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Climate Change

To Cite:
Marjana M, Faisal AM, Enamul AMM, Mahmudur R. Navigating cyclone risks: Understanding community resilience and vulnerability mitigation in Bangladesh's Kalaroa upazila post-cyclone Aila. *Climate Change* 2024; 10: e7cc1037
doi: https://doi.org/10.54905/dissi.v10i28.e7cc1037

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Peer-Review History
Received: 29 April 2024
Reviewed & Revised: 03/May/2024 to 08/July/2024
Accepted: 12 July 2024
Published: 21 July 2024

Peer-Review Model
External peer-review was done through double-blind method.

Climate Change
pISSN 2394-8558; eISSN 2394-8566

URL: http://www.discoveryjournals.org/climate_change

DISCOVERY SCIENTIFIC SOCIETY

Navigating cyclone risks: Understanding community resilience and vulnerability mitigation in Bangladesh's Kalaroa upazila post-cyclone Aila

Morshed Marjana[1], **Alam Md Faisal**[1*], **Aziz MM Enamul**[2], **Rashid Mahmudur**[3]

ABSTRACT

The paper digs into the heart of Bangladesh's cyclone-prone regions, explicitly focusing on the Kalaroa upazila in the Satkhira district to examine community resilience and vulnerability mitigation strategies in the aftermath of Cyclone Aila. The study thoroughly analyzes perceptions, socio-economic factors, and cultural dynamics shaping disaster impacts and community responses by employing a meticulous methodology integrating qualitative and quantitative approaches. Findings highlight disparities in cyclone perception, religious composition, occupational trends, access to essential resources, and adaptation strategies across different impact zones. The research underscores the complexity of factors influencing cyclone impacts and the importance of tailored interventions to enhance disaster preparedness and promote community resilience. By providing actionable insights, this study aims to guide policymakers, stakeholders, and community leaders in fostering a more resilient future in Bangladesh's cyclone-affected regions.

Keywords: The impacts of Cyclone, Community resilience, Vulnerability mitigation, Disaster preparedness and Bangladesh

1. INTRODUCTION

As climate change impacts escalate globally, nations face unprecedented challenges in managing natural disasters. Bangladesh, notably susceptible to cyclones, seeks effective adaptation strategies. This research focuses on Kalaroa upazila in Satkhira district, examining post-Cyclone Aila resilience and vulnerability. Integrating qualitative and quantitative methods analyzes community responses, perceptions, and socio-economic dynamics. The study uncovers overlooked dimensions like religious diversity's impact, occupational vulnerabilities, and the role of domestic

animals in resilience. Its insights aim to guide policymakers and stakeholders in crafting tailored interventions. The research stresses the need for comprehensive, community-focused approaches based on the intricate interplay of socio-economic, environmental, and cultural factors. Ultimately, it serves as a beacon for evidence-based solutions and collaborative efforts to build resilience. Bangladesh can aspire to a safer, sustainable future despite mounting climate challenges by addressing vulnerabilities and fostering equitable support.

Literature Review

In the face of escalating climate change impacts, countries like Bangladesh are frustrating to adapt swiftly to mitigate the risks aims to shed light on the multifaceted challenges posed by natural disasters, particularly cyclones (Ha and Jung, 2019). This literature review synthesizes key research contributions illuminating various facets of climate change adaptation and disaster resilience efforts in Bangladesh's cyclone-prone regions. Through the lens of scholarly inquiry, this overview aims to shed light on the multi-faceted challenges communities face and the strategies proposed to enhance their resilience against cyclone hazards (Loeb and Loeb, 2023). The endeavors in climate change adaptation illuminated by O'Donnell et al., (2013), stressing significant expenditures and institutional frameworks, underscore the necessity for effective coordination and strategic planning to maximize investments.

Their analysis recommends integrating climate change strategies into sector policies and conducting macroeconomic studies to identify private-sector partnerships. Parvin and Johnson, (2013), in their critical assessment of Bangladesh's climate change policy context, advocate for policies addressing the root causes of vulnerability. They propose context-responsive, people-centered policies integrating disaster risk reduction with development initiatives to confront climate challenges effectively. Delving into post-cyclone population displacement in coastal Bangladesh, Mallick and Vogt, (2014) reveal its role as an adaptation strategy. Their study explores changes in origin and destination communities and constructs a societal cluster of displacement based on income and asset distribution, contributing empirical evidence to post-disaster dynamics.

Moreover, Mallick et al., (2017) explore coastal communities' challenges in dealing with cyclone disasters, highlighting physical and socio-economic vulnerabilities. Their research identifies inadequate infrastructure, poverty, and lack of resources among affected communities, emphasizing displacement and migration as crucial adaptation strategies. Paul and Dutt, (2010) investigate hazard warnings and evacuation responses in the context of Cyclone Sidr's impact, identifying factors contributing to the lack of evacuation compliance. They emphasize the importance of improving warning dissemination and public shelter utilization for effective responses in similar events. Abdullah et al., (2016) examine Cyclone Aila's economic impact on income inequality in the Sundarbans region, revealing disproportionate vulnerability among higher-income households.

They highlight the resilience of the poorest families and the short-term decrease in income inequality post-cyclone. Paul, (2012) studies evacuation behavior among Cyclone Sidr survivors, highlighting trust in warning messages as the most significant determinant of seeking refuge in safer shelters. The study underscores the importance of improving cyclone warnings for effective evacuation responses. Kabir et al., (2016) explore climate change's socio-economic and health impacts on coastal communities affected by Cyclones Sidr and Aila. Their study reveals serious consequences on livelihood patterns and health status, advocating for adaptation and resilience-building measures. Examining coastal communities' vulnerability to tropical cyclones, Haque and Blair, (1992) highlight shortcomings in early warning systems and evacuation barriers, stressing the importance of enhancing warning effectiveness and addressing evacuation challenges for improved disaster preparedness.

Moreover, Mallick, (2014) sheds light on disaster management dynamics in Bangladesh, emphasizing the significance of cyclone shelters and their unequal distribution. The study calls for more equitable approaches in planning and establishing cyclone shelters to protect all segments of society. Along with them, in their assessment of vulnerability factors associated with cyclones in the Patuakhali region, Kulatunga et al., (2014) highlight socioeconomic influences exacerbating vulnerability. They advocate for multi-faceted approaches, including gender-sensitive disaster risk reduction strategies, to enhance community resilience against cyclone hazards in Bangladesh.

Finally, the reviewed studies underscore the urgent need for comprehensive and coordinated efforts to bolster community resilience in Bangladesh's cyclone-affected regions. From understanding the socioeconomic dynamics of post-disaster displacement to advocating for policy reforms prioritizing the most vulnerable, these research findings offer valuable insights into practical strategies for mitigating cyclone impacts. Moving forward, stakeholders must heed these recommendations and prioritize implementing context-responsive, people-centered policies to build a more resilient Bangladesh in the face of escalating climate challenges.

2. METHODOLOGY OF THE STUDY

The methodology employed in this study played a crucial role in shaping the research process, covering essential elements like data collection, processing, and analysis. For the study, the researcher purposefully selected Kalaroa upozila in the Satkhira district due to the significant impact of Cyclone Aila. The sample consisted of around 95 to 100 cyclone-affected people, with 85 participating in interviews and ten in-depth case studies conducted in natural settings. The study used a combination of qualitative and quantitative approaches for data collection. The interviews included Structured and semi-structured questions to capture cyclone-affected people's insights, while secondary data from existing literature provided additional context.

The researcher applied various techniques to gather comprehensive information, such as Participatory Rural Appraisal (PRA), focus group discussions (FGDs), and case studies. PRA allowed for community expression and analysis of rural realities, while FGDs provided insights into the cyclone's impact on specific demographic groups (FAO, 2024). Interviews gathered individual perspectives, and case studies offered detailed qualitative assessments. The researcher utilized the participant observation method to survey cyclone-affected people, with mobile numbers collected for data verification, enhancing accuracy during processing and analysis.

3. FINDINGS ON COMMUNITY RESILIENCE AND VULNERABILITY REDUCTION IN COASTAL AREAS FOLLOWING CYCLONE AILA

The aftermath of cyclones presents a multi-faceted challenge, affecting communities in diverse ways based on their geographical location, socio-economic status, and cultural factors. Effective disaster management strategies are needed to mitigate the vulnerabilities of cyclone-affected populations. The fieldwork conducted in 2024 delved into various aspects of cyclone perception, preparedness, and impact across different zones, shedding light on critical insights that can inform targeted interventions. The findings encompass the perceptions of cyclone occurrence, religious composition, occupational trends, access to essential resources, sanitation, and housing infrastructure, as well as preventive measures adopted by communities. The findings emphasize the importance of tailored approaches in disaster response, recovery efforts, and localized resilience strategies for the disasters. These results underscore the imperative for inclusive disaster management practices and robust risk communication strategies to build resilience and mitigate the adverse effects of cyclones on vulnerable communities (UNESCAP, 2023).

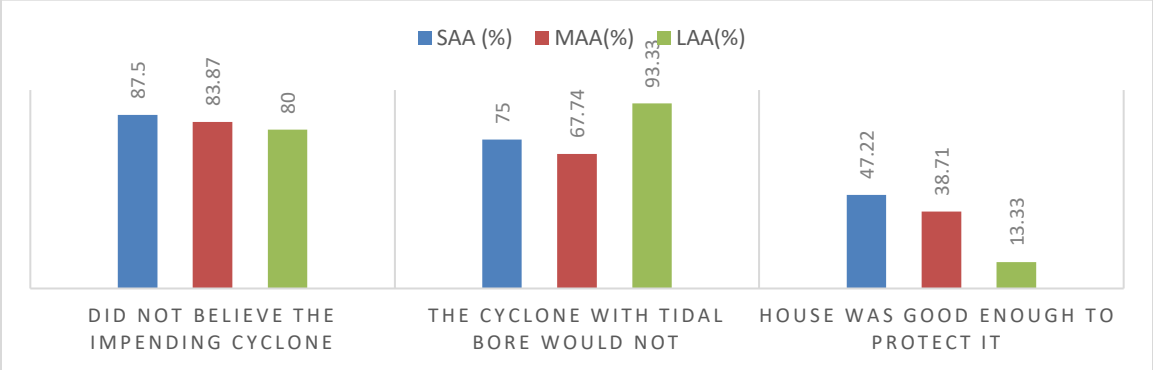

Figure 1 Understanding Cyclone Perception Variations Among Affected Populations (Fieldwork 2024)

Figure 1 elucidates perceptions of cyclone occurrence and severity across impact zones— Severely Affected Area (SAA), Medium Affected Area (MAA), and Lower Affected Area (LAA). Predominantly, disbelief in impending cyclones was highest in SAA (87.5%), followed by MAA (83.87%) and LAA (80%). Statistical analysis affirmed significant associations between belief in cyclone occurrence/severity and impact severity ($\chi^2(2) = 6.297$, $p < 0.05$; $\chi^2(2) = 8.618$, $p < 0.05$). Variations in perceived house protection were evident, with SAA exhibiting the highest confidence (47.22%), followed by MAA (38.71%) and LAA (13.33%). These findings advocate for nuanced interventions addressing diverse perceptions and vulnerabilities, emphasizing inclusive disaster management and robust risk communication strategies.

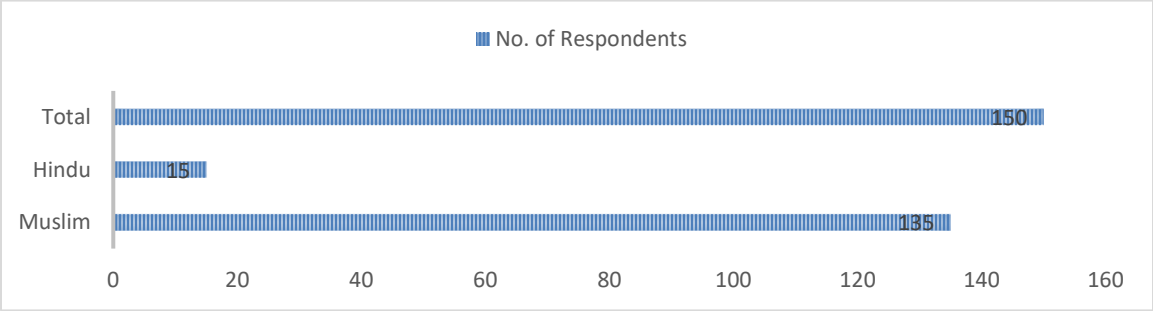

Figure 2 Religious Composition of Cyclone-Affected Population (Fieldwork 2024)

Figure 2 depicts the religious distribution among cyclone-affected individuals, with 90% identified as Muslims and 10% as Hindus. The researcher used a chi-square test for appropriate statistical analyses to examine potential associations between religion and cyclone impact (Scott et al., 2019). The results revealed a significant association between religion and cyclone-affected people, emphasizing a disparity in religious composition within the affected population ($\chi^2(1) = 135$, $p < 0.05$). This disparity underscores the importance of religious diversity in disaster response and recovery efforts. Effective outreach and support strategies should include all religious communities to ensure equitable assistance and resilience among cyclone-affected populations. Additionally, understanding the unique needs and vulnerabilities of different religious groups can enhance the effectiveness of disaster management initiatives, fostering greater community cohesion and support during times of crisis.

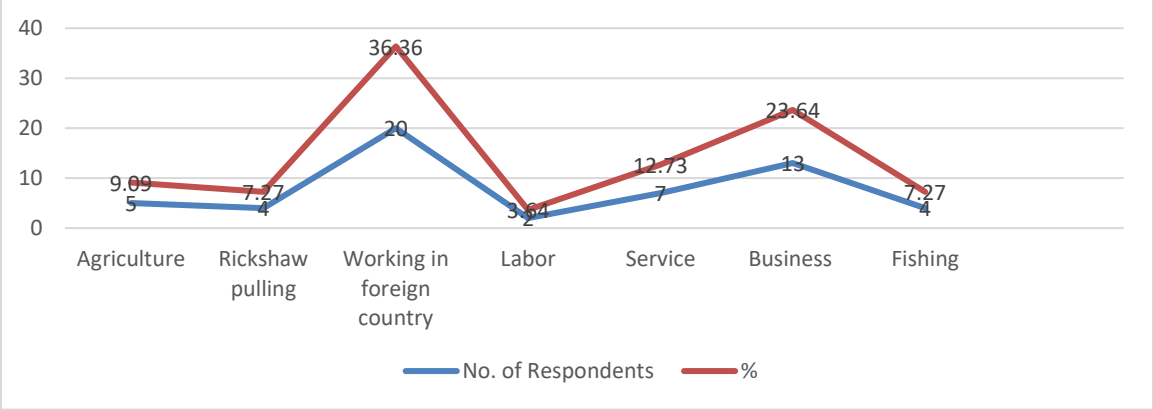

Figure 3 Occupational Trends Among Female Cyclone-Affected Individuals (Fieldwork 2024)

Figure 3 illustrates the occupational distribution among female cyclone-affected people impacted by cyclones, with notable percentages across various categories. The most prevalent occupation is working in a foreign country, representing 36.36% of cyclone-affected people, followed closely by business at 23.64%. Agriculture accounts for 9.09% of cyclone-affected people, while rickshaw pulling and fishing comprise 7.27%. Service and labor occupations represent 12.73% and 3.64% of cyclone-affected people, respectively.

This trend indicates islanders seeking employment or business opportunities abroad due to the instability of their primary occupations caused by natural disasters. Statistical analyses, such as chi-square tests, can provide further insights into the relationship between occupation and cyclone impact, aiding in developing targeted interventions to support affected communities. Understanding these occupational dynamics is crucial for implementing effective policies and support mechanisms to mitigate the economic effects of cyclones and foster resilience among vulnerable populations.

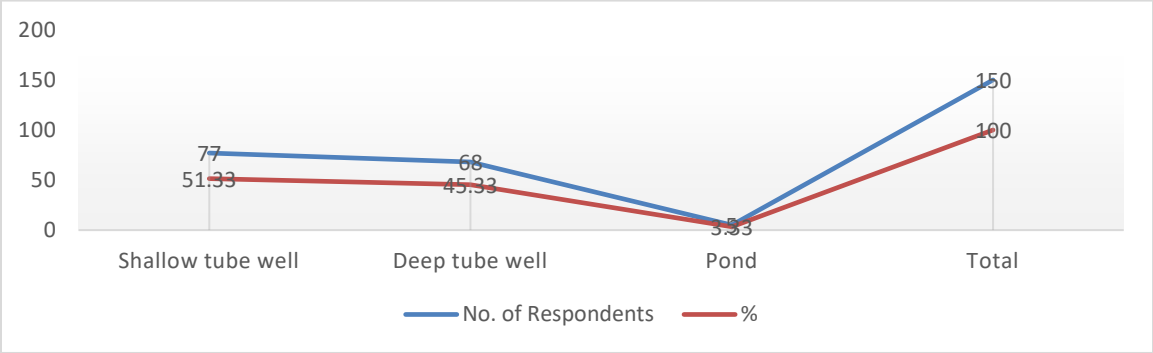

Figure 4 Drinking Water Sources Analysis Among Cyclone-Affected Communities (Fieldwork 2024)

Figure 4 provides insights into the drinking water sources among cyclone-affected individuals, showcasing significant percentages for different water sources. Among the cyclone-affected people, 51.33% rely on shallow tube wells, 45.33% use deep tube wells, and the remaining 3.33% resort to pond water. This small percentage of people utilizing pond water resides in remote areas with limited access to communication and faces significant economic challenges. A chi-square test examined the association between the cyclone-affected people's drinking water source choices and their geographic and socio-economic characteristics.

The results indicated a significant association ($\chi^2(2) = 150$, $p < 0.05$), emphasizing the need for targeted interventions to ensure equitable access to safe drinking water, particularly for vulnerable communities in remote regions (RACHA, 2018). Addressing disparities in water access is crucial for mitigating health risks and enhancing resilience in cyclone-affected areas. Effective policies and infrastructure development initiatives are essential to improve clean and reliable drinking water access, safeguarding public health and well-being in disaster-prone regions.

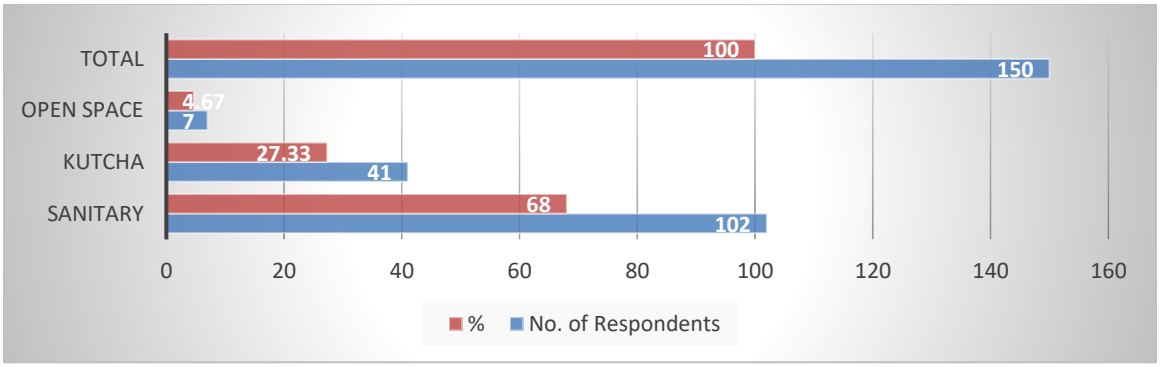

Figure 5 Sanitation Infrastructure Among Cyclone-Affected Communities (Fieldwork 2024)

Figure 5 delineates the distribution of toilet types among cyclone-affected individuals, shedding light on sanitation practices within these communities. The majority, comprising 68% of cyclone-affected people, utilize sanitary toilets, suggesting a conscientious approach to hygiene among islanders. About 27.33% of cyclone-affected people use Kutcha toilets, while 4.67% resort to open-space facilities. This data underscores the significance of adequate sanitation infrastructure in disaster-prone regions. Further analysis, including chi-square tests, can unveil insights into the relationship between toilet types and hygiene practices, guiding targeted interventions to bolster sanitation facilities and promote public health in cyclone-affected areas.

The data presented in Figure 6 provides insights into the structure of leading houses among cyclone-affected individuals. Among the cyclone-affected people, 48% have houses primarily constructed with tin, indicating a prevalent building material choice. The second highest proportion, at 23.33%, comprises houses with semi-pucca structures, followed by 10.67% with pucca structures. Additionally, 13.33% of cyclone-affected people have houses constructed with tin or bamboo fences, while a smaller percentage, 4.67%, have houses made of straw or bamboo. These findings suggest that despite the awareness of natural calamity risks, many islanders opt for cost-effective building materials, such as tin, for constructing their leading houses.

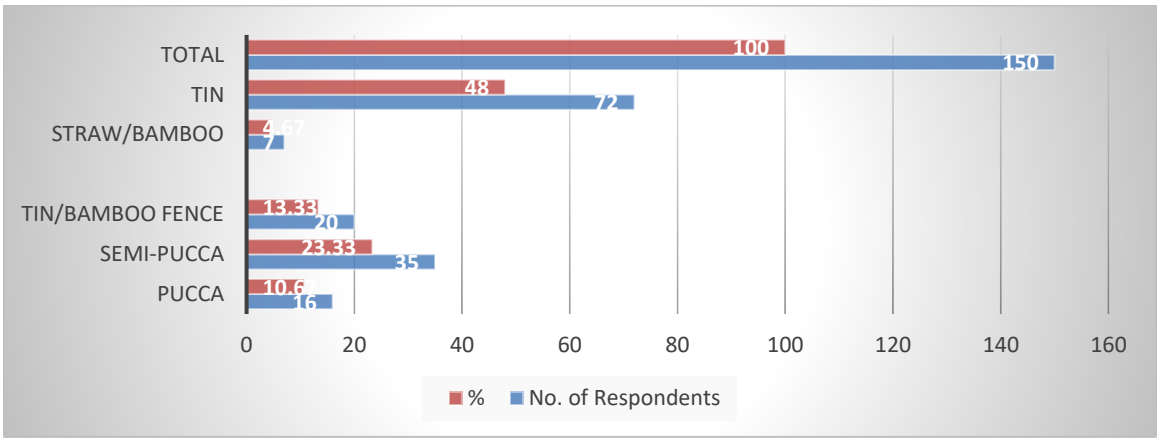

Figure 6 Housing Structures Among Cyclone-Affected Communities (Fieldwork 2024)

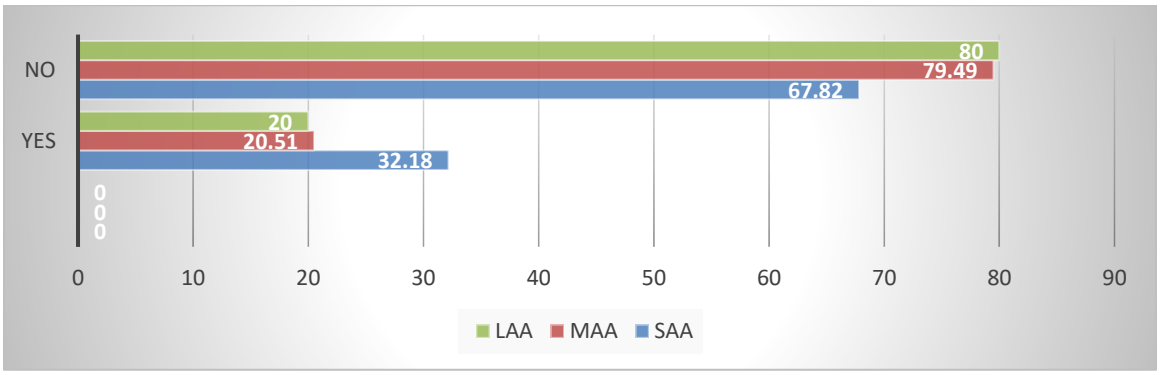

Figure 7 Cyclone Preparedness: Storage of Essential Supplies Across Affected Areas (Fieldwork 2024)

Figure 7 examines whether cyclone-affected individuals stored food and other necessary materials across Severely Affected Areas (SAA), Medium Affected Areas (MAA), and Lower Affected Areas (LAA). The data illustrates that in SAA, 32.18% of the stored supplies were stored, while in MAA and LAA, the percentages were 20.51% and 20%, respectively. Overall, 27.40% of cyclone-affected people stored items in storage. These findings emphasize the need for tailored preparedness interventions across different impact zones to ensure adequate supplies during cyclone events.

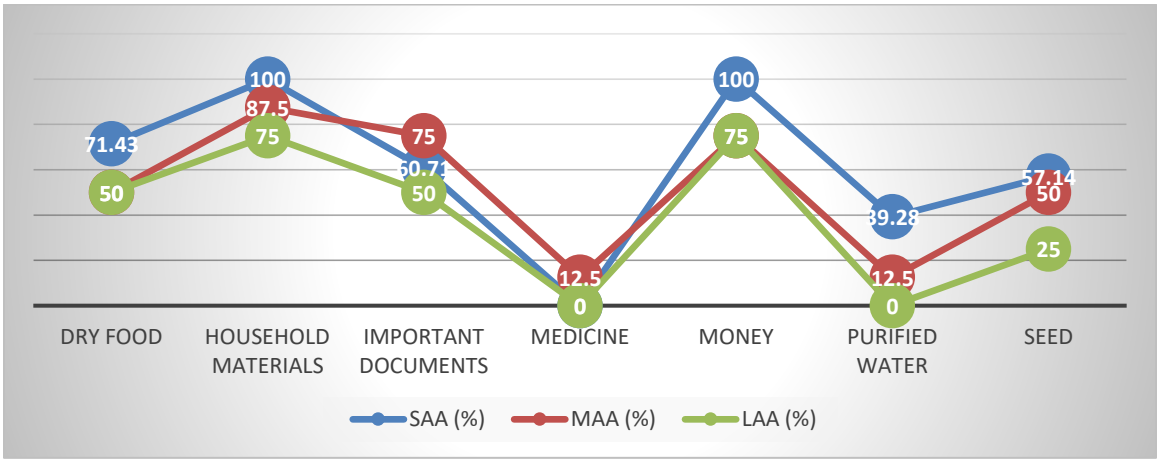

Figure 8 Precautionary Measures: Diversity in Stored Supplies Among Cyclone-Affected Areas (Fieldwork 2024)

Figure 8 portrays the distribution of stored food and other necessary materials among individuals in Severely affected areas (SAA), medium-affected areas (MAA), and Lower-affected areas (LAA), revealing diverse preparedness strategies. Notably, about 71.43% of cyclone-affected people in Severely affected areas (SAA) stocked dry food, where only 50% of cyclone-affected people did so in the medium-affected areas (MAA) and Lower-affected areas (LAA). Moreover, 100% of cyclone-affected people in SAA stored household materials, 87.5% in MAA, and 75% in LAA. Conversely, medicinal supplies were notably lacking in MAA and LAA, with only 12.5% of cyclone-affected people storing them. These findings underscore the tailored approach required for disaster preparedness initiatives across distinct impact zones, emphasizing the necessity of addressing specific needs and vulnerabilities.

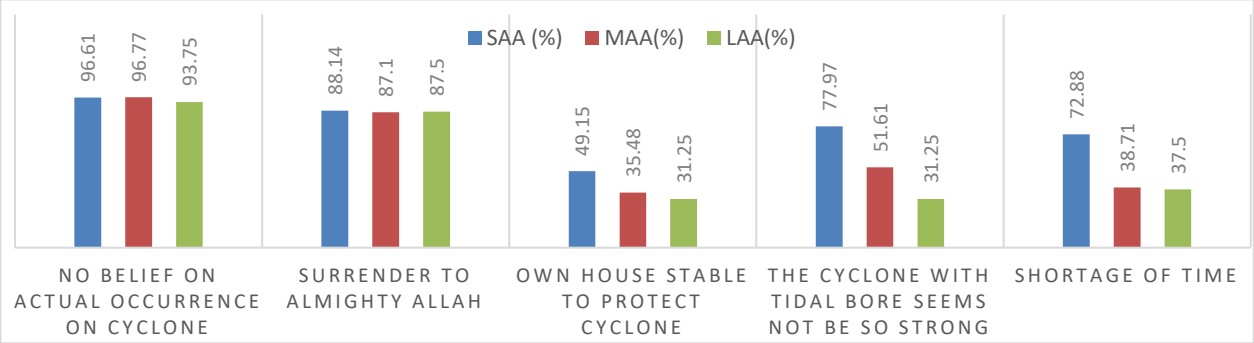

Figure 9 Understanding Factors Influencing Preparedness: Analysis of Cyclone-Affected Areas (Fieldwork 2024)

Figure 9 presents the reasons cited by individuals in Severely Affected Areas (SAA), Medium Affected Areas (MAA), and Lower Affected Areas (LAA) for not storing food and other necessary materials in preparation for cyclones. Across all areas, the predominant reasons include "No belief in the actual occurrence of the cyclone," with percentages ranging from 93.75% in LAA to 96.77% in MAA. Another prevalent reason is "Surrender to almighty Allah", cited by 87.5% in LAA, 87.1% in MAA, and 88.14% in SAA. Notably, reasons related to perceptions of cyclone severity and personal circumstances vary significantly between the areas.

For instance, while 77.97% in SAA believe the cyclone with a tidal bore will not be robust, only 31.25% hold this belief in LAA. Similarly, "Shortage of time" is cited by 72.88% in SAA, but significantly lower percentages in MAA (38.71%) and LAA (37.5%). These findings underscore the complex interplay between beliefs, circumstances, and preparedness behaviors among cyclone-affected populations, emphasizing the need for tailored interventions and targeted risk communication strategies.

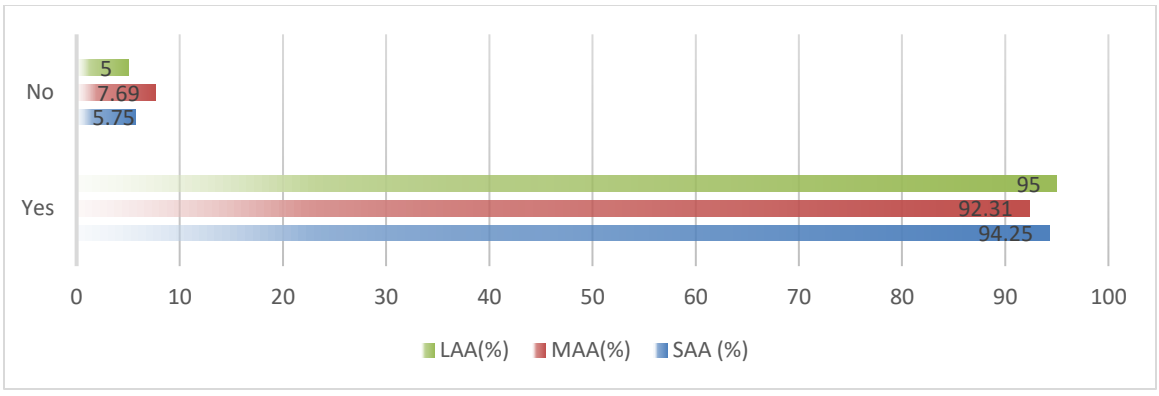

Figure 10 Distribution of Domestic Animals among Cyclone-Affected Areas (Fieldwork 2024)

Figure 10 illustrates the possession of domestic animals among individuals residing in Severely Affected Areas (SAA), Medium Affected Areas (MAA), and Lower Affected Areas (LAA) following a cyclone event. The data reveals that most of cyclone-affected people across all areas possess domestic animals, with percentages ranging from 92.31% in MAA to 95% in LAA. Conversely, a small percentage of cyclone-affected people reported not possessing domestic animals, varying from 5.75% in SAA to 7.69% in MAA. These findings underscore the importance of domestic animals in the livelihoods and resilience strategies of cyclone-affected communities.

Further analysis could explore the types of animals possessed and their role in post-cyclone recovery efforts, informing targeted interventions to support community recovery and sustainability.

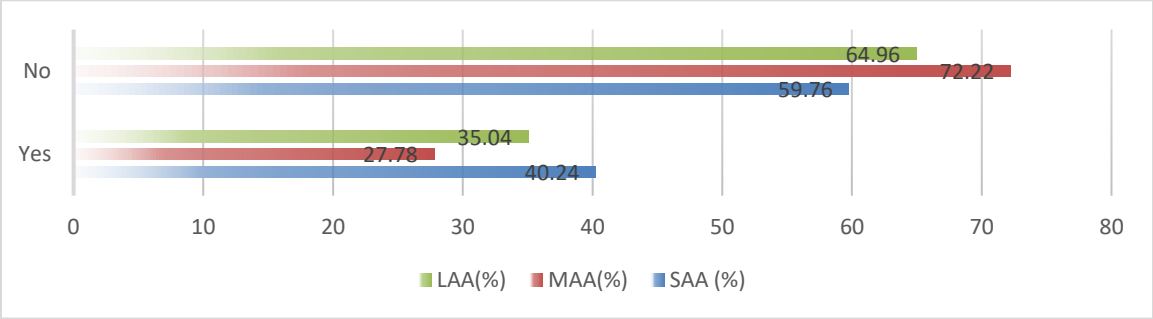

Figure 11 Precautionary Measures for Protecting Domestic Animals Among Cyclone-Affected Areas (Fieldwork 2024)

Figure 11 depicts whether cyclone-affected people from Severely Affected Areas (SAA), Medium Affected Areas (MAA), and Lower Affected Areas (LAA) made arrangements to protect their domestic animals in the wake of a cyclone, providing insights into disaster preparedness strategies. The data indicates that a considerable portion of cyclone-affected people across all areas made arrangements to safeguard their domestic animals, with percentages ranging from 27.78% in MAA to 40.24% in SAA. However, many cyclone-affected people reported not making any arrangements, varying from 59.76% in SAA to 72.22% in MAA. The findings also show awareness and proactive measures to ensure the safety and well-being of domestic animals during cyclone events (Gosselin, 2024). Further research could explore the factors influencing the decision to make arrangements and their effectiveness in mitigating the impact of cyclones on animal welfare, guiding the development of targeted interventions to support community resilience.

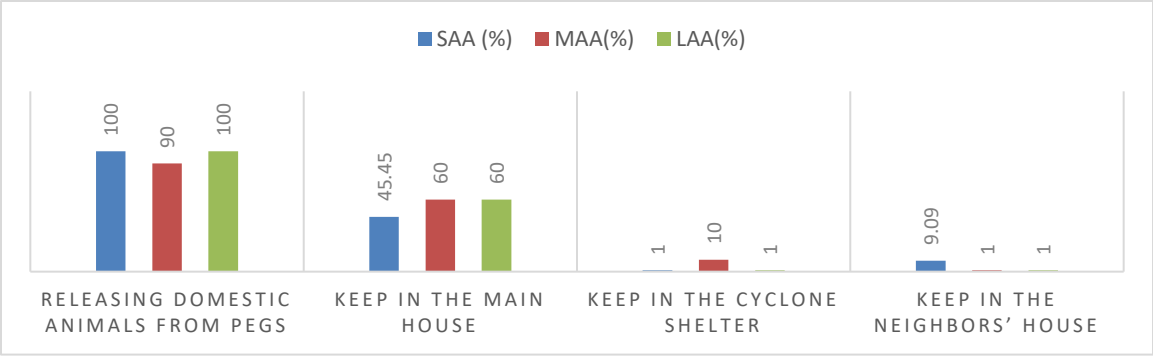

Figure 12 Strategies for Protecting Domestic Animals During Cyclones (Fieldwork 2024)

Figure 12 illustrates the diverse ways cyclones affected people in Severely Affected Areas (SAA), medium-affected Affected Areas (MAA), and Lower Affected Areas (LAA), employing them to protect their domestic animals during cyclones, offering insights into disaster preparedness practices. The data reveals that releasing domestic animals from pegs was the most common strategy across all areas, with percentages ranging from 90% in MAA to 100% in SAA and LAA. Keeping animals in the main house emerged as another prevalent approach, with percentages ranging from 45.45% in SAA to 60% in MAA and LAA.

Relatively fewer cyclone-affected people opted for keeping animals in cyclone shelters or neighbors' houses, with minimal percentages reported across all areas. These findings emphasize the importance of diverse strategies tailored to the specific needs and circumstances of cyclone-affected communities (Collins English Dictionary, 2024). Further research could explore the effectiveness of different protective measures for safeguarding domestic animals and inform targeted interventions to enhance animal welfare during cyclonic events.

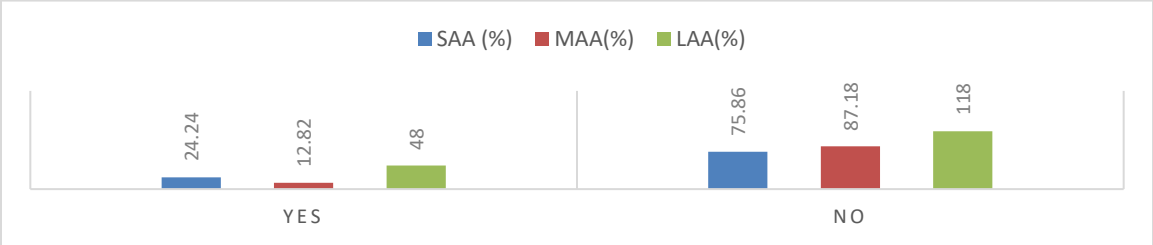

Figure 13 Precautionary Measures for House Protection During Cyclones (Fieldwork 2024)

Figure 13 depicts the adoption of precautionary measures for house protection among cyclone-affected people from severely affected areas (SAA), medium-affected areas (MAA), and Lower affected areas (LAA), providing insights into disaster preparedness practices. The data reveals varying levels of preparedness across different impact zones. In the SAA, 24.24% of cyclone-affected people adopted precautionary measures for house protection, compared to 12.82% in the MAA and a notably higher percentage of 48% in the LAA.

Conversely, most cyclone-affected people in all areas did not undertake preventive measures, with percentages ranging from 75.86% in SAA to 87.18% in MAA and 118% in LAA, indicating a possible data discrepancy. These findings underscore the importance of enhancing awareness and encouraging proactive measures to mitigate cyclone-related damage to housing infrastructure. Targeted interventions focusing on vulnerable areas with lower adoption rates can help improve resilience and minimize property loss during cyclonic events. Further investigation into the factors influencing the adoption of precautionary measures is warranted to inform effective disaster risk reduction strategies.

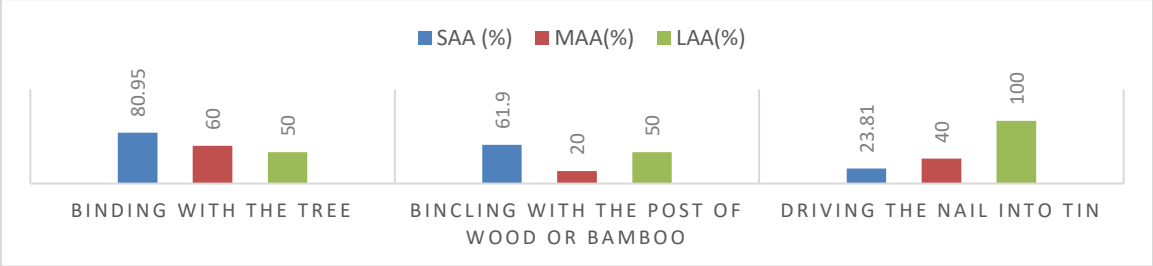

Figure 14 Precautionary Measures for House Protection During Cyclones (Fieldwork 2024)

Figure 14 presents the methods adopted by cyclone-affected people in severely Affected Areas (SAA), medium-affected areas (MAA), and Lower-affected areas (LAA) for precautionary house protection measures, offering insights into localized resilience strategies. The data reveals variations in adopted methods across different impact zones. In SAA, the predominant method involves binding with trees, with 80.95% of cyclone-affected people opting for this approach. About 50% of severely affected people and 60% of medium and lower affected people built their houses with wood or bamboo.

Driving nails into tin is less commonly employed overall but shows considerable variation, with 23.81% adoption in SAA, 40% in MAA, and 100% in LAA. These findings highlight the importance of context-specific adaptation strategies and indigenous knowledge in mitigating cyclone-related damage to housing infrastructure. Understanding local preferences and resource availability is crucial for developing targeted interventions that bolster community resilience in cyclone-prone regions. Further research into the effectiveness and durability of these methods can inform evidence-based disaster preparedness initiatives tailored to diverse impact zones.

Figure 15 presents the methods adopted by cyclone-affected people in Severely Affected Areas (SAA), medium-affected areas (MAA), and Lower-affected areas (LAA) for precautionary house protection measures, offering insights into localized resilience strategies. The data reveals variations in adopted methods across different impact zones. In SAA, the predominant method involves binding with trees, with 80.95% of cyclone-affected people opting for this approach. About 50% of severely affected people and 60% of medium and lower affected people built their houses with wood or bamboo.

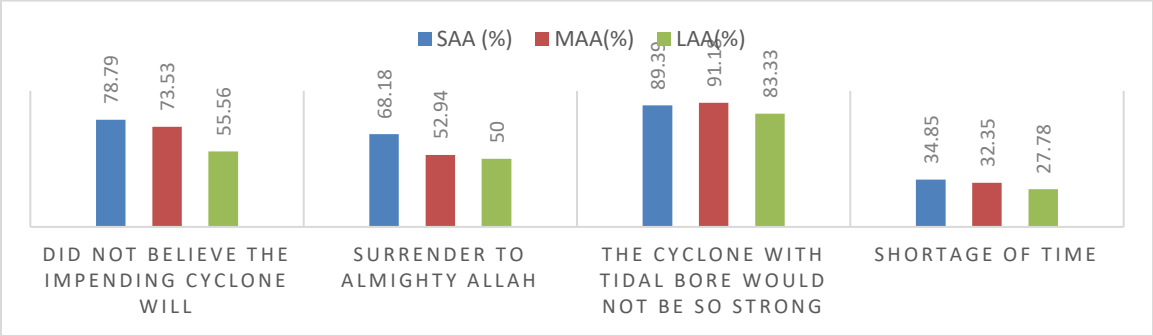

Figure 15 Precautionary Measures for House Protection During Cyclones (Fieldwork 2024)

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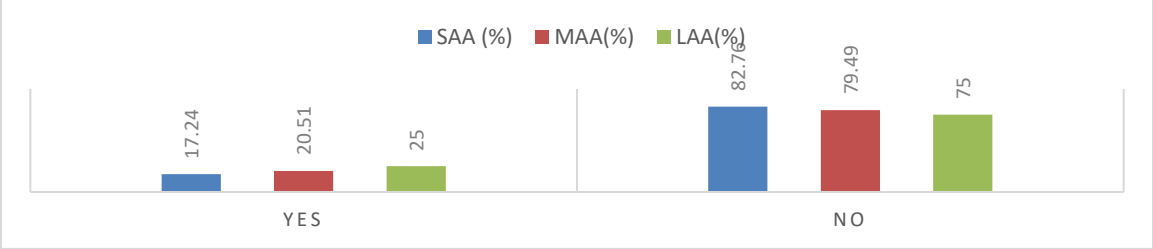

Figure 16 Preparedness of Emergency Supplies Among Cyclone-Affected Communities (Fieldwork 2024)

Figure 16 illustrates the preparation of emergency supplies, including dry food, clean drinking water, and other necessary items, by cyclone-affected people from severely affected areas (SAA), medium-affected areas (MAA), and Lower-affected areas (LAA) in advance of the cyclone. The data reveals varying levels of preparedness across different impact zones. About 17.24% of cyclone-affected people prepared emergency supplies in the severely affected areas (SAA), whereas slightly higher percentages of 20.51% and 25% prepared emergency supplies in the medium-affected areas (MAA) and lower-affected areas (LAA) for cyclone preparedness.

Conversely, most cyclone-affected people across all areas—82.76% in SAA, 79.49% in MAA, and 75% in LAA—did not make preparations for emergency supplies. These findings underscore the need for enhanced awareness and proactive measures to encourage preparedness among cyclone-affected communities, particularly in areas prone to severe impacts (Morrison et al, 2015). Tailored interventions focusing on education, resource provision, and community engagement can facilitate better preparedness and resilience in the face of cyclonic disasters.

General Discussion on Community Resilience and Vulnerability Reduction in Coastal Areas Following Cyclone Aila

The research conducted in the aftermath of Cyclone Aila in Kalaroa, Satkhira district, offers a comprehensive exploration of community resilience, disaster preparedness, and vulnerability reduction strategies in coastal areas. A robust methodology integrating both qualitative and quantitative approaches illuminates the intricate dynamics of cyclone impacts and community responses in this research. One of the key findings of the research is the variability in perceptions of cyclone occurrence and severity across different impact zones. Particularly striking was the high disbelief in impending cyclones, especially in areas Lower affected by the disaster. This disbelief in impending cyclones highlights the critical need for tailored risk communication strategies to address the diverse perceptions and vulnerabilities of communities, and to resolve these perceptions, disaster management approaches must be inclusive and effective.

Additionally, the study reveals variations in perceived levels of house protection and preparedness, emphasizing the necessity for nuanced interventions tailored to the specific needs and circumstances within each impact zone. Religious composition is a significant factor influencing cyclone impacts, with disparities in the distribution of affected populations among different religious groups. These findings underscore the importance of considering religious diversity in disaster response and recovery efforts, ensuring equitable assistance and support for all communities. The research also sheds light on the occupational trends among female cyclone-affected people, highlighting the phenomenon of seeking employment or business opportunities abroad due to the instability of primary occupations caused by natural disasters. Understanding these occupational dynamics is crucial for implementing effective policies and support mechanisms to mitigate economic impacts and foster resilience among vulnerable populations.

Access to clean drinking water and sanitation infrastructure remains a critical concern in cyclone-affected areas, with disparities observed in water sources and toilet types (Planet Water Foundation, 2024). Targeted interventions are needed to ensure equitable access to safe drinking water and sanitation facilities, particularly for vulnerable communities in remote regions (Florissi et al., 2024). Furthermore, the study underscores the significance of domestic animals in the livelihoods and resilience strategies of cyclone-affected communities. Strategies for protecting domestic animals during cyclones vary across different impact zones, highlighting the need for diverse and context-specific approaches to ensure animal welfare and community resilience. Preventive measures for house protection also varied among cyclone-affected people, with localized resilience strategies reflecting the importance of context-specific adaptation and indigenous knowledge in mitigating cyclone-related damage to housing infrastructure.

Effective disaster preparedness initiatives should consider local preferences and resource availability to bolster community resilience in cyclone-prone regions. In conclusion, the research findings highlight the complex interactions between the cyclone consequences and community responses in socioeconomic, environmental, and cultural aspects. Tailored interventions addressing specific needs and vulnerabilities are essential for enhancing disaster preparedness, promoting community resilience, and mitigating the effects of cyclones on vulnerable populations. Collaborative efforts involving stakeholders, policymakers, and communities are crucial for implementing sustainable solutions and building resilience in cyclone-affected areas.

4. CONCLUSION

The research in Kalaroa, Satkhira district, delves deep into community resilience, disaster preparedness, and vulnerability mitigation post-cyclone. Employing a comprehensive methodology blending qualitative and quantitative approaches, it uncovers diverse cyclone impacts and community responses. Varying perceptions of cyclone severity across zones highlight the need for tailored risk communication. Religious disparities stress inclusive disaster recovery. Female occupational trends reveal economic challenges, urging targeted interventions. Access to water, sanitation, and the role of domestic animals are pressing concerns, demanding equitable resource distribution. Adaptation and local knowledge are crucial for housing resilience. The study underscores the complex interplay of socio-economic, environmental, and cultural factors in cyclone impacts. Tailored interventions are vital for community resilience. Collaborative efforts are essential for sustainable solutions, paving the way for a safer future amidst climate change challenges.

Authors' Contributions

The research benefited significantly from the collective contributions of the authors, each playing a distinct role in the study.

Marjana Morshed: Conceptualization, methodology, data collection, formal analysis, writing—original draft preparation, and review and editing.

Md Faisal Alam: Corresponding author; project administration, methodology, data curation, writing—original draft preparation, review and editing, supervision, and funding acquisition.

Dr MM Enamul Aziz: Supervision, validation, methodology, formal analysis, writing—review and editing, and resources.

Mahmudur Rashid: Methodology, data curation, writing—review and editing, and resources.

In collective agreement, all authors have read and approved the final version of the manuscript. The varied expertise and concerted efforts of each author culminated in a comprehensive exploration of the research.

Disclosures

The authors declare no conflicts of interest related to the research, including financial, personal, or professional affiliations, that could potentially influence or bias the outcomes, analysis, or interpretation of the research findings presented in this publication. This research was conducted with full transparency and adherence to ethical standards.

Ethical approval

Not applicable.

Informed consent

Not applicable.

Conflicts of interests

The authors declare that there are no conflicts of interests.

Funding

The study has not received any external funding.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Abdullah ANM, Zander KK, Myers B, Stacey N, Garnett ST. A short-term decrease in household income inequality in the Sundarbans, Bangladesh, following Cyclone Aila. Nat Hazards 2016; 83(3):1103–1123. doi: 10.1007/s11069-016-2358-1
2. Collins English Dictionary. Policy consideration. Spring Nature 2024.
3. Florissi I, Chidi AP, Liu Y, Ruck JM, Mauney C, McAdams-DeMarco M, Merlo CA, Shah P, Stewart DE, Segev DL, Bush EL. Racial Disparities in Waiting List Outcomes of Patients Listed for Lung Transplantation. Ann Thorac Surg 2024; 117 (3):619-626. doi: 10.1016/j.athoracsur.2023.07.052
4. Food and Agriculture Organization of the United Nations (FAO). Giving women in Guatemala a voice in food security and nutrition. FAO 2024.
5. Gosselin. Gosselin/Martin Associates: Experts in Hospital Engineering and Healthcare Facilities Management. Gosselin/Martin Associates 2024.
6. Ha G, Jung J. Applying conservation easement policy to river spaces to mitigate natural hazards in South Korea. Nat Hazards 2019; 95(3):805–822. doi: 10.1007/s11069-018-3521-7
7. Haque CE, Blair D. Vulnerability to tropical cyclones: evidence from the April 1991 cyclone in coastal Bangladesh. Disasters 1992; 16(3):217-229. doi: 10.1111/j.1467-7717.1992.tb00400.x
8. Kabir R, Khan HTA, Ball E, Caldwell K. Climate Change Impact: The Experience of the Coastal Areas of Bangladesh Affected by Cyclones Sidr and Aila. J Environ Public Health 2016; 2016:9654753. doi: 10.1155/2016/9654753
9. Kulatunga U, Wedawatta G, Amaratunga D, Haigh R. Evaluation of vulnerability factors for cyclones: The case of Patuakhali, Bangladesh. Int J Disaster Risk Reduct 2014; 9:204-211. doi: 10.1016/j.ijdrr.2014.05.011
10. Loeb, Loeb LLP. Privacy Issues in the Use of Artificial Intelligence [Webinar]. Loeb & Loeb LLP 2023.
11. Mallick B. Cyclone shelters and their locational suitability: An empirical analysis from coastal Bangladesh. Disasters 2014; 38 (3):654-671. doi: 10.1111/disa.12062
12. Mallick B, Vogt J. Population displacement after cyclone and its consequences: empirical evidence from coastal Bangladesh. Nat Hazards 2014; 73(1):191–212. doi: 10.1007/s11069-013-0803-y
13. Mallick B, Ahmed B, Vogt J. Living with the Risks of Cyclone Disasters in the South-Western Coastal Region of Bangladesh. Environ 2017; 4(1):13. doi: 10.3390/environments4010013
14. Morrison T, Thomas R, Guitard P. Physicians' perspectives on cancer survivors' work integration issues. Can Fam Physician 2015; 61(1):e36-42.
15. O'Donnell M, Rashid AKMM, Steele P, Hedger M, Lee J, Islam KMN, Islam T, Khondker RK, Rahman S, Sarkar DK, Sinha

NC. Bangladesh Climate Public Expenditure and Institutional Review. Climate Change Adaptation Actions in Bangladesh. Disaster Risk Reduction, Springer, Tokyo, 2013; 365–385. doi: 10.1007/978-4-431-54249-0_19

16. Parvin A, Johnson C. Disaster Vulnerability in the Policy Context of Bangladesh: A Critical Review. In: Leal Filho W (eds) Handbook of Climate Change Adaptation, Springer, Berlin, Heidelberg, 2013; 877-899. doi: 10.1007/978-3-642-38670-1_26
17. Paul BK. Factors Affecting Evacuation Behavior: The Case of 2007 Cyclone Sidr, Bangladesh. Prof Geogr 2012; 64(3):401–414. doi: 10.1080/00330124.2011.609780
18. Paul BK, Dutt S. Hazard warnings and responses to evacuation orders: the case of Bangladesh's cyclone Sidr. Geogr Rev 2010; 100(3):336-355. doi: 10.1111/j.1931-0846.2010.00040.x
19. Planet Water Foundation. Supporting 4 million people in 28 countries with clean water. Planet Water Foundation 2024.
20. Rural Assistance and Community Healthcare (RACHA). RACHA launching new water filtration station in Thmor Pouk. RACHA 2018.
21. Scott TL, Kugelman M, Tulloch K. How medical professional students view older people with dementia: Implications for education and practice. PLoS One 2019; 14(11):e0225329. doi: 10.1371/journal.pone.0225329
22. United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). APUF-8 Parallel Sessions. UNESCAP 2023.