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FLOOD RISK PERCEPTION AND PREPAREDNESS PRACTICES OF FLOOD-PRONE COMMUNITIES IN DIBRUGARH CITY, ASSAM

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Abstract

The Assam flood has been a well-known phenomenon for ages. Its frequency and intensity have been increasing in recent years due to factors such as deforestation, unplanned urbanisation, encroachment of wetlands, and climate change-induced extreme weather events. These floods cause widespread damage to life, property, agriculture, and infrastructure, severely disrupting socio-economic development and posing serious challenges to public health, education, and the environment. Despite substantial national and state-level efforts in disaster management and risk reduction, the situation remains grim. In fact, such a situation is expected to intensify in the face of growing uncertainties of climate change issues. Building community resilience is therefore of utmost importance alongside the state's efforts in order to effectively face and deal with the situation. In view of this, this paper investigates flood risk perception and preparedness practices among people in Dibrugarh, a flood-prone City of Assam. The goal is to understand the ground on which local communities stand in the fight against floods and, accordingly, tailor interventions that best suit their needs. Using a mixed-methods approach, the study combines household interviews with 200 respondents, in-depth interviews with the key informants, and focus group discussions with women, youth and elderly populations. Findings demonstrated the presence of risk awareness in the community, but a critical gap in local preparedness, poor communication and early warning systems, and insufficient initiatives from local institutions. The study therefore underscores the urgent need for targeted community-based initiatives, diversified risk communication, inclusive training, and robust institutional engagement to translate high-risk awareness into actionable preparedness that can enhance the resilience of communities against floods.

Key words: Flood, Perception, Preparedness, Dibrugarh, Assam

Introduction

Flooding is a common natural disaster that severely impacts communities worldwide, causing substantial economic losses, displacing individuals, and resulting in fatalities (UNDRR, 2022). The Brahmaputra River basin in India, particularly in Assam, is highly susceptible to annual

flooding, endangering the lives and livelihoods of millions (NDMA, 2019). Despite the recurrent occurrence of such disasters, the efficacy of flood risk management is greatly affected by local communities' perception of dangers and their subsequent implementation of proactive preparedness strategies (Becker et al., 2015). Studies indicate that discrepancies between the risk evaluations of professionals and the public perceptions frequently hinder the implementation of preparedness programs (Siegrist & Cvetkovich, 2020). Disaster preparedness is essential in risk management, concentrating on alleviating the adverse effects of hazards resulting from global climatic changes. The significance of disaster preparedness was underscored in international accords such as the Sendai Framework for Disaster Risk Reduction (2015-2030), which stresses the necessity to understand disaster risk, enhance disaster risk governance, and augment disaster preparedness for efficient response (UNDRR, 2015). The disastrous situation in Japan, specifically the earthquake, exemplifies the efficacy of comprehensive disaster planning. Notwithstanding substantial seismic events, the country sustains a comparatively low fatality rate owing to its investments in earthquake-resistant infrastructure and a preparedness culture that includes routine disaster drills and early warning systems (Business Insider, 2024). In response to the issue, India has implemented a disaster management framework focused on prevention, mitigation, and preparedness. The National Disaster Management Authority endorsed a strategy to mitigate damage and devastation from disasters through continuous and collaborative efforts involving all stakeholders (NDMA, 2019). In India, engaging local communities has become a vital method for disaster preparedness. Communities were encouraged to engage in disaster risk reduction initiatives, develop resilience, and guarantee timely emergency responses. Despite India's significant advancements in disaster preparedness, numerous obstacles persist, underscoring the need for improved infrastructure, a robust early warning system, and heightened public awareness. To fill these gaps, investing in and implementing policies that will strengthen the nation's capacity to withstand disasters is essential. Assam, a state in North East India known for its natural beauty and climate, faces various hazards, including floods, earthquakes, landslides, and storms. The river systems in Assam, particularly the Brahmaputra and its tributaries, play a significant role in contributing to flood risks, and the state's positioning in the seismically active Zone V renders it particularly susceptible to earthquakes. The Assam State Disaster Management Authority indicates that the state is a multi-hazard zone, necessitating comprehensive disaster management strategies. asdma.gov.in. Dibrugarh, as one of the districts in Assam, faces a variety of natural disasters, such as floods, erosion, droughts, and famine, which occur frequently in the area (City Disaster Management Plan, Dibrugarh, DDIRC). According to SDMA, the intensity and severity of floods in the district have risen in recent years, significantly impacting the local population. The analogous study on flood-affected areas has underscored the significance of involving the community and implementing culturally relevant strategies to bolster resilience (Singh et al., 2025). The study will thoroughly examine the flood-affected community's understanding of flood risks and the preparedness measures they have in place, ultimately aiding in creating more focused and effective flood mitigation strategies and initiatives to enhance community resilience.

Literature Review

Threat of Flooding: A Global Perspective

Flooding is one of the most damaging natural hazards worldwide, leading to significant human suffering, population displacement, and substantial economic losses. The Intergovernmental Panel on Climate Change (IPCC, 2023) consistently emphasise the growing frequency and intensity of extreme weather events such as intense rainfall, which directly elevates flood risk across various regions. Developing nations, frequently marked by fragile infrastructure, dense population in flood-prone regions, and limited disaster management resources, disproportionately bear these repercussions (UNDRR, 2022). The catastrophic events occurring in regions such as Southeast Asia, certain regions of Europe, and the African subcontinent underscore the urgent need for comprehensive and locally adapted strategies to enhance resilience against these persistent challenges (Oxfam International, 2022; European Environment Agency, 2023). Consequently, adequate flood risk management is not merely a reactive approach but a crucial component of sustainable development and humanitarian well-being in the Anthropocene age.

India's Vulnerability to Floods: A National Imperative

In this global context, India, distinguished by its vast geographical extent and diverse hydro-climatic conditions, is susceptible to recurrent and intense flooding. The major river basins of the nation, including the Ganga, Brahmaputra, Kosi, and Mahanadi, are perpetually susceptible to floods, impacting agricultural productivity, urban infrastructure, and human lives (NDMA, 2019). The National Disaster Management Plan (NDM) of India identifies floods as a significant and frequently occurring natural hazard, endangering approximately 40 million hectares of land (NDMA, 2019). The financial repercussions of floods in India are substantial, frequently totalling billions of US dollars annually, interrupting supplies, damaging critical infrastructure, and exacerbating poverty among vulnerable communities (Economic Survey of India, 2023). Regardless of significant governmental initiatives for flood management, such as the building of embankments, improvement of the drainage system, and the establishment of early warning systems, the problem persists, underscoring the need for a shift towards a more cohesive and community-oriented approach to disaster risk reduction (NDMA, 2019). The complexity of India’s flooding issue is exacerbated by socio-economic factors, including growing urbanisation, informal settlements in flood-prone regions, and environmental degradation, which amplify existing dangers (Sharma et al., 2018). Risk perception is essential in shaping awareness regarding disasters. Studies indicate that individuals who have encountered disasters typically demonstrate greater awareness and preparedness levels. A study by Wachinger et al. (2013) demonstrated that personal experiences with disasters significantly influence risk perception, frequently leading to proactive behaviours about preparedness, while those who have not experienced a disaster may lack understanding of the associated risk. Therefore, the study underscores the necessity for a focused awareness campaign.

The Significance of Flood Risk Perception

Effective disaster risk reduction is tied to how individuals and communities comprehend the hazards they encounter. Flood risk perception is a subjective statement people make about the nature and severity of a flood threat that determines their behavioural actions (Slovic, 1987). This view transcends mere cognitive evaluation of risk; it embodies a multifaceted interplay of cognitive, emotional, and socio-cultural factors (Bubeck et al., 2017). Elements of risk perception encompass prior personal experiences with flooding, confidence in authorities, availabilities, availability of information, social networks, cultural values, and economic status (Paton & Johnston, 2017). For example, a community that has consistently experienced severe flooding may exhibit a higher risk perception, which could, paradoxically, lead to either improved preparedness or a sense of fatalism and apathy (Grothmann & Reusswig, 2006). On the other hand, the lack of direct experience and a diminished perceived probability of future occurrences may lead to a miscalculation of risk and inadequate preparedness (Bubeck et al., 2012). Understanding these intricacies in Dibrugarh City is crucial, as a disparity between risk identified by experts and those recognised by the community can severely undermine the efficacy of early warning systems, evacuation strategies, and long-term mitigation efforts (Lindell, 2013)

The imperative of Preparedness activities

Preparedness practices encompass the measures individuals and communities undertake before a disaster to mitigate its effects and improve their ability to handle, respond to, and recover from such events (UNDRR, 2015). These practices can include actions at the household level, such as elevating important items, assembling emergency kits, and creating family evacuation strategies, as well as community-level efforts like engaging in mock drills, setting up local early warning systems, and maintaining drainage infrastructure (Kapucu et al, 2013). The effectiveness of these preparedness practices is closely tied to risk perception; individuals are more inclined to dedicate time and resources to preparedness if they view the threat as significant, severe, and personally relevant. Nonetheless, preparedness is also limited by practical factors such as financial constraints, availability of information, social support systems, and the perceived efficacy of existing measures (Paton, 2008). In a highly susceptible urban setting like Dibrugarh, evaluating the degree and nature of the current preparedness practices is essential. Are residents implementing both structural and non-structural strategies? Do they have access to trustworthy information? What obstacles are hindering the broader adoption of preparedness initiatives? Addressing these questions can guide the development of more effective, culturally relevant, and resource-sensitive disaster risk reduction strategies.

Although considerable research has been carried out on global flood risk perception and preparedness, as well as in various parts of India (for instance, the Kerala floods analysed by there is a lack of specific, empirical, and comprehensive studies addressing the flood-prone urban communities in Dibrugarh City, Assam. Most existing literature tends to concentrate on

broader hydrological issues within the Brahmaputra basin or the vulnerability of rural areas to flooding in Assam (Sarma et al., 2018). Research investigating the rural population's specific perceptions and diverse preparedness practices within this distinctive geographical and socio-cultural context is currently limited. Therefore, conducting a focused study in Dibrugarh City will yield important localised insights that cannot be inferred from wider regional studies or those conducted in significantly different urban environments.

Study Area- Dibrugarh City

Dibrugarh is located in the eastern region of Assam, covering an area of 3,381 square kilometres. It is bordered by Dhemaji District to the north (across the Brahmaputra River), Tinsukia District to the east, Arunachal Pradesh to the south, and Sivasagar District to the west. The district hosts significant rivers, including the Brahmaputra River and its tributaries—Burhi Dihing, Dsang, Sessa, and Tengakhat. The district's economy is primarily agriculture-based, prominently featuring tea cultivation, which leads to Dibrugarh being known as the 'Tea City of India.' Other significant sectors contributing to employment in the district include petroleum, coal, education, and health services. The location of Dibrugarh is favourable to trade and commerce, but the City is highly vulnerable to severe flooding (District Disaster Management Plan, Dibrugarh, 2022).

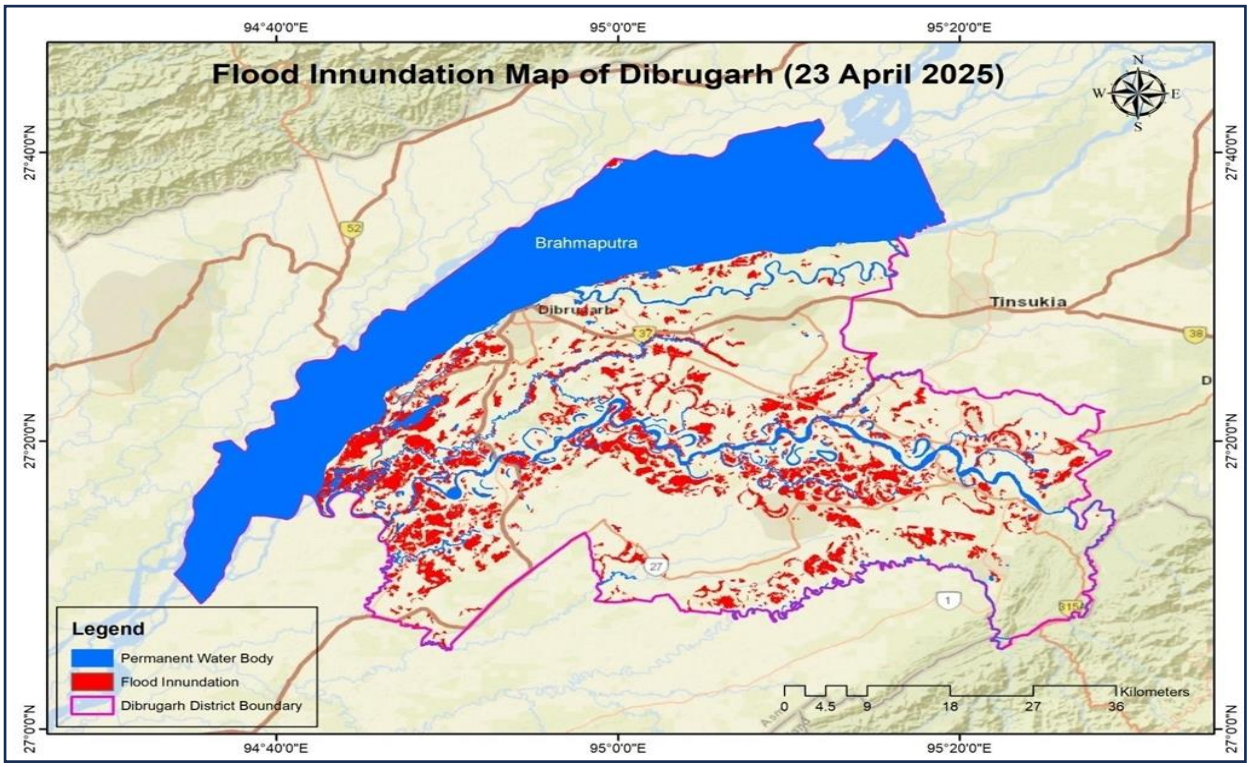

Figure 2: Flood inundation Map of Dibrugarh District as of April 23, 2025
Source: Assam State Disaster Management Authority. (n.d)

Moreover, Dibrugarh falls into the high-risk zone in India, i.e., seismic zone V, and the region is a part of the Eastern Himalayan seismic belt, highly prone to earthquakes. Among the many

events, the 1950 Assam-Tibet Earthquake is a notable event with an 8.6 magnitude, which caused massive destruction and altered river courses. Besides these, river erosion, storms, lightning, and industrial hazards are common to the study area. Its proximity to the river, combined with its low-lying landscape and insufficient drainage systems, results in a heightened risk for both river flooding (from the overflowing banks of the Brahmaputra) and urban flash floods (caused by intense rainfall and inadequate drainage) (Mahanta & Das, 2017). Local municipal documents and yearly flood assessment reports indicate that nearly every monsoon season, certain areas of Dibrugarh City face flooding, which leads to temporary displacement, damage to properties and businesses, and interruptions to essential services (ASDMA, 2023). The issues confronting Dibrugarh are complex: navigating the natural behaviours of a substantial river, dealing with rapid urbanisation, and safeguarding the health and safety of its growing population in the face of ongoing flood risks. Therefore, it is crucial to comprehend how the community in Dibrugarh City engages with and reacts to this persistent hazard.

Methodology

This study employed a mixed-method research design to assess how residents in flood-prone areas of Dibrugarh City perceive flood risk with their preparedness practices. The survey was conducted in four at-risk communities of the Dibrugarh urban area, including Panchali, Police Reserve, Naliapul, Grahambazar, and Paltan Bazar, selected through stratified random sampling. Fifty households from each area were selected purposively, and 200 respondents were selected. Quantitative data were collected through structured household surveys on demographic backgrounds, flood awareness, flood risk perception and flood preparedness measures. To gain a deeper understanding of community experience, qualitative data was collected through in-depth interviews with the key informants, like NGO representatives and the Municipal Corporation members, as well as focus group discussions with women, youth and elderly populations. Quantitative data was analysed in Microsoft Excel to generate descriptive statistics. In contrast, qualitative data was analysed thematically to understand risk knowledge, source of information about flood, preparedness measures, preparedness barriers, and the role of local institutions.

Results

Demographic characteristics: Figure 1 shows demographic characteristics of the study sample**.** Statistics regarding gender indicate that the male population constitutes the majority of the sample (58.5%), which may impact the community perception and participation in flood preparedness activities, particularly in a male-dominated decision-making process. Most of the respondents (42.5%) fall within the age of 31 to 45 years, indicating an economically active and more informed group, and only 10.5% are above 60 years, likely presenting a vulnerable elderly population who might encounter greater difficulties during a flooding event. The combined percentage of self-employed and service as an occupation stands at 43.5%, reflecting a diverse income community with varying capacities to prepare or respond to flood risks. 58%

of respondents possess secondary and higher education, depicting an educated population that could effectively comprehend flood alerts and participate in preparedness initiatives. Nevertheless, 15.5% of those lacking formal education might need specific awareness strategies employing non-verbal communication methods (such as visual media and local dialect).

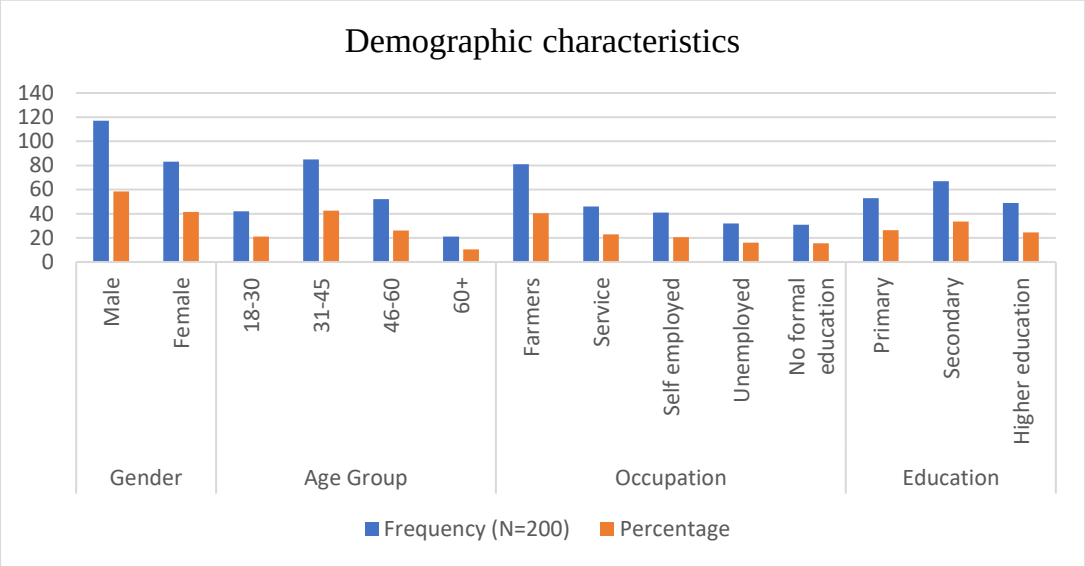

Figure 1: Demographic characteristics

Risk perception: The data on risk perception shows a high level of awareness among the community members about the threat of flooding (Fig. 2). 77% of those surveyed think that floods pose a risk to the community, and 63% agreed that they anticipate floods yearly. They are equally aware that their residences are in flood-prone areas (58%), reflecting their vulnerability. However, data reflect that awareness does not lead to sufficient preparedness. Only 28% of the respondents showed confidence in their knowledge of how to act during a flood, while 42% admit that they lack this knowledge, and 30% remain uncertain. This illustrates a notable gap between risk awareness and on-ground preparedness. Further, the respondents' overall perception of institutional support is unfavourable. Only 32% believe that the government offers sufficient information regarding flood risks, while merely 28% acknowledge flood alerts to be both timely and reliable. This reflects the respondent's lack of confidence in the existing risk communication and early warning systems. Nonetheless, a majority (53%) disagree with the notion that authorities or media inflate flood risks, indicating that the threat is seriously taken and official warnings are not perceived as exaggerated. The data highlights the need for more comprehensive community-based preparedness initiatives, better risk communication strategies, and increased trust in institutional responses to effectively enhance community resilience.

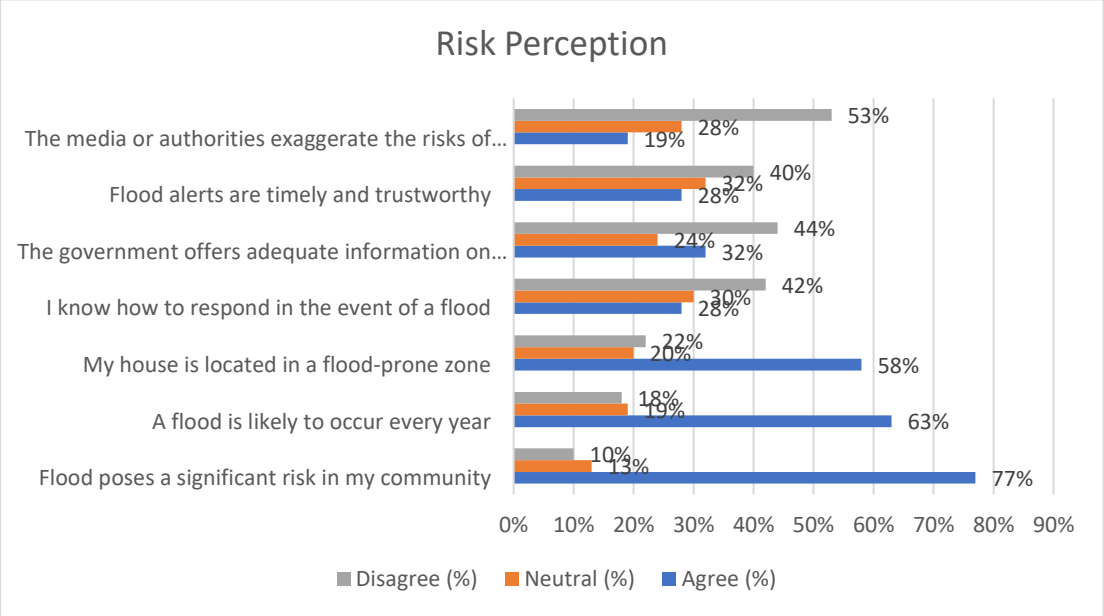

Figure 2: Risk Perception

Preparedness Practices: Fig. 3 shows data regarding preparedness practices of the community presents a difference between individual-level preparedness and more structured or long-term community preparedness plans. A large portion of those surveyed indicated that they keep stored water and food supplies (69%) and emergency kits (62.5%), which reflects that the community is taking the practical and immediate measures to protect themselves from flooding incidents. However, comprehensive and strategic preparedness initiatives are significantly low. Only 12.5% of the respondents have a family emergency plan, and a tiny portion (5.5%) are aware of community-level emergency plans, indicating a lack of coordinated efforts at the household and community levels, essential for efficient disaster response and risk mitigation. Further, it has been reflected in the data that merely 3.2% of the respondents were part of some training or drills, highlighting a gap in capacity development and practical preparedness.

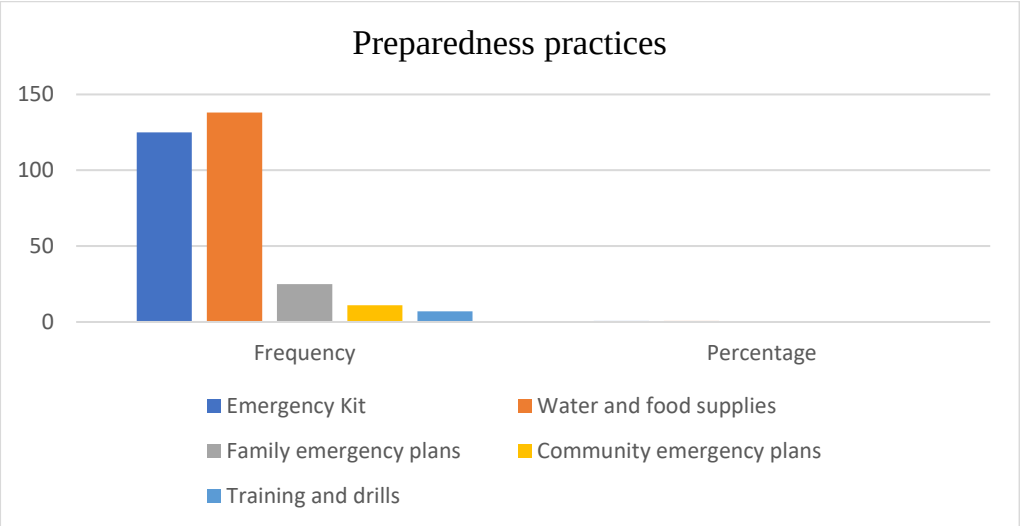

Figure 3: Preparedness practices

Results of qualitative data

The study also provided a detailed overview of qualitative insights from key informant interviews (KIIs) and Focus Group discussions (FGDs). The KIIs were conducted with the word commissioner and NGO representatives working in this field. Further, three FGDs were conducted with youth, women, and the elderly population of the area. The themes illustrate the key informants ' viewpoints on flood risk awareness, information sources, preparedness measures, preparedness barriers, and the role of local institutions.

Theme	**Respondents**	**Tool**	**Key Response (KIIs/FGD)**
Flood risk awareness	NGO representative	Interview with key informant (KIIs)	"Many households recognise the risk of flooding but lack the technical understanding of safe procedures."
	Youth & women	Focus Group Discussion (FGD)	“We know that floods occur annually, yet we do not receive timely updates.”
Information Source	Ward Commissioner	Interview with key informant (KIIs)	“We utilise WhatsApp groups for initial alerts, but many older populations are left out.”
	Elderly	Focus Group Discussion (FGD)	“Radio and local television remain our primary sources; mobile alerts are rare in this area.”
Preparedness measures	Ward Commissioner	Interview with key informant (KIIs)	“Community members depend on each other more than government support.”
	Youth & women	Focus Group Discussion (FGD)	"Food and medicine are stored in advance, but there is no safe shelter in the community."
Preparedness Barriers	NGO Representative	Interview with key informant (KIIs)	“Limited knowledge and reliance on rumours impede appropriate action.”
	Women, the elderly, and youth	Focus Group Discussion (FGD)	“Financial constraint and lack of guidance are the primary reasons we fail to take action promptly.”
Local Institution’s Role	Ward Commissioner	Interview with key informant (KIIs)	“We have limited resources, thereby unable to conduct awareness programmes regularly.”
	Youth Group	Focus Group Discussion (FGD)	“We rarely witness mock drills or safety training in our area.”

The insights gathered from Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) indicate that the community recognises that floods happen frequently, but their knowledge of safety procedures is insufficient. There is a digital gap in how flood alerts are received; the younger population relies on WhatsApp, while older adults turn to traditional media sources. While communities demonstrate informal preparedness measures, such as stockpiling food and medicine, they lack essential infrastructure like shelters and formal response plans. KIIs and FGDs highlighted limited awareness, misinformation, and financial obstacles as significant challenges.

Discussion

This research indicates a significant gap between the perception of high flood risk and the level of preparedness in Dibrugarh City. This area faces yearly inundation from the Brahmaputra River and its tributaries. 77% of participants acknowledged floods as a significant risk, and 63% anticipate floods yearly, and 42% lack preparedness knowledge both at the individual and community scales. These statistics indicate that mere awareness does not lead to practical preparedness actions. Further, only 32% expressed receiving sufficient information about floods from the government, while 28% acknowledged flood alerts as timely and reliable. This reflects the respondent's lack of confidence in the existing risk communication and early warning systems. Nonetheless, a majority (53%) disagree with the notion that authorities or media inflate flood risks, indicating that the threat is seriously taken and official warnings are not perceived as exaggerated. The data highlights the need for more comprehensive community-based preparedness initiatives, better risk communication strategies, and increased trust in institutional responses to effectively enhance community resilience. A concerning trend is the low level of participation in community-oriented disaster training or mock drills, even though research shows that such involvement greatly enhances preparedness (IFRC, 2020). The limited engagement of the community raises questions about the effectiveness and inclusivity of current disaster management programmes. Occupational and educational elements also influence reactions. For instance, a significant portion of the sample comprises farmers (40.5%), who frequently do not have the time, resources, or motivation to participate in formal preparedness planning; only 24.6% of them have attained higher education, which is generally linked to a better understanding of systemic risks and available resources. The discussion underscores the necessity for focused outreach and capacity-building initiatives. Therefore, the study made specific recommendations, presented below-

Conclusion

The study reflected that the community has awareness, but it has not turned into preparedness effectively due to inadequate communication and insufficient formal training. The urban community has a strong initiative, but institutional support is lacking. These barriers lead to educational disparities, poverty, and insufficient institutional outreach. Addressing these issues calls for target-based awareness campaigns and financial support. Institutional efforts are limited, leading to minimal community training and involvement. Therefore, the study suggests comprehensive, community-based preparedness initiatives, diversified risk communication

strategies, inclusive training and mock drills to reach all age groups effectively with robust institutional engagement to interpret high-risk awareness into actionable preparedness that can enhance the resilience of communities against floods in Dibrugarh City.

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