Socio-Economic Determinants of Household Vulnerability to Flood Hazards in Uyo Metropolis

Akwaowo D. Denny

Department of Environmental Management

University of Calabar, P. M. B. 1115, Calabar, Nigeria

Email: akwaowodenny@gmail.com – (Correspondent author)

Abstract

Flooding remains a critical environmental issue, significantly affecting man and its environment globally, which Uyo Metropolis is not left out of. This study investigates the socio-economic factors contributing to household vulnerability to flood hazards in Uyo. Employing a structured questionnaire, data was collected from 400 respondents, focusing on key socio-economic indicators like income, education, household size, and housing tenure. A multiple regression analysis showed a significant negative correlation between socioeconomic status and flood vulnerability, accounting for 84.3% of the variance. The findings revealed that household income, educational level, and property ownership significantly influenced household vulnerability to flooding with the level of association the analysis of variance (ANOVA) result showed that (2.677, ρ = 0.397) and the regression coefficient result showed positive association between socioeconomic status and household vulnerability to flood in Uyo (t = -0.885; ρ< 0.223). Households with lower income and larger family sizes were more susceptible to flood risks. The study concludes that enhancing socio-economic conditions is essential for reducing flood-related risks and recommending targeted interventions to improve resilience in vulnerable communities. The findings contribute to the broader discourse on flood risk management and resilience building, with practical implications for disaster risk reduction strategies in Uyo.

Keywords*: Flood-disaster, vulnerability, socio-economic, household-resilience, flood, Uyo metropolis*

Introduction

Globally, flood disasters significantly threaten every human endeavor, cutting across commerce, societal well-being, agriculture, and infrastructure. The devastating impact of floods in the commercial sectors is evident through setbacks in property damage, supply chain interruptions, loss of goods and services, and societal well-being, including stress, anxiety, and psychological breakdown. The increase in flood events in recent times globally is attributed to climate change and extreme weather events induced by both natural and anthropogenic activities (Week, & Wizor, 2020). McClymont (2020) argued that floods are natural events where a typically dry area or piece of land suddenly submerges in water. However, certain regions are more vulnerable or susceptible to flood hazards. In this context, vulnerability is defined by Joshua, Chirwa, Ngongondo, Monjerezi, Mwathunga, & Kasei (2021) as the susceptibility of an individual to illness, injury, or death.

In Africa, countries like Nigeria grapple with a complex array of environmental challenges, among which flooding emerges as a foremost concern. The geographical location of most states in Nigeria to large water bodies made this area more susceptible to flood hazards. For

instance, Cross River, Port Harcourt, Bayelsa, and Akwa Ibom State have faced recurring challenges, witnessing devastation due to the overflow of rivers and heavy rainfall. However, the nation's poor economic situation and lack of technological know-how in managing this incident made some households susceptible to flooding. Uyo Metropolis, in recent times, has experienced a surge in flood disasters primarily attributed to natural and anthropogenic factors. Uyo Metropolis, situated in a region susceptible to heavy rainfall and flooding, has invested significantly in state-of-the-art early warning systems and resilient infrastructure. Rentschler, Salhab, & Jafino (2022) noted that one in five people are vulnerable to flood hazards or live in areas exposed to flood risk.

Cutter, Ash, & Emrich (2019) measured the vulnerability of households to flood based on socioeconomic status, education, and healthcare access. Vulnerability is not solely a product of environmental conditions; it is intertwined with social, economic, and political factors (Cutter, 2003). Vulnerable populations, characterized by low socioeconomic status, limited access to resources, and inadequate infrastructure, face disproportionate risks and challenges after flood disasters (Cutter, 2003; Adger, 2004). The primary concern associated with flooding is the immediate danger it poses to human life and property, as inundated areas often experience rapid and unpredictable water flow, leading to risks of health issues, loss of livelihood, and injury. The socioeconomic characteristics that give rise to vulnerability and determinants of resilience are traceable and include income, education, access to resources, and social networks shaping vulnerability and resilience (Birkmann, 2006). These characteristics have been noted to influence exposure, sensitivity, adaptive capacity, and the efficacy of coping and adaptation strategies.

According to Nick (2005), the following vulnerability proxies were found to be correlated with decadal mortality outcomes at the 10% significance level. Population with access to sanitation, literacy rate, 15–24-year-olds, maternal mortality, literacy rate, over 15 years, calorific intake, voice and accountability, civil liberties, political rights, government effectiveness, literacy ratio (female to male), and life expectancy at birth. This study investigates the socio-economic status contributing to household vulnerability to flood hazards in Uyo metropolis Uyo, Akwa Ibom State, Nigeria. Doing so aims to contribute valuable insights into the broader global discourse on flood risk management and resilience building, ultimately supporting more effective disaster risk reduction strategies in Uyo metropolis, Akwa Ibom State, Nigeria.

Study Area

Uyo is the capital of Akwa Ibom State and is located between latitudes 5º 17' N and 5º 25' N of the Equator and longitudes 07º3' E and 07º 58' E of the Greenish Meridians. It is bordered on the south by Ekpe Atai and Nsit Ibom Local Government Areas, on the west by Abak Local Government, and on the north by Ikono and Itu Local Government Areas (Akpakpan, 2018). Uyo, the capital city of Akwa Ibom State, is situated in the southern region of Nigeria. The city has a diverse topography, including coastal lowlands, riverine areas, and upland terrain. The city's terrain is relatively flat in some places, while others feature undulating

hills. Uyo's geographical diversity is a significant factor in its susceptibility to flooding, as coastal and riverine areas are prone to inundation during periods of heavy rainfall (Johnson, 2023).
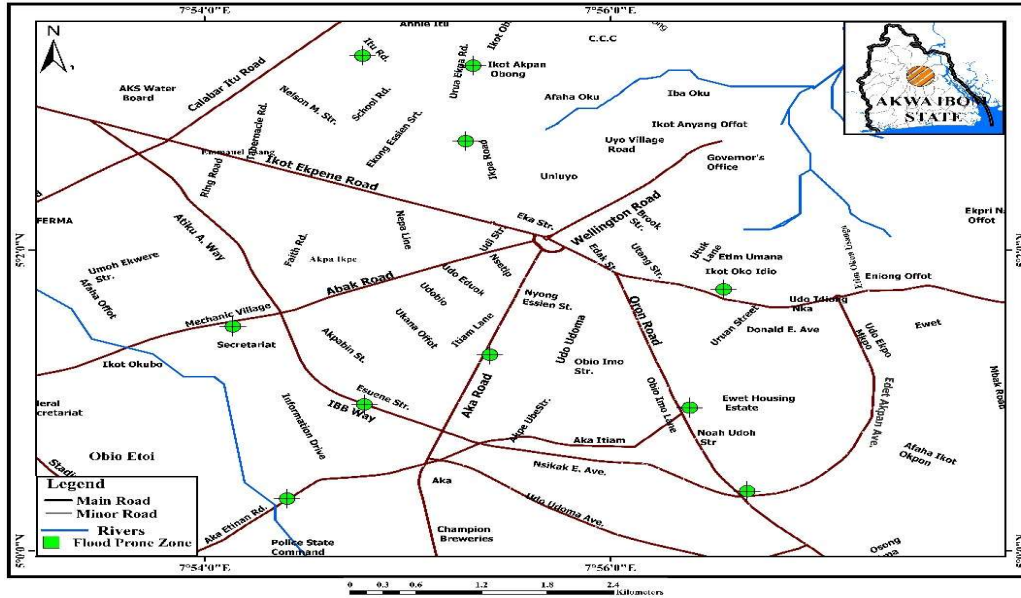

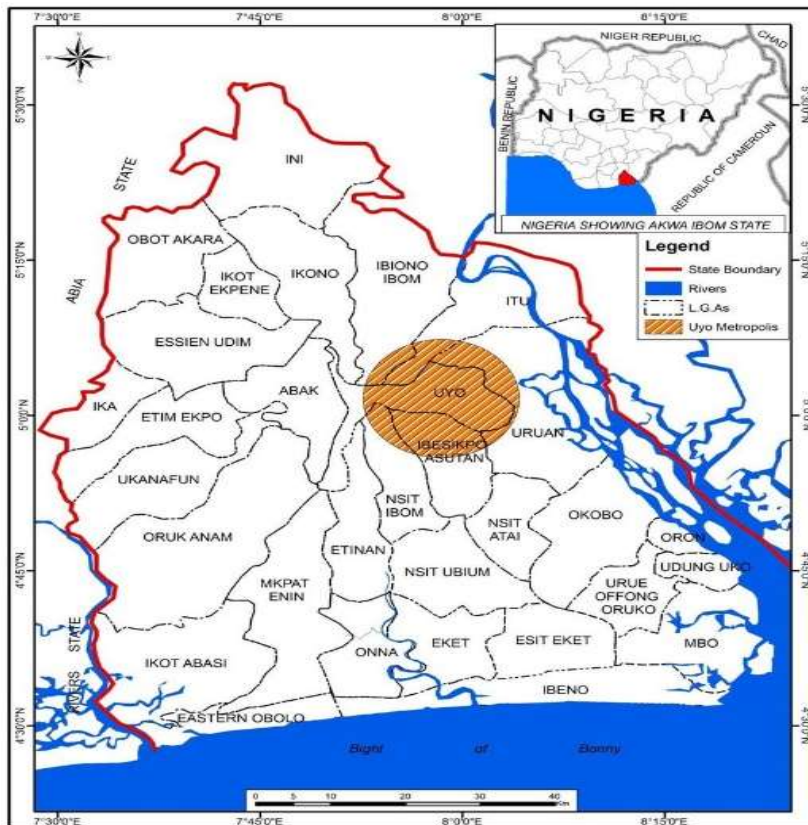**Fig.1: Streets and Flood Prone Areas in Uyo**

Fig.2: Location of Uyo Capital City in Akwa

Methods and materials

Primary data was sourced by administering structured questionnaires to respondents sampled within the capital city of Uyo. The questionnaire was administered to the respondents in the study locations to gather relevant information for the study. The questionnaire was divided into three sections. Section A was designed to obtain demographic and socioeconomic characteristics that render certain groups within the diverse population of Uyo a metropolis, in Akwa Ibom State. Section B was designed to obtain respondents' opinions on socio-economic status contributing to household vulnerability to flood hazards in the Uyo metropolis. Section C was designed to obtain respondents' opinions on the level of variation that renders some households vulnerable to flood in the Uyo metropolis, and Section E was designed to obtain respondents' opinions on the coping strategies adopted to enhance household resilience against flood hazards in the Uyo metropolis. The responses collected were later subjected to further analysis. The questionnaire was the main instrument used for data collection. The technique used for data analysis was both descriptive and inferential statistics. The descriptive statistics include percentages, tables, and frequencies. They were used to summarize the data obtained from the fieldwork, while the hypotheses for the study were analyzed using inferential statistics.

To test this hypothesis, the multiple regression model (MRM) was adopted to assess the level of association between socioeconomic status and household vulnerability. Key variables involved are income levels, level of education, and property damage caused by floods). The Multiple Regression Model (MRM) is given as;

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 \dots b_nx_n + e$$

Where;

Y	-	Dependent variable
a	-	Regression constant
$x_1 \dots x_n$	-	Independent variables
$b_1 \dots b_n$	-	Regression coefficient
e	-	Stochastic error terms

Results and Discussion
Socio-economic factors contributing to household vulnerability to flood hazards

Household income level: Table 1 displays data on household income level. It was revealed that 39.8 earns less than N30,000 per month, 27 per cent, earn between N30,000-N60,000 per month, 14.3 per cent, earn between N60,001- N90,000 per month, 19 per cent earn greater than N90,001 per month Thus, majority of the respondents earn less than N30,000 per month.

Household size: Table 2 presents the household size of respondents selected for the study. From the analysis, it was observed that 34 respondents representing 8.5 per cent had a household size of one, 209 respondents representing 52.3 per cent had a household size between 2-4 people, 103 respondents representing 25.8 per cent had a household size

between 5-7 person and 54 respondents representing 13.5 per cent had a household size of more than 7 persons. Hence, from the study, it was observed that the majority of the respondents had a household size between 2-4 persons in the study area.

Children in the household: Table 3 indicates the number of children in the household. The study revealed that 31 per cent, had no children; 31.5 per cent, had 2-4 children; 16.5 per cent, had 5-7 children; and 21 per cent, had more than 7 children in the house. The study observed that the majority of the respondents had 2-4 children within the study area.

Housing tenure: The result in Figure 6 presented the housing tenure of residents. The study discovered that 30.5 per cent, were the personal owners of the house, 62.3 per cent, rented an apartment, and 7.3 per cent, squatted with a person. Hence, the result observed that the majority of the respondents in the area were living in a rented apartment.

Table 1: Household income level of respondents

Category	Frequency	Per cent
Less than ₦30,000/month	159	39.8
₦30,000 - 60,000/month	108	27.0
₦60,001 – N90,000/month	57	14.3
₦90,001 – N120,000/month	76	19.0
Total	400	100.0

Source: Researcher's Fieldwork (2024)

Table 2: Household size of respondents

Category	Frequency	Per cent
1	34	8.5
2-4	209	52.3
5-7	103	25.8
More than 7	54	13.5
Total	400	100.0

Source: Researcher's Fieldwork (2024)

Table 3: Number of children in the household

Category	Frequency	Per cent
No children	124	31.0
2-4 Children	126	31.5
5-7 Children	66	16.5
More than 7 children	84	21.0
Total	**400**	**100.0**

Source: Researcher's Fieldwork (2024)

Per cent

30.5 — Owner
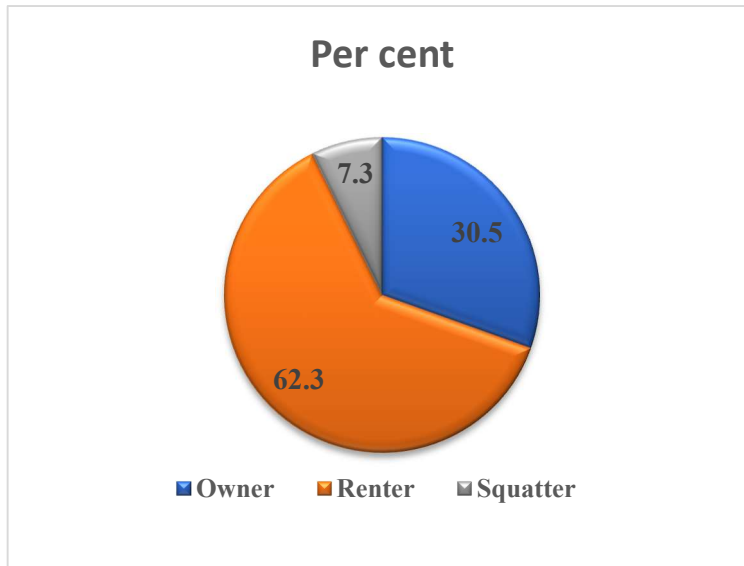62.3 — Renter
7.3 — Squatter

Figure 1: Housing tenure of respondents

H_0: Socioeconomic status of household does not have a significant effect on vulnerability to flood in Uyo Capital City, Akwa Ibom State, Nigeria

H_1: The socioeconomic status of the household has a significant effect on vulnerability to flood in Uyo Capital City, Akwa Ibom State, Nigeria

The analysis of research hypothesis one is presented in Table 13. It was revealed that there is a significant association between socioeconomic status and household vulnerability to flood hazards in Uyo Capital City, Akwa Ibom State, Nigeria. As a result, the null hypothesis is rejected. The model summary indicates a high correlation (91.8 percent) between the three variables. The R^2 value of (0.843) indicates that when other factors are kept constant, socioeconomic status accounts for 84.3 per cent influence on household vulnerability to flood hazard. Moreover, the level of association in the analysis of variance (ANOVA) result showed that (2.677, p = 0.397). This implies that the independent variable's overall prediction of the dependent variable is statistically significant. As a result, the data and the regression model fit well. Thus, there is a significant association between socioeconomic status and household vulnerability to flood hazards. Additionally, the regression coefficient result showed a negative association between socioeconomic status and household vulnerability to flood in Uyo (t = -0.885; < 0.223). Hence, the null hypothesis is rejected and the alternate hypothesis is accepted.

Table 4: Multiple regression analysis between socioeconomic status and household vulnerability to flood hazards

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.843	.528	44.92072

ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10804.129	2	5402.064	2.677	.397[b]

Residual	2017.871	1	2017.871	
Total	12822.000	3		

a. Dependent Variable: Household vulnerability

Coefficients

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.	95.0% Confidence Interval for B Lower Bound	Upper Bound
(Constant)	-21.956	77.104		-.885	.223	-1001.653	957.741
Household education	1.307	.593	.892	2.205	.271	-6.226	8.839
Income	-.087	.338	-.105	-.258	.839	-4.382	4.208

a. Dependent Variable: Household vulnerability

As presented in Table 4. The study revealed that there is a significant negative association between socioeconomic status and household vulnerability to flood hazards in Uyo Capital City, Akwa Ibom State, Nigeria. This implies that the socioeconomic status of an individual has a significant relationship with their level of exposure or vulnerability to flood hazards which manifests in terms of income, cultural beliefs and norms, and educational attainment among others. This is similar to the finding of Cutter (2018) who noted that socioeconomic factors influencing vulnerability are the economic status of individuals and communities. Households with lower income levels often face increased vulnerability due to limited resources for preparedness, response, and recovery. Thus, economic stability is a key indicator, with studies indicating that precarious employment and poverty contribute significantly to heightened vulnerability to various hazards. Additionally, Jemimah (2021) examined the social vulnerability of rural dwellers to climate variability in Akwa Ibom State, Nigeria. The study found that Akwa Ibom State has been vulnerable to extreme weather events, such as flooding, severe storms, and rising sea levels, leading to homelessness, poverty, conflicts, and war for millions of people. These have resulted in social disturbances and dislocations among rural populations, especially in coastal communities, making them more vulnerable to climate variability. Adger (2018) opined that lower levels of education are associated with reduced awareness, limited access to information, and difficulties in understanding and responding to hazards. Hence, education is a key determinant in shaping an individual's capacity to adapt and recover from adverse events. Furthermore, Eriksen (2018) states that the quality of housing and infrastructure is a tangible expression of socioeconomic status and a crucial vulnerability indicator. Inadequate housing, especially in informal settlements, contributes to heightened vulnerability by increasing exposure to hazards and limiting adaptive capacities. Thus, socioeconomic status increases household vulnerability to flood hazards due to their inability to command the needed financial capacity in flood management and mitigation.

References

Adger, W. N. (2018). Social-ecological resilience to climate change. *In Handbook on Sustainability Transition and Sustainable Peace* (pp. 1-12).

Akpakpan, U. D. (2018). Urban flooding and the challenges of sustainable housing development in Uyo, Nigeria. *International Journal of Engineering and Management Sciences*, 3(5), 262275.

Birkmann, J. (2006), Measuring vulnerability to natural hazards — towards disaster resilient societies.

Cutter, S. L., (2003). Social vulnerability to environmental hazards Social Science Quarterly, 84(2), 242261.

Cutter, S. L., (2018). Building disaster resilience: Steps toward sustainability. Sustainability, 10(10), 3374.

Eriksen, S. E. H., (2018). Vulnerability and resilience: Coalescing or paralleling approaches for sustainability science? Ecology and Society, 23(4), 3.

Jemimah T. E., & Idongesit, M. U., (2021), *Social vulnerability of rural dwellers to climate variability*: Akwa Ibom State, Nigeria

Johnson, M., & Brown, S. (2023). Satellite-based monitoring for improved Early Warning Systems in flood-prone regions. *Journal of Applied Remote Sensing*, 17(2), 024501.

Joshua, M. K., Chirwa, R. K., Ngongondo, C., Monjerezi, M., Mwathunga, E., & Kasei, R. (2021). Impact of floods on access to drinking water: A focus on 2019 floods in Magalasi Village in Chikwawa District, Malawi. *The increasing risk of floods and tornadoes in southern Africa*, 191-201.

McClymont K, Morrison D, Beevers L, Carmen E. Flood resilience: A systematic review. *Journal of Environmental Planning and Management*. 2020;63(7):1151– 1176.

Nick Brooks, W. Neil Adger, P. Mick Kelly (2005) The determinants of vulnerability and adaptive capacity at the national level and the implications for adaptation Global Environmental Change Volume 15, Issue 2, July 2005, Pages 151163, https://doi.org/10.1016/j.gloenvcha.2001006

Week, D. A., & Wizor, C. H. (2020). Effects of flood on food security, livelihood and socio-economic characteristics in the flood-prone areas of the core Niger Delta, Nigeria. Asian Journal of Geographical Research, 3(1), 1-17.