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Assessing the Effectiveness of the Disaster Management and Mitigation Unit in Disaster Risk Management in Zambia: A Case Study of Chiyeke Area in Chavuma District

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Abstract

This study assessed the effectiveness of Zambia's Disaster Management and Mitigation Unit (DMMU) in managing flood risk in Chiyeke Area, Chavuma District. A descriptive case-study design was applied within a cross-sectional framework. Fifty adult residents and local stakeholders with direct knowledge of flood conditions were selected purposively and completed a structured questionnaire. The analysis used frequencies and percentages, with open responses grouped into recurrent operational themes. The findings show a mixed but generally weak institutional performance. Only 38% of respondents agreed that warnings were timely, while 42% disagreed. Fifty-two per cent reported that evacuation routes and shelters were not clearly marked, and 50% disagreed that relief supplies were positioned before the flood season. Overall preparedness was rated inadequate or very inadequate by 44%, compared with 34% who considered it adequate. Response outcomes followed the same pattern: 44% rated DMMU's response ineffective or very ineffective, although 46% agreed that vulnerable households were reached. Reported failures centred on impassable roads, late delivery and unequal access to relief. Community participation was also limited; 42% rejected the claim that communities were consulted in planning and 44% said local knowledge was not reflected in DMMU plans. At the same time, residents repaired roads, raised granaries, dug drainage channels and organised informal river watches. The study concludes that the DMMU has a relevant mandate and some useful local partnerships, but its effectiveness is constrained by reactive planning, logistical shortages and weak integration of community knowledge. It recommends prepositioned supplies, locally anchored warning systems, improved transport arrangements and formal community co-decision mechanisms.

Keywords: Community Participation, Disaster Response, Disaster Risk Management, DMMU, Flood Resilience

1. Introduction

1.1 Background to the Study

Floods are recurrent hazards in many parts of Zambia and routinely affect housing, food production, transport, water systems and public health. The risk is particularly acute in settlements along the Zambezi basin, where seasonal river rises interact with limited infrastructure and livelihood dependence on flood-prone land. Climate variability is increasing the uncertainty surrounding the timing and severity of these events, while poverty and weak service access reduce the capacity of households to recover (CRED, 2021; FAO, 2022; IPCC, 2014; World Bank, 2023) [2, 5, 10, 21]. Disaster risk management therefore requires more than the distribution of relief after impact. It depends on credible warnings, evacuation arrangements, accessible shelters, prepositioned supplies, functioning transport and continuous engagement with people who live with the hazard.

Zambia's national disaster management system assigns the DMMU a central coordinating role. The National Disaster Management Policy and the national flood contingency framework require the institution to link prevention, preparedness, response and recovery across national, provincial and district levels (GRZ, 2010; GRZ, 2023) [7, 8]. This mandate reflects the Sendai Framework's emphasis on understanding risk, strengthening governance, investing in resilience and improving preparedness for effective response (UNDRR, 2015) [18]. However, national policy does not by itself guarantee effective delivery in remote communities. District performance depends on staff, transport, communication systems, stock availability

and practical collaboration with local authorities and traditional leaders.

Chiyeke Area in Chavuma District offers a useful setting in which to examine that local delivery problem. Residents experience repeated flood exposure, yet the area is geographically dispersed and becomes difficult to reach when roads are inundated. Household losses may occur before formal assistance arrives, making the speed, relevance and coverage of DMMU measures decisive. The study therefore evaluates what the institution actually implements, how residents judge the results and which constraints prevent the response system from working consistently.

1.2 Statement of the Problem

Despite an established policy and institutional framework, Chiyeke households continue to report recurring flood losses, delayed relief and limited access to organised preparedness measures. Existing national and provincial assessments describe broad capacity gaps, but they provide little respondent-level evidence on how DMMU measures are experienced in remote communities. Without such local evidence, the existence of an intervention can easily be mistaken for effectiveness. The unresolved issue is whether DMMU measures reach exposed households early enough, match their priority needs and draw on the knowledge and capacities already present in the community. This study addresses that gap by examining implementation, outcomes and operational constraints in Chiyeke Area.

1.3 Study Objective and Research Questions

The general objective was to assess the effectiveness of the DMMU in disaster risk management in Chiyeke Area of Chavuma District.

1. To identify the disaster response measures implemented by the DMMU in Chiyeke Area.
2. To assess the effectiveness of the disaster response strategies used by the DMMU.
3. To examine the challenges faced by the DMMU in implementing disaster response strategies.

The corresponding questions asked which response measures had been implemented, how effective those strategies were, and what challenges affected their implementation.

1.4 Theoretical and Conceptual Framework

The analysis combines Disaster Risk Reduction Theory and Resilience Theory. Disaster Risk Reduction Theory treats losses as the outcome of hazard exposure interacting with social and institutional vulnerability. Its practical implication is that public agencies should act before impact by improving risk knowledge, warning, evacuation, preparedness and coordination rather than relying mainly on emergency relief (UNDRR, 2022) [19]. Resilience Theory focuses on the capacity of a community or system to absorb disruption, adapt and continue functioning. It draws attention to local networks, knowledge, livelihood adjustments and collective action that support recovery (Cutter, Ash and Emrich, 2018; Coppola, 2022) [4, 1]. Used together, the two perspectives make it possible to evaluate both formal institutional performance and the community capabilities that can strengthen or compensate for it.

Conceptual framework for the assessment of DMMU effectiveness

Institutional inputs	Community interface	Expected outcomes
Warnings Evacuation arrangements Prepositioned supplies Response logistics	Consultation Local leadership Use of local knowledge Collective action	Timely and equitable relief Reduced losses Faster recovery Stronger resilience

Diagram 1: Institutional measures influence outcomes through the quality of the community interface. Source: Authors' conceptualisation, 2026

In the framework, institutional effectiveness is the principal explanatory factor and is represented by the availability, timeliness, relevance and coverage of DMMU measures. Community participation moderates that relationship because local leaders and residents influence how warnings are transmitted, how needs are identified and whether assistance reaches people who are difficult to access. Reduced vulnerability and stronger resilience are the expected outcomes. The framework therefore anticipates that technically sound interventions will have limited effects when participation and last-mile delivery are weak.

1.5 Significance of the Study

The study provides DMMU and district authorities with locally specific evidence on warning, logistics, relief targeting and participation. It also gives policymakers a basis for comparing formal policy expectations with delivery conditions in a remote flood-prone settlement. Community leaders and civil-society organisations can use the findings to identify practical entry points for strengthening local warning networks and preparedness. Academically, the article links institutional effectiveness with community resilience and shows why the two should not be assessed separately.

2. Literature Review

2.1 Disaster Response Measures in Flood-Prone Communities

Effective flood management is built around a sequence of mutually reinforcing measures. Risk information must be translated into warnings that are understandable, trusted and delivered through channels people actually use. Evacuation routes, shelters and transport arrangements must be established before roads or bridges fail. Relief stocks should be located close enough to affected settlements to avoid preventable delays. International guidance also stresses that these arrangements must be tested through drills, updated after events and linked to local contingency plans (IFRC, 2023; Twigg, 2015; UNDRR, 2022) [9, 16, 19]. Measures that exist only in policy documents cannot reduce loss when communities do not know how to act on them.

In rural African settings, traditional leaders, radio and community meetings often provide the final link between official information and households. This local communication role is important, but it can also mask weak

direct institutional reach. Tiepolo and Braccio (2020) [15] found that disaster risk reduction is less likely to be implemented where local development plans do not translate risk priorities into funded actions. In Zambia, assessments have similarly identified gaps in district resources, transport and coordination (UNDP, 2023) [17]. The literature therefore suggests that the appropriate question is not merely whether DMMU has issued a warning or distributed relief, but whether the whole delivery chain functioned at the time and place of need.

2.2 Effectiveness of Disaster Response Strategies

Response effectiveness can be assessed through timeliness, appropriateness, coverage and perceived results. Timeliness matters because food insecurity, unsafe water and displacement intensify rapidly after a flood. Appropriateness concerns whether the items delivered correspond with household priorities. Coverage examines whether assistance reaches people with the greatest exposure and least ability to cope. Perceived effectiveness adds the judgement of affected residents, whose experience can reveal access barriers that administrative reports may overlook. These dimensions are interdependent: a technically appropriate relief package has little value if it arrives after the critical period or reaches only roadside households.

Evidence from disaster practice also shows that coordination with local leadership can improve targeting and accountability. Gaillard and Mercer (2013) [6] argue that risk reduction becomes effective when scientific, institutional and local knowledge are connected rather than treated as competing sources. Mercer *et al*. (2021) [12] similarly place participation within risk governance rather than at the margins of project implementation. This means that effectiveness is not solely a property of DMMU's material resources. It also depends on relationships that enable information to move quickly and allow scarce assistance to be allocated transparently.

2.3 Challenges Affecting Implementation

Common implementation barriers include insufficient budgets, limited vehicles and boats, damaged roads, inadequate storage, weak communications and shortages of trained personnel. These constraints become more severe in dispersed settlements because the same flood that creates the need for assistance may cut the routes required to deliver it.

Governance challenges are equally important. Top-down planning can overlook informal routes, household vulnerability and locally workable warning methods. When affected people are invited only to receive information or assistance, institutions lose opportunities to use community knowledge for planning and monitoring (Ravazzoli *et al*., 2025) [13].

Community adaptation is often treated as evidence that formal systems are unnecessary. Resilience scholarship suggests the opposite. Collective road repairs, elevated storage, drainage work and local monitoring are forms of adaptive capacity, but they require institutional support if they are to operate safely and at scale (Cutter, Ash and Emrich, 2018; Jere *et al*., 2026) [4, 11]. Formal and informal capacities should therefore be designed as complements. DMMU can supply technical guidance, equipment and coordination, while residents contribute detailed knowledge of hazard pathways, vulnerable households and feasible local actions.

2.4 Personal Critique

The reviewed literature is strong in describing policy principles and broad institutional weaknesses, but it sometimes equates the presence of a national framework with local preparedness. It also tends to separate response performance from community participation, even though the last mile of warning, targeting and relief distribution is fundamentally relational. A more useful assessment should connect operational indicators with the views of exposed households and should examine whether institutions recognise the adaptive work already undertaken by communities. This study adopts that integrated position.

2.5 Research Gap

Few studies provide objective-by-objective evidence on DMMU implementation in Chiyeke Area. Existing national reports cannot show whether warnings arrive on time, which sources residents trust, whether relief matches needs, or why particular households are missed. There is also limited documentation of independent community action and its relationship to formal disaster management. The present case study fills that local empirical gap by combining scaled assessments with concrete accounts of success, failure and self-organised adaptation.

3. Methodology

3.1 Research Design and Study Area

A descriptive case-study design was used within a cross-sectional framework. The design was appropriate because the study sought a detailed account of DMMU measures and their perceived results in one flood-prone locality at a defined point in time. Chiyeke Area was selected because recurrent flooding, dispersed settlement and seasonal access problems make it a relevant test of local disaster-management capacity. The case-study approach also allowed numerical response patterns to be interpreted alongside brief accounts of specific events and community actions (Creswell, 2014; Yin, 2018) [3, 22].

3.2 Population and Sample

The target population comprised adult residents and household heads in flood-prone parts of Chiyeke Area, together with local stakeholders who had direct knowledge of disaster planning or response. Using an estimated adult population of 1,200, the study initially applied Yamane's formula at an 8% margin of error and obtained a planning figure of 138. Field constraints relating to time, finance, accessibility and dispersed settlement led to a pragmatic completed sample of 50 respondents. The article reports the completed dataset of 50 throughout.

3.3 Sampling, Data Collection and Analysis

Purposive sampling was used to select participants with relevant exposure or institutional knowledge. Data were collected through a structured questionnaire containing mainly closed questions and five-point Likert items, with several open questions on serious flood events, preparedness gaps, intervention outcomes and independent community actions. The instrument was pilot tested to improve clarity. Responses were coded and analysed in Microsoft Excel using frequencies and percentages. Open answers were grouped by recurrent meaning and counted, allowing qualitative experiences to be presented transparently alongside the scaled results. Participation was voluntary,

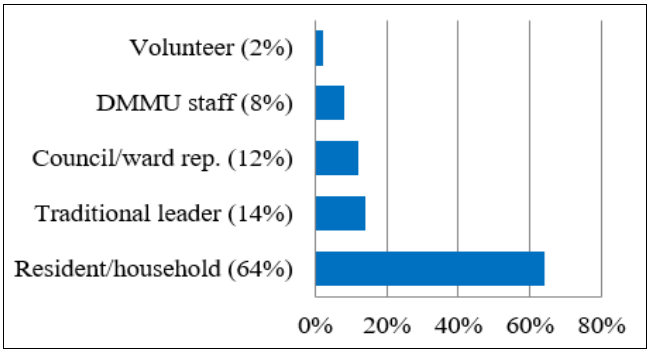
respondents were informed of the purpose of the study, and confidentiality was maintained.

The unit of analysis was the respondent's assessment of institutional measures and observed outcomes in Chiyeke. Percentages were calculated against the completed sample of 50, so each respondent represented two percentage points. Likert categories were retained in the figures to show the full distribution rather than collapsing every response into a single mean. For interpretation, strongly disagree and disagree were combined only when the text compared negative and positive assessments. This procedure preserved the underlying results and made the direction of opinion easy to verify (Saunders, Lewis and Thornhill, 2019) [14].

4. Results and Discussion

4.1 Respondent and Flood-Exposure Profile

Respondent roles in Chiyeke Area

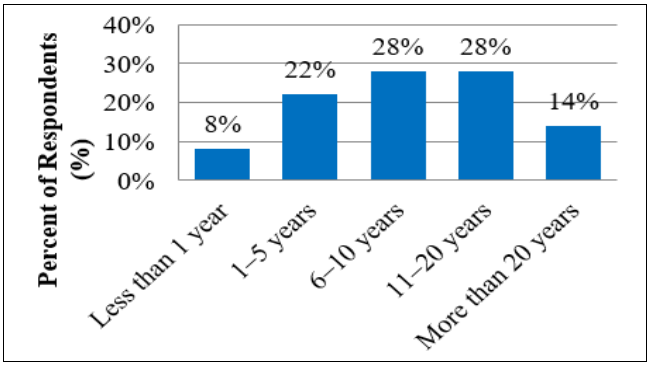


Source: Primary data, 2026

Fig 1: Respondent roles in Chiyeke Area

Residents and household heads constituted 64% of the sample. Traditional leaders accounted for 14%, council or ward representatives 12%, DMMU or disaster-response personnel 8%, and community volunteers 2%. The profile gives greatest weight to household experience while retaining perspectives from local governance and response structures.

Length of residence or work in Chiyeke Area

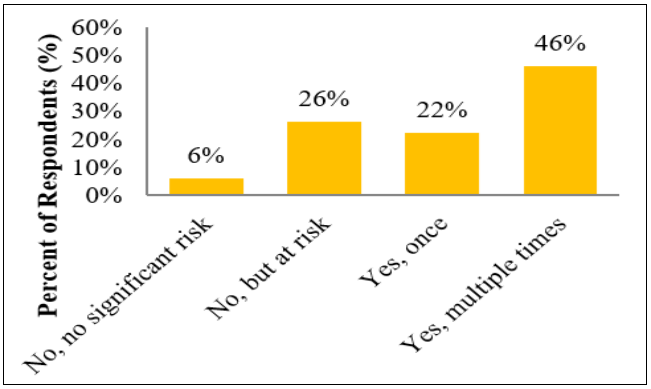


Source: Primary data, 2026.

Fig 2: Length of residence or work in Chiyeke Area

Most respondents had substantial local experience: 56% had lived or worked in Chiyeke for between six and twenty years, and a further 14% had more than twenty years' experience. Only 8% had been present for less than one year. The responses therefore largely reflect repeated observation rather than a single recent event.

Flood exposure during the previous five years

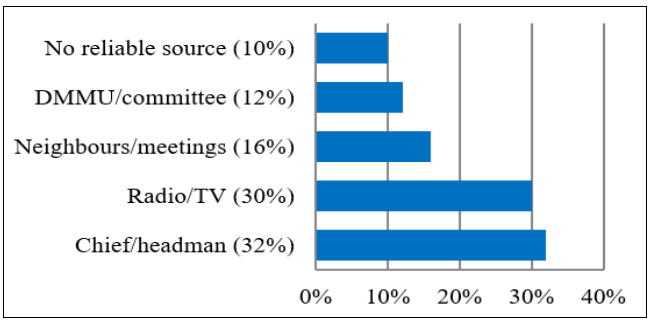


Source: Primary data, 2026.

Fig 3: Flood exposure during the previous five years

Sixty-eight per cent had experienced household flooding at least once during the previous five years, including 46% who had been flooded several times. Another 26% considered themselves at risk even though their households had not flooded. The high exposure confirms that respondents were well placed to judge local disaster-management performance.

Main source of flood information



Source: Primary data, 2026.

Fig 4: Main source of flood information

Traditional leaders were the main source of flood information for 32% of respondents and radio or television for 30%. Community meetings and neighbours accounted for 16%, while only 12% named DMMU or a local disaster committee as their main source. Ten per cent reported no reliable source. The pattern shows that DMMU depends heavily on intermediaries for last-mile communication.

Table 1: Most severe flood experience reported by respondents

Reported experience	Frequency	Percent
No direct flooding but nearby or at risk	16	32
Crop or house damage	6	12
Water entered the settlement after many years	6	12
Rapid onset; livestock, latrines or bridge affected	6	12
One-off flood that receded after about one week	5	10
Zambezi overflow affected homes, crops or road	4	8
River burst banks and affected gardens, crops or road	4	8
Other severe flood experience	3	6

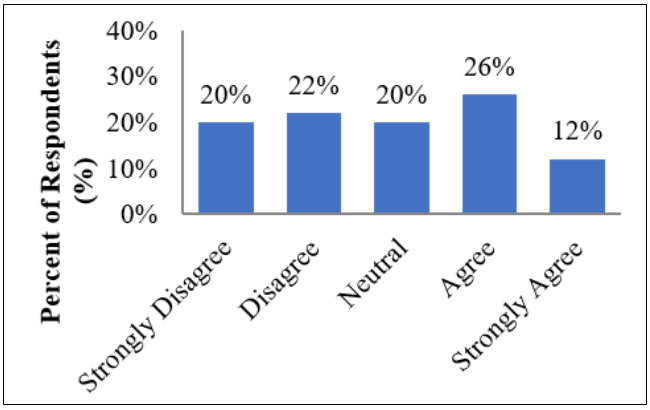
Source: Primary data, 2026.

The accounts show that exposure was not limited to water entering houses. Respondents also described crop losses, blocked roads, sanitation damage and the movement of livestock. These effects connect household welfare with transport and service infrastructure, explaining why preparedness and logistics must be assessed together.

4.2 Objective One: Disaster Response Measures Implemented by DMMU

The first objective examined the practical measures visible to respondents. The questionnaire focused on warnings, evacuation arrangements, prepositioning of supplies and the overall adequacy of preparedness. These indicators capture the preventive and readiness functions that should reduce the need for improvised action after flooding begins.

Timeliness of early flood warnings

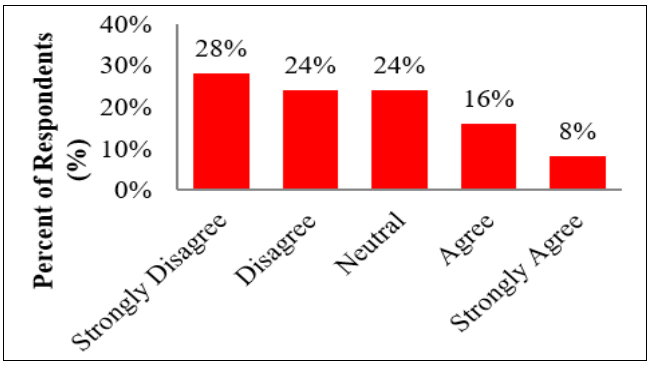


Source: Primary data, 2026.

Fig 5: Timeliness of early flood warnings

Views on warning timeliness were divided, but the balance was negative. Forty-two per cent disagreed or strongly disagreed that warnings arrived in time, compared with 38% who agreed or strongly agreed; 20% were neutral. The result suggests that warnings work for some residents but are not yet consistent across the area.

Availability of marked evacuation routes and shelters

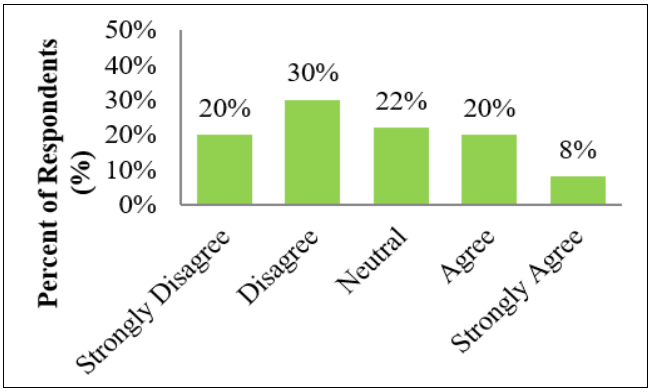


Source: Primary data, 2026.

Fig 6: Availability of marked evacuation routes and shelters

Evacuation arrangements were the weakest measured preparedness component. Fifty-two per cent disagreed or strongly disagreed that routes and shelters were clearly marked, while only 24% agreed. A further 24% were uncertain. Without visible routes and recognised shelters, a warning may not translate into safe movement.

Prepositioning of relief supplies before the flood season

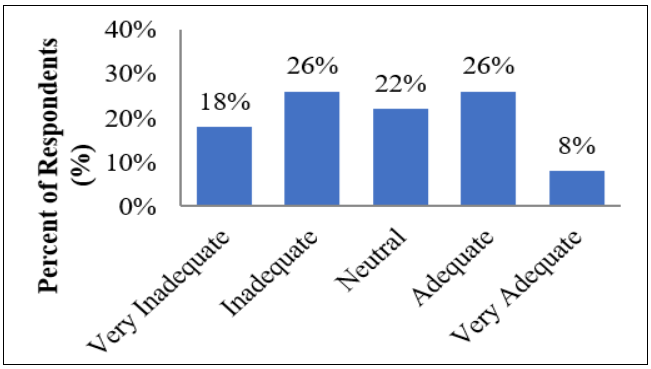


Source: Primary data, 2026.

Fig 7: Prepositioning of relief supplies before the flood season

Half of the respondents rejected the statement that relief supplies were positioned before the flood season, compared with 28% who agreed and 22% who were neutral. This finding is consistent with a response system that mobilises after impact and is then exposed to the same access constraints affecting the community.

Overall adequacy of flood preparedness



Source: Primary data, 2026.

Fig 8: Overall adequacy of flood preparedness

Overall, 44% rated flood preparedness inadequate or very inadequate. Thirty-four per cent rated it adequate or very adequate and 22% selected the neutral category. The distribution confirms that useful measures exist, but their coverage and reliability are insufficient to produce a generally positive assessment.

Table 2: Preparedness gaps identified by respondents

Preparedness gap	Frequency	Percent
Vulnerable households overlooked	7	14
Warnings arrived too late	6	12
No boat or response vehicle	6	12
Poor road access	6	12
Relief was not prepositioned	5	10
Relief items did not match needs	5	10
No community drills	4	8
DMMU visibility was low outside emergencies	3	6
No marked routes or shelters	3	6
No post-flood follow-up	2	4
No local flood monitoring or gauge	2	4
Weak communication between DMMU and headmen	1	2

Source: Primary data, 2026.

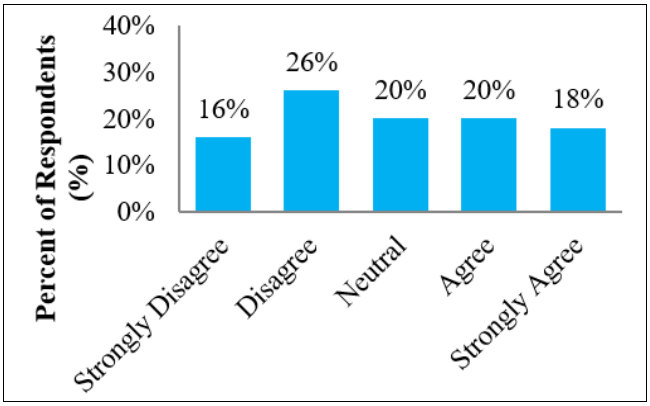
The open responses clarify why the scaled preparedness rating was weak. The most frequent concern was that vulnerable households were overlooked, followed by late warning, lack of transport and poor roads. These are not isolated technical defects; they describe a chain in which weak advance planning increases the likelihood of delayed and unequal assistance. The result supports Disaster Risk Reduction Theory's insistence on preventive investment and shows that a response mandate cannot be fulfilled reliably without readiness measures.

The objective-one evidence also distinguishes reach from readiness. The presence of radio messages and traditional-leader communication shows that warning activity occurs, but respondents did not experience a stable system linking warning to evacuation and immediate support. A preparedness measure should therefore be judged by the action it enables. For example, a warning is operationally complete only when households know where to go, which route remains safe, who will assist people with mobility constraints and what supplies are available at the destination. This interpretation is consistent with the Sendai Framework, which places preparedness within a wider system of risk governance and institutional accountability (UNDRR, 2015) [18].

4.3 Objective Two: Effectiveness of DMMU Response Strategies

The second objective assessed whether assistance arrived promptly, matched household needs and reached vulnerable groups. It also asked respondents for an overall judgement and for a specific example of an intervention that had worked or failed. This combination distinguishes partial success in particular activities from the broader performance of the response system.

Arrival of relief assistance within 72 hours

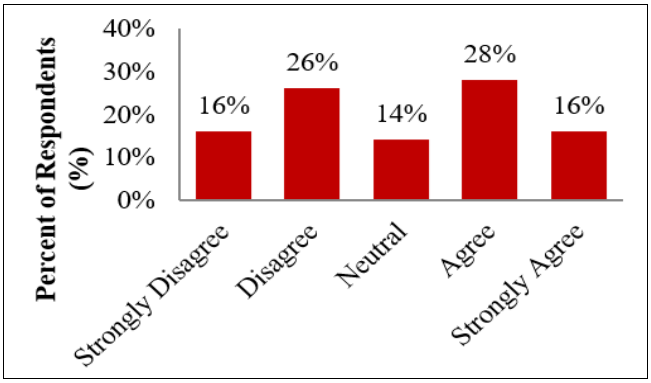


Source: Primary data, 2026.

Fig 9: Arrival of relief assistance within 72 hours

Forty-two per cent disagreed or strongly disagreed that relief arrived within 72 hours, while 38% agreed and 20% were neutral. The near-even split indicates uneven service: some locations or events received rapid support, but many households experienced delays beyond the period in which immediate assistance is most valuable.

Extent to which relief items matched household needs

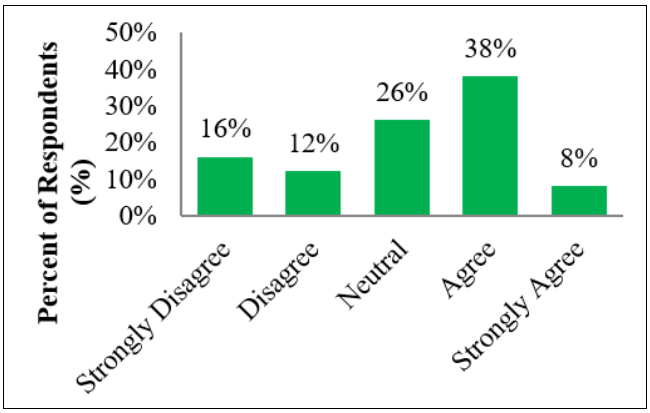


Source: Primary data, 2026.

Fig 10: Extent to which relief items matched household needs

Relief relevance produced a slightly more favourable result. Forty-four per cent agreed or strongly agreed that items matched household needs, compared with 42% who disagreed and 14% who were neutral. The narrow difference suggests that package content was appropriate in some interventions but was not consistently informed by local priorities.

Extent to which the response reached vulnerable households

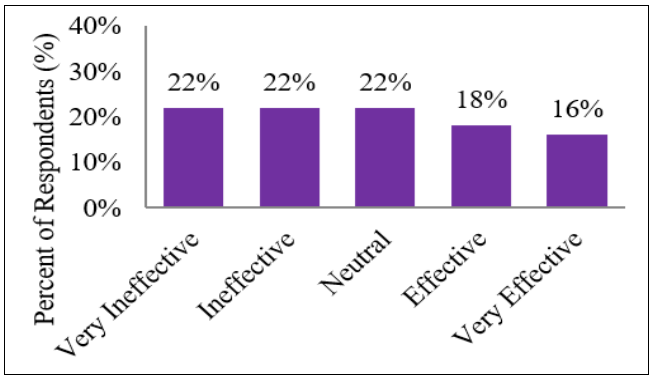


Source: Primary data, 2026.

Fig 11: Extent to which the response reached vulnerable households

Coverage of vulnerable households was the strongest response indicator: 46% agreed that the response reached those most in need, 28% disagreed and 26% were neutral. Although this is a relative strength, more than half of respondents either withheld a positive judgement or reported exclusion, leaving substantial room for improvement in targeting and access.

Overall effectiveness of the disaster response



Source: Primary data, 2026.

Fig 12: Overall effectiveness of the disaster response

The overall assessment remained negative. Forty-four per cent rated the response ineffective or very ineffective, compared with 34% who rated it effective or very effective; 22% were neutral. The result shows that isolated achievements in needs matching or targeting were not sufficient to overcome delays and logistical failures.

Table 3: Examples of DMMU interventions that worked or failed

Respondent example	Frequency	Percent
Failed: relief truck could not cross the flooded road	11	22
Failed: relief arrived about three weeks late	10	20
Failed: only households near the main road received relief	8	16
Worked: radio warning provided about two days' notice	8	16
Worked: DMMU and headman targeted the worst affected	5	10
Failed: distribution was disorganised	5	10
Worked: supplies or shelter were provided within days	3	6

Source: Primary data, 2026.

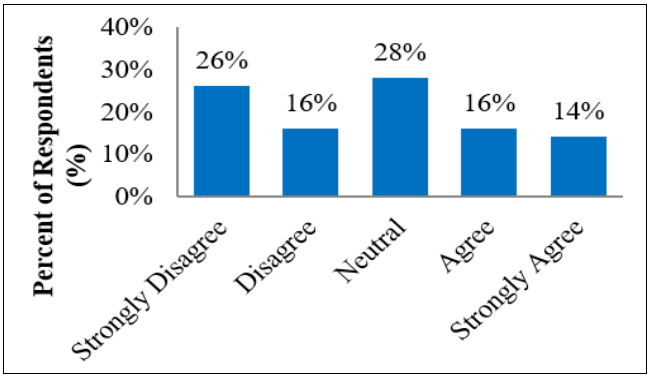
The examples are particularly revealing: 68% described failure and 32% described success. Inability to cross flooded roads, delivery after water had receded and roadside bias were the leading failures. By contrast, the positive examples involved advance radio warning, collaboration with a headman and relatively prompt provision of supplies or shelter. Effectiveness therefore improved when communication and local coordination worked, but declined when the institution relied on a single vulnerable transport route. This finding supports the conceptual framework: material inputs matter, yet their effect is mediated by the community interface and by last-mile access.

A further implication is that a single overall effectiveness rating can conceal differences between response dimensions. The relatively positive assessment of vulnerable-household reach indicates some targeting capability, while the weaker timeliness result points to logistical delay. Improvement should therefore be monitored through separate service standards rather than one aggregate indicator. DMMU could record the time between warning, request, dispatch and household receipt; the proportion of priority households served; and the extent to which distributed items correspond with an agreed needs list. Such records would make post-event review more precise and would help distinguish a stock shortage from a transport, communication or beneficiary-identification problem.

4.4 Objective Three: Challenges in Implementing Disaster Response

The third objective draws together the operational barriers recorded in the preceding tables and the participation measures that help explain them. The principal challenges were inadequate transport, impassable roads, delayed mobilisation, weak prepositioning, limited institutional visibility and uneven communication. Respondents also assessed whether the DMMU consulted residents, included them in decisions and used local knowledge.

Community consultation in disaster risk reduction planning

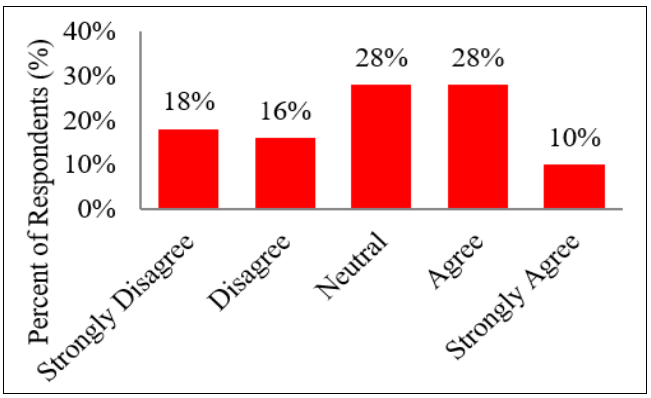


Source: Primary data, 2026.

Fig 13: Community consultation in disaster risk reduction planning

Forty-two per cent disagreed or strongly disagreed that DMMU consulted the community when planning disaster risk reduction activities, compared with 30% who agreed and 28% who were neutral. Planning was therefore experienced as more top-down than participatory.

Community involvement in disaster-related decisions

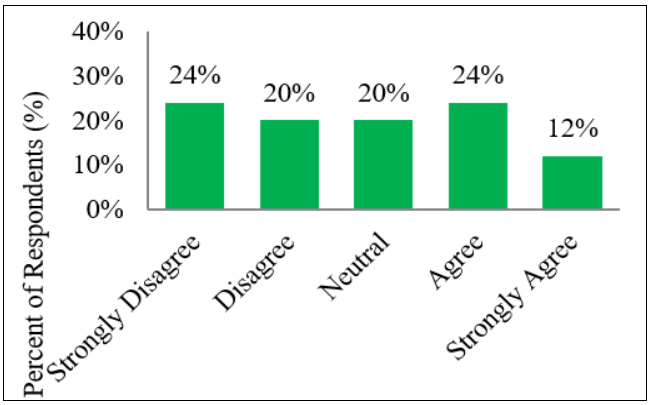


Source: Primary data, 2026.

Fig 14: Community involvement in disaster-related decisions

Perceptions of active involvement in decisions were somewhat better: 38% agreed or strongly agreed, 34% disagreed and 28% were neutral. The result may indicate that engagement improves during implementation, when local leaders and residents are needed to identify affected households, even though advance planning remains limited.

Use of local knowledge in DMMU plans

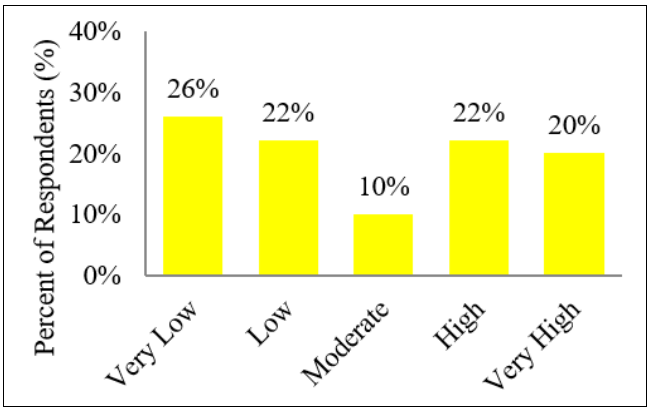


Source: Primary data, 2026.

Fig 15: Use of local knowledge in DMMU plans

Forty-four per cent disagreed that local knowledge was reflected in DMMU plans, compared with 36% who agreed and 20% who were neutral. The finding points to a missed opportunity because residents possess detailed knowledge of flood pathways, access constraints and household vulnerability.

Overall level of community participation in disaster risk reduction



Source: Primary data, 2026.

Fig 16: Overall level of community participation in disaster risk reduction

Overall community participation was rated low or very low by 48%, while 42% rated it high or very high and 10% selected the middle category. The split distribution suggests uneven practice across events or localities, but the negative balance confirms that participation is not yet institutionalised.

Table 4: Independent disaster-risk actions undertaken by the community

Community action	Frequency	Percent
Youths repaired an access road	9	18
Households raised granaries on wooden platforms	8	16
Residents dug drainage channels	8	16
Residents organised an informal river-watch system	7	14
Community members planted trees	5	10
Households relocated kitchens or stores	5	10
Women formed a savings group	4	8
Residents cleared blocked drainage	4	8

Source: Primary data, 2026.

The independent actions demonstrate substantial adaptive capacity. Residents did not wait passively for formal assistance; they repaired access, protected food stores, redirected water and monitored the river. Resilience Theory interprets these actions as resources that public institutions should strengthen rather than replace. The participation results show, however, that DMMU does not consistently incorporate this knowledge into formal planning. The implementation challenge is therefore both logistical and institutional: resources are scarce, but available community capacity is also underused.

Participation should not be interpreted as transferring institutional responsibility to residents. Communities can identify vulnerable households, maintain local warning contacts and propose practical routes, but they cannot substitute for public financing, trained coordination or safe transport. A balanced model would define responsibilities before the flood season and provide communities with feedback after they contribute information. This would reduce consultation fatigue and make participation observable in final plans, budgets and distribution procedures. It would also create a clearer accountability chain when agreed measures are not implemented.

4.5 Integrated Discussion

Across the three objectives, the evidence points to an institution that has a visible role but operates unevenly. Warnings, relief packages and targeting sometimes worked, especially when radio and traditional leadership connected DMMU with households. Yet preparedness remained reactive, transport arrangements were fragile and community knowledge was not routinely built into planning. This explains why individual indicators can appear moderately positive while the overall effectiveness rating remains negative.

The findings are consistent with national assessments that identify district-level resource and coordination constraints (UNDP, 2023) [17], but they add a local explanation of how those constraints affect households. A truck shortage becomes more than an administrative gap when an access road is flooded; it becomes a three-week delay or complete exclusion. Likewise, an official warning is not effective merely because it was issued. It must reach people through trusted channels and provide enough time for protective

action. The strong role of headmen and radio demonstrates the practical importance of decentralised communication.

These patterns also show why disaster risk cannot be reduced through emergency inputs alone. Vulnerability is produced by the interaction of exposure, livelihood insecurity, weak infrastructure and limited institutional capacity (Wisner, Gaillard and Kelman, 2012) [20]. In Chiyeke, the road network is simultaneously a development asset and a response lifeline. When it fails, warning follow-up, evacuation support and relief distribution all deteriorate. Investment in access, storage and local communications should therefore be treated as risk reduction rather than as separate development spending.

The community findings also qualify a deficit-based view of Chiyeke. Residents possess knowledge, networks and practical adaptations, but these are not consistently recognised by the formal system. Jere *et al*. (2026) [11] argue that resilience should be defined and measured with communities rather than imposed through external indicators. The Chiyeke evidence supports that position. Modest support for road repair, drainage, elevated storage and river monitoring could extend measures that residents already understand and maintain. Such collaboration would not remove DMMU's responsibility; it would enable the institution to use its limited resources more intelligently.

5 Conclusion and Recommendations

5.1 Conclusion

The study concludes that DMMU disaster risk management in Chiyeke Area is only partly effective. Under the first objective, the institution implemented warning, evacuation, relief-prepositioning and response measures, but residents experienced them as inconsistent. Preparedness was rated inadequate by 44%, evacuation arrangements attracted the strongest negative response, and only a small share relied directly on DMMU for flood information. The measures therefore exist but do not yet provide dependable community-wide readiness.

Under the second objective, response effectiveness was weakened by delay and unequal physical access. Some respondents received useful warnings, appropriate relief and support targeted through local leadership. Nevertheless, 44% rated the response ineffective, and the most common examples involved impassable roads, late delivery and roadside concentration. The results show that the main weakness is not the absence of a formal mandate but an operational system that cannot reliably convert plans and supplies into timely household support.

Under the third objective, DMMU faced intertwined logistical and governance challenges. Limited transport, poor roads and inadequate prepositioning constrained delivery, while weak consultation reduced the institution's access to local knowledge. Communities responded by organising their own protective measures, demonstrating resilience that remains insufficiently connected to formal planning. DMMU effectiveness will improve when operational readiness and meaningful participation are strengthened together.

5.2 Recommendations

1. Preposition food, safe-water supplies and essential non-food items at accessible points before each rainy season, with clear stock-control and release procedures.
2. Build a community-based warning network around headmen, radio, local-language messaging and designated household focal persons, and test it before peak flooding.
3. Map and mark evacuation routes and safe shelters with residents, then conduct periodic drills that include elderly people, persons with disabilities and female-headed households.
4. Agree on alternative transport before the flood season, including boats and contingency routes, and coordinate preventive road maintenance with district authorities and the Road Development Agency.
5. Formalise community participation through pre-season and post-season meetings, joint hazard mapping, transparent beneficiary selection and community monitoring of distribution.
6. Support proven local adaptations with tools, materials and technical advice, especially drainage work, elevated storage, river monitoring and small access-road repairs.

Table 5: Priority actions and indicators for implementation

Priority action	Responsible lead	Verification indicator
Preposition essential relief before the rainy season	DMMU and Chavuma District	Stock register and accessible storage point confirmed
Test the warning and evacuation chain	DMMU, headmen and radio partners	Pre-season drill and contact list completed
Secure alternative access for cut-off settlements	DMMU and district authorities	Boat or alternative transport agreement in place
Integrate community knowledge into contingency planning	District disaster committee	Community hazard map and meeting record approved
Review timeliness, coverage and needs matching after each event	DMMU monitoring team	Post-event report with disaggregated service indicators

Source: Developed from the study findings, 2026.

5.3 Study Limitations

The cross-sectional design records perceptions at one point and cannot establish changes over time. The purposive sample of 50 is appropriate for the local case but does not support statistical generalisation to every flood-prone district in Zambia. Findings also rely partly on self-reported experience and were not matched with administrative records for each intervention. These limitations do not remove the value of the results, but they mean that the percentages should be read as evidence about Chiyeke rather than as national estimates.

5.4 Policy and Practice Implications

For policy, the findings show that district disaster-management capacity should be assessed through last-mile indicators, including warning reach, route accessibility, delivery time and inclusion of vulnerable households. For practice, DMMU should plan with the community rather than treating participation as a distribution-stage activity. A small set of locally monitored indicators could be reviewed after each flood season and used to update the Chavuma contingency plan. Future research should repeat the assessment after operational changes and compare Chiyeke with other remote flood-prone communities.

5.5 Monitoring and Further Research

A practical monitoring cycle should begin before the rainy season with verification of stocks, transport agreements, warning contacts, marked routes and shelter readiness. During an event, DMMU should record the time at which a warning was issued, assistance was requested, supplies were dispatched and priority households received support. A short community review after the event should then compare those records with household experience, document excluded locations and identify items that did not match needs. The results should be discussed with headmen and district actors and used to revise the next seasonal plan. This cycle would convert the study indicators into routine management information and make institutional improvement visible over time.

Further research should use a larger probability-based sample where access permits and should include DMMU administrative records, route mapping and repeated measurements across more than one flood season. Comparative studies in other remote districts would show which findings arise from Chiyeke's geography and which reflect wider institutional conditions. Separate analysis of women, older people, persons with disabilities and households distant from the main road would also improve understanding of unequal response coverage.

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