



Original article

Public awareness and perception of the ecological impacts and responsibility for plastic pollution in Nigeria

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ABSTRACT

Plastic pollution poses a critical global environmental threat, with Nigeria being particularly vulnerable to this due to its rapid industrialization, urbanization, and inadequate waste management infrastructure. This study investigated public awareness and perceptions of plastic pollution in Nigeria, emphasizing the ecological impacts and potential economic opportunities associated with plastic waste. Using a comprehensive questionnaire administered from June to December 2023, the study evaluated the extent of public awareness, perceptions of responsibility, and key factors influencing attitudes towards the management of plastic waste. The findings revealed a high level of public awareness about plastic pollution, with 66.5% of respondents having participated in environment-related gatherings and 56.5% were familiar with the concept of a circular economy. A significant majority (79.2%) believed in the wealth-generating potential of plastic waste, highlighting methods such as recycling, energy generation, and manufacturing new products. The study also identified significant associations between socio-demographic factors and perceptions of responsibility for plastic pollution management. The study underscores the need for targeted education and policy interventions to address disparities influenced by socio-demographic factors. The potential for economic development through recycling and innovative waste management solutions, such as pyrolysis and gasification, is emphasized. Effective collaboration among government agencies, businesses, NGOs, and local communities is essential to develop infrastructure, implement supportive policies, and promote responsible waste disposal practices. The results highlight the dual opportunity for economic growth and environmental protection through sustainable waste management. Advancing circular economy initiatives in Nigeria requires innovative solutions, stakeholder collaboration, and policies that leverage the wealth-generating potential of plastic waste while safeguarding the environment.

KEY WORDS: circular economy, environmental sustainability, microplastics, recycling, stakeholder collaboration, waste management

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1. Introduction

Plastic pollution has become a significant global environmental problem, causing serious ecological

consequences and putting ecosystems at risk (MACLEOD ET AL., 2021). Nigeria, which is experiencing fast industrialization and urbanization, serves as a striking illustration of a country struggling with the

widespread consequences of the rise of plastic garbage (ALYU & AMADU, 2017). With increased reliance on plastic for packaging and single-use plastics, global plastic production will continue to increase and create an unpleasant and unhealthy environment for all. When plastics find their way into the ocean or water bodies, they gradually degrade into tiny pieces or fibres called microplastics, which negatively affect aquatic organisms (ZOLOTOVA ET AL., 2022).

Plastic waste exposed to the environment creates problems and is of significant concern for all life forms. In 2019, the global production of plastic was at 370 million tons, with only 9% of it being recycled, 12% being incinerated, and the remaining left in the environment or landfill, resulting in the leakage of plastic wastes into terrestrial and aquatic ecosystems at an unprecedented rate (KUMAR ET AL., 2021). In the environment, plastic waste causes severe problems such as the blockage of waterways, leading to standing water that serves as a breeding niche (for mosquitoes, pests, vector-borne diseases transmission), becomes a vector for toxic chemicals, and ultimately disturbs the natural cycles (biogeochemical cycle in terrestrial ecosystems) (SANCHEZ ET AL., 2014; VAN RAAMSDONK ET AL., 2020).

Plastics also create major challenges for aquatic ecosystems, where small-sized plastic particles are easily ingested by organisms, passing into their system, and are eventually transferred to the broader food chain. Plastic transfer into the food chain is dangerous to animals and humans (SANCHEZ ET AL., 2014; NEVES ET AL., 2015; BELLAS ET AL., 2016). In addition, plastic ingestion by aquatic organisms (e.g., dolphins, turtles, seabirds, and others) blocks their breathing pathways, leading to death (KUMAR ET AL., 2021). If left uncontrolled, marine litter from plastic waste may harm almost 600 species by 2050, with 90% of seabirds being threatened due to plastic ingestion and approximately 15% of marine species becoming endangered because of the ingestion and entanglement of plastics (JAMBECK ET AL., 2015).

Nigeria, the most populous country in Africa, is made up of 36 states in 6 geo-political zones covering a total land area of 923,769 sq. km (98.5% highland and 1.5% lowland) (OLATOMIWA ET AL., 2015). The country generates over 60 million discarded plastic sachet water bags daily, alongside widespread use of single-use plastic shopping bags and take away containers. Indiscriminate disposal practices, such as dumping waste on roadsides, in drainage channels, and under bridges, exacerbate plastic pollution, leading to severe environmental consequences

(OLATOMIWA ET AL., 2015). In 2010, Nigeria was ranked the ninth highest contributor to marine plastic pollution, releasing an estimated 0.34 million tonnes of plastic debris into the ocean (DUMBILI & ANDERSON, 2020).

The plastic pollution problem in Nigeria is worsened by the country's large population, increasing consumption, and insufficient waste management infrastructure, which requires immediate attention and collective action. Therefore, it is crucial to comprehend the public's knowledge, opinions, and accountability on plastic pollution to develop successful interventions and promote long-lasting changes in behaviour that are environmentally sustainable. The public health and ecological impact of microplastics have received great attention in the last decade due to their potential to pervade the food chain and elicit harmful effects. Their degradation rate and plastic persistence vary depending on the polymer, density, shape, and purpose of the plastic (ERIKSEN ET AL., 2014).

Among the approaches through which the problem of plastic pollution has been tackled apart from recycling is pyrolysis, gasification and upcycling. Pyrolysis and gasification are thermochemical processes that convert plastic waste into valuable products such as fuel oil, syngas, and char. Pyrolysis involves heating materials in the absence of oxygen, while gasification uses limited oxygen to break down plastics into smaller molecules (HUSSAIN ET AL., 2023; SHAH ET AL., 2023). Gasification, particularly when coupled with pyrolysis, enhances the production of syngas, which can be used as a clean energy source or as a feedstock for chemical synthesis (FRANTZI & ZABANIOTOU, 2021). Upcycling is a waste-to-product approach that creates new, higher-value items from plastic waste. Upcycling technologies contribute to a circular economy by reducing waste and transforming it into valuable resources, thus minimizing environmental impact (ZHAO ET AL., 2022; MUDONDO ET AL., 2022).

Despite the existence of impactful approaches for plastic management, understanding public knowledge, perception, and attitudes toward environmental issues is crucial as they shape environmental behaviour (LIOBIKIENÉ & POŠKUS, 2019; SABA ET AL., 2020). In the context of plastic pollution, this awareness is essential for effective waste management and the promotion of recycling and reuse (SOLEKAH ET AL., 2022). Assessing public perceptions enables policymakers to design targeted interventions that encourage sustainable plastic use (MODOI ET AL., 2022). However,

the lack of extensive data on public attitudes hinders evidence-based initiatives, slowing progress in mitigating plastic pollution. A deeper understanding can support tailored policies and educational efforts suited to local socio-cultural contexts. Pro-environmental behaviour is influenced by various factors, leading to the development of multiple theories identifying key determinants. Demographic factors such as gender, age, and education, along with social, economic, cultural, and institutional conditions, play significant roles (BARTKOWIAK ET AL., 2024). Intrinsic factors like motivation, awareness, values, attitudes, emotions, and environmental knowledge also contribute (KOLLMUSS & AGYEMAN, 2002; KIM ET AL., 2018). While research findings vary, studies consistently show that demographic characteristics affect sustainable behaviours, including eco-friendly purchasing (NGUYEN ET AL., 2021; LEE ET AL., 2024; LEE & HUNG, 2024).

In this study, awareness refers to public knowledge and recognition of plastic pollution, including its causes, ecological consequences, and the roles of individuals and institutions in addressing it. It includes both factual knowledge and the recognition of sustainable waste management needs (HARTLEY ET AL., 2015). Public perception, shaped by knowledge and awareness, is crucial for responsible plastic use, proper waste disposal, and policy support.

Although there is increasing worldwide awareness of plastic pollution (OGUGE ET AL., 2021), there is a dearth of empirical studies focused on the Nigerian situation. Apart from OMOYAJOWO ET AL. (2021) who assessed the public perception, knowledge, awareness, and attitude toward microplastic pollution around Lagos Lagoon, EZEDIKE ET AL. (2020) who evaluated the Health-seeking behaviour and waste management practices among women in major urban markets in Owerri, Nigeria, and HENDERSON & DUMBILI (2020), we did not find any published peer-reviewed empirical study measuring the perception of Nigeria's general population on what impact they have on taking adequate and timely responsibilities on addressing plastic pollution.

This research aimed to investigate public awareness and perceptions of plastic pollution in Nigeria, and focused on the factors that influence public attitudes and actions towards plastic waste management. Specifically, the study sought to (1) evaluate the extent of public awareness and understanding of plastic pollution and its ecological consequences, (2) explore how the public perceives responsibility and accountability in addressing plastic

pollution within the Nigerian context, and (3) identify the key socioeconomic factors that shape public perceptions and attitudes towards managing plastic waste. This information can help pinpoint areas where targeted interventions and behaviour change campaigns could be most effective in reducing plastic pollution in the country.

2. Methodology

2.1. Questionnaire development

The questionnaire design was guided by information from AFROZ ET AL. (2017) and SOARES ET AL. (2021). It consisted of dichotomous (yes/no), open-ended (without any defined answering categories, e.g. species examples), Likert-type (from 1 = "strongly disagree" to 4 = "strongly agree"), and multiple-choice questions. It also included sections to collect demographic information of participants (12 questions), the participants' level of awareness about plastic and micro plastic pollution (six questions), and the participants' perceptions of potential environmental effects (25 questions). Before data collection, the questionnaire was reviewed by a panel of experts in ecology and environmental sciences to ensure content validity. Subsequently, a pilot test was conducted among a small sample of respondents to assess the clarity, comprehensibility, and appropriateness of the questionnaire items. Based on feedback received during the pre-testing phase, minor modifications were made to enhance the questionnaire's clarity and relevance.

2.2. Data collection

Data collection took place from June to December 2023 with the help of an online questionnaire, which was created using Google Forms (<https://docs.google.com>) and was open to responses for six months (June–December 2023). A link to the questionnaire was shared randomly in different WhatsApp groups and sent to personal emails and Facebook accounts. Thereafter, Microsoft Office Excel was used to clean and code the data into reasonable categories.

2.3. Dimension reduction and reliability analysis

Principal components analysis (PCA) was used to cluster the various questions into different components based on their eigenvalues. All the 18

Likert-type items that measured the respondents' perceptions of the impacts of plastic pollution were subjected to Principal components analysis (PCA) to cluster the various Likert-type responses using Statistical Package for Social Sciences (SPSS) (version 26; Armonk, New York, USA). Principal component extraction was performed, guided by eigenvalue thresholds (>1) and scree plot analysis. Orthogonal rotation methods, specifically Varimax rotation with Kaiser Normalization, were applied to enhance interpretability. Component loadings were scrutinized to elucidate the underlying structure of the data. Finally, component scores were identified to represent the position of each observation along the extracted principal components.

A thorough examination of the selected scale or questionnaire was conducted to ensure its appropriateness for reliability assessment, particularly in measuring key constructs or dimensions. Internal consistency reliability was evaluated using Cronbach's alpha coefficient, a widely accepted measure in psychometric analysis (SABA ET AL., 2021). Consideration was given to item-total correlations to identify potential items for removal, thereby optimizing scale reliability. Interpretation of Cronbach's alpha values was carried out to gauge

the internal consistency of the scale, aiming for values exceeding the conventional threshold of 0.70 for satisfactory reliability. The validity of the scale and its constituent items were carefully considered in the context of the underlying construct being measured.

Of the 18 items subjected to PCA under the perceptions of ecological impacts of plastic pollution, two principal components were identified with 14 questions in component 1 and three in component 2 (Table 1, Fig. 1). While the seven items under the perceptions of the responsibility for plastic pollution resulted in four items having strong loading for further analysis (Table 2, Fig. 2). In both cases, the questions that gave very weak loadings in both components were excluded from further analysis. Reliability analysis of the 14 items clustered in component 1 from PCA, which assessed the respondents' perception of the ecological impacts of plastic pollution, gave a Cronbach's alpha coefficient of 0.96 and 0.67 for component 2 (Table 1). Also, reliability analysis of the four questions resulting from PCA analysis of questions relating to the perception of responsibility for plastic pollution gave a Cronbach's alpha coefficient of 0.92 (Table 2).

Table 1. Principal Components Analysis (PCA) Factor loadings and reliability (Cronbach's alpha) of the questionnaire items assessing the perception of the ecological impact of plastic pollution in Nigeria. C = Component

Item	C1	C2
Eigenvalues	9.339	1.666
Variance Explained (%)	54.940	9.800
Cumulative Variance Explained (%)	54.940	64.740
Can cause flood	0.785	0.085
Can cause erosion	0.682	0.144
Can serve as a breeding ground for pest and disease vectors	0.799	0.112
Could lead to reduction in water infiltration	0.775	0.103
Could lead to destruction of buildings	0.674	0.201
Could facilitate the transport of toxic chemicals	0.819	0.103
Harbours harmful microorganisms	0.825	0.132
Can reduce the uptake of essential nutrients by plants	0.835	0.082
Leads to Billions of plastic bags being thrown away annually	0.856	0.052
Leads to Millions of tons of plastic reaching our waterways every year	0.883	0.042
Aquatic animals can be negatively affected by improperly disposed of plastic	0.875	0.041
Could lead to plastic waste being found in our foods	0.688	0.180
Terrestrial animals can be negatively affected by improperly disposed of plastic	0.838	0.063
Plastic pollution is harmful to the environment	0.857	0.046
Throwing plastic waste in the trash will not harm the environment	0.335	0.548
Improper disposal leads to non-recyclability	0.060	0.826
Improper disposal leads to non-reusability	-0.055	0.850
Chronbach's alpha	<i>0.959</i>	<i>0.673</i>

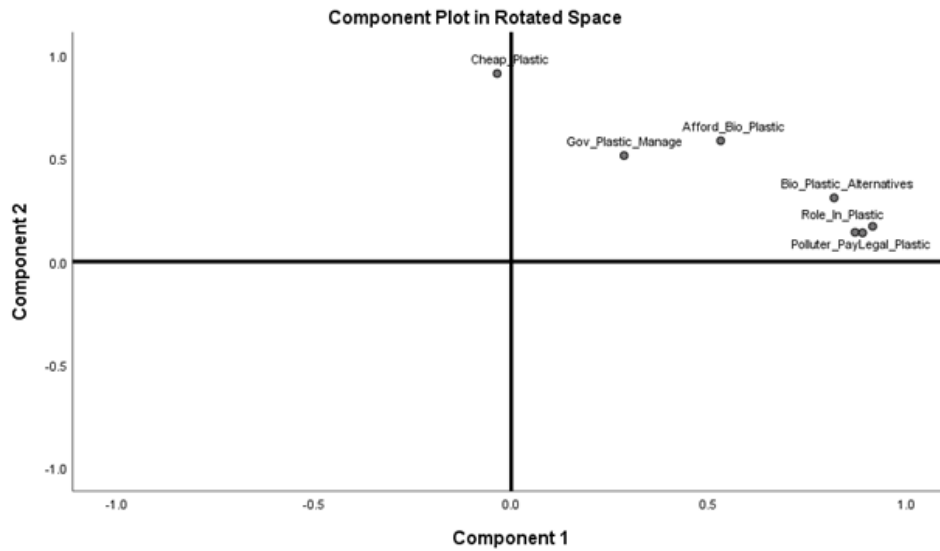


Fig. 1. Principal Components Analysis (PCA) plot of the included questionnaire items assessing the perception of the ecological impact of plastic pollution in Nigeria

Table 2. Principal Components Analysis (PCA) Factor loadings and reliability of the questionnaire items assessing the perception of responsibility for plastic pollution in Nigeria. C = Component

Item	C1	C2
Eigenvalues	3.924	1.096
Variance Explained (%)	56.054	15.658
Cumulative Variance Explained (%)	56.054	71.712
Everybody can play a role in plastic pollution control	0.915	0.171
The Polluter-pays Principle can reduce plastic pollution	0.890	0.139
Legal action can help reduce plastic pollution	0.871	0.142
Provision of biodegradable alternatives to plastic products	0.818	0.308
Making cheaper plastic products		0.910
Cheaper and affordable bioplastics products can help control pollution	0.531	0.585
Management of plastic pollution is the responsibility of the government	0.286	0.513
Cronbach's alpha	0.923	

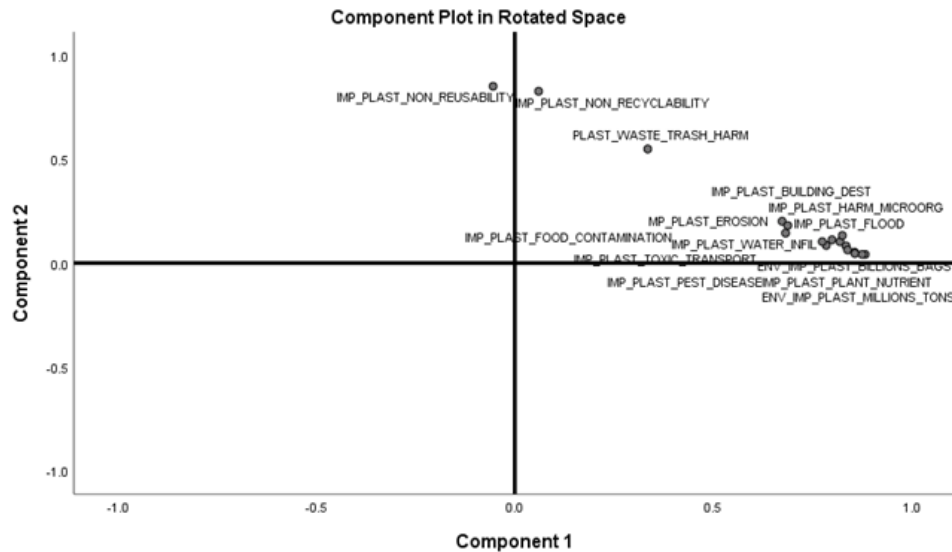


Fig 2. Principal Components Analysis (PCA) biplot of the included questionnaire items related to the perception of responsibility for plastic pollution in Nigeria

2.4. Test of association

The chi-square test was used to test if there were associations between the socio-demographic factors and the perceptions of respondents concerning the ecological impacts of plastics and the responsibility for plastic pollution and its management. These were done using the IBM SPSS statistics software version 26 (Armonk, New York, USA).

3. Results

3.1. Socio-demographic profiles

At the end of the data collection, a total of 481 responses were returned, out of which two were excluded due to incomplete responses. Most of the respondents were males (64%), in the age category of 18–27 years (42.8%), single (51.4%), hold a tertiary educational qualification (89.6%), non-employed (46.4%), in the STEM (Science, Technology, Engineering and Mathematics) discipline (89.9%) were in the northeastern part of the country (59.1%) and lived mostly in cities (64.3%) with a monthly household income of mostly more than N65,000 (58.7%) (Fig. 3).

3.2. Level of awareness

The results indicate a high level of awareness among participants regarding plastic pollution-related issues. Most respondents reported having participated in environment-related gatherings (where environmental issues are discussed), with 66.5% affirming their attendance. Furthermore, over half of the respondents (56.5%) indicated that they had heard about the concept of a circular economy. Among those aware of circular economy principles, a significant proportion (58.2%) believed that it could effectively reduce the negative impacts of plastics. Moreover, a large majority (79.2%) of participants expressed the opinion that plastic waste has the potential to generate wealth. Conversely, a

minority of respondents reported uncertainty or lack of awareness regarding these issues, with smaller percentages indicating either "No" or "Maybe" responses across all questions (Fig. 4).

Respondents highlighted the economic benefits of recycling and reusing plastic waste, such as job creation, income generation, and new markets for recycled products. They also highlighted the need for collaboration between various stakeholders, including government agencies, businesses, NGOs, and local communities, to develop innovative solutions, build infrastructure, and create supportive policies. Education and awareness-raising initiatives are also crucial to changing consumer behavior and promoting responsible waste disposal practices.

3.3. Associations between socio-demographic characteristics and perceptions

The chi-square test examining the socio-demographic impact of variables on the perception of plastic pollution of Nigerians revealed significant associations for age, occupation, and household monthly income. Age demonstrated a significant influence ($\chi^2 = 53.669$, $df = 30$, $p = 0.005$), alongside occupation ($\chi^2 = 74.477$, $df = 40$, $p < 0.001$) and household monthly income ($\chi^2 = 57.927$, $df = 40$, $p = 0.03$) (Table 3). The chi-square test assessing the relationship between perceptions of responsibility for plastic pollution management and socio-demographic characteristics among Nigerians revealed two significant variables: academic discipline and geographical location. Academic discipline exhibited a significant association ($\chi^2 = 27.13$, $df = 16$, $p = 0.04$), indicating an association between fields of study and their perceptions of responsibility regarding plastic pollution. Additionally, geographical location emerged as significant ($\chi^2 = 47.97$, $df = 32$, $p = 0.04$), suggesting that where respondents reside within Nigeria plays a role in their perception of responsibility for the management of plastics pollution (Table 4).

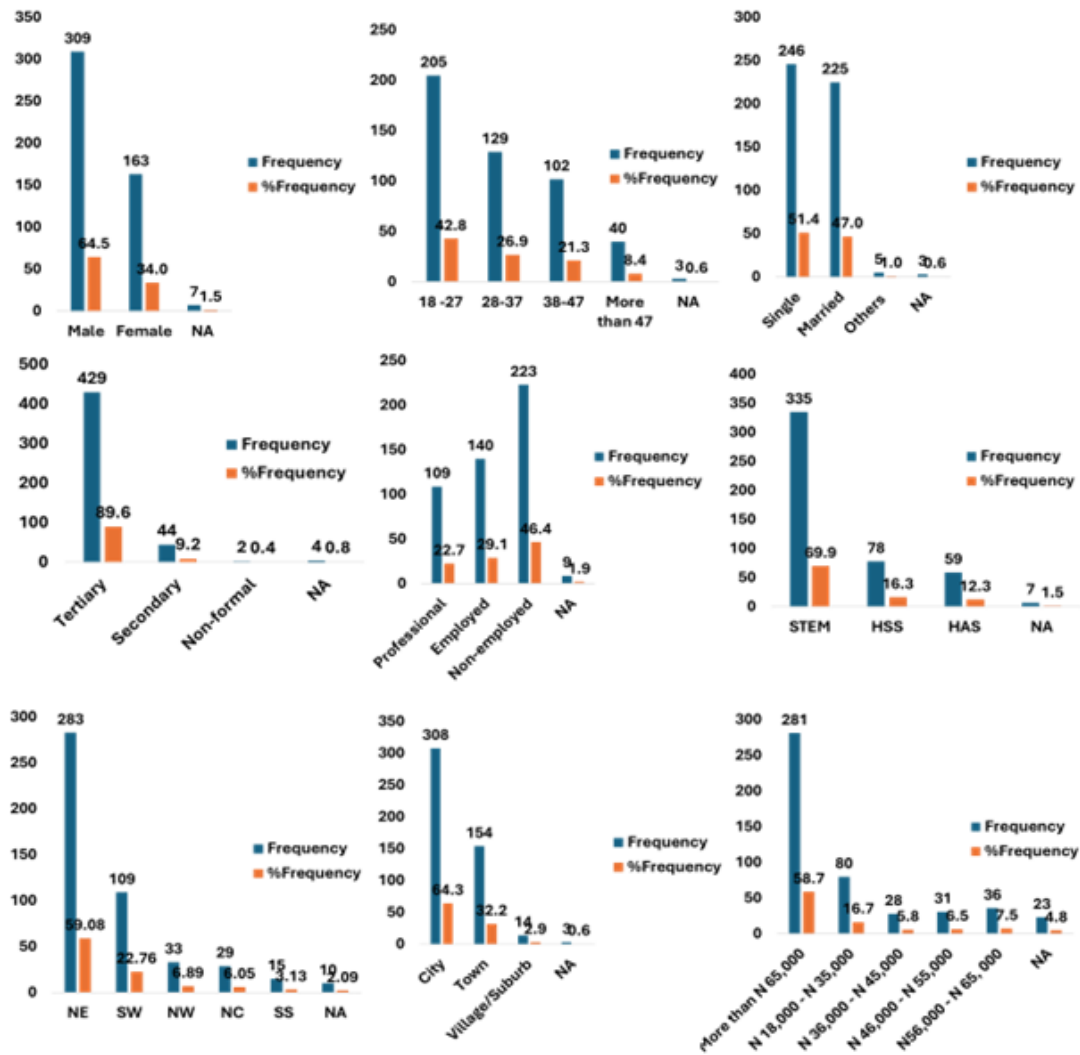


Fig. 3. Sociodemographic parameters of respondents including a) gender, b) age category, c) marital status, d) educational level, e) employment status, f) academic discipline, g) geographical location, h) settlement type, and i) household income. Academic discipline include STEM = Science, Technology Engineering and Mathematics, HSS = Humanities and Social Science, Health and Applied Science =, NA = Not Available, NE = Northeast, SW = Southwest, NW = Northwest, NC = Northcentral, SS = Southsouth.

Note: as of the time of data collection, 1 USD was equivalent to 638.7 Nigerian Naira
[\(https://www.statista.com/statistics/1304053/usd-to-nigerian-naira-annual-average-exchange-rate/\)](https://www.statista.com/statistics/1304053/usd-to-nigerian-naira-annual-average-exchange-rate/)

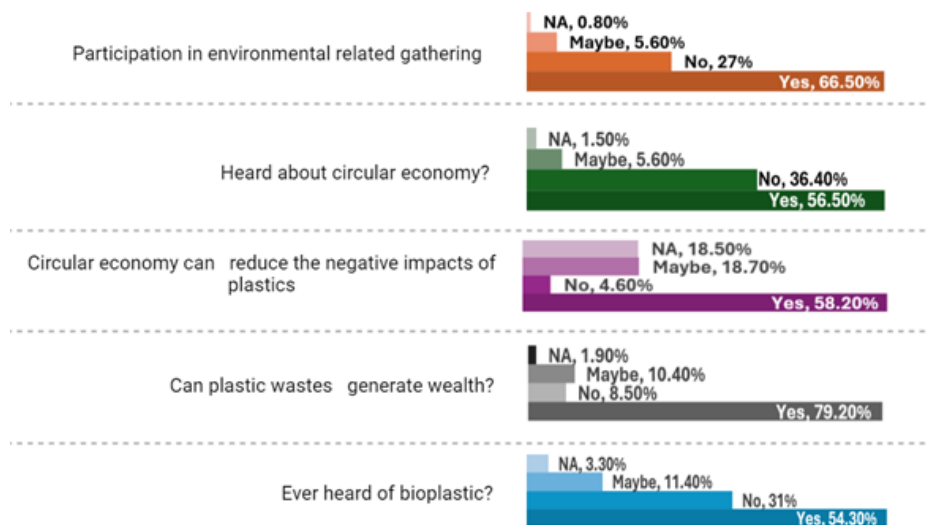


Fig. 4. Level of awareness in respondents about plastic pollution and related issues in Nigeria

Table 3. Chi-square test of association between perception of ecological impacts of plastic pollution and the sociodemographic characteristics of respondents. Values with an asterisk indicate statistical significance ($p < 0.05$)

Variable	Chi-square	df	P value
Gender	10.159	10	0.43
Age	53.669	30	0.005*
Occupation	74.477	40	0.001*
Marital status	23.137	20	0.28
Educational level	16.056	20	0.71
Academic discipline	24.146	20	0.24
Geographical location	30.757	40	0.85
Community	13.796	20	0.84
Household monthly income	57.927	40	0.03*
Household size	27.151	30	0.62

Table 4. Chi-square test of association between perception of responsibility for plastic pollution management and socio-demographic characteristics of respondents. Values with an asterisk indicate statistical significance ($p < 0.05$)

Variable	Chi-square	df	P value
Gender	1.61	8	0.99
Age	23.77	24	0.48
Occupation	21.21	32	0.93
Marital status	9.43	16	0.90
Educational level	13.03	16	0.67
Academic discipline	27.13	16	0.04*
Geographical Location	47.97	32	0.04*
Community	16.20	16	0.44
Household monthly income	30.79	32	0.53
Household size	24.83	24	0.45

4. Discussion

This study aimed to investigate public awareness and perceptions of plastic pollution in Nigeria. It assessed the extent of the public understanding of the ecological consequences of plastic pollution, examined perceptions of responsibility in addressing the issue, and identified key factors that could affect attitudes towards plastic waste management.

The significant associations between socio-demographic characteristics and perceptions of plastic pollution, as revealed by the chi-square tests, provide valuable insights into how different groups perceive environmental responsibility. Age, occupation, and household income were significant predictors of perceptions, with younger individuals, employed people, and those with higher incomes showing greater awareness and proactive attitudes. This finding aligns with previous research which found that socio-demographic factors significantly influence environmental attitudes and behaviours (CICHÓN ET AL., 2021; SCHULTZ ET AL., 2005),

Age plays a critical role in shaping environmental attitudes and behaviors. While some studies suggest that younger individuals are more environmentally conscious, supporting sustainability policies and eco-friendly purchases (CHAN, 1996; STRAUGHAN & ROBERTS, 1999), others indicate that older adults are more engaged in practical, everyday pro-environmental behaviors, such as recycling and reducing meat consumption (GIFFORD & NILSSON, 2014; ÁGOSTON ET AL., 2024). Additionally, research by XU ET AL. (2019) suggests that younger individuals are more likely to participate in organized pro-environmental actions, while older adults tend to exhibit stronger personal environmental habits. This duality highlights the complex interplay between age and environmental engagement, with different age groups contributing to sustainability in distinct ways.

Our study also found a significant relationship between income level and perceptions of the ecological impact of plastic pollution. This is supported by previous findings that income

influences environmental behaviour, with higher-income individuals generally displaying greater concern for sustainability and being more willing to purchase eco-friendly products (RAWAT, 2015; JAIN ET AL., 2023). However, it has also been noted that higher income can lead to resource-intensive lifestyles, which may counteract environmental benefits (BINDER ET AL., 2020). This paradox underscores the need for targeted interventions that encourage sustainable consumption patterns across all income levels.

This study did not find a significant relationship between gender and perceptions of plastic pollution. However, it has been reported that gender differences can influence environmental engagement, with women generally exhibiting stronger pro-environmental attitudes and behaviors than men (LI ET AL., 2022; KIEŻEL ET AL., 2019). Some researchers attribute this to women's socialization toward care, empathy, and responsibility (NAIR, 2015; ZELEZNY ET AL., 2000). Nevertheless, in line with the findings of this study, some studies have reported no significant gender-based differences in green purchasing behaviour (YILMAZ, 2020; MEHRAJ ET AL., 2023), suggesting that the relationship between gender and environmental attitudes may vary across contexts and populations.

In this study, the level of education did not significantly influence respondents' perceptions of the ecological impacts and responsibility for plastic pollution. This finding contrasts with previous research, which has demonstrated that higher educational attainment is often associated with increased environmental awareness and a greater willingness to pay for sustainability initiatives (IVANOVA & TRANTER, 2008; WANG, 2022). The lack of a significant association may be attributed to the sample's composition, as most respondents had tertiary education, with only a small proportion having secondary or primary education. This limited variability in educational levels may have reduced the likelihood of detecting significant differences in perceptions.

Academic discipline and geographical location, however, emerged as significant factors influencing perceptions of responsibility for plastic pollution management. Respondents in STEM (Science, Technology, Engineering, and Mathematics) as academic fields were more likely to perceive high responsibility for addressing plastic pollution, likely due to their technical expertise and problem-solving orientation, which align with environmental

sustainability goals. Similarly, individuals from specific regions, such as northeastern and southwestern Nigeria, demonstrated heightened awareness and responsibility perception, possibly due to localized environmental challenges or cultural factors that emphasize collective action and resource management. These findings align with research by VICENTE-MOLINA ET AL. (2013), which highlights the role of education and regional differences in shaping environmental awareness and responsibility. For instance, regions experiencing direct environmental degradation or those with strong community-based environmental initiatives may foster a greater sense of responsibility among residents.

The results indicate a high level of awareness among respondents regarding plastic pollution-related issues. This agrees with the findings of OMOYAJOWO ET AL. (2021), who reported that over 50% of respondents were aware of microplastics around the Lagos Lagoon. In this study, most respondents reported having participated in environment-related gatherings and had heard about the concept of a circular economy. Among those aware of circular economic principles, a substantial proportion (58.2%) believed that applying these principles could effectively reduce the negative impacts of plastics.

Moreover, a large proportion (79.2%) of participants expressed the opinion that plastic waste has the potential to generate wealth. KUMAR ET AL. (2021) noted that community participation in Nigeria demonstrates a capacity-building impact in managing waste, transforming it into wealth through segregation and recycling for economic benefits. These findings underscore the importance of continuing efforts to promote environmental education and awareness regarding plastic pollution and the potential for circular economic solutions to address associated challenges.

However, respondents expressed diverse perspectives on the potential of using plastic waste to generate wealth. Many respondents highlighted the importance of recycling and reusing plastic waste as a means of creating economic opportunities and reducing environmental pollution. They mentioned methods for turning plastic waste into profitable products, such as producing new materials, generating energy, or manufacturing items like shoes, bricks, or furniture. KEHINDE ET AL. (2020) noted that recycling plastic waste in Nigeria serves as a solution to poverty through wealth creation, and this is fundamentally due to the environmental impact

and the need for diversification and implementation. More so, upcycling plastic waste into biodegradable surfactants can increase its economic value and provide a sustainable solution for the environment (WECKHUYSEN, 2020).

A significant proportion of respondents (79.2%) recognize the economic potential of plastic waste, viewing it as a resource rather than mere waste. This perception is crucial for the success of circular economy initiatives, which emphasize the reuse, recycling, and repurposing of materials to create a closed-loop system. Economic benefits of recycling plastic waste include job creation, income generation for individuals and communities, and the development of new markets for recycled products (PRAJAPATI ET AL., 2021; KUMAR ET AL., 2021). In this study, some respondents mentioned specific examples of businesses or initiatives that are already leveraging plastic waste for economic gain. Environmentally, recycling plastic waste reduces pollution, conserves natural resources, and mitigates climate change. Sustainable waste management practices are crucial for preserving the environment for future generations.

Insights into the economic benefits of recycling plastic waste highlight a dual opportunity for economic development and environmental protection. The mention of specific profitable products, such as shoes, bricks, and furniture, aligns with practical examples observed in other developing countries. For instance, ZHAO ET AL. (2022) demonstrate how upcycling plastic waste can generate significant economic benefits while addressing pollution. The economic advantages identified by the respondents, including job creation and income generation, underscore the potential of recycling initiatives to support local economies. This is corroborated by NASCIMENTO ET AL. (2019), who reported that recycling industries could significantly contribute to local economies by creating jobs and developing new markets for recycled products. Environmentally, the reduction in pollution and conservation of natural resources mentioned by respondents align with the broader benefits of sustainable waste management practices identified in global research (HOPEWELL ET AL., 2009).

Innovative solutions for converting plastic waste into valuable resources, such as pyrolysis, gasification, or upcycling, have been mentioned as potential revenue streams and address environmental challenges (ZHENG ET AL., 2022). The responses highlight the need for collaboration between various stakeholders, including government agencies,

businesses, NGOs, and local communities, to develop innovative solutions, build infrastructure, and create supportive policies. Education and awareness-raising initiatives are also essential to change consumer behaviour and promote responsible waste disposal practices. The call for innovative solutions, such as pyrolysis and gasification, reflects a growing interest in advanced waste-to-energy technologies. These methods not only reduce the volume of plastic waste but also convert it into valuable energy resources. Similar sentiments are echoed in the work of AL-SALEM ET AL. (2009), which explores various technological solutions for plastic waste management and their economic viability.

The emphasis on collaboration among stakeholders such as government agencies, businesses, NGOs, and local communities – is critical for the success of these initiatives. Research by SELEBI ET AL. (2023) highlights the importance of multi-stakeholder partnerships in achieving sustainable development goals, particularly in the context of waste management. Effective policies, infrastructure development, and public-private partnerships are necessary to scale up recycling efforts and implement innovative solutions. The results of this study indicate a high level of awareness among the respondents about plastic pollution and its ecological impacts. This awareness is consistent with global trends, where increasing media coverage and educational initiatives have raised public consciousness about environmental issues (UNEP, 2020). The high participation rate in environment-related gatherings (66.5%) and the familiarity with the concept of a circular economy (56.5%) suggest that environmental education efforts are bearing fruit. This finding aligns with research by KHATIBI ET AL. (2021), which found that public engagement activities significantly enhance environmental awareness and knowledge.

5. Conclusions

In this study, age, occupation and household monthly income were the main factors influencing perceptions of plastic pollution, while academic discipline and geographical location impacted respondents' perceptions of the responsibility for plastic pollution management, indicating that individuals' fields of study influence their perceptions of responsibility regarding plastic pollution and suggesting that where respondents reside within Nigeria plays a role in their perception of responsibility for plastic pollution management.

The results underscore the multifaceted nature of plastic pollution awareness and the potential for economic and environmental benefits through effective waste management. The high level of awareness and the recognition of economic opportunities among Nigerians provide a strong foundation for advancing circular economy initiatives. However, the significant influence of some socio-demographic factors on perceptions suggests that targeted education and policy interventions are necessary to address disparities and enhance collective action. Future efforts should focus on fostering innovative solutions, strengthening stakeholder collaboration, and developing supportive policies to harness the wealth-generating potential of plastic waste while safeguarding the environment. By leveraging the diverse creativity of stakeholders and collective action, Nigeria can make significant strides in managing plastic pollution and promoting sustainable development. This study highlights the influence of socio-demographic factors – such as age, occupation, household income, academic discipline, and geographical location – on public perceptions of plastic pollution and responsibility for its management. The findings emphasize that the fields of study of its respondents shape their views on responsibility, while regional differences across Nigeria affect perceptions of plastic waste governance. The results demonstrate a strong awareness of plastic pollution and its economic opportunities, providing a foundation for advancing circular economy initiatives. However, the study had certain limitations. The sample may not fully represent all demographic groups across Nigeria, particularly rural populations with limited access to formal waste management systems, as well as the digitally disadvantaged population, since the questionnaire was entirely based online. More so, a very large proportion of the respondents had tertiary education, and this may have contributed to education not influencing people's perceptions. Additionally, self-reported data on awareness and perceptions may be influenced by social desirability bias. The findings are particularly relevant to policymakers, environmental agencies, educators, and industry stakeholders seeking to design targeted interventions for improved waste management. Strengthening educational programs, fostering multi-sector collaborations, and implementing supportive policies will be critical in addressing disparities and promoting sustainable plastic waste management. By engaging diverse stakeholders in solution-driven initiatives, Nigeria

can make meaningful progress toward reducing plastic pollution and enhancing environmental sustainability.

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