

SOLID WASTE MANAGEMENT IN TRADITIONAL AFRICAN CITIES – A PERSPECTIVE FROM THE BENIN CITY WASTE MANAGEMENT BOARD, EDO STATE, NIGERIA

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Abstract

Solid waste management is a social, economic and environmental problem facing all traditional African cities. Over the years, there have been concerted efforts made towards adequately solving the problems created by improper waste management and disposal in traditional African cities like Conakry, Ouagadougou, Cairo, Nairobi, Kumasi, Asmara, Kampala, Monrovia, Kigali, Harare, Abidjan, Bamako, Abuja, Kano, Ibadan, Lagos, and Benin City. This study appraises the activity of Edo State Waste Management with particular focus on Benin City being the state capital of Edo State, Nigeria. The objective(s) of this study is to identify types of wastes managed by the authority, describe the attitude and role of residents (household) toward solid waste management, and examine the possible constraints faced by EWMB Benin City in the discharge of their duties. The samples for the study were drawn from the total number of EWMB staff and clients served by the authority. Data were collected from a total of 324 randomly selected households (clients), through a self-administered survey from a frame of 32400, representing 1% of the clients in the study areas. 15% (70) of the staff sampled were drawn from a frame of 610 using SPSS version 21. Results reveal that, majority of the respondents (63.6%) who are staff of the board opined that, the authority lacks inadequate finance, while the majority of the clients (81.4%) expressed willingness to pay for service rendered by the authority, thereby promoting sustainable mitigation and adaptation measures region-wide. The study recommends that, there is the need for proper funding, provision of equipment and facilities for smooth running of the agency, to ensure effective collection and management of waste, diverting waste away from dumpsites and landfills towards reuse, recycling, and recovery, thus improve the livelihoods of thousands of informal waste declaimers, while also creating new jobs and business opportunities for citizens.

Key Words: *Solid waste, Sustainability, Cities, Edo State Waste Management Board, Benin City*

Introduction

Globally, municipal waste management is an important aspect of environmental management which in recent years has emerged as a dominant environmental issue in most part of the world. It is a problem that exhibits a high degree of public attention considering its alarm magnitude. According to WHO (2000), poor environmental quality in most parts of the world, is responsible for 25.0% of all preventable ill-health, including diarrhoea and respiratory disease. According to McGranham *et al.* (2001), it is estimated that; about 5 million people die each year in developing countries (DCs) particularly in African from health problem arising from inadequate collection and disposal of waste. Municipal solid waste management attendants have become a major issue of concern for many developing nations, especially as populations increase (Okosun *et al.*, 2021). The problem is compounded as many nations continue to urbanize rapidly. For instance, 40-60% of the population in most developing countries is urban. Although developing nations do spend between 20% and 40% of municipal revenues on waste management (Thomas-Hope, 1998; Schubeler, 1996), they are often unable to keep pace with the dynamics of the problem.

In most developing countries, it is the urban structure authorities/boards that are responsible for waste management (WHO, 2018). Municipal solid waste management is one of the major problems facing city planners all over the world. The problem is especially severe in most traditional African cities such as Conakry, Ouagadougou, Cairo, Nairobi, Kumasi, Asmara, Kampala, Monrovia, Kigali,

Harare, Abidjan, Bamako, Abuja, Kano, Ibadan, Lagos, and Benin City, where increased urbanization, poor planning, and lack of adequate resources contribute to the poor state of municipal solid waste management (Mato, 1999; Obirih-Opareh and Post, 2002; Okosun *et al.*, 2021).

In most traditional Africa countries, rapid urban growth since the 1960s has put pressure on land resources within the areas surrounding cities and has led to increased generation of waste. The problem is aggravated by the open dump nature of disposing waste especially in the slum areas of most African cities (Hammer, 2003). Public administration of waste collection is also inadequate for a variety of reasons which led most administrations to privatise the service, where private cost recovery seems to indicate a better solution (Obirih-Opareh and Post, 2002). These problems have resulted in serious environmental and social complications (Arinola and Arinola, 1995; Moore *et al.*, 2003; Okosun, 2023).

In 2019, Edo state government conducted a feasibility study of waste management in Edo State. The study showed that, most of the waste arises from households, abattoirs, poultries, piggeries, markets and small scale industries with a total generation of 290 tons per day. Other studies by scholars in environmental management have also worked on waste and management characteristics in Edo state. These include Abel (2007), Igbinomwanhia, (2012); Ekhaese *et al.* (2014); Cirella *et al.* (2019); Ikpe *et al.* (2022), these studies were majorly on solid waste management. However, none of these studies have sufficiently looked into institutional activities in waste management Benin City. Therefore, this research intends to appraise the resident's

perception of solid waste management. By critically examining the authority responsible for waste management in Edo state.

The aim of the study is to appraise the citizen's perception of solid waste management in Benin City, with a view to assessing the general performance of the Edo State waste management Board (EWMB). The following objectives were pursued. These are to: i) identify the nature of solid waste generated in the study area; ii) assess the strategies used by ESWB in collection of waste in Benin City, iii) examine the effectiveness of the waste management method used by the board, iv) determine the resident's attitude towards solid waste management in the study area and; v) examine the possible main constraints of waste management board in the discharge of their duties.

Theories Underpinning the Research Study

The production and storage of waste represents the first points of physical contact and other routes of exposure between the waste and humans or the environment. The exposure and potential for adverse human health risks are particular concerns in the case of special or hazardous waste, especially during the production of industrial products with toxic by-products. While the risk is generally less in case of generation and storage of domestic solid waste, the inclusion of relatively small quantities of infectious and toxic waste, such as bottles containing hazardous types of pharmaceutical products, photographic material, batteries, infectious health care wastes and sharp (e.g. syringe needles and scalpels), excreta, and other such substances, can turn seemingly benign domestic waste into potentially dangerous

waste, with attendant serious public health impacts (Oyeola, 2009). Waste collection is the collection of solid waste from point of production (industrial, institutional, commercial, and residential) to the point of treatment or disposal. Municipal solid waste is collected in several ways:

- i) House-to-House: Waste collectors visit each individual house to collect garbage. The user generally pays a fee for this service.
- ii) Community Bins: Users bring their garbage to community bins that are placed at fixed points in a neighbourhood or locality, or its designate, according to a set schedule.
- iii) Curbside Pick-Up: Users leave their garbage directly outside their homes according to a garbage pick-up schedule set with the local authorities (house-to house collectors not typical).
- iv) Self-Delivered: Generators deliver the waste directly to disposal sites or transfer stations or hire third-party operators (or the municipality).

Contracted or Delegated Service: Businesses hire firms who arrange collection schedules and charges with customers. Municipalities often license private operators and may designate collection areas to encourage collection efficiencies (Odjugo, 2009). Some critical concepts that are often engaged in managing the environment and effluents were reviewed. These include:

Zero Waste Concepts

This is a philosophy that aims to guide people in the redesigning their resource use system to reduce waste to zero. Zero waste requires that, we maximize our existing recycling and reuse efforts, while

ensuring that products are designed for the environment and have the potential to be repaired, reused, or recycled. The zero-waste strategy, prevent waste from being manufactured in the first place. In addition, the materials that are still required in these re-designed and resource-efficient systems will be recycled back into production.

Polluter Pays Principle of Remediation

In environmental law, the polluter pays principle is the principle that the party responsible for producing pollution should also be responsible for paying for the damage done to the natural environment. Concerning waste generally, it refers to the requirement for a waste generator to pay for appropriate disposal of the waste. Relevance of polluters pays principle of remediation waste in Benin can only be related to the monthly due pay by the clients for waste evacuation.

Waste to Wealth Concept

This is a concept that enlightens people on how wealth can be generated from waste. Individual should aim at waste minimization or reduction, reuse, and recycling before dumping the wastes into a dust bin. Recycling the non-biodegradable will help individual and the local industry. For recycling to be successful, separation should start at household level (source sorting). An individual can make some extra money from the sale of these recyclables. The relevance of these three concepts to waste management institutions in Benin City (EWMB) will go a long way in helping the institution to make some extra money from the sale of these recyclables.

History and Operations of Edo state Waste Management Board (EWMB)

Edo State Waste Management Board (EWMB), established by the local

authorities, put in place a monitoring program to regulate environmental quality and implement steps towards a waste-free society. Management of solid waste in Edo State started with the establishment of the EWMB by the Edo State government. The board was responsible for the collection and disposal of municipal and industrial waste in the state capital (Benin City), including 17 LGA in the state. The basic functions of EWMB includes, a) Collection and disposal of waste; b) Collection, disposal and removal of solid waste; c) Cleaning of streets; d) Cleaning and maintenance of public drains; e) Regulatory requirements to approve and supervise all waste disposal systems.

Materials and Methods

Study Area

Benin City is the administrative centre of Edo State; it is situated in the south-south geo-political zone of Nigeria at an elevation of 77.8m above sea-level. Benin is a pre-colonial city, the capital of the defunct Mid-West and Bendel States, and the present Edo State. It is located between Latitude 06°19'N and 06°21'N, and Longitude 05°34'E and 05°44'E. Benin City is under laid by sedimentary formation of the Miocene-Pleistocene-age often referred to as the Benin formation (Odemerho, 1988). The city is located in the humid tropical rainforest belt of Nigeria with a population of 1,086,882 (NPC, 2006) and a projected population of 1,336,056 by 2012 at 3.5% growth rate (Okosun and Fasakin, 2019). Benin City has witnessed, rapid territorial expansion, due to mainly rapid rural-urban migration, as well as tourist destination for bronze casting and the great Benin moat. Consequently, there was a heterogeneous mass of people and households into the

capital city, which has caused difficulties for the state and local environmental protection agencies in providing an effective and efficient municipal solid waste management system.

Methods

For this study, survey research method was adopted for this research and data was gotten from both primary and secondary sources. Two sets of questionnaires were administered; one to residents in each neighbourhood, and the second set to members of staff of Edo State Waste Management Board. Benin City was divided into three residential zones: core, intermediate, suburban, and planned estates. Blocking was utilized to collect data from a total of 324 randomly selected inhabitants through a self-administered survey. Due to the homogenous characteristics of the neighbourhoods such as residential density and level of income, three districts were selected, in each district, two neighbourhoods were selected randomly from each residential zone: Gapiona housing estate and Etete, in the core; Usele and Ugbowo in the transition area and Jesus Christ Road area and Gorreti were selected in the periphery.

A reconnaissance survey was carried out to ascertain the total number of households served by the EWMB. A total of 324,000 clients were identified, simple random sampling technique was used in selecting the streets in each neighbourhood where the questionnaires copies were administered. The purposive random sampling technique was used in selecting the houses from each of the selected streets for the purpose of administering the questionnaire to households. A total of 324,000 households were identified and 1% sample taken to give 324 questionnaires administered to residents (households); this sample size was deemed adequate to avoid repetitions based on homogeneity in the characteristic of the households. At the Edo State Waste Management Board (EWMB), 610 (430 regular and 180 casual) staff were identified, out of which 15% of them were sampled to give 43 regular and 27 casual staff surveyed amounting to 70 questionnaires administered respectively. From Table 1, 1% (324) of the total clients in the study areas were selected as the sample size, while from Table 2, 15% (70) sample size from a frame of 610 were conducted on staff of the authority.

Table 1: Randomized block design of the study area and sample size of the clients served by EWMB based on neighbourhood

District	Blocking of sampled area		Number of Client	Number of Questionnaire distributed (1%)
Oredo	Gapiona housing estate and Etete	Core, Planned Estate	10900	109
Orhionmwon	Usele and Ugbowo	Transition	15550	155
Ikpoba Okha	Jesus Christ Road area and Gorreti	Periphery	6000	60
Total			32400	324

From Table 1, 1% (324) of the total clients in the study areas were selected as the sample size, while from Table 2, 15%

(70) sample size were derived from a frame of 610 staff of the board/authority. Interviews with the staffs of waste

management companies and the Edo state waste management board was carried out to obtain the views and actions taken towards waste management in Benin City. Other primary sources of data collection

such as in-situ observations, photographs, informal interviews and discussions with the respondents were used to obtain relevant data for this research.

Table 2: Sample Size of Staff

Staff categories	Total Number of staff	Total No. of Questionnaires (15% of staff)
Regular	430	43
Casual	180	27
Total	610	70

Results and Discussion

The discussion of the findings was therefore based on the research objectives as follows:

Identification of the Nature of Solid Waste Generated

The staff of the authority recognizes that, the Edo state Waste Management

Board (EWMB), is the only formal organization involved in solid waste collection and management in Benin City. When asked whether they have knowledge of the private parties involved with garbage collection and area covered by them, they gave the following list of organizations:

Table 3: Accredited waste managers (Private firms) involved in waste management in Benin-city

Agency	Residential area (Area Coverage)
Odanaha Intl. Ltd	Ugbor estate, Reuben Agho/Gapiona housing estate
Gregosa Ventures	Sapele road, Adesuwa housing estates and Sakponba
Basty Batt Ventures	Uselu and <i>Egusedaikien</i>
Debev System Limited (SEEFOR)	Idia and Textile mill
And Lux Universal Ltd.	S & T barracks (Isiohor)
1 st Emebas Ventures	Erhumwunse
Vital Legacy Nigeria Enterprises	Ehaekpen
Phimade Business Solution	Upper Lanwani
Aupaul Kleanar	Ugbor village and Limit
Ehis/Eras Venture	Gorreti, Erediawa, Dumez
Ebi Edward Ventures	Country Home and Amagbe village

Table 3 shows the areas mostly covered by the private companies/accredited waste managers, owned by state and private individuals within Benin metropolis and these areas majorly occupied by both middle and low income earners. The other areas which exhibited low economic features in terms of the monthly income solely depended on Benin City Solid Waste Management Board, for collection

of garbage. The services they give ranges from distribution of the recommended black polythene bags, collection bins to the households and institutions served respectively, and regular collection according to the specified frequencies agreed. The link between Benin City Solid Waste Management Board and the private organization is that Benin City Solid Waste Management Board serves as the

regulating authority and both the Benin City Solid Waste Management Board and the private firms used the same dump site, this is in line with the findings of Okosun, *et al.* (2021).

Family size of the respondents

Result of the field survey reveals the family size of the clients of EWMB in

Benin City. Majority of the families (55.6%) have family sizes of 4-6 members, while the family sizes between 1-3 members accounted for 43.2%. A critical observation into the family size shows that, the family size with 4-6 members has the highest percentage.

Table 4: Family Size of Respondents

Family size	Frequency	Percent
1-3	144	43.2
4-6	180	55.6
7 and above	4	1.2
Total	324	100.0

Monthly Income Level of Respondents

The income level realized on monthly basis was asked in order to assess the requirement for the need of other services, such as Edo state Waste Management Board for their waste disposal. Figure 1 reveals that, the income range of N11,000–N30,000 had the highest percentage of 32.5%, while 27.5% of the respondents earned above N50,000 per month and 10.0% of the respondents earned between N31,000 and N50,000

respectively. However, approximately, one-third (30.0%) of respondents earn below N10, 000 monthly. It can be deduced that, the majority of the respondents were low and middle income earners. Findings from the occupation status, most of the clients selected are into trading and business, followed by civil servant, which implies that, they generate income that can be used to cater for other services such as waste disposal.

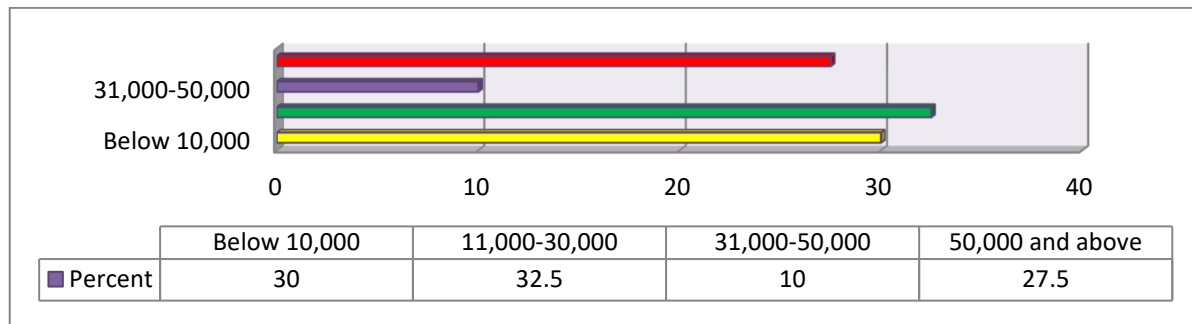


Fig. 1: Monthly Income Level of Respondents

Assessed the Strategies Used by EWMB in Waste Collections in Benin-City

A total of 81.1% of the staff of Edo state Waste Management Board opined

that, it is only solid wastes that are being managed by the Authority. About 18.9% believe that, both liquid and solid wastes are being managed. It may be inferred

that, the type of wastes managed by EWMB is mostly solid, which includes

trash and garbage from household, market and institutional.

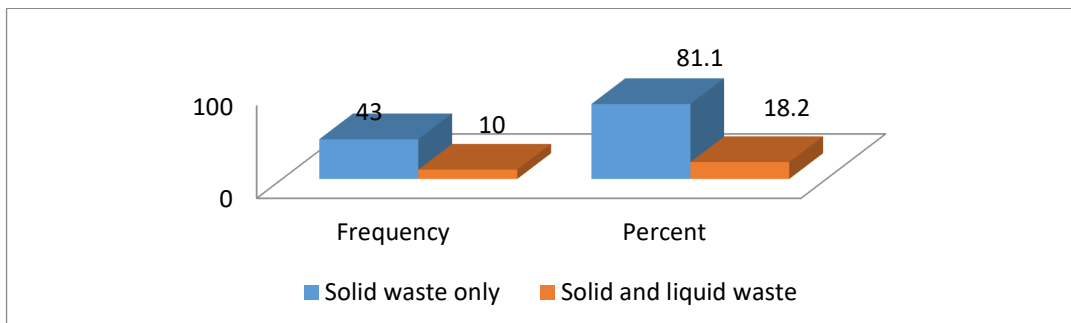


Fig. 2: Type of Waste Managed by EWMB on a Daily Basis

Type of Waste Generated

From Figure 3, it can be deduced that, 70.0% of the respondents generate waste primarily from food items, and 30.0% from garbage, wood and Ashes. Food

items having the highest percentage, shows that, majority of respondents generate more of food items than other related waste composition.

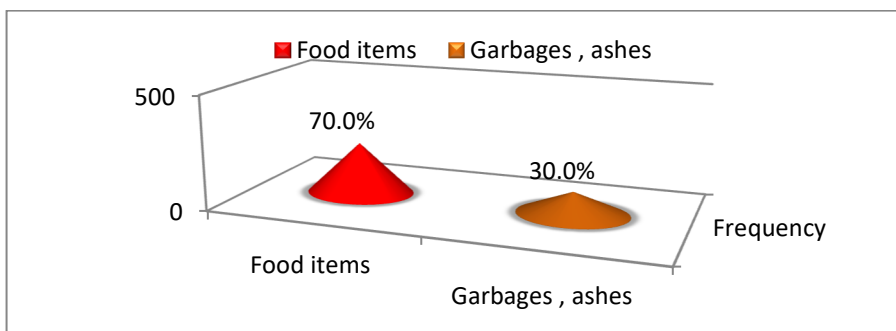


Fig. 3: Type of Waste Generated

Work Experience

Table 5 shows the highest numbers of years of experience of staff of the authority is 6-10 years, (45.4%), followed by those between 1-5 years, while 11-15 years and 15 years and above accounted for 9.1%. Findings reveal that, 6-10 years

of work experience has the highest percentage. This infers that, the staffs are not much experienced in waste management operation, only a few officers with experience in the field thus will affect the effectiveness of waste.

Table 5: Work Experience

Years	Frequency	Percent
1-5	14	27.3
6-10	24	45.4
11-15	10	18.2
15 and above	5	9.1
Total	53	100.0

Sponsor of Edo state Waste Management Board

Majority of the staff sampled (72.7%) opined that, government is the major sponsor of the waste management board, while 27.3% are private sponsor. A critical observation shows that, the government takes majority of the responsibility, in terms of management, equipment and

payment of staff salary. Finding reveals that, the lackadaisical attitude, political instability and inadequate funding by the government, affected operational efficiency. Private sector thrives better than government sector due to proper monitoring and management (Okosun *et al.*, 2023).

Table 6: Sponsor of Edo state Waste Management Board

Sponsor	Frequency	Percent
Government	39	72.7
Private	14	27.3
Total	53	100.0

Assessment of Strategies Used by Edo state Waste Management Board

On the material used for waste collection, majority (54.5%) of the staff opined that, the material used for waste collection is waste bin, followed by waste bags (27.3%) and drums (18.2%). This

could be attributed to the fact that, waste collections materials approved by the board are waste bin and bags designed for waste disposal purpose. Findings reveal that, waste vehicles are not fully motorised and so the bin bags being small can easily be evacuated.

Table 7: Waste Collection Material

Waste collection material	Frequency	Percent
Bag	14	27.3
Drums	10	18.2
Waste bin	29	54.5
Total	53	100.0

Mode of Transporting Waste on Daily Basis

Table 8 shows that majority of the staff of EWMB mode of transporting waste on a daily basis was through the usage of trucks (accounted for 81.8%), while

18.2%, reported that, tricycles are also used in the areas that cannot be easily accessed by Edo state Waste Management Board trucks, due to the poor state of roads in such areas.

Table 8: Mode of Transporting Waste on Daily Basis

Mode of transporting waste	Frequency	Percent
Trucks	9	81.8
Tricycle	2	18.2
Total	53	100.0

Waste Disposal Method

As depicted in Table 9, majority of the staff of EWMB were of the view that, the method of disposing waste as adopted by the Authority is sanitary landfill and this

accounted for 63.6%, while open dump and recycling accounted for 27.3% and 27.3% respectively. Findings revealed that, sanitary landfill are the waste disposal method adopted by the board.

Table 9: Waste Disposal Method

Waste Disposal Method	Frequency	Percent
Recycling	5	9.1
Open dump	14	27.3
Sanitary landfill	34	63.6
Total	53	100.0

Frequency of Waste Removal

Table 10 reveals how often/frequency waste is being removed from individual premises, majority of the respondents opined once a week (63.6%), while twice a week accounted for 27.3%, and every

day (9.1%). As observed, the collection of waste in most area takes place on a weekly basis, and as a result, most people are not satisfied, since most of the populace disposed their waste through the state waste management board Authority.

Table 10: Frequency of Waste Removal

Frequency of waste removal	Frequency	Percent
Everyday	5	9.1
Twice a week	14	27.3
Once a week	34	63.6
Total	53	100.0

Assessment of Effectiveness of the Strategies Used by EWMB

Table 11 reveals the opinion of respondents on the effectiveness of the collection strategies used by EWMB. Out of the total respondents, 22.2% opined that, the collection strategy is not

effective, 47.4% claimed that the collection strategies used is fairly effective, while 19.8% affirmed that, the collection strategies are effective and 10.6% ascertained that they are very effective.

Table 11: Effectiveness of Collection Strategies

Effectiveness of collection strategies	Frequency	Percent
Not effective	130	22.2
Fairly effective	147	47.4
Effective	43	19.8
Very effective	4	10.6
Total	324	100.0



Figure 4: Waste Disposal Methods in Benin City, Nigeria

Effectiveness of Collection Strategies

Table 12 reveals that, 40.2% of the respondents opined that, the disposal strategy is not effective, while 45.4% claimed it is fairly effective. Critical observation shows that, the waste disposal strategies are hazardous to the environment due to the failure in the initial

waste disposal strategies which is sanitary land fill. As shown in Figure 4, burning and indiscriminate dumping of waste at dump site has in turns resulted to serious environmental problems that could affect health of man causing disease outbreak, pollution, and fire hazard.

Table 12: Effectiveness of disposal strategies

Effectiveness of disposal strategies	Frequency	Percent
Not effective	130	40.2
Fairly effective	147	45.4
Effective	43	13.2
Very effective	4	1.2
Total	324	100.0

Opinion on the Performance of EWMB

Table 13 reveals the respondents opinion regarding the general performance of the Edo state Waste Management Board. 50.2% of the respondents opined that, the performance of the EWMB is not satisfactory, 18.9%

opined that, it's fairly satisfactory, while 20.0% affirmed that their performance is satisfactory. It can be infer that, resident's perception concerning EWMB is not satisfactory, because waste is not cleared when it supposed to be cleared.

Table 13: Opinion on the Performance of EWMB

Opinion on the Performance of EWMB	Frequency	Percent
Not satisfactory	162	50.2
Fairly Satisfactory	61	18.9
Satisfactory	65	20.0
Very satisfactory	36	11.1
Total	324	100.0

Attitudes and Role of the Residents toward the Solid Waste Management

The majority of the respondents (74.0%) were of the view that, there is need for private partnership, from the findings, devolving the management to private sectors will ensure positive outcome, government commercial centres

are always underperforming. Private sectors perform better than the present management, because their main motive is to generate more income, as such will give room for competition, thereby improving services, in order not to lose clients to their competitor.

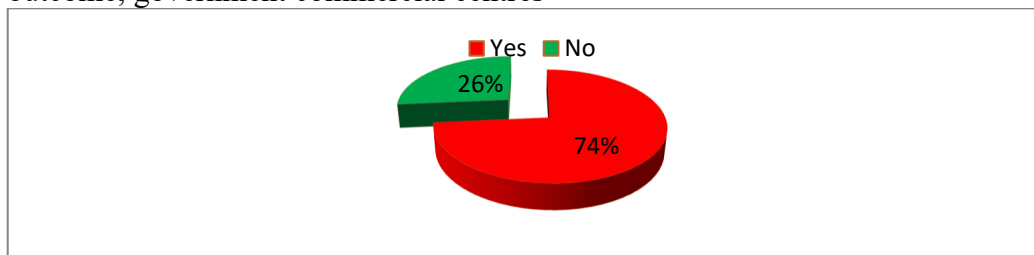


Fig. 5: Need for private partnership

Waste Disposal Habits

Table 14 reveals the inhabitants habit towards waste disposal. Burying and burning in pits was the common method (47.5%) of waste disposal in the study area. However, some of the respondents (16.9%) disposed their waste by throwing along the roadside in residential areas.

While the remaining 35.6 % dispose their waste through the waste management Authority. This could be attributed to environmental education on waste disposal habits. Therefore, there is need for the board/authority to come up with more environmental awareness programme.

Table 14: Waste Disposal Habits

Habit	Frequency	Percent
Burning	94	29.0
Burying in pits	60	18.5
Roadside dumping	55	16.9
Waste management Authority	115	35.6
Total	324	100.0

Residents’ Role in SWM

When asked about their role in solid waste management (SWM), all the respondents gave more than one response as shown in figure 6, the majority of the respondents (75.0%) indicated that, they were only supposed to keep their immediate surrounding (homes) clean, Residents in the research environ, had

little knowledge on the role they can play to reduce the problem of accumulating waste in public places in the area. Environmental education is very much needed in the study area to inform households about responsibilities of residents, place to deliver waste and waste recycling.

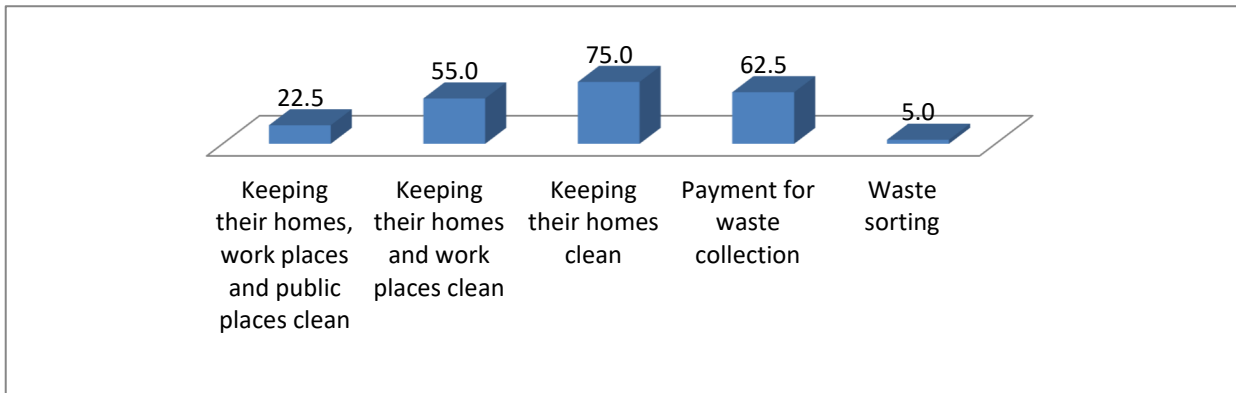


Fig. 6: Views Regarding Residents’ Role in SWM

Main Constraint of Waste Management Agencies in the Discharge of Their Duties

When asked about the main constraint of waste management agencies in the discharge of their duties, staff of EWMB stress on inadequate finance. As seen in Table 15, majority of the respondents (63.6%), who are staff of the board, opined that, they lack finance/allocated

budget to board by the State government is insufficient. Adequacy in terms of finance will increase the level of their performances and increase their coverage area of waste in order to carry out their duties effectively, Also the staff of the board opined that, equipment (vehicles) used by the board is inadequate to meet the need of the growing population of the area.

Table 15: Inadequate Finance

Inadequate finance	Frequency	Percent
Yes	34	63.6
No	19	36.4
Total	53	100.0

Conclusion and Recommendations

The study concluded that, solid waste generation is an inevitable attribute of human being, resulting from the activities of man. The problem of indiscriminate dumping of refuse is expected to become even more serious in the nearest future, if waste management is not radically improved. Though as the human population increases day by day, there is a geometrical tendency for these environmental problems to persist, unless it is viewed as a major problem which requires improvements in the performance operation of EWMB in the study area and in Edo state at large. However, EWMB must be funded and supported by the state government to ensure effective collection and management of waste in the study area. The residents should also be enlightened on environmental sanitation and protection to ensure environmental sustainability.

The study recommends, i) Effective Collection of Waste in the study area, which must be sanitarily stored in air tight container right from where they are generated and during transportation to disposal sites. Effective street waste collection must be embraced; Dino bin must be adequately provided for frequent collection of waste communal or municipal collection should be planned and properly embraced. Proper collection and disposal should be durable.

ii) Rehabilitation of the Disposal Site, to ensure the hygiene of the environment. The landfill site should be rehabilitated to

the work in accordance with the initial design which is sanitary landfill so as not to degrade the environment due to burning of waste which pollutes the environment and ensure sustainability in waste management;

iii) Improvement in transportation of waste: Waste should be transported to disposal sites with suitable vehicles. Such vehicles should be closed top non-compacting trucks or close top compacting trucks. Open trucks should not be used to prevent waste from flying and littering the environment. The vehicles should be the type with tipping gear for mechanical off loading and collapsible sides which makes manual off-loading possible when the tipping gear is faulty. Collection and transportation of waste must be well planned considering the following factors: a) Type and quantity of waste; b) Disposal method and site; c) Type of transportation vehicles and equipment; d) Population density and variations in waste generation rate; f) Physical layout of the study area and many more; and iv) Adequate funding: This will help in diverting waste away from dumpsites and landfills towards reuse, recycling and recovery, thus improve the livelihoods of thousands of informal waste declaimers, while also creating new jobs and business opportunities for citizens. Also, funds should be provided to local government to repair dilapidated waste equipment and improve working condition of EWMB and also improve the welfare of the staff.

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