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Assessing the Effectiveness of Flood Mitigation Strategies in Enhancing Community Resilience in John Laing Compound in Lusaka, Zambia

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Abstract

Flooding is a recurrent environmental and development challenge in Lusaka's informal settlements, where inadequate drainage, poor waste management, unplanned settlement and limited institutional capacity increase exposure and vulnerability. This study assessed the effectiveness of flood mitigation strategies in enhancing community resilience in John Laing Compound, Lusaka, Zambia. Its population, according to the Zambia Statistics agency is 123,196 people. A descriptive cross-sectional design using mixed methods was employed. Household data were obtained from 44 respondents, while six key informants drawn from community and institutional stakeholders provided qualitative evidence.

Questionnaires, key informant interviews and observation were used, with quantitative data summarized using descriptive statistics and qualitative information analysed thematically.

The findings show that drainage channels (60.5%) and waste-management activities (47.4%) were the most commonly reported mitigation measures. However, implementation was inconsistent:

47.7% of households reported that mitigation activities occurred rarely and 36.4% reported that they occurred occasionally. Perceived effectiveness was low, with 45.5% rating current strategies as not effective and 43.2% reporting that existing measures had not reduced flooding at all. Only 20.5% of households were confident or very confident in their ability to respond to floods. Key informants unanimously rated community emergency-response capacity as very poor. The principal constraints were poor drainage (95.3%), poor waste disposal (90.7%), weak community participation (79.1%) and weak enforcement of regulations (79.1%).

The study concludes that the presence of mitigation measures has not translated into adequate community resilience.

More consistent infrastructure maintenance, stronger waste management, meaningful community participation, enforcement and institutional coordination are required.

Keywords: Flood Mitigation, Community Resilience, Informal Settlements, John Laing Compound, Lusaka, Disaster Risk Reduction

1. Introduction

1.0 Overview

Floods are among the most destructive disasters in the world. In Zambia, flooding has become one of the most frequent and destructive natural hazards affecting urban and peri-urban communities, particularly in Lusaka's informal settlements such as John Laing Compound. These floods, which are driven by a combination of rapid urbanization, poor drainage infrastructure, and climate variability, lead to loss of lives, property damage, and increased exposure to waterborne diseases.

This research will assess the effectiveness of floods mitigation strategies in enhancing community resilience to floods within John Laing Compound.

1.1 Background

Disasters are increasing in both frequency and intensity, with floods accounting for a significant proportion of these events. According to UNDRR (2020) [16], floods represented approximately 43% of all recorded disasters between 2000 and 2019, affecting about 1.7 billion people and causing substantial economic losses.

In Africa, The African Development Bank (2020) [1] notes that floods are the most frequent type of disaster on the continent, with over 100 million people affected between 2000 and 2018.

In Southern Africa, Coetzee *et al*. (2023) [5] note that the region has experienced numerous disaster events affecting millions of people, highlighting the magnitude of the problem.

Zambia, also has had its share of flooding perils especially in urban areas. Manda, (2019) [8] argues that Lusaka is one of the most flood-prone cities due to unplanned settlements, poor waste management, and insufficient drainage infrastructure.

The John Laing Compound case is important because recurrent flooding occurs in a setting where households, community leaders, local government and disaster-management institutions share responsibility for risk reduction. The study therefore shifts attention from the mere existence of mitigation measures to their implementation and perceived contribution to resilience. This distinction is important because a drainage channel, awareness campaign or early-warning mechanism may exist without producing substantial improvements if it is poorly maintained, irregularly implemented or weakly connected to community preparedness.

The study was guided by the Disaster Risk Reduction (DRR) framework, which emphasizes reducing exposure and vulnerability while strengthening preparedness, coping capacity and recovery. The framework informed the assessment of structural measures, community-based activities, early warning, institutional coordination and the challenges affecting their implementation.

1.2 General Objective

To assess the effectiveness of flood mitigation strategies in enhancing community resilience to in John Laing Compound, Lusaka, Zambia.

1.2.1 Specific Objectives

1. To Analyse the flood mitigation strategies implemented in flood-prone areas of John Laing Compound.
2. To Assess the effectiveness of the strategies in enhancing community resilience to floods in John Laing Compound.
3. To Ascertain the challenges affecting the effectiveness of flood mitigation strategies in enhancing community resilience to floods in John Laing Compound.

2. Literature Review

2.0 Overview

This literature review examines flood mitigation strategies in enhancing community resilience to floods, with a focus on John Laing Compound in Lusaka, Zambia. It is organised around three key themes aligned to the study objectives. The first theme explores flood mitigation strategies in flood-prone areas, reviewing global, regional, and local approaches. The second theme ascertains the effectiveness of these strategies in enhancing community resilience while the third theme analyses the challenges affecting the effectiveness of flood mitigation strategies in John Laing Compound.

2.1 Flood Mitigation Strategies in Flood-Prone Areas

At the global level, empirical evidence underscores the value of integrated flood management. Keating *et al*. (2022) [6] demonstrated through a multi-country study across Europe and Asia that countries adopting integrated strategies—incorporating early warning systems, hazard mapping, and land-use planning—achieved sustainable reductions in flood-related economic losses ranging from 30% to 50%, driven by strong institutional coordination and long-term investment.

Within Africa, rapid urbanisation, infrastructural deficits, and governance challenges heavily influence disaster mitigation. Urban growth frequently outpaces municipal capacity, leading to expanding informal settlements with poor drainage and high vulnerability. Numbere and Ologunorisa (2021) [13] highlighted the critical role of physical infrastructure in West African cities, finding that over 60% of residents in flood-prone urban areas lacked access to functional drainage systems, a vulnerability severely exacerbated by poor solid waste management practices blocking drainage channels.

In Southern Africa, flood resilience is closely tied to community engagement and local governance structures. Chanza and Masocha (2021) [3] showed through participatory appraisals in Zimbabwe and Mozambique that communities actively involved in preparedness activities—such as risk mapping, disaster education, and local emergency planning—exhibited higher resilience, successfully utilizing context-specific coping strategies and indigenous knowledge systems.

At the local level in Zambia, particularly within informal settlements like John Laing Compound in Lusaka, flood vulnerabilities are acute. Manda and Siame (2020) found that over 65% of households experience recurrent flooding driven by poor drainage, unplanned settlement expansion, and inadequate waste management. Furthermore, existing municipal strategies remain largely reactive, focusing on post-disaster relief rather than preventative mitigation.

While macro-level policies exist, a significant research gap persists regarding how disaster management strategies operate in practice within resource-constrained informal settlements. Understanding local coping mechanisms, institutional interactions, and community-level realities remains essential for bridging the divide between policy frameworks and practical implementation.

2.2 Effectiveness of Flood Mitigation Strategies in Enhancing Community Resilience to Floods

Globally, the challenge of flooding and hence the mitigation strategies have not been unnoticed. Keating and Mechler (2022) [7] demonstrated through a multi-country study that nations with well-integrated early warning systems, preparedness planning, and strong institutional coordination achieved 30% to 50% reductions in disaster-related losses. Their findings underscore that such outcomes stem from deliberate pre-disaster investments, risk-informed budgeting, and decentralised management structures that empower local authorities.

In Africa, DRR effectiveness is heavily shaped by structural inequalities, institutional weaknesses, environmental pressures, and rapid urbanisation, creating a persistent gap between policy design and practical outcomes in informal settlements. Numbere (2022) [12] utilised case study methods and GIS-based spatial analysis in urban West African cities to reveal that poor drainage systems, environmental degradation, and unregulated urban expansion increased flood exposure by over 60% in informal settlements.

Conversely, areas implementing integrated approaches—combining drainage infrastructure improvements, land-use planning, and public awareness campaigns—experienced significant reductions in flood damage, displacement, and economic losses, highlighting that physical engineering must be paired with effective governance and behavioural change.

In Southern Africa, disaster management outcomes are closely linked to urbanisation patterns, climate variability, and informal settlement dynamics. Chanza and Masocha (2021) [3], using participatory rural appraisals and community surveys in Zimbabwe, found that communities engaged in participatory risk mapping and early warning systems exhibited higher levels of preparedness and reduced vulnerability during flood events. Their research highlights that active engagement improves risk awareness, strengthens local capacities, enhances trust between communities and institutions, and fosters sustainable, contextually appropriate local strategies.

At the local level in Zambia, within informal settlements such as John Laing Compound in Lusaka, disaster management remains constrained despite existing policy frameworks. Manda and Siame (2020) found that over 70% of households lacked adequate drainage infrastructure, significantly increasing flood vulnerability. Furthermore, their study notes that repeated exposure to flooding erodes household coping capacity over time, leading to deepening poverty cycles, while municipal awareness programmes are undermined by infrastructural deficits, weak enforcement of planning regulations, and limited institutional capacity.

2.3 Challenges Affecting the Effectiveness of Flood Mitigation Strategies in Enhancing Community Resilience to Floods in unplanned settlements like John Laing Compound

Worldover, disaster management effectiveness is heavily constrained by an implementation deficit and systemic rigidity. David Alexander (2021) [2] reveals that while more than 70% of countries possess formal disaster preparedness frameworks, only a minority regularly conduct simulation exercises or operational testing, leaving policies largely existing on paper rather than in practice. In addition, global systems often struggle with over-centralised command-and-control models and reactive funding frameworks that prioritize post-disaster recovery over long-term risk reduction.

Across Africa, disaster mitigation challenges are intensified by rapid urbanisation, institutional weaknesses, and socio-economic vulnerabilities. Pelling (2003) [14] demonstrates that over 60% of flood impacts in African cities are driven by underlying development factors such as poverty, informal housing, insecure land tenure, and weak governance structures. Consequently, disaster management strategies frequently fail because they address hazard exposure while neglecting these root socioeconomic drivers.

In Southern Africa, institutional and structural limitations create cascading vulnerabilities across social systems. Chanza *et al*. (2023) [4] highlight how disasters cause widespread disruptions in education, health services, water supply, and livelihoods, demonstrating that a lack of sectoral integration amplifies overall disaster impacts. Furthermore, structural inequalities result in low-income households experiencing disproportionately higher losses and slower recovery rates.

At the national and local levels in Zambia, flood mitigation is severely undermined by governance failures and infrastructure deficits. Siame (2023) [15] notes that over 70% of informal settlements lack adequate drainage infrastructure, while weak enforcement of land-use regulations drives continued settlement in high-risk areas.

In John Laing Compound, these systemic challenges converge with high poverty levels, poor solid waste management, low-quality housing materials (such as mud bricks), and limited access to formal early warning systems. This creates a recurrent "poverty-disaster trap," where seasonal flooding erodes household resilience, depletes savings, and increases vulnerability to waterborne diseases like cholera and dysentery.

2.4 Establishment of Research Gaps

Although the literature on flood mitigation strategies in flood-prone areas is extensive and provides valuable insights across global, regional, and local contexts, several important gaps remain. Firstly, most studies are strongly grounded in global and theoretical frameworks, with limited critical assessment of how applicable these models are to informal urban settlements in developing countries such as John Laing Compound in Lusaka. As a result, there is insufficient interrogation of contextual factors such as poverty, weak governance, infrastructural deficits, and rapid urbanisation that may influence the effectiveness and implementation of disaster risk reduction strategies at the local level.

Also, while the literature demonstrates broad agreement on the effectiveness of disaster management (flood mitigation) interventions, it is largely dominated by macro-level, policy-oriented, and model-based studies. These approaches often fail to capture contradictions in findings, methodological limitations, and variations in outcomes across different socio-economic and geographical contexts. In particular, there is limited comparative analysis between developed and developing country experiences, making it difficult to determine the extent to which globally reported successes can realistically be replicated in resource-constrained environments.

Further, although key challenges affecting flood mitigation's effectiveness are well documented; such as institutional weaknesses, infrastructural limitations, and socio-economic inequalities, there is limited empirical evidence capturing how these challenges are experienced and managed at the community level. Existing studies often overlook lived experiences, local coping mechanisms, and the interactions between different vulnerability drivers in informal settlements.

Therefore, the literature reveals a clear need for context-specific, empirically grounded research that moves beyond generalised global findings to examine how flood mitigation strategies operate in practice within informal urban settings. In particular, there is a need for studies that critically assess the effectiveness, limitations, and lived realities of these strategies in enhancing community resilience to floods in John Laing Compound, Lusaka.

3. Research Methodology

3.0 Overview

This chapter presents a comprehensive description of the research methodology employed to assess the effectiveness of flood mitigation strategies in enhancing community resilience to floods in John Laing Compound, Lusaka.

Research methodology refers to the systematic framework that guides the collection, analysis, and interpretation of data in a study.

While outlining the key methodological components, it provides the foundation upon which the validity and reliability of research findings are built. It is guided by the Disaster Risk Reduction (DRR) framework.

3.1 Research Design

The study used a descriptive cross-sectional survey design with a mixed-methods approach. It was conducted in John Laing Compound, Lusaka, a peri-urban settlement described in the source document as frequently affected by flooding and characterised by inadequate drainage, unplanned housing and limited municipal services.

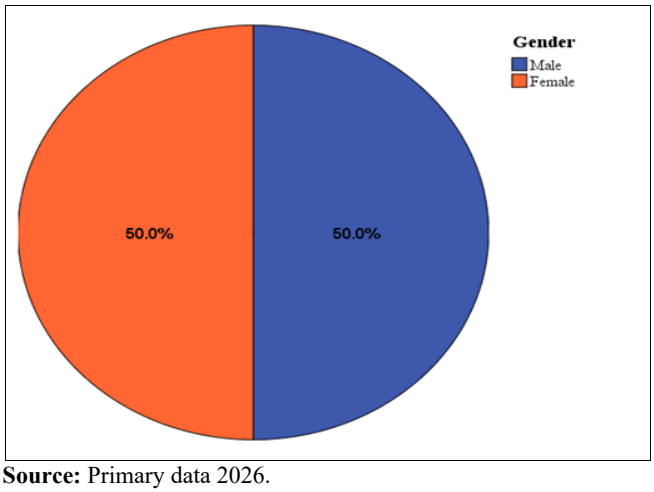
3.2 Target Population (Participants and sampling)

The study targeted 50 respondents: 44 household respondents and six key informants. Household respondents were selected to provide direct evidence of flood experiences, mitigation activities, preparedness and resilience. Key informants included community leaders and representatives associated with Lusaka City Council and community structures. The original methodology describes probability sampling for households and purposive sampling for key informants.

Table 3.2.1: Study participants

Participant group	Number	Share
Households	44	88%
Key informants	6	12%
Total	50	100%

Source: Primary data 2026.



Source: Primary data 2026.

Fig 3.2.2: Gender Distribution of Respondents

The pie chart shows that the respondents were equally distributed by gender. Out of the 44 respondents, 50% (22) were male and 50% (22) were female. This indicates that the study achieved an equal representation of male and female respondents.

3.3 Data collection and analysis

Primary data were collected using structured household questionnaires, key informant interviews and observation. Secondary information consisted of literature, reports and policy documents. Household responses were analysed using descriptive statistics, while key-informant and observational material was analysed thematically. Triangulation was used to compare household and institutional perspectives.

3.4 Ethical Considerations

Participation was voluntary, information was treated as confidential and the study was presented as an academic investigation. The source document indicates that respondents were informed of the purpose of the study and that data were intended for academic use.

4. Research Findings and Discussion of Results

4.0 Overview

This chapter presents and discusses the findings of the study on the effectiveness of flood mitigation strategies in enhancing community resilience in John Laing Compound, Lusaka, Zambia. The findings were obtained from 44 households and 6 key informants. Information obtained from the key informants is incorporated into the relevant sections to provide additional perspectives on flood mitigation and community resilience in the study area. Quantitative findings are presented using frequency tables, percentages and appropriate charts, while responses to open-ended questions and key informant interviews are analysed thematically.

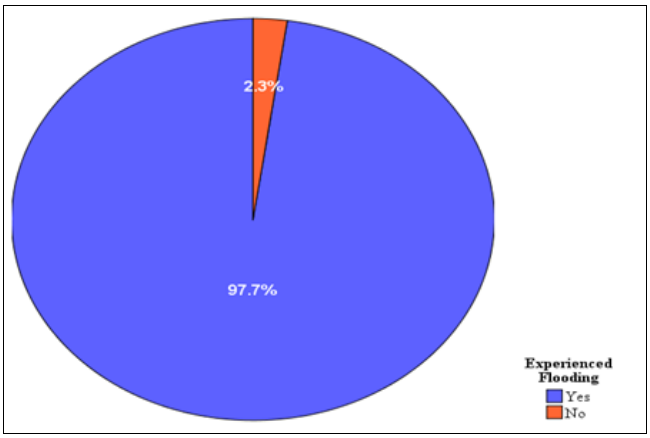
4.1 Respondent profile and flood experience

The 44 household respondents were equally divided by gender (50% male and 50% female). Young adults aged 18–35 constituted 77.2% of respondents. Half had lived in John Laing for more than 15 years, while 22.7% had lived there for 11–15 years. Almost all household respondents (97.7%) reported having experienced flooding. Damage to or flooding of houses and shops was the most frequently reported impact (77.3%), followed by road flooding (40.9%) and water contamination (25.0%).

Table 4.1.1: Selected household respondent characteristics

Characteristic	Main result
Gender	50% male; 50% female
Age	54.5% aged 18–25; 22.7% aged 26–35
Residence	50.0% had lived in John Laing >15 years
Flood experience	97.7% had experienced flooding
Most reported impact	77.3% reported flooded/damaged houses or shops

Source: Primary data 2026.



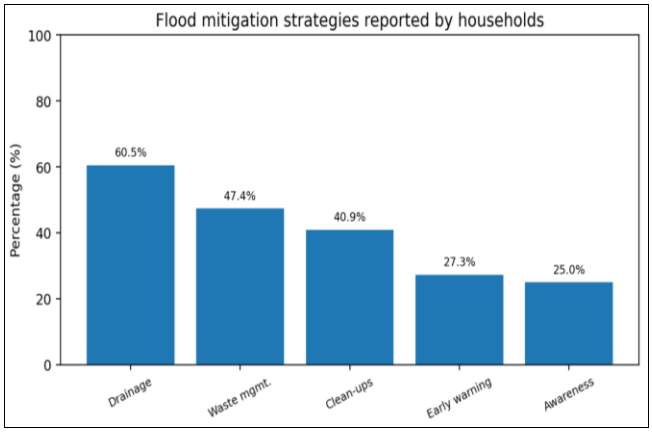
Source: Primary data 2026.

Fig 4.1.2: Respondents Experience of Flooding in John Laing Compound

Almost all respondents (97.7%) reported having experienced flooding, while only 2.3% (1) indicated that they had not experienced flooding. This shows that flooding is a widespread experience among the respondents, suggesting that it is a significant environmental challenge within the study area. The high proportion of respondents reporting flooding also provides a strong basis for examining its effects and the experiences of affected households.

4.2 Flood mitigation strategies implemented

Household respondents identified a mixture of structural and non-structural measures. Drainage channels were the most commonly reported strategy (60.5%), followed by waste-management activities (47.4%). Community clean-up activities, early-warning systems, and flood-awareness campaigns were also reported. The results indicate that mitigation is not absent from the community; rather, the issue is the consistency, adequacy, and coordination of implementation.



Source: Primary data 2026.

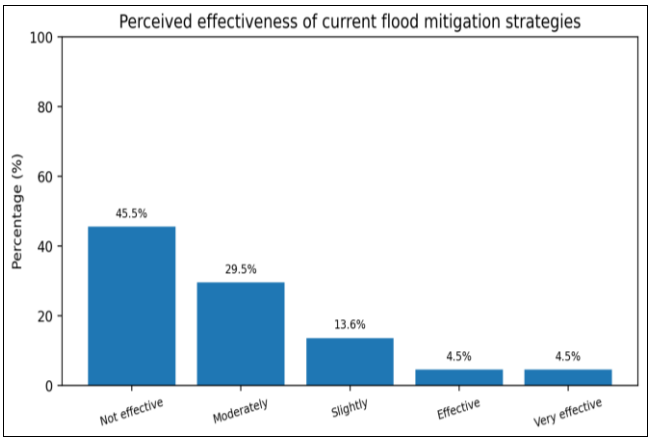
Fig 4.2.1: Flood mitigation strategies reported by household respondents

Community members were identified as an important implementing stakeholder, while key informants also identified DMMU and council structures as involved. However, 66.7% of key informants described planning and coordination as poor. Implementation was also perceived as irregular: 47.7% of households said mitigation activities occurred rarely, 36.4% said occasionally, 11.4% said never, and only 4.5% reported frequent implementation.

The most frequently identified missing intervention was improvement and maintenance of drainage infrastructure (56.8% of households). Among key informants, all six (100%) identified the need for improved or additional drainage, while five (83.3%) identified good roads as a missing requirement. These results place physical infrastructure at the centre of local flood-risk concerns.

4.3 Effectiveness in enhancing community resilience

The findings show a clear difference between the presence of mitigation measures and perceived resilience outcomes. Nearly half of household respondents (45.5%) considered the strategies not effective, while 29.5% considered them moderately effective. Only 4.5% rated them effective and 4.5% very effective.

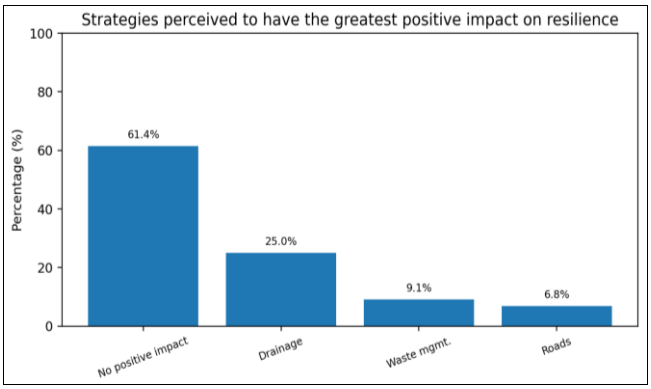


Source: Primary data 2026.

Fig 4.3.1: Household perceptions of the effectiveness of current flood mitigation strategies

Perceptions of actual flood reduction were similarly limited. A total of 43.2% reported that existing measures had not reduced flooding at all, while 40.9% reported very little reduction. Only 6.8% reported a moderate reduction, and no respondent reported a significant reduction. At the same time, 52.3% had observed improvements in drainage and water flow. This suggests that some physical improvements were visible without producing a comparable reduction in overall flood impacts.

Confidence in responding to floods was low. Only 20.5% of households were confident or very confident, whereas 52.3% were not confident or not confident at all. In the key-informant group, 83.3% stated that the strategies had not improved community preparedness, response or recovery, and all six rated community capacity to respond to flood-related emergencies as very poor.



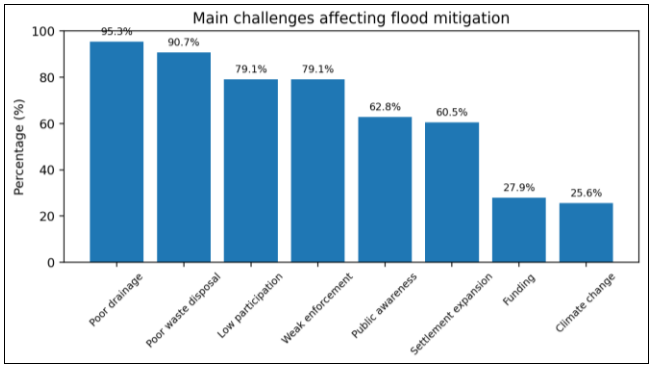
Source: Primary data 2026.

Fig 4.3.2: Strategies perceived to have the greatest positive impact on community resilience

Drainage was the intervention most often associated with positive change, but 61.4% of households stated that no mitigation strategy had had much positive impact on community resilience. Key informants similarly reported limited effectiveness: 66.7% described current strategies as not very effective and 33.3% reported that there were no effective strategies. Thus, the findings suggest limited overall effectiveness despite some improvements in drainage and water flow'.

4.4 Challenges affecting effectiveness

The most prominent challenges identified by households were poor drainage systems (95.3%) and poor waste-disposal practices (90.7%). Lack of community participation and weak enforcement of regulations were each reported by 79.1%. Limited public awareness (62.8%) and rapid settlement expansion (60.5%) were also substantial. In contrast, inadequate funding (27.9%) and climate change (25.6%) were reported less frequently by households as immediate implementation challenges.



Source: Primary data 2026.

Fig 4.4.1: Main challenges affecting flood mitigation

Community participation was generally rated low. Among valid household responses, 43.9% rated it very low. All six key informants independently rated community participation as low. Key informants identified inadequate government support (66.7%) and lack of awareness programmes (33.3%) as factors discouraging participation. All six key informants also considered existing laws, regulations and enforcement mechanisms ineffective in preventing activities that increase flood risk.

The effects of these constraints were substantial. Increased health risks and water-borne diseases were reported by 56.8% of households, damage to houses and property by 50.0%, and disruption of movement and economic activities by 29.5%. Key informants identified poor roads and drainage as the most significant implementation challenge (66.7%).

4.5 Discussion of Research Findings

In this section, findings of the study are discussed in relation to the three specific objectives and the literature reviewed in Chapter Two. The discussion focuses on the flood mitigation strategies implemented in John Laing Compound, their effectiveness in enhancing community resilience to floods, and the challenges affecting their implementation. The findings are interpreted in relation to the Disaster Risk Reduction (DRR) framework, which emphasises risk reduction, preparedness, community participation, institutional capacity, and resilience-building. This discussion also compares the findings of the study with evidence from previous studies in order to identify areas of agreement, differences, and possible explanations within the context of John Laing Compound.

The findings indicate that John Laing Compound has a recognizable set of flood mitigation measures, but their implementation is insufficiently regular and coordinated. This is consistent with the DRR perspective adopted by the study, which treats resilience as an outcome of interacting physical, social and institutional capacities. Drainage was the most visible intervention and the measure most often associated with improvements in water flow, yet recurrent flooding remained widespread.

The gap between infrastructure improvement and broader resilience is particularly important. More than half of households observed improved drainage and water flow, yet most respondents reported little or no reduction in flooding, and confidence in responding to floods remained low. This supports Norris *et al*. (2008) [11], who conceptualize resilience as a broader set of capacities rather than a single physical outcome. It also aligns with Mercer *et al*. (2010) [10], who emphasize the importance of community knowledge and participation in risk reduction.

Community participation presents a further implementation challenge. Residents were identified as important actors, but both household and key-informant responses indicate that participation is weak. This creates a practical contradiction: communities are expected to contribute to flood mitigation, while institutional support, awareness programmes and coordination remain limited. The findings therefore suggest that participation should be understood as a structured partnership rather than simply a responsibility transferred to households.

The evidence on enforcement and coordination points to an institutional implementation gap. All key informants regarded existing regulations and enforcement as ineffective, and two-thirds described planning and coordination as poor. This indicates that policy or regulatory existence alone does not guarantee effective risk reduction. The findings reinforce the need for coordinated action among the community, local government, disaster-management institutions and local leadership.

Finally, the reported health, property and livelihood impacts demonstrate that flood mitigation is also a development and public-health concern. The results indicate that weaknesses in drainage and waste management can increase exposure to health risks while simultaneously damaging homes, movement and economic activities. Flood resilience in John Laing therefore requires an integrated approach linking infrastructure, environmental management, preparedness, governance and community participation.

5. Conclusion and Recommendations

5.0 Overview

In this chapter, the conclusion and recommendations of the study on the effectiveness of flood mitigation strategies in enhancing community resilience to floods in John Laing Compound, Lusaka will be presented. The conclusion is based on the findings presented and discussed in Chapter Four. The chapter also provides recommendations aimed at improving flood mitigation and strengthening the community's ability to prepare for, respond to and recover from floods.

5.1 Conclusion

The study concludes that flood mitigation strategies are present in John Laing Compound but have limited overall effectiveness in enhancing community resilience. Drainage channels, waste-management activities, clean-ups, awareness, early warning and household protection measures are being implemented, but their irregularity, weak coordination and inadequate scale reduce their contribution to resilience. The strongest evidence of partial improvement concerns drainage and water flow; however, this has not

translated into substantial perceived reductions in flooding or strong preparedness and response capacity.

The central constraints are inadequate drainage and road infrastructure, poor waste disposal, low community participation, weak enforcement, rapid settlement expansion and limited institutional support. The results therefore suggest that strengthening resilience requires a shift from isolated or occasional activities towards sustained, coordinated and community-supported flood-risk reduction.

5.2 Recommendations

1. Lusaka City Council should improve and maintain drainage and road infrastructure, including routine clearing of drainage channels before and during the rainy season.
2. Community waste management should be strengthened through regular collection, clean-up activities and practical measures to prevent solid waste from entering drainage channels.
3. Community participation should be institutionalised through local preparedness groups, awareness activities, clean-up campaigns and participatory flood-risk planning.
4. Relevant authorities should strengthen enforcement of flood-related regulations, particularly those concerning waste disposal and development in high-risk locations.
5. DMMU, Lusaka City Council, community leaders and residents should strengthen coordination through regular planning meetings, clear responsibilities and improved early-warning dissemination.
6. Flood-awareness and preparedness programmes should provide practical guidance on actions before, during and after flood events, with attention to households with lower capacity to respond.

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