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Post-Disaster Housing Vulnerabilities: Shelter Provision and Recovery Challenges in Chimanimani, Zimbabwe After Tropical Cyclone Idai

Takudzwa Chikwanha[1,2*], Kaoru Suehiro[2], Takashi Sugiyama[3] and Chisaki Kitajima[2]

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Abstract Cyclone Idai, one of Southern Africa's most destructive tropical storms, struck Zimbabwe's Chimanimani region in March 2019, resulting in widespread devastation, displacement, and long-term socio-economic challenges. This study explores the challenges of post-disaster resettlement and reconstruction efforts, focusing on shelter provision, infrastructure rehabilitation, and socio-economic recovery. A qualitative ethnographic research design, incorporating field surveys, stakeholder interviews, and secondary data analysis, was employed to evaluate the effectiveness of response initiatives. The findings reveal a disconnect between emergency housing provisions and the cultural, economic, and environmental contexts of displaced communities and the associated risks. Phase 1 transitional shelters, constructed primarily from timber and corrugated metal, deteriorated rapidly due to poor thermal insulation and exposure to high humidity, necessitating reconsideration of material choices and design strategies. Phase 2 masonry-based permanent housing, while structurally sound, faced significant delays and limited community involvement, further exacerbating the vulnerabilities of the affected populations. The study also assesses the feasibility of prefabricated shelters, which, while offering rapid deployment, present financial and logistical challenges in low-income rural areas where access to industrialized materials is limited. The research highlights the importance of integrating disaster risk reduction principles with culturally appropriate and environmentally sustainable housing solutions to improve resilience and support long-term recovery. Recommendations include enhanced stakeholder collaboration, increased use of prefabricated housing, and the adoption of participatory planning frameworks that empower displaced communities in post-disaster rehabilitation. These findings provide valuable insights for developing effective policies for sustainable disaster recovery in vulnerable regions.

Keywords: Tropical Cyclone Idai, community resilience, post-disaster resettlement, disaster risk reduction, temporary housing, emergency shelter

[1] Architecture, University of Plymouth, the United Kingdom
[2] Architecture, Kyushu University, Japan
[3] Urban Design, Kyushu University, Japan
* Corresponding author email: chikwanha.takudzwa.307@s.kyushu-u.ac.jp

1. INTRODUCTION

1.1 Background

In March of 2019, Tropical Cyclone Idai made landfall in the Chimanimani Mountains, straddling the border between Zimbabwe and Mozambique, unleashing torrential rain and sustaining winds of up to 52.8 m/s. The resulting devastation included the flooding of low-lying areas such as the Kopa Shopping Centre. The catastrophic impact of Tropical Cyclone Idai in March 2019 exposed the vulnerabilities of Chimanimani and the Eastern Highlands of Zimbabwe to extreme weather events such as floods and landslides. It is estimated that over 3 million people were affected in the Southern African Regions, thousands of fatalities and casualties, and hundreds of missing person cases were reported (United Nations News, 2019). This resulted in the displacement and dismantling of thousands of households and families in the region. Official reports document over 340 fatalities and direct ramifications for more than 270,000 individuals in Zimbabwe, including over 129,000 children (United Nations Office of Disaster Risk Reduction, 2020).

Tropical Cyclone Idai has left nearly 90,000 individuals in need of shelter, and they have been relocated to 66 resettlement camps (Pinto de Oliveira et al., 2020). Major commercial and industrial centres, towns, schools, and hospitals have suffered extensive damage. Furthermore, the impairment of roads, bridges, and other vital infrastructure has compounded challenges in relief efforts, particularly exacerbating hardships for rural communities in Chimanimani (Chikowore et al., 2019). In its aftermath, achieving long-term sustainable recovery has proven to be a complex challenge, necessitating a comprehensive and adaptive response strategy.

The Technical report from the United Nations on hazard assessment and classification report emphasizes that deforestation, combined with the increased frequency and severity of floods, droughts, and the impact of climate change on land composition, heightens the susceptibility to landslides (UNDRR, 2020). The occurrence of landslides can be attributed to various factors, including illegal excavation and settlements on dangerous slopes, inadequate town planning regulations, and deforestation within the area (Nhamo et al., 2021). The influence of anthropogenic activities, encompassing deforestation, unauthorized settlements, urbanization, and the exploitation of natural resources, causes gradual land quality deterioration without immediate detection, which has precipitated an escalation in both the frequency and magnitude of natural hazards (Sina et al., 2019). The landslides in areas such as the Chimanimani township have dramatically altered the landscape of the Eastern highlands, as delineated in Figure 1. This aerial depiction distinctly showcases the devastation wrought by landslides, which decimated the terrain of the region.

In the case of Chimanimani, Wynberg et al. (2024) report significant deforestation linked to agricultural expansion and settlement, driven partly by an influx of migrants following earlier cyclones and floods. This includes illegal logging for commercial gain or fuel, timber extraction for construction, and land clearance for farming and unregulated settlements.

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Figure 1. Geographical comparison of Chimanimani Ward 15 before and after Tropical Cyclone Idai (Left: March 26, 2015; Right: March 26, 2019) (NASA, 2022)

Following the cyclone, many of the major infrastructure and transport systems leading in and out of Chimanimani were destroyed, rendering some areas completely inaccessible for at least 2 weeks. Local authorities in Chimanimani stated that the damage was escalated because some of the roads had not been graded since the 1980s. The roads were generally poorly maintained, and some culverts and drains are still silted and, in some cases, have become overgrown. (Government of Zimbabwe, 2019). As of August 2024, a lot of the road networks have been reconstructed; however, access is still limited in remote areas. 9 bridge approaches and 4 major bridges were washed away. Out of the 634 km of roads which were damaged, 347km (57.3%) were in Chimanimani (Government of Zimbabwe, 2019). The rain and flooding caused further damage, soaking the roads, causing mudslides, and washing away culverts. Figure 2. Shows the state of the damage in the centre of the township in 2023. The landslides caused by the cyclone have left a significant scar on the image of the township.

Figure 2. Ongoing landslide damage in Chimanimani Ward 15 (Author, 2023)

1.2 Research Objective and Framework

Despite growing global attention to post-disaster recovery and the increasing number of studies on Tropical Cyclone Idai, there remains limited academic research that critically engages with the medium to long-term recovery dynamics in Chimanimani, a remote and rural district in eastern Zimbabwe that was among the hardest hit. Existing studies largely concentrate on immediate humanitarian aid, economic losses, public health, and agricultural impacts. However, essential themes such as the lived realities of transitional shelter life, construction feasibility, material durability, social and spatial implications of displacement, and the evaluation of locally sourced and prefabricated shelter solutions remain insufficiently

explored. This study aims to address this gap by examining transitional and semi-permanent shelter interventions in the aftermath of Cyclone Idai. Through an integrated approach combining site surveys and semi-structured interviews with victims, it analyses user-led adaptations, phased reconstruction processes, and implementation constraints. In doing so, the study offers context-specific empirical insights from Zimbabwe on a critical yet understudied dimension of disaster management and recovery, contributing to more resilient, participatory, and climate-responsive shelter practices in low-resource and hazard-prone settings. These findings aim to inform both national recovery frameworks and the wider body of knowledge in disaster risk reduction and management.

This study follows a methodological research framework as outlined in Figure 3, designed to examine the impact of disruptions on recovery efforts in Chimanimani, Zimbabwe, following Tropical Cyclone Idai. It explores the socio-economic factors that constrain sustainable post-disaster recovery and contribute to heightened vulnerability among affected communities, with a particular focus on the misalignment between shelter interventions and the contextual needs of displaced populations. By integrating ethnographic field data with descriptive statistics derived from survey responses, the study presents a predominantly qualitatively driven analysis of recovery dynamics, with descriptive quantitative data used to substantiate the findings. This methodological approach is intended to inform evidence-based strategies for disaster risk reduction and the reinforcement of community resilience in post-disaster contexts. To build this analysis, Section 2 reviews existing literature on disaster recovery and shelter interventions, while Section 3 outlines the methodological framework, including the study area, data sources, and ethical considerations. Section 4 presents and discusses the findings across themes of post-disaster recovery, resettlement, socio-economic factors, and shelter models, which are then synthesised in Section 5 as key conclusions. Finally, Section 6 reflects on the study's limitations and offers recommendations for future research.

2. LITERATURE REVIEW

The intensifying frequency of hazards has drawn increasing scholarly attention to the compounded vulnerabilities in rural communities, where weak infrastructure and institutional fragility heighten post-disaster health risks. Public health challenges such as cholera, diarrheal disease, and malnutrition are particularly severe among displaced populations residing in overcrowded shelters with poor sanitation (Watson et al., 2007). These outcomes are rooted not just in exposure to hazards but in chronic underdevelopment, especially in remote and rural areas (Kienberger & Hagenlocher, 2014). Current literature highlights that such structural vulnerabilities underscore the need for disaster recovery frameworks that prioritize health equity and infrastructural resilience in low-capacity rural contexts.

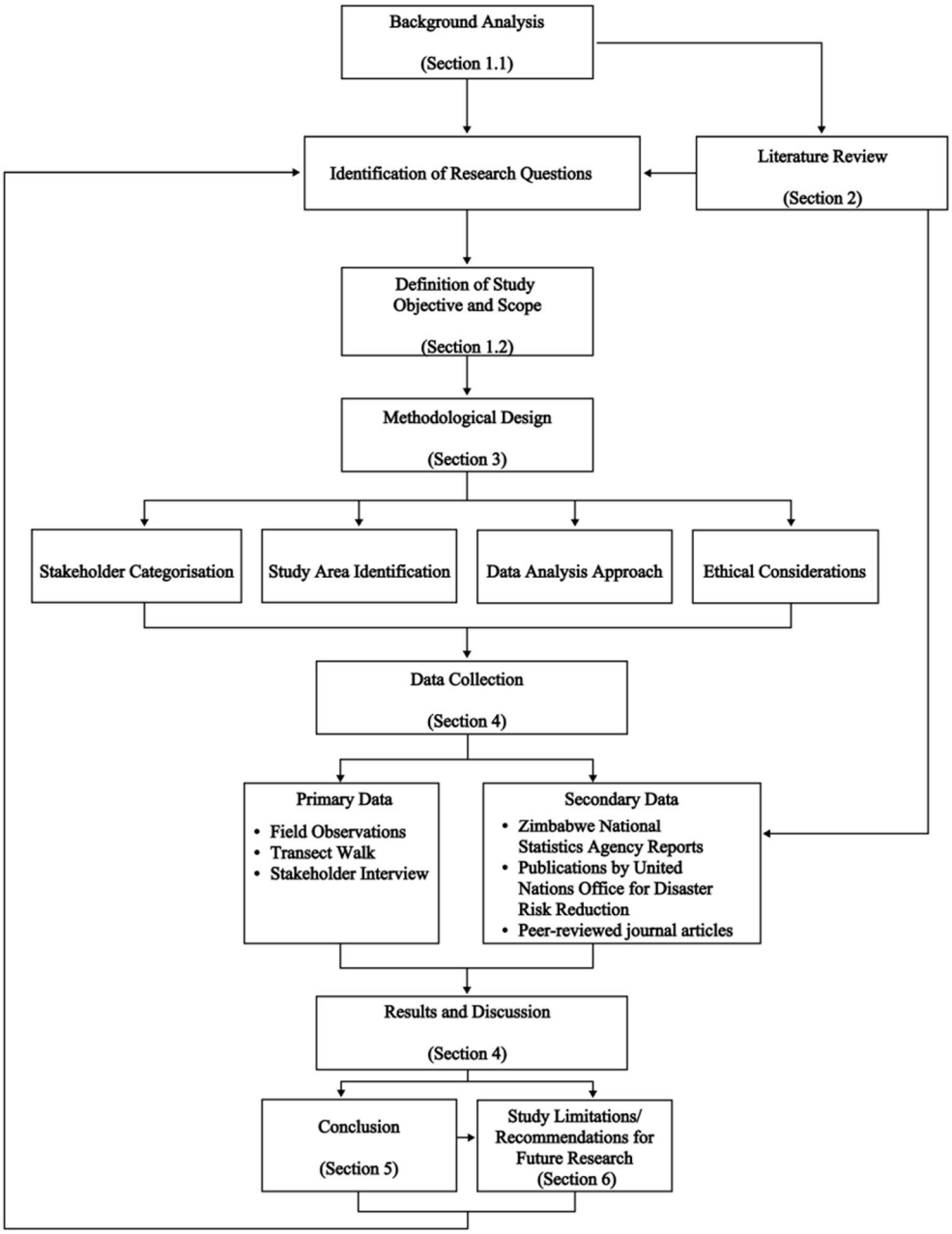

Figure 3. Methodological framework diagram

Parallel research in disaster recovery shelters highlights the persistent challenges in the coordination of foreign aid during post-disaster recovery. Fragmented interventions and the exclusion of local governance structures often result in a misalignment between donor strategies and community needs, diminishing the effectiveness of recovery efforts. (Altay & Labonte, 2014). In their analysis of the Haiti earthquake, Altay and Labonte emphasize that humanitarian success depends on multi-actor coordination, transparency, and integration with local systems. Despite substantial resource mobilization, poor information sharing and top-down decision-making delayed long-term recovery and weakened local ownership. Although based in Haiti, their findings are widely applicable to Sub-Saharan Africa, including Zimbabwe, where similar issues of donor centralization and weak national integration have been observed. A lack of harmonization between international actors and domestic recovery frameworks can

erode institutional trust, marginalize community priorities, and undermine the development of resilient local systems necessary for sustainable recovery.

These structural challenges in aid delivery are compounded in remote, low-capacity communities where institutional fragility intersects with geographic isolation. The vulnerability of such communities in post-disaster contexts has been extensively acknowledged in the disaster risk reduction literature. Coccossis et al. (2021), in their examination of the 1953 and 1956 earthquakes in the Greek islands of Cephalonia and Santorini, revealed that over 27,000 out of 33,300 housing units were destroyed. This level of destruction exposed the limitations of conventional recovery frameworks, which often rest on assumptions of adequate institutional and infrastructural capacity. However, in smaller, rural, or insular communities, these assumptions rarely hold true due to limited infrastructure and constrained access to critical services. In such contexts, resilience depends less on formal systems and more on community-level factors such as indigenous knowledge, social cohesion, and cultural norms. Disaster response strategies that overlook these realities often fall short, reinforcing the need for context-sensitive recovery models rooted in lived experience.

Sangasumana (2018) similarly illustrates the significance of institutional preparedness and governance in post-disaster recovery. In his case study of the Samasarakanda landslides in Sri Lanka, he identifies how delays in selecting appropriate relocation sites were symptomatic of broader planning failures. These delays hindered not only the speed but also the effectiveness of the resettlement process, leaving displaced populations in prolonged states of uncertainty. Sangasumana advocates for an integrated recovery approach that extends beyond rebuilding physical structures. This research underscores the necessity of addressing the wider social and economic dimensions of recovery, including livelihood restoration and political empowerment. Such a comprehensive model is vital for ensuring that displaced populations are not just resettled but meaningfully reintegrated into society.

Karunasena et al. (2010) highlight the value of community engagement in housing reconstruction, noting that owner-driven models lead to greater satisfaction and adaptability. However, contrasting findings highlight that the applicability of such models is highly dependent on local demographics and capacity. For example, in Suzu, Japan, following the 2024 earthquake, the implementation of community-led reconstruction was significantly hampered by the region's aging population. Older residents often face multiple vulnerabilities, including chronic health issues, reduced physical and cognitive capacity, and limited economic means, all of which impede active participation in rebuilding (Ngo, 2001). These conditions demand flexible recovery strategies that consider demographic limitations while promoting resilience at the community level. Collectively, these studies reinforce the need for a multidimensional, participatory approach to post-disaster shelter and resettlement tailored to local realities and long-term needs.

Ginigaddara et al. (2023) contribute to this discourse by emphasizing the importance of long-term housing solutions. Their study supports the use of prefabricated modular structures as durable, holistic alternatives in resource-constrained settings. They also stress the importance of appropriate material selection; poor insulation and ventilation in temporary shelters have

been linked to thermal discomfort and health hazards, as seen after the Great East Japan Earthquake, where dew condensation and fungal growth affected 58% and 37% of shelters, respectively. The challenges of material access and construction logistics are also central to post-disaster housing efforts. Wilhelm (2010) emphasizes the potential benefits of in-kind compensation, specifically, the direct provision of building materials as an alternative to cash-based approaches. He argues that material-based support facilitates quicker access to essential resources, enables the mobilisation of local labour, and strengthens community ownership of the reconstruction process.

Alongside public health and welfare and foreign aid allocation considerations, a critical component in establishing sustainable disaster recovery frameworks is the effective identification and engagement of stakeholders. In remote, low-capacity settings, rigid institutional classifications often fail to capture the diverse actors influencing outcomes. Mishra & Dahal (2024) demonstrate that shared responsibilities between formal agencies, NGOs, and community leaders strengthen coordination and service delivery. Li et al. (2021) similarly propose real-time, data-informed frameworks to identify organizational roles in disaster contexts.

The victims often act as proactive agents in their own recovery, drawing on social networks, navigating institutional barriers, and playing a central role in rebuilding community structures (Aldrich, 2015). Donor coordination and accountability frameworks significantly influence the effectiveness of crisis response, yet studies show that externally driven mechanisms often lack adaptability to local systems, reducing impact and sustainability (Chorna et al., 2025). Implementers such as NGOs, local governments, and volunteers frequently serve as intermediaries who operationalize recovery plans, though they are often limited by logistical and institutional constraints (Altay & Labonte, 2014). Experts and researchers play a central role in disaster recovery by embedding response strategies within frameworks of sustainability and resilience, thereby supporting evidence-informed and context-sensitive interventions (Echeverri et al., 2024). These perspectives reflect broader ethnographic insights that stress stakeholder mapping grounded in contextual realities and local agency.

3. METHODOLOGY

3.1 Methods

This study employed a qualitative ethnographic design to examine disaster response and recovery in Chimanimani, Zimbabwe, following Tropical Cyclone Idai. Fieldwork was conducted between 5 and 30 August 2022 and 10 and 20 August 2023. Guided by an interpretivist epistemology, the research assumed that knowledge is socially constructed and shaped by lived experience. Although this non-probabilistic approach limits generalizability, it is appropriate for exploratory, context-specific analyses of vulnerability and resilience (Igarashi et al., 2023). Bean (2021) provides empirical and theoretical support for this position, noting that interpretive methodologies uncover how meanings of risk and resilience are socially

produced, privileging depth and contextual understanding over universal generalization. Moreover, the social constructivist framework, emphasizing interaction and experiential learning, provides an effective means of examining victims' lived experiences.

Participants served as key informants and privileged witnesses, offering grounded insights that enriched the understanding of recovery processes (Galletta & Cross, 2013). The study aimed to generate contextually embedded interpretations rather than test predetermined theories. Purposive sampling was used to identify participants with first-hand experience in post-disaster recovery, including disaster victims, donors, implementers, and experts. This approach ensured the inclusion of diverse perspectives vital for understanding complex social dynamics (Etikan et al., 2016) and was particularly suited to Chimanimani's remote and challenging context.

One-on-one semi-structured interviews were selected for their adaptability and depth, which are particularly advantageous in disaster-affected settings. Conducted in private and secure locations, interviews ensured confidentiality and encouraged open, candid responses. For victims, interviews were kept brief (≈ 10 minutes) to minimize the risk of re-traumatization. In contrast, discussions with on-site implementers and experts lasted ≈ 20 minutes, reflecting the complexity of the topics addressed. The interview process began with a common set of open-ended questions to facilitate consistency, while allowing for conversational flexibility based on each participant's experiences (Dwyer & Horney, 2014). For example, victims were asked, "Can you describe the living conditions in the Resettlement area?", whereas implementers were asked, "What were the main challenges in providing recovery for the victims?". Follow-up questions were used to explore emerging themes and narratives. This method is well-suited for post-disaster contexts, where rigid questioning can suppress expression and where contextual, emotional, and cultural factors are vital to interpretation.

To enhance methodological rigour and triangulation, this study incorporated secondary data from both institutional and academic sources, selected for their credibility and alignment with field findings. Government documents were obtained from the Zimbabwe National Statistics Agency, the Ministry of National Housing and Social Amenities, and the Ministry of Public Works, offering data on demographics, cyclone impacts, and shelter policy. Additional reports were consulted from operational agencies involved in the Cyclone Idai response, including the International Federation of Red Cross, the United Nations High Commissioner for Refugees, and the United Nations Office for Disaster Risk Reduction. These sources provided situational analyses and institutional recovery frameworks. Peer-reviewed journal articles on post-disaster shelter, vulnerability, and governance further informed the analysis and interpretation.

3.2 Stakeholder Categorization

To capture the complexity of post-disaster recovery processes in Chimanimani, the study employed a purposive stakeholder-informed categorisation of participants into four key groups: victims, donors, implementers, and experts, as detailed in Table 1. While this categorization is not framed as a formal typology, this configuration was specifically developed to reflect the

realities of Chimanimani's recovery landscape, where access to reliable data is constrained due to its information environment, and responsibilities are dispersed across actors with differing capacities and mandates. Unlike more conventional sector-based or institutional classifications, this structure emerged from the pragmatic need to ensure inclusive representation of those most directly involved in or impacted by the recovery.

By structuring data collection through these stakeholder perspectives, the study was able to uncover divergences and intersections between policy-level intentions and on-the-ground experiences. This approach proved particularly valuable in identifying gaps in coordination, highlighting the adaptive strategies employed by victims of the tropical cyclone, and revealing how policymaker priorities translated into implementation challenges. Moreover, the targeted categorisation allowed for context-specific insights that informed stakeholder-relevant recommendations. In the case of Chimanimani, where institutional fragmentation and socio-economic vulnerability intersect, this method offered a practical way to access and synthesise grounded knowledge from both formal and informal recovery actors.

Table 1. Participant categorization and description

	Description
Victims	This group was made up of individuals directly affected by the floods and landslides triggered by Tropical Cyclone Idai. Including victims was crucial to capturing the human impact of the tropical cyclone and the lived experiences of those most affected. Their insights provided valuable feedback on the adequacy and effectiveness of the recovery programs, highlighting areas for improvement in disaster response efforts.
Donor	Donors included representatives from government and bilateral organizations such as the Japanese Embassy in Zimbabwe, the Ministry of Public Works, the International Organization for Migration, Zimbabwe Red Cross Society, USAID, and the Zimbabwe National Water Authority. Engaging with donors provided an understanding of the funding mechanisms, resource allocation, and the alignment of donor priorities with local needs.
Expert	This group consisted of three specialists, including researchers, local agronomists, architects, and urban strategists. Experts contributed technical and strategic insights, offering evidence-based assessments of the recovery measures and their long-term implications for resilience and sustainability. Their perspectives also contextualized local environmental, agricultural, and disaster management practices.
Implementer	This group comprised individuals actively engaged in executing post-disaster relocation programs, including local government officials, NGO staff, and volunteers. Implementers provided critical insights into the operational challenges and successes encountered during the recovery phase. Their perspectives were essential to evaluating the practicality and effectiveness of recovery strategies, particularly in Wards 7 and 15.

3.3 Selection of Study Area

Chimanimani District in eastern Manicaland Province (Figure 4), Zimbabwe, was purposively selected for its high hazard exposure, socio-economic marginalisation, and remoteness, factors central to disaster risk management (DRM) challenges. Its steep terrain, high rainfall, and dense river systems intensified the destruction of Tropical Cyclone Idai in March 2019. The case study focused on Ward 15 (Chimanimani Village), heavily damaged, and Ward 7 (West End - Shinja), the main relocation site. Both face recurrent flooding and landslide risks, compounded by weak infrastructure.

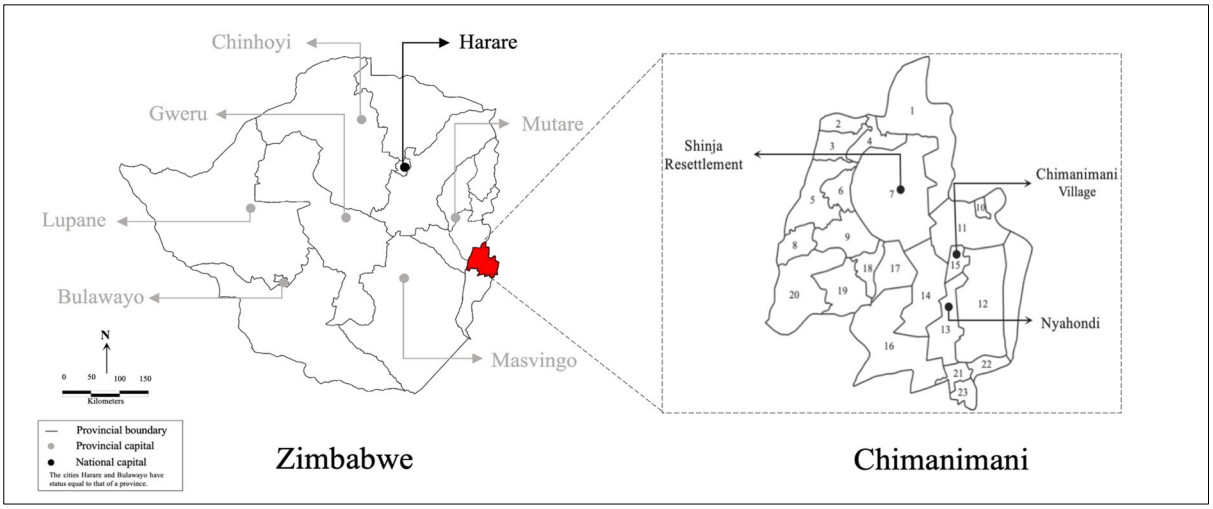

Figure 4. Map outlining Chimanimani District and its respective Wards

Before the cyclone, many residents lived in informal, non-durable housing constructed from materials such as mud, thatch, or wooden poles, making them highly susceptible to damage (Siddik et al., 2024). Ward 15 also had the district's highest average household size at 4.6 individuals (ZIMSTAT, 2022), reflecting dense living conditions and limited livelihood options. With a poverty rate of 76.8% (Figure 5), Chimanimani provides a critical context for examining how post-disaster recovery interacts with structural vulnerability in rural DRM.

3.4 Data Analysis

In this study, thematic analysis and triangulation were applied to analyse the qualitative data collected from interviews, site observations, and secondary sources. These methods were chosen to ensure a systematic and context-sensitive approach to understanding the disaster response and relocation efforts in Chimanimani following Tropical Cyclone Idai. Thematic analysis was used to identify patterns and themes within the data. This approach, grounded in the six-phase framework outlined by Braun and Clarke (2006), ensured a systematic and transparent process for analysing the data:

1. Familiarization with Data - Transcripts from interviews and notes from site observations were reviewed multiple times to gain a deep understanding of the content.

2. Generating Initial themes - Data was broken into meaningful units, and recurring concepts related to disaster recovery, stakeholder challenges, and shelter sustainability were identified.

3. Searching for Themes - Themes were grouped into broader categories, reflecting major themes such as resource allocation challenges, socio-economic dynamics, and shelter program effectiveness, as well as comparing alternative solutions.

4. Reviewing Themes - Themes were refined through iterative analysis to ensure they accurately represented the data.

5. Defining and Naming Themes - Each theme was defined with a clear scope, ensuring it aligned with the study's objectives.

6. Producing the Report - Findings were synthesized into a narrative to inform actionable insights for disaster risk management.

This approach was appropriate for the study because it enabled the identification of nuanced insights across the diverse stakeholder groups comprising of victims (14), Donors (5), Experts (3) and implementers (7), while maintaining flexibility to adapt to the study's qualitative ethnographic nature. Triangulation was employed to enhance the credibility and reliability of the findings and ensure the study has a robust methodological framework that provided actionable insights into disaster response and recovery. This method compared data from three main sources, interviews, site observations, and secondary documents such as Government and NGO, reports to cross-verify insights. Triangulation ensured that findings were corroborated across sources, reducing the risk of bias, and enhancing trustworthiness.

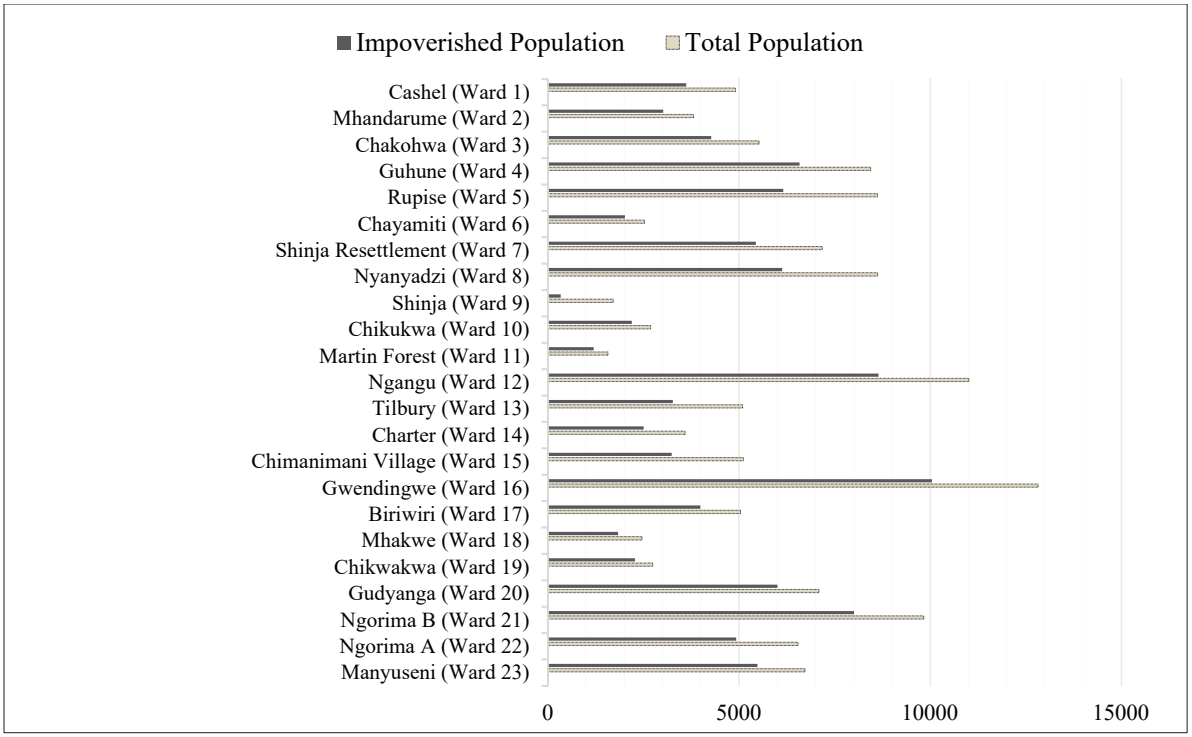

Figure 5. Chimanimani District poverty prevalence by ward graph
(Zimbabwe National Statistics Agency, 2022)

Key aspects of its application include: Cross-Referencing Data Sources - For example, community perceptions from victim interviews were cross-checked against implementers' operational records to validate findings; Highlighting Stakeholder Divergences - Triangulation revealed discrepancies between donor priorities and community needs, enriching the understanding of gaps in recovery efforts; Strengthening Contextual Validity - By integrating observational data with participants' accounts, triangulation ensured that the analysis reflected real-world conditions (Hammerton & Munafo, 2021).

3.5 Ethical Considerations

This study adhered to rigorous ethical standards to protect the well-being, rights, and dignity of all participants. Prior to participation, individuals received a comprehensive briefing outlining the study's objectives, methodology, potential risks, and their role in the research, enabling informed and voluntary consent. The research was conducted in accordance with institutional ethical guidelines consistent with international principles for qualitative research, including respect for privacy and the right to withdraw at any stage.

Ethical approval was obtained from a university-affiliated Institutional Review Board (IRB), in compliance with the Ethical Guidelines for Life Sciences and Humanities Research (2021), jointly issued by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Health, Labour and Welfare (MHLW), and the Ministry of Economy, Trade and Industry (METI) of Japan. All procedures followed established protocols for research involving human subjects, ensuring voluntary participation, protection of personal data, and full confidentiality throughout the study.

To uphold the principle of autonomy, participants retained the right to decline answering specific questions or to withdraw from the study at any stage without facing any adverse consequences. This measure was designed to reduce potential coercion and ensure that participation remained voluntary throughout the research process. Additionally, steps were taken to minimize any psychological or emotional distress that might arise during interviews, particularly given the sensitive nature of post-disaster resettlement experiences. Interview techniques were carefully designed to be non-intrusive, with researchers trained to recognize and address signs of participant discomfort.

Confidentiality was maintained through the removal of personal identifiers from all collected data and photographs, ensuring that responses could not be traced back to individual participants. Importantly, there were no reported instances of participant distress or discomfort during the research process, suggesting that the approach employed was both culturally sensitive and ethically sound. By integrating these ethical safeguards, the study not only ensured compliance with research ethics but also fostered a respectful and trustworthy environment for participants.

4. RESULTS AND DISCUSSION

4.1 Post Disaster Recovery in Chimanimani

Following the devastation of Tropical Cyclone Idai in March 2019, the Tropical Cyclone Idai Recovery Project (January 2020 - June 2021), implemented by the Ministry of Public Works, combined a resettlement program with four rounds of assessments in Chimanimani, Chipinge, and Buhera to evaluate the return, reintegration, and recovery of displaced populations (International Organization for Migration [IOM], 2021). A total of 6,767.7 hectares was allocated for planned resettlement, with West End - Shinja in Ward 7 (Figure 6) as the largest site at 1,081 hectares, serving as a primary relocation area. The Flats followed at 913 hectares, while smaller sites, Bonny Eagle, Sunnyside, Muchadziya, Greenmount Farm, and Lindley Farm, accommodated smaller groups (Chatiza, 2019). Shinja Resettlement formed the focus of this study, with findings addressing recovery challenges, socio-economic impacts, shelter constraints, and alternative recovery shelter case studies.

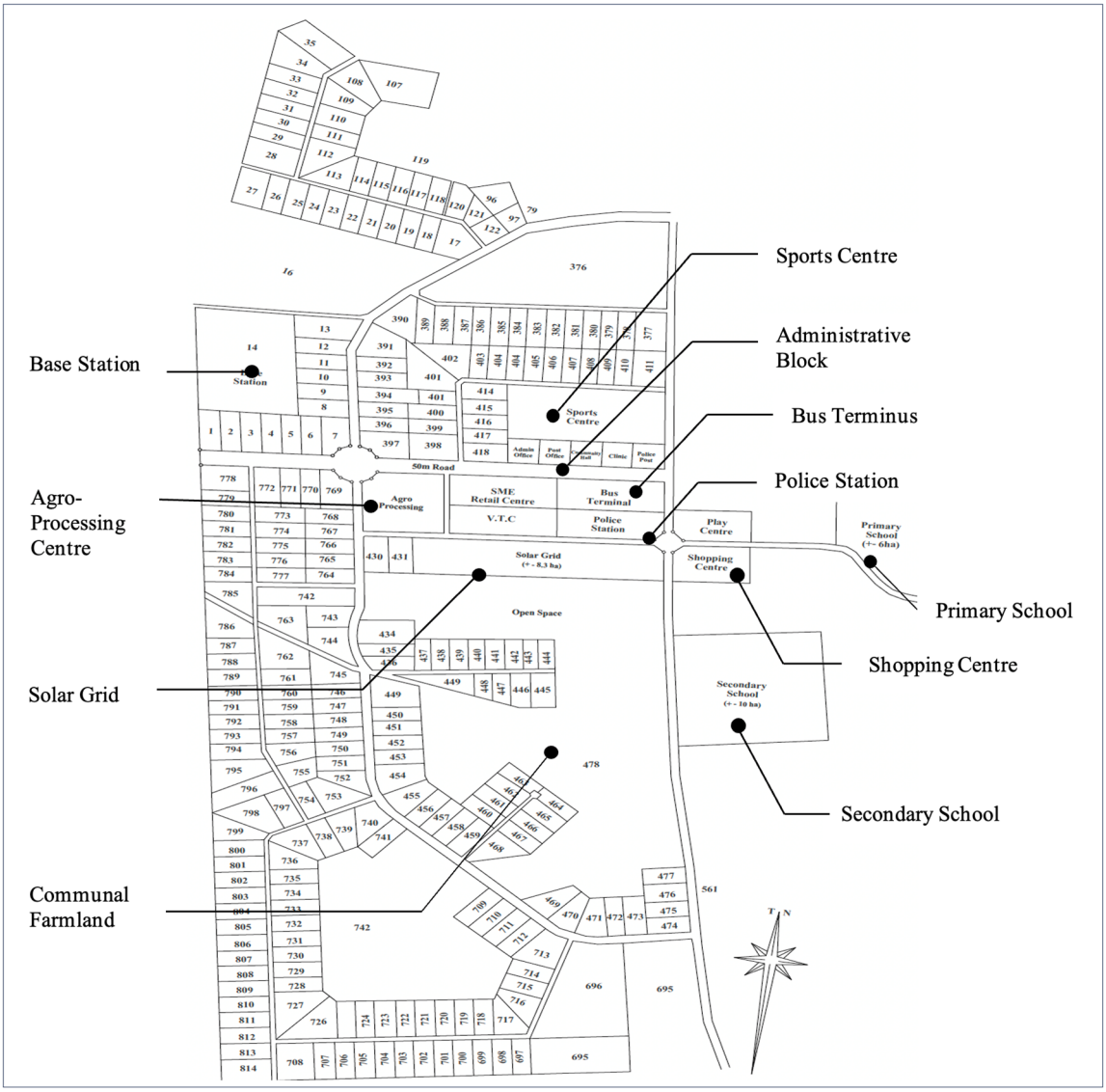

Figure 6. West End Layout- Shinja (Ward 7) resettlement area (Adapted from Ministry of Local Government, Public Works and National Housing, Zimbabwe 2020)

The resettlement program, implemented by the Ministry of Public Works, was structured into two phases. Phase 1 prioritized the construction of transitional shelters alongside essential service centres, ensuring access to water, electricity, health, and educational facilities to meet the immediate needs of displaced populations. This was followed by Phase 2, which focused on the development of permanent resettlement housing, retail centres, and the agro-processing facility alongside the communal farmland to promote long-term recovery and economic sustainability. This two-phase approach reflects a strategic and incremental framework commonly advocated in disaster recovery, addressing urgent shelter and service needs while establishing the foundation for enduring, community-driven solutions.

The integration of residential plots, educational institutions, communal farmland, retail centres, and renewable energy systems in Phase 2 reflects a comprehensive and sustainable approach to long-term community recovery. The proposed development of both a primary and secondary school is intended to ensure continuity in education for children affected by the tropical cyclone, thereby mitigating disruptions to their academic progress during the rehabilitation process. The strategic placement of a centrally located police station is designed to facilitate accessibility to security services and critical information, thereby enhancing safety, governance, and social cohesion within the relocated community.

These features address not only housing needs but also livelihood support, education, and infrastructure development. By incorporating communal farmland and solar grids, the plan supports economic recovery and resilience, providing displaced families with the means to rebuild their lives sustainably. Furthermore, the establishment of these institutions will generate employment opportunities for local educators and administrative staff, contributing to economic stability within the resettlement area.

The incorporation of a bus terminus and the retail and shopping centre underscores the strategic objective of transforming the Shinja resettlement area into a hub for trade and commerce, thereby fostering economic revitalization for those affected by the tropical cyclone. This development is intended to facilitate mobility for residents, enabling dependents to travel to other regions with ease while simultaneously enhancing accessibility for traders and visitors from surrounding areas. By promoting connectivity and commercial exchange, this initiative aims to support long-term economic sustainability and integration within the broader regional economy.

Based on site surveys and interviews conducted with policymakers and victims at the West End - Shinja resettlement area, findings show that the deployment of transitional shelters following Tropical Cyclone Idai conformed to international best practices as outlined in the Transitional Shelter Guidelines (IOM, 2012). In the immediate aftermath of the cyclone, these shelters played a critical role in housing internally displaced persons (IDPs), offering rapid protection from further harm and a degree of stability amid widespread infrastructural collapse. The evidence underscores that transitional shelters were not only essential for meeting urgent humanitarian needs but also formed a necessary bridge toward longer-term recovery and reconstruction efforts in severely affected areas such as Chimanimani.

4.2 Resettlement Program - Phase 1

During Phase 1 of the resettlement initiative, local authorities supported by IOM and United Nations Development Program (UNDP) conducted a one-week shelter construction training at Ndima Government High School, engaging skilled and unskilled local workers and volunteers. Timber was selected as the primary construction material due to its affordability, availability, and alignment with traditional building techniques. This facilitated the rapid assembly of shelters, enabled short-term employment, and encouraged local ownership of the recovery process. The reliance on locally sourced materials allowed for scalable, cost-effective construction and simplified future maintenance. These findings reinforce broader post-disaster recovery literature, which emphasizes the benefits of participatory implementation and material-based support, as Wilhelm (2010) argues that in-kind provision of building materials not only expedites access to essential resources but also promotes labour mobilisation and strengthens community engagement.

Despite the efforts to provide transitional housing, interviews conducted with victims of Tropical Cyclone Idai currently residing in the West End - Shinja resettlement area revealed several ongoing challenges. Delays in the construction of Phase 2 permanent shelters extended the duration of stay in Phase 1 units well beyond their intended temporary and transitional use. These timber structures were not designed for long-term habitation, and their prolonged occupation introduced new hardships, as documented in this study. Victims who had received Phase 1 transitional units but were still awaiting permanent relocation expressed a strong desire to return to their original homes once conditions allowed. In the interim, many repurposed the temporary shelters for secondary uses such as storage, livestock housing, or seasonal accommodation. One male respondent in his 30s, living with his young family, remarked,

“I am only here for now while I rebuild my main house in Chimanimani, so I don’t think I will stay much longer. I am staying here with my children, but using one half to store my belongings and things that were salvaged after the landslides.”

The use of locally sourced timber as the primary construction material facilitated rapid shelter deployment; however, the material’s susceptibility to environmental stressors has significantly undermined long-term durability. As shown in Figure 7, the shelters exhibit signs of structural fatigue such as panel warping, cracking, roof instability and the deterioration is further accelerated by termite infestation within 3 years of installation. These observations are consistent with findings by Zhan et al. (2023), who highlight the limited longevity of timber structures in high-humidity settings, where degradation typically occurs within two to three years.

Despite not being intended for prolonged use, many Phase 1 shelters remained occupied and were modified by victims to improve thermal comfort, structural stability and living conditions. These user-led adaptations underscore both the limitations of the original design and the resilience of displaced populations. In response to inadequate environmental protection, particularly during hotter months, victims used local materials to retrofit shelters. As shown in Figure 8, some added shading using corrugated sheeting and wooden poles, while others

repositioned doors, replaced metal roofs with thatch, reinforced warped panels, or added makeshift supports. Such modifications reflect broader issues of thermal discomfort, which have been linked to increased morbidity and unsustainable coping strategies, including reliance on firewood or kerosene for heating (Moran et al., 2021). Interviewees frequently cited dissatisfaction with spatial and thermal conditions. One 33-year-old female respondent remarked:

"The house gets unbearably cold during the night, and I can't afford to keep it heated throughout the winter, so I'm thinking of moving back to Chimanimani and renting a room."

Figure 7. Damaged Phase 1 unit - West End (Ward 7) (Photography by Author, 2023)

Figure 8. Modified Phase 1 unit - West End -Ward 7 (Photography by Author, 2023)

4.3 Resettlement Program - Phase 2

Phase 2 of the resettlement initiative marked the transition toward more permanent infrastructure, including roads, schools, and housing constructed with durable materials. This phased approach aimed to gradually populate designated resettlement areas while alleviating pressure on cyclone-affected zones undergoing large-scale reconstruction. It provided displaced populations with a safer environment to begin rehabilitation and long-term recovery. As shown in Figure 9, housing units were constructed using locally produced bricks and vernacular techniques, addressing many of the structural and thermal limitations encountered in Phase 1. Each unit comprised two bedrooms, a kitchen, and a bathroom, designed to accommodate typical household needs in a more adequate and durable manner.

This construction strategy proved particularly suitable for the rural context of Chimanimani, where financial constraints limit the feasibility of frequent repairs. The use of familiar building methods and regionally sourced materials not only enhanced construction efficiency and cost-effectiveness but also supported ease of maintenance and community ownership. Moreover, by minimizing reliance on industrialized supply chains, this approach reduced embodied energy and advanced sustainability objectives. As emphasized by Grafham et al. (2022), such material choices foster long-term energy savings and improve environmental resilience, making them especially relevant in post-disaster recovery scenarios for vulnerable, resource-constrained communities.

Despite the initial aim of implementing a more durable and culturally appropriate housing solution during Phase 2, the resettlement initiative encountered multiple setbacks that significantly delayed progress. While traditional construction methods are widely accepted within the local context and offer long-term durability, they also proved to be slow, labour-intensive, and ultimately impractical for rapid deployment in a post-disaster recovery setting with urgent housing needs. Interviews with implementers at the Shinja resettlement highlighted several factors which hindered continuity. When asked why construction had taken so long to complete, one implementer explained:

“There was strong momentum at the start, but when COVID-19 began, everything slowed down. Lockdowns and curfews critically disrupted this project, interrupting supply chains, restricting labour, and diverting significant funds and resources toward national public health priorities.”

Consequently, these challenges left numerous Phase 2 housing units and associated infrastructure incomplete, significantly disrupting both the pace and continuity of the recovery process. These shortcomings are exemplified in Figure 9, which shows a Phase 2 housing unit still lacking essential components such as doors and windows. Beyond the unfinished structure, the image highlights broader infrastructural deficits. Water is accessed through a surface-level, exposed pipe system, indicating the absence of a permanent supply network. Additionally, no visible electrical connections are present, despite the original site development plan, as previously highlighted in Figure 6, which proposed the installation of an approximately 8-hectare solar farm to deliver decentralized, off-grid energy to the resettlement area.

Figure 9. Phase 2 - West End -Ward 7 (Photography by Author, 2023)

Despite the perceived benefits of in-situ masonry construction, the method proved slow, labour-intensive, and logistically demanding, especially where skilled labour and materials were scarce. In contrast, alternative prefabricated building systems could have offered a more efficient and scalable solution under these conditions. Moreover, the long-term viability of housing solutions is closely tied to user satisfaction, comfort, and energy performance. As Fokaides et al. (2016) emphasize, incorporating passive cooling and insulation strategies can reduce annual energy demands by up to 90%, significantly enhancing thermal comfort and household sustainability.

These findings underscore the need to align housing interventions with environmental realities and local capacities. These findings highlight that While Phase 2 of the resettlement initiative aimed to provide durable and culturally appropriate housing, significant delays in infrastructure delivery, such as access to electricity and clean water, undermined recovery objectives and exacerbated the vulnerability of displaced populations. These limitations highlight broader socio-economic challenges in executing sustainable recovery programs in remote, resource-constrained contexts.

4.4 Socio-Economic Implications

Individuals uprooted by Tropical Cyclone Idai confront a broad range of socio-economic hurdles, magnified by overlapping vulnerabilities and further complicated by insufficient infrastructure and economic exclusion. The shortcomings noted in this study severely restrict the capacity of displaced populations to re-establish stable livelihoods, thus perpetuating cycles of poverty and risk. Without reliable services, these communities experience amplified socio-economic marginalization, which hinders efforts to build sustainable, secure futures. In response, many displaced people weigh returning to their disaster-stricken homes, despite ongoing instability, revealing the difficult choices they continually face.

Complicating this situation are lengthy delays in the construction of permanent housing, leaving internally displaced persons to endure overcrowded, substandard temporary shelters. These precarious dwellings, ill-equipped to accommodate family needs, provide neither a sense of permanence nor the certainty required for effective recovery. As a result, many remain in prolonged uncertainty, unable to fully reclaim control over their lives. For some, returning to partially damaged homes becomes the only viable option to regain even a semblance of normalcy. Although these returnees confront ongoing hazards and instability, they often prioritize a familiar environment and personal agency over the uncertainties of relocation.

Figure 10. indicates that out of the victims surveyed, 68% expressed a preference to relocate to an alternative resettlement site, while an additional 12% favoured relocation to areas with established infrastructure rather than designated relocation zones. Within the Shinja resettlement area, 7% of victims expressed a desire to return to their original home despite known hazards, highlighting the enduring significance of community cohesion and place-based recovery frameworks. These findings underscore that relocation preferences are shaped not only by material considerations but also by cultural and socio-economic attachments. While

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community involvement in selecting relocation sites represents an important entry point for participatory recovery, it must be situated within broader community-led recovery strategies. As Pomeroy et al. (2006) argue, genuine participation entails sustained engagement across all phases of recovery, fostering local ownership, contextual appropriateness, and long-term sustainability.

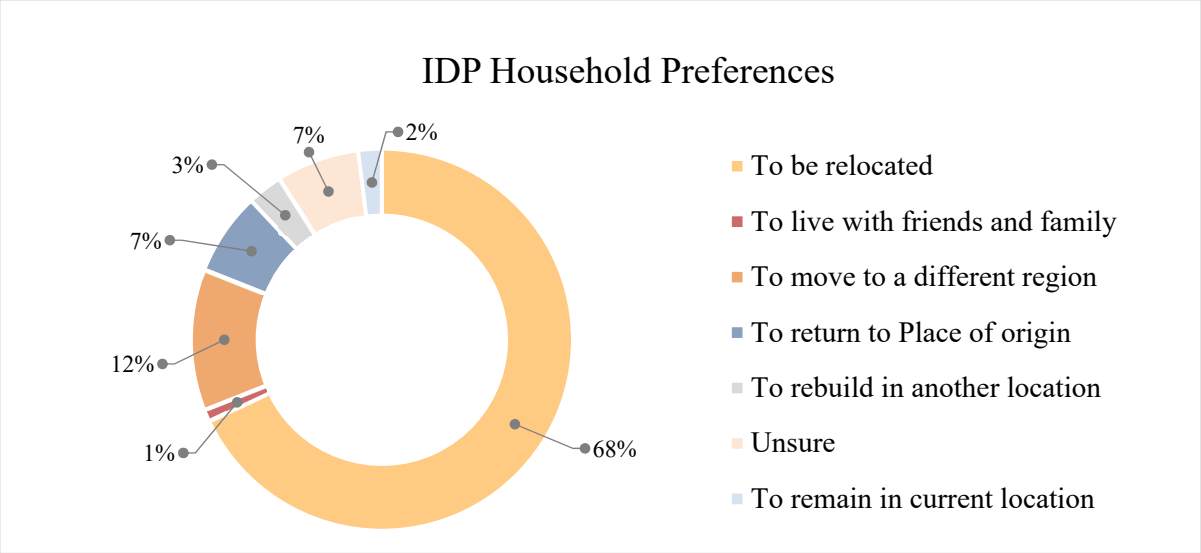

Figure 10. IDP relocation preferences

Additionally, 7% of households expressed uncertainty about their ability to relocate or rebuild, while 3% indicated ownership of alternative properties and preferred relocating there. 2% of households in the Shinja resettlement area preferred to remain, citing either a lack of alternatives or believing that the area offered better opportunities for agriculture, trade, or healthcare services. Finally, 1% prefer to move in with friends and family who may be in other provinces around the country.

Ultimately, the cycle of poverty, limited skill sets, and inadequacies in the resettlement areas has left many IDPs with no viable alternative but to return to the disaster-prone regions to maintain their livelihoods. This situation highlights the urgent need for resettlement programs to focus their efforts on improving the rehabilitation infrastructure by providing skills training and employment opportunities to break this continuous cycle of poverty. Without such interventions, resettlement efforts risk perpetuating hardship rather than facilitating recovery.

When asked about their sense of safety in this resettlement area, a respondent (Female, 51) from the Shinja resettlement area (Ward 7) stated that,

“Because of the lack of streetlights, after dark, it is very difficult to leave our units. It is a danger, especially for women of all ages who need to walk alone. Also, because of the lack of secure door locks and lack of electricity, we feel uneasy roaming around here, so we often spend our days back at home (Disaster-affected house) or gathered here together.”

Living in temporary shelters for extended periods can contribute to stress and mental health challenges for the occupants. The lack of progress toward permanent housing creates

uncertainty and hinders their ability to achieve long-term stability. Figure 11. highlights the living conditions of individuals displaced by Tropical Cyclone Idai who are still residing in temporary timber-constructed shelters in the Shinja resettlement area, four years after the Tropical Cyclone. Although government and donor initiatives have sought to provide permanent housing, residents have still been unable to move into more secure, long-term shelters. Moreover, they voiced their entitlement to adequate agricultural land and essential services, critical for sustaining their livelihoods. Regrettably, in the years following the cyclone, they observed that their demands were scarcely being fulfilled.

Figure 11. Phase 2 permeant housing - West End Ward 7 (Photography by Author, 2023)

4.5 Prefabricated Shelter Prototype Case Study

This shelter case study, conducted in the aftermath of Tropical Cyclone Idai, explores prefabrication as a targeted strategy for post-disaster recovery. Carried out by a Donor, the project focuses on developing shelters using recycled concrete and Styrofoam, materials chosen to mitigate excessive construction waste. This off-site manufacturing approach enhances both construction speed and cost-efficiency, addressing the urgent need for housing in a region burdened by infrastructure damage and logistical challenges. Compared to conventional rebuilding, as currently experienced in Chimanimani which faces delays and poor outcomes, modular construction, encompassing design, factory fabrication, transport, and rapid on-site assembly, offers a streamlined and more reliable alternative. Construction materials, including lightweight wall panels, aluminium roofing trusses, cement, and standardized fixtures, are delivered in compact shipments, enabling efficient assembly. As detailed in Figure 12, each wall panel, composed of recycled concrete and Styrofoam, measures 50mm x 2500mm x 125mm and is designed to provide low thermal transmittance. These lightweight panels reduce labour intensity while improving safety and structural performance. The entire structure can be manually assembled by five workers within three to four days, emphasizing simplicity and adaptability.

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A (Day1)	
	Construction components such as precast recycled concrete panels, aluminium roofing sheets and fenestration units are delivered to the site in staggered consignments using light-duty vehicles with a 350 kg payload capacity. Site preparation and substructure installation begin on Day 1 with the deployment of a non-invasive surface-mounted foundation system. This modular and demountable foundation allows for rapid on-site assembly and future disassembly, minimizing ground disturbance. This supports sustainable construction practices and aligns with architectural principles of low-impact transitional shelter design.
B (Day2)	
	The panels are positioned and anchored to the foundation system, with their lightweight composition accelerating the installation process. Door and window openings are pre-configured during the design and fabrication stages, ensuring precision and reducing on-site modifications. By Day 2, the roof structure, doors, and windows are installed. The use of lightweight aluminium enhances the assembly process by improving installation speed, safety, and overall cost-efficiency. Once the structural shell is complete, internal works such as plumbing, electrical installations and flooring are executed swiftly, typically within the same day, allowing for rapid project completion.
C (Day3~)	
	In the final construction phase, interior fixtures and finishes are installed, with the layout customizable to suit different household sizes. A standard configuration for an average household includes two bedrooms, a kitchen, a living area and a combined toilet and shower room. In post-disaster recovery contexts, non-essential interior finishes, such as cabinetry and wardrobes, can be deferred, enabling early occupancy, and allowing residents to personalize the space over time. The exterior façade is treated with a fire-resistant coating, which also enhances the durability and longevity of the recycled concrete panels.

Figure 12. Shelter prototype construction timeline (Photograph by Author, 2023)

Several limitations hinder the effectiveness of such prefabricated shelters in rural contexts such as Chimanimani. A key concern is the relatively high upfront cost associated with prefabricated shelters. The initial investment in research and development, specialized material processing, and long-distance transportation can be financially burdensome, especially for low-income, affected communities. At scale, these shelters may prove more expensive per unit than Phase 1 or Phase 2 emergency shelters, which relied on locally available materials and labour. The absence of local manufacturing facilities near Chimanimani further limits opportunities for job creation and economic revitalization, as local labour is currently excluded from the production process.

Donor perspectives echo these concerns, noting that since production of the panels can only be done off-site at this stage, the recovery process is highly dependent on long-distance transportation and adequate road infrastructure. In the absence of robust transport networks, delivery to Chimanimani can result in material damage before arrival. As one donor stated: “Since production is done off-site, some panels crack during transport on roads that are not in the best condition, and they become unusable.” Such losses not only reduce the efficiency of the recovery process but also increase costs and slow the overall pace of shelter delivery.

Cultural and social factors also present challenges; standardized prefabricated designs may not align with local architectural traditions or support communal living practices, potentially reducing community acceptance and long-term satisfaction. Crucially, the lack of real-world field testing for this prototype at this stage restricts data on its thermal comfort, durability, and practical performance, making it difficult to assess its viability at scale; thus, broad adoption remains speculative.

Nonetheless, when effectively implemented, prefabricated shelters may offer substantial advantages in terms of construction speed, environmental sustainability, and post-disaster resilience. This prefabricated shelter prototype offers notable advantages that make it a compelling option for post-disaster recovery in regions like Chimanimani. Its modular design allows for customizable internal layouts during fabrication, potentially accommodating diverse household sizes and living arrangements. The deferral of non-essential interior features enables early occupancy while allowing displaced families to personalize their space over time, supporting phased and flexible recovery processes. This adaptability not only improves functionality but can also foster a sense of ownership, contributing to social stability and community reintegration (Duan & Kim, 2023).

Despite the challenges identified in this case study, standardized off-site production enhances quality assurance by enabling construction in controlled environments where material availability is consistent. Modular design further supports scalability and adaptation to the diverse geographic and socio-cultural needs of end users. In this prototype case study, the use of surface-mounted, demountable foundations minimizes environmental disruption while allowing for relocation or reuse, and recycled materials align with circular construction principles, reinforcing sustainability objectives. Incorporating local labour during on-site assembly accelerates knowledge transfer and supports short-term livelihood restoration. For governmental and humanitarian actors, such systems offer a viable model for rapid, environmentally responsible shelter provision. However, their successful integration into disaster risk management frameworks requires addressing site-specific constraints and validating real-world performance through comprehensive field evaluations.

5. CONCLUSION

This study has examined the complex interconnections between socio-economic and infrastructural factors in post-disaster resettlement efforts following Tropical Cyclone Idai in Chimanimani, Zimbabwe. While the relocation program was developed with a focus on addressing the short and mid-term recovery scope, and implemented in a phased manner, significant challenges emerged in effectively addressing the needs and lived experiences of the displaced population. The experiences following Tropical Cyclone Idai underscore that post-disaster recovery cannot be approached through standardized solutions alone. Instead, it is imperative to incorporate and emphasize an adaptive, culturally responsive, socio-economically viable, and context-sensitive framework informed by the realities of

affected populations. Considering these insights into disaster risk management strategies ensures that recovery efforts are not only efficient but also equitable and sustainable.

Among the primary challenges identified were the misalignment between resettlement designs and the cultural as well as socio-economic practices of affected communities, protracted delays in transitioning from temporary to permanent housing, and the inadequacy of infrastructure in providing essential services such as electricity, sanitation, and secure living conditions. Furthermore, the study found that transitional shelters lacked sufficient thermal comfort, further exacerbating the vulnerabilities of displaced individuals. Environmental sustainability considerations were also undermined due to extensive deforestation and reliance on construction materials and methods that did not incorporate passive energy strategies. These shortcomings highlight the need for more resilient, culturally appropriate, and environmentally sustainable approaches in disaster recovery planning and implementation.

Although prefabricated shelters present a potentially expedient solution to post-disaster housing challenges, their applicability to rural and poor communities remains problematic. Issues such as high initial costs, dependence on external suppliers, potential cultural incongruences, limited adaptability, and long-term maintenance constraints necessitate a critical assessment of their suitability for Chimanimani and other comparable contexts. Addressing these barriers requires strategies aimed at cost reduction, increased local participation, cultural alignment, and the establishment of sustainable maintenance mechanisms to optimize the effectiveness of prefabricated housing solutions in risk management and recovery.

The findings of the study highlight that for post-disaster recovery efforts in disaster-prone regions such as Chimanimani and their recovery programs to achieve long-term success, the following measures are essential. Effectively establishing these measures within the disaster risk management framework will aid in breaking the cycle of vulnerability and poverty among disaster-affected communities, thereby fostering resilience and self-sufficiency:

- Systematic community engagement throughout planning and implementation to ensure alignment with local socio-cultural and economic realities.
- Prioritization of durable, thermally efficient, and environmentally sustainable solutions.
- Strengthening of livelihood support mechanisms and capacity-building initiatives to facilitate the seamless integration of displaced populations into resettlement areas.

This study offers critical insights for policymakers, humanitarian organizations, and practitioners engaged in disaster risk management and post-disaster recovery, particularly in rural areas that remain highly susceptible to climate-induced disasters such as those addressed in this study. These insights underscore the importance of adopting a holistic and integrated approach that balances efficiency with socio-economic and environmental sustainability.

6. STUDY LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Although this study analyses user-led adaptations, phased reconstruction processes, and implementation constraints, offering context-specific empirical insights from Zimbabwe on a critical yet understudied dimension of disaster management and recovery, it faces several limitations. These findings aim to inform national recovery frameworks and contribute to global disaster risk reduction knowledge, but methodological and practical constraints limit the scope and breadth of the findings.

A primary limitation of this study lies in its reliance on purposive sampling, which deliberately targeted participants with direct experiential knowledge, including victims, implementers, experts, and donors. This approach enabled access to context-rich, in-depth insights but inherently restricts representativeness and introduces the potential for selection bias. Consequently, the findings should be interpreted as context-specific perspectives rather than universally generalisable conclusions.

While participant narratives provided analytically valuable accounts, they may not fully capture the diversity of experiences across all affected populations. The sample size further constrained the study, particularly in the number of in-depth interviews. Although responses were candid and detailed, a larger and more diverse sample size could have yielded a broader range of perspectives, especially from marginalised subgroups such as women-headed households, elderly residents, and persons with disabilities.

Another constraint is the limited temporal scope. Fieldwork was conducted between 5 and 30 August 2022, with a follow-up visit from 10 to 20 August 2023. While sufficient to capture important patterns and emerging themes, this time frame did not allow for comprehensive observation of evolving recovery dynamics. Extended, multi-year engagement could reveal changes in shelter functionality, community adaptation strategies, and the sustainability of recovery interventions over time. Without such extensive data, this study provides a short-term perspective rather than a full trajectory of post-cyclone recovery.

In terms of scope, the study did not undertake detailed technical performance evaluations of the shelter prototypes. While field observations and participant feedback identified issues such as poor thermal comfort, limited ventilation, and structural concerns, these were not complemented by quantitative assessments, such as thermal imaging, energy efficiency testing, or structural integrity analyses. This omission limits the ability to substantiate observed shortcomings with measurable performance data. Additionally, no cost-benefit analysis of the prefabricated model versus alternative reconstruction strategies was undertaken, which could have strengthened the policy relevance of the findings.

External contextual factors also influenced the study. COVID-19-related restrictions, ongoing during early recovery phases, constrained access to affected regions, delayed project implementation, and diverted resources toward public health priorities. These disruptions affected both the recovery process and the research's ability to observe it under 'normal'

operational conditions. Furthermore, the remote and mountainous geography of Chimanimani limited physical access to certain sites, potentially narrowing the range of observed conditions.

As a result, several recommendations emerge for future research. First, longitudinal studies are needed to assess how resettlement communities adapt over time, including changes in shelter durability, maintenance practices, and livelihood recovery. Such research should also explore the socio-cultural acceptability of prefabricated housing and the extent to which these models integrate with local building traditions and risk perceptions.

Second, incorporating quantitative technical assessments, thermal performance, ventilation efficiency, and structural resilience would provide robust evidence to complement qualitative findings. This should be paired with economic analyses to determine cost-effectiveness in comparison to other reconstruction approaches.

Finally, future studies should expand participant diversity, ensuring representation from vulnerable and often marginalised groups. Comparative research across multiple resettlement sites, within Zimbabwe and in similar hazard-prone, low-resource contexts would enable identification of common success factors and recurring challenges, strengthening the evidence base for context-sensitive disaster risk management strategies. By addressing these gaps, future work can build on the contributions of this study, advancing the development of resilient, participatory, and climate-responsive shelter solutions that are both technically sound and socially grounded.

NOTES

i. A full outline of the semi-structured interview guide, detailing the questions used for Victims, Donors, Experts, and Implementers, is provided in Appendix A.

ii. Figure 6 was reproduced in accordance with the original map provided by the Ministry of Public Works of Zimbabwe.

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Appendix A: Interview Questions for Victims, Donors, Experts, and Implementers

To complement field observations and secondary data, semi-structured interviews were conducted with four key stakeholder groups: victims of Tropical Cyclone Idai, donors, implementers, and experts. The questions were designed to elicit context-specific perspectives on shelter interventions, resettlement processes, and broader socio-economic recovery challenges. Open-ended wording allowed respondents to narrate lived experiences, identify constraints, and reflect on institutional practices, while a common thematic structure ensured comparability across groups. This approach enabled triangulation between different viewpoints and enriched the analysis by grounding findings in the voices of those directly involved in, or responsible for, post-disaster recovery in Chimanimani.

1. Questions for Victims of Tropical Cyclone Idai

Victim questions were designed to capture lived experiences of displacement and recovery, focusing on shelter conditions, safety, livelihoods, and unmet needs, while being concise and sensitive to avoid traumatization. They aimed to elicit both descriptive accounts, such as living arrangements, duration of stay, and support received and reflective perspectives on participation in decision-making, long-term aspirations, and perceptions of shelter durability. By using open-ended, semi-structured phrasing, the questions allowed victims to narrate their realities in their own words while providing context-specific insights essential for understanding vulnerabilities and recovery dynamics.

1.	Can you describe the living conditions you have experienced in the resettlement area?
2.	How long after the earthquake were you relocated to this site?
3.	Do you view this settlement as a long-term or permanent place of residence?
4.	Which forms of support (governmental or non-governmental) have been most valuable in your recovery?
5.	Would you prefer to remain in this location, or would you rather be relocated elsewhere?
6.	How would you describe your current living arrangements within the settlement?
7.	To what extent do you feel safe and secure in this resettlement area?
8.	How do you assess the durability and safety of the shelters provided to you?
9.	What livelihood activities are you currently engaged in, and how are they supported by this setting?
10.	What would you identify as your primary unmet needs in the current shelter conditions?
11.	Have you been consulted in decisions regarding your relocation or housing provisions?
12.	How has your daily life changed since moving to the resettlement area?
13.	How do current shelter conditions affect your daily routines, health, and well-being?
14.	How do you manage issues such as access to clean water, sanitation, electricity, and transport?
15.	Have you made any modifications or changes to your shelter? If so, why, and how?

2. Questions for Donors

Donor questions were structured to balance practical and evaluative aspects of their role in post-disaster recovery, focusing on four themes: funding priorities and allocation, coordination and accountability with government and NGOs, constraints such as logistics or political dynamics, and reflections on effectiveness and lessons learned, encouraging descriptive accounts of strategies while allowing critical reflection on policy gaps and implementation challenges.

1.	What were your main priorities when providing support after Tropical Cyclone Idai?
2.	How were funding decisions made regarding shelter and recovery?
3.	Did you consult local communities to provide for specific needs?
4.	How do you evaluate the effectiveness of the interventions funded?
5.	What constraints or challenges did you face in resource allocation?
6.	How did donor coordination affect the recovery outcomes?
7.	What lessons did you learn from supporting shelter interventions in Chimanimani?
8.	How do you balance immediate relief needs with long-term recovery planning?
9.	What recommendations would you make for improving donor interventions in future disasters?
10.	How did you adapt your interventions to the remote and logistically challenging context of Chimanimani?

3. Questions for Experts

For experts, the questions were designed to capture professional assessments of shelter models, governance, and recovery processes in Chimanimani. They focused on technical evaluations of design and durability, reflections on policy and institutional coordination, and recommendations for strengthening resilience and future disaster recovery strategies.

1.	How would you evaluate the policy framework for disaster recovery in Zimbabwe?
2.	From your perspective, what were the main drivers of vulnerability in Chimanimani after Cyclone Idai?
3.	What gaps do you see in current recovery strategies, especially regarding housing?
4.	What role did NGOs and international agencies play, and how effective was their coordination with local authorities?
5.	What gaps do you see between international best practices and the approaches taken in Chimanimani?
6.	What role do you see for prefabricated housing in Zimbabwe's recovery efforts?
7.	How can resilience be better integrated into housing recovery policies?
8.	What challenges hindered participatory approaches to recovery?
9.	What long-term risks do you foresee in current resettlement strategies?
10.	What recommendations do you have for improving methodological approaches to studying post-disaster recovery?

4. Questions for Implementers

The questions for implementers were designed to capture operational, logistical, and coordination challenges encountered during shelter and resettlement efforts in Chimanimani following Cyclone Idai. They focused on material sourcing, site selection, stakeholder collaboration, cultural appropriateness, inclusivity, and integration of disaster risk reduction principles. By probing issues such as procurement delays, use of local labour, and balancing speed with quality, the questions aimed to assess both practical constraints and adaptive strategies.

1.	What were the main challenges in providing recovery support for the victims of Tropical Cyclone Idai?
2.	How did logistical and geographical factors affect project delivery? And how did the mountainous terrain of Chimanimani affect construction timelines and costs?
3.	What are the causes for the delays in the completion of the resettlement program?
4.	To what extent did Covid 19 and its associated challenges affect recovery efforts?
5.	How were shelter materials sourced, transported, and distributed in remote areas?
6.	What difficulties did you encounter in implementing transitional or semi-permanent shelters?
7.	How did you collaborate with government, donors, and local communities?
8.	What measures were taken to ensure cultural appropriateness of the shelters?
9.	What strategies were used to manage limited resources? And how was the budget allocated and managed?
10.	What role did training workers or capacity building play in ensuring shelters were maintained after construction?
11.	Were the local communities and the victims' opinions integrated in the planning and decision making?
12.	What is the long-term recovery and development plan for the victims in the resettlement area?