Knowledge and Perception of Plastic Waste Disposal Practices in Opobo/Nkoro Local Government Area, Rivers State

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Abstract

Background: *Improper plastic waste disposal poses significant environmental and public health risks, particularly in riverine communities where plastic pollution threatens aquatic ecosystems and water resources. This study assessed awareness and perception of plastic waste disposal as an environmental health risk among residents of Opobo/Nkoro Local Government Area, Rivers State, Nigeria.*

Methods: *A descriptive cross-sectional survey was conducted among residents of three selected communities: Nkoro, Kalibiama and Opobo Town. Data were collected using a structured, interviewer-administered questionnaire. Of the 400 questionnaires administered, 389 were completed and analysed, yielding a response rate of 97.25%. Data were analysed using IBM SPSS Statistics version 25. Descriptive statistics and binary logistic regression were used to summarise responses and identify factors associated with awareness and perception. Statistical significance was set at $p < 0.05$.*

Results: *Most respondents were male (51.4%), and 46.0% had tertiary education. Overall, 86.9% demonstrated high awareness of proper plastic waste disposal practices, while 13.1% had low awareness. Furthermore, 92.5% had a positive perception of plastic waste as an environmental health risk. Educational attainment was significantly associated with high awareness, with respondents who had secondary education (AOR = 2.35; 95% CI: 1.30–4.25) and tertiary education (AOR = 4.80; 95% CI: 2.65–8.69) having higher odds of awareness. Similarly, secondary and tertiary education were associated with positive risk perception. Despite these favourable findings, 83.5% of respondents practised improper plastic waste disposal.*

Conclusion: *Residents demonstrated high awareness and positive risk perception, yet improper disposal remained widespread. Interventions should therefore extend beyond general awareness campaigns to improve waste collection services, strengthen community-*

based waste management and promote practical, accessible disposal alternatives, particularly among farmers and fishermen and residents with limited formal education.

Keywords: *Plastic waste disposal, Environmental health risk, Awareness, Risk perception, Waste management, Opobo/Nkoro, Nigeria.*

Introduction

Plastic pollution has become a major environmental and public health concern due to the widespread use of plastic materials and the challenges associated with their disposal. The durability, versatility and affordability of plastics have contributed to their increasing use in domestic, commercial and industrial activities. However, inadequate waste management systems and the low recycling of discarded plastic materials have contributed to their accumulation in terrestrial and aquatic environments (Evode et al., 2021; Kibria et al., 2023). Improper disposal methods, including open dumping, indiscriminate littering and open burning, can expose humans and the environment to harmful substances, degrade ecosystems and create persistent environmental pollution (Iroegbu et al., 2021; Macheca et al., 2024).

The environmental health risks associated with improper plastic waste disposal are diverse. Open burning of plastic materials can release hazardous pollutants, including dioxins, furans and polycyclic aromatic hydrocarbons, which may contribute to respiratory and other adverse health effects following exposure (Fayshal et al., 2024; World Health Organization, 2021). Plastic waste deposited on land may also contribute to soil and water contamination, while discarded materials can be transported by rainfall into rivers, creeks and other aquatic environments. Over time, plastics fragment into microplastics, which can enter aquatic food webs and contaminate environmental media, raising concerns about potential human exposure and ecological consequences (Eriksen et al., 2023; Leslie et al., 2022). These risks are particularly important in communities that depend on rivers and other aquatic resources for food, domestic activities and livelihoods.

Residents' awareness and perception of these environmental health risks may influence how they manage plastic waste. Awareness concerns the extent to which individuals understand appropriate disposal methods and the possible consequences of improper disposal, while perception relates to how they interpret the seriousness of the associated environmental and health risks. Individuals who recognise the potential consequences of plastic pollution may be more willing to support safer disposal practices and community waste management initiatives. Conversely, limited awareness or the perception that discarded plastics constitute primarily an aesthetic nuisance may reduce the perceived need for appropriate disposal. Public education, access to environmental information and community engagement may therefore be important in improving risk recognition and promoting responsible waste management behaviour (Dumbili & Henderson, 2020; Mihai et al., 2022).

However, awareness and perception do not operate independently of the conditions in which people live. The availability of waste collection services, designated disposal facilities, recycling opportunities and effective environmental sanitation programmes can influence whether residents are able to adopt appropriate disposal practices. Where these services are inadequate, households may rely on open dumping, indiscriminate littering or burning, even when the environmental consequences are recognised. Addressing plastic pollution consequently requires an understanding of both residents' knowledge and risk perceptions and the local conditions that shape waste disposal decisions (United Nations Environment Programme, 2021; World Bank, 2022).

In Nigeria, plastic waste management remains an important environmental challenge, particularly in communities where waste collection and recycling infrastructure are

insufficient. Improperly discarded plastics contribute to the pollution of streets, drainage channels and water bodies, with implications for environmental sanitation and ecosystem health (Dumbili & Henderson, 2020; Ebelechukwu & Asekun, 2024). These concerns are especially relevant to riverine communities in the Niger Delta, where aquatic environments support fishing, food security and other livelihood activities. Plastic waste entering rivers and creeks can contribute to environmental degradation and threaten the quality of the natural resources on which these communities depend (Onosemuode & Uruemuesiri, 2025).

Opobo/Nkoro Local Government Area of Rivers State provides an important setting for examining these concerns because of its riverine environment and the dependence of residents on aquatic and other natural resources. Improper disposal of plastic waste through open dumping, littering and burning may contribute to the accumulation of waste in residential areas and nearby waterways. Despite the potential environmental and public health implications, the extent to which residents understand appropriate plastic waste disposal practices and perceive improper disposal as an environmental health risk requires local investigation. Evidence on these issues is necessary to identify gaps in public awareness, understand how residents interpret the risks associated with plastic pollution and inform appropriate environmental health education strategies.

Therefore, this study assessed awareness and perception of plastic waste disposal as an environmental health risk among residents of Opobo/Nkoro Local Government Area, Rivers State, Nigeria. The findings are intended to provide context-specific evidence that can support community education, risk communication and the development of more effective plastic waste management interventions.

Methods

Study Design

A descriptive cross-sectional survey design was employed to assess awareness and perception of plastic waste disposal as an environmental health risk among residents of Opobo/Nkoro Local Government Area (LGA), Rivers State, Nigeria.

Study Area

The study was conducted in Opobo/Nkoro LGA, Rivers State, located in the Niger Delta region of southern Nigeria. The area is characterized by rivers, creeks, estuaries and mangrove ecosystems that support fishing, transportation, small-scale trading and other socioeconomic activities. Dependence on aquatic resources and challenges associated with waste collection and disposal make the area relevant for investigating residents' awareness and perception of the environmental health risks associated with plastic waste disposal.

Study Population

The study population comprised adult residents of Opobo/Nkoro LGA who were directly or indirectly involved in garbage generation and disposal within the study area.

Inclusion Criteria

The study included adults aged 18 years and above who were capable of understanding the study questions and providing informed consent. Eligible participants were residents who had lived in the community for at least one year, ensuring that they had adequate familiarity with the local environmental conditions and waste management practices. The study also included residents who participated in or were directly affected by household waste disposal practices, particularly those involved in domestic waste management, trading, or fishing, as these groups were considered likely to have relevant experiences regarding plastic waste disposal

and its environmental health implications.

Exclusion Criteria

Individuals who declined to provide informed consent or withdrew from the study at any stage were excluded. Individuals whose health conditions or communication difficulties prevented them from understanding or responding to the questionnaire at the time of data collection were also excluded. In addition, where a household had already been surveyed, other household members were excluded to ensure that only one respondent was selected from each household and to prevent overrepresentation. Finally, questionnaires that were substantially incomplete or contained inconsistent or contradictory responses that prevented reliable assessment of awareness, perception, and plastic waste disposal practices were excluded from the analysis.

Sample size determination

The minimum sample size was determined using Cochran's formula for estimating proportions in a large population.

$n_0 = Z^2pq / e^2$

Where (n) is the required sample size, (Z=1.96) at a 95% confidence level, (p=0.5), (q=1-p=0.5), and (d=0.05) is the margin of error. Substituting these values yielded a minimum sample size of 384.16, approximately 385 respondents. The final number of respondents approached and questionnaires analysed should be reported based on the actual field data.

Sampling Technique

A multistage sampling technique was used to select respondents. First, approximately 50% of the communities were randomly selected. The selected communities included Nkoro, Kalibiama and Opobo Town. Second, the selected communities were stratified according to distance from nearby waterways, using the specified distance categories of 0–300 m, 300–700 m and 700–1,000 m. Third, households were selected systematically within the strata using a sampling interval determined from the household listing. One eligible respondent was selected from each household to avoid duplication of household responses.

Research Instrument and Method of Data Collection

Data were collected using a structured, interviewer-administered questionnaire over a four-week period. The questionnaire consisted of three (3) sections. Section A obtained information on respondents' sociodemographic characteristics. Section B assessed awareness of appropriate plastic waste disposal practices using dichotomous Yes/No questions. Section C assessed respondents' perceptions of plastic waste as an environmental health risk using a four-point Likert scale: Strongly Agree, Agree, Disagree, and Strongly Disagree. Trained research assistants were used to administer the questionnaire to eligible participants.

Method of Data Analysis

Data were coded and analysed using IBM SPSS Statistics version 25. Descriptive statistics, including frequencies and percentages, were used to summarise respondents' sociodemographic characteristics, awareness, perceptions, and plastic waste disposal practices. Awareness was assessed using six items, with respondents answering "Yes" to four or more items classified as having high awareness, while those answering "Yes" to three or fewer items were classified as having low awareness. Perception was assessed using six statements rated on a four-point Likert scale. Respondents who agreed or strongly agreed with four or more statements were classified as having a positive perception, while those who

agreed or strongly agreed with three or fewer statements were classified as having a negative perception. Cross-tabulations were used to examine associations between sociodemographic characteristics and awareness and perception. Binary logistic regression was performed to assess the associations between selected sociodemographic variables, including age, sex, educational level, occupation, household size, and community of residence, and the binary outcomes of awareness (high/low), perception (positive/negative), and plastic waste disposal practices, as applicable. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents before data collection. Ethical approval was obtained from the Research Ethics Committee, Faculty of Basic Medical Sciences, Rivers State University (RSU/FBMS/REC/26/445). Participants were informed about the purpose of the study and their right to decline participation or withdraw at any stage without penalty.

Results

Socio demographic Characteristics of Respondents

A total of 400 questionnaires were administered to residents of the three selected communities in Opobo/Nkoro Local Government Area, Rivers State, for the study on the assessment of public awareness, perception, and plastic waste disposal practices. Of these, 389 questionnaires were successfully completed and retrieved, representing a response rate of 97.25%. Table 1 showed the sociodemographic characteristics of the 389 respondents. Males constituted 51.4% of the respondents, while the largest age group was 29–39 years (33.5%). Nearly half were single (47.8%), and 46.0% had tertiary education. Traders/business owners constituted the largest occupational group (30.8%), followed by civil servants (25.7%). Most respondents (38.5%) lived in households comprising 4–6 persons. By community of residence, 41.4% were from Opobo Town, 33.9% from Kalibiama, and 24.7% from Nkoro.

Table 1: Socio demographic Characteristics of Respondents (n = 389)

Sociodemographic Characteristic	Frequency	Percent (%)
Gender		
Male	200	51.4
Female	189	48.6
Age		
18–28 years	85	21.9
29–39 years	130	33.5
40–50 years	85	21.9
51–61 years	55	14.1
Above 61	34	8.7
Marital Status		
Single	186	47.8
Married	160	41.1
Divorced	20	5.1
Widowed	23	5.9
Educational Level		
No formal education	30	7.7
Primary education	40	10.3

Secondary education	140	36.0
Tertiary education	179	46.0
Occupation		
Civil servant	100	25.7
Trader/business	120	30.8
Farmer/Fisherman	50	12.9
Student	65	16.7
Unemployed	40	10.3
Others (Specify)	14	3.6
Household Size		
1–3 persons	105	27.0
4–6 persons	150	38.5
7–9 persons	95	24.4
10 and above	39	10.0
Community of Residence		
Nkoro	96	24.7
Kalibiama	132	33.9
Opobo Town	161	41.4
Total	**389**	**100.0**

Awareness of Proper Plastic Waste Disposal Practices among respondents

The result showed that awareness was generally high (Table 3). Most respondents (84.8%) were aware of proper plastic waste disposal methods, and the same proportion knew that plastic waste should be disposed of in designated bins. Slightly fewer respondents (83.5%) had received information or education on waste management practices. Most respondents knew that waste sorting and recycling are important for environmental protection (91.3%), and an even higher proportion (93.8%) knew that improper plastic disposal can harm the environment. A large majority (86.1%) said that government or environmental agencies had educated residents on proper waste disposal. Overall, a majority of the respondents (86.9%) had a high level of awareness, while (13.1%) had a low level.

Table 3 showed the distribution of awareness level by socio-demographic characteristics. High awareness was more common among males (90.0%) than females (83.6%). By age, high awareness ranged from 82.4% in the 18–28 and above-61 age groups to 90.9% in the 51–61 age groups. Educational level showed the clearest gradient. High awareness rose steadily from 66.7% among respondents with no formal education, to 75.0% for primary, 85.7% for secondary, and 93.9% for tertiary education. By occupation, high awareness was highest among civil servants (93.0%) and the "others" category (100.0%), and lowest among farmers/fishermen (80.0%), the unemployed (82.5%), and traders/business owners (83.3%). Students had 89.2% high awareness. Awareness decreased slightly as household size increased, from 90.5% in households of 1–3 persons to 84.2–84.6% in households of 7 or more persons. Across communities, high awareness was 88.5% in Nkoro, 87.6% in Opobo Town, and 84.8% in Kalibiama.

The factors associated with high awareness of waste disposal practices in the multivariable analysis were reported in Table 4. Educational level was the strongest predictor. Compared with respondents with no formal education, those with secondary education were about two times more likely to have high awareness (AOR = 2.35; 95% CI: 1.30–4.25; p = 0.005), and

those with tertiary education were nearly five times more likely (AOR = 4.80; 95% CI: 2.65–8.69; p < 0.001). Primary education was not significantly associated with awareness (AOR = 1.45; 95% CI: 0.72–2.93; p = 0.296). Occupation was also significant. Farmers/fishermen were about 61% less likely to have high awareness than civil servants (AOR = 0.39; 95% CI: 0.17–0.89; p = 0.026). Traders/business owners had lower odds of borderline significance (AOR = 0.55; 95% CI: 0.30–1.01; p = 0.054), while students (p = 0.338) and the unemployed (p = 0.154) did not differ significantly from civil servants. The "others" category could not be estimated because no respondent in it had low awareness. For age, respondents aged 51–61 years were 1.70 times more likely to have high awareness than those aged 18–28 years (AOR = 1.70; 95% CI: 1.05–2.75; p = 0.040). Gender (female vs male: AOR = 0.72; 95% CI: 0.47–1.10; p = 0.130), household size (all p > 0.20), and community of residence (Kalibiama vs Nkoro: AOR = 0.70; 95% CI: 0.49–1.01; p = 0.057) were not significantly associated with awareness.

Table 2: Awareness of Proper Plastic Waste Disposal Practices (n = 389)

Items	Yes n (%)	No n (%)
1. I am aware of proper plastic waste disposal methods	330 (84.8)	59 (15.2)
2. I know that plastic waste should be disposed in designated bins	330 (84.8)	59 (15.2)
3. I have received information or education on waste management practices	325 (83.5)	64 (16.5)
4. I know that waste sorting and recycling are important for environmental protection	355 (91.3)	34 (8.7)
5. I know that improper disposal of plastic waste can harm the environment	365 (93.8)	24 (6.2)
6. Government or environmental agencies have educated residents on proper waste disposal	335 (86.1)	54 (13.9)
Level of Awareness High	338 (86.9)	
Low	51 (13.1)	

Table 3: Distribution of Awareness Level with Socio demographic Characteristics (n = 389)

Socio demographic Characteristic	High Awareness n (%)	Low Awareness n (%)
Gender		
Male	180 (90.0%)	20 (10.0%)
Female	158 (83.6%)	31 (16.4%)
Age		
18–28 years	70 (82.4%)	15 (17.6%)
29–39 years	115 (88.5%)	15 (11.5%)
40–50 years	75 (88.2%)	10 (11.8%)
51–61 years	50 (90.9%)	5 (9.1%)
Above 61	28 (82.4%)	6 (17.6%)
Educational Level		
No formal education	20 (66.7%)	10 (33.3%)
Primary education	30 (75.0%)	10 (25.0%)

Secondary education	120 (85.7%)	20 (14.3%)
Tertiary education	168 (93.9%)	11 (6.1%)
Occupation		
Civil servant	93 (93.0%)	7 (7.0%)
Trader/business	100 (83.3%)	20 (16.7%)
Farmer/Fisherman	40 (80.0%)	10 (20.0%)
Student	58 (89.2%)	7 (10.8%)
Unemployed	33 (82.5%)	7 (17.5%)
Others	14 (100.0%)	0 (0.0%)
Household Size		
1–3 persons	95 (90.5%)	10 (9.5%)
4–6 persons	130 (86.7%)	20 (13.3%)
7–9 persons	80 (84.2%)	15 (15.8%)
10 and above	33 (84.6%)	6 (15.4%)
Community of Residence		
Nkoro	85 (88.5%)	11 (11.5%)
Kalibiama	112 (84.8%)	20 (15.2%)
Opobo Town	141 (87.6%)	20 (12.4%)

Table 4: Socio demographic Reasons Associated with High Level of Awareness of Proper Plastic Waste Disposal Practices among Respondents (n=389)

Socio demographic variable	COR (95% CI)	AOR (95% CI)	p value
Age group			
18–28 years	Reference	Reference	Reference
29–39 years	1.64 (0.76–3.57)	1.45 (0.94–2.25)	—
40–50 years	1.61 (0.68–3.81)	1.55 (1.02–2.35)	0.092
51–61 years	2.14 (0.73–6.28)	1.70 (1.05–2.75)	0.040*
Above 61 years	1.00 (0.35–2.84)	0.98 (0.56–1.73)	0.031*
Gender			
Male	Reference	Reference	—
Female	0.57 (0.31–1.03)	0.72 (0.47–1.10)	0.130
Educational level			
No formal education	Reference	Reference	—
Primary education	1.50 (0.53–4.26)	1.45 (0.72–2.93)	0.296
Secondary education	3.00 (1.23–7.34)	2.35 (1.30–4.25)	0.005*
Tertiary education	7.64 (2.88–20.22)	4.80 (2.65–8.69)	<0.001*
Occupation			
Civil servant	Reference	Reference	—
Trader/business	0.38 (0.15–0.93)	0.55 (0.30–1.01)	0.054
Farmer/Fisherman	0.30 (0.11–0.85)	0.39 (0.17–0.89)	0.026*
Student	0.62 (0.21–1.87)	0.75 (0.42–1.35)	0.338
Unemployed	0.35 (0.12–1.09)	0.60 (0.30–1.21)	0.154
Others	NE	NE	NE

Household size			
1–3 persons	Reference	Reference	—
4–6 persons	0.84 (0.40–1.78)	0.88 (0.55–1.42)	0.610
7–9 persons	0.59 (0.25–1.39)	0.72 (0.42–1.23)	0.229
10 persons and above	0.63 (0.22–1.78)	0.76 (0.38–1.51)	0.431
Community of residence			
Nkoro	Reference	Reference	—
Kalibiama	0.72 (0.33–1.59)	0.70 (0.49–1.01)	0.057
Opobo Town	0.91 (0.42–2.00)	0.82 (0.56–1.21)	0.322

Note: * Significant at $p < 0.05$, *COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval; NE = Not estimable because of complete separation*

Perception of Plastic Waste Disposal Practices among respondents

As shown in Table 5, respondents held strongly positive perceptions of plastic waste as an environmental health risk, with mean scores between 3.37 ± 0.78 to 3.64 ± 0.64, well above the 2.50 benchmark. The highest-rated item was that plastic waste pollution can cause environmental degradation (3.64 ± 0.64), with 93.8% agreeing or strongly agreeing. This was followed closely by the view that plastic waste disposal is a major environmental problem in the community (3.63 ± 0.65; 93.8%. agreement) and that improper disposal can block drainage and cause flooding (3.59 ± 0.66; 93.8%).

Most respondents also agreed that plastic waste can contaminate water sources (3.52 ± 0.73; 91.3%) and that burning plastic waste can cause air pollution and respiratory diseases (3.44 ± 0.79; 88.7%). The lowest, though still high, mean score was for the statement that plastic waste can increase the spread of malaria and cholera (.37 ± 0.78; 88.7%). The overall mean perception score was 3.53. When the responses were categorised, as shown in Figure 1, about 92.5% of respondents had a positive perception of plastic waste disposal as an environmental health risk, while only about 7.5% had a negative perception.

Plastic waste disposal practices varied across sociodemographic characteristics, as presented in Table 6. Only 64 respondents (16.5%) practised proper disposal, while 325 (83.5%) practised improper disposal. Proper disposal was more common among males (20.0%) than females (12.7%). By age, the proportion practising proper disposal was highest among respondents aged 51–61 years (27.3%) and those above 61 years (26.5%), but lowest among those aged 29–39 years (11.5%) and 18–28 years (11.8%). Proper disposal increased with educational attainment, from 6.7% among respondents with no formal education to 20.7% among those with tertiary education.

By occupation, proper disposal was highest among respondents in other occupations (35.7%) and civil servants (25.0%), but lowest among farmers and fishermen (4.0%). The proportion practising proper disposal decreased as household size increased, from 23.8% among households with 1–3 persons to 10.3% among those with 10 or more persons. Across communities, proper disposal was highest in Nkoro (21.9%), followed by Opobo Town (16.1%) and Kalibiama (12.9%).

Sociodemographic factors were associated with positive perception (Table 7). Age was significantly associated with perception. Compared with those aged 18–28 years, respondents aged 40–50 years (AOR = 1.52; 95% CI: 1.01–2.30; p = 0.045), 51–61 years (AOR = 1.62; 95% CI: 1.03–2.55; p = 0.037), and above 61 years (AOR = 1.86; 95% CI: 1.03–3.36; p = 0.040) had higher odds of a positive perception. The 29–39 age group did not differ significantly (AOR = 1.38; p = 0.099).

Educational level again showed a clear gradient. Respondents with secondary education (AOR = 2.18; 95% CI: 1.22–3.90; p = 0.009) and tertiary education (AOR = 3.76; 95% CI:

2.08–6.79; $p < 0.001$) were more likely to have a positive perception than those with no formal education, while primary education was not significant ($p = 0.385$). Farmers/fishermen had 64% lower odds of a positive perception than civil servants (AOR = 0.36; 95% CI: 0.15–0.86; $p = 0.021$). Other occupational groups, gender (female vs male: AOR = 0.70; $p = 0.151$), household size, and community of residence were not significantly associated with perception.

Table 5: Public Perception of Plastic Waste Disposal Practices (n = 389)

Items	SA (4)	A (3)	D (2)	SD (1)	Sum	Mean	SD
Plastic waste pollution can cause environmental degradation.	280	85	18	6	1,417	3.64	0.64
Improper plastic waste disposal can block drainage and cause flooding.	260	105	17	7	1,396	3.59	0.66
Plastic waste can contaminate water sources.	245	110	24	10	1,368	3.52	0.73
Burning plastic waste can cause air pollution and respiratory diseases.	230	115	30	14	1,339	3.44	0.79
Plastic waste can increase the spread of malaria and cholera.	200	145	30	14	1,309	3.37	0.78
Plastic waste disposal is a major environmental problem in my community.	275	90	18	6	1,412	3.63	0.65

Note: SA = Strongly Agree; A = Agree; D = Disagree; SD = Strongly Disagree; SD (last column) = Standard Deviation.

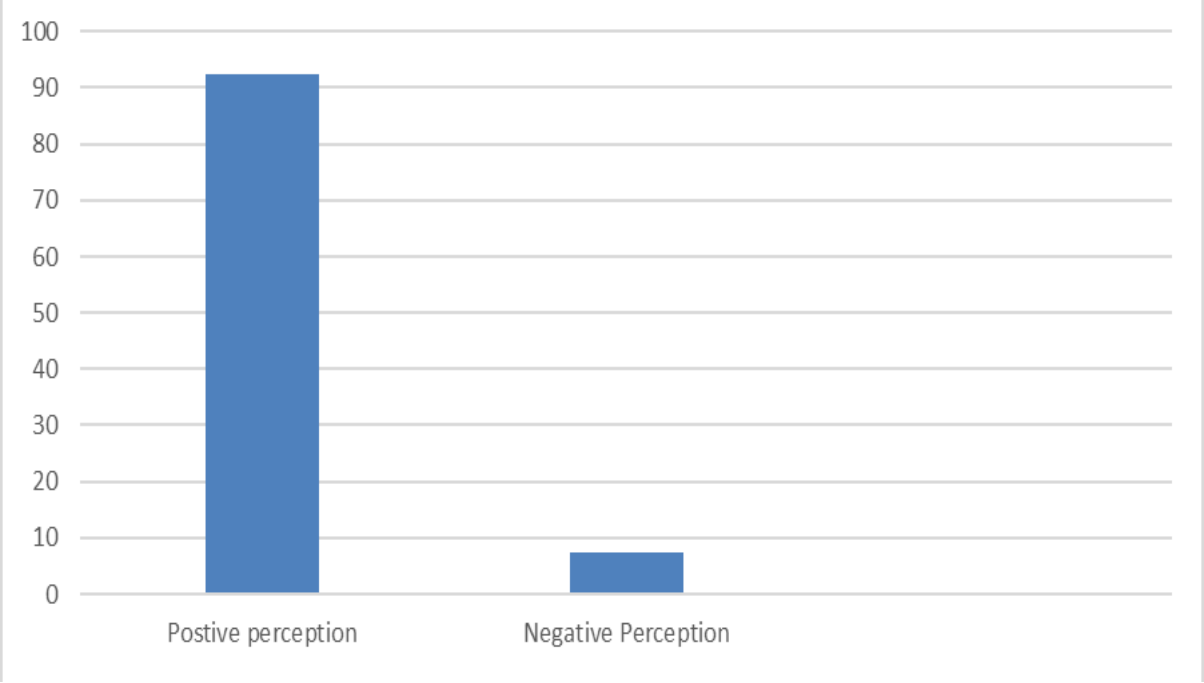


Table 6: Distribution of Plastic Waste Disposal Practice Level with Socio demographic Characteristics (n= 389)

Socio demographic Characteristic	Improper Disposal n (%)	Proper Disposal n (%)
Gender		
Male	160 (80.0%)	40 (20.0%)
Female	165 (87.3%)	24 (12.7%)
Age		
18–28 years	75 (88.2%)	10 (11.8%)
29–39 years	115 (88.5%)	15 (11.5%)
40–50 years	70 (82.4%)	15 (17.6%)
51–61 years	40 (72.7%)	15 (27.3%)
Above 61	25 (73.5%)	9 (26.5%)
Educational Level		
No formal education	28 (93.3%)	2 (6.7%)
Primary education	35 (87.5%)	5 (12.5%)
Secondary education	120 (85.7%)	20 (14.3%)
Tertiary education	142 (79.3%)	37 (20.7%)
Occupation		
Civil servant	75 (75.0%)	25 (25.0%)
Trader/business	105 (87.5%)	15 (12.5%)
Farmer/Fisherman	48 (96.0%)	2 (4.0%)
Student	53 (81.5%)	12 (18.5%)
Unemployed	35 (87.5%)	5 (12.5%)
Others	9 (64.3%)	5 (35.7%)
Household Size		
1–3 persons	80 (76.2%)	25 (23.8%)
4–6 persons	125 (83.3%)	25 (16.7%)
7–9 persons	85 (89.5%)	10 (10.5%)
10 and above	35 (89.7%)	4 (10.3%)
Community of Residence		
Nkoro	75 (78.1%)	21 (21.9%)
Kalibiama	115 (87.1%)	17 (12.9%)
Opobo Town	135 (83.9%)	26 (16.1%)

Table 7: Socio demographic Reasons Associated with Positive Public Perception of Plastic Waste Disposal Practices among Respondents (n=389)

Socio demographic variable	COR (95% CI)	AOR (95% CI)	p value
Age group			
18–28 years	Reference	Reference	—
29–39 years	1.60 (0.68–3.75)	1.38 (0.94–2.04)	0.099
40–50 years	1.88 (0.63–5.58)	1.52 (1.01–2.30)	0.045*
51–61 years	2.00 (0.54–7.40)	1.62 (1.03–2.55)	0.037*
Above 61 years	2.50 (0.32–19.41)	1.86 (1.03–3.36)	0.040*
Gender			
Male	Reference	Reference	—
Female	0.53 (0.22–1.28)	0.70 (0.43–1.14)	0.151
Educational level			
No formal education	Reference	Reference	—
Primary education	1.42 (0.42–4.79)	1.36 (0.68–2.72)	0.385
Secondary education	3.25 (1.00–10.57)	2.18 (1.22–3.90)	0.009*
Tertiary education	6.17 (1.90–20.00)	3.76 (2.08–6.79)	<0.001*
Occupation			
Civil servant	Reference	Reference	—
Trader/business	0.46 (0.18–1.17)	0.59 (0.32–1.10)	0.097
Farmer/Fisherman	0.25 (0.07–0.91)	0.36 (0.15–0.86)	0.021*
Student	0.50 (0.14–1.75)	0.68 (0.35–1.32)	0.247
Unemployed	0.40 (0.09–1.75)	0.63 (0.28–1.42)	0.263
Others	NE	NE	NE
Household size			
1–3 persons	Reference	Reference	—
4–6 persons	0.58 (0.24–1.39)	0.91 (0.53–1.56)	0.730
7–9 persons	0.39 (0.14–1.10)	0.79 (0.43–1.46)	0.451
10 persons and above	0.44 (0.13–1.50)	0.83 (0.39–1.76)	0.624
Community of residence			
Nkoro	Reference	Reference	—
Kalibiama	0.67 (0.26–1.70)	0.66 (0.40–1.10)	0.111
Opobo Town	0.91 (0.36–2.29)	0.88 (0.53–1.46)	0.616

*Note: * Significant at p < 0.05COR = Crude Odds Ratio; AOR = Adjusted Odds Ratio; CI = Confidence Interval; NE = Not estimable. Significant at p < 0.05.*

Discussion

The high composite awareness observed places Opobo/Nkoro in the higher range reported in recent studies of Nigerian communities. Evidence at the national level shows high public awareness of plastic pollution (Ibrahim et al., 2025), and public education is reported to be raising awareness of environmental sanitation (Chilote & Dhakal, 2025). This contrasts with the low sanitation awareness found among urban households in Kano (Abdulmumin et al., 2024). However, high awareness has not translated into proper practice in several settings. In Imo State, residents knew the health risks of improper disposal but did not act accordingly (Emesowum & Onyekwuo, 2024), and open dumping persisted despite good knowledge in the informal settlements of Jos (Sambo et al., 2021) and in Birnin Kebbi (Mainasara & Dodo, 2024). The same gap between awareness and practice was seen in the present study.

Education was the strongest independent predictor of awareness, consistent with other Nigerian studies (Adeniran et al., 2024; Akintola et al., 2025) and with a logistic regression

analysis from Bogotá (Henaó Rodríguez et al., 2024). However, formal education alone did not consistently improve littering behavior in a multi-city Indonesian study (Brotosusilo et al., 2022), which suggests that the education gradient seen here may reflect exposure to information rather than a guarantee of practice. The lower awareness among farmers and fishermen is consistent with findings among occupationally dispersed, lower-service populations (Pathak et al., 2023), and may reflect less frequent contact with formal outreach. The higher unadjusted awareness among men differs from a Malaysian youth survey (Zulkipli et al., 2022), but since gender was not significant after adjustment, this more likely reflects context and confounding than a true gender effect. Awareness also varies by waste type, as fewer than half of Lagos residents had fair knowledge of pharmaceutical waste disposal (Adedeji Adenola et al., 2022), so high awareness of plastic waste should not be assumed for other waste streams.

Because awareness is already high, further general awareness campaigns are unlikely to be the most effective intervention. Efforts should instead target the subgroups with relatively low awareness, namely farmers and fishermen, people with no formal education, and the youngest and oldest adults, and could be delivered through occupational associations and existing educational structures such as adult literacy programs. Gender, household size and community of residence were not significant after adjustment, so programs need not be tailored by sex or settlement. The high awareness itself probably reflects residents' direct experience of flooding and blocked waterways in a riverine environment, exposure to government and agency education, and the role of formal education in accessing health messages, although this study did not test these explanations. As the study was cross-sectional, we cannot conclude that investing in education would raise awareness over time.

The very high proportion of respondents with a positive perception of plastic waste as an environmental health risk, with agreement strongest for environmental degradation and weakest for the spread of disease vectors, places this community at the higher end of what has been reported in Nigeria and internationally over the past five years. At the national level, Ibrahim et al. (2025) reported high public awareness of plastic pollution across Nigeria. That study assessed awareness and perceptions of responsibility rather than health-risk perception, and its national sample has more variable exposure to the hazard than our study area, where plastic accumulation in waterways is directly and frequently visible. Our findings also align with Donuma et al. (2024), who found in Maiduguri that indiscriminate disposal had led to plastic waste accumulating in open spaces, drainage systems, and water bodies, with microplastic contamination of water sources that poses a potential risk to human health. This resembles the causal chain captured by the water contamination and drainage blockage items in our study, and it suggests that riverine and flood-prone communities most easily arrive at risk perception through the direct, observable consequences of plastic waste.

High perception should not, however, be taken for granted. Omoyajowo et al. (2021) found high awareness but poor perception of microplastic pollution among residents, students, and fishermen around Lagos Lagoon. The difference from our findings may reflect that microplastics are far less visible than the plastic waste and blocked drains addressed by our items. Education also appears to matter internationally. In a review of survey-based research across nine countries, Walker et al. (2023) found that awareness of the negative impacts of plastic pollution was extremely high regardless of location, and highest among groups including the better educated. This is consistent with our data, in which respondents with tertiary education had the most favorable perception and those with no formal education the least. Formal schooling may also have a ceiling effect, as Anokye et al. (2024) found total agreement on the negative environmental impacts of plastic waste among senior high school teachers in rural Ghana, although that sample was small in scope and predominantly male.

The weaker agreement on the link between plastic waste and malaria and cholera is more likely explained by the cognitive distance of that causal chain than by weaker environmental concern. Recognizing that discarded plastic containers create stagnant-water breeding sites for vectors requires knowledge of an intermediate biological mechanism that cannot be directly observed, whereas recognizing that a blocked drain causes flooding is a short, observable inference. A study of soot pollution from artisanal crude oil refining in Rivers State showed a similar pattern, with awareness of the pollutant exceeding the proportion who linked it to specific health effects (Whyte et al., [year]). This suggests that the gap between visible, mechanical harms and biologically mediated harms is a general feature of how communities process environmental risk and not unique to Opobo/Nkoro. Resources should therefore go to this specific gap, through risk communication explaining how stagnant water in discarded containers and blocked drains supports the organisms that transmit malaria and cholera, rather than to basic sensitization on whether plastic waste is harmful.

The unequal distribution of perception across subgroups is a second and possibly more important finding. Farmers and fishermen, who have the most direct and prolonged exposure to the rivers and streams where plastic waste accumulates, had the lowest positive perception of any occupational group. Research on coastal communities in Delta State has shown that residents may perceive persistent hazards such as oil pollution and flooding as normal parts of life rather than as major risks (Olowoporoku, 2023), which may help explain this result. It implies that the residents most affected by plastic pollution may be the least likely to see it as a concern, so an undifferentiated campaign aimed at the community average would under-serve them, and occupationally tailored interventions are needed. The marked difference by educational level likewise suggests that written pamphlets and formal health messaging may not reach, or persuade, the residents whose perception is weakest. Formal education plausibly strengthens the ability to link a visible cause to a less visible effect and increases exposure to structured health information, which is consistent with Walker et al. (2023) and with Adeniran et al. (2024), who showed that education was a significant factor in understanding environmental health risks. Finally, the contrast between high perception and low proper disposal practice in this study suggests that perception alone is not a strong enough lever to change behavior, and that these findings are exploratory because the cross-sectional design cannot establish why the differences exist.

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