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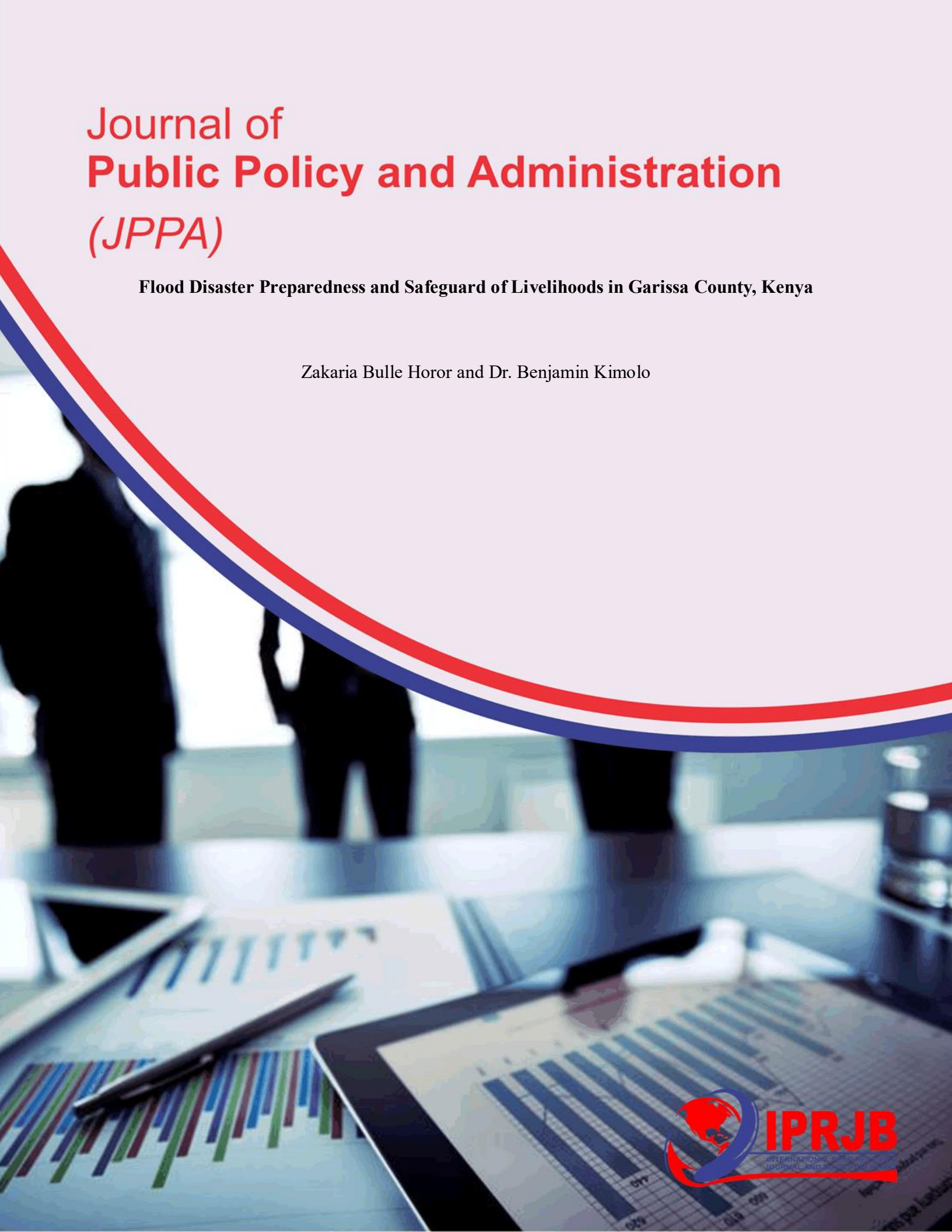
Zakaria Bulle Horor and Dr. Benjamin Kimolo



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Flood Disaster Preparedness and Safeguard of Livelihoods in Garissa County, Kenya

[1*]Zakaria Bulle Horor
Department of Public Policy and Administration, Kenyatta University, Kenya

[2]Dr. Benjamin Kimolo
Department of Public Policy and Administration, Kenyatta University, Kenya

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Abstract

Purpose: The study investigated the effect of flood disaster preparedness on the safeguarding of livelihoods in Garissa County, Kenya. Specifically, it examined how flood risk assessment, fiscal resource allocation, community involvement, and capacity building in flood emergency planning affect the protection of households against recurrent flooding.

Methodology: The study employed a descriptive research design targeting 141,444 individuals, including disaster officials, households in flood-prone areas, and community-based organizations. Stratified random sampling was used to select 384 respondents. Data were collected using structured questionnaires and key informant interviews. Reliability of instruments was confirmed (Cronbach's alpha > 0.7), and validity was ensured through expert review. Quantitative data were analyzed using STATA version 16 through descriptive statistics, Pearson correlation, and multiple regression.

Findings: Findings showed that all four preparedness dimensions flood risk assessment, fiscal resource allocation, community involvement, and capacity building had positive and significant relationships with safeguarding livelihoods. Regression analysis confirmed that community involvement and capacity building were the strongest predictors. Challenges included inadequate funding, weak coordination, and limited participation in planning.

Unique Contribution to Theory, Practice, and Policy: The study extends disaster risk reduction theory, adaptive capacity theory, and resilience theory by providing empirical evidence that preparedness measures directly enhance community resilience. Practically, it highlights the importance of inclusive participation, transparent fiscal management, and capacity building. Policy-wise, it informs county and national governments to adopt proactive, community-centered preparedness strategies.

Keywords: *Flood Disaster Preparedness, Livelihoods, Community Involvement, Fiscal Resource Allocation, Capacity Building*

JEL Codes: *Q54, I32, H75, H83, H41*

INTRODUCTION

Flood disasters have become an increasingly urgent global challenge, threatening human security, economic stability, and sustainable livelihoods. Among all natural disasters, floods are the most frequent, affecting over 6.6 million people annually (Chaudhary and Piracha, 2021). They displace communities, destroy homes and infrastructure, and damage agricultural land, disrupting local economies and pushing vulnerable households deeper into poverty (Masese, Neyole, and Ombachi, 2016; Erman et al., 2020). The effects are more severe in low-income regions, where residents primarily rely on farming, animal husbandry, and informal commerce for their livelihoods.

Worldwide, countries have adopted different centralization strategies to properly prepare for floods, including infrastructural, community, and policy-level activities. Infrastructural measures like embankments or dikes, and drainage are some of the critical measures for flood control in Bangladesh and the Netherlands. The Netherlands under the Delta Works combines heavy flood barriers with very sophisticated water control systems to protect vulnerable lands (Pot, 2024). Community-based strategies in Bangladesh and Japan generally consist of early warnings, drill practices, and campaigns for educating the population that enable people of working together quickly in response to the flood hazard (Ghosh et al., 2023; Nguyen et al., 2020). At the policy level, countries such as the United States have introduced comprehensive reforms in floodplain regulation and emergency response mechanisms, particularly after disasters like Hurricane Katrina (Gall and Cutter, 2019).

These global approaches offer valuable lessons for Kenya, and more specifically for Garissa County, in designing more effective flood preparedness strategies. For example, Garissa could adapt Bangladesh's localized early warning systems to inform pastoralist communities or implement land-use regulations similar to those in the Netherlands to prevent settlement in high-risk areas. Integrating structural measures, community engagement, and governance reforms could significantly enhance resilience in flood-prone areas. However, much of Africa continues to face challenges in preparedness due to limited resources, fragmented institutions, and reactive planning. While Mozambique and Nigeria have made progress following major floods, gaps remain in their implementation. South Africa has experienced some success through investment in urban drainage and enforcement of building standards, although flash flooding continues to pose risks (Mutasa, 2022; Echendu and Georgeou, 2021; Ziervogel et al., 2016).

Kenya is no exception. Regions such as the Tana River Basin, Nairobi, and coastal lowlands frequently experience destructive flooding that displaces populations and destroys crops and livestock (Karanja and Saito, 2018; Njogu, 2021). Although preparedness mechanisms exist, including early warning systems and disaster response frameworks, these are often under-resourced, poorly coordinated, and implemented inconsistently (MacLeod et al., 2021). Garissa County is particularly vulnerable due to its flat topography, arid and semi-arid conditions, and heavy reliance on rain-fed agriculture and pastoralism. In 2020, floods displaced over 48,000 residents and submerged approximately 12,000 hectares of farmland (NDMA, 2020).

Garissa has received little attention in disaster preparedness research despite being highly exposed to flood risks. Most studies in Kenya concentrate on urban centers or agriculturally productive

highlands. Consequently, not much is being explored on flood risk dynamics in arid and semi-arid regions. Limited knowledge inhibits policymakers and practitioners in designing interventions intentionally meant for protecting livelihoods in such landscapes.

This study tries to fill in this critical gap by investigating the effects of flood disaster preparedness on livelihood protection in Garissa County. By focusing on this less-studied region, the study complements ongoing efforts directed at building disaster resilience in Kenya. It gives policy-relevant implications for sound resource allocation and good governance, pragmatic guidance toward building local preparedness systems, and a scholarly contribution toward the furtherance of disaster management theory in the context of arid and semi-arid environments.

Statement of the Problem

Flood disasters in Garissa County continue to pose significant threats to local livelihoods, despite ongoing interventions. The county's arid and semi-arid conditions, flat terrain, and proximity to the Tana River increase exposure to recurrent flooding. These floods frequently destroy agricultural land, kill livestock, and disrupt access to markets and public services, pushing already vulnerable communities into deeper cycles of poverty. According to the Kenya Red Cross Society, the 2019–2020 floods disrupted the livelihoods of 80% of pastoralist households and led to the death of approximately 32,000 livestock (KRCS, 2021). Beyond household impacts, flooding in 2023 damaged over 40 public schools, forcing temporary closures and disrupting learning for thousands of children (MoE, 2023). Recovery timelines often exceed six months, with inadequate follow-up support, which hinders economic stability and food security. Recent estimates by the World Bank indicate that recurrent floods in Garissa cost the county approximately KSh 1.8 billion annually in lost agricultural production, infrastructure damage, and emergency assistance (World Bank, 2023).

Although the government, humanitarian agencies, and local stakeholders have implemented various interventions, including the National Flood Response Plan and Garissa County's Integrated Development Plan (CIDP), significant preparedness gaps remain. Flood risk assessments are irregular and not well-integrated into planning processes, leaving communities under-informed and exposed. Funding for preparedness is often delayed or insufficient, limiting timely infrastructure upgrades and contingency planning. Community involvement is generally low, with most disaster planning occurring in top-down frameworks that exclude local voices. Capacity building for emergency response remains weak, contributing to uncoordinated institutional reactions during crisis periods.

These shortcomings reflect deeper systemic issues. Institutional inertia, characterized by a slow policy response and bureaucratic delays, undermines proactive flood management. Weak decentralization limits the autonomy of county governments like Garissa to implement context-specific disaster strategies. Additionally, limited accountability in resource allocation and project execution reduces public trust and leads to mismanagement, duplication of efforts, or neglect of high-risk zones. These systemic challenges reduce the overall effectiveness of flood preparedness and weaken livelihood protection.

Most research on flood management in Kenya focuses on urban areas or general national policy frameworks. There is limited empirical evidence on how specific preparedness mechanisms such

as risk assessment, fiscal allocation, community participation, and capacity building, impact livelihood outcomes in arid and semi-arid counties. This lack of localized analysis creates a critical knowledge and policy gap. Consequently, this study seeks to investigate how flood disaster preparedness influences the safeguarding of livelihoods in Garissa County, with a focus on strengthening context-specific strategies that are inclusive, well-funded, and institutionally grounded.

LITERATURE REVIEW

This section investigates the underlying principles of flood risk management and livelihood preservation in Garissa County. It describes the manner in which disaster risk management, adaptive capacity, and resilience theoretical frameworks influence community foregrounding to reduce vulnerability at the household level to floods. Then it also looks into the existing gaps in knowledge and further provides the conceptual framework describing the association between preparedness actions, such as risk assessment, allocation of money, community involvement, and capacity strengthening, with the protection of livelihoods in the County.

Theoretical Framework

This study was anchored on three related theories that provided an understanding of preparedness and livelihood safeguarding. Disaster Risk Reduction (DRR) Theory stresses the systematic identification, assessment, and reduction of disaster risks as a way of resiliency-building and compatibility reduction (UNDRR, 2015). It speaks of anticipatory measures, risk mapping, preparedness drills, and early warning, amongst others. In the context of this study, the DRR Theory brings into focus that the structured assessments of risks and preparedness mechanisms somewhat reduce community or household vulnerability in Garissa County to the adverse effects of flooding. However, arguably, the DRR paradigm inclines towards placing emphasis mainly on technical and infrastructural solutions, such as hazard mapping or engineered barriers, with lesser attention given to the social and political dimensions of vulnerability. An over emphasis on such technical fixes often leads to overly centralized plans which deny communities any input or simply brush aside their knowledge on the issue. Adaptive Capacity Theory explains the ability of individuals, households, and communities to adjust to potential damage, take advantage of opportunities, or respond effectively to the consequences of hazards (Folke, 2016). Adaptive capacity in the context of managing flood risks is embodied in the ways communities respond through adjustments to the allocation of resources, institutional arrangements, and participatory planning. In this study, adaptive capacity is demonstrated in the degree of community engagement and financial allocation that may enhance the resilience and livelihood safeguarding of Garissa County. On the downside, the theory has been criticized for assuming that members of a community and institutions are always equipped with the resources, knowledge, or political capital necessary for them to mount a response. In places like Garissa where incidences of poverty, marginalization, and institutional constraints abound, adaptive capacity can be seriously curtailed.

Resilience Theory, first propounded by Holling (1973), states that systems have the basic ability to absorb shocks, to reorganize themselves, and continue functioning while undergoing change so as to accommodate an adverse event. Under flood management, resilience is created through strong capacity building, coordination mechanisms, and livelihood recovery mechanisms. This study

applies resilience theory to assess the contribution of preparedness activities such as training, emergency planning, and stakeholder coordination toward livelihood protection in flood-prone areas of Garissa County.

A major limitation of resilience theory is its conceptual ambiguity. It is at times very hard to define exactly what resilience needs to be in any given instance and how to gauge in absolute terms, some level of recovery or stability on one community as against another, rendering the application and especially the evaluation of strategies conceived under the notion of resilience somewhat highly intricate.

Each theory emphasizes a particular area of disaster preparedness; yet, they are interconnected and reinforce one another. While DRR identifies and describes risk, it allows for anticipatory actions before the disaster hits. These risk-reduction methods put Adaptive Capacity into motion since they allow systems and communities to respond in a flexible manner as threats emerge. Adaptive responses such as resource re-allocations or local actors' engagement in planning activities form the basis for building Resilience. In turn, resilience ensures that communities absorb shocks, remain functional, and recover livelihoods following flood events.

At the intersection of institutional fragility, limited resources, and high exposure to climate risks in Garissa County, these theories offer a very holistic view. DRR informs the act-place nexus; Adaptive Capacity determines the community's willingness to act; and Resilience implies the long-term sustainability of those actions. By their nature, these three perspectives are each limited in their scope, but together they provide a view that is balanced and of multiple layers into how the mechanisms for flood preparedness could potentially protect livelihoods in arid and semi-arid contexts.

Empirical Literature

Flood Risk Assessment and Safeguarding Livelihood

Buuren, Ellen, and Warner (2016) studied flood management in the Netherlands, highlighting how the introduction of a multilayered concept of safety brought about a transition from protectionist policies to a risk-oriented approach based on resilience. The study showed that institutional change was constrained by entrenched practices but, with increasing emphasis on resilience, there arose an improved ability to assess and plan for impending flood risks. Akter et al. (2018), in Belgium, showed how urbanization and climate change increased peak flows enormously in flood-prone catchments, putting an emphasis on integrating risk assessment into spatial and emergency planning. Onencan et al. (2016) noted similar lapses in Kenya, where inadequate flood risk assessments and poor dissemination of early warnings during the El Niño floods led to tremendous losses; hence, proactive risk identification and dissemination of information remain paramount to livelihood protection.

In Tana River County, Awuor et al. (2019) found that although flood risk mapping had gotten better following a series of disasters, some risk data were rarely brought forth for decision-making at the community level. Guleid and Abikar (2021) report that communication of risks was usually hindered by language and by pre-emptive alerts, rendering the early warning systems ineffective for nomadic populations of Mandera. These cases suggest that, in addition to technical assessments, it is very important to have local-level adaptation of flood risk data in ASAL settings.

Similarly, Mulwa (2013) saw in the lower Tana River that communities were growing aware of the threat of floods, but due to poor dissemination of risk information and inability to trust the official warnings, useful action was very much limited. Fathia et al. (2020) conducted a flood impact-based forecasting study in the River Tana Basin and showed how exposure and vulnerability data could be used to improve early warnings and guide preparedness interventions. These empirical contributions add to the argument that risk communication must be context-specific and tailor-made for marginalized communities in arid zones.

Fiscal Resource Allocation and Safeguarding Livelihood

Ishiwatari and Sasaki (2022) examined the historical flood protection budgets of Japan and concluded from their research that steady fiscal allocation over decades has made it possible for the country to bring down flood damages relative to national income from over 1% to less than 0.4%. The results stressed that a long-term commitment to finance was necessary for building resilience. Panwar and Sen (2020) looked into various Indian states and found that floods severely affected state finances by way of increased expenditure and intergovernmental transfers, decreased state revenues, and worsened budget balances. These impacts demonstrated the negative effects on sustainable pre-disaster financing. Nyandiko (2020) highlighted that mismanagement and late fund allocation for flood mitigation from Nairobi and Western Kenya worsened the disaster impacts, emphasizing that delay or improper allocation of funds renders all flood preparedness measures ineffective.

The study by Hassan et al. (2020) in Isiolo County found that the delays in the release of contingency funds affected response times and created mistrust between local administrators and communities. Similarly, Lomuria and Ewoi (2022) in their study in Turkana reported that limited budgetary autonomy at the county level prevented investment in localized flood control infrastructure. These findings imply that institutional bottlenecks in devolved governance structures compromise fiscal preparedness in ASAL counties.

Community Involvement and Safeguarding Livelihood

According to Nguyen et al. (2020), community-based flood management in Bangladesh has been evaluated in cases where awareness-building campaigns, drills, and participatory planning were believed to have been used for boosting local flood resilience. Guided by resolution in Accra, Ghana, Atanga (2020) discovered that although mostly community leaders were involved in the implementation phase, engaging them in the planning phase highly contributed to improved methods for flood management. Mulligan et al. (2016) analyzed community adaptation in the informal settlements of Kibera, Kenya, and found that while households attempted adaptation largely by themselves, successful flood management had to be a combination of local effort with policy interventions.

In a study done in Turkana by Ekal and Namoit (2019), it was found that elders and clan leaders shape community engagement and that therefore, formal government processes sometimes come into conflict with such local governance systems. Musyoka and Odhiambo (2021) noted that in Tana River, women's participation in disaster planning remained basically insignificant because of cultural norms while at the same time, they were central in household-level coping. These

findings imply that social structure and gender dynamics influence greatly the community-based preparedness.

Flood Emergency Planning, Capacity Building, and Safeguarding Livelihood

Popering-Verkerk and Buuren (2017) assessed pilot projects in the Netherlands and showed that collaborative approaches enhanced institutional capacity to manage flood risks, though success depended on supportive functional contexts. Shah et al. (2018) investigated schools in Pakistan and revealed significant weaknesses in flood preparedness, including inadequate planning for children with disabilities and poor continuity systems, underscoring the need for structured training and capacity building. In Kenya, MacLeod et al. (2021) analyzed heavy rainfall advisories and found that while forecasting tools improved recognition of flood events, limited spatial detail and broad probability ranges reduced their utility for preparedness.

A study in Isiolo by Wambua et al. (2022) noted that county disaster teams lacked basic training in emergency coordination, and there were no clear protocols for protecting people with disabilities. In Mandera, Ali and Huka (2020) reported that capacity-building programs often excluded minority clans and female-headed households, limiting equitable access to preparedness support. These studies highlight that capacity-building efforts must address social inclusion to be effective.

While existing studies provide valuable insights into flood preparedness, several gaps remain. Many studies focus on urbanized or developed contexts, with relatively few addressing semi-arid counties like Garissa. Risk assessment practices in ASALs are rarely localized, and their link to livelihood protection remains underexplored. Fiscal allocation research tends to operate at the national or state level, with limited attention to how county-level budgeting under devolution affects preparedness. Social dimensions of preparedness are also understudied. Gender, disability, and socio-economic status all influence how households access early warning systems, training, or relief support, yet most studies fail to integrate these factors. The literature from Tana River, Turkana, and Isiolo shows that preparedness interventions must account for cultural dynamics, informal governance, and social marginalization to be effective. Further research is needed on how flood preparedness mechanisms particularly at the county level affect the resilience and livelihood outcomes of marginalized groups in ASAL regions. In particular, Garissa County presents a compelling case for examining how risk assessment, fiscal allocation, community participation, and emergency capacity interact to shape flood response and recovery in a devolved governance context.

Conceptual Framework

This study conceptualizes the relationship between flood disaster preparedness and the safeguarding of livelihoods in Garissa County. Preparedness is captured through four dimensions: flood risk assessment, fiscal resource allocation, community involvement, and emergency capacity building. These variables are expected to influence livelihood safeguarding, which is measured through income protection, recovery programs, and infrastructure resilience.

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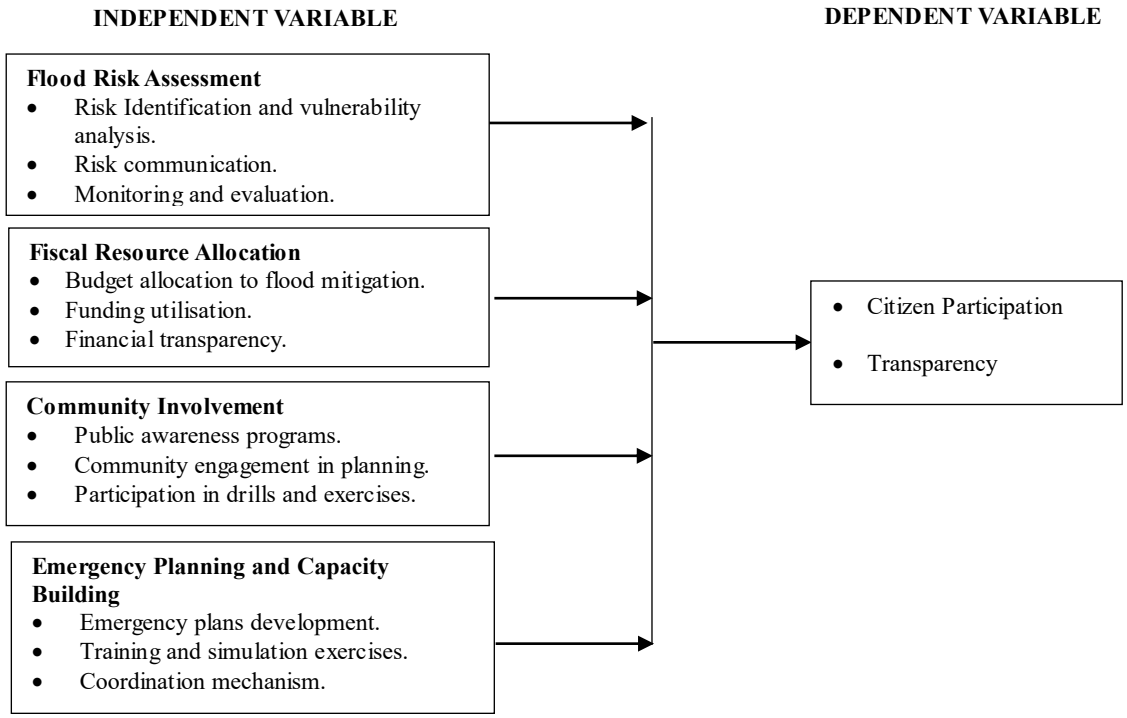

Figure 1: Conceptual Framework

METHODOLOGY

The study adopted a descriptive research design because it was suitable for examining the relationship between flood disaster preparedness and the safeguarding of livelihoods in Garissa County in a real-life context. This design enabled the systematic collection of both quantitative and qualitative data to provide a comprehensive understanding of the phenomenon without manipulating variables.

The target population consisted of 141,444 individuals, including county disaster management officials, households residing in flood-prone areas, and members of community-based organizations. Using Yamane's formula at a 95% confidence level, a sample size of 384 respondents was determined. A stratified random sampling technique was employed to ensure that the perspectives of officials, households, and organizations were adequately represented.

Data collection involved the use of structured questionnaires administered to households and community-based organizations. The research instrument was validated through expert review, while a pilot study was conducted to ensure reliability. Cronbach's alpha coefficients for all constructs exceeded 0.7, confirming internal consistency. Quantitative data were coded and analyzed using STATA Version 16. Descriptive statistics such as means, frequencies, and standard deviations were used to summarize the data. Pearson correlation analysis was applied to test the relationships between flood preparedness dimensions and livelihood safeguarding. Multiple

regression analysis was conducted to assess the predictive power of the preparedness dimensions on livelihood outcomes.

RESULTS AND DISCUSSION

The study assessed four dimensions of flood disaster preparedness flood risk assessment, fiscal resource allocation, community involvement, and emergency capacity building and their relationship with livelihood safeguarding in Garissa County. Respondents were asked to indicate their level of agreement with various preparedness practices using a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Risk Identification and Flood Disaster Preparedness

The first objective of the study was to examine the effect of risk identification on flood disaster preparedness in Garissa County, Kenya. Respondents were asked to indicate their level of agreement with several statements related to risk identification practices using a five-point Likert scale. The results were presented in Table 1.

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Table 1: Descriptive Statistics on Risk Identification

Statement	SD (F/%)	D (F/%)	N (F/%)	A (F/%)	SA (F/%)	Mean	SD
Flood risk assessments are conducted regularly in the County.	6 (1.6%)	21 (5.5%)	72 (18.8%)	174 (45.3%)	111 (28.9%)	3.94	0.94
Flood risk assessment data informs livelihood protection planning.	4 (1.0%)	15 (3.9%)	65 (16.9%)	182 (47.4%)	118 (30.7%)	4.03	0.86
The County integrates risk zones mapping in development planning.	9 (2.3%)	30 (7.8%)	82 (21.4%)	176 (45.8%)	87 (22.7%)	3.79	0.96
Risk information is shared with all relevant stakeholders.	8 (2.1%)	26 (6.8%)	84 (21.9%)	173 (45.1%)	93 (24.2%)	3.82	0.94
Local knowledge is considered in identifying flood risks.	10 (2.6%)	28 (7.3%)	77 (20.1%)	169 (44.0%)	101 (26.3%)	3.84	0.99
Flood risk identification includes vulnerable populations.	7 (1.8%)	25 (6.5%)	83 (21.6%)	178 (46.4)	91 (23.7%)	3.84	0.93
Community-based assessments are part of flood risk identification.	11 (2.9%)	23 (6.0%)	90 (23.4%)	172 (44.8%)	88 (22.9%)	3.78	0.96
Flood-prone areas are clearly demarcated and monitored.	12 (3.1%)	27 (7.0%)	88 (22.9%)	165 (43.0%)	92 (24.0%)	3.78	1.00
Early warning needs are considered in risk assessments.	10 (2.6%)	29 (7.6%)	81 (21.1%)	168 (43.8%)	96 (25.0)	3.81	0.99
Experts are involved in identifying flood risks.	7 (1.8%)	24 (6.3%)	86 (22.4%)	170 (44.3)	97 (25.3%)	3.85	0.93
Data from past flood events is used in risk identification.	8 (2.1%)	21 (5.5%)	79 (20.6%)	174 (45.3%)	102 (26.6%)	3.89	0.93
GIS and remote sensing are used in flood risk identification.	9 (2.3%)	33 (8.6%)	86 (22.4%)	164 (42.7%)	92 (24.0%)	3.77	1.01
Overall Mean and SD						**3.83**	**0.96**

The findings show that risk identification plays a critical role in flood preparedness in Garissa County. Most respondents agreed that flood risk assessments are regularly conducted (74.2 %, $\bar{x}$ = 3.94), and a similar majority confirmed that risk data informs livelihood protection planning (78.1 %, $\bar{x}$ = 4.03). This suggests that risk assessments are not only consistent but also useful in shaping resilience strategies, a result consistent with studies in Kisumu and Somalia that highlighted the value of GIS-integrated and participatory approaches in identifying vulnerable zones and supporting planning (Odero et al., 2022; Osman and Das, 2023).

Technical and historical inputs were also emphasized, with expert involvement ($\bar{x}$ = 3.85) and the use of past flood records ($\bar{x}$ = 3.89) widely acknowledged as vital to preparedness. These findings align with Mugari et al. (2025), who demonstrated that combining expert knowledge with community participation produces more accurate risk mapping. Similarly, community-based approaches were strongly supported, as over two-thirds of respondents confirmed that local knowledge, participatory assessments, and stakeholder collaboration inform risk identification ($\bar{x}$

= 3.82–3.84). This reflects a strong culture of inclusivity, echoing Houessou Dossou et al. (2019), who showed that participatory GIS enhances hazard understanding in Kenya.

Other components, including the inclusion of vulnerable populations, early warning considerations, and the use of GIS and remote sensing technologies ($\bar{x}$ = 3.77–3.84), were also viewed positively. Overall, the construct recorded an average score of $\bar{x}$ = 3.83, reflecting a strong consensus that Garissa County applies a blended model of scientific, expert, and community-driven approaches to flood risk identification. Respondents further shared mixed views on the adequacy of risk communication, monitoring, and evaluation, highlighting areas that require strengthening to complement ongoing preparedness efforts.

Fiscal Resource Allocation and Safeguarding Livelihood

The second objective of the study was to examine the effect of fiscal resource allocation to flood mitigation on safeguarding livelihood in Garissa County. Respondents were asked to express their level of agreement with a series of twelve statements using a five-point Likert scale. The findings are presented in Table 2.

Table 2: Descriptive Statistics on Fiscal Resource Allocation

Statement	SD (F/%)	D (F/%)	N (F/%)	A (F/%)	SA (F/%)	Mean	SD
The budget allocated for flood prevention and control in Garissa County is sufficient.	25 (6.5%)	49 (12.8%)	116 (30.2%)	139 (36.2%)	55 (14.3%)	3.39	1.08
The allocation of resources for flood management is prioritized in local budgets.	12 (3.1%)	34 (8.9%)	101 (26.3%)	159 (41.4%)	78 (20.3%)	3.67	0.99
Budgetary provisions for flood prevention and control are regularly reviewed and updated.	9 (2.3%)	29 (7.6%)	95 (24.7%)	166 (43.2%)	85 (22.1%)	3.75	0.94
The funds allocated for flood prevention and control are used for their intended purpose.	17 (4.4%)	38 (9.9%)	112 (29.2%)	148 (38.5%)	70 (18.2%)	3.56	1.01
There is minimal wastage in the use of funds allocated for flood management.	21 (5.5%)	53 (13.8%)	108 (28.1%)	140 (36.4%)	63 (16.4%)	3.44	1.06
The community is informed about how flood control funds are utilized.	27 (7.0%)	58 (15.1%)	111 (28.9%)	130 (33.9%)	58 (15.1%)	3.34	1.09
The use of flood control funds is monitored regularly to ensure accountability.	11 (2.9%)	31 (8.1%)	104 (27.1%)	160 (41.7%)	77 (20.0%)	3.68	0.96
Flood prevention projects are completed within the allocated budget.	14 (3.6%)	39 (10.2%)	103 (26.8%)	154 (40.1%)	74 (19.2%)	3.61	0.99
There is a clear and transparent system for tracking flood control expenditures.	16 (4.2%)	36 (9.4%)	98 (25.5%)	157 (40.9%)	76 (19.8%)	3.63	1.00
Financial reports on flood spending are made available to the public.	22 (5.7%)	54 (14.1%)	107 (27.9%)	144 (37.5%)	57 (14.8%)	3.42	1.07
The public is involved in decisions regarding flood funding.	30 (7.8%)	62 (16.1%)	108 (28.1%)	126 (32.8%)	58 (15.1%)	3.31	1.12
Mismanagement of flood control funds is promptly addressed by authorities.	26 (6.8%)	55 (14.3%)	102 (26.6%)	138 (35.9%)	63 (16.4%)	3.40	1.09
Overall Mean and SD						**3.52**	**1.03**

The findings in Table 2 indicate that fiscal resource allocation contributes positively to flood preparedness and livelihood protection in Garissa County, though with mixed perceptions. Respondents expressed moderate satisfaction with the sufficiency of budgetary allocations, with

just over half agreeing or strongly agreeing (50.5 %, $\bar{x}$ = 3.39), while nearly one-fifth expressed dissatisfaction. This reflects the ongoing challenge of disaster financing, where adequacy is often judged against visible impacts of past interventions. Similar concerns were noted by Kiptum et al. (2023), who observed that despite improvements in Kenya's early warning systems, funding frameworks remain limited and largely reactive.

Budget prioritization was viewed more favorably, with over 60 % of respondents acknowledging that flood management receives attention in local fiscal planning ($\bar{x}$ = 3.67). Regular budget reviews were also reported, with 65.3 % in agreement ($\bar{x}$ = 3.75), suggesting that Garissa's fiscal framework is somewhat adaptive to emerging risks. These findings align with Okoko (2024) and Okunola (2025), who both highlighted fragmented but growing attention to flood-related financing within Kenyan counties, albeit constrained by structural and legal gaps.

Accountability mechanisms were another strength, as most respondents agreed that flood control funds are monitored and tracked transparently ($\bar{x}$ = 3.63–3.68). This reflects some progress in internal oversight, echoing Ninan (2024), who emphasized the role of financial governance in enhancing trust and effectiveness in flood management projects. However, transparency to the public and participatory budgeting were perceived as weaker areas, with fewer than half of respondents confirming that communities are informed or involved in funding decisions ($\bar{x}$ = 3.31–3.34). This finding resonates with Oino and Musau (2024), who argued that limited public engagement undermines climate adaptation efforts in Kenya.

Overall, the fiscal resource allocation construct recorded a moderately positive mean score ($\bar{x}$ = 3.52), indicating that while Garissa County has made strides in structured budgeting, monitoring, and prioritization, persistent gaps remain in budget adequacy, inclusivity, and transparency. These shortcomings highlight the need for more participatory and risk-responsive fiscal governance to strengthen resilience and livelihood protection.

Community Involvement and Safeguarding Livelihood

The third objective of the study was to establish the effect of community involvement in flood mitigation on safeguarding livelihoods in Garissa County. Respondents were asked to rate twelve statements using a five-point Likert scale. The findings are shown in Table 3.

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Table 3: Descriptive Statistics on Community Involvement

Statement	SD (F/%)	D (F/%)	N (F/%)	A (F/%)	SA (F/%)	Mean	SD
The community participates in flood awareness programs.	4 (1.0%)	8 (2.1%)	58 (15.1%)	174 (45.3%)	140 (36.5%)	4.07	0.89
Awareness programs have improved community knowledge about flood preparedness.	3 (0.8%)	9 (2.3%)	55 (14.3%)	168 (43.8%)	149 (38.8%)	4.11	0.90
Flood risk awareness campaigns are inclusive of all community members.	5 (1.3)	14 (3.7%)	69 (18.0%)	154 (40.1%)	142 (36.9%)	4.00	0.94
Public awareness programs are regularly updated to reflect current flood risks.	6 (1.6%)	11 (2.9%)	74 (19.3%)	160 (41.7%)	133 (34.6%)	3.96	0.93
The community is involved in planning flood prevention and control strategies.	9 (2.3%)	13 (3.4%)	72 (18.8%)	157 (40.9%)	133 (34.6%)	3.90	0.99
Community input is incorporated in flood management decision-making processes.	7 (1.8%)	12 (3.1%)	79 (20.6%)	152 (39.6%)	134 (34.9%)	3.91	0.96
Local residents have opportunities to contribute to flood preparedness plans.	6 (1.6%)	10 (2.6%)	67 (17.4%)	160 (41.7%)	141 (36.7%)	4.04	0.91
Community leaders do participate in flood risk management planning.	4 (1.0%)	11 (2.9%)	68 (17.7%)	162 (42.2%)	139 (36.2%)	4.02	0.90
The community regularly participates in flood preparedness drills.	8 (2.1%)	13 (3.4%)	76 (19.8%)	156 (40.6%)	131 (34.1%)	3.89	0.96
Participation in flood drills has improved community readiness for floods.	6 (1.6%)	10 (2.6%)	70 (18.2%)	161 (41.9%)	137 (35.7%)	3.97	0.93
Drills and exercises have helped the community prepare for actual floods.	5 (1.3%)	12 (3.1%)	73 (19.0%)	158 (41.1%)	136 (35.4%)	3.96	0.92
All community members are encouraged to participate in flood preparedness exercises.	7 (1.8%)	14 (3.6%)	71 (18.5%)	159 (41.4%)	133 (34.6%)	3.94	0.95
Overall Mean and SD	–	–	–	–	–	**3.97**	**0.93**

The findings show that community involvement plays a central role in safeguarding livelihoods through flood mitigation in Garissa County. A large majority of respondents confirmed participation in flood awareness programs, with more than four-fifths in agreement ($\bar{x}$ = 4.07), reflecting broad acceptance and trust in such initiatives. These programs were perceived as effective in shaping preparedness behaviors such as evacuation, safe construction, and community coordination, and as inclusive of diverse groups. This outcome aligns with Weesie (2025), who found that storytelling and local narratives strengthened engagement and adaptive behavior among agro-pastoralist populations in southeastern Kenya.

Awareness programs were also credited with improving flood knowledge, with nearly 83 % of respondents affirming their usefulness ($\bar{x}$ = 4.11). These efforts were seen not as superficial, but as fostering meaningful understanding and readiness across the community, consistent with Bhanye (2025), who showed that community-based education enhances resilience in informal settlements. Inclusivity was another key strength, with campaigns perceived to reach different demographic

groups ($\bar{x}$ = 4.00), echoing Opilo (2023), who documented that extension services ensured women, the elderly, and low-income households were not excluded from flood risk communication.

Participation in planning and decision-making was also positively viewed, with around three-quarters of respondents affirming that communities contribute to prevention strategies and that their input is considered in governance processes ($\bar{x} \approx 3.90–3.91$). Such perceptions reflect a growing sense of ownership and accountability, consistent with Ngigi (2024), who observed that participatory risk assessments in Kenya's drylands produced more accepted and implementable solutions. Similarly, opportunities for engagement were reported as strong, with both citizens and local leaders seen as actively involved in preparedness planning ($\bar{x}$ = 4.02–4.04), reinforcing Mwangi's (2023) findings that empowered leaders enhance uptake of early warnings and coordination.

Community preparedness drills were another area of strength, as most respondents confirmed regular participation and improved readiness ($\bar{x}$ = 3.89–3.97). Drills were noted to encourage inclusivity, build practical skills, and strengthen cohesion, findings consistent with Otieno (2024), who demonstrated their role in reducing disaster losses.

Overall, the community involvement construct recorded a high mean score ($\bar{x}$ = 3.97), reflecting strong approval of the county's efforts to promote inclusive and participatory flood preparedness. These findings suggest that Garissa has made commendable strides in embedding awareness, participation, leadership engagement, and drills into its flood governance framework. By combining education with active involvement, the county fosters resilience and ensures preparedness is not only a technical process but a collective responsibility.

Flood Emergency Planning and Capacity Building on Safeguarding Livelihood

The fourth objective of the study was to investigate the effect of flood emergency planning's capacity building on safeguarding livelihood in Garissa County. Respondents rated 12 statements using a five-point Likert scale. The results are presented in Table 4 below.

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Table 4: Descriptive Statistics on Flood Emergency Planning and Capacity Building

Statement	SD (F/%)	D (F/%)	N (F/%)	A (F/%)	SA (F/%)	Mean	SD
Flood emergency response plans are available in Garissa County.	13 (3.4%)	29 (7.6%)	88 (22.9%)	158 (41.1%)	96 (25.0%)	3.77	0.99
Emergency plans are regularly reviewed and updated.	14 (3.6%)	33 (8.6%)	81 (21.1)	157 (40.9%)	98 (25.5%)	3.76	1.01
The community is aware of flood emergency response protocols.	18 (4.7%)	36 (9.4%)	91 (23.7)	154 (40.1%)	85 (22.1%)	3.65	1.05
Training on flood emergency response is provided to community members.	22 (5.7%)	38 (9.9%)	87 (22.7)	148 (38.5%)	89 (23.2%)	3.64	1.09
Flood simulations are conducted regularly to enhance preparedness.	20 (5.2)	42 (10.9)	90 (23.4)	139 (36.2)	93 (24.2%)	3.63	1.10
Emergency drills are conducted to test flood response systems.	16 (4.2)	33 (8.6)	84 (21.9)	162 (42.2)	89 (23.2)	3.71	1.02
Early warning systems are functional and reliable.	19 (4.9)	36 (9.4)	97 (25.3)	144 (37.5)	88 (22.9)	3.64	1.05
Community members receive training on using flood early warning tools.	24 (6.3)	44 (11.5)	85 (22.1)	148 (38.5)	89 (23.2)	3.59	1.12
Training materials are accessible and culturally appropriate.	26 (6.8)	41 (10.7)	87 (22.7)	146 (38.0)	84 (21.9)	3.57	1.11
Schools and institutions are engaged in emergency preparedness programs.	21 (5.5)	39 (10.2)	83 (21.6)	152 (39.6)	89 (23.2)	3.65	1.08
Volunteers are trained and involved in flood emergency response.	17 (4.4)	36 (9.4)	92 (24.0)	153 (39.8)	86 (22.4)	3.66	1.04
Emergency response trainings are tailored to specific community needs.	22 (5.7)	38 (9.9)	89 (23.2)	150 (39.1)	84 (21.9)	3.62	1.07
Overall Mean and SD						**3.65**	**1.06**

The findings indicate that flood emergency planning and capacity building have a positive influence on safeguarding livelihoods in Garissa County. A majority of respondents confirmed the availability of emergency response plans and regular updates ($\bar{x} \approx 3.76–3.77$), reflecting structured planning processes that acknowledge evolving risks. However, a sizeable share of neutral responses suggested that not all community members are fully aware of these plans or their revision cycles, echoing Ogambo, Masibayi, and Odhiambo (2024), who found that preparedness plans in Nyando were effective but unevenly disseminated.

Awareness of emergency protocols was moderately high ($\bar{x} = 3.65$), though over 14 % of respondents disagreed, highlighting gaps in risk communication. This suggests that while formal strategies exist, their effectiveness is undermined if communities are not adequately informed, a challenge also observed by Ahmed (2022) in Bangladesh. Training and simulations were reported as present but unevenly practiced, with mean scores around 3.63–3.71. These activities were acknowledged to improve readiness, though their coverage was inconsistent, reflecting Mavhura's (2023) findings in Zimbabwe that drills build resilience but often fail to reach all households.

Early warning systems were recognized as functional ($\bar{x} = 3.64$), but concerns were raised over reliability and limited user training ($\bar{x} = 3.59$). These constraints mirror Wachira's (2024) observations in Tana River, where technical tools underperformed due to weak engagement and lack of training. Accessibility of training materials also emerged as a challenge, with relatively

lower ratings ($\bar{x}$ = 3.57), suggesting that cultural and linguistic barriers may hinder uptake. Mutua (2023) similarly emphasized that poorly contextualized materials reduce participation in disaster training.

Engagement of institutions and volunteers received moderately positive feedback ($\bar{x} \approx 3.65–3.66$), indicating growing involvement of schools and local actors in preparedness, consistent with Barasa (2023), who highlighted the importance of intergenerational learning in schools, and Khan (2022), who underscored the vital role of volunteers in flood response despite limited formal support. Tailoring of training to community needs was also noted ($\bar{x}$ = 3.62), though significant neutrality suggests further adaptation is required, reinforcing Lwasa's (2023) argument that context-sensitive programs achieve stronger outcomes.

Overall, the construct recorded a mean score of $\bar{x}$ = 3.65, reflecting a moderately positive perception of emergency planning and capacity building in Garissa County. While systems such as plans, drills, early warnings, and institutional involvement are in place, their effectiveness is constrained by gaps in awareness, inclusivity, and contextual adaptation. Strengthening outreach, improving cultural relevance of training, and expanding the role of schools and volunteers will be essential to enhance resilience and safeguard livelihoods.

Safeguarding Livelihoods

This section presents descriptive findings on the dependent variable: Safeguarding Livelihoods. Respondents were asked to indicate their level of agreement with twelve statements on livelihood protection using a five-point Likert scale. The results are detailed in Table 5.

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Table 5: Descriptive Statistics on Safeguarding Livelihoods (N = 384)

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	SD
Income protection measures are in place for flood-affected households	17 (4.4%)	32 (8.3%)	78 (20.3%)	174 (45.3%)	83 (21.6%)	3.72	1.01
Financial assistance is provided to those who lose their livelihoods due to floods	22 (5.7%)	34 (8.9%)	74 (19.3%)	166 (43.2%)	88 (22.9%)	3.69	1.07
There are programs to help rebuild incomes after flood disasters	19 (4.9%)	36 (9.4%)	77 (20.1%)	160 (41.7%)	92 (24.0%)	3.71	1.05
Insurance schemes for flood-related losses are accessible to the community	41 (10.7%)	55 (14.3%)	93 (24.2%)	133 (34.6%)	62 (16.1%)	3.31	1.18
The recovery programs address the long-term needs of flood-affected individuals	28 (7.3%)	40 (10.4%)	84 (21.9%)	150 (39.1%)	82 (21.4%)	3.57	1.12
Recovery efforts focus on restoring both physical and economic aspects of livelihoods	20 (5.2%)	31 (8.1%)	69 (18.0%)	175 (45.6%)	89 (23.2%)	3.73	1.03
Community members are involved in the planning and execution of recovery programs	26 (6.8%)	38 (9.9%)	92 (24.0%)	155 (40.4%)	73 (19.0%)	3.55	1.08
Recovery programs have been successful in restoring livelihoods after floods	24 (6.3%)	35 (9.1%)	96 (25.0%)	153 (39.8%)	76 (19.8%)	3.57	1.05
Infrastructure in Garissa County is designed to withstand flood events	33 (8.6%)	50 (13.0%)	101 (26.3%)	142 (37.0%)	58 (15.1%)	3.37	1.13
Efforts have been made to improve the resilience of critical infrastructure against floods	20 (5.2%)	38 (9.9%)	87 (22.7%)	158 (41.1%)	81 (21.1%)	3.63	1.08
The County government prioritizes infrastructure resilience in flood-prone areas	27 (7.0%)	41 (10.7%)	82 (21.4%)	157 (40.9%)	77 (20.1%)	3.56	1.11
Community feedback is incorporated into the design and improvement of flood-resistant infrastructure	29 (7.6%)	39 (10.2%)	86 (22.4%)	154 (40.1%)	76 (19.8%)	3.55	1.09
Overall Mean and SD						**3.59**	**1.08**

The findings indicate that safeguarding livelihoods is perceived as a key outcome of flood risk management interventions in Garissa County. Income protection measures for flood-affected households were acknowledged by a majority of respondents ($\bar{x}$ = 3.72), though notable proportions expressed disagreement or neutrality, suggesting uneven access or limited awareness. This pattern implies that while such frameworks exist, they may not consistently reach the most vulnerable, a challenge also noted by Onyutha (2023) in East Africa, where resource constraints and inequities hindered implementation.

Financial assistance to households that lose livelihoods due to floods received similar mixed responses ($\bar{x}$ = 3.69). While many respondents recognized its availability, others noted insufficiency or delays, echoing Asare's (2022) findings in West Africa, where cash assistance schemes were weakened by funding gaps and distribution delays. Likewise, programs aimed at rebuilding incomes were moderately supported ($\bar{x}$ = 3.71), but concerns remained about exclusion of marginalized groups such as landless or informal workers, reflecting Chanza's (2023) observation in Malawi that recovery efforts often bypass the most vulnerable.

Insurance schemes emerged as the weakest area ($\bar{x}$ = 3.31), with high levels of disagreement and neutrality highlighting low penetration and limited trust in flood-related microinsurance. This mirrors Amare's (2022) findings in Ethiopia, where affordability and awareness barriers

constrained uptake. Similarly, recovery programs were rated moderately for responsiveness to long-term needs ($\bar{x}$ = 3.57), with many respondents perceiving a focus on short-term relief at the expense of sustainable livelihood restoration, aligning with Mfitumukiza's (2022) critique of African recovery programs.

When asked whether recovery efforts addressed both physical and economic aspects, respondents generally agreed ($\bar{x}$ = 3.73), though some pointed to inconsistencies across communities. Community involvement in recovery planning was moderately rated ($\bar{x}$ = 3.55), suggesting that participatory processes are in place but not fully inclusive findings consistent with Oino (2023), who emphasized the importance of participatory governance for sustainable recovery.

Perceptions of recovery effectiveness were also moderate ($\bar{x}$ = 3.57), with many noting that while some households regain stability, others remain vulnerable, echoing Opere's (2023) findings in Kenya. Infrastructure resilience was highlighted as a weaker dimension, with relatively low scores for flood-resistant design ($\bar{x}$ = 3.37) and mixed perceptions of infrastructure improvements ($\bar{x}$ = 3.63). Institutional prioritization of resilience ($\bar{x}$ = 3.56) and incorporation of community feedback ($\bar{x}$ = 3.55) were also rated moderately, indicating that while efforts are underway, gaps remain in consistency, resources, and inclusivity. These results align with Maina (2022), Manda (2022), and Nyongesa (2023), who each documented ongoing but underfunded and uneven infrastructure resilience initiatives in Kenya.

Overall, the safeguarding livelihoods construct recorded an average score of $\bar{x}$ = 3.59, reflecting a moderately positive perception. The results suggest that while Garissa County has made notable strides in providing income support, recovery programs, and infrastructure upgrades, effectiveness is undermined by gaps in equity, long-term planning, and participatory implementation.

CORRELATION ANALYSIS

To test the relationships between flood preparedness dimensions and safeguarding livelihoods, Pearson correlation analysis was conducted.

Table 6: Correlation Analysis

Variables	1	2	3	4	5
1. Flood Risk Assessment	1				
2. Fiscal Resource Allocation	0.668**	1			
3. Community Involvement	0.693**	0.689**	1		
4. Emergency Planning & Capacity Building	0.701**	0.694**	0.703**	1	
5. Livelihood Safeguarding	0.668**	0.689**	0.693**	0.701**	1

** Correlation is significant at $p < 0.01$.

Source: Field Data (2024)

The analysis revealed that all preparedness dimensions were positively and significantly correlated with livelihood safeguarding. The strongest association was with capacity building ($r = 0.701$, $p < 0.01$), followed by community involvement ($r = 0.693$, $p < 0.01$). Fiscal resource allocation and flood risk assessment also showed strong associations ($r = 0.689$ and $r = 0.668$, respectively). This

confirms the adaptive capacity theory and resilience theory, which posit that community-driven capacity building and preparedness are crucial in reducing vulnerability.

Multiple Regression Analysis

Regression analysis was applied to determine the predictive power of each preparedness dimension.

Table 7: Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
Preparedness	0.801	0.641	0.637	0.391

Source: Field Data (2024)

The model explained 64.1% of the variance ($R^2 = 0.641$) in livelihood safeguarding.

Analysis of Variance

To assess the overall significance of the regression model, ANOVA was conducted.

Table 8: ANOVA Results for Regression Model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.487	4	14.622	95.282	0.000
	Residual	32.105	379	0.085		
	Total	**90.592**	**383**			

The ANOVA confirmed that the model was statistically significant ($F = 95.282$, $p < 0.001$). This indicates that flood disaster preparedness dimensions collectively have a significant effect on safeguarding livelihoods in Garissa County.

Regression Coefficients

The regression coefficients indicate the individual contribution of each independent variable in predicting the dependent variable, safeguarding livelihoods.

Table 9: Regression Coefficients

Predictor	B	Std. Error	Beta (β)	t	Sig.
Constant	0.423	0.401	–	1.055	0.292
Flood Risk Assessment	0.274	0.069	0.244	3.971	0.000
Fiscal Resource Allocation	0.292	0.064	0.271	4.563	0.000
Community Involvement	0.308	0.068	0.289	4.529	0.000
Emergency Planning & Capacity Building	0.336	0.070	0.305	4.800	0.000

Source: Field Data (2024)

The coefficients show that all four predictors were significant ($p < 0.01$). Capacity building ($\beta = 0.305$) had the strongest influence on livelihood safeguarding, followed by community involvement ($\beta = 0.289$), fiscal resource allocation ($\beta = 0.271$), and flood risk assessment ($\beta = 0.244$).

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SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The study investigated the effect of flood disaster preparedness on the safeguarding of livelihoods in Garissa County, based on 384 valid responses. Findings indicated that flood risk assessment was moderately implemented, with respondents noting that while mapping and assessments were undertaken, dissemination of results to households and integration into development plans remained limited. The mean scores showed that respondents generally agreed risk assessment contributed to preparedness, with strong correlations to livelihood safeguarding ($r = 0.668$, $p < 0.01$). Fiscal resource allocation was rated less favorably, with participants reporting delays, inadequacies, and mismanagement of funds for flood preparedness. Despite these challenges, fiscal allocation remained a significant predictor of livelihood safeguarding, supported by the correlation results ($r = 0.689$, $p < 0.01$). Community involvement emerged as a stronger dimension, as respondents agreed that awareness campaigns, participatory planning, and mobilization improved adaptive capacity. Its contribution was further highlighted by a significant correlation with safeguarding livelihoods ($r = 0.693$, $p < 0.01$). The strongest dimension was emergency planning and capacity building, where respondents acknowledged that training, emergency drills, and coordination mechanisms enhanced resilience, though coverage remained uneven. This was confirmed by the correlation coefficient ($r = 0.701$, $p < 0.01$). Regression analysis further established that all four dimensions significantly predicted livelihood safeguarding, with capacity building being the strongest predictor ($\beta = 0.305$, $p < 0.001$), followed by community involvement ($\beta = 0.289$, $p < 0.001$), fiscal resource allocation ($\beta = 0.271$, $p < 0.001$), and flood risk assessment ($\beta = 0.244$, $p < 0.001$). The overall model explained 64.1% of the variance ($R^2 = 0.641$, $p < 0.001$), underscoring the collective role of preparedness measures in protecting communities. Qualitative findings reinforced these results by highlighting practical barriers, including weak institutional coordination, limited financing, and low integration of local voices in planning processes.

Conclusion

The study concluded that flood disaster preparedness significantly influences livelihood safeguarding in Garissa County. Risk assessments provide anticipatory capacity, fiscal allocations underpin structural responses, and community involvement enhances adaptive capacity, while emergency planning and capacity building are the most critical drivers of resilience. Collectively, these dimensions extend disaster management theory by showing that resilience in arid and semi-arid regions is determined by the combined effect of institutional readiness, inclusive participation, and adequate resources.

Recommendations

The study recommends that Garissa County institutionalize regular and transparent risk assessments and improve the dissemination of risk information to households. Fiscal allocations should be timely, sufficient, and ring-fenced for flood preparedness activities to prevent diversion and delays. Community involvement should be deepened through participatory planning forums, awareness campaigns, and localized flood drills that encourage ownership of preparedness measures. Finally, capacity-building initiatives should be scaled up to cover both institutional

actors and communities, ensuring that training, simulations, and emergency protocols are well understood and effectively coordinated across the county.

REFERENCES

Abuya, T., Nduku, M., & Wanjohi, M. (2025). Fiscal governance and accountability in climate resilience projects: Evidence from Kenyan counties. *African Journal of Climate Policy, 12*(1), 55–72.

Ahmed, F. (2022). Community perceptions of flood preparedness plans in Bangladesh. *International Journal of Disaster Risk Reduction, 72*, 102848.

Akter, T., Dewan, A., Rahman, M., & Faisal, A. (2018). Urbanization, climate change, and flood risk in Belgium. *Environmental Hazards, 17*(3), 223–242.

Amare, M. (2022). Barriers to flood-related microinsurance uptake in Ethiopia. *Journal of Development Studies, 58*(7), 1212–1230.

Asare, S. (2022). Effectiveness of cash assistance in flood recovery: Evidence from West Africa. *Disasters, 46*(4), 905–923.

Atanga, R. (2020). Community participation in flood management: Lessons from Accra, Ghana. *Journal of Flood Risk Management, 13*(1), e12580.

Barasa, L. (2023). The role of schools in strengthening flood disaster preparedness in Kenya. *Journal of Education and Disaster Studies, 15*(2), 112–128.

Bhanye, M. (2025). Enhancing resilience through community-based education in informal settlements. *African Journal of Disaster Studies, 14*(1), 89–105.

Buuren, M. V., Ellen, G. J., & Warner, J. (2016). Path-dependent institutions and flood risk management: The case of the Netherlands. *Journal of Water and Climate Change, 7*(2), 365–379.

Chanza, N. (2023). Livelihood recovery after floods in Malawi: Gaps and opportunities. *Natural Hazards, 117*(2), 1323–1345.

Chaudhary, A., & Piracha, A. (2021). Global flood risk and livelihood impacts: A review. *International Journal of Environmental Science, 26*(3), 203–215.

Echendu, J., & Georgeou, N. (2021). Flooding in Nigeria: A review of the causes, impacts and management. *International Journal of Disaster Risk Reduction, 62*, 102356.

Erman, A., Motte, E., Goyal, R., Asare, S., & Takamatsu, S. (2020). Gender dimensions of disaster risk and resilience. *World Bank Policy Research Working Paper, 9332*, 1–65.

Folke, C. (2016). Resilience: The emergence of a perspective for social–ecological systems analyses. *Global Environmental Change, 16*(3), 253–267.

Gall, M., & Cutter, S. (2019). Who needs losses? Deaths, damage, and dollars in the emergency management literature. *International Journal of Disaster Risk Science, 10*(3), 293–301.

Ghosh, A., Rahman, M. A., & Hossain, S. (2023). Community-based flood management in Bangladesh: Lessons learned. *Journal of Flood Risk Management, 16*(1), e12841.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics, 4*, 1–23.

Houessou Dossou, R., Ndemah, J., & Okello, J. (2019). Participatory GIS for flood hazard mapping in Kenya. *Applied Geography, 112*, 102081.

Ishiwatari, M., & Sasaki, D. (2022). Long-term trends in flood protection budgets and their impacts in Japan. *International Journal of Disaster Risk Reduction, 77*, 103078.

Karanja, F., & Saito, F. (2018). Flood risk management in Kenya: Emerging issues and policy gaps. *Water Policy, 20*(4), 721–736.

Kenya Red Cross Society. (2021). *Flood Impact Report 2019–2020*. Kenya Red Cross. MacLeod, H., Omondi, G., & Mwangi, J. (2021). Heavy rainfall advisories and preparedness in Kenya. *Climate and Development, 13*(7), 586–599.

Masese, F., Neyole, E., & Ombachi, P. (2016). The socio-economic impacts of floods on livelihoods in East Africa. *African Journal of Environmental Economics, 8*(2), 77–94.

Mutasa, M. (2022). Mozambique's flood experiences: Lessons for disaster risk reduction. *Journal of Disaster Risk Studies, 14*(1), a1010.

Mulligan, M., Wainaina, J., & Wambua, J. (2016). Community adaptation to floods in Kibera informal settlements, Kenya. *Urban Studies, 53*(5), 955–972.

National Drought Management Authority (NDMA). (2020). *Kenya Flash Floods Situation Report 2020*.

Nguyen, T., Takahashi, Y., & Pham, H. (2020). Community-based flood risk management: Case studies from Japan and Bangladesh. *International Journal of Disaster Risk Reduction, 49*, 101655.

Njogu, H. (2021). Floods in Kenya: Emerging risks and disaster management strategies. *African Journal of Environmental Risk, 12*(2), 133–148.

Nyandiko, N. (2020). Challenges of flood disaster funding in Nairobi and Western Kenya. *Kenya Policy Journal, 5*(2), 88–101.

Onencan, A., Meijer, D., & Otiende, B. (2016). Flood risk assessment and early warning in Kenya. *International Journal of River Basin Management, 14*(4), 371–382.

Osman, I., & Das, A. (2023). GIS and participatory approaches to flood risk mapping in Somalia. *Journal of African Geoscience Research, 10*(2), 54–68.

Panwar, V., & Sen, S. (2020). Fiscal impacts of floods in Indian states: Public expenditure and revenues. *International Journal of Disaster Risk Reduction, 50*, 101707.

Popering-Verkerk, J., & van Buuren, A. (2017). Collaborative approaches in flood risk governance in the Netherlands. *International Journal of Water Resources Development, 33*(4), 575–593.

Pot, W. (2024). The Netherlands' Delta Works program: Infrastructure resilience against flooding. *Journal of Flood Protection, 11*(1), 33–47.

Shah, A., Khan, M., & Malik, S. (2018). School preparedness for floods in Pakistan: Gaps and lessons. *International Journal of Disaster Risk Reduction, 28*, 517–526.

United Nations Office for Disaster Risk Reduction (UNDRR). (2015). *Sendai framework for disaster risk reduction 2015–2030*.

World Food Programme (WFP). (2023). *Long Rains Food Security Assessment 2023*.

Ziervogel, G., Pelling, M., Cartwright, A., Chu, E., Deshpande, T., & Zweig, P. (2016). Inserting rights and justice into urban resilience: A focus on everyday risk. *Environment and Urbanization, 28*(1), 123–138.