

Original Research Article

Knowledge, Attitude and Perception of Environmental Sanitation among Communities in Calabar Municipality, Cross River State

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Abstract: Environmental sanitation and waste management are critical components of public health, environmental sustainability, and urban development. In Calabar, Nigeria, rapid urbanization and infrastructural challenges have exacerbated issues related to poor environmental sanitation, improper waste disposal, pollution, and disease outbreaks. The aim of the present study was to assess the knowledge, attitude and perception (KAP) of community members in Calabar regarding environmental sanitation and waste management. Three research questions, three objectives and one hypothesis were formulated to guide the study. Literature was reviewed based on major research variables. Health belief model and unitary human being model were used. The study employed a descriptive cross-sectional design. A multistage sampling technique was used to select a total of 301 residents from 2 randomly selected council wards in Calabar municipal. The streets from where data was collected were further selected via a convenience purposive method. Data were collected using 54-item Adopted questionnaires validated for content and reliability. Data collected was coded using SPSS version 25.0 and analysed using descriptive statistics and multivariate regression at p value 0.05, significance level. Findings revealed a high level of knowledge (mean = 2.96), positive attitude (mean = 2.92), and favourable perception (mean = 2.89) of environmental sanitation and waste management. Moreover, hypothesis test indicates F -value of 9.762 for the relationship between variables, because the p -value 0.000 is less than 0.05 level of significance at 3 and 298 degrees of freedom, there was significant relationship between the variables. This indicates that increased knowledge, positive attitude and perceptions are associated with responsible waste management behaviours. The study emphasized the need for continuous community education, infrastructural development, and policy enforcement to sustain positive environmental health outcomes. It recommends strengthening community-based awareness programs, improving waste disposal facilities, and fostering stakeholder collaboration to promote sustainable environmental sanitation and proper waste management practice in Calabar municipal local government area of Cross River state, Nigeria.

Keywords: Knowledge, Attitude, Perception, Environmental-Sanitation, Waste-Management, communities.

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INTRODUCTION

Human health is intricately linked to the dynamic interactions among man, animals, and the environment. These interactions are fundamental to understanding the origins and spread of many infectious diseases in the environment. Disruptions in these interactions, often driven by human activities such as urbanization, industrialization, and deforestation, have led to increased exposure to environmental hazards that

threaten health (WHO, 2021). The displacement of animals from their natural habitats due to rapid developmental activities has heightened the risk of zoonotic diseases crossing species barriers, further complicating global health challenges (Bedenham *et al.*, 2022; Tajudeen *et al.*, 2022). Efforts to control emerging epidemics increasingly emphasize the importance of a “One Health” approach, which recognizes the interconnectedness of humans, animals, and

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environmental health, calling for integrated strategies to prevent disease outbreaks globally (WHO, 2023). The increasing emergence of epidemics across the world has become a public health concern. Every day, ten people die or are hospitalized due to preventable infectious diseases associated with poor sanitation and waste management (WHO, 2018). This burden may worsen if this situation continues unchecked. Data suggests that more than 2.4 billion people in the world currently lack access to adequate sanitation and are forced to dispose their excreta in unimproved and unsanitary condition (WHO 2018). Indiscriminate disposal of waste into gutter, stagnant water, poor hygiene practices, defecating in polythene bags give rise to infections such as; malaria, cholera, typhoid fever, and respiratory problems (Elechi and Eleki 2025). This practice is common with those people that lack most basic human needs and also tend to be victims of ill health and poor quality of life (WHO, 2018). Positive life style is crucial in maintaining human health and its quality directly influences disease prevalence and health outcomes. Globally, it is estimated that over 55 million deaths occur annually, and is attributable to environmental factors, including air and water pollution, waste mismanagement, and exposure to hazardous chemicals (WHO, 2022). These environmental-related diseases encompass respiratory infections, vector-borne diseases, waterborne illnesses, and non-communicable diseases linked to pollution and poor sanitation. Sub-Saharan Africa bears a disproportionate burden of these health issues, primarily due to inadequate infrastructure, poverty, and lack of portable drinking water, (Jones *et al.*, 2020). For example, in Nigeria, poor environmental sanitation is the leading cause of disease outbreaks, significantly impacting vulnerable populations, especially children under five years old (Adebayo *et al.*, 2021). Outbreaks of cholera, Lassa fever, Ebola, and most recently COVID-19 have been associated with environmental degradation and poor sanitation, underscoring the critical need for improved waste management and environmental hygiene (Brown and Lee, 2021).

Globally, the effect of negative attitude toward environmental sanitation and indiscriminate waste disposal has become a pressing concern, as improper disposal of waste leads to pollution, the proliferation of disease vectors, and environmental degradation. The World Health Organization (2018) emphasizes that effective environmental sanitation involves the collection, treatment, and disposal of waste in acceptable ways by the ministry of environment. Some persons often exempt themselves from cleaning the environment with the notion that the landlords and municipal council authority should be fully responsible for waste management, (Ekoru, *et al.*, 2021). Despite international efforts, many regions still grapple with inadequate waste disposal systems, resulting in open dumping, burning of refuse, and contamination of water bodies. These practices not only degrade ecosystems but also significantly increase the risk of waterborne diseases

such as cholera, dysentery, and typhoid (WHO, 2018). In developing countries, including Nigeria, the situation is compounded by rapid urbanization, which often outpaces infrastructure development, leading to unsanitary living conditions (Akpa *et al.*, 2024). For instance, Nigeria reports approximately 600,000 cases of childhood diarrhoea annually, largely attributable to poor sanitation and contaminated water sources (WHO, 2022). However, despite sporadic attempts made by local authorities to sustain modern environmental sanitation practices, such efforts have lacked continuity and community involvement, limiting their effectiveness (Abubakar, *et al.*, 2020).

Calabar in recent time have observable waste generation in higher proportion that is plausible to their standard of living, rapid urbanization, industrial renovations, and improvement in medical and health care delivery system, and income. Looking at these changes, waste are generated per day while available space for waste disposal decreases accordingly due to population density, this implies that environmental sanitation should be the responsibility of every individual in the community to maintaining healthy environment and populations health (Iwu *et al.*, 2016: Ekoru, *et al.*, (2021). This study seeks to assess the knowledge, attitude and perception of members of the community toward environmental sanitation and waste management. Health belief model and unitary human being model were used in the present study.

The objectives of the present study include;

1. To determine the level of knowledge of environmental sanitation and waste management among members of the community in Calabar, Cross River State.
2. To examine the attitude of members of the community in Calabar, Cross River State, towards environmental sanitation and waste management.
3. To determine the perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State.

The Research Questions include;

1. What is the level of knowledge of environmental sanitation and waste management practice among members of the community in Calabar, Cross River State?
2. What is the attitude towards environmental sanitation and waste management in among members of the community in Calabar Municipality, Cross River State?
3. What is perception of environmental sanitation and waste management among members of the community in Calabar municipality, Cross River State?

Operational Definition of Terms:

Knowledge: Refers to what the communities know about the principles and practices that promote hygienic and healthy conditions.

Attitude: Refers to what the people's subjective feelings, beliefs, and values is concerning environmental sanitation and waste management.

Perception: Refers to what individual interpretation and understanding is about environmental sanitation and waste management.

Environmental Sanitation: Refers to the practices and measures taken to improve and maintain clean and healthy environment with the goal of preventing disease and promoting health.

Waste Management: Refers to how communities wastes are being dispose.

Members of the Community: Refers to the people living within Calabar municipality that generate wastes and should take part in environmental sanitation.

Environmental Health Hazards: Refers to any external physical, chemical and biological substances in the community that can negatively impact human health.

Pollution: Refers to the introduction of harmful substance into the environment that contaminate natural resources like water, air and land causing disease to human health.

Environmental Hazard: This is a substance, condition, or situation in the environment that has the potential to cause harm to human health, animals, or the ecosystem.

Epidemics: The outbreak of a particular disease.

METHODOLOGY

Research Design:

This study adopted a descriptive cross-sectional survey and quantitative methodology to comprehensively examine knowledge, attitude and perception toward environmental sanitation and waste management among communities in Calabar Municipal Local Government Area of Cross River State, Nigeria. Calabar is an ancient city in the Federal Republic of Nigeria located in the South-South zone of Nigeria with an estimated population of 741,455 in 2026 (World Population Review). There are ten council wards in the local government and two ethnic groups (Quas and the Efik) which form the indigenous population (Cross River State, 2022). A multistage stage sampling technique was used to select a total of 301 residents from 2 randomly selected council wards in Calabar municipal. The streets from where data was collected were further selected via a convenience purposive method.

Eligibility Criteria:

This study involved 301 apparently healthy men and women aged ≥ 18 years in Calabar municipal local government area.

Inclusion Criteria:

1. Apparently healthy subjects aged ≥ 18 years who have resided in Calabar municipal LGA for at least 12 months.

2. Subjects who gave consent to participate in the study.

Exclusion Criteria:

1. Subjects who refuse to give consent to participate on the study
2. Patients who were ill at the time of this study.

Study Instrument/Tools

The instrument use was an adopted questionnaire for data collection consisting of 54 items (Safo-Adu *et al.*, 2019; Bartholomew *et al.*, 2024). The questionnaire was divided into four sections covering all aspects of the research questions in the study. Four points Linkert scale for level of knowledge, attitude and perception of environmental sanitation and waste management sections. Section A was the socio-demographic data, section B was used to assess level of knowledge of environmental sanitation and waste management among community members in Calabar municipality local government area, section C was used to assess their attitude toward environmental sanitation and waste management whereas section D was designed to obtained information on perception of the people toward environmental sanitation and waste management.

Validity of the Instrument:

Face Validity: The instrument through a closer look measured the appropriate variables. The questionnaire was submitted to the supervisors to review its clarity, relevance, and accuracy. Clear and simple languages were used to ensure participants understand what is being asked.

Content Validity: This measured the extent in which content in the instrument relates with research objectives, questions and hypotheses. Here, the questionnaire was reviewed by the supervisors to ensure it is relevant, accurate, and comprehensive and covers all the aspects of construct.

Reliability of Instrument: Consistency and stability of the instrument was ascertained using a test-retest method. Here, the researcher administered the questionnaire to a smaller group of 10 households in a pilot test to ascertain its feasibility and to identify any potential issues. The study adopted the threshold of 0.7 for the reliability.

Method of Data Collection and Analysis

It was face to face by the researcher, questions were interpreted using "pidgin" English or Efik language to those who do not understand English language. Data was analysed using descriptive statistics and presented in Mean, range, standard deviation and percentages. Multivariate regression analysis was used to assess the relationship between knowledge, attitude and perception of members of the community toward environmental sanitation and waste management. Data was coded using statistical package for social science (SPSS) version 25.0.

Ethical Consideration:

Ethical approval for the study was obtained from the University of Port Harcourt Research Ethics and Development Committee with approval number; UPH/R&D/REC/EXEC/003/108. We also obtained ethical clearance from Cross River State Health Research Ethics Committee, ministry of environment; CRSHREC/2023/87. Written and verbal consent forms were translated in Efik and “pidgin” English, explaining purpose of the study, risk and benefits. Anonymity was maintained as no name and address was recorded.

Potential impacts of the research: Related to Sustainable Development Goals:

Particularly Sustainable Development Goal 6 clean water and sanitation, goal 11 (sustainable cities and communities), goal 12 (waste reduction habit, supported by goal 3 and 13. These sustainable development goals are significant in understanding why environmental sanitation and waste management is important.

RESULTS AND DISCUSSION

Results of data collected are presented in tables for easy comprehension. The data that form the basis of this analysis are data generated from the questionnaires administered to the respondents in the field.

Socio-Demographic Information**Table 1: Analysis of Socio-Demographic Information (n = 301)**

Items	Frequencies (n)	Percentage (%)
Gender		
Male	160	53.2
Female	141	46.8
Age		
19-29	88	29.2
30-39	69	22.9
40-49	66	21.9
50-59	78	25.9
Marital Status		
Single	166	55.1
Married	135	44.9
Religion		
Christianity	297	98.7
Islam	4	1.3
Educational Level		
FSLC	72	23.9
SSCE	76	25.2
BSc	80	26.6
MSc	73	24.3

As shown in the Table 1, the result showed that the number of males (53%) that participated in the study was higher than that of female (47%). Variable two showed that 88 (29.2%) of the respondents were under the age bracket of 19 – 29 years, 69 (22.9%) of the respondents were in the age range of 30 – 39 years, 66 (21.9%) of the respondents were in the age range of 40 – 49 years and 78 (25.9%) of the respondents were under the age range of 50 – 59. The result indicates that the highest number of respondents were between the range of 19 – 29 years. Variable three showed that 166 (55.1%) of the respondents were single while 135 (44.9%) of the

respondents were married. The result indicated that number of the respondents who were single were higher than those who were married. The result indicated that most of the respondents were Christians and this may be due to the location of the study.

Results of Research Questions**Research Question 1:**

What is the level of knowledge of environmental sanitation and waste management practice among members of the community in Calabar, Cross River State?

Table 2: Mean Analysis of Knowledge of Environmental Sanitation and Waste Management Practice among Members of the Community in Calabar, Cross River State (n = 301)

S/N	Statement	Mean	SD	Remark
1.	Poor sanitation contributes to outbreaks of diseases such as cholera and typhoid	2.94	1.03	High
2.	Garbage discard into gutters, on the street and around the surroundings is capable of causing flooding.	3.72	1.14	Very High
3.	Managing refuse by burning is the best but has effect on the environment.	2.63	1.13	High
4.	Open defecation in bushes, field and backyards has negative effect on people living in the area.	3.60	1.07	Very High
5.	It is the responsibility of people in households to clear bushes and weeds around their houses.	2.62	.54	High
6.	Sorting out plastic waste from garbage contributes to waste segregation	2.61	.51	High
7.	Storing refuse in dustbin which has no cover is a bad practice.	3.52	.56	Very High
8.	Covering waste containers is a good sanitation and hygiene practice	2.68	1.16	High
9.	Sewage (human excreta) could be recycled	3.67	1.13	Very High
10.	Stagnant water breed disease vectors in your house and it is a good sanitation and hygiene practice.	2.11	.49	Low
11.	Refuse can be converted into manure by scientist/experts.	2.81	1.10	High
12.	Poor sanitation, improper waste disposal, stagnant water, and open defecation pose significant health risks.	3.72	1.16	Very High
13.	Proper waste disposal is essential for maintaining a healthy environment	3.74	1.14	Very High
14.	Open dumping of refuse is harmful to human health	2.94	1.03	High
15.	Household waste segregation is necessary for effective waste management	3.72	1.14	Very High
	Grand Mean	2.96		High

The result in Table 2 showed the mean level of knowledge of environmental sanitation and waste management practice among members of the community in Calabar, Cross River State. As shown in the table, the grand mean of 2.96 indicated a high mean level of knowledge of environmental sanitation and waste

management practice among members of the community in Calabar, Cross River State.

Research Question 2: What is the attitude towards environmental sanitation and waste management in Calabar among members of the community in Cross River State?

Table 3: Mean Analysis of Attitude towards Environmental Sanitation and Waste Management in Calabar among Members of the Community in Cross River State (n = 301)

S/N	Statement	Mean	SD	Remark
1.	I dispose of waste into garbage bags and throw them into gutters and on the street	2.27	1.04	Low
2.	I cover my waste bin/container after putting in refuse	2.61	.51	High
3.	I pile up refuse in my household for a day or two before putting it into the household dustbin	2.58	.69	High
4.	I weed and clean my surroundings	3.52	.56	Very High
5.	I clean my toilet facility	2.85	1.14	High
6.	I throw faecal matter into the environment	2.36	1.13	Low
7.	I allow stagnant water around my household	2.81	1.10	High
8.	I add my refuse to the garbage pile in the area	3.72	1.16	Very High
9.	I participate in community sanitation exercise	3.74	1.14	Very High
10.	I advise people in my neighbourhood to stop throwing refuse into their backyard	2.92	1.13	High
11.	I leave the garbage there whenever I sweep	2.26	1.34	Low
12.	Do you know that if solid and liquid wastes are not managed, well cause for generation of different infectious disease	3.52	.51	Very High
13.	Proper waste management has health environmental and ecologic important	2.61	.56	High
14.	Every person does have the responsibility for the proper collection and disposal of waste	2.68	1.16	High
15.	Solid and liquid wastes should not be collected to gather	2.58	1.14	High
16.	Solid and liquid wastes can be recycled for reuse	3.67	1.13	Very High
	Grand Mean	2.92		High

The result in Table 3 shows the mean attitude towards environmental sanitation and waste

management in Calabar among members of the community in Cross River State. As shown in the table,

the grand mean of 2.92 indicated a high positive attitude towards environmental sanitation and waste management in Calabar among members of the community in Cross River State.

Research Question 3: What is perception of environmental sanitation and waste management among members of the community in Calabar, cross river state?

Table 4: Mean Analysis of Perception of Environmental Sanitation and Waste Management among Members of the Community in Calabar, Cross River State (n = 301)

S/N	Statement	Mean	SD	Remark
1.	Environmental sanitation in my community is generally poor	2.47	.94	Low
2.	Poor sanitation is a serious problem in Calabar	2.64	.61	High
3.	Environmental sanitation directly affects my family’s health	2.86	.68	High
4.	Most residents in my community do not practice proper sanitation.	2.72	.65	High
5.	Open defecation and indiscriminate refuse disposal are common in my area	2.58	.98	High
6.	Flooding in my community is linked to poor waste disposal	3.26	.83	Very High
7.	Environmental sanitation receives adequate attention from authorities	2.87	1.01	High
8.	Waste collection services in my community are inadequate	2.79	.69	High
9.	Refuse bins and dumpsites are insufficient in my area.	3.47	.74	Very High
10.	Burning of refuse is a common waste disposal practice here.	2.89	.85	High
11.	Waste management practices in my community harm the environment	3.21	.93	Very High
12.	Improper waste disposal contributes to blocked drainage systems.	3.25	.57	Very High
13.	Government policies on sanitation are poorly enforced	2.81	.56	High
14.	Community leaders are actively involved in sanitation activities	2.61	1.16	High
15.	Improved sanitation services would significantly improve community health.	2.89	.84	High
	Grand Mean	2.89		High

The result in Table 4 shows the mean perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State. As shown in the table, the grand mean of 2.89 indicated a high good perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State.

Testing of the Hypothesis

There is no significant relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State.

Table 5: Analysis of Variance of the Relationship between Knowledge, Attitude and Perception of Environmental Sanitation and Waste Management among Members of the Community in Calabar, Cross River State (n = 301)

Sources of Variance	Sum of Squares	Df	Mean Square	F	p-value
Between Groups	8265.294	3	2066.324	9.762	.000
Within Groups	105414.924	298	211.677		
Total	113680.219	301			

The result in Table 5 indicated that the F-value of 9.762 for the relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State is significant. This is because the p-value of 0.000 is less than 0.05 level of significance at 3 and 298 degrees of freedom. Therefore, the null hypothesis which stated that there is no significant relationship between knowledge, attitude and perception

of environmental sanitation and waste management among members of the community in Calabar, Cross River State is rejected. Hence, there is a significant relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State. The group where the significant relationship exists is shown in Bonferroni post hoc test in Table 6 below.

Table 6: Bonferroni Post Hoc Test of the Relationship between Knowledge, Attitude and Perception of Environmental Sanitation and Waste Management among Members of the Community in Calabar, Cross River State

(I) Variables	(J) Variables	Mean Difference (I-J)	Sig.
Knowledge	Environmental Sanitation	-6.11469*	.004
	Waste Management Practice	-5.92351*	.016
Attitude	Environmental Sanitation	6.11469*	.004
	Waste Management Practice	.19118	1.000
Perception	Environmental Sanitation	9.70022	.058
	Waste Management Practice	11.96696*	.000

*. The mean difference is significant at the 0.05 level.

The result in Table 6 shows the Bonferroni Post Hoc test for the relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State. As shown in the table, the level of knowledge, attitude and perception of environmental sanitation and waste management practice differ significantly among members of the community in Calabar except in the area of attitude towards waste management practices and perception of environmental sanitation.

Findings

- i. There is a high level of knowledge of environmental sanitation and waste management practice among members of the community in Calabar, Cross River State.
- ii. There is a positive attitude towards environmental sanitation and waste management in Calabar among members of the community in Cross River State.
- iii. There is a high positive perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State.
- iv. There is a significant relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State.

DISCUSSION OF FINDINGS

The discussion of findings in this chapter is based on the results from the field work in line with the research questions and literatures.

Knowledge of Environmental Sanitation and Waste Management Practice

The result of the study revealed that members of the community in Calabar, Cross River State have a high level of knowledge of environmental sanitation and waste management practice. This finding is not entirely surprising, given that members of the community in Calabar, Cross River State, have a high level of knowledge of environmental sanitation and waste management practices. One plausible reason for this elevated awareness is the ongoing community sensitization programmes and environmental campaigns conducted by local government agencies and non-governmental organizations. These initiatives often include workshops, seminars, and public education campaigns that emphasized the importance of proper waste disposal, cleanliness, and environmental health, thereby increasing community members' knowledge. Furthermore, the widespread media coverage about environmental issues, including radio broadcasts, social media campaigns, and posters, has played a significant role in disseminating information about sanitation practices. Such platforms frequently highlight the health and environmental benefits of maintaining a clean

environment, which likely influences residents' awareness levels. Another reason could be the community's direct experiences with environmental challenges such as flooding, disease outbreaks like cholera, and waste accumulation, which have heightened their awareness and concern for sanitation. These experiences often motivate community members to seek information and adopt better waste management practices to prevent health hazards. Additionally, the role of local leaders, community health workers, and environmental activists in educating residents cannot be overlooked. These stakeholders often serve as role models and sources of information, encouraging the adoption of proper sanitation behaviours. This finding aligns with earlier studies. For example, Eze *et al.*, (2019) observed that residents in Enugu State displayed high knowledge of waste management due to persistent health education campaigns. Similarly, Okafor *et al.*, (2020) found that communities with active environmental education programme tend to have better sanitation practices and higher awareness levels. These studies support the idea that targeted education and community-driven initiatives significantly influence environmental health knowledge among community members.

Attitude towards Environmental Sanitation and Waste Management

The study also revealed a positive attitude among members of the community toward environmental sanitation in Calabar municipal, Cross River State. This finding suggests that community members in Calabar, Cross River State, are well-informed about environmental sanitation and waste management practices, and they likely recognize the importance of maintaining a clean environment for health and well-being. Their positive attitude towards environmental sanitation and waste management may be driven by their understanding of the health risks associated with poor sanitation, such as the spread of communicable diseases like cholera, diarrhea, and malaria. As residents who are aware of these dangers, they may also be motivated to adopt proper waste disposal habits and participate actively in community sanitation efforts. A contributing factor to this positive attitude could also be the impact of ongoing health education campaigns, community clean-up initiatives, and environmental awareness drives conducted by local authorities and non-governmental organization (NGOs). These efforts often involve engaging community members in educational sessions and practical activities that reinforce the importance of sanitation, thereby fostering positive attitudes toward waste management. Additionally, being aware of the danger of poor environmental sanitation and waste management practice could bring about positive attitude among the community members of Calabar. The role of their knowledge may also encourage them to cultivate good environmental sanitation and waste management practices. A possible reason for this positive attitude may

also be because of the growing exposure to health education campaigns and outreach programme that emphasize on environmental sanitation and waste management practices. The presence of local leaders, health workers, and environmental advocates who regularly educate residents about sanitation practices can further influence attitudes positively. This finding aligns with earlier research by Ojo *et al.*, (2018) who observed that communities actively engaged in environmental health education programmes tend to develop favorable attitudes and practices towards sanitation. Similarly, Johnson and Obinna (2020) found that awareness campaigns significantly improved residents' perceptions and willingness to participate in waste management activities, supporting the idea that education and exposure shape positive attitudes toward environmental health practices.

Perception of Environmental Sanitation and Waste Management

The study further showed that members of the community in Calabar, Cross River State have positive perception of environmental sanitation and waste management. This finding indicates that members of the community in Calabar, Cross River State, possess a positive perception of environmental sanitation and waste management, which may influence their behaviours and participation in maintaining a clean environment. A possible reason for this good perception may be because of the cultural and social values placed on cleanliness and environmental stewardship within the community. Many residents may view sanitation as a collective responsibility that contributes to overall community health and well-being, fostering a sense of pride and ownership over their environment. Another contributing factor could be the effectiveness of local government policies and community-led initiatives that promote positive perceptions about sanitation. Regular public enlightenment campaigns, community meetings, and the involvement of traditional leaders in advocating for cleanliness may have cultivated a favorable attitude towards waste management. The community's exposure to visible clean-up activities and environmental beautification projects may also reinforce the perception that maintaining a clean environment is essential and beneficial. Furthermore, previous experiences with environmental health issues, such as disease outbreaks or flooding caused by poor sanitation, might have heightened community awareness and fostered a perception that proper waste management is crucial for preventing such problems. Education programme that focuses not only on knowledge but also on changing attitudes and perceptions could have played a significant role in shaping these positive views. Supporting literature shows that positive perceptions of sanitation are closely linked to community participation and environmental outcomes, underscoring the significance of perception in environmental health promotion (Venkataraman *et al.*, 2018; Prüss-Ustün *et al.*, 2019).

Relationship between Knowledge, Attitude and Perception of Environmental Sanitation and Waste Management

Finally, the study revealed that there is a significant relationship between knowledge, attitude and perception of environmental sanitation and waste management among members of the community in Calabar, Cross River State. This may be because individuals who possess a higher level of knowledge about environmental sanitation are more likely to recognize its importance and develop positive attitudes toward proper waste disposal and environmental cleanliness. Such knowledge often stems from educational campaigns, community programs, or personal experiences with health issues caused by poor sanitation, which in turn heighten awareness of the health risks associated with unsanitary environments. When community members understand the dangers of improper waste management, they tend to perceive environmental sanitation as a critical aspect of public health, motivating them to adopt and maintain positive attitudes towards waste disposal practices. This perception of environmental sanitation as vital for health and well-being reinforces their commitment to participating in proper waste management behaviours. Another reason for this relationship could be that community members with greater knowledge feel more empowered and responsible for their environment, leading to more favourable perceptions and attitudes. They may believe that their actions can have a tangible impact on their health and that of the community, fostering a sense of ownership and accountability. This is consistent with findings from Olowu and Omotosho (2020), who reported that awareness and knowledge significantly influence attitudes towards sanitation, ultimately leading to behavioural change.

Additionally, community perceptions are often shaped by cultural norms and social influences; when the community values cleanliness and proper waste management, individuals are more likely to develop positive perceptions and attitudes, especially when they are well-informed about the health and environmental benefits. This finding aligns with earlier research. Studies conducted among older populations in Ethiopia and similar settings have shown that older adults tend to exhibit more favourable attitudes toward health-related lifestyle modifications, including sanitation and hygiene practices, compared to younger individuals, largely due to greater life experience and increased awareness of health risks (Teshale *et al.*, 2023; World Health Organization, 2022). This was partly because older individuals had more exposure to health issues and environmental concerns over time, which heightened their perception of the importance of proper waste management. Positive attitudes toward health-promoting behaviours, including sanitation practices, have been shown to be strongly influenced by individuals' knowledge and risk perception, with higher adoption often observed among older populations who have

experienced or observed health consequences of poor sanitation practices (Haque *et al.*, 2023). Evidence from related studies indicates that while awareness of environmental health issues is increasing among younger populations, older community members often demonstrate stronger behavioural intentions and more positive attitudes toward sanitation practices, largely due to accumulated life experiences and heightened perception of vulnerability to health risks (Cadmus *et al.*, 2021; Venkataramanan *et al.*, 2018). In the context of Calabar, these findings suggest that enhancing knowledge about environmental sanitation could be a key strategy to improve attitudes and perceptions within the community. When individuals are well-informed, they are more likely to view sanitation practices positively, perceive them as essential for health, and adopt behaviours that contribute to waste management. The relationship between knowledge, attitudes, and perceptions underscores the importance of on-going education and community engagement efforts aimed at fostering a culture of environmental responsibility. Strengthening these aspects can lead to sustainable improvements in waste management practices, ultimately resulting in healthier, cleaner communities. This relationship emphasizes that knowledge is not just power but also a catalyst for shaping perceptions and attitudes that promote behavioural change, which is vital for achieving long-term environmental health goals in Calabar and similar settings.

CONCLUSION

Based on the findings of this study, it can be concluded that members of the community in Calabar, Cross River State, possess a high level of knowledge, positive attitudes, and favourable perceptions regarding environmental sanitation and waste management. Moreover, the significant relationship among these factors highlights the interconnectedness of awareness, perceptions, and behavioural dispositions towards maintaining a clean and healthy environment. These results underscore the importance of continued education and awareness programs to reinforce knowledge and perceptions, which in turn can sustain and enhance positive attitudes and practices in waste management. Strengthening these aspects within the community is essential for fostering sustainable environmental health outcomes and ensuring long-term commitment to proper sanitation practices in Calabar. However, Cross River state has made a notable progress in sanitation initiatives, but a significant gap remained in waste segregation, method of disposal and inadequate infrastructures, (Eja *et al.*, 2021). Sustainable environmental sanitation and waste management involves the combination of household efforts, government investment in modern waste treatment technologies and policy enforcement, (Aderemi *et al.*, 2019).

Implications of the Study

The findings of this study on the knowledge, attitude and perception of environmental sanitation and

waste management among members of the community in Calabar, Cross River State have following implications:

1. The findings imply that leveraging the existing high levels of knowledge, positive attitudes, and perceptions in Calabar can be an effective foundation for implementing sustainable waste management initiatives, as community members are already informed and motivated to participate.
2. Additionally, the significant relationship among these factors suggests that targeted educational campaigns could further strengthen attitudes and perceptions, leading to improved waste disposal practices and environmental health outcomes.
3. The positive perceptions and attitudes also indicate a community readiness for behavioural change, which can be harnessed through policy support and community engagement programmes.
4. Finally, findings imply that continuous reinforcement of knowledge and perception through awareness campaigns can sustain and potentially enhance community participation, ensuring long-term improvements in environmental sanitation and waste management in Calabar.

Recommendations

Based on the findings from the study, the following recommendations were made:

1. Community health educators and community leaders should collaborate to strengthen and expand educational programme aimed at maintaining and further improving the community's high level of knowledge on environmental sanitation and waste management.
2. Government agencies and community leaders should develop community-driven initiatives that harness positive attitudes to promote active participation in sanitation and waste management practices.
3. Government and Non-Governmental Organizations should continue supporting and funding public awareness campaigns that reinforce positive perceptions and motivate community members to uphold and advocate for proper waste management.
4. Community health educators, and community leaders should work together to design and implement integrated interventions that simultaneously target knowledge, attitudes, and perceptions, fostering sustainable behavioral change in environmental sanitation practices.
5. Revitalization of monthly environmental sanitation exercise by Nigerian government to reintroduce and strictly enforce nationwide practice of environmental sanitation once every month. At the state level, the governor should

make it compulsory on the last weekend of every month while the local government in collaboration with the sub villages ensures mandatory involvement of all community members, traders at their business premises, with an attach penalty for non -compliance. People should be empowered at the grassroot to ensure compliance.

6. There should be a strict ban on indiscriminate dumping of waste on the road side and gutter in the community.
7. From the national to the local government should support community-led waste collection initiative by providing waste bin at designated disposal points.
8. Introduction of waste to wealth program in communities, recycling of waste like plastic material and any other recyclable waste for monetary incentive.
9. Provision of public toilets in markets, motor parks, and religious centres with the help of private partners to facilitate the construction of affordable toilet and employ sanitation workers to keep it clean.
10. Nollywood and social media influencers can be used for sanitation campaigns as massive impact will be felt by Nigerian. Creating sanitation related content in local languages via TikTok, Facebook, WhatsApp, Instagram and music stimulate people to action.
11. Community task force should be encouraged to assist ministry of environment and waste management to oversee and report violation.
12. Government should encourage waste-to-wealth or trash to treasure known as integrated solid waste management (ISWM).

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