irregularities in waste management agencies' operations in Enugu, respondents show dissatisfaction with the standard and system of waste

management in the study area representing 93 percent of the study population.

CONCLUSION AND RECOMMENDATION

Information gathered from the respondents shows that the government has not been up and doing well in the provision of waste collection facilities in the markets. The federal government in 2005 developed policy guidelines on market and abattoir sanitation concerning providing waste collection facilities in all markets and abattoirs. However, individuals in the market provide storage facilities for their waste. The study shows that most traders use nylon to collect the garbage they generate. The use of nylon also contributes to the amount of waste in these markets. From the economic point of view, it is safe to infer that traders go for the least cost waste collector in all the study areas. A good number of respondents also use baskets and plastic containers while others are people without waste storage containers and those that dump on the dumpsites.

Findings on waste disposal methods in the study areas show that a large percentage of people dispose of their waste on the roadside. This accounts for the reason why roadsides along market areas in Akure are always in poor condition. Furthermore, regarding the waste disposal methods, data analyzed revealed that good numbers of traders also dump their waste in dumpsites within the market or elsewhere. This practice is unhealthy, and it also reduces the beautiful scenery of the markets and the environment. It is essential to note that some of the traders also burn their waste due to the irregular operational services of the waste management authorities. Only a few proportions of the respondents dispose of their waste directly to waste disposals in the study areas.

This study has provided insight into waste facilities in the study area and the methods of waste disposal in each market area. The research has further shown the level of government involvement in the provision of storage bins in the study areas to aid proper waste disposal. The lack of storage facilities has led to unlawful disposal of waste along the city road. This can lead to an outbreak of epidemics in the city. Based on the findings, the following recommendations are made to address the issue of waste disposal in the study areas:

1) The trader's association in the market area such raise fund to collaborate with the government in providing storage bins in the market; this could be achieved if government provide waste bins at discounted price for traders to be able to afford it.
2) Waste collection interval should be improved upon by the concerned agency to ensure proper waste disposal by the traders
3) Environmental contravention laws should be enforced for any trader disposing waste on roadsides, dumpsites, and other unhealthy disposal methods practiced by the traders.

Author contributions: OR: conceptualization, formal analysis, investigation, methodology, administration, supervision, validation, writing – review & editing; **ETO:** data curation, formal analysis, visualization, writing – original draft. The maps in the study were cited and credited to the authors' intellectual property. All authors agreed with the results and conclusions.

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Declaration of interest: No conflict of interest is declared by the authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

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