

Household disaster preparedness, environmental stewardship and climate-smart water management in rural Kabarole District, Uganda: a cross-sectional study with implications for climate-resilient WASH governance

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Abstract

Background

Climate-related hazards can disrupt water, sanitation and hygiene services and increase health risks, while household preparedness and functioning local risk-management structures shape how communities anticipate and respond to shocks. Evidence linking disaster preparedness, environmental stewardship and water-management practices is limited in rural western Uganda. We assessed household disaster exposure, preparedness and community risk-management enabling conditions, alongside environmental stewardship and climate-smart agricultural water-management practices, in Karangura Sub-County.

Methods

We conducted a cross-sectional secondary analysis of 620 households surveyed during the 2025 Karangura Child Focused Community Transformation baseline. The primary outcome was self-reported disaster preparedness, dichotomized as somewhat/very prepared versus not prepared. Descriptive analyses summarized disaster exposure, preparedness plans, training, disaster committees, early-warning awareness, safe shelter, emergency supplies, environmental stewardship, climate-smart agriculture awareness and improved agricultural water-management practice. Adjusted prevalence ratios (aPRs) for preparedness were estimated using modified Poisson regression with village-clustered robust standard errors, adjusting for disaster exposure, disaster-response training, disaster-committee presence, early-warning awareness, asset tertile and parish.

Results

Among 620 households, 261 (42.1%) reported having been affected by a disaster in the previous five years and 291 (46.9%) described themselves as somewhat or very prepared. Only 32 (5.2%) reported a household disaster-preparedness plan, 101 (16.3%) had received disaster-response training or information, 46 (7.4%) reported a designated community disaster committee or team, and 283 (45.6%) were aware of early-warning signs. Environmental stewardship was widely endorsed, with 578 (93.2%) agreeing or strongly agreeing that humanity is responsible for caring for the environment. In contrast, climate-smart agriculture awareness was reported by 72 of 570 households (12.6%), and improved agricultural water-management techniques by 25 of 570 (4.4%). Preparedness was reported by 85.1% of trained households versus 39.5% of untrained households, and by 64.7% of households aware of early-warning signs versus 32.0% of those not aware. In adjusted analysis, disaster-response training (aPR 1.69, 95% CI 1.47–1.94; $p < 0.001$) and early-warning awareness (aPR 1.57, 95% CI 1.22–2.02; $p < 0.001$) were positively associated with preparedness. Prior disaster exposure was associated with lower preparedness (aPR 0.73, 95% CI 0.58–0.93; $p = 0.011$).

Conclusions

Karangura households experienced substantial disaster exposure but had limited household preparedness plans, formal disaster-management structures, training and mitigation actions. Strong pro-environmental attitudes were not matched by widespread climate-smart agriculture awareness or improved agricultural water-management practice. Strengthening community disaster-risk governance, early-warning communication, household preparedness, climate-resilient WASH planning and practical water-management support should be pursued together, with particular attention to households already affected by hazards.

Background

Climate hazards are a threat to public health in terms of damage to WASH infrastructure, decreasing of the water supply, contamination of water sources and disruption of hygienic practices. According to WHO, floods, droughts, landslides and other emergencies may deteriorate environmental conditions and significantly increase risks of WASH diseases if local systems lack ability to cope with them [1]. WHO and UNICEF define climate-resilient WASH as the capacity of water, sanitation and hygiene systems to anticipate, withstand, recover from and adapt to climate hazards and sustainably provide services [2, 3].

This definition is linked with governance, as climate-resilient WASH relies on infrastructure, risk assessments, monitoring, financing, regulations, local engagement, preparedness and clarity of responsibilities. In its 2025 UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water, WHO and UNICEF stressed the importance of building resilient WASH systems in order to secure people's health against climate risks, recurrent outbreaks and infrastructure stresses [4]. Disasters' committees in communities, early-warning communications, preparedness planning and availability of risk-reduction information are thus related to the continuity and safety of water and sanitation services in households.

Households is one of units of resilience, as exposure, preparedness and adaptive capacity can differ between households even within one community. It was demonstrated in Ugandan households that their ability to prepare for, recover from and adapt to climate disasters is affected by economic and social resources [5]. In eastern Uganda, the recent study showed households' vulnerability to climate impacts on WASH and the importance of risk mitigation [6]. A multi-country study including Uganda revealed that floods may cause sanitation system failure and increase open defecation after latrines damage [7], emphasizing the importance of designing and maintaining resilient sanitation systems.

Uganda experienced floods, droughts and landslides that led to significant impacts on water, sanitation and hygiene systems. As it was noted following the Bududa landslide of 2010, there was urgent need for WASH measures among displaced households [8]. The most recent study in eastern Uganda also identified connection of floods, droughts and landslides with risks of waterborne and vector-borne diseases and called for combination of WASH and disaster preparedness interventions [9]. It is also

important beyond emergencies, as rural communities can suffer from recurrent and smaller shocks that affect water accessibility, agricultural livelihoods, household assets and people's health.

Environmental stewardship and climate-smart agriculture add another aspect. Households' approval of environmental protection can be an indicator of acceptance of conservation actions, but it does not mean that these practices will be adopted to preserve water sources and mitigate the impacts of climate change. Climate-smart agricultural practices such as efficient water management, drought resistant crops, agroforestry and conservation practices can decrease pressures on water sources and increase livelihood resilience. Similarly, WHO recommends to focus on integrated risk management, monitoring and adaptation in climate-resilient WASH [2, 3, 13–15].

Karangura Sub-County in Kabarole District of western Uganda is a rural area where agriculture, water supply and environmental conditions are tightly interlinked. During the 2025 Child Focused Community Transformation (CFCT) baseline, household data on disaster exposure, preparedness, community's disaster-risk governance, awareness of early warnings, environmental attitudes, climate-smart agriculture and agricultural water management practices were collected. These data provide an opportunity to analyze coexistence of disaster preparedness and governance enabling conditions, environmental stewardship and water-management practices in households.

This study had four objectives: (1) to describe household disaster exposure, preparedness and community disaster-risk governance indicators; (2) to describe environmental stewardship, climate-smart agriculture awareness and improved agricultural water-management practices; (3) to explore socioeconomic and geographic determinants of self-reported disaster preparedness; and (4) to identify factors associated with disaster preparedness and discuss implications for climate-resilient WASH governance and public health.

Methods

Study design and reporting

This study is a cross-sectional secondary analysis of household data collected during 2025 Karangura Child Focused Community Transformation (CFCT) project baseline survey. Household interviews in the analytical dataset were conducted from 31 March to 22 April 2025. The present analysis used existing de-identified baseline data without additional participant recruitment, contact and data collection. Reporting followed the STROBE guidelines for observational studies [10].

Study setting

Karangura Sub-County is in Kabarole District, western Uganda. The parent baseline covered five hills – Buhamia, Mahyoro, Kibagha, Nyarukamba and Karangura – of three parishes in the household dataset:

Kamabale, Kibwa and Nyakitokoli. The sampling frame of the baseline survey comprised about 3,492 households.

Study population, sampling and sample size

According to the parent baseline survey protocol, household sample consisted of approximately 620 households with the proportional geographic allocation. The analytical dataset included 620 households. Two of them were not suitable for the multivariable analysis with geographical adjustment due to lack of parish and village data, so 618 households were left for geographic comparison and the main adjusted model. All 620 households provided data for non-geographic descriptive indicators unless the question was not applicable or not answered.

Data collection and quality assurance

The questionnaire for the structured household interview was administrated by trained research assistants with ODK-based mobile application. The parent protocol defined skip-logic and validation, daily uploading, field supervision and submission of the data. In addition to demographic, socio-economic, health and WASH data, the questionnaire contained information on disaster exposure and preparedness, community's disaster-risk governance, early-warning awareness, environmental attitudes, climate-smart agriculture and agricultural practices. The data on health and WASH variables used in other papers from the baseline were collected in parallel.

Primary outcome: disaster preparedness

Respondents answered whether they felt their household was not prepared at all, somewhat prepared or very prepared to respond to a disaster. For the main analysis, respondents who said that their household was somewhat or very prepared were coded as "prepared", and those who said not prepared at all were coded as the reference group. This outcome is a subjective preparedness measure and is not a validated multi-dimensional disaster-resilience index. Therefore, it was decided not to use the preliminary composite "disaster/environment resilience" score and use directly observed questionnaire items instead.

Disaster exposure and governance-related enabling conditions

Disaster exposure was defined by answering whether the household was exposed to any disaster during the last 5 years. Disasters and preparedness indicators included: existence of household disaster plan, disaster response training or information, community disaster management strategy awareness, disaster management meeting attendance, presence of a community disaster management committee or team, awareness of early-warning signs, ability to recognize warning signs, access to safe shelter,

community's resilience measures, emergency supplies storage, household's disaster mitigation actions, and awareness of disaster risk reduction programs of the government or NGOs. "Not sure" answers for committee and resilience measures were considered as lack of structure.

Environmental stewardship and climate-smart water management

Environmental stewardship was measured by agreement/disagreement with the statement that humanity is responsible for the environment, with rating from strongly disagree to strongly agree. Agreement and strong agreement were combined into endorsement of environmental stewardship. This coding reverses the direction of the preliminary derived variable, as it was classified as environmental care. Climate-smart agriculture awareness was defined from answering yes/no to having heard of climate-smart agriculture practices. Improved agricultural water management referred to usage of such technologies as drip irrigation from the climate-smart agriculture module. So it was considered as agricultural water management practice. Both climate-smart agriculture variables included 570 non-missing observations because of incomplete climate-smart agriculture module for 50 households.

Socioeconomic and geographic variables

Simple household asset index was derived from the ownership of quality-of-life and production assets and categorized into tertiles. Parish was included as an indicator of geographic variability and adjustment factor. Village was used as the clustering unit for the multivariable models.

Statistical analysis

Binary indicators were summarized by counts and percentages. Prevalence of preparedness was estimated for different categories of exposure, training, awareness of early warnings, presence of community disaster committee, asset tertile and parish. The main multivariable analysis used modified Poisson regression with a log link to estimate adjusted prevalence ratios (aPRs) for being somewhat or very prepared [11]. Sandwich standard errors were clustered by village to account for within-village correlation [12]. The model included prior disaster exposure, disaster response training, presence of a disaster committee, early-warning awareness, asset tertile and parish. These variables were selected as representing different aspects of exposure, support for preparedness, local governance, information on warnings and socioeconomic/ geographic context. The results were presented with 95% confidence intervals and two-sided p values ($p < 0.05$ was considered as statistical significance). Due to cross-sectional design, estimates are interpreted as associations rather than causal effects.

Results

Household disaster exposure and preparedness

Of the 620 households surveyed, 261 (42.1%) said they had experienced at least one disaster in the last five years. Just 291 (46.9%) said that they considered their household somewhat or very well prepared to cope with a disaster, whereas 329 (53.1%) said they did not consider themselves prepared at all. Planning in advance for disaster was infrequent: 32 households (5.2%) reported a disaster preparedness plan at the household level, and 101 (16.3%) had participated in any disaster response training or received disaster information. Figure 1 summarizes household disaster preparedness and governance indicators.

Community disaster-risk governance and early warning

There were relatively few community-level enabling conditions present. One hundred twenty households (19.4%) knew of any community disaster management strategy or plan, 112 (18.1%) had participated in any disaster management meetings, and 46 (7.4%) said that there was a community disaster management committee or team. There were higher levels of early warning awareness: 283 households (45.6%) knew of any early warning signs for disasters, and 311 (50.2%) were somewhat or very confident about recognizing any early warning signs. Safe shelters during a disaster were reported by 245 households (39.5%).

Only 103 households (16.6%) said that there were community resilience efforts underway, 167 (26.9%) kept emergency supplies, and 88 (14.2%) reported any specific disaster-risk mitigation efforts by their household. Government or NGO programs for disaster-risk mitigation were known about by only 45 households (7.3%). Overall, it seems clear that there was relatively much less information or preparedness resources available than disaster risk.

Environmental stewardship and climate-smart water management

There was strong support for environmental stewardship. A total of 578 households (93.2%) agreed or strongly agreed that humanity is responsible for taking care of the environment. This finding was in sharp contrast to the output of the preliminary package, since the original derived variable had been mistakenly coded. With correction, the baseline demonstrates broad pro-environmental attitudes, rather than low environmental concern.

However, there were relatively few practical indicators of climate-smart agriculture or water management. Out of 570 households which answered the climate-smart agriculture module, 72 (12.6%) had heard of climate-smart agriculture, and only 25 (4.4%) used improved techniques of agricultural water management, such as drip irrigation. Figure 2 shows environmental stewardship, climate-smart agriculture awareness and improved agricultural water-management practice.

Disaster preparedness and enabling conditions

There were strong differences in self-reported disaster preparedness by selected enabling conditions. Disaster preparedness was reported by 86 out of 101 households (85.1%) which had any disaster response training, compared to 205 of 519 (39.5%) which did not have any. Among households with awareness of any early warning signs, 183 out of 283 (64.7%) were disaster prepared, while only 108 of 337 (32.0%) without such awareness were disaster prepared.

Disaster preparedness was also higher among households reporting any disaster committee or team (76.1% vs. 44.6%), although this association was somewhat weakened by multivariable adjustment. Disaster-affected households reported lower disaster preparedness compared to non-disaster-affected households (36.0% vs. 54.9%). Figure 3 shows self-reported disaster preparedness by selected enabling conditions. Disaster preparedness varied relatively little by asset tertiles, ranging from 44.4% in the lowest tertile to 50.5% in the highest, and by parish, from 45.3% in Nyakitokoli and 45.6% in Kamabale to 52.1% in Kibwa. Figure 4 shows self-reported disaster preparedness by parish and household asset tertile.

Associations with disaster preparedness, adjusted

In the adjusted model, we included 618 households with complete parish and village information. Disaster response training was a significant predictor of disaster preparedness (aPR 1.69, 95% CI 1.47–1.94; $p < 0.001$). Awareness of any early warning signs was also associated with higher disaster preparedness (aPR 1.57, 95% CI 1.22–2.02; $p < 0.001$). In contrast, disaster-exposed households had lower disaster preparedness even after adjustment (aPR 0.73, 95% CI 0.58–0.93; $p = 0.011$).

Disaster committee presence was not significantly associated with disaster preparedness after adjustment (aPR 1.12, 95% CI 0.84–1.48; $p = 0.446$). Neither asset tertile nor parish showed significant independent associations in the adjusted model. These results demonstrate that the direct impact of training and early warning on disaster preparedness was stronger than asset position or geography of households. Figure 5 presents adjusted prevalence ratios for self-reported disaster preparedness.

Discussion

Principal findings

In this study, there is a significant gap in disaster exposure and preparedness in rural Karangura. Over two in five households had experienced a disaster over the previous five years, but only a little more than one in two considered themselves somewhat or very prepared. Household and community preparedness structures were not widespread – only 5.2% had a household preparedness plan, 16.3% had disaster-response training, and 7.4% had a disaster-management committee/ team. These results suggest that disaster experience is not sufficient for household preparedness.

The second notable finding is the association of training and early-warning awareness with preparedness. The households who received disaster-training were more likely to consider themselves

prepared after adjustment as well as the households who knew about early-warning signs. These factors are actionable, as they are related to communication mechanisms and community and household preparedness programming, not to fixed household traits. The lack of association with asset tertile in the adjusted model suggests that the information and training can improve preparedness at different income levels, but financial limitations can make it impossible to take action even when aware of early-warning.

Finally, the correction of the environmental-stewardship variable alters the interpretation of the preliminary analysis. A large majority of households supported environmental stewardship, but only 12.6% were aware of climate-smart agriculture and 4.4% implemented improved agricultural water-management techniques. This disconnect is critical for climate-resilient WASH and livelihood planning, since willingness to protect the environment does not provide households with the means to protect it.

Disaster exposure, preparedness, and household resilience

The relationship between disaster experience and preparedness deserves special attention. One might think that it is counterintuitive, as the experience should promote learning. However, repeated hazards can deplete the assets of households, surpass their capacity to cope, and limit their ability to prepare. Similarly, in the literature from Uganda, household resilience research shows that households' capacity to prepare, recover and adapt relies on resources and social connections, not on exposure alone [5]. In eastern Uganda, recent literature on climate impact on WASH demonstrates that vulnerability is determined by household and settlement characteristics and the presence of mitigation measures [6].

One should not take it to mean that disaster experience causes low preparedness level. The cross-sectional design does not allow establishing causality or finding out whether the households were already vulnerable before the experience, whether the loss made them vulnerable, or whether the areas where households experienced disasters are more vulnerable because of the combination of hazards and poor services. Future research should focus on the monitoring of households after hazard events to distinguish between learning, recovery, and increasing vulnerability.

Training, early warning and local disaster-risk governance

The relationships of training and early-warning awareness with preparedness fit the framework of disaster-risk reduction. The knowledge and communication are essential to effective response. Early-warning systems can only provide public health benefit when alert reaches households, is understandable to them, and prompts the action they can take. With the lack of household preparedness plans, mitigation actions, and awareness of programs, the information about warning in Karangura should be linked to the preparations and actions.

Reported existence of the disaster committee was positively related to the unadjusted preparedness, but not to the adjusted. It may reflect the overlap of the committee presence and training or warning awareness. At the same time, it may be that the existence of the committee is not enough if it does not function, if there is no funding for it, and if households do not know how to contact it. The household

questionnaire at the baseline did not contain information about functioning of committee, frequency of meetings, training of the members, records and financing for each household. Therefore, future research on disaster-risk governance should cover its actual performance.

Climate-resilient WASH and environmental stewardship

Climate shocks affect WASH through a variety of pathways: floods can destroy sanitation facilities, contaminate water sources, and force households to use unsafe water; droughts limit water quantity. Therefore, WHO guidance puts climate risk management within water and sanitation safety planning and recommends monitoring of climate-resilient WASH [2, 3]. The 2026 WHO WASH strategy also promotes resilience, surveillance, institution strengthening, and service delivery in face of climate shocks [3].

This evidence is particularly relevant to the case of Uganda. The work of Isunju et al. describes household vulnerability to the impact of climate change on WASH in eastern Uganda and analyzes mitigation strategies [6]. Literature from Uganda reports the significant difference in safe water-chain practices and drinking-water and sanitation service levels [16, 17]. Kohlitz et al. analyzing data from Uganda, Ethiopia and Nepal finds that floods were associated with sanitation failures and stresses the role of the quality of construction and maintenance [7]. Twinomuhangi et al. find links between environmental hazards and risks of waterborne diseases in eastern Uganda and recommend integrated WASH and disaster-preparedness interventions [9]. All this literature supports the need of household preparedness together with water-service continuity, sanitation resilience, and public-health surveillance. Moreover, a recent systematic review of WASH practices in developing countries strengthens the ongoing public health importance of integrated water, sanitation and hygiene [18].

Karangura contributes to the literature with the western Ugandan perspective. The environmental stewardship was highly common among households, but climate-smart agriculture awareness and use of improved agricultural water-management techniques was rare. The question on improved water-management refers to agriculture, e.g., drip irrigation, and therefore should not be viewed as the measure of water governance. The importance of the item consists in assessing whether households start using water-efficient livelihood practices which would reduce their vulnerability to droughts. Agricultural extension services, demonstration sites, farmer groups, and local water-planning can help households to implement such practices.

Implications for climate-resilient WASH governance and public health

The results of the study suggest the package of local actions. First, the authorities of the district and sub-counties should increase disaster preparedness training at the household level and ensure that early-warning messages will specify practical actions related to water storage, drinking-water treatment, sanitation protection, evacuation, and shelter. Second, there is a need to map the disaster committees and assess their functionality, membership, training, record-keeping, and connection with community

health and water-user organizations. Third, water points and sanitation facilities vulnerable to disasters should be identified and monitored during the rainy and dry seasons.

Fourth, the WASH monitoring should shift from checking infrastructure to assessing service continuity under stress. The routine monitoring should include data on functionality, down-time, seasonal switching of water sources, waiting time, water quality, and alternative water sources in emergencies. Such approach is consistent with the climate-resilient WASH monitoring agenda [2], with the GLAAS priorities on systems, monitoring and local participation [4]. Fifth, environmental and agricultural extension services should help to connect awareness of climate-smart agriculture with feasible water management technologies and financing options.

Households affected by the disasters deserve special attention because they reported lower preparedness after the adjustment. The disaster recovery programs should assess whether the shocks in the past depleted their assets, destroyed water and sanitation facilities, and limited their ability to prepare. Linking the records of disaster responses with longitudinal WASH and livelihood monitoring will help to identify repetitive disaster exposure and prioritize the preventive assistance.

Strengths and limitations

There are several strengths of the study. The research used the large community sample in Karangura and covered disaster exposure, household preparedness, community risk management structures, early-warning awareness, environmental stewardship, and climate-smart water management within one data set. Also, the analysis corrected a coding error in the preliminary environmental stewardship variable and replaced an arbitrary four-item "resilience" scale with directly reported preparedness. Modified Poisson regression provided prevalence ratios easily interpretable for the binary outcome, and village-clustered standard errors accounted for geographic correlation.

Several limitations need to be addressed. Self-reported preparedness was not assessed with the validated multi-dimensional resilience scale. The research is cross-sectional, and therefore does not establish temporal relationship and causality. The disaster types and severity were not coded into the analyzable categories for the current paper, which makes it difficult to interpret the results by the type of disaster. The committee presence and community measures were reported by households and did not prove institutional functionality. The environmental stewardship was measured with one attitudinal question. The improved water-management question belongs to climate-smart agriculture module and refers to agricultural techniques, not water governance. There were fifty households missing climate-smart agriculture variables. Finally, the survey took place during a short period in 2025 and therefore does not include seasonal variation in hazards, water availability and preparedness.

Conclusions

The disaster exposure is high in Karangura, but household preparedness plans, disaster-response training, disaster-management committees in communities, disaster-related mitigation actions, and

awareness of WASH-related programs are limited. Training and early-warning awareness are strongly related to self-reported preparedness, while disaster-affected households reported lower preparedness after the adjustment. Environmental stewardship is common, but climate-smart agriculture awareness and implementation of improved agricultural water management techniques is uncommon. Climate-resilient WASH governance in Karangura should incorporate household preparedness, community disaster-risk management structures, actionable early-warning system, water and sanitation service resilience, environmental stewardship and practical climate-smart water management.

Abbreviations

aPR

adjusted prevalence ratio

CFCT

Child Focused Community Transformation

CI

confidence interval

DRR

disaster risk reduction

GLAAS

UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water

IDI

International Development Institute

JMP

WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene

ODK

Open Data Kit

PR

prevalence ratio

STROBE

Strengthening the Reporting of Observational Studies in Epidemiology

WASH

water, sanitation and hygiene

WHO

World Health Organization

Declarations

Ethics approval and consent to participate

Clinical trial number: not applicable. This manuscript reports a secondary analysis of de-identified household data collected from 31 March to 22 April 2025 during the Karangura Child Focused

Community Transformation project baseline. The baseline survey involved household-level human participant data and was conducted as a project monitoring and evaluation activity under an established protocol. The requirement for formal ethical approval for the present secondary analysis was waived by the Makerere University School of Public Health Research and Ethics Committee (MakSPH-REC), reference number SPH-2025-907. All participating households provided voluntary informed consent before the baseline interviews. No new data were collected, and there was no participant contact for the present secondary analysis. The baseline procedures and this secondary analysis were conducted in accordance with relevant ethical guidelines and regulations, including the ethical principles of the Declaration of Helsinki.

Consent for publication

Not applicable. The current manuscript consists of aggregate data about households, which does not contain any individually identifiable data/images/case details.

Competing interests

The authors declare that they have no competing interests.

Authors' information

This team comprises public health, epidemiologists, biostatisticians, M&E experts, child health experts, district health services, health research, data systems, implementation and community health programming experts in Uganda. The multidisciplinary team guided the interpretation of the findings using perspectives of public health, environmental health, disaster resilience and service delivery.

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Author Contribution

SCO developed the manuscript idea, coordinated the parent baseline study design and project management, managed the data analysis, managed the statistical analysis and visualization, and drafted the manuscript. IRO contributed methodological development, findings interpretation, and manuscript review and editing. SN contributed to disaster preparedness and equity framework, literature analysis and review. UMW contributed to disaster risk reduction and resilience framework, governance findings interpretation, and manuscript review. IS contributed to water, sanitation and hygiene (WASH) governance and resilience interpretation, literature analysis and review. AN contributed to environmental

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Data Availability

The de-identified analytic data and analysis code underlying this manuscript are available from the corresponding author on reasonable request, subject to approval by the data custodian and applicable ethical, confidentiality and institutional data-sharing requirements.

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Tables

Table 1
Household disaster preparedness, governance and environmental indicators

Indicator	N	n	%
Affected by disaster in past 5 years	620	261	42.1
Somewhat/very prepared for disaster	620	291	46.9
Household preparedness plan	620	32	5.2
Received disaster-response training/information	620	101	16.3
Aware of community disaster strategies/plans	620	120	19.4
Participated in disaster-management meetings	620	112	18.1
Designated disaster committee/team reported	620	46	7.4
Aware of disaster early-warning signs	620	283	45.6
Somewhat/very confident recognizing warning signs	620	311	50.2
Access to safe shelter during disaster	620	245	39.5
Community resilience measures reported	620	103	16.6
Stores emergency supplies	620	167	26.9
Household has taken mitigation action	620	88	14.2
Aware of government/NGO mitigation programmes	620	45	7.3
Agrees humanity should care for environment	620	578	93.2
Aware of climate-smart agriculture	570	72	12.6
Uses improved agricultural water management	570	25	4.4
Note: Climate-smart agriculture awareness and improved agricultural water-management practice each had N = 570 because 50 households had no data for that module. Environmental stewardship is coded as agree/strongly agree with the statement that humanity is responsible for taking care of the environment.			

Table 2
Self-reported disaster preparedness by selected household and governance factors

Comparison	Category	N	Prepared, n	Prepared (%)
Disaster exposure	Not affected	359	197	54.9
Disaster exposure	Affected	261	94	36.0
Disaster-response training	No training	519	205	39.5
Disaster-response training	Training received	101	86	85.1
Early-warning awareness	Not aware	337	108	32.0
Early-warning awareness	Aware	283	183	64.7
Disaster committee/team	Not reported	574	256	44.6
Disaster committee/team	Reported present	46	35	76.1
Asset tertile	Highest asset tertile	206	104	50.5
Asset tertile	Lowest asset tertile	207	92	44.4
Asset tertile	Middle asset tertile	207	95	45.9
Parish	Kamabale	158	72	45.6
Parish	Kibwa	142	74	52.1
Parish	Nyakitokoli	318	144	45.3

Table 3

Adjusted modified Poisson model for self-reported disaster preparedness (N = 618)

Variable	aPR	95% CI	p value
Lowest vs highest asset tertile	0.91	0.73–1.14	0.423
Middle vs highest asset tertile	0.86	0.70–1.06	0.153
Kibwa vs Kamabale parish	1.02	0.76–1.37	0.898
Nyakitokoli vs Kamabale parish	0.91	0.68–1.22	0.516
Affected by disaster in past 5 years	0.73	0.58–0.93	0.011
Received disaster-response training/information	1.69	1.47–1.94	< 0.001
Disaster committee/team reported present	1.12	0.84–1.48	0.446
Aware of early-warning signs	1.57	1.22–2.02	< 0.001
Model adjusted simultaneously for all variables shown. Standard errors were clustered by village. Reference categories: not affected by disaster, no training, no/uncertain committee, not aware of early-warning signs, highest asset tertile and Kamabale parish.			

Figures

Household disaster preparedness and governance indicators

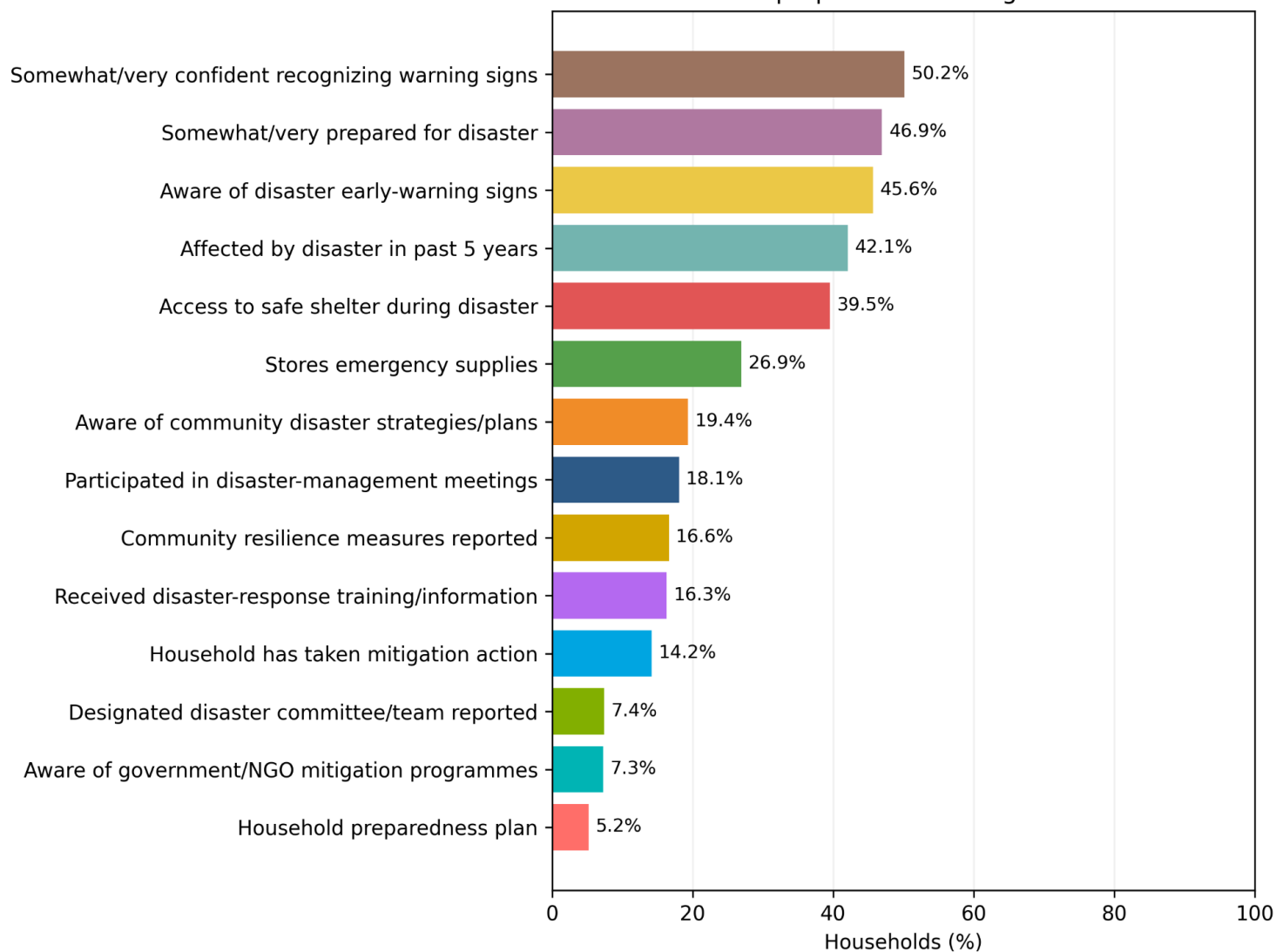


Figure 1

Household disaster preparedness and governance indicators in Karangura.

Environmental stewardship and climate-smart water management

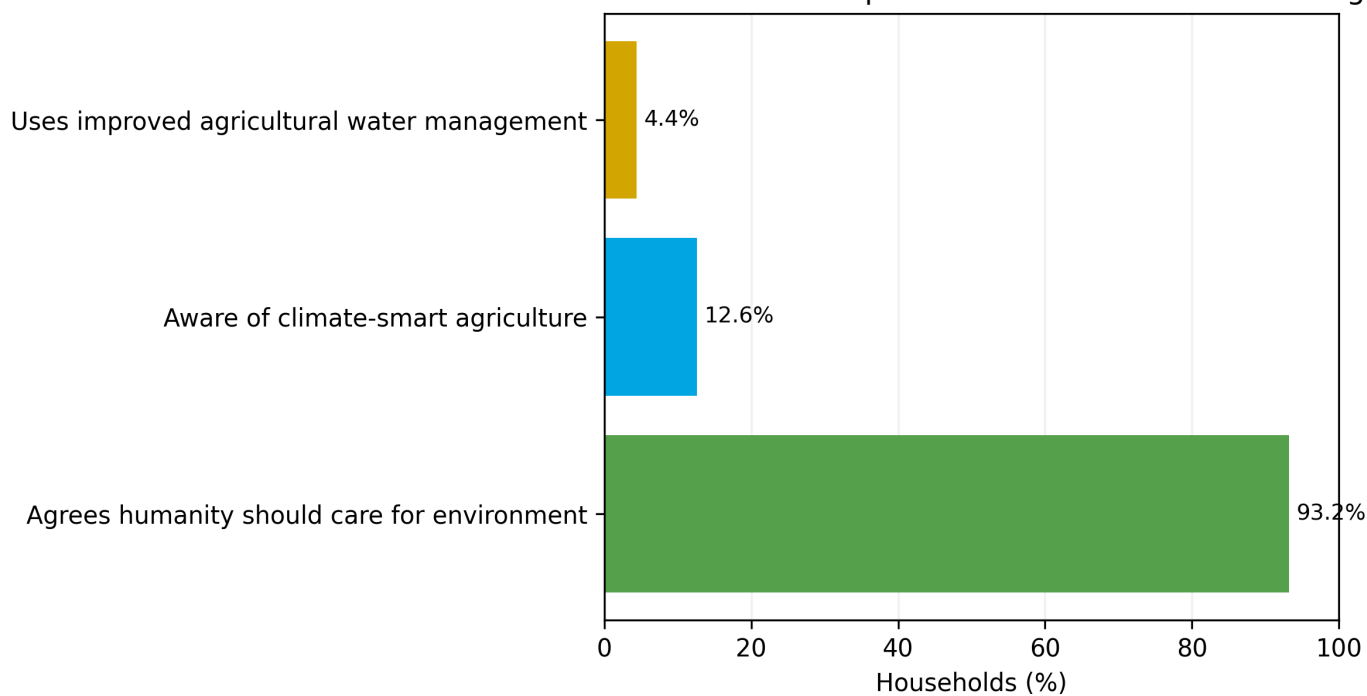


Figure 2

Environmental stewardship, climate-smart agriculture awareness and improved agricultural water-management practice. Climate-smart agriculture indicators use N=570.

Self-reported disaster preparedness by selected enabling conditions

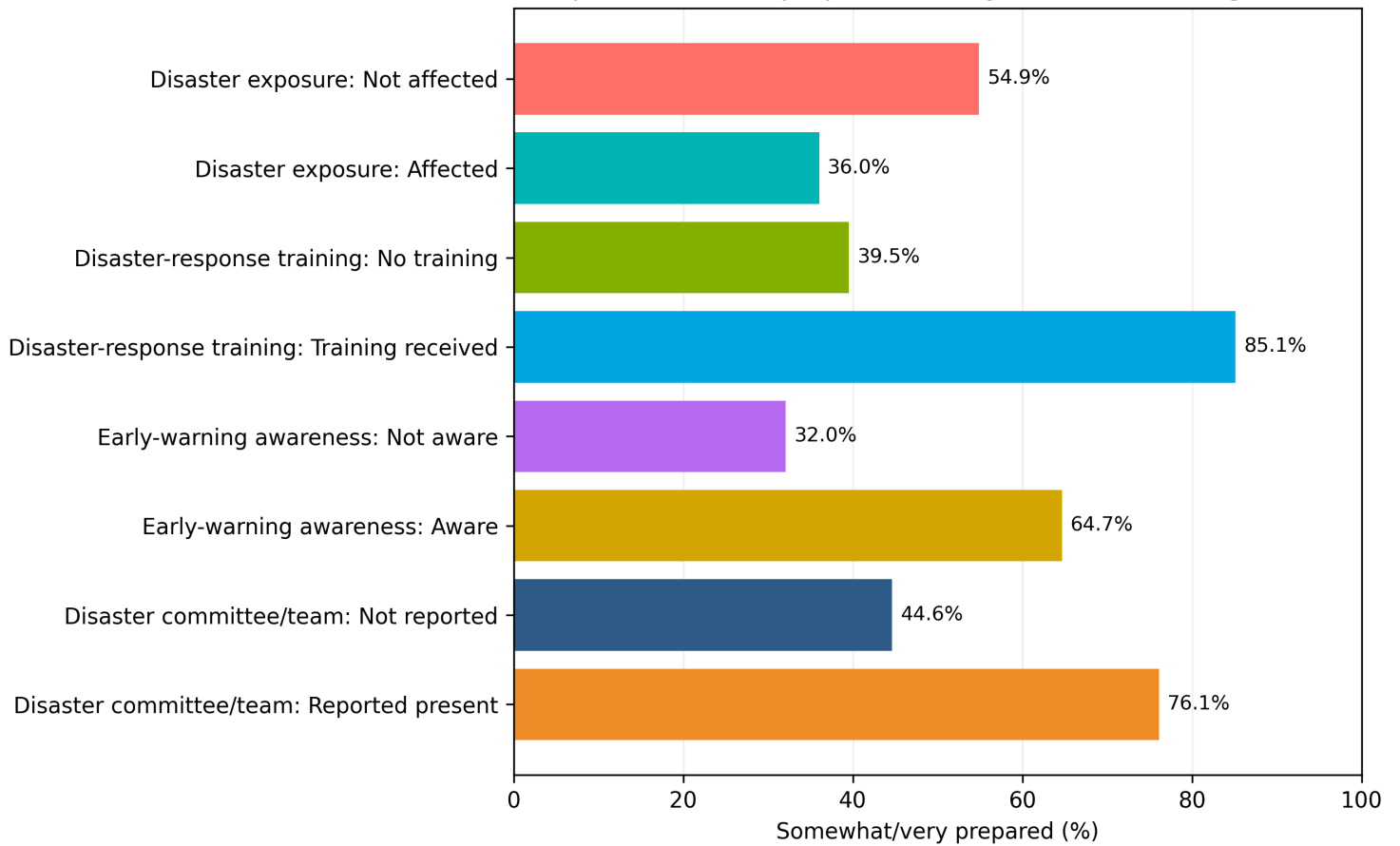


Figure 3

Self-reported disaster preparedness by selected enabling conditions.

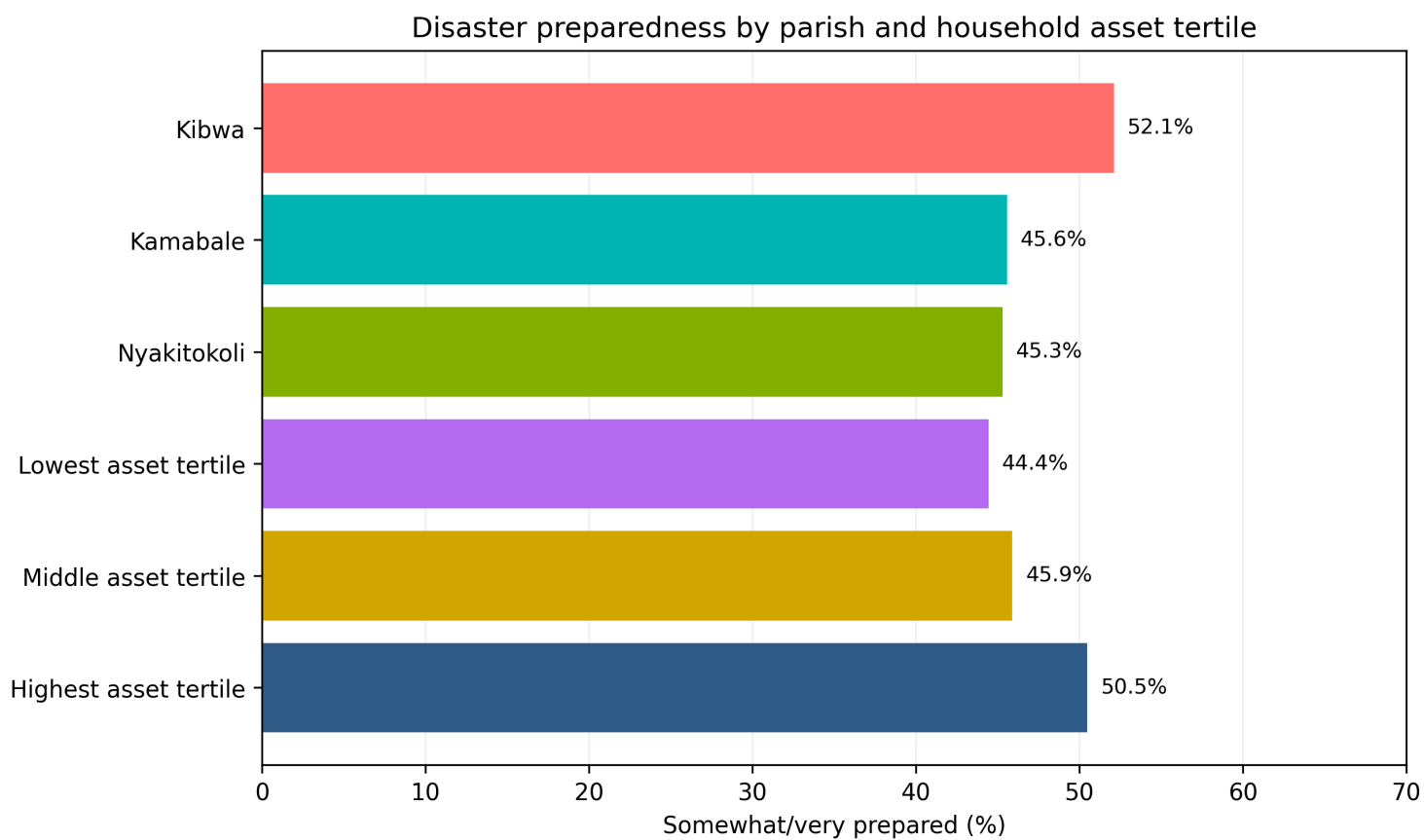


Figure 4

Self-reported disaster preparedness by parish and household asset tertile.

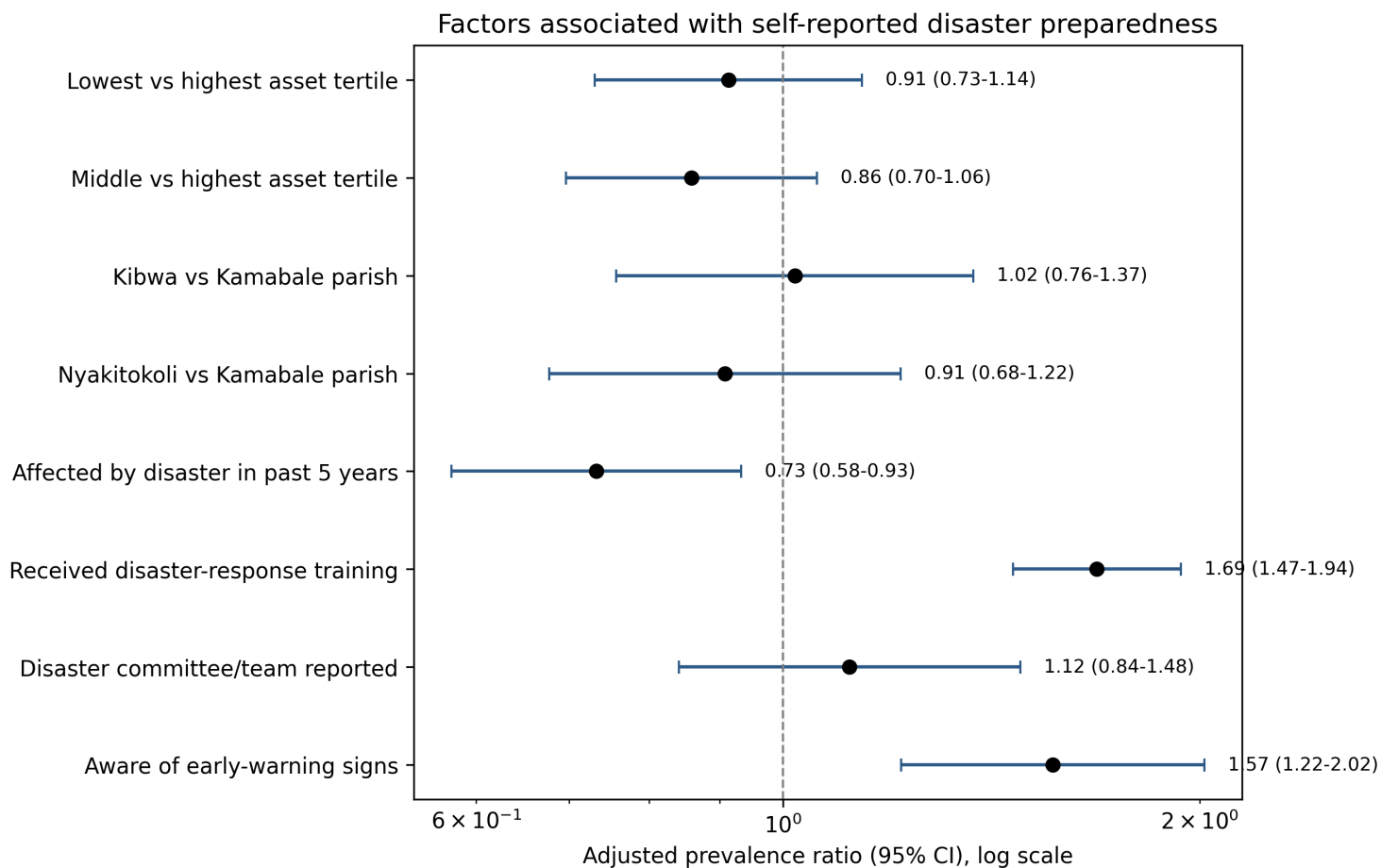


Figure 5

Adjusted prevalence ratios for self-reported disaster preparedness. Modified Poisson estimates use village-clustered robust standard errors.

Supplementary Files

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- [Table4Parishprofile.docx](#)
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- [Table8Fullgroupmatrix.docx](#)
- [Table5Assetprofile.docx](#)
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