

**Determinants of Knowledge, Attitude and Practices of Refuse Disposal Method among Residents of Port Harcourt Metropolis**

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**Abstract**

**Background/Objective:** Waste management poses a notable environmental hurdle for developing countries, chiefly revolving around the collection and disposal practices varied across societies. This study aims to investigate the determinants of knowledge, attitude, and practices of refuse disposal methods among residents of Port Harcourt.

**Methods:** A cross-sectional survey involving 422 adult residents of Port Harcourt Metropolis was conducted. Participants completed a questionnaire assessing their knowledge, attitude, and practices regarding refuse disposal methods. Statistical analysis, including descriptive and correlation analysis, were employed to assess levels of knowledge, attitude, practices, and factors influencing refuse disposal, as well as the relationships between these variables.

**Results:** Findings indicate a high level of knowledge (85%), positive attitude (81%), and moderate practices (63%) regarding refuse disposal methods among residents of Port Harcourt Metropolis. Factors influencing refuse disposal in the area include access to waste disposal facilities (88%), cost of waste disposal (55%), peer influence (23%), lack of awareness (48%), and government policies (72%). Chi-Square test indicates a significant relationship between knowledge and practice, as well as attitude and practice of refuse disposal methods among residents of Port Harcourt, at the significance level ( $p < 0.05$ ).

**Conclusion:** The research indicates that Port Harcourt residents generally possess a high level of knowledge and a positive attitude towards refuse disposal, coupled with moderate practices. Nevertheless, significant factors such as access to waste disposal facilities and governmental policies influence these practices, highlighting the necessity for focused interventions and policy improvements to enhance waste management efforts in the region.

*Keywords:* knowledge, attitude, practice, determinants, refuse, disposal method

**Introduction**

Developing nations face significant environmental challenges in managing refuse due to issues with collection, disposal methods, and factors like modernization, population growth, and urbanization (Nwigwe, 2008). Globally, around 2 billion tons of municipal solid waste (MSW) are generated annually, with urban centers contributing about 1.3 billion tons yearly (Hoornweg & Bhada-Tata, 2012). Africa, particularly, experiences rapid waste proliferation, with only a fraction of MSW being collected and recycled (AUDA, 2021). Nigeria, a prominent example, generates over 32 million tons of solid waste annually, with inadequate collection and disposal methods contributing to environmental degradation (Wale, 2022). Negative attitudes and lack of awareness exacerbate waste management challenges (Ukala et al., 2020). In Port Harcourt, observations reveal issues like landfill capacity, offensive odors, and health risks (Ikebude, 2017). Escalating waste volumes globally pose threats to ecosystems and

human health, emphasizing the importance of waste prevention, recycling, and responsible disposal practices (UNEP, 2024). Research on refuse disposal in Port Harcourt underscores the influence of socioeconomic status, cultural beliefs, and attitudes on waste management behaviors, highlighting the need for holistic approaches to waste management that consider various societal factors (Okwu-Boms et al., 2022).

The socio-economic, cultural, governmental, environmental, infrastructural, communal, gender and age-related factors intricately shape refuse disposal practices (Chukwuone et al., 2022). Socio-economic status significantly impacts waste management, with higher-income households accessing better services (Khan et al., 2023). Education influences environmental awareness, affecting proper disposal behaviors (Wang et al., 2022). Urban areas typically boast superior waste infrastructure compared to rural regions (UN-Habitat, 2016). Cultural norms dictate disposal methods, while accessibility to recycling facilities varies (Oluwadipe et al., 2022). Socio-economic gaps often lead to waste-related injustices, particularly affecting marginalized communities (Bullard et al., 2007). Gender dynamics influence waste management, with women often bearing significant household waste responsibilities (Oyedotun & Akindele, 2013). Government policies regulate waste collection, recycling, and disposal, aiming for sustainability and public health (Oudejans, 2016). Environmental consciousness drives recycling efforts and waste reduction, influencing consumer choices and advocacy (Gleim et al., 2017). Infrastructure dictates the efficiency of waste collection and disposal, with advanced technologies enhancing sustainability (Astrup, 2017). Community attitudes and behaviors impact waste generation, recycling rates, and cleanliness, driving local waste management initiatives (Hoorweg, 2013). Understanding and addressing these factors are imperative for developing comprehensive and equitable waste management strategies.

Residents' understanding of refuse disposal significantly shapes waste management behaviors (Tian & Liu, 2022). Understanding encompasses waste types, disposal methods, environmental impacts, regulations, and safety (Altikolatsi et al., 2021). Core knowledge includes categorizing waste, following disposal protocols, and complying with regulations. Awareness of environmental consequences is crucial, as is knowledge of local guidelines and safety measures (Azilah et al 2015; Steg & Vlek, 2009; Bernstad, 2014). Education initiatives enhance understanding, while access to information facilitates proper disposal (Emmanuel et al., 2021; Hameed et al., 2021). Higher knowledge correlates with responsible waste management practices.

Some residents prioritize convenience over responsible waste disposal due to busy lifestyles or lack of awareness about environmental impact. Others view it as a responsibility, balancing convenience and duty (Gifford, 2014). Environmental consciousness globally is rising, driving eco-friendly practices like recycling (Halkos & Matsiori, 2018). Cultural norms and socioeconomic conditions shape waste disposal attitudes, and traditional practices coexist with modern waste generation challenges (Ajani & Olutayo, 2021). Limited resources can hinder proper waste management (Debrah et al., 2022). Increasing environmental awareness in Nigeria fosters support for sustainable practices (Ogunleye, 2003).

Composting offers eco-friendly waste decomposition, soil improvement, and sustainable waste management (Wen et al., 2020). Waste reduction advocates a "reduce, reuse, recycle" approach (Linda et al., 2021). Informal waste pickers aid recycling efforts (Opoko & Oluwatayo 2016). Illegal dumping persists due to inadequate waste infrastructure, posing environmental and health risks (Grobler et al., 2022). Community-led waste management initiatives promote sustainable practices (Kalra, 2019). Nigerian communities initiate waste programs to raise awareness and promote responsible disposal (Sambo & Wetnwan, 2021). E-waste management is a growing concern due to improper disposal practices (Otapo & Adebari,

2012). Attitudes and practices are influenced by cultural, economic, and environmental factors, necessitating a multi-faceted approach involving government policies, public awareness, and community engagement.

### **Research Questions**

1. What is the level of knowledge of refuse disposal among residents of Port Harcourt?
2. What is the attitude of residents of Port Harcourt towards refuse disposal methods?
3. What practices are used by residents of Port Harcourt for refuse disposal?
4. What are the most common determinants of refuse disposal methods among residents of Port Harcourt?
5. What are the observed refuse disposal methods and level of participation among the residents of Port Harcourt?

### **Methodology**

A mixed-method cross-sectional descriptive study was conducted to explore knowledge, attitudes, and practices of refuse disposal among residents of Port Harcourt Metropolis, Rivers State, Nigeria. This design integrates qualitative and quantitative methodologies with a focus on data and method triangulation to enhance research validity. Triangulation involves using multiple investigators, theories, and methodologies to ensure comprehensive data collection and analysis. The study's design is deemed appropriate for its purpose and fills a gap in existing literature.

Residents of Port Harcourt Metropolis were included in the study, with a projected population of 1,439,600 in 2022. Criteria for inclusion encompassed individuals aged 18 or above, residing in Obio-Akpor or Port Harcourt City LGA, providing informed consent, and willingly participating in the study. Exclusion criteria included individuals with incomplete or erroneous data, temporary residents, visitors, those with cognitive impairments, and poor language proficiency.

The sample size was determined to be 422 using Cochran's method, ensuring a sufficient representation of the population. This sample size provides a high level of accuracy at a 95% confidence level with a 5% margin of error, aligning with previous research recommendations.

Stratified random sampling was employed, with 12 respondents randomly selected from each of the 37 wards across Obio-Akpor and Port Harcourt City LGA, totaling 444 potential participants. From this pool, 422 samples were randomly selected for the study. Data collection utilized a structured questionnaire, interview guide, observation, and digital audio recorder. The questionnaire comprised five sections focusing on socio-demographic data, knowledge, attitudes, practices, and determinants of refuse disposal. Likert scale responses were utilized for sections B to E, while the interview guide facilitated qualitative exploration of residents' perspectives on waste management practices.

A combination of manual and digital methods was employed for data gathering and entry. Manual data collection was conducted initially, followed by conversion to a digital format using Google Forms. Subsequently, the data underwent verification, cleansing, and preparation for analysis using MS-Excel 2016.

Data analysis encompassed descriptive and inferential statistics using MS-Excel 2016. Descriptive statistics measured knowledge, attitudes, practices, and determinants of refuse disposal among residents. Inferential statistics, including Chi-Square Test and thematic analysis, explored relationships between variables and identified recurring themes in qualitative data.

**Results**

The tables below highlight the respective findings of the study based on the study objectives.

**TABLE 1: Level of knowledge of refuse disposal among residents of Port Harcourt**

ITEMS				Mean	Percentage (%)	Outcome
	Yes	No	Not Sure			
Knowledgeable about different refuse disposal methods available in Port Harcourt.	374	37	11	0.89	89%	High
Understands the potential environmental impacts of improper refuse disposal.	419	3	0	0.99	99%	High
Aware of the proper segregation techniques for different types of waste.	350	58	14	0.83	83%	High
Know the designated collection points for refuse disposal in your area.	323	85	14	0.77	77%	High
Actively seek information on best practices for refuse disposal.	326	93	3	0.77	77%	High
<b>Grand Knowledge</b>				<b>0.85</b>	<b>85%</b>	<b>High</b>

Table 1, summarizes residents' knowledge and awareness of refuse disposal in Port Harcourt. Findings reveal strong awareness, with 89% knowledgeable about disposal methods and 99% understanding environmental impacts of improper disposal. Additionally, 83% grasp proper waste segregation, while 77% know designated collection points and actively seek disposal information. Overall, 85% exhibit high knowledge proficiency. These results indicate successful achievement of Objective 1, highlighting residents' commendable understanding and awareness of refuse disposal practices.

**TABLE 2: Attitude of residents of Port Harcourt towards refuse disposal methods**

ITEMS	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	(%)	Outcome
Believes it is important to properly dispose of refuse to protect the environment.	1476	159	0	0	3.50	87%	Positive
Willing to make an effort to adopt more sustainable refuse disposal practices.	1344	258	0	0	3.18	80%	Positive
Thinks the government should provide more facilities and services for refuse disposal.	1520	114	0	4	3.60	90%	Positive
Feels responsible for ensuring that your refuse is disposed of properly.	1220	342	6	0	2.89	72%	Fair
Believes community involvement is crucial for effective refuse disposal.	1296	273	14	0	3.07	77%	Positive
<b>Grand Attitude</b>					<b>3.25</b>	<b>81%</b>	<b>Positive</b>

Residents of Port Harcourt generally hold positive attitudes towards proper refuse disposal and environmental protection, as indicated by the results in Table 2. The mean scores reveal strong beliefs in the importance of proper refuse disposal (3.5 or 87%) and a willingness to adopt more

sustainable practices (3.18 or 80%). There's also a high expectation for government involvement (3.6 or 90%) in providing facilities and services for refuse disposal. However, there's room for improvement in residents' sense of personal responsibility (2.89 or 72%) for waste management. Nonetheless, there's recognition of the importance of community involvement (3.07 or 77%) in effective refuse disposal. Overall, the average mean score of 3.25 (81%) reflects a positive attitude towards refuse disposal practices. These results suggest opportunities for education and awareness campaigns to enhance personal responsibility and community involvement, emphasizing the need for government support and infrastructure for effective refuse disposal.

**TABLE 3: Refuse disposal practices used by residents of Port Harcourt disposal**

ITEMS	Very Frequent (4)	Frequent (3)	Sometime (2)	Do Not (1)	Mean	%	Outcome
How frequent do you segregate your waste into recyclable and non-recyclable categories? (RECYCLING METHOD).	216	231	366	108	1.06	31%	Low
How regularly do you use designated bins or collection points for refuse disposal? (DESIGNATED BINS).	688	348	188	40	2.45	68%	Moderate
How frequent do you avoid littering and dumping refuse in unauthorized areas? (INDISCRIMINATE DUMPING).	1124	327	44	10	3.44	92%	High
How frequent do you properly package your refuse to prevent spillage and environmental contamination? (WASTE PACKAGING).	1204	270	50	6	3.49	93%	High
How frequent do you participate in community clean-up initiatives or refuse disposal campaigns? (COMMUNITY CLEAN-UP).	172	255	370	109	1.01	30%	Low
<b>Grand Practice</b>					<b>2.29</b>	<b>63%</b>	<b>Moderate</b>

Table 3 outlines refuse disposal practices in Port Harcourt. Results reveal insights into waste management behaviors. Residents show low rates of waste segregation (mean score: 1.06,

31%), indicating limited participation. Moderate adherence to designated disposal areas is noted (mean score: 2.45, 68%), suggesting room for improvement. High frequencies of avoiding littering (mean score: 3.44, 92%) and proper waste handling (mean score: 3.49, 93%) are observed. Community involvement in clean-up initiatives is low (mean score: 1.01, 30%). Overall, residents demonstrate moderate waste disposal practices (mean score: 2.29, 63%), with room for improvement in waste segregation and community participation. Enhancing education and promoting responsible waste disposal could improve practices, aligning with study objectives.

**TABLE 4: The most common determinants of refuse disposal methods among residents of Port Harcourt**

ITEMS	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)	Mean	Outcome (%)	Outcome
	(4)	(3)	(2)	(1)			
Accessibility of waste disposal facilities influence your refuse disposal practices.	800	516	86	7	3.12	88%	High
Cost of waste disposal facilities influence your refuse disposal practices.	272	492	294	43	1.81	55%	Low
Peer influence affect your approach to refuse disposal.	88	228	438	105	0.75	23%	Low
Lack of awareness about proper refuse disposal methods hinders your efforts.	236	426	310	66	1.57	48%	Low
Government policies and regulations impact your refuse disposal behavior.	400	609	182	28	2.39	72%	High
<b>Grand Determinants:</b>					<b>1.93</b>	<b>57%</b>	<b>Low</b>

Table 4 presents an analysis of the factors influencing waste disposal practices among residents of Port Harcourt. Findings reveal that high accessibility to waste disposal facilities significantly influences residents' disposal behaviors, with a mean score of 3.12 (88%). Conversely, the cost of waste disposal facilities, with a mean score of 1.81 (55%), is perceived to have a relatively low impact. Peer influence received a score of 0.75 (23%), indicating minimal effect on disposal practices. Lack of awareness about proper refuse disposal methods scored moderately at 1.57 (48%), while government policies and regulations scored high at 2.39 (72%). Overall, the determinants averaged a score of 1.93 (57%), indicating a moderate influence. However,

specific factors such as accessibility and government policies stand out as significant influencers, suggesting targeted interventions could enhance waste management practices in the area.

**TABLE 5: Ho1; There is no significant relationship between knowledge and practices of refuse disposal method among the residents of Port Harcourt**

Item	Practice (P)	Knowledge (K)	(P - K)	(P - K) <sup>2</sup>	(P - K) <sup>2</sup> /K
1	131	374	-243	59049	157.89
2	288	419	-131	17161	40.96
3	390	350	40	1600	4.57
4	391	323	68	4624	14.32
5	128	326	-198	39204	120.26
<b>Chi-Square (X<sup>2</sup>):</b>					<b>337.99</b>
<b>df:</b>					<b>4</b>
<b>Critical Value at p&lt;0.05:</b>					<b>9.49</b>

Based on the Chi-Square test results: Chi-Square value: 337.99, Degrees of Freedom (df): 4, Critical Value at  $p < 0.05$ : 9.49. The Chi-Square value is much larger than the critical value at the significance level of 0.05. This indicates a significant relationship between knowledge and practices of refuse disposal method among the residents of Port Harcourt. Therefore, we reject the null hypothesis that there is no significant relationship between knowledge and practices of refuse disposal method among the residents of Port Harcourt, as there is a significant relationship between knowledge and practices of refuse disposal method among the residents of Port Harcourt.



**TABLE 6: Ho2; There is no significant relationship between attitude and practices of refuse disposal method among the residents of Port Harcourt.**

<b>Item</b>	<b>Practice (P)</b>	<b>Attitude (A)</b>	<b>(P - A)</b>	<b>(P - A)<sup>2</sup></b>	<b>(P - A)<sup>2</sup>/K</b>
<b>1</b>	131	422	-291	84681	200.67
<b>2</b>	288	422	-134	17956	42.55
<b>3</b>	390	418	-28	784	1.88
<b>4</b>	391	419	-28	784	1.87
<b>5</b>	128	415	-287	82369	198.48
<b>Chi-Square (X<sup>2</sup>):</b>					<b>445.44</b>
<b>df:</b>					<b>4</b>
<b>Critical Value at p&lt;0.05:</b>					<b>9.49</b>

The Chi-Square value (445.4) is much larger than the critical value (9.49) at significance level of  $p < 0.05$ . This reveals a significant relationship between attitude and practices of refuse disposal method among the residents of Port Harcourt. Therefore, the null hypothesis that; there is no significant relationship between attitude and practices of refuse disposal among residents of Port Harcourt is rejected.

**TABLE 7: Exploration of the refuse disposal methods and level of participation among the residents of Port Harcourt.**

Items	Percentage (%)			
	Yes	No	Mean	
Recycling	131	291	0.31	31%
Open Dumping	32	390	0.08	8%
Burning	72	350	0.17	17%
Compositing	49	373	0.12	12%
Segregation	350	72	0.83	83%
Designated Bins	288	134	0.68	68%
Community Engagement	128	294	0.30	30%
Environmental Awareness	419	3	0.99	99%
<b>Grand Observation</b>			<b>0.44</b>	<b>44%</b>

Qualitative analysis of refuse disposal in Port Harcourt reveals a mixed scenario: Recycling engagement is low at 31%, while open dumping stands at 8% and burning waste at 17%, posing environmental risks. Compositing is practiced by 12%, indicating an eco-friendlier approach. Segregation is strong at 83%, and 68% use designated bins, suggesting infrastructure support. However, community engagement is lacking at 30%, despite high environmental awareness at 99%. Overall, there's room for improvement in waste management practices, with 44% showing poor practice, highlighting the need for targeted interventions and awareness campaigns.

### **Discussion**

This study compares the findings of the previous studies and our current study on refuse disposal methods in Port Harcourt Metropolis, highlighting notable similarities and differences in knowledge, attitudes, practices, and determinants of waste management. Our study in Port Harcourt reveals a high level of knowledge among residents regarding waste disposal practices, contrasting with findings from studies on students at the University of Venda by Owojori et al. (2022), and healthcare waste management staff by Onoh et al. (2019). While Port Harcourt residents demonstrate proficiency across various waste management criteria, students and cleaning staff exhibit lower levels of understanding in different settings. This suggests a

potential disparity in waste management education between these populations, indicating a need for targeted interventions to improve knowledge and practices.

Both our study and previous research highlight positive attitudes towards waste disposal practices among participants, yet discrepancies exist between attitudes and behaviors. While residents in Port Harcourt and Gelemso town exhibit positive attitudes, actual practices often fall short. This suggests a need for comprehensive education and awareness campaigns to bridge the gap between positive attitudes and sustainable behaviors. Studies by Shahzadi et al. (2018) and Eshete et al. (2023) emphasize similar findings in rural areas and Gelemso town, respectively.

Our findings in Port Harcourt indicate moderate waste disposal practices among residents, mirroring observations in Morogoro municipality by Chengula et al. (2015). However, there are areas for improvement, such as increased waste segregation. Similarly, the study on healthcare waste management highlights the importance of proper training for cleaning staff to ensure safe waste handling. These findings underscore the critical need for enhanced waste management infrastructure and education initiatives to promote responsible waste disposal practices.

Several determinants influence refuse disposal practices, including knowledge, accessibility of disposal facilities, and government policies. Comparisons with studies in Agege and Enugu by Iyasele and Dangana (2023) and Ekperi et al. (2019) highlight the significance of these factors in shaping waste management behaviors. Effective interventions should address these determinants comprehensively to promote sustainable waste management practices and mitigate environmental and public health risks.

In a nutshell, our study contributes to the broader understanding of waste management practices by identifying key similarities and differences with previous research. By addressing knowledge gaps, enhancing attitudes, improving practices, and addressing determinants, policymakers and stakeholders can work towards more effective waste management strategies and promote environmental sustainability.

## **Conclusion**

The study on refuse disposal in Port Harcourt shows residents possess a strong understanding and positive attitude towards waste management, but there are gaps in actual disposal practices, influenced by factors like accessibility of facilities and government policies. While knowledge and attitude correlate with disposal practices, other factors like infrastructure and socio-economic status play significant roles. Targeted interventions, including education campaigns and improved infrastructure, are necessary to enhance waste management practices and promote sustainability within the community.

## **Recommendations**

Based on the findings of the study, here are several recommendations made to improve waste management practices in Port Harcourt:

- 1. Strengthen education and awareness:** Increase efforts to educate residents about proper waste disposal, emphasizing recycling, avoiding dumping, and promoting community involvement.
- 2. Enhance infrastructure:** Invest in improving access to waste disposal facilities and collection points for residents.
- 3. Enforce regulations:** Implement stricter waste management regulations, including penalties for illegal disposal.

**4. Promote recycling:** Sensitize and promote recycling through initiatives like providing bins and organizing collection drives.

**5. Foster community engagement:** Encourage participation in clean-up initiatives and waste management campaigns to instill a sense of responsibility.

**6. Monitor and evaluate:** Establish mechanisms for ongoing monitoring and evaluation of waste management practices to identify areas for improvement.

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