

Understanding Flood-Risk Knowledge and Flood-Risk Education from the Perceptives of Flood-Affected People in Dhemaji District, Assam

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Abstract

This study focused on understanding the flood-risk knowledge and perception of risk-education from the flood-affected people of Dhemaji district, Assam. The study uses descriptive statistics to examine a flood-prone area of Dhemaji. One hundred flood-affected people participated in this study. The results show that respondents possess basic awareness of flood causes and safety measures, but there are gaps in their knowledge of evacuation routes and safe shelters. All participants strongly supported the inclusion of flood-risk education in school curricula, emphasizing the need for structured learning to improve preparedness and safety behaviour.

Keywords: *Flood, Flood-risk knowledge, Flood-risk education, Perception, School curricula, Dhemaji district*

Introduction

Flood Risk and Flood-Risk Knowledge

Assam is one of the most flood-affected states in India. In Assam, floods create severe and recurring challenges every year during the monsoon season. This is mainly because the state is traversed by the Brahmaputra and Barak rivers, along with more than fifty of their tributaries (Water Resources, Government of Assam, India, 2025). According to the report by the Assam State Disaster Management Authority, nine districts are identified as the most flood-affected districts of Assam. Of these nine districts, Dhemaji is affected by floods every year (Bora, 2025). Flood risk is the outcome when a flood hazard meets the vulnerability of people or places (Cançado

et al., 2008). Reducing flood risks requires a clear understanding of the factors driving floods. A careful examination of evolving flood risk policies and recognition of different types of flood-risk knowledge can guide policy decisions. The recognition of the specific conditions of each context has been highlighted as essential for developing more effective flood risk policies (Arinabo, 2023).

The impact of climate change on flood risks is expected to increase in rivers and floodplains. The direct impacts of flooding include both loss of life and economic damage, which are likely to rise due to population growth in flood-prone areas (Bosschaart, van der Schee,

& Kuiper, 2016). From a statistical point of view, natural hazards include both the harmful event and the chance that it can occur. However, people perceive risks in different ways. This is known as risk perception. It depends on personal factors such as whether the risk is taken by choice and how much control a person feels they have over its outcomes (Tyszka, 2017). Researchers and policymakers are very interested in understanding the key factors that shape how people view risks. One widely used approach in this field is the psychometric model, created by Slovic and his colleagues (Michailova & Macko, 2017; Paul, 2016). In this model, five dimensions are considered crucial. Among these dimensions, knowledge of risks is particularly important because it influences how individuals understand flood hazards, evaluate safety measures, and respond to disaster situations. Therefore, this study focuses on flood-risk knowledge as one of the key dimensions influencing preparedness and awareness. Of these dimensions, this paper focuses on knowledge of risk, referred to here as flood-risk knowledge (Michailova & Macko, 2017).

A truly representative process in flood risk management can include people who reflect the whole community at risk. This helps to collect different types of flood-related knowledge, which can then be reviewed and used to guide better decisions. The people who live and interact with their environment every day often have strong local knowledge about how floods behave. For example, they may know the early paths of floodwater, spots where debris builds up and causes blockages, or where the most vulnerable residents live. This information

adds important detail to expert-designed strategies and offers a better understanding of how people make decisions during a flood (Maskrey et al., 2018). In Pickering, North Yorkshire, a new method is used to involve local people in creating flood-risk knowledge jointly. These efforts combine community experience with expert insights, helping to develop a shared or hybrid understanding of flood risk (Lane et al., 2010; Landström et al., 2011; Haughton et al., 2015; Maskrey et al., 2018).

Flood-Risk Education and Preparedness

Flood-risk education is another important dimension of this paper, particularly for schools, which have several compelling reasons to participate in this process. One key reason is that formal education can give proper time and attention to important topics such as flood risk (Bosschaart, van der Schee, Kuiper, et al., 2016). Many different groups are involved in flood-risk education and communication. Some groups lead the process by sharing information. Others receive this knowledge, including the people who are directly impacted by floods. Certain stakeholders have an official duty to manage risks or reduce flood damage. Others may not have formal responsibilities but still take part because it relates to their organisational goals. Some groups act as communication intermediaries. The overall number of participants is large, especially when considering national, regional, and local levels (Konieczny et al., 2017).

The flood risk education programme can change people's beliefs and improve their preparedness. To develop this program, it is important to understand how they think about floods. This process

generally happens in three steps: first, increasing knowledge and understanding of flood risks; second, raising awareness and strengthening personal risk perception; and finally, motivating people to take preparedness actions (Bosschaart, van der Schee, & Kuiper, 2016). In a flood risk education programme, students are given realistic information about local flood conditions that can create a moderate level of concern. This encourages them to think carefully about the risk without becoming anxious. Activities such as serious games, simulations, field visits, and discussions allow students to explore different aspects of flood risk in their own environment. Through these experiences, they start to connect places around them with flood-related knowledge and emotions. By highlighting both the danger of floods and the actions that can be taken to stay safe, the program provides a balanced understanding of flood risk. Previous studies suggest that flood-risk education programmes can improve awareness, influence risk perception, and strengthen preparedness intentions among individuals and communities. Structured educational interventions may therefore play an important role in enhancing long-term disaster preparedness in flood-prone regions.

Conceptual Relationship Between Flood-Risk Knowledge and Flood-Risk Education

Although flood-risk knowledge and flood-risk education are discussed as separate dimensions in the literature, both concepts are closely interconnected in disaster preparedness. Flood-risk knowledge refers to people's understanding of flood causes, hazards,

evacuation processes, and safety measures, while flood-risk education focuses on structured processes through which such understanding, awareness, and preparedness behaviours are developed. Therefore, flood-risk education can contribute to the development of flood-risk knowledge by increasing people's understanding of local flood conditions and appropriate response strategies. At the same time, individuals with prior flood-risk knowledge may also engage more actively with educational and preparedness activities. In this study, these two dimensions are examined together to understand how flood-affected people in Dhemaji district perceive flood risks and the role of education in improving preparedness and resilience.

Study Context and Research Gap

Existing studies on flood-risk knowledge and flood-risk education have mainly focused on disaster preparedness programs, risk perception, and educational interventions in different international contexts. While several studies have examined school-based disaster education and community awareness initiatives, limited research has explored both flood-risk knowledge and perceptions of flood-risk education together from the perspective of flood-affected communities in Assam. In particular, there is limited empirical evidence from highly flood-prone districts such as Dhemaji, where recurring floods continue to affect livelihoods, education, and community resilience.

Therefore, this paper aims to understand the flood-risk knowledge and the perceptions of flood-risk education among flood-affected people in Dhemaji district, Assam. The state of Assam in

India receives very heavy rainfall. The Brahmaputra River that flows through the state causes floods almost every year. These floods seriously affect the region's economy. The floods in Assam occur due to both natural conditions and human activities. The state has experienced major flood damage in several years, including 1954, 1962, 1966, 1972, 1977, 1984, 1986, 1988, 1998, 2000, 2002, 2004, 2007, and in more recent times as well. These floods severely affect the region's agriculture and economy (Chaliha et al., 2012).

The Dhemaji district of Assam is highly flood-affected, posing a major concern for livelihoods and young people. It is one of the districts in India that faces frequent and severe flooding. It is ranked 60th in national development indicators. The district has a significant tribal population of about 47.29%, and around 92.16% of the people live in rural areas. Nearly 70% of the district is affected by floods. Floods have caused major damage to agriculture in this region, along with riverbank erosion and sand deposition (Kakoty et al., 2018).

Dhemaji district lies in eastern Assam and includes four revenue circles: Dhemaji, Sissiborgaon, Jonai, and Gogamukh (District Disaster Management Plan Dhemaji District, 2024). For this study, the focus is on the Dhemaji revenue circle, which is one of the most flood-affected lowland areas and covers about 467.32 km². The study area extends from 94°25'E to 94°37'E longitude and 27°16'N to 27°37'N latitude. It is bordered by Arunachal Pradesh to the north, Gogamukh revenue circle to the west, the Brahmaputra River and Dhakuakhana to the south, and Sissiborgaon revenue circle to the east. The region is intersected by many tributaries

and sub-tributaries of the Brahmaputra, such as the Silly, Simen, Jiadhal, Gainadi, Moridhal, and Subansiri rivers. Among them, the Jiadhal River is the main cause of recurring floods in the area. The region receives heavy annual rainfall ranging from 2600 mm to 3200 mm, and temperatures vary from about 39.9°C in summer to 5.9°C in winter.

Research Methodology

This study adopted a quantitative descriptive design to evaluate two dimensions: flood-risk knowledge and perception of flood-risk education among the flood-affected people of Dhemaji district. The target population consisted of individuals who had experienced flood events in previous years and met the inclusion criterion of previous flood exposure. Dhemaji district was selected as the study area for this paper because it is one of the most flood-prone districts of Assam (Bora, 2025), especially in Upper Assam. The district experienced approximately ten flood events between 2011 and 2020 (DRR Roadmap, 2022).

A multistage sampling approach was adopted. In the first stage, purposive sampling was used to identify flood-affected areas and eligible respondents based on the inclusion criterion of previous flood exposure. Information regarding flood-affected areas and eligible respondents was obtained through consultation with local field officers and local administrative records. In the second stage, simple random selection was applied among eligible individuals to reduce selection bias and improve representation.

The questionnaire was developed based on the dimensions of flood-risk

knowledge and perception of flood-risk education identified through a literature review. The questionnaire consisted of items measuring respondents' knowledge of flood risks and their perceptions of flood-risk education, and items were adapted and refined from concepts identified in previous studies. Items were designed to evaluate respondents' understanding of flood-related issues and their perceptions regarding educational approaches to flood preparedness using Likert-scale items. A pilot survey was conducted before the final data collection and necessary revisions were made based on participant feedback. To improve content validity, questionnaire items were refined following the pilot survey and reviewed for relevance and clarity. Data were collected through face-

to-face interviews. Internal consistency was assessed using Cronbach's alpha.

Participation was voluntary. Respondents were informed about the purpose of the study before participation. Informed consent was obtained, anonymity and confidentiality of responses were maintained, and participants were informed that they could withdraw at any stage. After questionnaire refinement, a total of 125 questionnaires were administered for data collection. Of the 125 questionnaires, 100 respondents provided consent and participated in the study. The survey was conducted between September 16, 2025, and September 26, 2025. The collected data were analysed using descriptive statistics to explore flood-risk knowledge and perception of flood-risk education.

Demographic profile		Frequency	Percentage
Gender	Male	43	43
	Female	57	57
Age	21-40	35	35
	41-60	59	59
	>60	6	6
Occupation	Cultivation	68	68
	Business	21	21
	Government Sector	5	5
	Others	6	6
Education level	<Matriculation	41	41
	Matriculation	27	27
	High school	20	20
	Bachelor degree	11	11
	> Bachelor's degree	1	1

Flood-Risk Knowledge

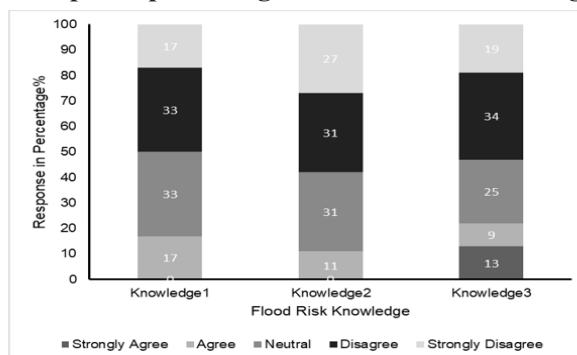
Knowledge affects an individual's flood-risk perception and their understanding and perspective on particular hazards (Botzen et al., 2009; Kellens et al., 2012; Liu et al., 2022). Huang et al. (2020) reported in a case study that flood risk knowledge was strongly associated with flood risk perception. To evaluate flood-risk knowledge, respondents were asked their level of agreement with the indicators presented in Table 1 using a five-point Likert scale (1 = Strongly agree to 5 = Strongly disagree). Mean scores were interpreted as follows: lower values indicate stronger agreement, while higher values indicate increasing disagreement.

Figure 1 illustrates respondents' distribution across the flood-risk knowledge indicators. The indicator 'I know the main cause of floods in my area'(knowledge1) received the highest number of responses with 17 respondents agreeing (17%), but responses were concentrated in the neutral (33%) and disagree (33%) categories. This shows that respondents demonstrated moderate confidence rather than strong

certainty regarding their understanding of local flood causes. Similarly, the indicator: 'I know the location nearby in our house where to go during floods'(Knowledge 3) receives the second highest response with 13 respondents strongly agreeing (13%) and 9 respondents agreeing (9%). However, responses remained distributed across the remaining categories, indicating variation in preparedness-related knowledge among respondents.

Overall flood-risk knowledge had a mean of 3.54, a standard deviation of 1.04 and a Cronbach's alpha of 0.76. Since higher mean values represent increasing disagreement, this result indicates an overall tendency toward neutral to disagreement rather than strong agreement. This suggests that repeated exposure to flood events alone does not necessarily lead to stronger perceived flood-risk knowledge and highlights the importance of structured flood-risk education and awareness initiatives. The internal consistency of the construct was acceptable (Cronbach's alpha = 0.76), indicating satisfactory reliability.

Figure 1
Response percentage for flood-risk knowledge



Compilation: author

Table 1
Descriptive statistics for flood-risk knowledge

Indicators	N	Mean	SD	Min	Max
Flood risk knowledge scale(Cronbach's alpha =0.76)	100	3.54	1.04	1	5
I know the main cause of floods in my area (knowledge1)	100	3.52	0.95	1	5
I am aware of which safety measures need to be followed during a flood (knowledge2)	100	3.73	0.92	1	5
I know the location nearby in our house where to go during floods (knowledge3)	100	3.37	1.26	1	5

Notes: The response was categorised by a Likert scale ranging from 1 = Strongly agree to 5 = Strongly disagree.

Perception of Flood-Risk Education

Flood-risk education is strongly related to flood risk perception (Huang et al., 2020; Liu et al., 2022). Therefore, teaching children about disasters from an early age seems to be an important step to help them prepare better and adapt to such situations as they grow, leading to stronger and safer communities over time (McLeod, 2007; Azmi et al., 2021). Bosschaart et al. (2016) further explained that school education plays an important role in increasing awareness of hazard-related risks, and it indirectly influences family and community awareness.

To evaluate the perception of flood-risk education, respondents were asked to indicate their level of agreement with the indicators presented in Table 2 using a five-point Likert scale (1 = Strongly agree to 5 = Strongly disagree). Figure 2 illustrates the distribution of respondents across perceptions of flood-risk education indicators. The indicator 'I feel that including flood-risk topics and flood-

related education in the school curriculum is important for our children' (Perception 3) received the highest responses with 50 respondents strongly agreeing (50%) and 50 respondents agreeing (50%) agreeing with it. This suggests unanimous support among respondents for integrating flood-risk education into school curricula and highlights the perceived importance of formal education in strengthening preparedness and awareness.

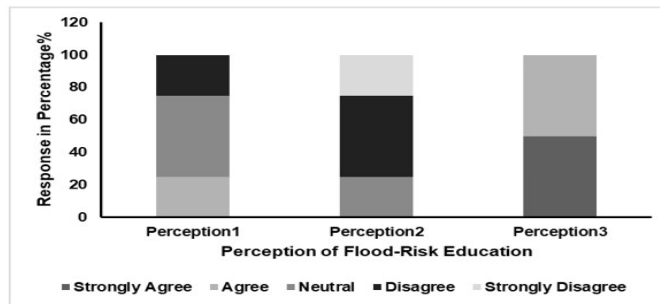
The indicator: 'I think that the people of our village get enough education about flood risk' (Perception1) showed more varied responses across categories, suggesting that respondents do not uniformly perceive current flood-risk education efforts as sufficient. This may indicate gaps in awareness initiatives and opportunities to strengthen local flood education programmes.

The overall perception of flood-risk education score had a mean of 2.84 and a standard deviation of 0.64. Since lower mean values indicate stronger agreement,

this result suggests an overall tendency toward moderate agreement regarding the importance and effectiveness of flood-risk education. This indicates that respondents generally recognise flood-risk education as valuable for preparedness and awareness,

although perceptions regarding existing educational efforts remain varied. The internal consistency of the construct was high (Cronbach's alpha = 0.92), indicating excellent reliability.

Figure 2
Response percentage for perception of flood-risk education



Compilation: author

Table 2
Descriptive statistics for perception of flood-risk education

Indicators	N	Mean	SD	Min	Max
Perception of flood risk education scale (Cronbach's alpha =0.92)	100	2.84	0.64	1	5
I think that the people of our village get enough education about flood risk (perception1)	100	3	0.71	1	5
School programs in our area are effective in teaching children how to respond during floods(perception2)	100	4	0.71	1	5
I feel that including flood-risk topics and flood-related education in the school curriculum is important for our children (perception3)	100	1.50	0.50	1	5

Notes: The response was categorised on a Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree).

The findings of this study indicate differences in respondents perceived flood-risk knowledge and their perceptions of the importance of flood-risk education for preparedness. Respondents reported moderate levels of flood-risk knowledge (Mean = 3.54), suggesting an overall tendency toward neutral to disagreement. This finding supports previous research indicating that repeated exposure to flooding does not necessarily translate into stronger perceived knowledge or understanding of flood risks. In contrast, respondents showed comparatively stronger support for flood-risk education (Mean = 2.84). In particular, all respondents either agreed or strongly agreed that flood-related topics should be included in school curricula. This finding suggests that respondents recognise education as an important mechanism for strengthening preparedness and increasing awareness even when perceived knowledge remains moderate. At the same time, variation in responses regarding whether villages receive sufficient flood education indicates that existing educational efforts may not be viewed as fully adequate, highlighting opportunities to strengthen community-level flood-risk education initiatives.

Discussion

Our study found that 50% of the respondents strongly agreed and 50% agreed that including flood-risk topics and flood-related education in the school curriculum is important for our children (perception 3). There is a need for structured education on flood disasters, particularly at the school and community levels. Formal education can address issues such as flood

risk more comprehensively. Therefore, school education should be included in this process. Risk education is a key approach to shaping the risk perceptions of people by emphasising various experiences through experiential methods (Bosschaart et al., 2016). Individual perceptions of flood risk can be improved through learning opportunities provided across public, private, and non-profit sectors (S. Hutton & J. Allen, 2021). The Hyogo Framework for Action (2005–2015) highlights the need to employ knowledge, innovation, and education to foster a culture of safety and resilience across all levels of society (UN Office for Disaster Risk Reduction, 2007; Mudavanhu, 2014). Asian Disaster Preparedness Center (ADPC) (2007) states that schools are considered important places for shaping long-lasting shared values and are therefore suitable for promoting disaster prevention and resilience. Floods have also been associated with reduced instructional time, which negatively affects the quality of education (Mudavanhu, 2014).

The unanimous agreement regarding the inclusion of flood-risk education in school curricula is particularly important because it reflects strong public support for institutionalised disaster education. This finding indicates that respondents perceive formal education as an important mechanism for improving long-term preparedness and awareness in flood-prone communities.

The sphere of education is also heavily affected by floods. Students in Assam face difficulties attending school during flood events. After flood events, it becomes difficult for students and families to return to normal life. Floods damage

school infrastructure, students' books and other educational materials. Children's regular education is also affected because of school closures, dropouts and loss of life (Bora, 2025). In this study, the strong support for flood education suggests the need for a flood-education curriculum in schools of Assam. This finding suggests that flood-risk education is viewed not only as an educational activity but also as an important preparedness strategy for reducing vulnerability among children and communities in flood-prone regions.

Bosschaart, van der Schee, and Kuiper (2016), in their study in the Netherlands, highlighted the importance of combining flood-risk education with practical and participatory learning approaches to improve preparedness intentions and realistic perceptions of flood risk. Their findings suggest that structured educational programmes supported by practical activities and reflection exercises can strengthen disaster preparedness. These findings are relevant in the context of Dhemaji, Assam, where structured and context-specific learning approaches may help improve preparedness among students living in flood-prone areas.

Mujalin Intaramuean et al. (2025), in a study in Thailand, found that a structured educational program can significantly improve students' knowledge of floods and their level of preparedness. Integrating local flood knowledge into the basic education core curriculum may be helpful. Education within health and physical education or science can particularly strengthen students' understanding of disaster preparedness. Similar approaches would also be beneficial in Assam, where

recurring floods disrupt livelihoods, education, and community life almost every year. Incorporating flood hazard maps into geography lessons can also be helpful for students to identify flood-prone areas and evacuation routes. The local disaster agencies can help in emergency drills, along with practical activities such as preparing emergency kits. This can further enhance real-world preparedness during floods. The involvement of parents and regional authorities in school-based flood education can support stronger community resilience. Integrating these strategies into the curriculum would help students acquire practical skills and a deeper understanding of flood risks, contributing to long-term disaster preparedness.

School-based flood education demonstrates that systematic and context-specific learning programs can significantly improve students' understanding of flood hazards and preparedness responses. The programs that combine classroom instruction with practical activities like preparedness have been shown to be effective for students. Practical exercises conducted in coordination with disaster management agencies, including the preparation of emergency kits and school drills, can help convert the theoretical knowledge into real-world skills.

The flood-affected people in Dhemaji have a moderate level of knowledge about floods. Most respondents know the causes of floods and understand how to follow the safety measures during a flood. However, some of them are not fully aware of safe places to which they can evacuate. Therefore, the information about safe places needs to be shared

before emergencies. This can be included as information during the awareness campaigns by disaster management authorities. Although Dhemaji experiences recurring floods almost every year, respondents demonstrated only moderate levels of perceived flood-risk knowledge. This may indicate that repeated exposure to flood events alone does not automatically translate into stronger preparedness knowledge. Knowledge development may depend not only on lived experience but also on access to structured awareness programmes, communication systems, and educational initiatives. An important observation from the study is that frequent exposure to floods did not correspond with very high perceived flood-risk knowledge. This contradiction highlights a possible gap between lived experience and structured preparedness learning.

The strong support for school-based flood education indicates that respondents perceive educational institutions as important spaces for strengthening preparedness, awareness, and practical disaster-response skills among children in flood-prone regions. The study results suggest integrating flood-risk education into school curricula so that, in a flood-prone state like Assam, the students from the affected region can learn and understand information about flood hazards, evacuation routes, and safety measures from an early age. This knowledge can help improve the preparedness within families and communities. Institutionalising flood-risk education within school curricula may help create long-term preparedness cultures in flood-prone regions by strengthening

awareness and adaptive capacity from an early age.

There is a need for collaboration between schools and disaster management agencies through drills, training, awareness campaigns and preparedness programmes that translate knowledge into practical skills, which can support long-term community resilience. Overall, the findings suggest that strengthening structured and context-specific flood-risk education may help bridge the gap between repeated flood exposure and meaningful preparedness knowledge in flood-prone districts such as Dhemaji. These findings highlight the importance of moving beyond short-term awareness campaigns toward continuous, structured, and context-specific flood-risk education in highly flood-prone regions such as Dhemaji district.

Conclusion

This paper has focuses on flood-risk knowledge and flood-risk education in Dhemaji district, Assam. Assam faces recurring flood events during the monsoon season including Dhemaji district, and this makes it very difficult for students and other affected people to carry on with their daily lives. Children have the right to receive education on time, but because of the flood, schooling is disrupted for long periods. When education is suspended again and again, it affects children's academic progress and future opportunities (Bora, 2025).

The findings of this study show that while many people have basic knowledge about flood causes and safety measures, they are still not fully aware of

proper evacuation options and safe places in their local areas. At the same time, every respondent strongly believes that flood education should be included in the school curriculum. These findings suggest that repeated exposure to flood events alone does not necessarily lead to stronger preparedness knowledge and that structured educational interventions are needed to improve awareness and preparedness in flood-prone communities. This highlights the need for a proper and structured education system that teaches children how to understand flood risks and follow safety practices during floods. Schools are important places for learning. They can also become shelters during emergencies. Therefore, they must be supported with proper planning and resources. If children learn about warning systems, evacuation routes, and emergency actions at school, they can help protect themselves and support their community during floods.

Assam experiences floods almost every year. In Assam, Dhemaji faces repeated floods every year. It is one of the most flood-affected districts of Upper Assam. In the post-flood period, students may face difficulty attending school (Goswami, 2018). The infrastructure damage, loss of learning materials, and displacement of families often interrupt academic activities for long periods. As a result, children face learning gaps that can affect their regular progress and overall educational development. Schools should ensure continuous education and emotional support after floods (MFON, 2024) because maintaining educational continuity during disasters is essential for protecting children's right to education and supporting

long-term community resilience.

Disaster management agencies and schools should work together to conduct drills, practical training, and awareness activities that increase real-life preparedness. Therefore, this study suggests that improving flood-risk education in schools can support better preparedness and protect children's right to continuous learning. Improving knowledge, practical skills, and safety planning can help build stronger resilience in the flood-affected regions of Assam. The experts reviewed the work at different stages while creating the teaching and learning materials for the flood risk education programme. They assessed whether the content was consistent, practical, and likely to be effective. During this process, key design principles such as emotional engagement, accessibility, and blended learning were strengthened and further developed (Bosschaart, van der Schee, & Kuiper, 2016). Continued efforts from the government, schools, and local authorities are needed to ensure that children remain safe and their education is not compromised by recurring floods. This understanding emphasises the need to strengthen both awareness and educational strategies in flood-prone districts like Dhemaji. Productive, accessible and continuous flood-risk education can empower residents to better protect their lives and livelihoods in future disasters.

This study contributes to the growing discussion on flood-risk knowledge and flood-risk education by examining both dimensions together from the perspective of flood-affected people in Assam. However, the study is limited to descriptive statistical analysis and a

relatively small sample size within one district. Future research may expand the study to other flood-prone districts of Assam and apply inferential statistical approaches to examine relationships between flood-risk knowledge, flood-risk education, preparedness behaviour, and community resilience. Further research may also explore the effectiveness of school-based flood education programmes and community-level awareness initiatives in improving long-term disaster preparedness.

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