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Evaluation of Residents Perception of Dumpsites in Port Harcourt Metropolis, Rivers State, Nigeria

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Abstract

This study examined the perception, attitude, and disposal behaviours of inhabitants on solid waste management in the Port Harcourt Metropolis. Data set from a sample of one hundred (100) respondents, using simple random sampling techniques. The primary instrument utilized in collecting the data was a questionnaire. The concept of Distance Decay was employed to elucidate the behaviour of residents. From the study, 39% of the respondents attributed the causes of poor waste disposal to indifferent attitude of the residents, 35% to lack of waste disposal facilities, 22% lack of waste services and 6% to institutional failure. Furthermore, the findings indicated that a majority of the participants (75.0%) discard their solid garbage in local skips, whereas a significant proportion of respondents (25.0%) chose to dispose of their solid wastes on the street. Recycling was the favoured technique of solid waste disposal among the available strategies. Forty-six percent (46%) of the respondents believe that the responsibility for maintaining clean environments falls with the Ministry of Environment. Respondents perceive that incorrect treatment of solid wastes leads to foul odours, the proliferation of parasites, visual displeasure, aesthetic issues, and drain blockages. The study recommends an increase enlightenment campaign through jingles in mass media, recruitment and empowerment of community health workers and sanitary officers, reactivation of the monthly environmental sanitation programme. The Port Harcourt City Council, in conjunction with the Ministry of Health and Ministry of Environment, should enhance the dissemination of information regarding the hazards associated with the haphazard disposal of solid waste.

Keywords: Dumpsites, Solid Waste, Perception, Disposal, Environment.

1. Introduction

In recent times, a number of studies have been conducted on the impact of dumpsite leachate on surface water and groundwater. In those studies, many approaches including experimental determination of impurities and mathematical models have been used to access the level of contamination of groundwater in many parts of the world. However, no study has been done on in Port Harcourt, Nigeria. Considering that Port Harcourt is developing rapidly due to the presence of Universities and companies, and that the average residents depend solely on groundwater for drinking water, it becomes expedient to ascertain how the dumpsites in Port Harcourt has affected the residents in any way.

Solid waste management has remained an uncontrollable environmental problem in Nigeria. This problem has manifested in several ways which include creation of illegal dumpsite, litters of waste around street corners and untimely evacuation of solid waste from the dumpsites. The practice of dumping waste product in Africa has become a subject of major concern for world environmental protection agencies. Solid waste management has remained intractable environmental sanitation problem in Nigeria. This problem manifested in the form of piles of indiscriminate disposal of uncovered waste and illegal

dumpsite along their roads and at street corners in cities and rural areas (Gobo, 2019). The effects of indiscriminate refuse/waste disposal have been a thorny issue in contemporary urban and rural communities in developing countries (Babayemi & Dauda, 2011). Port Harcourt metropolis presents a ghastly picture, the neglect of filled refuse bins in recent time has its effect on the inhabitants. Many areas around the homes are littered with domestic refuse sewage waste, garbage and other wastes from industrial operations.

Waste management authorities collect refuse from households and public containers on regular basis in Port Harcourt metropolis. As a result, most individuals or households' resort to open dumping of refuse, engage refuse collector, burn or bury waste. Solid waste management is a serious sanitary problem in Port Harcourt Metropolis. The problem seems to be defying solution. Many sell foods items like frozen food, fish, meat, fruits, pepper etc around these littered refuse and people still patronize them with the swarm of flies. Canteens and eateries are located in those dirty environments and people still buy those foods and eat there comfortably.

Port Harcourt is an industrial and highly populated city located in the Niger Delta region lying along the Bonny River (an eastern distributary of the Niger River), 41 miles (66 km) upstream from the Gulf of Guinea. The city has the problems of urban migration and resource limitations. The siting and development of residential quarters near waste sites are common due to shortage of building land to cope with the increasing rate of migration and consequent population explosion (Gidarakos et al., 2019). The city relies on boreholes (water wells) as sources of drinking water hence poor drinking water quality may have health consequences. The uncontrolled citing of boreholes as the source of potable water in Port Harcourt as the government apparently no longer provides the populace with water has become a serious challenge due to poor waste disposal and management practices. The challenge is worsened by the fact that there are inadequately trained waste disposal personnel and equipment, poor waste collection, sorting and disposal methods, and indiscriminate location of disposal sites without regards to the local geology and hydrogeology of the area (Igoni et al., 2013). As a result of the imminent impact of waste dumpsites, it has become necessary to investigate the perception of the residents of the Port Harcourt metropolis on dumpsites in Rivers State.

2. Materials and Methods

Port Harcourt is the capital and largest city in Rivers State, Nigeria. It lies between latitude 4 49' 27.0012" N and longitude 7 2'0.9996"E along the Bonny River and is located in the Niger Delta (Figure 1). As of 2016, the Port Harcourt urban area had an estimated population of 1,865,000 inhabitants, up from 1,382,592 as of 2006. The population of the metropolitan area of Port Harcourt is almost twice its urban area population with a 2021 United Nations estimate of 3,171,076. In 1950, the population of Port Harcourt was 59,752. Port Harcourt has grown by 150,844 since 2015, which represents a 4.99% annual change.

This research adopted the survey research design. Survey Research is the collection of information from a sample of individuals through their responses to questions. This is because the study is an investigation of the perception of the residents on dumpsites in the study area.

The population of the study included communities in Port Harcourt municipality and its residents. However, for the purpose of this study, eight (8) communities were randomly selected from the twenty-five (25) communities (Figure 1). This was to allow for manageable data collection while still covering a reasonable portion (about 32%) of the population, making the findings more generalized and statistically valid. Thus, the population of these eight (8) communities was projected from 1991 population census data (111,098 persons) to 2022 is 219,646 persons using the exponential projection model with an annual growth rate of 6.5%.

This study adopted the simple random procedure. The simple random procedure is a -probability sampling techniques that gives opportunity to all sample to be chosen. Thus, from the twenty-five (25) communities in the study area, eight (8) communities was randomly chosen for study as shown in Table 1.

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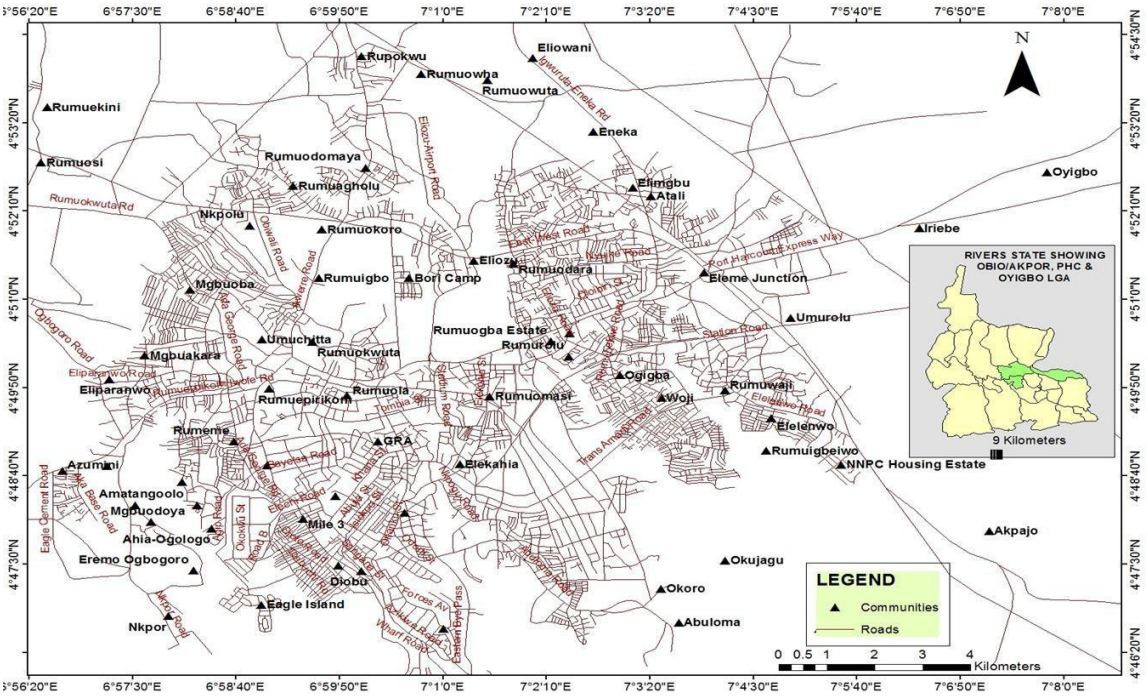

Figure 1: Port Harcourt Metropolis

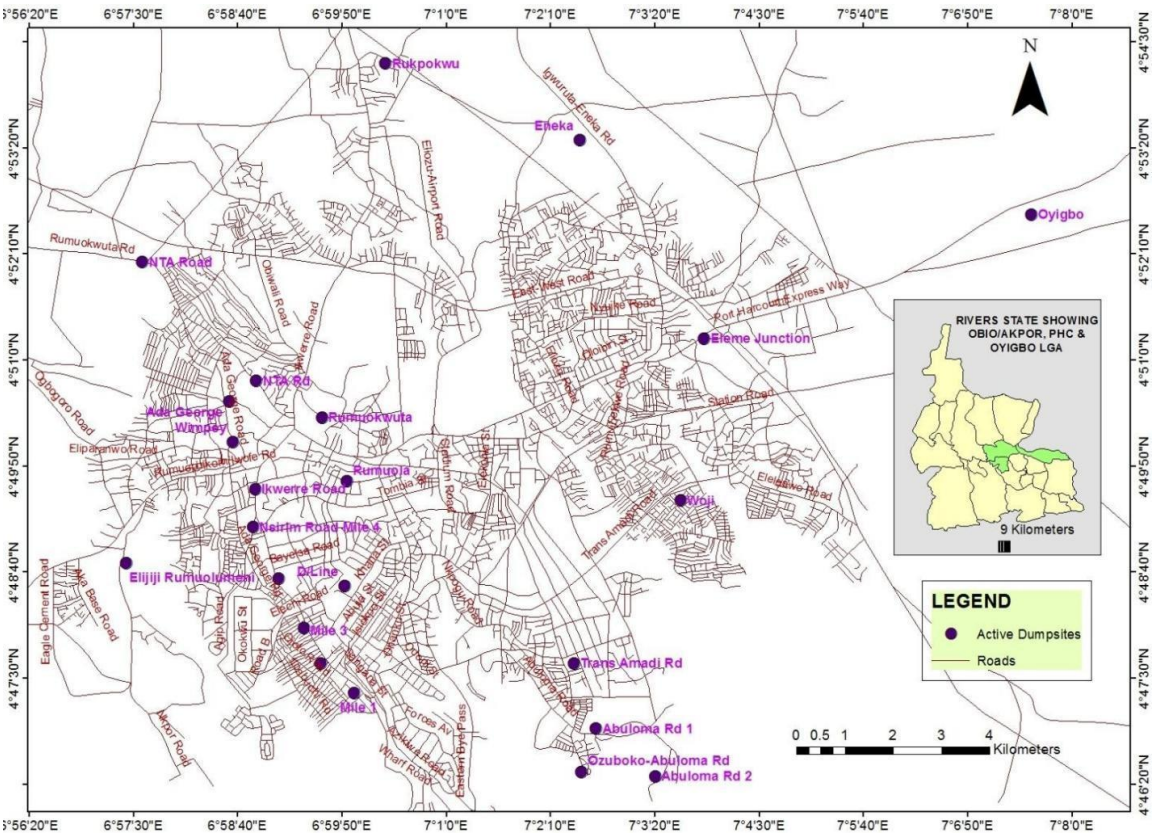

Figure 2: Dumpsites in Port Harcourt Metropolis

Table 1: Sample Communities and Questionnaire Distributions

S/N	Communities	1991 Population	Projected Population 2022	Households Size (6)	Questionnaire distribution
1.	Abuloma	8,443	59,475	99123	45
2.	Borikiri	22,057	155376	25896	12
3.	Bundu	21,400	150748	25125	11
4.	Nkpogu	19,680	138632	23105	11
5.	Elekahia	10,101	71155	11859	5
6.	Ogbunabali	12,611	88836	14806	7
7.	Nkpolu	8,633	60813	10136	5
8.	Oromenike	8,173	57573	9596	4
	Total	**111,098**	**718568**	**219646**	**100**

Source: Researchers' Computation, 2023.

From the eight (8) communities chosen, total number of households was carried out by dividing each community population with an average household of 6 persons per household. To ascertain the sample size, the Taro Yamane formula was applied to the total household size and gave a sample size of 100 using 10% level of precision as shown below:

Taro Yamene Formula for Sample Size:

$$n = \frac{N}{(1 + N * 2 * e^2)}$$

where, n = sample size

N = population size

e = level of precision (margin of error)

Given:

N = 219,646

e = 10% = 0.10

Substituting into the formula:

n = 219,646/(1+219,646*0.102)

n = 219,646/(1+219,646*0.10)

n = 219,646/(1+219,646)

n = 219,646/1+2,197.46

n ≈ 100

The data sources for this research included both primary and secondary data. The descriptive survey research statistics was used to compute samples of means from the various respondent collected from the field through questionnaire administration to sample respondents in the study area. Also, the content analysis of the checklist used in collecting data from the key informant was carried out.

3. Results and Discussion

Table 2: Questionnaire Administered and Retrieved.

S/N	Sampled Communities	No. of Questionnaire Administered	No. Correctly Filled and Retrieved	Percentage Rate Returned (%)
1.	Abuloma	45	43	43.3
2.	Borikiri	12	12	12.4
3.	Bundu	11	11	11.3
4.	Nkpogu	11	11	11.3
5.	Elekahia	5	5	5.2
6.	Ogbunabali	7	6	6.2
7.	Amadi – Ama	5	5	5.2
8.	Orominike	4	4	4.1
	Total	100	97	100

Source: Researchers Field Survey, 2023.

3.1. Demographic Characteristics of Respondents

This study is about the socio-economic impact of black soot in Port Harcourt municipalities thus respondents' gender, age, level of education, marital status and occupation are considered very important demographic characteristics in our findings and are presented under various sub-headings as shown below.

3.2. Gender of Respondents

Figure 3 shows the sex distribution of respondents. The demographic data shows that 63% of the respondents are male and 37% are female as shown below. This analysis implies that the majority of male under the study responded to the questionnaire than female.

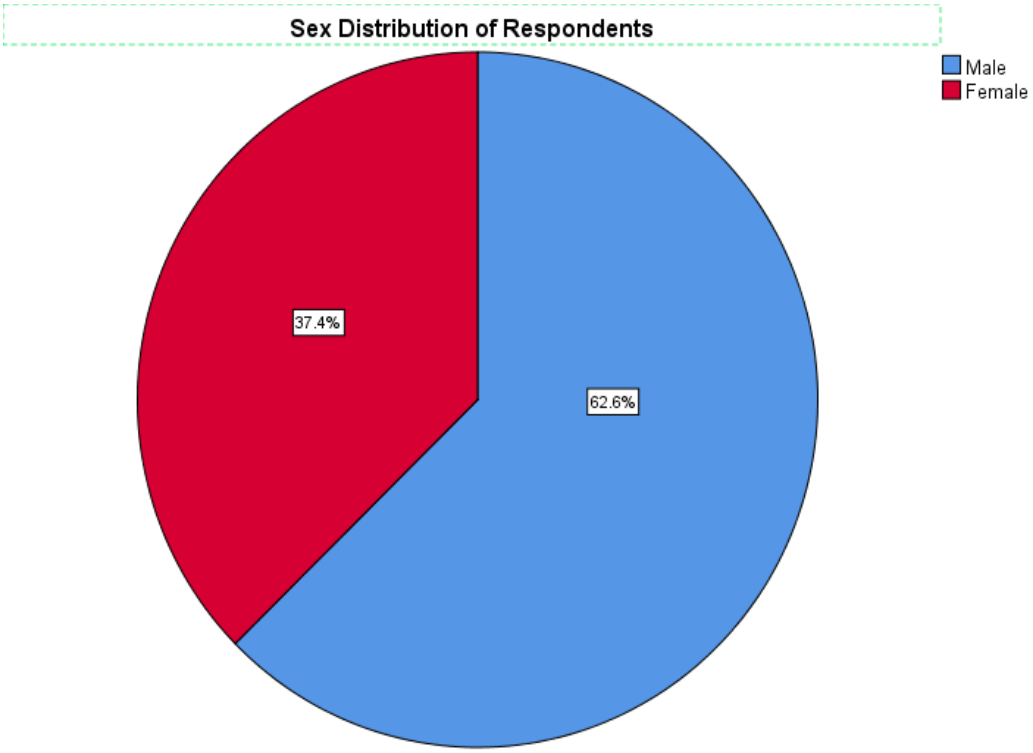

Figure 3: Gender Distribution of Respondents
Source: Researchers' Field Survey, 2023.

3.3. Age of Respondents

The demographic data also shows that 3.9% are below the ages of 24 years, 22.6% are between 25–29 years, 15.7% between30-34years, 43.1% between 35-39 years and 5.9% are between the ages of 40-44years and 8.8% are above 45years (Table 3). Age composition is important in order to ensure that participants were old enough to understand wastes and environmental issues (Ebikapade & Jim, 2016).

Table 3: Age Distribution of Respondents

S/N	Age	Frequency	%
1	Less than 24 yrs	4	3.9
2	25 – 29 yrs	22	22.6
3	30 – 34 yrs	16	15.7
4	35 – 39 yrs	40	43.1
5	40 – 44 yrs	6	5.9
6	45 yrs and above	9	8.8
	Total	97	100

Source: Researcher's Field Survey, 2023.

3.4. Educational Level of Respondents

The information on the academic status of the people interviewed shows that they cut across all the education level. This is presented in Table 4. The analysis in table 4, revealed that 45.3% of the sampled respondent are educated up to tertiary level, while 8.3% has no formal education. 18.8% have primary education. 27.8% have the secondary school education. The data equally show all strata of the population were sampled. This implies that the majority of the respondents are educated to tertiary education implying that they were highly knowledgeable of the issue of waste disposal and its implications.

Table 4: Educational Status of Respondents.

S/N	Education Level	Frequency	%
1.	Primary Education	18	18.8
2.	Secondary Education	27	27.8
3.	Tertiary Education	44	45.3
4.	No formal Education	8	8.3
	Total	97	100

Source: Researcher's Field Survey, 2023

3.5. Occupation of Respondents

The occupation of the people interviewed as presented in Table 5 reveals that 18.6% of the population of study are either civil servant or public servant, 8.3% are either artisan while 12.3% of the people interviewed are commercial drivers. Also, 10.6% are company workers and 15.5% are cooperate workers. Again, 20.7% are Business men/women while 10.0% are Health workers and 4.0 % represents other occupation.

3.6. Marital Status of Respondents

The nuptial status data of the sampled respondents showed that 55% are married, 25.0% are single, while widows/widowers and divorcee are 10% respectively. This is shown in Figure 4. This implies that majority of the respondents are married.

Table 5: Distribution of Occupation of Respondents

S/N	Occupation of Respondents	Frequency	%
1.	Civil/ Public Servant	18	18.6
2.	Business	24	20.7
3.	Company Workers	10	10.6
4.	Commercial Drivers	12	12.3
5.	Artisan	8	8.3
6.	Cooperate Workers	15	15.5
7.	Health Workers	10	10.0
8.	Others	4	4.0
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

3.7. Number of Persons in the Household

The size of the interviewed people's households of the respondents shows that a residential household size of 2 person represent 13.0% of the population, those that have between 3 – 5 persons per household represent 28.0%, 6 – 8 persons per household represent 26.0%. Again, those that have between 9 – 11 persons and 12 persons per household represent 21.6% and 12.0% each respectively as presented in Figure 5. This implies that more of the respondents live between 5 and above in a household implying high ratio of occupancy.

3.8. Residents Perception on Dumpsites

3.8.1. Waste Generation and Disposal in Port Harcourt

The findings of the study show that the type of waste generated in the study area according to the response of the respondents, 37.3% of the respondents is garbage, 32.3% rubbish, trash 15.7%, and effluent 12.7% as shown in Table 6.

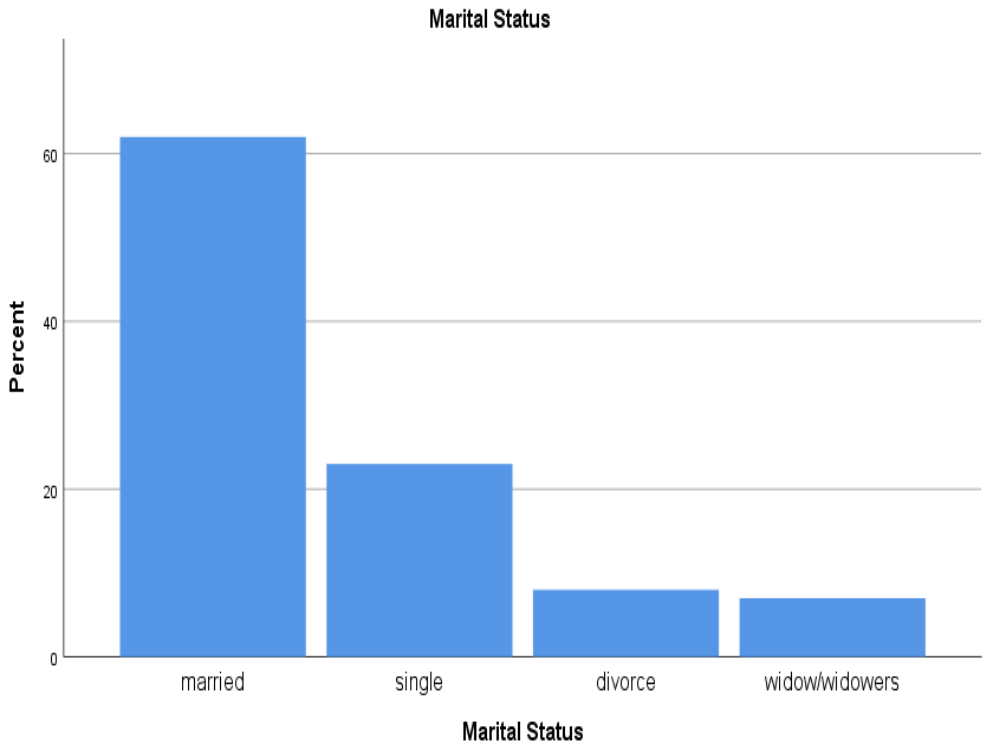

Figure 4: Distribution of Marital Status of Respondents.
Source: Researcher's Field Survey, 2023.

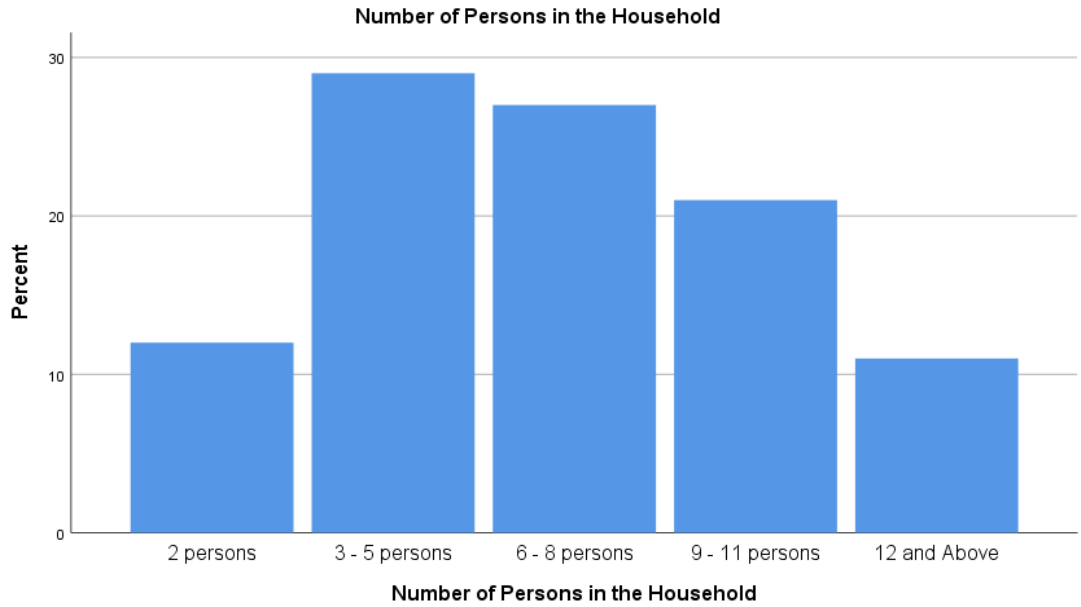

Figure 5: Number of Persons in the Household.
Source: Researcher's Field Survey, 2023.

Table 6: Perception of Waste Generation and Disposal

S/No	Type of Waste Generated in Port Harcourt	Frequency	%
1	Garbage	37	37.3
2	Rubbish	32	32.3
3	Trash	15	15.7
4	Effluent	13	12.7
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023

3.8.2. Residents Perception on Waste Collection Facilities in the Study Area

Most of the wastes are collected temporary for a short period of time before they are finally disposed of. The waste collection facilities according to respondent's opinion are open waste bin (30.4%), close waste bin (50%), plastic bags (15.7%) and others 3.9% as shown in Table 4.3.2 When the wastes are collected, they are transported to the dumping sites (7).

Table 7: Distribution of Type of Waste Storage in the Study Area

S/N	Type of Waste Generated in Port Harcourt	Frequency	%
1.	Open Waste Bin	30	30.4
2.	Close Waste Bin	49	50.0
3.	Close Plastic Bags	15	15.7
4.	Others	3	3.9
	Total	97	100

Source: Researcher's Field Survey, 2023.

3.8.3. Residents Perception on Mode of Transportation of Waste

Findings from the study shows that most of the waste (37.3%) were transported by trucks while 48% of the respondents claimed that the waste are transported to dumpsites manually on the head, and 11.8% claimed that waste are transported through waste van and 2.9% claimed other means as shown in Table 8.

Table 8: Mode of Transportation of Waste

S/No	Mode of Transportation of Waste	Frequency	%
1	Manually on head	36	37.3
2	Use of trucks	48	48.0
3	Use of waste van	10	11.8
4	Others	3	2.9
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

3.8.4. Residents Perception on Method of Waste Disposal

The solid wastes generated in Port Harcourt Municipalities can either come from residential premises (households), industries, markets, shops, offices (Government and private), and municipal areas. Wastes collected from the residential premises are either sent to the community collection centers (temporary dumpsites) or taken directly to the main disposal site (located in the area). Households often accumulate wastes outside their houses in plastic bags (cement bags, fertilizer bags and small plastic bags).

The methods of waste disposal in the study area according to the respondent's opinion include open waste bin 54%, open dumpsites 33.3%, burying in landfills 8.8% and others 3.9% as shown in Table 9.

Table 9: Distribution of Method of Waste Disposal

S/N	Mode of Waste Disposal	Frequency	Percentage
1	Use of waste bin	52	54.0
2	Open dumpsites	33	33.3
3	Burying in landfills	8	8.8
4	Others	4	3.9
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023

3.8.5. *Causes of Improper Waste Disposal*

When the respondents were asked the causes of poor waste disposal in the study area, 39% of the respondents attributed it to indifferent attitude of the residents in the study area, 35% of the respondents claimed it is the lack of waste disposal facilities, 22% lack of waste services and 6% to institutional failure (Table 10).

Table 10: Distribution of Causes of Poor Waste Disposal

S/N	Causes of Poor Waste Disposal	Frequency	Percentage
1	Lack of waste service	20	21.6
2	Indifferent attitude of residents	38	38.2
3	Lack of waste disposal facilities	34	34.3
4	Institutional failure	5	5.9
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023

3.8.6. *Perception of Effects of Poor Waste Disposal*

When the respondents were asked if they know what constitute poor waste disposal, 24.5% claimed that it is pouring of effluent on the street, 22.5% claimed that it is dropping rubbish randomly, 44.2% claimed that it is dumping refuse in open dumps, while 8.8% claimed that it is burning of waste materials in open space and this is represented in Table 11.

3.8.7. *Description of Efficiency of Waste Disposal*

It has been observed that indiscriminate dumping of solid waste has become a common practice in most urban centers in Nigeria. The increasing rate of this practice is attributed to increasing urbanization, rapid population growth, deterioration in standard of living, poor governance and low level of public awareness of the effect of indiscriminate waste disposal among others. Findings from the study shows that 92% of the respondents claimed that they are aware of the effects of poor waste disposal while 8% claimed that they are not aware of the effects of poor waste disposal.

Table 11: Distribution of Effects of Poor Waste Disposal

S/N	Description of Poor Waste Disposal	Frequency	Percentage
1	Pouring of effluent on the street	24	24.5
2	Dropping of rubbish randomly	22	22.5
3	Dumping of refuse in open dumps	44	44.2
4	Burning of waste materials	7	8.8
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

On the description of waste disposal method in the study area by the respondents, 45.1% claimed that their present practice is safe, 12.7% claimed it is environmentally friendly, 36.3% insist it is environmentally harmful and 5.9% claimed that they don't know (Table 12).

Table 12: Distribution of Efficiency of Waste Disposal

S/N	Description of efficiency of Waste Disposal	Frequency	Percentage
1	Very safe	11	12.7
2	Environmentally friendly	36	36.3
3	Environmentally harmful	44	45.1
4	Don't know	6	5.9
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

3.8.8. *Residents Perception of Effects of Poor Waste Disposal*

On the effects of poor waste disposal, 44.1% of the respondents claimed that it is associated with offensive odour, 18.6% claimed that it is a breeding ground for insect parasites, 8.8% believed that it affects the aesthetic quality of the environment, 5.9% claimed it

blocked drainages and 17.7% claimed that it caused health problems (Table 13).

Table 13: Distribution of Effects of Poor Waste Disposal.

S/N	Distribution of Effects of Poor Waste Disposal	Frequency	Percentage
1	Offensive odour	42	42.1
2	Breeding ground for parasites	19	19.6
3	Eyesore	8	8.8
4	Aesthetic problem	5	4.9
5	Blockage of drains	5	5.9
6	Health problems	18	18.7
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

3.8.9. Waste Management in the Study Area

The study sought to find out if there is any waste management policy in existence. 49% of the respondents claimed that there is waste management policy in place while 51% of the respondents claimed there was none in existence. On the existence of community participation in waste management, 68% of the respondents claimed that there is while 32% claimed that there is none. When asked to suggest efficient method of waste management in the study area, 57% suggest waste recycling, 24% claimed that it is burying in public landfills, 19% suggest incinerators and 2% suggest other methods as shown in Table 14.

3.8.10. Distribution of Dumpsites in the Study Area

Most of the high- and middle-income areas are located in areas comprises low income areas of the Metropolis. The low-income Metropolis is deprived of adequate sanitation facilities. Inadequate awareness of residents in the northern sector of the Metropolis on how to dispose of waste properly has led to spilling of waste, making the sanitary sites messy and untidy.

3.9. Discussion of Findings

The increase in waste generation in most urban centers in Nigeria in recent times has risen astronomically as a result of urbanization and industrialization. Effective waste management has become an intractable problem beyond the capacity of most municipal authority in most developing countries.

Table 14: Distribution of Waste Management in Port Harcourt

S/N	Efficient Methods of Waste Management	Frequency	Percentage
1	Recycling of waste	54	57
2	Incineration	19	19
3	Burying in public landfill	24	24
4	Others	2	2
	Total	**97**	**100**

Source: Researcher's Field Survey, 2023.

Effective solid waste disposal has become one of the challenges of urban centres in contemporary times that have defied all solutions by both state and Federal government and non-governmental organizations. The increasing population in urban areas has outstripped the weak and inadequate infrastructure for waste management, resulting in refuse heaps that is left only to burning method and exposures to open landfills.

Solid wastes are usually unattended to, and in some cases either buried or burnt without taking into consideration the effects on the environment. Due to poor management and lack of public awareness, many parts of Port Harcourt metropolis is littered with solid waste which constitutes health hazards to the general public. Other causes of poor solid waste disposal in the study area include lack of good and enough infrastructures, non-implementation of existing environmental sanitation laws and regulations, irregular and unplanned dumping of solid wastes, population growth due to rural-urban migration, insufficient capital to manage solid waste and lack of new technology in effective solid waste disposal. Moreover, lack of awareness and active involvement of the households as key stakeholders in service provision and unwillingness

to pay for solid waste collection and disposal in the study area contributes to poor solid wastes disposal in the area. The most common solid waste disposal method in the study area is open dumpsites. However, open dumpsites are good sources of environmental pollution (polluting soil, ground and surface water) due to the fact that they usually contain almost all types of pollutants from the initial collection sources. Open dumping of food wastes results in various environmental and health hazards. The decomposition of organic materials produces methane, which can cause fire and explosions and contributes to global warming. This health hazards can include contamination of surface and ground water through direct waste contacts or leachate, air pollution by burning of wastes, spreading of diseases by different vectors like birds, insects and rodents, or uncontrolled release of methane by anaerobic decomposition of waste.

Thus, inadequate collection and improper waste disposal facilitates multiplication of pathogens causing diseases like cholera and diarrhea and provides favorable breeding ground for disease vectors like mosquitoes (malaria), flies (diarrhea) and rodents. Proper solid waste disposal is a big problem in most urban centres especially in developing countries and Sub Saharan Africa in particular. The intensity of solid waste management problem increases with increased population resulting from increased human activities and the volume of solid wastes to be disposed. Industries and urban municipal areas generate large amount of solid wastes that are often dumped in open field. The safe alternative to open dumpsites which is sanitary landfill, is a site where wastes are disposed at a carefully selected location constructed and maintained by means of engineering techniques that minimize pollution of air, water and soil, as well as other risks to humans and animals.

4. Conclusion

The study empirically examined the perception of residents on the effects of solid waste dumpsite in the Port Harcourt metropolis. From the findings all the objectives were accomplished. Though the majority 57% of the respondents said they throw their solid waste into a nearby waste bins, about 36% of the respondents throw solid waste on the streets. It appears that most of these respondents who said they throw their solid waste onto the street were people from the middle -income category.

Again, a lot of the respondents stated composting as a proper way of dealing with solid waste without recourse to the money and veracity of expertise needed. The study found a significant relationship between place of residence of respondents and disposal practices they think was appropriate. Most of the respondents at GRA indicated recycling and composting of solid waste. This may possibly mean because they could afford the fees that would be charged in such case and the consequences on the other practices. On the other hand, those in the middle- and low-income areas stated burning, burying and landfilling of solid waste perhaps it was cheap. It could also be concluded that those respondents with higher level of education and also knowledgeable of the ramifications of burning, landfilling and indiscriminate dumping of waste hinted that the proper ways of dealing with solid waste was to recycle or composite them.

For the attitude of respondents, most respondents (76%) expressed worries over the improper disposal of waste and most affected were those found to be in the high-income category. Respondents however expressed the opinion that the ministry of environment and the individuals should share the responsibility of ensuring proper disposing of solid in their surroundings regarding the worries at the backdrop of their minds.

Also, majority of respondents expect the Ministry of environment to provide free dustbin for them in their houses. This could explain why some residents in the study practiced improper solid waste disposal. However, majority of respondents agreed that it was a bad practice to litter around when there is no dustbin. Almost all the respondents irrespective of their area of settlement agreed that indiscriminately dumping of waste possess a threat to health and not rather evil spirits. Majority of respondents were aware that improper solid waste disposal leads to sickness.

Respondents mentioned that the health risk involved were malaria, cholera, typhoid, diarrhoea and other respiratory tract infections.

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