Assessing Residents' Satisfaction with Waste Management Approaches in Port Harcourt Metropolis

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ABSTRACT

Effective waste management is crucial for maintaining clean, healthy and sustainable urban environments. Port Harcourt Metropolis, a rapidly urbanizing region in Nigeria, faces distinctive waste management challenges. Understanding residents' satisfaction with waste management systems and services is a pivotal step towards a cleaner and healthier city. This study aims to assess residents' satisfaction with waste management approaches in Port Harcourt Metropolis. Utilizing a quantitative and descriptive research design, this study collects data through structured questionnaires distributed to 340 households. The sample is thoughtfully selected using stratified random sampling, ensuring representation from various communities within the two key local government areas (Port Harcourt City and Obio/Akpor). Quantitative data are analyzed using descriptive statistics, including frequencies, percentages, and the Likert scale. The study provides a comprehensive profile of residents, including gender, marital status, age, length of stay, household size, educational status, employment status, and monthly income. It also reveals residents' levels of satisfaction with critical waste management practices, including waste collection, receptacle evacuation, and monthly environmental sanitation exercises. The discussion of findings highlights various avenues for potential improvements in waste management practices within the Port Harcourt Metropolis, contributing to a cleaner and healthier urban environment.

Keywords: waste management, socio-economic characteristics, residents' satisfaction, Port Harcourt Metropolis, urban environment.

1.0 INTRODUCTION

Households and businesses in urban areas generate significant volumes of solid waste, necessitating regular collection, recycling, proper treatment, and disposal to ensure clean and hygienic living environments. A growing number of cities grapple with solid waste management issues, primarily driven by rapid urbanization, limited technical and financial resources, or low policy emphasis. With ongoing urbanization and population expansion, it is anticipated that the production of municipal solid waste will double by the year 2025 (UN-Habitat, 2018). This presents a pressing challenge for municipalities and underscores the need for sustainable waste management solutions to accommodate this impending surge in waste generation.

Urbanization, population growth, and changing consumption patterns have escalated the challenges associated with waste disposal and environmental sustainability (Ugwuanyi & Isife, 2012).

The quality and effectiveness of waste management services profoundly impact public health, environmental well-being, and overall quality of life for city residents (Debrah, Vidal & Dinis, 2021).

Port Harcourt Metropolis, encompassing a diverse range of communities, presents unique waste management challenges. Understanding residents' satisfaction with existing waste management approaches is essential for local authorities and waste management agencies to make effective and data-driven decisions. The city's socio-economic diversity further adds complexity to the issues involved, as different demographic groups may have distinct waste management needs and expectations.

1.1 Problem Statement

RIWAMA, the Rivers State Waste Management Agency, has been entrusted with the critical responsibility of waste management in Port Harcourt Metropolis. However, it has become evident that key aspects of waste management, including door-to-door waste collection, waste segregation, clean-up of dump sites, and environmental sanitation exercises, are not meeting the expected standards.

Door-to-Door Waste Collection: The efficiency and coverage of door-to-door waste collection, a fundamental waste management practice, have been suboptimal. Residents' expectations regarding waste collection services are not being met, posing concerns about the overall effectiveness of waste collection efforts.

Waste Segregation: Adequate waste segregation, essential for responsible waste management and recycling, has not been consistently promoted or enforced. This deficiency hinders sustainable waste management practices and environmental preservation.

Clean-Up of Dump Sites: The state of cleanliness and maintenance at dump sites has been lacking, resulting in environmental pollution and health risks. The absence of effective clean-up and maintenance protocols at these sites contributes to the deteriorating state of the environment.

Environmental Sanitation Exercises: The periodic environmental sanitation exercises, which aim to uphold public hygiene and cleanliness, have not consistently met the desired standards. This deficiency poses health and environmental hazards within the metropolis.

These shortcomings emphasize the urgent need for a comprehensive evaluation of waste management services and residents' satisfaction with these services.

1.2 Aim

The primary aim of this research is to assess residents' satisfaction with waste management approaches in Port Harcourt Metropolis.

1.3 Objectives

To profile and record respondents' socio-economic characteristics, including sex, marital status, age, length of stay, household size, educational status, employment status, and monthly income status.

To evaluate residents' satisfaction with waste management approaches, including Waste Collection from House-to-House, Waste Evacuation and Clean-up of Receptacles/Open Dump Sites, and Monthly Environmental Sanitation Exercise.

1.4 Area of Study

This study was conducted in Port Harcourt Metropolis, which comprises 90 distinct communities. These communities represent a diverse urban landscape with unique waste management challenges.

2.0 LITERATURE REVIEW

The literature review section provides an in-depth analysis of prior research, theories, and findings relevant to the study's focus on waste management and residents' satisfaction in urban settings. This section aims to provide a comprehensive understanding of the existing body of knowledge and identify gaps that the current study seeks to address.

2.1. Urbanization and Waste Management

The rapid urbanization observed globally has resulted in increased waste generation and complexity in waste management (Ugwuanyi & Isife, 2012; Debrah, Vidal & Dinis, 2021). Urban centers, including Port Harcourt Metropolis, experience intensified waste management challenges due to population growth and evolving consumption patterns (Ayotamuno & Gobo, 2004); Ogbonna, Amangabara & Ekere, 2007; Binafeigha & Enwin, 2017). The increased urban waste burden necessitates efficient waste management strategies that align with the needs of a diverse and expanding population (McAllister, 2015).

2.2. Socio-Economic Characteristics and Waste Management

Waste management practices in developing countries are often inadequate due to limited resources, inadequate infrastructure, and poor waste management practices. Studies have established that socio-economic factors such as income, education, employment, and household size have been identified as important determinants of waste management practices. Income, education, employment, and household size are significant predictors of waste management practices in developing countries (Jagun, Daud, Ajayi, Samsudin, Jubril & Rahman, 2022). Therefore, promoting sustainable waste management practices among low-income households, promoting education and awareness-raising campaigns, promoting formal employment opportunities, and promoting sustainable waste management practices among larger households can contribute to achieving sustainable waste management in developing countries (Jagun et al, 2022).

According to Cherian and Jacob (2012), some of the socio-economic factors that impact waste generation and planning include income, level of consumption, cultural and educational environment, population density, average income, level of education, climate, religious and cultural beliefs, living habits, and social and public attitudes. However, the effects of these factors vary from place to place and may be different across countries, cities, and even zones within a particular city. Understanding these socio-economic drivers is crucial for tailoring waste management strategies and services to specific urban communities.

2.3. Residents' Satisfaction with Waste Management

Residents' satisfaction with waste management services is a vital metric in evaluating the effectiveness of waste management programs. According to the Wang, Chen, Wang, Wei and Song (2022), the factors that were found to be most important in determining satisfaction with solid waste management services in China include: the frequency of waste collection, the cleanliness of the collection site, the adequacy of waste disposal facilities, the level of public participation in waste management, and the quality of waste management personnel.

Larbi-Tettey (2018) stated that the main drivers that influence the public satisfaction towards waste collection services in Ho Municipality are lifting frequency, provision of bins, bins overflowing with waste, and safety at the container sites. The study found that residents were moderately satisfied with the waste collection services rendered by both private waste management company and the Municipal Assembly.

In Nigeria, Aminu, Abd Manaf, Sharaai and Zainordin, (2022) studied solid waste collection service satisfaction in non-service area of Jigawa State, Nigeria. The authors used a questionnaire designed based on a 5-Likert scale to study solid waste collection service satisfaction among the residents. The questionnaire was validated by 8 panel of experts selectively drawn from academia and local authority with the reliability of the instrument standing at 0.846, which is worthy enough for the instrument to be accepted. The authors used a multistage sampling technique to administer the

questionnaires to the respondents, and the data was analyzed using SPSS (IBM 25 version), descriptive statistics with frequency and percentage, then illustrated and interpreted. According to the findings of the study, 74% of the respondents were satisfied with the level of household participation in solid waste collection, 65% of the respondents reported being satisfied with the cleanliness of the non-service area done by the non-residents, and 60% were satisfied with collection frequency. However, 57% of the respondents were not satisfied with the absence of waste collection service, and only 3% of the respondents were very not satisfied with the collection services by the non-residents

2.4. Challenges in Urban Waste Management

Urban waste management is fraught with challenges, especially in emerging economies. According to Nwosu and Chukwueloka (2020), some of the challenges faced by waste management authorities in Nigeria include inadequate environmental policies and legislations, poor funding, low level of government support, limited environmental awareness, inadequate facilities, corruption, politics, inappropriate technology, urbanization, and low public participation. These challenges have made it difficult for waste management authorities to effectively manage solid waste in Nigeria. Understanding the specific challenges faced by Port Harcourt Metropolis in waste collection, segregation, and disposal is essential for effective policy formulation.

2.5. Tailored Waste Management Strategies

To address the unique waste management challenges in urban settings, tailored strategies have been initiated and implemented. According to Nwosu and Chukwueloka (2020), there are traditional solid waste management strategy (TSWMS) and waste minimization strategy (WMS). The traditional solid waste management strategy (TSWMS) and waste minimization strategy (WMS) differ in their approach to waste management. TSWMS focuses on the collection, transportation, and disposal of waste, while WMS aims to reduce the amount of waste generated in the first place. WMS achieves this by promoting the 3Rs (reduce, reuse, and recycle) and encouraging the use of environmentally friendly products. The TSWMS approach is more reactive, while the WMS approach is more proactive and seeks to prevent waste generation.

Nwosu and Chukwueloka (2020) went ahead to say that there are some innovative technological solutions being employed in Nigeria to address solid waste management. One such solution is the use of GPS, GIS, and remote sensing technologies in the Technological Strategy (TcS) approach to solid waste management. These technologies are used to track waste collection vehicles, monitor waste disposal sites, and identify areas with high waste generation rates. Additionally, some private institutions in Nigeria have implemented recycling and waste-to-wealth initiatives using innovative technologies to convert waste into useful products. However, the adoption of these technologies is still limited due to factors such as inadequate funding, lack of technical expertise, and poor infrastructure.

3.0 METHODOLOGY
3.1. Research Design

This study employs a quantitative and descriptive research design to comprehensively assess residents' satisfaction with waste management approaches in Port Harcourt Metropolis and their connection to socio-economic characteristics.

3.2. Population and Sampling
3.2.1. Population

The study focuses on the diverse and expanding population of Port Harcourt Metropolis, a major urban center in Rivers State, Nigeria. This dynamic urban area is

characterized by a wide range of socio-economic characteristics, reflecting the complexities of waste management challenges in the region.

3.2.2. Sampling Method

To ensure a representative sample, a stratified random sampling method is employed. Port Harcourt Metropolis is stratified based on geographic locations, including communities and neighborhoods. Within each stratum, households are randomly selected to participate in the study.

3.2.3. Sample Size

The sample size is determined based on statistical calculations to ensure the sample's confidence level and margin of error. With a confidence level of 95% and a margin of error set at 5%, the sample size is calculated to be 340 households.

3.3. Data Collection

Structured questionnaires are distributed to the selected households. These questionnaires are designed to gather quantitative data on socio-economic characteristics (including gender, marital status, age, length of stay, household size, educational status, employment status, and monthly income) and residents' satisfaction with waste management approaches: Waste Collection from House-to-House, Waste Evacuation and Clean-up of Receptacles/Open Dump Sites, and Monthly Environmental Sanitation Exercise. The survey is conducted by the research team, ensuring a standardized approach to data collection.

3.4. Data Analysis

Quantitative data are analyzed using descriptive statistics, including frequencies, percentages and Likert scale. This analysis provides a clear picture of residents' socio-economic characteristics and their levels of satisfaction with waste management approaches.

4.0 Study Findings
4.1 Socio-Economic Characteristics of Heads of Households

The socio-economic characteristics of heads of households in the study area were examined to gain a comprehensive understanding of the demographic and economic background of the respondents. The data was collected from a total of 340 respondents and is presented in the following table.

Sex of Respondents

Out of the 340 respondents, 185 individuals, representing 54.4%, were male, while the remaining 155 respondents, constituting 45.6%, were female. This data reveals that a majority of the heads of households who participated in the survey were male.

Marital Status of Respondent

Among the respondents, 30.0% were identified as single, 43.0% were married, 20.0% were separated, and 7.0% were identified as widows or widowers. These findings provide insights into the marital status distribution within the study area.

Age of Respondents

The age distribution of the respondents indicates that 11.2% of them were between the ages of 18 and 29, 36.2% fell within the age group of 30 to 41, 25.8% were aged 42 to 53, 21.5% were in the 54 to 65 age bracket, and the remaining 5.3% were 66 years or older.

Years of Residents in the Neighbourhood

A significant portion of the respondents had been residents in the neighborhood for extended periods. Specifically, 23.0% had lived in the area for 1 to 5 years, 25.8% for 6 to 10 years, and a majority of 51.2% had resided in the neighborhood for 11 years or more.

Household Size

Household size plays a role in determining the volume of waste generated. The data showed that 30.0% of households had 1 to 3

members, 31.5% had 4 to 6 members, 22.4% had 7 to 9 members, and 16.1% had 10 or more members.

Educational Status of Respondents

Educational backgrounds varied among the respondents, with 16.5% having primary education, 68.0% having secondary education, and 15.5% holding tertiary education qualifications. None of the respondents indicated having no formal education.

Employment Status of Respondent

In terms of employment, 65.6% of the respondents were identified as civil servants, 13.0% worked in the private sector, 9.1% were self-employed, 5.6%

were retired, and 6.7% were unemployed. The majority of the respondents were engaged in civil service jobs.

Monthly Income Status of Respondents

Regarding monthly income, the modal income category for respondents was '60,001-90,000,' accounting for 36.2% of the distribution. This was followed by those earning '90,001-120,000' at 28.8% and '30,001-60,000' at 16.2%. The socio-economic characteristics of heads of households provide valuable insights for understanding the study area's diverse demographic and economic composition, which are essential for assessing their perspectives on solid waste management.

Table 1: Socio-Economic characteristics of Heads of Households in the Study Area

Socio-Economic Characteristics	Number	Percentage (%)
Sex of Respondents		
Male	185	54.4
Female	155	45.6
Total	340	100
Marital Status		
Single	102	30.0
Married	146	43.0
Separated	68	20.0
Widow (er)	24	7.0
Total	340	100
Age		
18-29	38	11.2
30-41	123	36.2
42-53	88	25.8
54-65	73	21.5
66 and above	18	5.3
Total	340	100
Length of Stay		
1-5	78	23.0
6-10	88	25.8
11 and above	174	51.2
Total	340	100
Household Size		
1-3	102	30.0
4-6	107	31.5
7 -9	55	22.4
10 and above	76	16.1
Total	340	100
Educational Status		
Primary	56	16.5
Secondary	231	68.0
Tertiary	53	15.5
None	0	0
Total	340	100
Employment Status		
Civil Servant	223	65.6
Private Sector	44	13.0
Self employed	31	9.1
Retired	19	5.6
Unemployed	23	6.7
Total	340	100
Monthly Income Status (N)		

0-30,000	19	5.6
30,001-60,000	55	16.2
60,001-90,000	123	36.2
90,001-120,000	98	28.8
Above 120,000	45	13.2
Total	340	100

Source: Authors, (2022)

4.2 Residents Satisfaction with Waste Management Approach

In assessing the level of residents' satisfaction with the waste management approach in the Port Harcourt Metropolis, we conducted a thorough analysis based on responses obtained from the survey. The data presented in Table 2 outlines the residents' perspectives on various aspects of waste management and provides insight into their overall satisfaction.

Waste Collection from House-to-House

The first aspect of waste management under consideration is the collection of waste from house-to-house. Among the respondents, 84 individuals expressed being Very Dissatisfied, 106 respondents were Dissatisfied, 23 individuals were Neither Satisfied nor Dissatisfied, while 66 residents were Satisfied and 61 were Very Satisfied. The weighted mean score for this aspect is 2.74.

Waste Evacuation and Clean-up of Receptacles/Open Dump Sites

The second aspect examined the waste evacuation and clean-up of receptacles and open dump sites. Among the respondents, 78 individuals expressed being Very Dissatisfied, 75 respondents were Dissatisfied, 10 individuals were Neither Satisfied nor Dissatisfied, while 89 residents were Satisfied, and 88 were Very Satisfied. The weighted mean score for this aspect is 3.1.

Monthly Environmental Sanitation Exercise

The third aspect considered the monthly environmental sanitation exercise. Among the respondents, 89 individuals expressed being Very Dissatisfied, 99 respondents were Dissatisfied, 12 individuals were Neither Satisfied nor Dissatisfied, while 73 residents were Satisfied, and 67 were Very Satisfied. The weighted mean score for this aspect is 2.8.

Table 2: Residents Satisfaction with Waste Management Approach

S/N	Residents Satisfaction with Waste Management Approach	Very Dissatisfied (VD)	Dissatisfied (D)	Neither Satisfied Nor Dissatisfied (N)	Satisfied (S)	Very Satisfied (VS)	Weighed Mean Score	Decision
01	Waste Collection from house-to- house	84	106	23	66	61	2.74	Not satisfied
02	Waste Evacuation and Clean-up of Receptacles/ Open Dump Sites	78	75	10	89	88	3.1	Satisfied
03	Monthly Environmental Sanitation Exercise	89	99	12	73	67	2.8	Not Satisfied

Source: Authors (2022)

5.0 DISCUSSION OF FINDINGS

Effective waste management is a shared responsibility between the government and residents in most cities of Nigeria. The cleanliness and overall health of a city significantly impact its global attractiveness and competitiveness. To meet the recommendations of the Millennium Development Goals (MDG7) and Sustainable Development Goals (SDGs), it is crucial to focus on internal efforts, including proper orientation, enlightenment, and enforcement among residents who may

not be satisfied with the state of waste management.

Residents play a pivotal role as major stakeholders in waste management and should be held accountable for their contributions to the process. The study revealed that residents' satisfaction with certain aspects of the waste management approach falls below the 3.0 weighted mean score, indicating areas that require attention and improvement.

5.1 Socio-economic Characteristics of Respondents and its Implication

The socio-economic characteristics of residents in Port Harcourt Metropolis, as outlined in Table 1, can have several implications for their satisfaction with the waste management approach. Here are some of the potential implications:

Gender and Satisfaction: The data shows that there are more male respondents (54.4%) than female (45.6%). This gender imbalance could imply that the waste management approach may need to consider gender-specific preferences and needs, which could influence residents' satisfaction.

Marital Status and Satisfaction: Residents' marital status can impact their waste generation and disposal practices. For instance, married individuals might produce more waste than single ones. Hence, understanding the marital status of residents can help tailor waste management strategies to meet the diverse needs of different households.

Age and Satisfaction: Age is a critical factor in waste management as the waste generation patterns and environmental awareness tend to vary with age. Residents in different age brackets may have different expectations and requirements concerning waste management services. Thus, the age distribution data can inform strategies for catering to the preferences and needs of various age groups.

Length of Residence and Satisfaction: The number of years residents have spent in their neighborhood is vital because long-term residents may have a more in-depth understanding of local waste management practices and may have specific expectations based on their experience. This information can be used to improve services for both long-term and recent residents.

Household Size and Satisfaction: Household size directly affects the volume of waste generated. Larger households generate more waste and are more likely to use informal waste collection services. Since larger households are likely to produce more waste, understanding this can guide waste collection schedules and strategies to manage larger quantities effectively.

Therefore, promoting sustainable waste management practices among larger households, such as waste segregation and composting, can contribute to achieving sustainable waste management in developing countries.

Educational Status and Satisfaction: Education often influences awareness of environmental issues, including waste management. Residents with higher educational qualifications may have different expectations and may be more willing to engage in sustainable waste management practices. Households with higher levels of education are more likely to be aware of the environmental and health impacts of poor waste management practices and adopt sustainable waste management practices. Education can also promote community participation in waste management activities, such as waste segregation and recycling.

Employment Status and Satisfaction: Employment status can influence the time residents have available for waste management activities. For example, civil servants may have structured work hours, while self-employed individuals might have more flexible schedules. This could impact participation in community waste management initiatives. Households with formal employment therefore are more likely to use formal waste collection services and dispose of waste properly. In contrast, households with informal

employment are more likely to use informal waste collection services, such as scavenging and dumping.

Monthly Income and Satisfaction: Monthly income can affect residents' willingness and capacity to participate in waste management programs or initiatives. Households with higher incomes are more likely to use formal waste collection services and dispose of waste properly, including investing in eco-friendly waste disposal methods. In contrast, households with lower incomes are more likely to use informal waste collection services, such as scavenging and dumping, which can lead to environmental and health hazards.

The socio-economic characteristics provide a basis for understanding the diverse needs, behaviors, and expectations of residents. Waste management authorities can use this information to tailor waste management approaches, outreach, and services to better align with the specific demographics within the community. It's crucial to recognize that a one-size-fits-all approach might not be effective in ensuring overall resident satisfaction, and customization based on these socio-economic factors could lead to more successful waste management strategies.

5.2 Residents Satisfaction with Waste Management Approach in the Study Area

Table 2 presents valuable insights into residents' satisfaction with the waste management approach in the Port Harcourt Metropolis. This discussion will delve into the implications and key takeaways from these findings:

Waste Collection from House-to-House

Residents' dissatisfaction with waste collection from house-to-house is notable, with a weighted mean score of 2.74, indicating a level of satisfaction below the midpoint of the scale. This suggests that the current approach to waste collection may be lacking in effectiveness or efficiency. Possible reasons for dissatisfaction could include irregular collection schedules, inadequate coverage, or subpar service quality. To improve resident satisfaction in this aspect, local authorities and waste management agencies may need to consider revising collection strategies, ensuring timely and consistent services, and addressing any issues that impede smooth waste collection.

Waste Evacuation and Clean-up of Receptacles/Open Dump Sites

In contrast, residents express a higher level of satisfaction with waste evacuation and clean-up of receptacles and open dump sites, with a weighted mean score of 3.1. This indicates that the current methods of waste evacuation and site clean-up are generally well-received by the community. This positive finding reflects efficient waste management practices, which may include regular and thorough site clean-up, effective waste transportation, and proper disposal techniques. Responsive authorities should continue to maintain and improve these practices to sustain high resident satisfaction and ensure a cleaner environment.

Monthly Environmental Sanitation Exercise

The monthly environmental sanitation exercise receives a lower satisfaction rating, with a weighted mean score of 2.8, slightly below the midpoint of the scale. This suggests that residents are generally dissatisfied with the effectiveness of these exercises. Several factors might contribute to this dissatisfaction, such as insufficient public awareness and participation, inadequate enforcement of sanitation regulations, or the need for more frequent clean-up activities. To enhance satisfaction in this area, the relevant authorities (RIWAMA, local government council and Rivers State Ministry of Environment) should consider increasing community involvement, raising awareness of the importance of sanitation exercises, and improving enforcement mechanisms.

Recommendation for Improvement in Waste Management Practices

Overall, these findings underline the importance of tailoring waste management strategies to specific aspects of the process and addressing the unique needs and concerns of residents. It is clear that a one-size-fits-all approach may not be effective in achieving high resident satisfaction. The discussion of findings points to several avenues for potential improvement in waste management practices in the Port Harcourt Metropolis:

Enhanced Communication: Increased public awareness and education about waste management and sanitation exercises are crucial to improving participation and satisfaction among residents. Efforts should be made to inform the community about the importance of proper waste disposal and the role they play in maintaining a clean environment.

Consistency and Timeliness: Timely and consistent waste collection services are essential to meeting residents' expectations. Local authorities and waste management agencies should establish regular collection schedules and ensure that services are provided as promised.

Community Involvement: Encouraging residents to actively participate in environmental sanitation exercises can foster a sense of ownership and responsibility for waste management. Community engagement initiatives should be developed and promoted.

Enforcement of Regulations: To maintain clean and sanitary neighborhoods, regulations related to waste management and sanitation exercises must be enforced effectively. This includes penalties for non-compliance and ensuring that open dump sites are properly managed.

Continuous Improvement: The relatively higher satisfaction with waste evacuation and clean-up of receptacles/open dump sites indicates that certain aspects of the waste management process are working well. Efforts should be made to sustain and enhance these practices to maintain high levels of resident satisfaction.

In conclusion, these findings provide a foundation for relevant waste management authorities to refine their waste management approaches, and addressing specific areas of concern while capitalizing on aspects that are already performing well. Ultimately, the goal is to ensure a cleaner, healthier and more sustainable environment while meeting the expectations and needs of residents in the Port Harcourt Metropolis.

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