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SPECIAL ISSUE: CELEBRATING 20 YEARS OF GEOGRAPHY IN KADUNA STATE UNIVERSITY - ADVANCES AND FRONTIERS IN GEOGRAPHY

Assessing Demographic and Socio-economic Characteristics and Awareness Levels of Coastal Hazards in the Niger Delta Region, Nigeria

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ABSTRACT
Solid Coastal communities in the Niger Delta region face increasing environmental risks shaped by complex socio-economic and ecological factors. Consequently, this study assessed the relationship between demographic and socio-economic characteristics and awareness levels of coastal hazards in the Niger Delta region of Nigeria. The data used for this study were acquired from the administration of 817 copies of the questionnaire. A systematic sampling technique was used for the administration of the questionnaire. Descriptive statistics were used to examine the socio-demographic/economic profiles of the respondents and their coastal hazards awareness levels. Chi-square (X^2) test was used to examine the relationship between the demographic/socio-economic variables and hazard awareness levels in the study area. Findings of the study revealed that floods and saltwater intrusion showed the highest awareness levels (means 3.06, 3.02), while erosion and accretion were lowest at 2.26. The findings revealed moderate coastal hazard awareness among respondents, with a grand mean of 2.59 and a standard deviation of 1.067, indicating notable variability in awareness levels. Findings further revealed that there is a significant correlation with age, educational attainment, and family size, duration of residence, occupation, and income with respondents' awareness of coastal hazards. Notably, older, more educated individuals and larger families exhibited higher awareness of hazards, including coastal erosion, saltwater intrusion, and sea-level rise. The study recommends targeted coastal hazard education for marginalized groups like low-income, low-education, and new residents.

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1 Introduction

Globally, coastal areas abundant in marine and coastal resources serve as vital regions where socio-economic development inextricably intertwines with environmental sustainability. These areas' biodiversity is a significant global driver of economic growth and human well-being, with fisheries alone providing essential food and nutrition to over 600 million people and generating approximately USD 2.6 trillion annually in direct value (United Nations Development Programme (UNDP), 2025). Furthermore, the ocean contributes up to $50 trillion in indirect economic value yearly through ecosystem services. Coastal zones support climate regulation, freshwater supply, food provision, and biodiversity preservation (Choudhary et al., 2024; Weiskopf et al., 2020). In the Niger Delta, coastal ecosystems face threats from pollution linked to oil exploration, agriculture, industrial operations, and untreated waste discharge (Bode-obanla & Ajisebiyawo, 2025; Ewim et al., 2023). The region's 853 km coastline also experiences erosion, flooding, storm surges, and land subsidence, among others, compounded by sea-level rise and poor waste management (Adeola et al., 2021; Getirana et al., 2021; Ukhurebor et al., 2021).

Coastal hazard awareness encompasses residents' recognition and understanding of physical phenomena exposing coastal areas to risks such as floods, erosion, saltwater intrusion, sea-level rise, and anthropogenic impacts, including dredging and oil exploration (Danladi et al., 2017; Folorunsho et al., 2023; Laino & Iglesias, 2024). Demographic and socio-economic characteristics like age, education, income, and occupation, among others, had been observed to shape perception, response, and preparedness to these hazards amid low-lying topography, high rainfall, and dense river networks in the Niger Delta (Abija, 2024; Oyegun, 1993). These factors interact with fishing and farming livelihoods, intensifying vulnerability through ecosystem degradation from oil exploration and poor waste management (Adeola et al., 2021). Assessing the correlations between awareness levels identifies disparities, as existing studies emphasize physical assessments over socio-demographic integration, necessitating a targeted study for tailored resilience strategies in this region.

Numerous studies like Atiglo et al. (2022), Efiong (2025), Ehsan et al. (2022), and Wang (2025) have examined how socio-demographic factors influence coastal hazard awareness. Yet, gaps remain, justifying targeted research in Nigeria's Niger Delta. For instance, Ehsan et al. (2022) identified age and education as key predictors on Malaysia's Selangor Coast, with older,

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educated residents showing superior understanding of erosion and accretion. Similarly, Reimann et al. (2023) linked family size and residence duration to heightened perception of saltwater intrusion and sea-level rise through prolonged exposure. Furthermore, Oktari et al. (2025) highlighted that occupation and income barriers for low-income groups limit information access and preparedness. Although these studies illuminate global patterns, they often generalize across regions without addressing the Niger Delta's specifics, such as over 40 ethnic groups, more than 250 languages, 70% of the people living below poverty rates, oil-dependent fishing and farming economies, and recurrent shoreline retreat of 15-25 m/year amid low elevations (Abija, 2024; Abija et al., 2020; Adeola et al., 2021; Dada et al., 2021). Moreover, most research emphasizes physical vulnerability (Danladi et al., 2017; Folorunsho et al., 2023), neglecting socio-demographic integration to explain awareness disparities. Consequently, a localized study is essential to examine demographic and socio-economic characteristics against coastal hazard awareness levels, thereby informing tailored policies amid ongoing ecosystem degradation from oil spills and erosion in the Niger Delta.

Against this backdrop, there is still the need for more local studies in the Niger Delta, where, as also noted by Folorunsho et al. (2023), culture and economy influence the awareness of coastal hazards. As a result, this study aims to assess the relationship between demographic and socio-economic characteristics and awareness levels of coastal hazards in Nigeria's Niger Delta region. Specific objectives include: (1) examining respondents' demographic and socio-economic characteristics; (2) determining coastal hazard awareness levels; and (3) analyzing interrelationships between profiles and awareness.

2 Materials and Methods

2.1 Study Area

The study area is located between latitudes 4°10′51″N to 6°12′47″N and longitudes 4°49′32″E to 8°49′17″E (Figure 1). This area is located in Nigeria's Niger Delta, encompassing littoral local government areas (LGAs) across Delta, Bayelsa, Rivers, Akwa Ibom, and Cross River states within the South-South geo-political zone of Nigeria. The study area is bordered by Ondo State (west), Cameroon (east), and the Atlantic Ocean (south). This densely riverine region receives high annual rainfall up to 3,500 mm and humidity peaking at 90%, fueling frequent floods, erosion, and saltwater intrusion that directly threaten coastal communities (Getirana et al., 2021). Demographically, it hosts over 30 million people with high population density, widespread poverty affecting over 70% living below the poverty line, low literacy rates, and youth-dominated age structures, rendering low-income fishing and farming households particularly susceptible to hazard disruptions (Siloko, 2024).

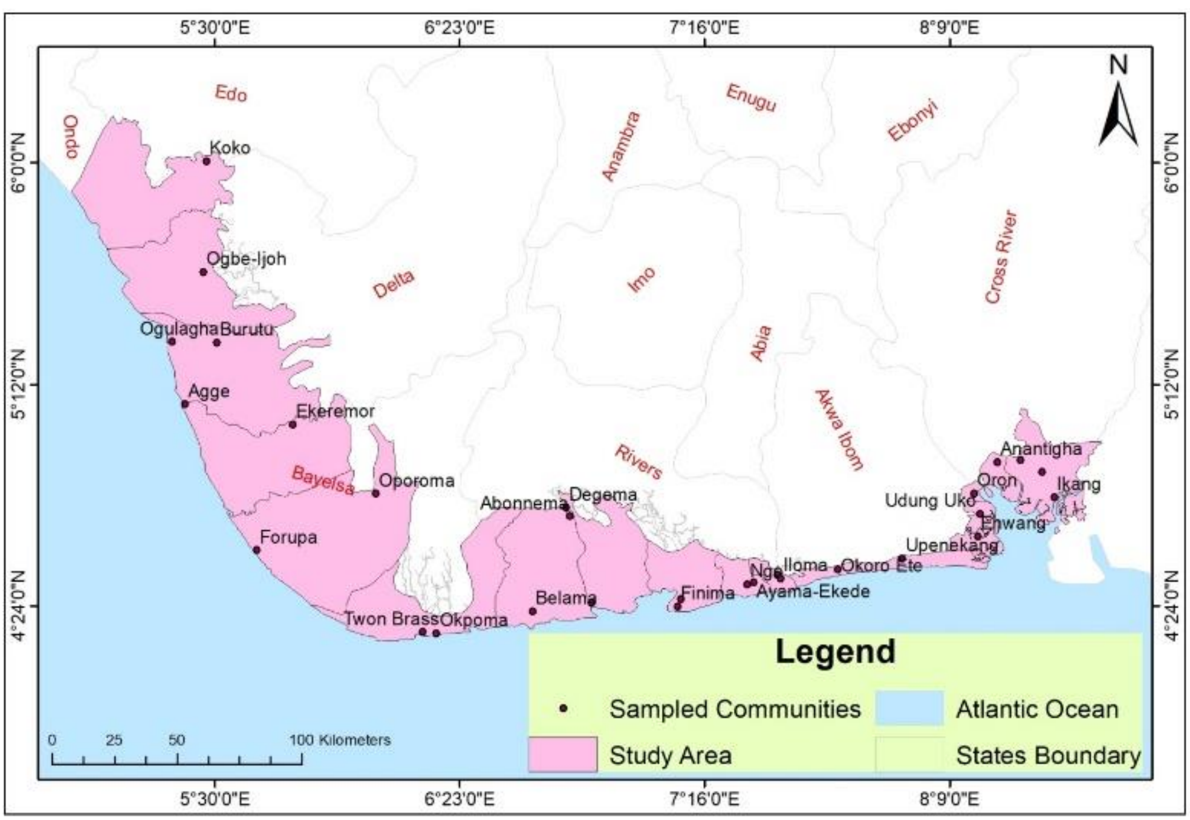

Figure 1: Map of the study area showing sampled communities
Source: Adapted from the political map of Nigeria

Culturally, the Niger Delta features over 40 ethnic groups, including Ijaw, Itsekiri, Urhobo, Isoko, Egbema, Ogoni, Ibibio, and Annang, whose traditional knowledge of tides and currents informs hazard coping but varies by group, which could influence localized awareness disparities. The study area is linguistically diverse, with over 250 indigenous languages alongside English and Pidgin (Okafor, 2025). This multilingual environment creates communication challenges that can impede the uniform dissemination of coastal hazard warnings, potentially increasing vulnerabilities among non-English speakers and migrant populations. These socio-cultural dynamics, intertwined with oil-dependent economies and weak governance, underscore the need to link demographic and socio-economic profiles to tailored awareness strategies for resilience in the study area.

2.2 Data Collection

In this study, data collection was from both primary and secondary sources. A structured questionnaire was employed to collect data on demographic, socioeconomic, and hazard awareness, the latter measured on a four-point Likert scale rated from 1—'not familiar at all' to 4—'very familiar'. Secondary data from the 2006 population records that were obtained from the National Population Commission were used to determine the sample size for the study area after projecting the data to 2024 using Newman's (2001) formula. The study was limited to the 19 littoral LGAs for questionnaire administration. These LGAs were purposively selected because studies had observed that coastal residents offer firsthand knowledge of environmental dynamics, aligning with the study of Tourlioti et al. (2021), emphasizing the importance of localized insights in coastal hazard assessment and decision-making.

The study utilized a systematic sampling technique to administer the questionnaire. The questionnaire was designed to gather socio-economic data and perceptions of coastal hazards in the Niger Delta region. An extensive literature review informed the questionnaire's development that ensured a comprehensive understanding of the relationship between socio-economic background and coastal hazard awareness. KoboToolbox was employed to create an electronic questionnaire with built-in logic checks for accuracy and efficiency in data collection. The questionnaire was administered using KoboCollect on Android devices, enabling real-time and offline data capture, and GeoTracker was used for spatial accuracy. A pilot study involving 30 respondents was conducted in Ilorin to test for clarity and reliability, leading to necessary adjustments. Two trained native data collectors, supported by a WhatsApp group for communication, conducted the data collection following training on ethical and technical procedures through Google Meet. The LGA headquarters were purposively selected for the administration of the questionnaires. This ensured the selection of administrative centers with higher population density and accessibility in coastal areas. This was supplemented by using simple random sampling to select additional communities from ward headquarters in LGAs with 40 or more samples to promote a balanced representation across diverse socio-economic and geographic settings in the Niger Delta. The sampled communities are shown in Figure 1 and Table 1.

The sample size of 817 was calculated using Yamane's (1967) formula, $\frac{N}{1+N\,(e)^2}$ by applying a 3.5% margin of error based on population projections from 2006 to 2024 (Table 1). Thus, this choice of 3.5% margin of error was chosen to enhance robust statistical representation while maintaining a manageable fieldwork scope and costs in resource-constrained coastal surveys. As noted by Adam (2020), obtaining representative samples remains crucial for survey researchers because it directly impacts cost, time, and estimation precision. Neuman (2013) further supports this approach, noting that tighter margins of error effectively balance resource constraints while ensuring reliable statistical power for community-level studies in large populations. This enabled the study to capture diverse socio-demographic profiles and obtain robust insights into coastal hazard awareness across the littoral LGAs of the south-south geopolitical zone of Nigeria.

Table 1: Projected Population and Sample Size by Local Government Areas

S/No	Local Government Area	Population 2006	Projection 2024	Sample Size	Sampled Communities
1	Mbo	102,173	164,703	27	Enwang
2	Udung Uko	53,060	85,533	14	Udung Uko
3	Oron	87,209	140,581	23	Oron
4	Eastern Obolo	59,970	96,672	16	Okoro Ete
5	Ibeno	74,840	120,642	20	Upenekang
6	Southern Ijaw	321,808	518,754	85	Oporoma & Forupa
7	Ekeremor	269,588	434,576	71	Ekeremor & Agge
8	Brass	184,127	296,813	48	Twon Brass & Okpoma
9	Calabar South	191,515	308,722	50	Anantigha
10	Akpabuyo	272,262	438,886	72	Ikot Nakanda & Ikot Offiong
11	Bakassi	31,641	51,005	8	Ikang
12	Warri South West	116,538	187,859	31	Ogbe-Ijoh
13	Burutu	207,977	335,259	55	Burutu & Ogulagha
14	Warri North	136,149	219,472	36	Koko
15	Andoni	217,924	351,293	57	Ngo & Ayama_Ekede
16	Degema	249,467	402,141	66	Degema & Ferupakama
17	Akuku Toru	161,103	259,698	42	Abonnema & Belema
18	Bonny	214,983	346,553	56	Bonny Island & Finima
19	Opobo/Nkoro	152,833	246,367	40	Opobo & Iloma
Total		3,105,167	5,005,529	817	

Source: National Bureau of Statistics (2011)/Authors' Compilation (2025)

2.3 Data Analysis

The study utilized descriptive statistics, specifically frequencies and percentages, to analyze the demographic and socioeconomic characteristics of the respondents and their coastal hazards awareness levels using IBM SPSS v27 software. The residents' level of coastal hazards awareness index (CHAI) was first determined by the Sum of Weighted Value (SWV) for each of the coastal hazard types. This was obtained through the sum of the product of the number of responses of each item and the respective weighted value attached to each rating. It contains four indicators ranging from 1—'not (familiar) at all' to 4—'very familiar' for CHAI of each coastal hazard type. Then the averages determine the awareness of the respondents from the study area. This is expressed mathematically as Eqn. (1):

$$SWV = \sum_{i=1}^{4} X_i Y_i \quad (1)$$

Where:
SWV = summation of weight value,
X_i = number of respondents to rating i;
Y_i = the weight assigned a value (i = 1, 2, 3, 4).

Consequently, the CHAI for each coastal hazard type on the scale was arrived at by dividing the SWV by the total number of respondents (N=817), mathematically expressed as Eqn. (2):

$$CHAI = \frac{SWV = \sum_{i=1}^{4} X_i Y_i}{N} \quad (2)$$

The analysis of the responses was termed 'CHAIs'. Also, the mean hazard awareness indexes ($\overline{CHAI}$) was later computed by summing the CHAI and dividing it by the number of the identified hazard type (n), mathematically expressed using Eqn. (3):

$$\overline{CHAI} = \frac{CHAI}{n} \quad (3)$$

This mean index was used to analyze the level of awareness of hazards associated with the respondents, with the results presented in a table. The standard deviation (SD) about the mean CHAI for each of the hazard types was also computed. The deviations were representative measures of dispersion that provided information on the level of awareness of hazards as perceived by the respondents. The SD was used to measure the degree of spread or dispersion of the level of awareness within the same distribution.

To further investigate the relationships between the demographic/socio-economic variables and the types of coastal hazards experienced by respondents, the study applied the Chi-square (X^2) test of independence. This statistical method was used to examine the correlations between the categorical variables (e.g., gender, occupation) and the ordinal or continuous variables. The X^2 analysis deepens the understanding of how different demographic or socio-economic groups are knowledgeable about the coastal hazards. Such insights are valuable for designing targeted educational programmes and for more efficient allocation of resources to the most at-risk populations. This approach was utilized by Yahya-Imam et al. (2025) to examine the relationships between socio-demographic factors and environmental hazard perceptions in Osogbo, Nigeria. By understanding these relationships, policymakers and stakeholders could develop more effective disaster preparedness and response strategies that could enhance community resilience against the increasing threats posed by coastal hazards in the study area. The X^2 statistic used in the analysis is calculated using Eqn. (4):

$$X^2 = \sum \frac{(O - E)^2}{E} \quad (4)$$

Where X^2 is the test statistic, O is the observed frequency, and E is the expected frequency for each category. This formula sums the squared differences between observed and expected frequencies, divided by the expected frequencies, across all the categories considered in this study to test the association between two categorical variables.

3 Results and Discussion

3.1 Demographic Characteristics of the Respondents

Table 2 displays the demographic characteristics of the respondents. The demographic profile of the study area reveals a male majority (69.52%), consistent with earlier research in the Niger Delta (Eleanya et al., 2015; Niger Delta Regional Development Master Plan [NDRDMP], 2016b), which reported a predominance of male-headed households in the Niger Delta region. Men, often engaged in community leadership and livelihoods vulnerable to coastal erosion and storm surges, may perceive tidal flooding and cyclones as immediate threats to their roles as providers. This contrasts with female respondents (30.48%), who face compounded risks from coastal hazards during disasters, alongside heightened vulnerability to displacement and resource scarcity. Married individuals (65.24%) could prioritize family safety and advocate for structural protections like mangrove restoration or dunes, to balance caregiving demands during environmental crises. Larger families (e.g., 32.8% with 1–2 children, 25.46% with 3–4 children, 12.12% with 5–6) could face dual pressures: securing resources for evacuation plans and rebuilding homes damaged by storm-induced erosion, while managing limited budgets. Gender disparities persist, as women's restricted mobility during floods and caregiving roles exacerbate vulnerability. These findings align with those of Zahan (2022), who examined global patterns in coastal zones, where socio-economic inequities intersect with environmental risks to deepen disparities in hazard resilience.

Table 2: Demographic Characteristics of the Respondents

Variable	Frequency	Percent
Gender of respondents		
Male	568	69.52
Female	249	30.48
Total	**817**	**100.00**
Age of Respondent		
16–25	49	6.00
26–35	117	14.32
36-45	270	33.05
46-55	213	26.07
56-65	111	13.59
66 and above	57	6.98
Total	**817**	**100.00**
Marital Status		
Single	189	23.13
Married	533	65.24
Divorced	21	2.57
Widowed	65	7.96
Others (complicated, separated, in a relationship)	9	1.10
Total	**817**	**100.00**
Number of children		
None	179	21.91
1-2	268	32.8
3-4	208	25.46
5-6	99	12.12
7-8	36	4.41
9 and above	27	3.30
Total	**817**	**100.00**

3.2 Socio-economic Characteristics of the Respondents

The socio-economic characteristics of respondents shown in Table 3 reveal critical patterns that could influence perception of coastal vulnerability differently. Findings in Table 3 reveal that 39.41% of respondents have a family size of 2 to 4, while 33.17% have 5 to 7. As noted by Nguyen et al. (2023) and Sofyan et al. (2024), family size could correlate with resource constraints during hazards like floods or erosion, as larger households may face challenges in securing evacuation funds or rebuilding materials. Findings in this Table further show occupational diversity: 28.52% traders, 18.12% civil servants, 16.89% fishing/farming households, and artisans accounted for 8.08%. This pattern highlights exposure disparities in how residents may face direct livelihood losses from flooding and risk supply chain disruptions differently. Findings on tenancy status show that 52.51% of respondents are owner-occupiers vs. 39.66% renters, which could impact recovery capacity, as renters may lack incentives for hazard mitigation investments.

According to Table 3's findings on duration of residence, 38.92% of respondents had lived in their neighbourhoods for 16 years or longer, 23.13% for 1 to 5 years, and 22.4% for 6 to 10 years. These findings suggest entrenched community knowledge of local hazards, where long-term residents may underestimate evolving risks like accelerated erosion due to climate change. These findings align with global studies emphasizing how socio-economic factors such as income inequality, resource access, and institutional support could shape vulnerability (Sofyan et al., 2024; Zou & Thomalla, 2008). For instance, the findings of Sofyan et al. (2024) confirm that socio-economic variables explain 56.5% of preparedness variability, underscoring the need for policies targeting marginalized groups (e.g., renters, unemployed individuals) to enhance adaptive capacity.

Table 3: Socio-economic Characteristics of the Respondents

Variable	Frequency	Percentage
Family size		
Less than 2	99	12.12
2- 4	322	39.41
5-7	271	33.17
8-10	75	9.18
11 and above	44	5.39
Do not know or answer	6	0.73
Total	**817**	**100**
Duration of residence in the neighborhood		
Less than 1 year	38	4.65
Between 1–5years	189	23.13
Between 6-10 years	183	22.4
Between 11-15 years	88	10.77
16 years and above	318	38.92
Do not know or answer	1	0.12
Total	**817**	**100**
Occupation		
Schooling	78	9.55
Farming/Fishing	138	16.89
Trading	233	28.52
Artisan	66	8.08
Private Company jobs	39	4.77
Civil Service	148	18.12
Unemployed	59	7.22
Others (retired personnel, lumberjack etc.)	53	6.49
Do not know or answer	3	0.37
Total	**817**	**100**
Tenancy category of respondents		
Owner occupier	429	52.51
Rented accommodation	324	39.66
Government Housing	25	3.06
Others (squatting, cohousing etc.)	31	3.79
Do not know or answer	8	0.98
Total	**817**	**100**

3.3 Educational Qualification of Respondents

Figure 2 presents the educational qualifications of respondents in the study area. The majority of the respondents have completed secondary education (46.63%), followed by those with tertiary education (37.7%). However, a significant portion lacks formal education: 6.24% have no formal schooling, and 9.3% have only primary education. This educational landscape indicates that while many possess at least a basic level of education, a substantial number remain undereducated. The correlation between educational attainment and perceptions of coastal hazards is crucial, as undereducated groups may face heightened susceptibility to floods and erosion due to limited awareness of evacuation protocols or resource mobilization. For instance, Oloyede et al. (2022) observed that the Nigerian coastal vulnerability framework further underscores how educational disparities intersect with socio-economic factors, exacerbating risks in areas with limited institutional support.

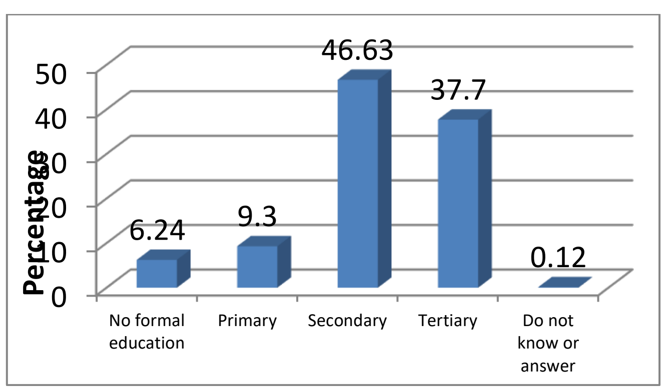

Figure 2: Educational Qualification of Respondents

3.4 Monthly Income of Respondents

Figure 3 illustrates the monthly income distribution of respondents in the study area. Findings in Figure 3 reveal an average monthly income of ₦117,388. Notably, 35.9% of respondents live below the poverty line, earning less than ₦70,000, which is below the national minimum wage. Additionally, approximately 33.3% of respondents fall within the low-income bracket of ₦70,000 to ₦140,000 per month. These findings align with the NDRDMP (2016a), which indicated that over 70% of individuals in the region live at a subsistence level, particularly in rural areas. Economic hardships increase vulnerability to coastal hazards and social unrest, which could influence perception. The findings in Figure 3 further highlight significant income inequality, with only 1.7% of respondents earning more than ₦350,000. This aligns with Afon and Badiora (2017), who found that just 16.5% were top earners in a residential neighbourhood in Ibadan, Nigeria. Those with higher incomes are better equipped to handle environmental challenges due to greater access to resources and safety measures. Conversely, widespread poverty and economic marginalization could lead to social alienation among residents, creating an environment where individuals may seek alternative survival means or express dissatisfaction with their socio-economic conditions.

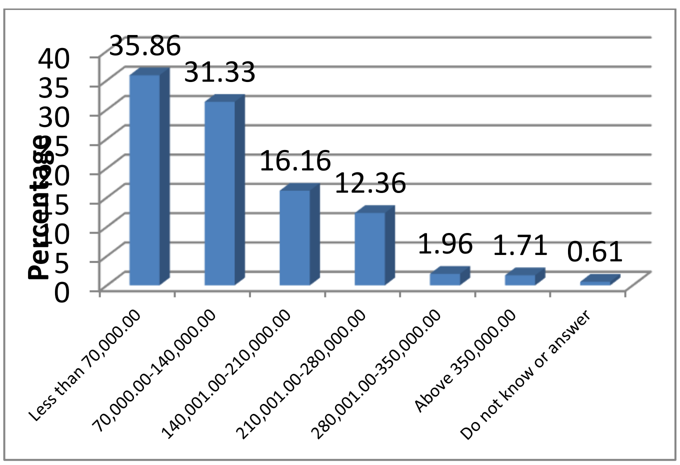

Figure 3: Monthly income of respondents

Note: Income levels were categorized according to the Nigerian civil service income grade structure as follows: below Poverty Line / National Minimum Wage: Less than ₦70,000, low-Income Group: Grade Levels 01 to 06 (₦70,000 – ₦140,000), middle-Income Group: Grade Levels 07 to 12 (₦141,000 – ₦210,000) and high-Income Group: Grade Levels 13 to 17 (Above ₦280,000)

3.5 Awareness Levels of Coastal Hazards in the Study Area

Table 4 shows the descriptive statistics on awareness of coastal hazards in the study area. Findings in this Table reveal that there is a varying familiarity across the different hazard types. For instance, findings showed that floods (mean = 3.06, SD = 1.095) and saltwater intrusion (mean = 3.02, SD = 1.000) had the highest awareness levels. This could be driven by frequent direct impacts like recurrent flooding from heavy rains and tidal surges, plus visible saltwater intrusion salinizing farmlands and wells in coastal-boundary of the study area. These immediate, experiential threats foster strong recognition among residents, contrasting with subtler geomorphological processes.

In contrast, coastal erosion and accretion had the lowest awareness score (mean = 2.26, SD = 1.147), which could mean that the respondents had a limited understanding of this hazard type. Surprisingly low erosion awareness in coastal-boundary LGAs contrasts with documented crises in the Niger Delta region. For instance, Abija et al. (2020) report shoreline retreat and erosion rates of 11.1 m/year in Bayelsa, 7.2 m/year in Rivers, and 5.5 m/year in Akwa Ibom. Perceptual normalization of gradual geomorphological shifts likely contributes to these findings, as residents increasingly perceive such changes as commonplace amid more pressing threats like flooding, urbanization, and oil exploration. Additionally, terminological gaps exist where locals recognize "land eating" but not scientific terms, which could be compounded by the high poverty, low education, and distrust in remediation efforts. The findings on the high standard deviations of erosion/accretion (1.136) underscore response variability, with some respondents showing knowledgeable experience while others lack awareness. Overall, while there is a general awareness of coastal hazards, targeted educational efforts are essential to enhance understanding and preparedness for all types of coastal hazards, particularly those that are less visible or gradually developing over time.

Table 4: Descriptive Statistics on the Awareness towards Coastal Hazard

Coastal Hazard Types	Coastal Hazard Awareness CHAI	Std. Deviation
Coastal Erosion and accretion	2.26	1.147
Floods	3.06	1.095
Salt water intrusion	3.02	1.000
Sea level rise	2.63	1.064
Waves/winds	2.49	1.011
Longshore current	2.39	1.086
Tides and tidal streams	2.61	1.032
Low relief	2.70	0.983
Rhythmic topography	2.43	1.080
Human impacts like urbanization, agriculture, deforestation, etc.	2.52	1.117
Oil and gas exploration	2.63	1.102
Dredging of river or port channels	2.36	1.089
Grand Mean CHAI	2.59	1.067

Note. Responses provided on a scale from 1—'not at all' to 4—'very familiar'.

Findings in Table 4 further reveals moderate awareness levels for sea level rise (mean = 2.63, SD = 1.064) and oil/gas exploration (mean = 2.63, SD = 1.102) due to media exposure and ubiquitous oil infrastructure; human impacts like urbanization/deforestation (mean = 2.52, SD = 1.117) from visible land-use changes; low relief (mean = 2.70, SD = 0.983) reflecting everyday low-elevation living; and tides/tidal streams (mean = 2.61, SD = 1.032) from routine coastal observations. These scores (2.52-2.70 range on a 4-point scale) indicate general recognition without strong conviction, bridging high-awareness floods (3.06) and low-awareness erosion (2.26), driven by indirect or familiar exposures rather than acute personal threats.

Other coastal hazards types, such as waves/winds, longshore currents, rhythmic topography, and dredging, show low awareness means of 2.36 to 2.49 with SDs of 1.01 to 1.09, indicating limited familiarity and response variability (Table 4). Findings further revealed that the grand mean CHAI of 2.59 (SD = 1.067) signals overall moderate awareness across the Niger Delta sample, highlighting the need for targeted educational initiatives on specific lesser-known hazards. These findings align with Dike et al. (2024), who highlight the existence of significant flood risks, erosion, sea level rise, and saltwater intrusion due to low elevations and shoreline dynamics in the Niger Delta.

3.6 Relationship between Demographic/Socioeconomic Factors and Coastal Hazards Awareness

Table 5 presents the results of the relationships between demographic/socioeconomic characteristics and coastal hazard awareness among vulnerable communities in the Niger Delta Basin. This reveals important patterns that deepen understanding of risk perception in this complex environment. For instance, findings in Table 5 revealed that age and educational attainment show strong links to awareness of hazards such as coastal erosion and accretion, evidenced by high chi-square values (82.026 and 106.279, respectively). This aligns with findings from Ehsan et al. (2022), who reported that individuals with greater education and involvement in natural resource-related occupations in the Selangor Coast of Malaysia tend to have higher environmental awareness. Education enhances knowledge and fosters a mindset conducive to adaptation and proactive risk management, a pattern consistently observed in global coastal hazard studies (Oktari et al., 2025; Torani et al., 2019). Larger family sizes and longer duration of residence also correlate with greater awareness of hazards like saltwater intrusion and sea-level rise (chi-square values around 139.757 and 117.848). These findings corroborate research by Reimann et al. (2023), suggesting that lived experience and community narratives strengthen understanding of environmental risks and motivate engagement in adaptation strategies. The longer residents stay exposed to coastal dynamics first-hand, the more cognizant they become of the hazards and the urgent need for mitigation, which highlights the value of integrating local knowledge into disaster risk reduction frameworks.

Table 5: Correlations between Demographic/Socioeconomic Variables and Coastal Hazard Awareness

S/No	Coastal Hazard Type	Gender	Age	Family size	Duration of stay	Educational attainment	Occupation	Monthly Income
1	Coastal Erosion and Accretion	-	74.22	82.03	106.42	63.24	106.28	49.22
2	Floods	-	32.71	-	29.28	22.28	45.32	36.61
3	Salt water intrusion	11.95	145.98	90.35	139.76	59.34	138.91	68.86
4	Sea level rise	12.68	108.24	99.28	117.85	69.20	159.39	32.28
5	Waves/winds	16.81	81.48	80.43	123.03	63.81	116.98	38.82
6	Longshore current	16.22	103.74	72.65	164.85	49.92	83.35	87.81
7	Tides and tidal streams	20.83	91.14	129.09	165.90	91.73	110.90	61.63
8	Rhythmic topography	7.39	71.04	89.92	160.53	52.17	103.03	124.57
9	Low relief	7.20	87.20	106.81	168.50	70.98	101.71	62.32
10	Human impacts like urbanization, agriculture, deforestation, etc.	7.65	25.72	33.30	71.94	33.34	59.29	78.22
11	Oil and gas exploration	-	27.04	39.95	66.49	29.26	107.80	77.87
12	Dredging of river or port channels	8.09	34.53	48.45	92.65	39.29	51.46	66.30

Note: Only statistically significant results are provided ($p < 0.05$).
df= Gender-3, age-15, family size-15, duration of stay-12, educational attainment-9, occupation-24, monthly income, 18

Socioeconomic indicators such as occupation and monthly income further influence hazard awareness, with occupation showing an especially high association with sea-level rise awareness (chi-square value of 159.385). This finding resonates with Sofyan et al. (2024), who emphasized that economically marginalized groups face systemic barriers that reduce preparedness and access to hazard information. Indeed, poverty and limited livelihood options restrict the capacity for proactive adaptation, driving vulnerabilities in many coastal regions globally (Ehsan et al., 2022; Saha et al., 2024). The nexus between socioeconomic status and hazard perception underscores the need for tailored educational interventions and social protection policies that address these inequities. Studies from other developing coastal areas such as Bangladesh and the Philippines have demonstrated the efficacy of targeting vulnerable groups with location-specific risk communication and livelihood diversification programs to uplift adaptive capacity (Ahmed et al., 2019; Neumann et al., 2015). For the Niger Delta, addressing these social determinants of vulnerability is critical, given the compounding challenges from oil exploration, environmental degradation, and climate change impacts (Kuta et al., 2025; Ogba & Utang, 2007; Ola et al., 2024).

Practically, these findings call for multi-level interventions in the Niger Delta. Policymakers must prioritize community-tailored educational programmes that consider socio-demographic diversity, ensuring that less educated, lower-income, and newer residents receive accessible, culturally relevant hazard information. Local governments and NGOs should strengthen participatory risk assessments incorporating indigenous knowledge to enhance adaptive strategies that resonate with lived experiences. Additionally, improving access to diversified livelihoods and social safety nets is essential for reducing vulnerability linked to economic marginalization. These align with global disaster risk reduction frameworks such as the Sendai Framework and Sustainable Development Goals, reinforcing the need for inclusive approaches that combine social equity with environmental resilience. Ultimately, bridging the gap between scientific risk data and community perceptions will enable more effective, sustainable management of coastal hazards, protecting livelihoods and ecosystems in the Niger Delta's ecologically sensitive and socially complex coastal communities (Wokocha et al., 2023).

4 Conclusion

This study assessed how socio-demographic factors profoundly shape coastal hazard awareness in Nigeria's Niger Delta. Findings showed that floods and saltwater intrusion command the highest recognition due to recurrent, tangible impacts on livelihoods, while erosion and accretion lag amid perceptual normalization, terminological mismatches like "land eating," and socio-economic barriers. The study's findings further reveal that male-dominated households, married residents with larger families, long-term dwellers, and those with secondary/tertiary education or skilled occupations/incomes above poverty thresholds emerge as key enhancers of awareness. In contrast, female, low-education, and subsistence fisher/farmer groups exhibit lower awareness due to resource scarcity and information gaps. These disparities underscore the inequities amplifying risks in ethnically diverse, oil-impacted coastal communities, with occupational diversity and tenancy status further modulating perceptions of acute versus gradual threats.

Based on these insights, two main recommendations are proposed. First, coastal hazard education and awareness programmes should be designed specifically to reach marginalized demographic groups, including low-income households, those with minimal formal schooling, and newer community members. Employing local languages and culturally appropriate communication strategies will improve engagement and knowledge retention. Second, institutional frameworks must be strengthened to address socio-economic barriers by expanding support for livelihood diversification, enhancing access to resources, and fostering inclusive decision-making processes. Empowering communities through participatory governance and resource mobilization can help build adaptive capacity aligned with their unique vulnerabilities. Together, these recommendations advocate for integrated, socially sensitive policies combining environmental management with socio-economic development to sustainably enhance resilience against coastal hazards in the Niger Delta Basin.

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