The Asian Review of Civil Engineering
ISSN: 2249-6203 (P); 2583-7893(E)
Vol.14 No.1, 2025, pp.43-53

www.crijournals.org
DOI: https://doi.org/10.70112/tarce-2025.14.1.4253

In-depth Appraisal of Pluvial Flood Risk Perception and Coping Strategies in a Flood Prone Urban Settlement: A Case Study of Ala Community, Ondo State Southwestern Nigeria

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(Received 19 November 2024; Revised 24 February 2025; Accepted 30 March 2025; Available online 6 April 2025)

***Abstract* - Efforts to mitigate the damage and risks associated with natural disasters have been extensive; however, floods continue to rank among the most destructive natural hazards worldwide. In recent years, the occurrence of such natural events appears to have increased, and the associated threats to both development and economic stability from flood disasters are also growing. There is widespread recognition-sometimes well-founded-that climate change could substantially alter risk levels, potentially rendering many current flood management strategies insufficient for future needs. The scale of current and projected flood impacts underscores the urgency of prioritizing flood risk management within urban areas in policy and political discourse. This paper provides a detailed assessment of flood risk, emphasizing the relationship between flood risk perception variables and the adoption of protective measures. The correlation analysis shows that key factors such as worry, direct flood experience (r = 0.61), and flood awareness significantly influence risk perception. However, preparedness behaviors, including the adoption of Property-Level Flood Mitigation Measures (PLFMM), were more strongly influenced by socio-demographic factors such as gender, property ownership (p = 0.699), and self-efficacy, while risk perception had minimal influence. Additionally, low-cost interventions such as channelization (24%) and moving expensive items (18%) were the most adopted protective measures. The study also shows that direct and indirect flood experiences were stronger predictors of PLFMM adoption than risk perception.**
***Keywords:* Flood Risk Management, Risk Perception, Climate Change, Protective Measures, Socio-Demographic Factors**

I. INTRODUCTION

Disasters have been a persistent challenge throughout human history, with devastating effects on societies [1]. Floods, the most frequent natural disaster worldwide, pose significant threats to human life, property, and well-being, impacting over 75 million people annually and causing more than 20,000 deaths. Beyond economic losses, floods lead to severe health and social challenges, including population displacement and mental health conditions such as post-traumatic stress disorder, depression, and anxiety [2]-[5]. According to the International Catastrophe Database (EM-DAT), floods accounted for 39% of disaster events globally between 1980 and 2013, followed by storms, which accounted for 30% of reported natural disasters [6]. Among countries with the highest flood-related fatalities, Nigeria had its deadliest year since 2002, with 378 deaths, including 363 lives lost to flooding in July 2012. While food crises and droughts affected over a million people in Ethiopia, Chad, Zimbabwe, Kenya, Sudan, Burkina Faso, Mali, Angola, Niger, Malawi, and Tanzania, a single flood event in Nigeria alone impacted 25.3 million individuals [7].

As flooding is a global issue, governments worldwide have sought practical solutions for flood risk through both structural and non-structural approaches [8]. Structural solutions often involve large-scale initiatives that demand significant financial investment, lengthy implementation timelines, and complex sociopolitical coordination. Consequently, these measures may face delays, become irreversible, or fall short of expectations. In many cases, they are also economically and financially unfeasible for developing nations.

Urbanization, a hallmark of demographic growth-especially in developing nations-further complicates flood risk management. Currently, nearly half of the global population resides in urban areas, a proportion anticipated to rise to 60% by 2030. This growing urbanization places increasing strain on infrastructure, heightening vulnerability to climate-related impacts. Urban flooding is often exacerbated by increased population density, poorly planned development that neglects drainage systems, and the proliferation of impervious surfaces such as paved roads and buildings, which reduce natural infiltration [9]. Coastal regions are particularly susceptible to flood damage, worsened by rising sea levels. Additionally, changes in rainfall patterns contribute to more frequent and intense riverine and flash floods. Over-reliance on groundwater extraction often leads to land subsidence, further amplifying the impacts of sea-level rise. Moreover, the occurrence of more frequent and intense storms significantly increases the risk of storm surges.

This is the case in Akure, where urban characteristics have worsened drainage conditions, with impervious surfaces increasing runoff and settlements being erected with little regard for stormwater management due to weak development control mechanisms and ineffective enforcement. Flooding along the Ala River in Akure has become a recurring

challenge, posing significant threats to lives and properties in the surrounding areas. This persistent issue has raised considerable concerns among residents and garnered attention from local, state, and federal authorities. Levine [3] emphasized that future increases in urbanization and unregulated development in vulnerable areas, such as flood-prone zones, could substantially heighten flood risks, regardless of climate change impacts.

Given the continuous development in floodplains driven by land pressure and political and economic factors, it is crucial for governments, communities, and individuals to manage flood risks through comprehensive, practical, and context-appropriate strategies. Thus, it is rational to confront the flood risk challenge by enhancing the adaptive capacity of Ala residents, particularly property owners. This proactive approach helps absorb financial and physical hazards, reducing losses. The success of such programs-focused on prevention, protection, and preparedness-depends on residents' flood knowledge and preparedness, which are shaped by their perception of flood risk, an essential factor for designing and assessing effective flood-risk management strategies.

This research aims to critically assess how flood risk perception variables and awareness of protective actions influence households located along the Ala River. To achieve this aim, the study sets the following objectives:

a. Design a sampling map and structured questionnaires to be administered to selected individuals in the area.
b. Evaluate public flood risk perception and protective capacity behavior through face-to-face interviews and structured questionnaire surveys administered to selected individuals in the area.
c. Identify and examine the key factors impacting flood risk perception and adaptive capacity among respondents.
d. Propose recommendations for flood risk mitigation strategies in the area based on the research outcomes.

Previous studies have highlighted the role of household mitigation behaviors in reducing flood damage. For example, self-protection measures in Germany have proven effective [10]. Despite this, there is a lack of research exploring the connection between risk perception and adaptive capacity among Ala residents. This disparity is particularly concerning given the increasing flood risks confronting the Ala community.

To address this gap, this study examines flood-related behaviors and attitudes among property owners in Ala, focusing on their experiences, flood risk perceptions, adoption of property-level protection measures, and financial commitment (FC) toward flood mitigation efforts.

Interestingly, unlike results from studies in other parts of the world, most Ala residents-despite moderate exposure and literacy levels-can still accurately assess the flood risk in their residential areas, except in cases where risk denial is common among property owners.

These findings could be valuable in developing non-structural flood risk management strategies for the Ala community.

II. MATERIALS AND METHOD

A. Study Area

The research was carried out in the Ala community, located within the floodplain of the Ala River in Akure. This area has experienced uncontrollable floods when the river reaches its high-water stage, overflowing its banks due to excessive rainfall. The Ala River, a tributary of the Ogbese River, flows through Akure, the capital of Ondo State, between 5°10′E, 7°18′N, and 5°17′E (Figure 1). Although the Ala River is 57 km long, 14.8 km pass through Akure, starting in the northeast and flowing south through Oba-Ile to Edo State [11].

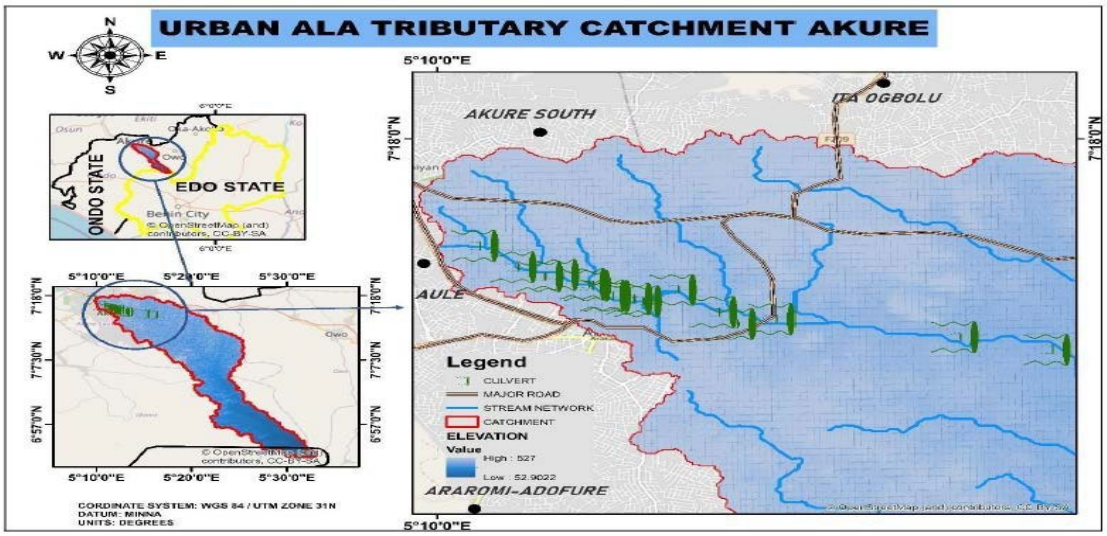

Fig. 1 Research Area Map

Akure, which lies 396 m above sea level, is situated between 739,000 and 746,000 easting and 801,500 and 807,000 northing. According to the Federal Office of Statistics, Akure is in the central senatorial district of the state [12]. The study area is geomorphologically located within uneven topographic landscapes, characterized by features such as spurs, saddles, valleys, and river channels. The region is part of Nigeria's southwestern basement complex, with dominant rock types including biotite gneiss, migmatite gneiss, quartzite, and charnockite. These Precambrian rocks have experienced tectonic processes, resulting in disruptions such as fracturing, jointing, and cracking [2].

The city is bordered to the north by Akure North and Ifedore local governments, to the west by Ile-Oluji/Oke-Igbo, to the east by Owo, and to the south by Idanre. Akure is approximately 282 km from Abuja, Nigeria's capital, and 312 km from Lagos, the country's commercial hub [11], [13]. The population of Akure has steadily increased over the years due to its relative economic prosperity. According to the 2006 census, Akure had a population of 484,798, which was projected to grow to 570,500 by 2011 [11].

Akure has a tropical climate characterized by heavy rains, high temperatures, and high humidity. Based on the Köppen-Geiger classification system, the region is categorized under the *Af* climate type, characterized by a short dry season and a minimum rainfall of 60 mm in the driest month. The area receives about 1,524 mm of rainfall annually, with mean relative humidity exceeding 80%. The temperature ranges between 22 °C during the harmattan season (December to February) and peaks at 32 °C in March. Rainfall increases from April to July, decreases in August, and peaks again from September to November, with July receiving the most rainfall [13].

B. Risk Perception Construction and Protection Motivation Theory (PMT)

This research applies the PMT model to assess which risk perception variables have consistently influenced Ala residents to adopt adaptive measures to mitigate flood impacts and ensure protection. Exploring the construction of risk perception and its influence on protective behavior can expand local knowledge about flood risks and the options available to residents, enabling better management and preparedness [14]. Therefore, the creation of programs that guide householders through available protective actions, as well as their implementation efficacy, is essential.

Two main concepts define response behavior: the willingness to undertake action and the types of actions available for deployment. Although this research focuses on protective behavior and the adaptive capacity of residents, protective motivation is relevant because it reflects individuals' perception of preparedness.

Protection Motivation Theory (PMT), developed by R. W. Rogers in 1975, aims to explain how individuals respond protectively to health threats, particularly through fear appeals. Rogers anticipated that the application of PMT would expand over time, which has indeed occurred over the past four decades [15]. In 1987, Rippetoe and Rogers revised the theory. PMT suggests that the motivation for protection drives health behaviors, guiding the decision-making process and ultimately triggering protective actions. According to Rogers, the four primary components of PMT are:

1. The perceived severity of the hazard.
2. The likelihood of the hazard occurring.
3. The mitigation measures available.
4. The individual's ability to successfully enact those measures.

Components I and II represent the threat appraisal, while III and IV represent the coping appraisal.

C. Data Acquisition, Processing, and Analysis

The study involved collecting data from individuals who were directly impacted by flooding. The social dataset comprised basic demographic information such as education levels, employment status, skills, coping mechanisms, health conditions, and the frequency of flood experiences, along with other relevant details to assess the vulnerability of residents. Data were gathered through surveys, focusing on how the local people perceived the risk of flooding to their properties. A longitudinal correlational survey method was employed, utilizing questionnaires and face-to-face interviews.

The questionnaire design began in April 2021. Several sessions with research supervisors were held at the Federal University of Technology, Akure (FUTA), from April to early June 2021. After a reconnaissance survey of five houses in June 2021, the questionnaire was revised, and the final survey was conducted between mid-June and early August 2021, toward the end of the rainy season, when respondents' flood experiences were still recent. The questionnaires were directed at community members, leaders, and government agents, with 92 questions for community members, 61 questions for leaders, and 19 questions for government agents. These questionnaires aimed to establish relationships between risk perception (RP), awareness, and four spatial factors related to flooding:

1. Proximity to the nearest stream (tributaries of the Ala River).
2. Proximity to the Ala River, the primary watercourse in the area.
3. Elevation difference between the house platform level and the closest stream.
4. Elevation difference between the house platform level and the Ala River.

Additional questions addressed respondents' risk profiles, attitudes toward flooding, preventive actions, insurance coverage, and flood awareness. On average, each questionnaire took 30 minutes to complete. The layout was simple, with no complex filtering and clear instructions. To

ensure flexibility and better understanding, the questionnaire was written in both English and Yoruba, accommodating varying education levels. For respondents with low literacy levels, a trained personnel member from Ala assisted in interpreting the questionnaire in the form of an interview. To ensure reliability, the credibility of the data was enhanced through repetition and reframing when necessary. Important questions, such as those regarding respondents' flooding experiences, were often reframed for clarity. The dataset was organized, coded, and subsequently processed using Microsoft Excel and SPSS software.

Socio-demographic factors, along with hazard experience data, were analyzed. Gender was recorded as a binary variable (male = 0, female = 1), and age was captured on a continuous scale. Direct exposure to previous storm surges and flooding events was evaluated as a binary variable (yes = 1, no = 0), as were property ownership and permanent residence near the Ala River. Education level was divided into two categories: "higher education" for individuals with a high school or university degree (assigned a value of 1), and "lower education" for those with a primary or secondary qualification (assigned a value of 0).

A multiple regression analysis was used to analyze the data and forecast protective behavior based on the influence of independent factors. The correlation method was also used to assess how these variables influenced the protective actions taken by residents.

III. RESULTS AND DISCUSSION

A. Respondent Characteristics

Table I provides an overview of the characteristics of the respondents, complemented by bar and pie charts in Figures 2-4, which illustrate the distribution of socio-demographic data and property ownership. Additionally, 35% of respondents reported earning between NGN 50,000 and NGN 100,000 per month.

TABLE I RESPONDENT CHARACTERISTICS

Variable	Number	Percentage	Variable	Number	Percentage
Age Group			**Education**		
0 to 25 years old	60	20%	High	123	41%
25 to 35 years old	78	26%	Low	177	59%
36 to 45 years old	78	26%	0	0	0
46 to 55 years old	57	19.0%	**Flood experience**		
55 years old and above	27	9%	Yes	123	41%
			No	177	59%
Gender					
Male	144	48%	**Ground floor**		
Female	156	52%	Yes	216	72%
	0	0	No	84	28%
Property ownership					
Owner	42	14%	**Permanent residence**		
Tenant	258	86%	Yes	186	62%
			No	114	38%
Duration of Residence Among Respondents					
< 2 years	29	9%	**Education Level**		
2 to 10 years	84	28%	Bachelor's degree (Least)	123	41%
More than 10 years	189	63%	High School degree or less	177	59%

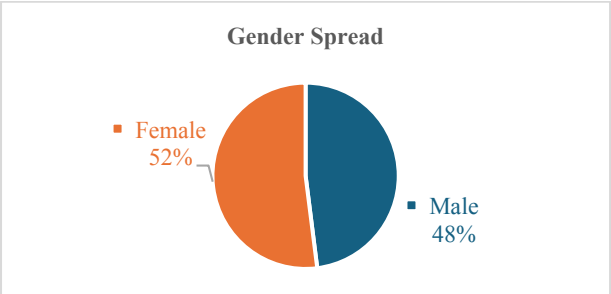

Fig. 2 Gender Spread

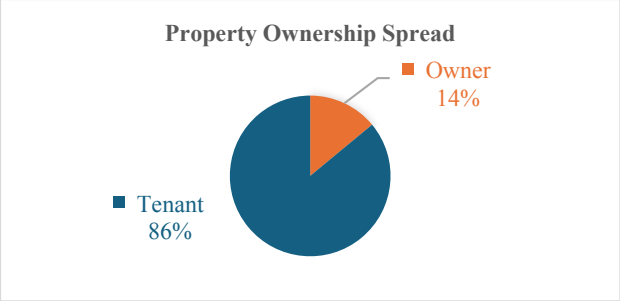

Fig. 3 Property-Owner Spread

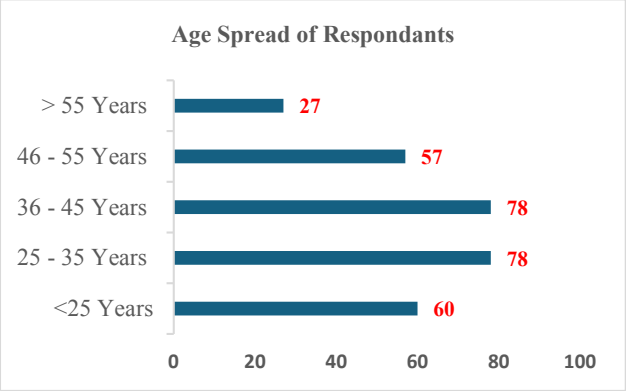

Fig. 4 Age spread

B. Flood Risk Perception

Unlike some literature suggests, flood risk awareness in the Eyin Ala area was found to be high, with only a few respondents denying the existence of flood risk. This discrepancy may stem from the early development of the community, which originally had more green land cover. Initially perceived as flood-free, awareness was minimal. The following dialogue illustrates this perspective:

1. *Interlocutor:* How would you rate the level of flood risk in this area?
2. *Male Respondent:* About 75%.
3. *Interlocutor:* Then why did you build in such a high flood-risk area?
4. *Male Respondent:* No one in their right mind would build in an area with high flood risk. When we first arrived, the area seemed free of flood risk until upstream activities began.

Table II provides an assessment of flood risk levels among the respondents. The study found that fear of flooding was notably high in some areas of Ala, even among residents whose homes were not directly at risk. While their homes may be safe, the surrounding environment is not, possibly due to more frequent flooding in Ala compared to other areas. Research indicates that flood risk awareness diminishes over time; thus, areas prone to flooding tend to have higher concern levels. This hypothesis warrants further investigation.

Osberghaus [14] observed that property owners in Germany who expect increases in future flood damage are more inclined to implement preventive measures. Overall, heightened risk perception can motivate protective behavior and preparedness [15]. Since residents in Ala already possess a strong risk perception, efforts to enhance their adaptive capacity may be less critical compared to locations with low risk awareness. However, increasing residents' confidence in their ability to take preventive actions and educating them about effective flood-prevention options could significantly improve adaptive capacity.

Table VI reveals minimal statistical associations between risk perception and factors such as age, gender, income, education, and duration of residence. Older individuals and women exhibit higher flood risk perception, consistent with Lindell and Hwang's [16] findings. However, the influence of socio-economic factors appears mediated by geographical variables, as risk perception varies by location. Burningham *et al.,* [17] identified social class as the primary factor influencing flood-risk awareness, with flood experience and duration of residence being secondary predictors. Kellens *et al.,* [18] noted that age, gender, and previous flood experiences affect coastal residents' risk perception, while Botzen *et al.*, [19] identified age and education as key factors.

In this study, marital and employment status were found irrelevant. Although the correlation between gender and risk perception is weak, it remains a useful predictor of attitudes toward natural disasters. Housing tenure also influences perceptions; renters are more likely than property owners to believe their properties are at risk, though property owners typically take more protective actions. Lindell and Hwang [16] deemed past tenure irrelevant.

TABLE II LEVEL OF FLOOD RISK CONCERN

Classes	Present level of risk	Classes	Risk projected for the next 25 years
Not concerned	39%	Decrease by	-
Neutral	6%	No change	-
Very concerned	55%	Increase	75% and 100% chosen

Notably, proximity to flood sources (within 50 meters) showed no significant association with self-reported flood risk, indicating the absence of a dissonance effect in the study area. This phenomenon is referred to as the *risk paradox*. The risk paradox, in decision theory, occurs when people's choices violate the principles of subjective expected utility. The core idea is that individuals tend to prefer taking risks when they know specific odds, rather than facing uncertain alternatives. In this case, one might expect that the closer an individual is to a hazardous zone, the stronger their intention to prepare for the risk. However, this is not always the case, as several studies have demonstrated that psychological proximity to hazards does not necessarily translate into more proactive behavior.

Research on psychological factors influencing risk perception provides valuable context for these findings, particularly through the concept of the *risk normalization effect* [20]. Many studies indicate that factors such as perceived efficacy, level of concern, and behavior, among others, can moderate and diminish the impact of psychological distance bias [21], [22]. The literature on psychological processes in risk perception reinforces this, showing that these variables can mediate and reduce the influence of psychological distance bias.

Finally, negative experiences related to past flooding tend to diminish trust in authorities, while positive emotions enhance it. Wachinger *et al.,* [15] identified three reasons why people with high risk perception might fail to adopt preventive measures:

1. The advantages of residing near a river are considered more significant than the possible risks.
2. Responsibility for action is delegated to authorities.
3. Limited economic and personal resources hinder action.

C. Flood Experience

Most participants (59%) had no prior flood experience, while 41% had either direct or indirect exposure. Indirect experience was evaluated by inquiring whether respondents knew of flooding incidents that had affected close friends or family members; 42% affirmed this. A total of 34% of participants reported having encountered flooding in their current homes, primarily due to heavy rain (pluvial flooding), with 89% of incidents occurring in the previous year (2020). The recency of these experiences likely enhanced memory of damages and responses. Most flood damages were estimated at under #25,000, with only 3% exceeding #50,000.

D. Perceived Impacts of Flood Experience

The relationship between flood experience and perceived impacts was analyzed, with descriptive statistics presented in Table III, detailing perceptions categorized by prior residential exposure to flooding. Flood experience significantly shapes damage perceptions.

TABLE III RESPONDENT'S PERCEIVED FLOOD CONSEQUENCES ACCORDING TO FLOOD EXPERIENCE

Flood Consequences	Flooded		Evacuated		Injured	
	Yes	No	Yes	No	Yes	No
Agricultural impact (% yes)	50	61	61	71	64	70
House impact (% yes)	89	45	81	81	77	82
Health impact (% yes)	77	56	67	77	85	59
Time recovered (av. number, of days)	14	9	13	11	23	21

TABLE IV FLOOD REPERCUSSIONS AS PERCEIVED BY RESPONDENTS BASED ON FLOOD EXPERIENCE

Flood Repercussions	Flood experience					
	Injured		Evacuated		Flooded	
	Yes	No	Yes	No	Yes	No
Expect more floods (%)	55	27	68	29	54	24
Expect less floods (%)	58	74	32	77	47	80

Households that had encountered flooding in the past recorded the highest average score for anticipated flood-related damage. Specifically, 89% of flooded households anticipated a major impact from future floods, compared to 45% of non-flooded households. Households that experienced injuries or evacuations showed similar trends,

with 85% of injured households expecting significant health impacts from future floods, compared to 59% of non-injured households.

Additionally, a connection was found between flood experience and recovery time estimates. Households that had flooded, evacuated, or were otherwise affected anticipated needing considerably longer to recover, as shown in Table 3. Conversely, higher floor elevations correlated with lower expectations of severe flood damage, particularly to agricultural production. Elevated floors may serve as a form of self-insurance, helping to minimize losses during floods and facilitating safer storage for agricultural products.

In general, people who had experienced more frequent flooding tended to have greater perceptions of flood risk compared to those with less experience. Numerous studies indicate that past flooding enhances risk perception, and those with recent experiences tend to develop better flood knowledge and mitigation practices [19], [23].

E. Influence of Flood Experience on Perceived Flood Probabilities

The relationship between previous household experiences (flooding, evacuation, or injury) and perceived probabilities of future floods was investigated. Table IV outlines associations between having experienced flooding at least once in the past five years and perceived probabilities.

Experiencing flooding significantly increases beliefs in future occurrences and influences perceptions of their likelihood. There is an intrinsic connection between perceived flood probabilities and threat assessments. Households anticipating greater flood damage in the future (especially related to injuries) and longer recovery times are more likely to expect future floods. For instance, 54% of flood victims foresee more frequent floods, compared to 24% of those without prior experiences.

Protective behavior also influences these attitudes. A higher floor elevation increases the perception of more frequent future floods, while a lower floor elevation leads to beliefs in fewer occurrences.

F. Worry

Interestingly, the findings reveal that worry has no significant association with distance from the risk source, implying that the reality of the situation has less impact on anxiety than the current perception of the situation.

The elevation of the respondent's residence also emerges as significant, indicating that people who live on higher ground are less likely to be concerned about flooding. The variables capturing preparedness appear significant and positively connected to worry, i.e., individuals who are prepared or planning for flooding, as well as those who have implemented actual flood prevention measures, are more likely to be concerned [18].

Prior exposure to flooding emerges as a critical determinant of worry, with those who have been flooded before more likely to be concerned about flooding, as indicated by the standardized coefficients. In the regression, other flood factors such as risk profile, views toward regulating rivers and floodwaters, awareness of the flood relief system, and household insurance were all found to be negligible.

Finally, being very close (within 100 feet) to the hazard source had no effect on concern levels. This supports the earlier conclusion that the degree of fear is more closely related to the assessed perception (whether residents are in or out of the flood zone) than to actuality. It was also found that females are more likely than males to be concerned about a threat, and that higher education is associated with less concern. Higher education, however, is not always linked to a better understanding of flood risk.

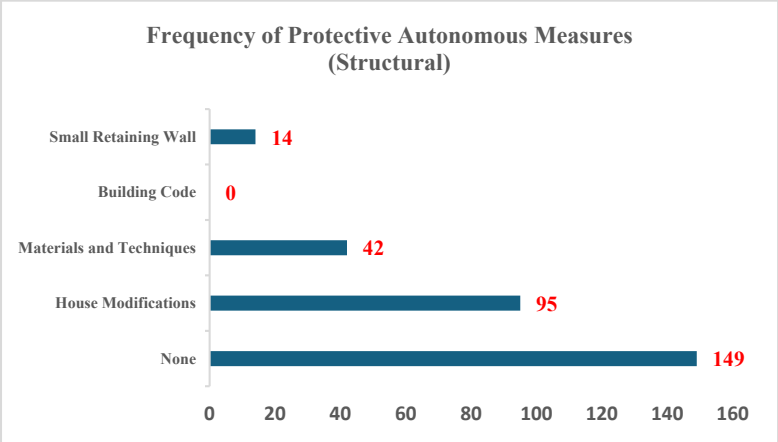

Fig. 5 Frequency of protective autonomous actions (structural)

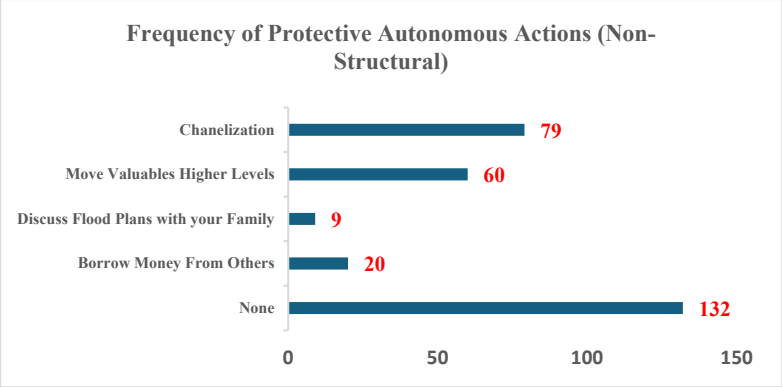

Fig. 6 Frequency of protective autonomous actions (non-structural)

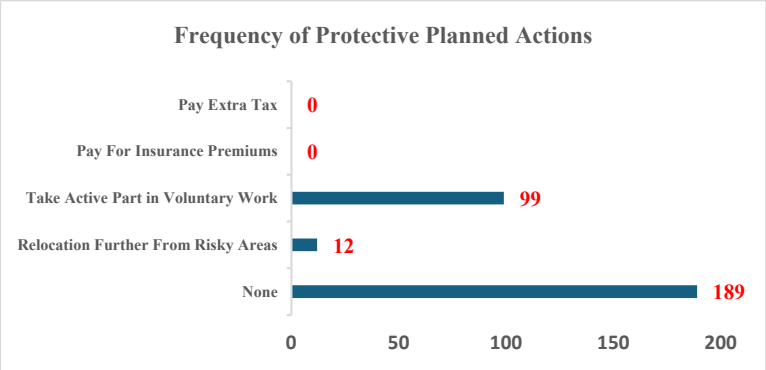

Fig. 7 Frequency of Protective Planned Actions

TABLE V SOCIO-DEMOGRAPHIC FACTORS

Factors	FC	PLFMM	Risk perception
Education	0.092	-	0.884
Gender	0.059	-	0.207
Age	0.089	-	0.613
House type	0.816	0.411	0.090
Income	0.086	0.212	0.194
Owner/renter	0.080	0.699	0.227
Years in current home	-	0.601	-

Result significant at the $p<0.05$

Interestingly, low-cost interventions, such as channelization and moving expensive items from basements, were the only measures showing a link between risk perception and protective behaviour. To delve deeper into the connection between risk perception, flood experience, and PLFMM adoption, the mean score for each respondent was computed based on all binary behavioural factors. These mean values were then analysed using chi-squared tests to explore the relationships among PLFMM actions, flood risk perception, and prior flood experience.

Table V highlights that no significant relationship was identified between PLFMM adoption and risk perception. In contrast, direct flood experience emerged as a key determinant of higher PLFMM scores, with indirect (social) experience also showing a positive, albeit smaller, effect. This supports well-established findings in the literature indicating that prior flood experience is a stronger motivator for PLFMM adoption than risk perception.

Additionally, Table V highlights the association between socio-demographic factors and PLFMM adoption. A notable finding was the strong correlation between property ownership and the adoption of PLFMM measures ($p = 0.699$), which aligns with real-world expectations, as tenants often have less incentive to prepare for flooding.

Income was also found to be related to PLFMM adoption ($p = 0.212$), further emphasizing the socio-economic dimensions of flood preparedness. Risk perception, as reflected in Table V, did not show a significant relationship with PLFMM adoption across most socio-demographic variables, reinforcing the finding that experience-rather than perception-drives action.

H. Financial Commitment (FC)

Beyond the PLFMM measures already implemented, respondents were asked to indicate how much they would be willing to pay (FC) for flood protection measures. Nearly half of the respondents (48%) were willing to pay less than ₦50,000, while 74% indicated a financial commitment under ₦10,000. Notably, 74% of the sample were willing to contribute less than ₦10,000, which is likely insufficient to significantly reduce potential flood damage.

To better understand the relationship between limited FC for PLFMM and other factors, a chi-squared test was conducted. The results, summarized in Table VI, reveal a weak association between income and FC ($p = 0.194$). This may suggest that the cost of PLFMM presents a real financial barrier, or it could reflect a heuristic justification for non-action, where individuals rationalize not investing in protective measures.

This finding aligns with Owusu *et al.,* [25], who explored the links between FC, household income, and previous flood damage. In our study, however, no significant relationship was found between previous flood damage and FC, potentially indicating that those who experienced flood damage did not perceive additional PLFMM measures as necessary.

Further support comes from Table VI, which highlights more pronounced socio-demographic correlations with FC compared to those with risk perception, indicating that factors such as income and ownership status have more influence on the willingness to invest in PLFMM measures than the perception of flood risk itself. This supports the conclusions of [18] and [25], who argue that fostering intention (e.g., FC) is generally more achievable than encouraging the actual implementation of PLFMM measures.

When respondents were asked about their interest in receiving confidential advice from a contractor regarding PLFMM measures, used as an indicator of their intention, 24% expressed no interest, 38% were neutral, and 39% showed interest. The relationship between interest in professional advice and risk perception was analysed using a chi-squared test, revealing a weak association. This suggests that prior flood experience may reduce the perceived necessity for professional advice, as those with experience may feel they have already taken adequate protective measures. While [25] found a connection between previous flood damage costs and FC, this relationship was not significant in our study group. This could indicate that prior flood experiences lead individuals to question the effectiveness of PLFMM measures. This aspect of FC presents an opportunity for further investigation in future studies.

TABLE VI SUMMARY OF INFLUENCE OF RISK PERCEPTION ON PREPAREDNESS

Factors of flood risk perception	Primary Variable	Secondary Variable	No influence
Preparedness	Gender Property ownership Living on groundfloor Length of residence Self - efficacy	Awareness Direct experience Knowledge Worry Age Income	Education Hazard proximity
Worry	Education Direct experience Living on ground floor	Gender Awareness	Hazard proximity
Awareness	Direct experience Knowledge		Education Income Gender Age
Risk perception	Worry Awareness Direct experience Knowledge	Hazard proximity Length of residence Home ownership Age Gender Education Income Preparedness	Living on ground floor

*primary factors ($0.5 \leq |r| \leq 1$); *secondary factors ($0.2 \leq |r| < 0.5$); *no influence ($|r| < 0.2$)

I. Risk Perception and Adaptive Capacity

A correlation analysis was conducted to assess the relationship between preparedness behaviours and flood risk perception variables. The results, summarized in Table V, classified the variables based on their r-values into primary factors (r-values between 0.5 and 1), secondary factors (r-values between 0.2 and 0.5), and those with no influence (r-values less than 0.2). Primary factors, indicating a moderate to strong relationship, included variables such as worry, direct experience, and living on the ground floor for flood risk perception. In terms of preparedness, the strongest influences were gender, home ownership, and self-efficacy.

Despite these apparent relationships, a hypothesis test was carried out to evaluate the significance of the correlations, with the null hypothesis asserting that no correlation exists. The results revealed p-values ≥ 0.05, suggesting that although the correlations appear strong (particularly for primary factors), they are statistically insignificant. This implies that the apparent connections between flood risk perception and preparedness may not hold under rigorous statistical scrutiny.

Interestingly, the findings indicated that none of the threat appraisal indicators significantly influenced protective behaviour, contrary to expectations. Instead, two aspects of coping appraisal-self-efficacy and reaction efficacy-consistently influenced household protective behaviours. Among these, self-efficacy had the strongest relationship with the use of protective activities, underscoring the role of personal confidence in one's ability to effectively implement preventive actions. This supports existing research, which suggests that individuals with higher self-efficacy are more likely to take proactive steps in flood preparedness.

IV. CONCLUSION

Flood risk perceptions and protective behaviours are two critical elements that must be integrated into any effective flood policy, particularly in flood-prone areas such as Ala. Individual perceptions of risk heavily influence their responses to floods and their level of preparedness. Drawing on data collected through a household-level survey in Ala, this research provides an in-depth analysis of the factors influencing both preventative behaviour and flood risk perceptions. Our findings indicate that individuals with either direct or indirect flood experience exhibit higher concern for future flood risks compared to those without such experience. Importantly, we found that direct and indirect flood experiences-rather than risk perception-serve as stronger determinants of individual preventative actions. Socio-demographic factors such as income, property ownership, and housing type demonstrated the strongest associations with Financial Commitment (FC) toward protective measures and the actual implementation of protective actions. These variables exerted greater influence compared to others such as gender, age, and education. Furthermore, findings related to FC and interest in contractor consultations-both considered indicators of intention rather than actual adoption-exhibited a stronger link to risk perception. Conversely, risk perception showed only a minor connection to the practical implementation of private flood protective measures (PLFMM).

These results highlight the need to differentiate between behavioural intentions and their actual implementation when exploring the connection between risk perception and preparedness. This distinction is crucial for designing more effective tools to assess and enhance flood preparedness strategies. Our sample, comprising 48% of the 300 respondents, highlights these trends and points to the need for targeted flood management policies in Ala.

V. RECOMMENDATIONS

Despite the widespread recognition of flood risks, our findings show that protective motivation does not always result in actual protective behaviour, consistent with the work of Grothmann and Reusswig [10]. Obstacles such as limited resources-be it finances, social support, time, or knowledge-often prevent action. For example, 74% of respondents indicated a willingness to contribute less than NGN10,000 for flood protection, a figure too low to meaningfully mitigate flood risks. This emphasizes the importance of financial assistance or cost-effective measures for flood protection.

Flood management efforts in Ala should focus on delivering personalized risk information that highlights both the likelihood and severity of flooding, as well as appropriate precautionary measures. Given the weak relationship between risk perception and PLFMM adoption identified in our study, communication efforts should go beyond simply raising awareness. Instead, strategies should emphasize increasing self-efficacy and response efficacy through detailed guidance on how specific actions can effectively reduce flood risks. Previous flood experience was shown to be a stronger driver of protective behaviour than perception, indicating that personal and social flood experience should be leveraged in communications to foster preparedness.

Our results also demonstrated that factors such as property ownership and income are significantly linked to the willingness to adopt PLFMM. Therefore, communication strategies should target these groups and utilize diverse channels-including community meetings, mobile apps, and radio programs-to ensure broad accessibility. This approach aligns with research [19], which shows enhanced coping strategies through multi-channel communications, thereby increasing the likelihood of protective behaviours. To address the financial constraints highlighted by the weak relationship between income and FC, financial assistance programs should be developed to support property owners in adopting more expensive PLFMM measures. Additionally, training programs tailored to property owners should be created to guide them through the available PLFMM options and their effectiveness in different scenarios. The results indicate that individuals who own property are more inclined to implement PLFMM measures, especially in the presence of higher self-efficacy and detailed knowledge of effective strategies. Offering hands-on training and contractor consultations, as indicated by the interest in contractor visits, would improve the practical implementation of protective measures.

Finally, our results indicate a stronger relationship between risk perception and the intention to take preventive measures (e.g., FC, contractor consultations) than actual adoption. As such, flood risk management programs should emphasize bridging the gap between intention and action. Incentive-based programs or subsidies that reward early adoption of protective measures could help overcome this intention-adoption divide.

Declaration of Conflicting Interests
The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The authors received no financial support for the research, authorship, and/or publication of this article.

Use of Artificial Intelligence (AI)-Assisted Technology for Manuscript Preparation
The authors confirm that no AI-assisted technologies were used in the preparation or writing of the manuscript, and no images were altered using AI.

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