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The Impacts of Flood and Local Communities' Coping Strategies along the River Gambia

Edward Mendy[1*], Sêmihinva Akpavi[2], Sidat Yaffa[3], Alpha Kargbo[4]

[1]WASCAL-Graduate Research Program in Climate Change and Disaster Risk Management, Universite de Lome, Lome, Togo
[2]Laboratory of Botany and Plant Ecology (LBPE), University of Lomé, Lome, Togo
[3]School of Agriculture and Environmental Sciences, University of The Gambia, Kanifing, The Gambia
[4]School of Arts and Sciences, University of The Gambia, Kanifing, The Gambia
Email: *mendy.e@edu.wascal.org, semakpavi@gmail.com, syaffa@utg.edu.gm, akargbo@utg.edu.gm

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Abstract

Flood disasters as Climate change hazards are common in developing countries, particularly in communities along the river Gambia. Local communities, for instance, had their local coping strategies that enabled them to stay in their communities even amid these ordeals, and climate change disaster threats. This work strives to understand flood impacts and the local peoples' adaptation or coping strategies along the River Gambia basin. A community-based cross-sectional research study of 422 research participants of which 294 are males (69.7%) and females 128 (30.3%), and a focus group discussion of 10 groups which comprised 5 female groups and 5 male groups respectively found that 98.6% of the households experienced floods in their community, and 70.6% experienced flood in their houses, 2.1% have impending flood information and 88.4% do not know evacuation centres. The majority of the households had some local coping strategies, but they acknowledged their insufficient effectiveness. The result also shows that the impact of floods on farmlands, roads, buildings, and livestock was greatly felt. Coping strategies such as sandbags, raised elevations, contour bonds, dikes, and buildings on highlands were all found to be common mechanisms the local people used. The study opines that floods affect communities, but the effects vary depending on individual assets.

Keywords

Coping Strategies, Disaster, Flood Impact, Climate Change Hazard, Local Communities

1. Introduction

The Gambia's most vulnerable areas to flooding are wetlands and lowlands

which include the riverine areas of the River Gambia and unplanned settlements within the urban areas (Kavegue & Eguavoen, 2016). Some of the marine coast and riverine wetlands are partly covered with mangroves thus protecting the land from the impact of tides. The need to comprehend and assess flood impact along the River Gambia and examine the local coping strategies of households during the flood is paramount in the country's climate change disaster risk reduction approaches. According to The Gambia National Climate Change Policy, seasonal disaster floods could occur along the River Gambia after an above-average rainy season (Penny Urquhart, 2016). This shows that there is a need for flood hazard assessment to be done along the River Gambia. During wet seasons, excess precipitation triggers the river to reach its flood stage, causing the flooded water to flow to the flood plains and onto the land and rice fields (Carney, 1998; M'koumfida et al., 2018). According to UK Essays (2018) in 1999 and 2003, there were serious flood events occurred in the Upper River and Central River Regions, affecting 13.1% of the country's population. This is also stated in the NDMA report that between 2002 and 2006, there were 65 flood-related disasters in The Gambia (NDMA, 2005). As reported by Roberto (1990), the Gambia in recent years, experienced a significant number of disastrous events of both natural and human origins, and among those disasters are floods and droughts. The Gambia's provincial town of Kuntaur and its surroundings in the Central River Region (CRR) in 2019, experienced severe flooding and the entire village was buried in a heavy downpour of rain. According to NDMA December 25, 2019, Report Kuntaur Town is situated on the river bank and is very prone to flooding.

According to Yin (2017) and UN Secretary-General (2016), disaster is a serious disruption of the functioning of a community or society involving human, material, economic, or environmental impacts and losses, where it exceeds the ability of the affected community or society to cope using its own mechanism. Disasters related to climate change could be a result of vulnerability caused by either, political, socioeconomic, or environment and not just as a result of natural hazards. In developing countries like The Gambia, high poverty is associated with unemployment and no access to land ownership. These are some of the main factors that may compel the local people to migrate and settle in areas that are highly prone to climate change hazards. According to Terry Cannon (1994) and Bouchard et al. (2023), poor people are more likely to live in dwellings that are naturally vulnerable to natural hazards than rich people. One of the greatest challenges local communities face in preparing and responding to flood events is an uninformed local dweller. Inadequate data leads to information shortage and ignorance which can lead to a very chaotic response by the local community members. Effective and efficient flood management begins with a better understanding of the flood impact.

Floods are the overflow of water that submerges dry land. Floods are the most common and devastating disasters currently affecting all sectors of life

(Maranzoni et al., 2023). Floods can be emotionally devastating, Hudson et al. (2019) state in their findings that "experiencing a flood has a large negative impact on subjective well-being that is incompletely attenuated over time". It is obvious that one does not have to be directly affected by flood to be affected by subjective well-being hence it is lower for anyone who anticipates their flood risk to increase or live in the trauma of a neighbor's flood experience. On the contrary, those living around flood-prone areas and having prepared for flooding have higher subjective well-being. Flood coping strategies refer to actions that individuals, communities, and systems employ to manage and adapt to the impacts of flood disasters (Mensah & Ahadzie, 2020). It is a very important measure to evaluate the local communities' resilience to the impact of floods. Research conducted by Gomez et al. (2020) reveals that local communities in The Gambia have their recommended strategies for coping or mitigating coastal erosion (flooding) of which most of the local people are induced by anthropogenic, chromogenic, and naturogenic.

Research carried out by Shaari et al. (2017) indicated that flood has a serious implication on the country's GDP growth. This is because floods affect the country's agricultural sector and the growth of the manufacturing sector directly or indirectly. The Gambia is highly vulnerable to climate change-related disasters with both floods and dry spells affecting the country (Bojang et al., 2020). Since The Gambia has experienced the effects of climate change, the events of floods could have been more severe in the future (van der Geest & Warner, 2015).

However, despite the various research carried out and policies made towards combating this life-threatening hazard, over the last decade, the effects and impacts of climate-related hazards like flood are still visible and devastating as many researchers could not bridge the gap between flood impacts and the local communities' coping strategies. This menace has posed serious threats to rice field owners in The Gambia, especially in the Central River Region (CRR), which is seen as the "food basket" of The Gambia (Bagagnan et al., 2019). Flood has a high likelihood of jeopardizing the efforts made by local farmers in the Gambia. The impact of floods and the coping strategies of the local communities are key concepts in this study. This study has a significance that spans multiple levels—internationally and nationally. It provides comprehensive data on flood impacts and community coping strategies. It also underscores the importance of integrating local knowledge with broader scientific and policy efforts, fostering resilience against floods, and improving disaster preparedness and management globally, regionally, and locally. In light of this stark background, this research strives to provide more insights into flood impacts and the local peoples' adaptation or coping strategies along the River Gambia.

2. Materials and Methods

2.1. Study Area

The Gambia is a small country occupying the two banks of The Gambia River

which are North and South of the river (Gambia & Diagnostic, 2020). Considering the 2013 Population and Housing Census, The Gambia has a population of 1,882,450 with a density of 176 persons per km^2 (GBoS, 2013). This research covered the whole country hence the focus of the assessment will be based on the impact on households and the coping strategies of communities along the River Gambia. The whole five regions; West Coast Region (WCR), North Bank Region (NBR), Lower River Region (LRR), Central River Region (CRR), and Upper River Region (URR)) and the two administrative regions (Kanifing (KMC) and Banjul (BJL) were covered in the assessment. In the FGD, the five regions were also covered leaving the other two administrative regions (KMC and BJL). The reason is that, the study is designed to know the local coping strategies of the people living in the rural and remote communities along the River Gambia. The selection of this research area is mainly motivated by settlements along the River Gambia which are much closer to the river.

2.2. Methods and Design

As a means of better understanding the flood impacts and household coping strategies of local communities along the River Gambia, this research employed the convergent parallel mixed method of case study designed (Meissner et al., 2011) to be able to access: the impacts of floods on household along the River Gambia. **Figure 1**, the convergent parallel mixed methods design helped in the simultaneous collection and analysis of both quantitative and qualitative data that provided a comprehensive understanding of the research problem. The results from each method were then compared and integrated during the interpretation phase to corroborate findings and draw holistic conclusions. The local coping strategies adopted by local households to mitigate, prepare, and respond to flooding. Our analysis used a mix of qualitative and quantitative data collected from both primary and secondary sources. This study was nationwide and adopted a mixed-methods design (Areia, Tavares, & Costa, 2023). The quantitative and qualitative data were gathered in the same phase of the research process during the data collection, analyzed independently, and interpreted together to produce results (Demir, 2018).

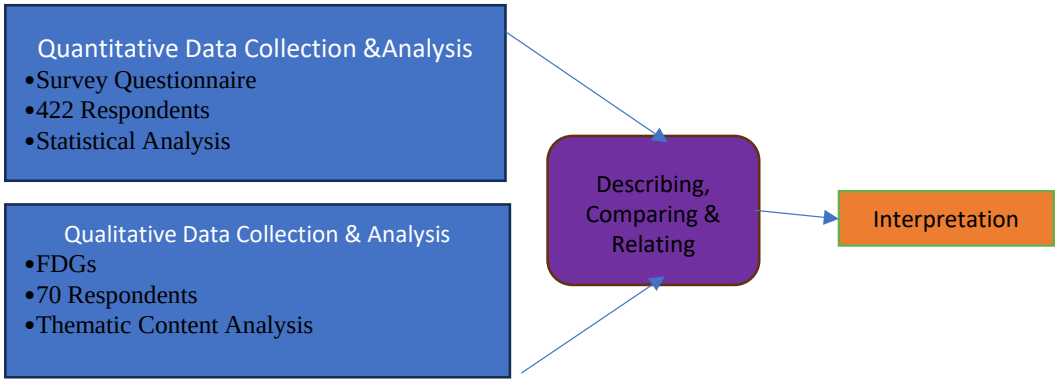

Figure 1. A framework of the study design showing the convergent parallel mixed method study approach.

2.3. Focus Group Discussion (FGD)

We employed one of the purposeful samplings; the Criterion Sampling Method for FGD participants. 10 FGDs were conducted with 7 participants in each group. This was done in five regions of the Gambia, namely the West Coast Region, North Bark Region, Lower River Region, Central River Region, and Upper River Region (GBoS, 2013). In each region, two FDGs were conducted, one for females and the other for males. The FDG was convinced that interviewing community members in a group discussion would be very helpful (Sakurai & Munadi, 2018).

The participants were selected purposively in consultation with the "Alikalos" (village heads). The following criteria were used during the selection of participants: 1) 30 years of age and above, 2) living in the community for more than 3 years, 3) Having experience of flood events, 4) currently a permanent resident in the area. Questions were open-ended and were well structured to capture the flood's local coping strategies and the impacts of the flood. The main questions asked were:

- What are the local coping strategies community members use before and during floods?
- How did you acquire this knowledge you've mentioned?
- How effective is your local strategy toward the management of floods in your community?
- What is well-known to be destroyed during floods in your community?
- How serious is the damage in your community?

2.4. Quantitative Data Collection

The design of this research was a community-based cross-sectional research approach (Zacharia, 2022). The impact assessment approach made use of socioeconomic, biophysical, and demographic variables. The research was conducted by the use of questionnaires for each selected household. The questionnaires were pretested for reliability and validity before the actual data collection was done (Liu & Miao, 2021; Q. Hu et al., 2021). Household heads were interviewed with the help of a semi-structured interviewer-administered questionnaire by simple random sampling in each selected community (Abbas & Routray, 2014). The data collection was determined by the factors, of both women and men, age 30 and above, household head, or a representative participation (Mugambiwa, 2018). Any person who has stayed in the research area for a minimum of 3 years was excluded from the research because he/she may have not experienced the last year's rainy season. A sample of 384 was generated ($n = pq\,(z^2e)^2$), and it was further multiplied by 10% for sampling error to obtain 422 respondents. The final 422 respondents were divided into five regions according to the GBoS 2013 population census on the number of households for each Local Government Area. In each region, 3 communities along the River Gambia were randomly selected.

2.5. Data Analysis

Qualitative data analysis: The interviews were Focus Group Discussions (FGD) and recorded using an audio recorder. Voice recording was done during discussions and field notes were kept for proper record writing. Afterward, the voice recordings were transcribed. The transcribed data were vigorously proofread to check the content of the writing to the voice records before the analysis. Later on, interview transcriptions and field notes from the observation process were read thoroughly to understand the issue from a holistic point of view. Direct quotes were used to reflect participants' views more strikingly and to depict the phenomenon more clearly by unfolding it for the readers.

Quantitative Data Analysis: In the quantitative stage, participants' answers obtained from the data collection tools (questionnaire) have been processed using the STATA 11. Both descriptive and inferential analyses were performed on the data collected during the survey. Microsoft Excel Office version 2016 software was used to manage the raw data and STATA 11 statistical analysis tools were used to analyze and do data interpretation. The obtained data were presented using descriptive statistics (percentages, frequencies, and pie charts). The relationship between respondents' demographic variables (eg. region, gender, age, ethnic group, religion, marital status, education, occupation, household size, and the number of years stayed in the community) was examined using Pearson's chi-square and Binary Logistic Regression. During the Binary Logistic Regression, we considered demographic variables (eg. region, gender, age, ethnic group, religion, marital status, education, occupation, household size, number of years stayed in the community) of respondents as the independent variable (coping ways or strategy) as the dependent variable.

3. Result and Discussions

3.1. Socio-Demographic Characteristics of the Household Head of Communities along the River Gambia (the Word "Data" Is Plural, Not Singular)

A total of 422 households responded to this research. Among the respondents, 294 (69.7%) were males, while 128 (30.3%) were females. More than one-third 183 (43.8%) of the respondents are not educated and 88 (20.9%) are farmers. More than half 218 (51.1%) of the respondents have lived in their communities for more than 20 years. Regarding household size, 250 (59.2%) have a household size of 6 or above (see Table 1).

Household experience of flood events shows that 416 (98.6%) had experienced a flood in their community. 298 (70.6%) stated that their houses had experienced floods where water entered their buildings (Table 2).

The result shows that the local people have less information about the impending floods, out of the respondents 9 (2.1%) said that they have information about the impending floods. 373 (88.4%) of the respondents said that they did not know any evacuation centre during flood disasters (Table 3).

Table 1. Demography of household Heads of communities along the River Gambia.

Characteristics	Frequency	Percentage
Region		
BJL	12	2.8
KMC	123	29.1
WCR	162	38.4
LRR	16	3.8
NBR	41	9.7
CRR	39	9.2
URR	29	6.9
Total	422	100.0
Gender		
Male	294	69.7
Female	128	30.3
Total	422	100.0
Age		
20 - 29	8	1.9
30 - 39	60	14.2
40 - 49	139	32.9
50 - 59	161	38.2
60 and above	54	12.8
Total	422	100.0
Education		
Primary	61	14.5
Secondary	87	20.6
Tertiary	73	17.3
Informal/Madarasa	16	3.8
Not Educated	185	43.8
Total	422	100.0
Occupation		
Civil Servant	88	20.9
Farmer	88	20.9
Trader	219	51.9
Others	27	6.4
Total	422	100.0
Settlement		
Rural	131	31.0
Urban	291	69
Total	422	100.0

Continued

Household Size		
5 Below	172	40.8
6 - 10	118	28.0
11 - 20	50	11.8
20 and Above	82	19.4
Total	442	100.0
Years Stayed		
5 Below	25	5.9
6 - 10	39	9.2
11 - 15	42	10.0
16 - 20	98	23.2
20 and Above	218	51.1
Total	422	100.0

Table 2. Household experience of flood events.

Flood Experience Variable	Yes	No
Community ever Flooded	416 (98.6%)	6 (1.4%)
Water entered the household	298 (70.6%)	124 (29.4%)

Table 3. Household Knowledge/Preparedness on the effects of flood.

Preparedness Variables	Yes	No
Received warning on impending flood	9 (2.1%)	413 (97.9%)
Know any safe place (evacuation centre)	49 (11.6%)	373 (88.4%)

The result of household knowledge or preparedness on the effects of the flood (**Table 2**) shows that the majority of the local people have knowledge of flood events but are not fully informed and prepared for early warning. This is in agreement with the research carried out by Perera et al. (2019), which reveals that the local people do not have an adequate response to an early warning system to reduce the effect of flood disasters. In the same vein, a similar survey was carried out in Pakistan where the result suggested that there was an ineffective early flood warning system that could be a result of many factors (Samansiri et al., 2023). In addition, the result of this research has shown that the majority of the local people could not identify locally, a designated location or place for an evacuation centre during a flood disaster contrary to what was found in the research conducted in Indonesia (Rahman et al., 2018; Sutton et al., 2020).

3.2. Impacts of Flood on Households along the River Gambia Using Pearson Chi-Square Test

Table 4 shows Pearson Chi-square results for the impacts of the flood on households along the River Gambia. In the results, region, and gender were

highly significantly associated with death impact as a result of flood. The region, gender, ethnic group, and occupation were also highly significantly associated with the impact of the flood on injury to household members. Region, gender, age, ethnic group, occupation, settlement type, household size, and number of years stayed in the community were all highly significantly associated with the impact of water entering houses.

Table 4. Pearson chi-square result for the impact of the flood on household.

Items	Factors	X Value	*p* Value
Did any member of your household die as a result of the last flood?	Region	29.882	.000
	Gender	9.275	.002
	Age	2.774	.596
	Ethnic Group	4.116	.249
	Religion	.411	.521
	Marital Status	.395	.983
	Education Level	4.746	.314
	Occupation	7.341	.062
	Settlement Type	3.645	.056
	Household Size	5.384	.146
	Years in the community	3.779	.437
Did any member of your household suffer injury as a result of the last flood?	Region	51.466	.000
	Gender	19.742	.000
	Age	9.501	.050
	Ethnic Group	14.862	.002
	Religion	2.363	.124
	Marital Status	8.768	.067
	Education Level	5.394	.249
	Occupation	23.648	.000
	Settlement Type	1.055	.304
	Household Size	3.353	.340
	Years in the community	3.632	.458
Do you consider your coping strategies sufficient?	Region	2.055	.915
	Gender	1.758	.185
	Age	51.863	.000
	Ethnic Group	2.485	.478
	Religion	.411	.521
	Marital Status	27.772	.000
	Education Level	27.486	.000
	Occupation	13.686	.003
	Settlement Type	1.818	.178
	Household Size	4.768	.190
	Years in the community	8.840	.065

Continued

Did water enter your building during the last flood?	Region	92.407	.000
	Gender	14.913	.000
	Age	10.685	.030
	Ethnic Group	12.079	.007
	Religion	.290	.590
	Marital Status	8.545	.074
	Education Level	9.078	.059
	Occupation	16.671	.001
	Settlement Type	43.355	.000
	Household Size	22.826	.000
	Years in the community	29.147	.000
Has your community ever been flooded?	Region	13.797	.032
	Gender	1.114	.291
	Age	4.611	.330
	Ethnic Group	12.727	.005
	Religion	.620	.431
	Marital Status	.578	.966
	Education Level	2.464	.651
	Occupation	3.324	.344
	Settlement Type	3.608	.057
	Household Size	4.578	.205
	Years in the community	5.945	.203

Pearson chi-square result for households' preparedness for flood risk indicated that region, age, ethnic group, marital status, educational level, occupation, settlement type, household size, and years in the community were all statistically significantly associated with the household preparedness toward flood events. This is similar to the research carried out by (Elum & Lawal, 2022) where their Pearson chi-square shows age and household size have an influence on the preparedness of local people for the flood. The chi-square analysis test (**Table 4**) shows that region, gender, ethnic group, and occupation were the only demographic variables that have shown a statistically significant association with the question about death as an impact of flood in their communities. Furthermore, region, gender, age, ethnic group, occupation, settlement type, household size, and number of years stayed in the community were all highly significantly associated with the impact of water entering the house and its consequences. This suggested that local people know and are aware of the impact of floods in their communities. A similar research carried out by Rakib et al. (2017) indicated that the local people (80%) are aware of the flood impacts or consequences.

3.3. Households' Preparedness to Flood Risk along the River Gambia Using Pearson Chi-Square Test

Table 5 shows Pearson chi-square results of households' preparedness to flood communities along the River Gambia. Region, age, ethnic group, religion, education level, settlement type, household size, and years in the community were all significantly associated with household access to electricity. Region, age, ethnic group, religion, educational level, occupation, settlement type, household size, and years in the community were all significantly associated with household members having health or asset insurance in case of flood disaster. Region, age, ethnic group, marital status, educational level, occupation, settlement type, household size, and years in the community were all highly significantly associated with household preparedness for flood events.

Table 5. Pearson chi-square result for households' preparedness to flood risk.

Items	Factors	X Value	*p* Value
Does your household have access to electricity?	Region	40.458[a]	.000
	Gender	3.229[a]	.072
	Age	12.133	.016
	Ethnic Group	32.848	.000
	Religion	88.921	.000
	Marital Status	5.838	.212
	Education Level	21.044	.000
	Occupation	108.153	.000
	Settlement Type	30.710	.000
	Household Size	15.616	.001
	Years in the community	56.400	.000
Do you have access to flood maps?	Region	13.256	.039
	Gender	.010	.919
	Age	31.501	.000
	Ethnic Group	3.148	.369
	Religion	.725	.395
	Marital Status	15.357	.004
	Education Level	6.611	.158
	Occupation	11.020	.012
	Settlement Type	5.424	.020
	Household Size	10.774	.013
	Years in the community	9.445	.051

Continued

Have you used any institution to insure yourselves (life, health) or property (household goods, house vehicle, and the like) in the past 12 months?	Region	69.634	.000
	Gender	.015	.904
	Age	23.038	.000
	Ethnic Group	33.319	.000
	Religion	11.835	.001
	Marital Status	4.121	.390
	Education Level	19.328	.001
	Occupation	29.914	.000
	Settlement Type	8.957	.003
	Household Size	15.792	.001
	Years in the community	12.783	.012
Does your household know any safe place (Evacuation centre) you could move to during flood events?	Region	46.314	.000
	Gender	9.123	.003
	Age	7.472	.113
	Ethnic Group	19.589	.000
	Religion	5.504	.019
	Marital Status	8.362	.079
	Education Level	38.819	.000
	Occupation	24.586	.000
	Settlement Type	4.161	.041
	Household Size	3.748	.290
	Years in the community	33.178	.000
Are there preparations your household makes beforehand in anticipation of the flood?	Region	21.084	.002
	Gender	.144	.705
	Age	46.138	.000
	Ethnic Group	39.847	.000
	Religion	.010	.919
	Marital Status	79.628	.000
	Education Level	55.695	.000
	Occupation	41.169	.000
	Settlement Type	8.430	.004
	Household Size	19.870	.000
	Years in the community	11.370	.023

This study also tried to find out whether the local people had been interacting with flood risk maps but the majority of the respondents said that they did not have flood maps. A similar research was carried out in Ethiopia and it was established that flood risk maps were of great help in local coping strategies in flood management (Erena, Worku, & De Paola, 2018).

3.4. Local Communities' Knowledge of Their Local Coping Strategies

Table 6 shows the binary logistic result of how the local people responded to their flood local coping strategies. The result reveals that KMC (CL 9.250 - 3.739 and $p = .000$), NBR (CL −1.038 - 4.824 and $p = .002$) and CRR (CL 3.535 - .141 and $p = .034$), male gender (CL −.303 - 3.014 and $p = .016$), household head youth age 20 - 29 (CL 11.669 - 1.553 and $p = .010$), Mandinka ethnic group (CL 3.557 - .782 and $p = .002$), informal education (CL −.945 - 4.270 and $p = .002$), rural settlement type (CL .042 - 4.377 and $p = .055$), household size 5 below (CL 4.224 - .416 and $p = .017$), 6 - 10 (CL 4.545 - 1.519 and $p = .000$) and 11 - 20 (CL 6.120 - 2.764 and $p = .000$), and number of years stayed in the community 6 - 10 (CL 7.909 - .089 and $p = .045$) and 16 - 20 (CL 2.283 - .123 and $p = .029$) were all significantly associated with the household heads' knowledge on their local coping strategies.

Table 6. The binary logistic result on how local communities' members viewed their coping strategies was sufficient.

Variables	Odd ration	(95% CL)	*p* value
Region			
BJL	2.4444	6.065 - 1.176	.186
KMC	6.495	9.250 - 3.739	.000
WCR	1.653	3.414 - .108	.066
LRR	1.767	3.670 - .136	.069
NBR	−2.931	−1.038 - 4.824	.002
CRR	1.838	3.535 - .141	.034
URR	Ref	ref	ref
Gender			
Male	−1.659	−.303 - 3.014	.016
Female	ref	ref	ref
Age			
20 - 29	6.611	11.669 - 1.553	.010
30 - 39	−1.720	.452 - 3.892	.121
40 - 49	−.750	.820 - 2.320	.349
50 - 59	−.960	.573 - 2.494	.220
60 and above	ref	ref	ref

Continued

Ethnic Group			
Mandinka	2.169	3.557 - .782	.002
Wolof	.607	2.969 - 1.756	.615
Fula	1.236	2.753 - .282	.111
Others	ref	ref	ref
Religion			
Islam	−.369	1.419 - 2.156	.686
Christianity	ref	ref	ref
Marital Status			
Married	20.855	155749.472 - 155707.762	1.000
Single	15.478	155744.095 - 155713.139	1.000
Widowed	119.267	155748.175 - 155709.059	1.000
Divorced	Ref		Ref
Education			
Primary	.995	2.251 - .260	.120
Secondary	−.407	1.044 - 1.858	.582
Tertiary/University	−.427	1.120 - 1.975	.588
Informal/ Madarasa	−2.607	−.945 - 4.270	.002
NA	ref	ref	ref
Occupation			
Civil Servant	1.873	4.792 - 1.045	.208
Farmer	1.981	4.736 - .775	.159
Trader	−1.884	.704 - 4.473	.154
Others	ref	ref	ref
Settlement Type			
Rural	−2.168	.042 - 4.377	.055
Urban	ref	ref	ref
Household Size			
5 below	2.320	4.224 - .416	.017
6 - 10	3.032	4.545 - 1.519	.000
11 - 20	4.442	6.120 - 2.764	.000
20 and above	ref	ref	ref

Continued

Years stayed in the community			
5 below	20.240	27231.607 - 27191.127	.999
6 - 10	3.999	7.909 - .089	.045
11 - 15	−.724	.758 - 2.207	.338
16 - 20	1.203	2.283 - .123	.029
20 and above	ref	ref	ref

3.5. Qualitative Data

Knowledge of flood among the local communities during FGD

Participants show a local knowledge of flood management. All participants pointed out that both river and flash floods occurred mainly during the rainy season (June to October). They pointed out that whilst flooding can be induced by heavy rainfall, it frequently happens where there is less preparation and socio-oeconomic strength to curb the effect of flood.

"…yes rainfall is the main cause of flood in this community but our way of settlement and financial strength are not able to handle the effect of the flood as you can see…" (Participant 2 in Dasilameh—Male group).

It was said by the participants that water spread rapidly in their villages due to the intensity and duration of rainfall. The longer the rainfall, the faster the flood water and the more destruction it makes on farmlands and buildings. Based on this, women in LRR were able to identify a particular place in the village square, a high land which they viewed as a temporary evacuation centre during severe floods. Moreover, the men group in CRR-North showed a very high level of awareness of vulnerability and exposure to certain locations in their villages, they've reiterated that households located in swampy (lowland), mud houses, and are not raised higher above the ground are the ones mostly affected during flood events.

3.6. Impact of Flood-FGD

It was unanimously agreed in all the discussions that the greatly and frequently affected asset is their farmlands. However, roads are the second most destroyed as mentioned by the majority. Buildings came third hence some participants said that their houses were not seriously affected because they built them on high land instead of lowland.

The impact of the flood in The Gambia is greatly felt as much research has shown in another part of the world where floods in some cases claimed lives. Olanrewaju et al. (2019) and Hu et al. (2018) in their research noticed that the impact did not only stop at destroying roads and buildings but also on vulnerable lives whose resilience is very low. Run-offs, coverage areas, and impacts of the flood are on the increase as stated by the participants in FGD. Most of the

informants have a view that the main cause of flood could be anthropogenic activities like blocking the drainage system, building houses or fences on the run-off, building flimsy house foundations, etc. Similar causes were also identified in research carried out in Nigeria (Aderogba, 2012). In addition, this research also reveals that floods are capable of destroying people's assets like farmlands, buildings, roads, livestock, etc. This is also mentioned by Aderogba (2012), Banerjee (2010), and Banerjee (2010) in their research on the effect/impact of floods on the people.

Based on the FGD, participants had shown that flood has a great impact on their livelihood. Out of the total participant who said "yes" flood has damaged their assets, **Figure 2** shows that farmlands (32%) and roads (31%) are the two most affected assets out of the four assets discussed. Out of the 70 participants in the five regions during the FGD, 69 participants agreed that their farmlands were destroyed by flood, 63 out of 70 agreed that their buildings were destroyed, 66 out of 70 also said that the roads were destroyed, 16 out of 70 said that their livestock were destroyed by flood water. "…We are always seeking help both from the government and philanthropists to prevent our farms from flooding because we are financially constrained." (FGD Male group NBR). Local people even though they have some local strategies for coping with floods, all admitted that their strategies are not sufficient thus they needed help to be able to properly manage the adverse effects of floods in their communities. "…yes we have our local means of managing flood but we are very often overwhelmed by the strength the flood water enters our farmlands and houses, that is why we need help to be able to do our farming well, especially during the rainy season" (FGD, Female group LRR).

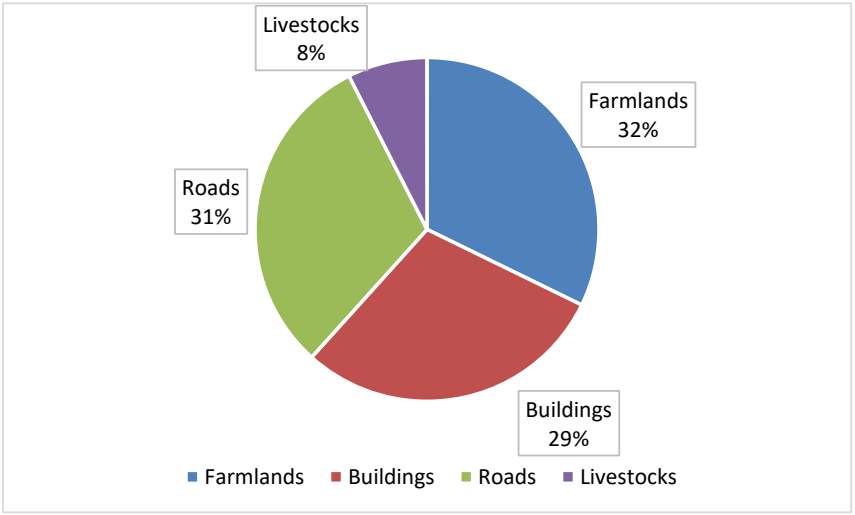

Figure 2. A bar chart showing the response of participants of FGD in the five regions on assets damaged.

This research revealed that households have their local coping strategies that are always employed. Local strategies like; sandbags to block or reduce the speed

of flood water, household reinforced buildings or raised elevations of the house to obstruct the entry of flood waters into their houses, and constructing contour bonds and dikes to prevent flood were all identified during the research which was in consonant with the research carried out by Yin et al. (2021) and Jonga et al. (2021). Based on the result (**Table 7**), the local community members had much more concentration on the control of flood water and their assets than on the control of flood water sources (Iacob et al., 2014).

Table 7. A table showing the local people's flood coping strategies during FGD.

Local Strategy	Explanation
Sandbag	Filling sandbags and placing them on the run-off waterway. This helps to reduce the speed and the force of water especially flood water entering the house.
Raised elevations of the house	Raising the elevation of the house high above the ground level. This helps the house to be above the flood water level thus minimizing the entering of water into houses during flood events.
Construction of contour bonds and dikes	Constructing contour bonds helps block and divert flood water and has been seen as a very effective and helpful coping strategy among the local people.
Building houses on highland	Building houses on highlands had been seen by many to be very effective. Local people survey the land before they decide on the site to construct their houses.

4. Conclusion

The household flood coping strategies are not homogeneous within a given society or community. Local strategies are highly influenced by socioeconomic and cultural factors. The local coping strategies are readily available and accessible to everyone, although underlying causes of vulnerability that are within these communities have great influence. It is obvious that flood local coping strategies have their limitations and some of these could be exogenous processes that have influenced flooding in local communities thus rendering the local strategies less relevant. This was seen when many local people said during the survey that their local coping strategies were not sufficient to curb the effects of climate change hazards in their communities. The impacts of climate change hazards like floods, etc. are greatly felt among the local people. The result from this research indicated that all local people agreed that their communities are affected by flood although the effects may vary from individuals depending on the assets possessed.

The results also showed that most of the household heads have little or no knowledge and awareness of household flood preparedness thus showing a low level of adaptation capacity to deal with the impact of climate hazards like floods (Elum & Lawal, 2022). We strongly recommend that support be rendered to the local communities for an adequate adaptation to climate change-related disas-

ters. Government, NGOs, and other stakeholders should consider the local peoples' knowledge in coping with the flood during their intervention approaches thus making their policies proactive.

We recommend a detailed assessment and mapping of flood hazards of communities along the River Gambia. There is a need for further research on integrating local knowledge with scientific approaches and assessing the long-term psychological, social, and socioeconomic impacts of floods. These are crucial for enhancing community resilience and informing policy implementation in The Gambia and the sub-region. Evaluating existing policies and integrating climate change adaptation measures into flood risk management strategies are crucial for sustainable resilience building for The Gambia.

Limitations of the Study

The research faces limitations due to financial constraints, time limitations, the broad scope of being country-wide, and the reluctance of some local people to participate in the survey. These limitations, delayed data collations and analysis thus hindering capturing seasonal variations. Conducting a country-wide study resulted in logistical challenges. Despite these limitations, the study offers valuable insights into the impact of flood and coping strategies of communities along the River Gambia.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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