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Assessment of Solid Waste Management Strategies in Ekosodin Community

Ambrose –Agabi, E.E and Uzoagu C.N

Department of Civil Engineering, Faculty of Engineering University of Benin, P.M.B 1154,
Benin City Edo State, Nigeria.

Abstract

The significance of a clean environment to People's health and aesthetics of an environment cannot be overemphasized. One of the major challenges to this today, is poor solid waste management practice. In spite of the efforts made by the government to address the problem, there has been no remarkable solution. This study is aimed at examining critically the solid waste management problems in Benin city metropolis in terms of collection, storage and final disposal with a view of finding solution to them by determining the composition of solid waste, identifying the existing solid waste management strategies being applied, assessing the effectiveness of the existing system of solid waste management strategies, and identifying the specific problems associated with refuse management strategies in the study area. A random sampling technique was used in administering questionnaires to 200 respondents in the study area. Data collected were presented in forms of tables. Hence, the result shows a significant difference of solid waste disposal strategies and management practice amongst residents of the study area. Although some findings revealed some deleterious effects on both human health and environment, inconsistencies in ensuring that the established policies are implemented still remain the major drawbacks in waste management in the study area. However, the findings of this study can help in making data-driven decisions in strengthening the effectiveness of waste collection and disposal for a healthy environment for the people.

Keywords: Solid Waste, Data, Management, Strategies, Disposal

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1. Introduction

Waste management is the collection, transportation, processing, recycling, disposal, and monitoring of various types of waste materials generated by human activities (Bacinschi et.al., 2010). The objective of waste management is to minimize the negative impact of waste on the environment, public health, and overall quality of life. Solid waste generation as a significant environmental challenge in Benin City in the recent times, has made management of solid waste a major public health and environmental concern knowing that a clean environment promotes good environmental health and esthetics. According to Wright and Boorse, (2011) as cited by Agbebaku, (2018), for practical purposes, it is possible to classify urban solid waste into three major groups.

The industrial wastes, building and construction waste, and municipal waste. Factors such as population increase, rapid urbanization, industrialization, and increased use of packaged products, has made the task of maintaining a neat environment through good sanitary disposal increasingly difficult leading to corresponding problems such as blocking of drainages, air pollution, soil and water contamination, distortion of our environmental aesthetic value, and ineffective waste management. Effective waste management, on the other hand, would result in waste reduction, recycling, energy recovery, incineration, and land filling (Collins O. et al.,2021)

The movement of people from rural areas to cities as a result of industrial revolution led to a substantial increase in volume and variety in composition of wastes generation (Wilson, 2007) and materials such as metals and glass began to appear in large quantities in municipal waste stream (Williams, 2005). Since there is a constant increase in human population, Nigeria is one of the nations that produces a high amount of solid waste and with a population of over 190 million, Nigeria is most likely one of the world's most populous nations (Aniekan Ikpe, et al., 2020).

Due to the country's current economic situation, citizens' poor attitudes toward solid waste management, urbanization and increased growth rates, population growth, the government's inability to implement laws and policies, citizens' improper orientation and education, and the inadequate financial support of municipal council institutions, has made it difficult for proper solid waste management and environmental safety. Hence, residents, particularly those in urban areas, carelessly dispose of waste, which encourages the breeding of mosquitoes and rodents that could lead to the spread of communicable diseases as well as forming necroleachate that could lead to soil and water contamination. Also the indiscriminate dumping of waste can degrade the aesthetic values of our environment.

The rate of generation of waste doesn't match the rate of evacuation because of some problem ranging from lack of funds to negligence of duty. The persisting problems of municipal waste management in Nigeria prompt the need for communicating innovations and knowledge to achieve desire transformation in overcoming socio-economic and environmental challenges.

Different approaches and interventions have been developed in the past for tackling municipal waste concerns with little or no progress.

Also, lack of public enlightenment on waste management practices in Edo states is one of the major problems of waste management because people will keep a less polluted environment when they know of the dangers of environmental pollution. This study tried to look at ways to optimize waste management strategies

2. Research Methodology

2.1. Study Area Description

The study area is Ekosodin community in Benin City situated in Ovia northeast of Edo state Nigeria with geographical coordinates of 6 24' 46" North, 5 37' 10" East. According to Ogeah and Ajalaye, (2011), Ekosodin community land use type was mainly agricultural, with few residential houses for the indigenes, but with the influx of the students who gained admission to University

of Benin, UNIBEN, there has been a shift from agricultural land use to mainly residential and commercial land uses. The Nations, (2020), reported that over fifty percent (50%) of UNIBEN students resides in Ekosodin. The increase in the influx of students greatly increased the population of Ekosodin community thus, increasing the generation of waste which affected the environmental sanitation of the village since there is no adequate provision for waste disposal in the village. Personal interview with the community's traditional head and chiefs revealed that students are the major cause of the low level of sanitation in the area. The influx of students yearly into the community has transformed the community from a farm settlement to a commercial community by attracting many people into the community as service providers to the students and making every household in the community to be involved in one commercial activity or the other. This development is negatively impacting on the quality of lives of the residents and threatens the sustainability of the environment because the community heads claims that the physical environment of the community is neater when the students are on holidays.

2.2. Data Collection

Primary data used for this research were collected through personal observation, one on one oral interview with some residents in Ekosodin community and staff of Edo state waste management board covering Ovia North LGA and questionnaire survey methods.

2.2.1. Survey of the Area

Questionnaire were administered to households in Ekosodin community to physically assess the existing structures and means of solid waste disposal, to know the various waste management strategies and to examine the efficacy of solid waste management in the community, to identify the existing solid waste management practices in the area and to determine the level of awareness and knowledge of waste management of residence and their attitude towards proper waste disposal practices. Figure 1 and figure 2 shows examples of the solid waste management practice in the area.



Figure 1. An overflow of a waste bin in the study area Figure 2. Burning waste in the study area

The relevant answers provided through the questionnaires provide random opinions of people towards the existing solid waste management structure in the Ekosodin community, problems that are associated with it and also possible steps that can be taken towards resolving these problems. The distribution of questionnaires to different residents of the community generated variation in opinion regarding the subject of waste disposal within the study area hence diversifying the platform upon which the project is being carried out. The study's sample size was 200 respondents, however only 144 of them completed and returned the questionnaire. the random sampling method was used in the distribution of the questionnaire for this survey, and descriptive statistics were used to present the findings.

3. Results and Discussion.

The results of the responses of the residents gathered from the questionnaires administration on the Assessment of Solid Waste Management Strategies carried out in the study area are presented in tables 1 to 5, and figures. This report provides a summary of the results from a total of 144 responses.

Table 1: Primary Waste Constituent generated by the respondents.

Waste Type	Frequency	Percent
Food and Agricultural waste	60	41.7
papers	39	27.1
Textiles	21	14.6
Plastic and water bottles	18	12.5
Electronic devices	3	2.1
All of the Above	3	2.1
Total	144	100.0

The responses gathered from the questionnaires was aimed to understand individuals' waste disposal preferences and behaviors. The analysis reveals that that individuals' waste disposal behaviors vary across different waste types. 41.7% respondents indicated food and agricultural waste as their frequently disposed waste while 27.1% indicated paper as their frequent waste disposal. Textiles were disposed of frequently by 14.6% respondents. A lesser but still considerable percentage of 12.5% of respondents reported regular disposal of plastic and water bottles and 2.1% of respondents reported disposal of electronic devices. A very small percentage of respondents (2.1%) indicated to dispose of all waste types indicated in the questionnaire on a regular basis, signifying a complete waste management technique.

Table 2: Waste Storage Facility used by the respondents

Storage Facility	Frequency	Percent
Carton	6	4.2
Block Setting	72	50.0
Old Bucket	21	14.6
Waste Basket	27	18.7
Plastic Bag	12	8.3
Others	6	4.2
Total	144	100.0

Table 2 reveals the different types of receptacles the residents use to collect waste. The result from table 2 shows that the use of block setting constitutes the majority of storage facilities which makes up to 50% of total storage facilities. 18.7% use waste basket followed by 14.6% use of old buckets. Plastic bags are used 8.3% of the time and the use of carton is 4.2% of the time. The remaining 4.2% is made up of the utilization of other amenities. However, findings from the preliminary survey reveals that the block settings are commonly used in buildings that are hostels in Ekosodin.

Table 3: Method of Waste Disposal by Residents

How Waste is Disposed	Frequency	Percent
Self Service	15	10.4
Private service provider	19	13.2
By burning	24	16.7
By burying	9	6.3
Collected by Government Agencies	77	53.5
Total	144	100.0

Table 3 shows how respondents dispose of the waste generated in their compounds. Five disposal options, the Self Service, Private Service Provider, By Burning, By Burying, and Collection by Government Agencies were presented to respondents in the questionnaire. Over half of the respondents (53.5%) selected the option of using Government agencies in disposing their waste. This shows that the community relies heavily on the regulated waste management services provided by the Government Agencies but over flow of waste were mainly observed in areas that depends solely on Government agencies for waste disposal as presented in figure 1. The option, by burning of waste (16,7%) followed the most common disposal method. This could indicate a refusal to register with the Government agencies for waste disposal due to the poor attitude of the staff towards waste disposal or for convenience. 13.2% admitted to using private disposal services. This shows the presence of some private management team serving and satisfying the residents demand. Waste disposal through self-service was observed by 10.4% of the respondents. This

shows that some respondents managed their waste independently. This is as a result of convenience or lack of knowledge about the Government agencies waste disposal method. 6.3% of the respondents bury waste as their disposal method. It is the least amongst the options of waste disposal but it aligns with a trend towards waste management process that are better controlled and environmental friendly.

Table 4: Residents Responses on Waste Collection Frequency by Waste Managers

Collection of Waste	Frequency	Percent
Daily	9	6.3
Weekly	18	12.5
Monthly	78	54.2
No planned time	39	27.1
Total	144	100.0

This response is aimed at understanding residents' preferences for waste collection frequency by Environmental Waste Managers on daily, weekly, monthly, or no planned time bases. Table 4 reveals that waste is collected majorly once a month in the area which makes up 54.2% of the time. This preference shows less frequent pickups by the waste managers in the study area followed by no planned time, (27.1%), which indicates that the waste can be collected once in two months or even after three months. This leads to situations of overflowing storage facilities and unsanitary conditions, as well as poor, environmental aesthetic condition. This was seen in some locations in the study area. Weekly collection of waste represents 12.5%, then daily waste collection of 6.3% was recorded. This likely stems from specific waste generation needs, such as businesses or facilities that produce a high volume of waste daily

Table 5: Willingness to pay for Waste Disposal

Willingness to payment	Frequency	Percent
Willing	111	77.1
Not willing	33	22.9
Total	144	100.0

Table 5 shows the analysis of responses from the questionnaire to measure the respondents' willingness to pay for the disposal of their waste. The respondents were presented with two options willing and not willing. 77.1%, the majority of the respondents indicated willingness to pay for waste disposal. This shows an understanding for the value and importance of waste management disposal agencies. 22.9% of the respondents indicated not willing to pay for their waste disposal.

This could be as a result of some factors such as financial constraints, different views on waste management responsibility, poor or no awareness on waste management, or staffs' attitude to work.

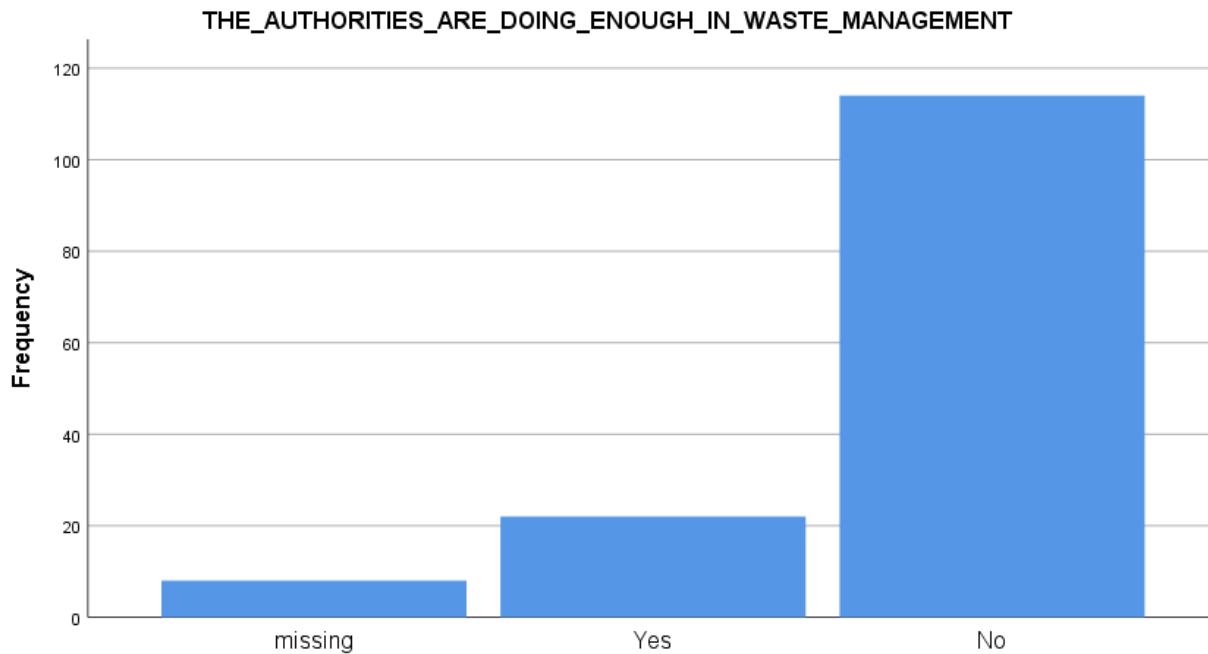


Figure 1 The authorities are doing enough in waste management.

Figure 1 presents a visual representation of the distribution of responses from respondents showing the public opinion of the respondents regarding the efforts of authorities in waste management. The respondents were given two option "Yes" and "No" to determine whether the government agencies are doing enough in the field of waste management. From the chat above a significant majority of the respondents responded "No". this shows an overwhelming dissatisfaction on the state of waste management and a wide perception of the government inadequacies to manage waste in the study area. A minority of the respondents responded "Yes" showing that they believe the authorities are making adequate effort in managing waste. The missing shows that there were few respondents that did not give any response to the question.

Table 6. Waste Management Situation Rating

Waste management situation rating	Frequency	Percent
Good	37	25.7
Better	30	20.8
Bad	64	44.4
Worse	13	9.0
Total	144	100.0

Table 6 presents the analysis of the questionnaire rating the situation of waste management in the study area. The rating is in four categories "Good," "Better," "Bad," and "Worse." 44.4% respondents choose the rating "Bad" showing a significant dissatisfaction of the waste management system in the study area. 25.7% of respondents responded to the "Good" rating showing that a number of respondent still identifies positively to the waste management situation in the study area. 20.8% of the respondent believes that there is room for improvement hence, responded to the rating "Better" amongst the category followed by 9.0% of the respondent who responded to the rating "Worse" in the category expressing a high level of dissatisfaction.

Table 7. Awareness of Municipal Solid Waste (MSW) on Environmental Health

Awareness of Municipal Solid Waste (MSW) on Environmental Health	Frequency	Percent
Yes	111	77.1
No	33	22.9
Total	144	100.0

Table 7 presents the distribution of the respondents regarding the Awareness of Municipal Solid Waste (MSW) on Environmental Health. 77.1% constituting the majority of respondents, indicated that they were uninformed of how Municipal Solid Waste (MSW) affects the environment. This reveals a substantial knowledge gap in the surveyed population while only 22.9% of the respondents have the knowledge of how municipal Solid Waste (MSW) affects the environment.

Table 8. Interest in Private Waste Disposal Agency

Interest in Private Waste Disposal Agency	Frequency	Percent
Interested	64	44.4
Not Interested	80	55.6
Total	144	100.0

Table 8 represents the response of the 144 respondents in the study area to determine the level of interest in employing the services of a private waste disposal agency. The survey reveals that 44.4% of the respondents are interested in a waste disposal agency while 55.6% are not interested. This suggests that despite the respondents' indicated displeasure in government waste disposal agency, the majority either prefers other waste management options or wants to avoid the financial implications rather than using the services of a private waste disposal agency. Nevertheless, there is a significant demand for the services of private agencies in the area.

4. Conclusion

The individuals' waste disposal behaviors in the study area vary across different waste types but a substantial portion of the respondents expressed dissatisfaction or uncertainty about the timing of waste collection. The resident's receptacles for waste collection before disposal is majorly the block setting and a significant number practiced open dumping. These practices caused overflow of storage facilities in the area. Agencies that collect waste are more frequently provided by government agencies than business owners. The government authority's collection of waste is not up to par since there are records of deficient services and collection techniques, which constitute an environmental risk due to improper waste management and impair the environment's aesthetic values. Substantial portion of the respondents lack awareness of the impact of Municipal Solid Waste (MSW) on environmental health. This suggests a need for educational and awareness-building initiatives in the community.

The data gathered through the questionnaires can be useful for waste management authorities, environmental organizations, and policymakers in creating targeted awareness campaigns and orientations to promote proper waste management practices and lessen the environmental impact of waste materials. Since the community is willing to contribute to ethical waste management practices for a cleaner environment, business owners involved in waste management should be encouraged.

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