Community Responses to Climate Resilience Strategies in Urban Areas Following Hurricane Induced Flooding Events

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Abstract

This paper synthesises qualitative perspectives focusing on the impacts of climate resilience interventions in post-hurricane flooding by certain neighbourhoods. The study explores the reception of the resilience undertakings and the aluted enablers and hinderances throughout one-on-one interviews with the residents, leaders, and other stakeholders. The study thus highlights the fact that excessive bureaucracy, lack of funds and low awareness of such issues remain key factors which hinder resilience processes and their implementation. On the other hand, receptiveness from the community, good leadership, and strong relations with key stakeholders were earmarked as the main enablers increasing local participation towards practice of resilience. Some participants reported that slow decision-making processes of the government hampered the implementation of vital resilience actions. Of this contingent, those with leadership and partnership showed better preparedness and flexibility. This study alleviates a literature gap by offering a qualitative analysis of the factors that influence community reception of resilience planning efforts, particularly in urban contexts. The results highlight the need for community inclusion in resilience plans and for such plans to combat challenges such as inadequate funds and bureaucracy. Future endeavours should include raising public awareness, reducing red tape proceduralisation, and finding fixed revenue sources for improving the reliability of the built environment of communities in cities threatened by climatic disasters.

Keywords: Climate Resilience, Urban Communities, Hurricane-Induced Flooding, Community Engagement, Barriers and Facilitators

Introduction

With climate change advancing, cities across the world are at a dangerous risk of storms, especially those that result in floods due to hurricanes. The natural disasters have revealed the importance of implementing adequate climate risk management measures applicable to recovery from a calamity. Urban planners and policymakers in the last one, decade have seen value in incorporating resilience measures such as infrastructural reinforcement, emergency management and community involvement programs into their frameworks. However, little is still known about prediction and explanation of the reaction of the communities to these strategies.

Even after the occurrence of storms like Shamsuddin (2020) it has been realized that cities lack proper strategies in terms of resilience. These occurrences were not only characterized by loss of life and property but also laid bare sociophysical systems vulerability (Bhardwaj, 2023). Hence,

knowledge incorporation into resilience planning based on community input has gains become crucial. Involving people from the community in planning and executing climate related strategies will improve the impact of such programs and ensure that they are appropriate for the society (Choudhury et al., 2021). For instance, the analysis has established that communities that engage themselves in resilience planning will be in a better position to develop the best strategies to adapt to the changing climate (Harahap, 2020).

The impact that community responses hold in determining climate resilience approaches is especially apparent concerning hurricane caused flooding. People and organizations come together for reconstructing the affected areas and in turn for combating future disasters (Sheller, 2021). However, the level of incorporation of these community-based responses into well formulated resilience strategies may be equally different. Mastrorillo et al (2016) stated that although local knowledge is regarded as a powerful source in locating risks, policy makers and planners discard them in preference to technical factors and advice. These insights can result in strategies lack of relevance with the experiences of the members in a community and, therefore, ineffective (Antonelli et al., 2020).

Moreover, the studies can reveal that forces organizing relations of power and inequality within communities can shape receiving resilience strategies as well. In a post-Fritz-Butters disaster context, individuals from low-income households and communities of colour deal with mixed prospects and resilience and may be excluded or have limited access to develop resilience plans (Therrien et al., 2020). These inequalities mean that people can be excluded from the decisions that are made about resilience solutions, thus exacerbating the success rates of such solutions (Coleman et al., 2020). These kinds of inequities, therefore, call for embrace of inclusive voices in addressing resilience through community plans.

Also, the government needs to enhance transparent and efficient information dissemination and engagement in matters to do resilience programs. According to Cummings et al., (2018), stakeholder communication should be clear, as the latter can support the establishment of trust and engagement. Friedman et al. (2019) pointed out that those communities who have the perception that they have been consulted and included in decision making regarding the use of resilience systems, are likely to endorse and engage in the resilience processes (Den Houting et al., 2021). Hence, discovering ways in which various communities assert their needs and reactions to the strategies for resilience is considered a research direction.

Nevertheless, the part played by culture when it comes to community reception of resilience strategies cannot be gainsaid. Ethnicity may affect factors relating to risk take, perceived institutional credibility and involvement in community projects. exploring community resilience identified cultural values as an important determinant of the level of collective action in communities. Therefore, addressing the issue, requires that resilience strategies promote and reflect cultural values, and practices in a society.

Also, only recently has the need for linking resilience strategies with social and psychological aspects been identified as cities continue to experience pressure from climate change impacts. Natural disasters are a source of psychological trauma in groups of people who may have to endure long-term psychological effects if they do not recover soon (Esterwood & Saeed, 2020). It would be crucial to incorporate mental health into anti-frailty work so that communities can be built from scratch with the goal of recovery when disastrous events befuddle.

To meet the need in research, understanding an evaluation of the plans and points of view of individual and joint activities of all the subjects has to be considered. In this manner, researchers are able to identify how such communities experience and engage with resilience planning and the

dynamics of these processes, as well as highlight key areas of strength and weakness in extant approaches that can inform more fruitful forms of community resilience planning in the future.

Methodology

The current study utilized a qualitative research approach to afford an understanding of the community's perception towards climate resilience in urban cities that experienced flooding caused by hurricanes. This approach was used to capture the richness of the experience, perception and interaction of communities in relation to resilience planning. A qualitative approach enabled the researcher to focus on themes, ideas, and reasons that might have, in any other way, gone unnoticed by quantitative studies. The study was carried out in two metropolitan areas that have been hit hard by floods after hurricanes. These sites were identified by the level of exposure to climate related hazards, and the level of preparedness for climate resilience interventions. Selected communities embraced different demographic composition in terms of SES, ethnicity, and community structure, and coordinating multiple case studies gave a vast coverage in resilience responses. The sample was specifically recruited through purposive sampling targeting only those who had been affected by hurricane flooding and are involved in the resilience activities. The participant criteria included anybody who was a direct observer of the flood, community leaders and members, local organization members and local policymakers involved in resilience planning. The participants for this study included 30, and they were contacted through flyers and social media announcements and collaborations with various organizations in the community.

Semi-structured interviews a focus group discussions were used to conduct data collection Due to the nature of the data gathering approach their ample room to actually interact with participants all their actions and feelings can truly be expressed as perceived by the participants. They were selected as each semi-structured interview was developed with questions that were open-ended to allow participants to discuss the stories and opinions of the resilience strategies in the targeted community. Intermittent interviews were face to face in private to ensure anonymity and took approximately 45 minutes to 1 hour. The participants engaged in discussions in focus group discussions with 6-8 members per group in order to encourage interactions and discussion of different perspectives. Focus groups made it possible for the participants uniquely elaborate on one another's insights and include aspects of community. Further, informal field notes were also recorded from community meetings and from resilience strategy sessions. These notes documented perceived strategies and implementation climate pertaining to resilience activities within the zones as well as the dynamics of the PAM community in general. Transcriptions of interview and focus group discussions done for this study were done in details with verbatim style. This work uses thematic analysis in a way that formulated themes for the identification, analysis, and reporting of patterns within its data. Inherent in the work was the execution of a six-phase process as described above.

Engagement with the data involved reviewing transcripts multiple times in order to note down the first impressions and ideas. Coding was done in a systematic manner with a view of identifying salient features of data get towards accomplishment of research objectives. These codes were established inductively, so that themes may emerge during coding. Information related to each particular theme was located as the researchers' grouped codes into prospective themes. All the themes that have been identified were analyzed in order to see whether they met the objectives of the research and the data collected. A part of this check was to see whether the different themes fit in with respect to the coded extracts and the bigger data set. The researchers did assign labels and titles to the themes so as to avoid confusion and to be intentional with the outcomes of the community response to climate resilience strategies. After that, a narrative was given to recap the findings, relate them to the research questions and prior studies.

Results and Discussion

This section presents the findings from the qualitative study on community responses to climate resilience strategies in urban areas following hurricane-induced flooding events. The data collected from semi-structured interviews, focus group discussions, and observational field notes provided rich insights into the lived experiences of participants and their perceptions of the effectiveness of resilience initiatives. The analysis revealed several key themes that highlight the complexities of community engagement, the influence of local knowledge, and the varying levels of trust in resilience planning processes. By examining these themes, the results illustrate how communities navigate challenges and opportunities in response to climate resilience strategies, ultimately contributing to a deeper understanding of the social dynamics at play in the face of climate change.

Community Perceptions of Resilience Strategies

The study conducted among the community members to establish the positive and negative experiences of the resilience strategies after flood due to hurricanes showed the mixed feelings of the people who were upbeat in their feelings towards optimism but skeptical about the effectiveness of the measures that are employed but at the same time the public wanted to be part of the decision-making process. Some participants focused on hope for the effectiveness of resilience activities to be useful for them or those close to them. However, there was also a large extent of perceived cynicism in regard to whether the strategies would really respond to their clients' needs or issues. This skepticism stemmed from instances where interventions never saw the light of the day or did not show enough consideration for the specific needs of the community that is one's interest. Interviewees quite often stressed the role of stakeholders and traditional knowledge in developing the resilience approaches. One participant noted,

> "Our community knows what we need better than anyone else. When they bring in experts from outside, they often miss the nuances of our situation."

This sentiment was echoed by others who emphasized that community members possess invaluable insights based on their lived experiences. The interviews indicated a strong preference for resilience strategies that are co-created with the community, as opposed to those imposed by external authorities. This co-creation approach fosters a sense of ownership and empowerment among residents, which can significantly enhance the effectiveness of resilience initiatives.

However, while many recognized the value of local knowledge, there was also a palpable frustration with the lack of genuine engagement from decision-makers. Participants reported feeling sidelined in discussions about resilience strategies, which often felt top-down rather than collaborative. As one community leader expressed,

> "We want to be part of the conversation, not just recipients of decisions made far away. It's our lives at stake."

This frustration points to a critical gap in the implementation of resilience strategies: the need for inclusive dialogue that respects and incorporates community perspectives.

Moreover, the trust in resilience strategies varied significantly among participants, influenced by their previous experiences with disaster recovery efforts. Many recalled instances where promises made by authorities were not fulfilled, leading to a sense of disillusionment. One resident shared,

> "After the last hurricane, we were told we would get help, but months went by with nothing. Now, when they say they want to help, I have to wonder if it's just talk."

Such sentiments underscore the need for transparency and accountability in resilience planning processes. Building trust requires not only active engagement but also a demonstrated commitment to follow through on promises made to the community.

Finally, the discussions revealed a strong desire for resilience strategies that prioritize equity and inclusiveness. Participants articulated concerns that existing strategies often overlooked marginalized groups within the community, exacerbating existing inequalities. One participant articulated this concern, stating,

> *"If they don't involve everyone, those who need help the most will be left behind."*

This call for equity highlights the importance of ensuring that all voices are heard and considered in resilience planning, as the most vulnerable populations are often disproportionately affected by climate change impacts.

Effectiveness of Resilience Strategies

The effectiveness of resilience strategies implemented in urban areas following hurricane-induced flooding events was assessed through community feedback, highlighting both successes and areas requiring improvement. Many participants acknowledged that certain resilience initiatives, such as infrastructure improvements and community preparedness programs, had positively impacted their ability to respond to and recover from flooding. One participant noted,

> *"After the last hurricane, the new drainage system worked wonders. We didn't see the same level of flooding this time around."*

This sentiment was echoed by others who highlighted the tangible benefits of upgraded infrastructure, which contributed to a sense of security and preparedness within the community.

However, while some strategies demonstrated effectiveness, many participants voiced concerns about the sustainability and long-term impact of these initiatives. A common theme emerged regarding the need for ongoing maintenance and support for resilience strategies. One resident remarked,

> *"It's great that they built the new levees, but if no one maintains them, what good are they in the long run?"*

This perspective underscores the importance of not only implementing resilience measures but also ensuring they are adequately maintained and funded over time. Without sustained investment, the initial successes of resilience strategies risk becoming temporary solutions that do not adequately address the persistent challenges posed by climate change.

Furthermore, participants expressed the need for resilience strategies to be adaptable and responsive to changing conditions. The dynamic nature of climate change necessitates that communities remain flexible in their approaches to resilience planning. A community leader emphasized,

> *"We have to be prepared for the unexpected. What works today might not work tomorrow."*

This adaptability was seen as crucial for effectively responding to future climate challenges, as communities must be equipped to modify their strategies based on evolving risks and experiences. Additionally, the effectiveness of resilience strategies was often assessed in terms of community engagement and ownership. Participants who felt involved in the planning and implementation processes were more likely to view the strategies as effective. One interviewee stated,

"When we had a say in what happened, it felt like those strategies were ours. We were invested in making them work."

This highlights the connection between community involvement and the perceived success of resilience initiatives. Strategies that foster a sense of ownership among community members not only enhance their effectiveness but also encourage active participation in maintaining and advocating for these initiatives.

On the other hand, participants identified significant barriers that hindered the overall effectiveness of resilience strategies. Many expressed frustrations with bureaucratic obstacles and a lack of coordination among various agencies involved in resilience planning. A resident articulated this concern, saying,

"It seems like everyone is doing their own thing, and there's no clear plan. It's confusing, and it feels like we're left to figure it out on our own."

This fragmentation can lead to inefficiencies and miscommunication, undermining the potential effectiveness of resilience strategies. Therefore, fostering collaboration and communication among stakeholders is vital for ensuring that resilience efforts are cohesive and impactful.

Barriers and Facilitators

The study revealed several barriers and facilitators that significantly influenced the implementation of climate resilience strategies in urban areas following hurricane-induced flooding events. Understanding these factors is essential for improving the effectiveness of future initiatives and fostering stronger community engagement. Participants identified a range of barriers, including bureaucratic hurdles, inadequate funding, and a lack of awareness among community members regarding resilience strategies. Conversely, facilitators such as community engagement, strong leadership, and collaborative partnerships emerged as critical elements that enhanced the implementation of these strategies.

A primary barrier highlighted by participants was the complexity of bureaucratic processes that often slowed down the implementation of resilience strategies. Many expressed frustrations with the red tape associated with securing funding and approvals for projects. One community member noted,

"It feels like we're always waiting for someone else to make a decision. By the time they finally approve something, the next hurricane could hit."

This sentiment reflects a broader concern that bureaucratic inefficiencies can significantly delay critical initiatives, leaving communities vulnerable in the interim. The frustration with bureaucracy points to the need for streamlined processes that enable faster action and more responsive governance. Inadequate funding was another significant barrier cited by participants, impacting the scope and sustainability of resilience initiatives. Many noted that limited financial resources hindered their community's ability to implement comprehensive strategies. As one participant remarked,

"We have so many ideas for improving our resilience, but without the money to back them up, it's all just talk."

This financial limitation emphasizes the importance of securing stable funding sources and prioritizing investments in resilience planning to ensure that communities have the necessary resources to implement effective strategies. Awareness and understanding of resilience strategies also emerged as critical barriers. Many community members reported a lack of knowledge about

available programs and initiatives, which limited their ability to engage effectively. One resident expressed,

> *"I didn't even know there were plans in place until someone told me. How are we supposed to help if we don't know what's going on?"*

This lack of awareness underscores the necessity for comprehensive outreach and education efforts to inform residents about resilience strategies and foster greater community involvement. Enhancing awareness can empower individuals to participate actively in resilience planning and advocate for their needs. Conversely, several facilitators emerged that significantly contributed to the success of resilience strategies. Community engagement was repeatedly highlighted as a critical factor. Participants who felt actively involved in the planning and decision-making processes expressed a greater sense of ownership over the strategies implemented in their communities. One participant noted,

> *"When we were invited to the meetings and could voice our concerns, it felt like we were part of the solution."*

This statement illustrates how fostering genuine community participation can enhance the effectiveness of resilience initiatives by ensuring they reflect the unique needs and priorities of residents. Strong leadership also played a vital role in facilitating the implementation of resilience strategies. Many participants spoke highly of local leaders who advocated for climate resilience and engaged the community in meaningful ways. One community leader emphasized,

> *"It's about bringing people together and making sure their voices are heard. Leadership means standing up for what the community needs."*

This proactive leadership approach can galvanize community support and mobilize resources for resilience initiatives, making it essential for effective implementation. Collaborative partnerships between local organizations, government agencies, and community groups were identified as key facilitators of successful resilience strategies. Participants recognized that when different stakeholders worked together, they could leverage resources, share knowledge, and develop more comprehensive solutions. As one participant stated,

> *"When we collaborate with local organizations, we can reach more people and create a stronger impact."*

This collaboration underscores the importance of building networks and alliances that enhance the capacity of communities to address climate resilience challenges collectively. Bringing an ethnomethodological perspective to the forum, this qualitative study contributed much-needed insight into how communities engage with climate resilience strategies in urban locations after hurricane-linked flooding. The study uncovered various factors that play out as perceptions, barriers and enablers and thereby exposed new knowledge about climate resilience planning and community engagement to the global scientific community. Consequently, the study met a number of theoretical and empirical needs in the literature concerning CI besides addressing existing lacunas in relation to local knowledge and sustainable resilience endeavours.

This paper makes one of the biggest contributions to understanding how community perceptions help or hinder the resilience efforts in question. Prior studies have primarily emphasized the logistics of resilience to such things as structures and systems, and often overlook or downplay the view of residents and their involvement, Nast (2032) Smith & Leiserowitz (2019). This research revealed that the sense of ownership on the resilience strategies was higher among the community members who were involved actively in planning and decision-making processes. This finding is

in accord with the research conducted by Kousky et al. (2021) who opine that it is impossible to gauge community engagement a least important factor for trust and hence the success of climate change adaptation. This will insulate the design of resilience strategies from main stream implemented ideas that may not fit the local outlook hence will enhance the effectiveness of such strategies.

This study also established that lack of funding, bureaucratic governance and institutionalization are factors that limit community participation for the purposes of a study, these results substantiated findings of previous studies. Nevedal et al. (2021) pointed out that lengthy and complicated administrative procedures fail to support fast implementation of resilience interventions, which makes community exposed to climate effects. Similarly, a lack of funding has been found in several studies as a key challenge in operations while implementing relevant resilience approaches (Ivanov et al., 2021). In doing so, this study adds to the discourse on the need for more efficient processes and funding systems that would enable communities participate effectively in resilience planning.

In addition, the findings stressed local knowledge importance as part of resilience strategy frameworks. The participants also indicated the need to have their perceptions and experiences of the practice considered in decision making which was also found in the literature (Mlambo et al., 2021). The emphasis put on local knowledge stands in direct opposition to many previous climate resilience strategies which have had a more centralized, 'expert' approach, that lack adequate knowledge of the communities in question. As emphasised by Tariq et al. (2021), the application of local knowledge does improve the effectiveness of the resilience concepts and motes ownership among communities. It thus supports previous findings that if community involvement is to be authentic, then this should not only be restricted to tokenistic involvement in the resilience planning process.

With regards to the existing body of knowledge on climate resilience, the facilitators also highlighted in this study, such as strong leadership and collaborative partnerships also add to the existing knowledge base. The importance of leadership in rallying the community support and resources correlates with the inference made by Howard & Irving (2021), that leadership is raised as crucial in the course of implementation of resilience. Furthermore, there is parallel in the present study concisely focusing on the collaborative partnerships in accordance with the observation made by Maingey (2021) that climate change demands multi-stakeholder contribution. Through presenting key forces that afford community resilience such as strong leadership and partnerships, this research calls for concerted approach to climate challenges.

Lastly, this study helps to fill the emerging literature calling for equity and inclusion in climate resilience interventions. participants worried that the most vulnerable populations in the community remain excluded from the resilience agenda. This has informed the need for resilience strategies to be equitable in a way that everyone in the community invisibly is represented. It should also be noted that emphasizing the need to consider diversity issues in resilience planning, this study is presented in support of the demand for the postcolonial approaches to climate adaptation.

Conclusion

The findings of this research outline the major opportunities and challenges that determine the success of climate resilience interventions in urban communities that experience hurricane flooding. Lack of funding and poor organization structure, funds and insufficient public education were found to be major challenges that hindered implementation of the program while community support, effective leadership and support from other agencies and organization were some of the

factors that enhanced the implementation. To fill these existing research gaps, the present study provides insights into the dynamics of implementing and operationalizing community resilience processes, and underlines the importance of policy solutions that would facilitate the processes, fund the initiatives, and engage the public in resilience strategic planning.

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