



## Profile of the Visitors' Knowledge Related to Disasters at Kuta Mandalika Beach, Central Lombok Regency

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### ABSTRACT

*Kuta Mandalika Beach in West Nusa Tenggara Province, as one of the tourist destinations vulnerable to disasters, requires a good level of disaster preparedness among its visitors. This study aims to determine the disaster knowledge of visitors to Kuta Mandalika Beach. The data collection technique was conducted through a survey using an instrument in the form of a questionnaire. The population of this study is an infinite population. The sampling technique was carried out by convenience with a total of 487 respondents. Respondents in this study were aged between 17 and 55 years who had visited Kuta Mandalika Beach in the last five years. The research instrument was a questionnaire consisting of 46 questions based on a Guttman dichotomous scale, which measured general knowledge about disasters, recognition of disaster signs, and appropriate emergency response actions. The results showed that most visitors had a high level of disaster knowledge, especially regarding types of disasters and identification of natural warning signs. Nonetheless, some respondents showed moderate to low awareness, especially in determining appropriate actions in the event of a disaster. The study also revealed that education level and age were found to correlate with visitors' disaster knowledge.*

### ABSTRAK

Pantai Kuta Mandalika di Provinsi Nusa Tenggara Barat, sebagai salah satu destinasi wisata yang rentan terhadap bencana, memerlukan tingkat kesiapsiagaan bencana yang baik di kalangan pengunjungnya. Penelitian ini bertujuan untuk mengetahui pengetahuan kebencanaan para pengunjung Pantai Kuta Mandalika. Teknik pengumpulan data dilakukan melalui survei dengan menggunakan instrumen berupa angket. Populasi penelitian ini adalah populasi infinite. Teknik penentuan sampel dilakukan secara convenience dengan total responden sebanyak 487. Responden dalam penelitian ini berusia antara 17 hingga 55 tahun yang pernah berkunjung ke Pantai Kuta Mandalika dalam lima tahun terakhir. Instrumen penelitian berupa angket yang terdiri dari 46 pertanyaan berdasarkan skala dikotomi Guttman, yang mengukur pengetahuan umum tentang bencana, pengenalan tanda-tanda bencana, dan tindakan tanggap darurat yang tepat. Hasil penelitian menunjukkan bahwa sebagian besar pengunjung memiliki tingkat pengetahuan bencana yang tinggi, terutama mengenai jenis-jenis bencana dan identifikasi tanda-tanda peringatan alam. Meskipun demikian, sebagian responden menunjukkan kesadaran yang sedang hingga rendah, terutama dalam menentukan tindakan yang tepat saat terjadi bencana. Temuan ini juga mengungkapkan bahwa tingkat pendidikan dan usia ternyata berkorelasi dengan pengetahuan kebencanaan pengunjung.

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## INTRODUCTION

Tourism industry is vulnerable to crisis and disaster (Akbar et al., 2020; Danzi et al., 2024; Dyahati, 2020; Liu et al., 2024; Nair & Dileep, 2020). The occurrence of a disaster can give a significant impact on tourism. Although the detrimental impacts of natural disasters on the tourism industry are well recognized, there is a small amount of research focused on destinations disaster management from a more holistic perspective (Chan et al., 2021). Meanwhile, tourist destinations located in disaster-prone areas face increased vulnerability in the event of natural disasters (Rindrasih et al., 2024). The disaster management principles should be integrated into the destination management plans to enhance resilience of tourist destinations to natural disasters (Filimonau & De Coteau, 2020).

Kuta Mandalika Beach in Lombok Island is one of the developed tourist destinations in West Nusa Tenggara which located in disaster-prone areas. Since the construction of the MotoGP circuit, the Mandalika Special Economic Zone (SEZ) has become increasingly well-known on a global scale, leading to a notable increase in tourist visits from both domestic and international sources. While being a prospect of national destination gate (Islamy, 2019) and included in the Mandalika Special Economic Zone (SEZ), Kuta Mandalika Beach is a coastal area located in close proximity to the subduction zone in the Indian Ocean. This region is renowned for its susceptibility to seismic activity and the subsequent generation of tsunamis (Pradjoko et al., 2021). In 1977, an earthquake and tsunami struck West Nusa Tenggara including Kuta Mandalika Beach (Pradjoko et al., 2021).

As indicated in the Indonesian Disaster Risk Index (IRBI) publication, which is released annually by the BNPB, Central Lombok Regency is associated with a considerable tsunami threat, ranking 101st among the cities and districts with the highest tsunami risk (BNPB, 2022). Furthermore, Lombok Island is prone to seismic activity,

that can also contribute to the occurrence of tsunamis. As a result, the Kuta Mandalika Beach area is vulnerable to both seismic activity and tsunamis. The hazard places the local community and visitors as people at risk that are vulnerable to the impact of disaster.

A disaster management system has been established at Kuta Mandalika Beach, but its still insufficient to prevent casualties without community disaster awareness. Disaster management system which includes the installation of a tsunami early warning system (InaTEWS) has been installed in Kuta Mandalika Beach, along with the information about the system to the public, and simulation for locals. But even an effective disaster mitigation system will not function optimally in the absence of community awareness and the capacity to recognize and respond to hazardous situations (Sukhyar, 2020). Consequently, it is crucial that the general public and visitors, who are at risk, to have the requisite knowledge that make them can respond appropriately in the event of a disaster. Disaster knowledge has a significant impact on an individual's preparedness to face disasters (Hargono et al., 2023; Sekartaji & Mei, 2023). The lack of disaster awareness among visitors can increase the risk that may be caused when a disaster occurs. Consequently, visitors' knowledge about disaster preparedness is a crucial factor in their ability to respond effectively in the event of an emergency. This knowledge will help them understand the severity of these disasters and assess whether they pose a risk to themselves, their surroundings, and others.

Many academic studies have focused on how natural disasters may exert influence on tourism industries and destinations, how these places and communities have reacted to disasters frequently, and strategy on how to develop visitor's awareness (Estevão & Costa, 2020; Dyahati, 2020; Gulo & Koestoer, 2024), but there is still a limited study about tourist disaster awareness, especially in tourist disaster knowledge context. Assessing the level of knowledge among visitors can provide insights into their capacity to respond

appropriately in the event of a disaster on Kuta Mandalika Beach.

## LITERATURE REVIEW

### Tourism and Disasters

Tourism and disasters have an interrelated and mutually influential relationship. The organization of the tourism industry is very likely to affect the occurrence of disasters in an area if it is not managed properly. Conversely, the occurrence of disasters can also impact the organization of the tourism industry. Even in Indonesia, numerous tourist destinations are located in disasters prone area (Budiatiningsih & Rosyidie, 2022). Tourism is one of the fastest-growing sectors in Lombok, yet it is also confronted with the challenge of the island's numerous disaster risks. For example, the 2018 Lombok earthquake had a profound impact on the tourism sector (Baihaqi et al., 2023).

In accordance with the stipulations set forth in the Law of the Republic of Indonesia No. 10/2009, tourism activities are defined as travel activities undertaken by individuals who reside outside of their place of usual abode for a limited period of time with the specific intention of pursuing leisure, relaxation, or the seeking of novel experiences. When undertaking travel, tourists seek a positive experience that offers a sense of security and comfort. When traveling, tourists seek a pleasant experience and a sense of security and comfort. It is incumbent upon those engaged in the tourism industry, collectively known as "tourism actors and stakeholders," to strive to actualize the aspirations and expectations of tourists when they visit tourist destinations.

The effort required will increase significantly if the tourist destination visited is a disaster-prone area. All tourism actors and stakeholders need to ensure the safety of tourists, although the occurrence of disasters is inherently unpredictable. The occurrence of natural disaster is random and can have

devastating consequences with unpredictable outcomes, making the tourism industry particularly vulnerable to them (Estevão & Costa, 2020). The absence of a good mitigation plans in tourist destinations can lead the tourism sector to face a range of challenges including infrastructure damage, potentially negative destination image, and decreased visitation (Akbar et al., 2020). A tourist destination image is so important for the growth of tourism sector. For example, tourism emerging as the new source of NTB's economy development beyond the mining sector after its image as "the second Bali" that emerge after several destination getting well known, underscores the significance of preserving a positive tourist destination image (Islamy, 2019). It is therefore crucial to consider the issue of disaster management, especially disaster mitigation in the context of tourism development. In order to guarantee the safety of all parties involved, it is important that a destination in a disaster-prone area has an adequate disaster management system in place.

### Visitor Disaster Knowledge

Disaster awareness and preparedness are a part of disaster risk management that refer to measures taken to prepare for and reduce the effect of disasters, to predict and prevent them where possible (Hargono et al., 2023). Disaster knowledge is very important to be possessed by all people in disaster risk areas (Budiatiningsih & Rosyidie, 2022), including tourists. The disaster knowledge that should be possessed by all individuals in disaster-risk areas, includes disaster knowledge, disaster warnings, the symptoms and signs of disasters, and actions to take when disasters occur (Budiatiningsih & Rosyidie, 2022). Such knowledge represents a fundamental asset for visitors, enabling them to respond and act in an appropriate manner when disaster risks materialize in tourist areas. Furthermore, knowledge affects decision-making behaviors, heightening an

individual's awareness of potential disasters (Wulandari et al., 2023).

An understanding of disaster risk is a crucial element in the process of disaster preparedness. Preparedness is defined as a series of activities undertaken to anticipate disasters through organization and the implementation of appropriate and effective measures (UUD Republik Indonesia, 2007). The findings of Hatibe et al., (2021) indicate that disaster knowledge and community attitudes collectively accounted for 79.7% of the variance in landslide preparedness. The findings of Sekartaji & Mei, (2023) study indicate that disaster knowledge exerts a positive and significant impact on the preparedness of the Palu City community in addressing the liquefaction threat. It can be inferred that a community with a high level of disaster knowledge will demonstrate a higher level of preparedness in confronting the liquefaction threat. Education, knowledge, and awareness also play a pivotal role in mitigating the significant risks of losses that may result from disasters (Fauziyah et al., 2022). The sources of knowledge generally can come from experiences and information that are achieved from information sources or vicariously from other people (Dewi et al., 2021).

An effective disaster management system can function at its optimal capacity when it is supported by the awareness and ability of a community to recognize and respond to hazard conditions (Sukhyar, 2020). In the absence of a strong understanding of disaster risk, it is challenging to attain this objective and, conversely, it can even intensify the potential impact of impending hazards. Consequently, it is important that all individuals and entities engaged in activities within disaster-prone regions possess a comprehensive understanding of disaster management. This encompasses not only those who are resident in such areas but also visitors to tourist destinations that may be susceptible to disasters (Budiatiningsih & Rosyidie, 2022; Widodo, 2019). People who live in disaster-

prone areas often still experience a confusion when a disaster occurs, particularly visitors from outside of the area who may lack familiarity with the tourist destinations (Budiatiningsih & Rosyidie, 2022).

## RESEARCH METHOD

This research is a quantitative research. The data collection technique was conducted through a survey. The survey was conducted by testing the knowledge of visitors to Kuta Mandalika Beach related to disasters. The research instrument used was a disaster knowledge test sheet. Data collection was carried out directly at Kuta Mandalika Beach and online for 4 months, started from March to June 2024. This study used an infinite population, which are all visitors to Kuta Mandalika Beach. Sampling was done by convenience sampling. The criteria for respondents in this study are: 1) over 17 years old; 2) have visited Kuta Mandalika Beach in 2019 - 2024. The number of respondents in this study was 487 people.

Data analysis was carried out through 2 stages, which were instrument analysis and descriptive statistical analysis. Instrument analysis is carried out to determine the feasibility of instruments in generating data through validity tests, reliability tests, and item difficulty indices. This analysis used Rasch Model in QUEST software. Meanwhile, descriptive statistical analysis was conducted through classification and interpretation of the visitor's knowledge profile that is related to disasters in Kuta Mandalika. The correlation between demographical aspects and disaster knowledge profile was analyzed by using Spearman correlation test for non parametric data.

### Instrument Analysis

Instrument analysis includes validity, reliability, and item difficulty index. This analysis used the Rasch Model in QUEST software.

### **Validity**

The validity test was carried out through 3 stages, which were content validity, construct validity and field validity. Content validity was conducted by experts in the field of volcanology and geological disasters. Construct validity was conducted by instrument experts. Meanwhile, field validity was analyzed using QUEST software. In QUEST software, item validity is tested based on its conformity with the Rasch model. An item is declared fit with the Rasch model if the INFTT MNSQ value is between 0.77 - 1.30. A total of 45 items are valued 0.85 - 1.17 which means that they fit the Rasch model and declared valid and can function normally as a measurement tool. While 1 item (item 41) was declared invalid so that it then needed to be deleted.

### **Reliability**

The item reliability value is 0.97. This shows that the level of instrument reliability is in the excellent category. The reliability test result shows that the research instrument has the ability to measure the ability of respondents with similar characteristics at different times.

### **Item Difficulty Index**

The item difficulty index was analyzed using Quest software. The item difficulty index that uses a dichotomous scale is indicated by the Threshold value. Based on Table 4.3, the number of very easy questions is 8 items (17%), easy questions are 8 items (17%), medium questions are 17 items (37%), difficult questions are 4 items (9%), very difficult questions are 9 items (20%). This data shows that that the distribution of items is categorized as ideal.

In the moderate/medium interval, item number 41 was deleted because it was invalid so that the number of items in the moderate/medium interval amounted to 16. The determination of disaster knowledge variables was adopted from [Budiatiningsih & Rosyidie \(2022\)](#). Disaster knowledge includes general knowledge about disasters;

knowledge about disaster warnings, symptoms/signs of disasters; and knowledge about actions to take when a disaster occurs.

## **RESULT AND DISCUSSION**

In this study, researchers distributed questionnaires to 487 respondents who were visitors of Kuta Mandalika Beach in Central Lombok. The following information presents a profile of the respondents included in this study. The demographic profile ([Table 1](#)) suggests that the visitors of Kuta Mandalika Beach are predominantly young adults, with 90% aged between 18 and 34 years. The majority were also local residents from NTB Province (96%), with relatively high education levels, 43% having completed senior high school and 33% holding a bachelor's degree.

### **Analysis of Visitors' Knowledge related to Disasters at Kuta Mandalika Beach**

Based on the results of the analysis, the average disaster knowledge of Kuta Mandalika Beach's visitor is in the high category ([Figure 1](#)). Almost 100% of respondents, which are 468 people, have disaster knowledge in the high category, and 19 respondents have moderate disaster knowledge. It means that most of the visitor have enough knowledge about the general knowledge about disaster, sign of disaster, and the right action to do in case of disaster. The high level of the visitor's knowledge indicating preparedness of the visitors when they visit a destination that is prone to disaster.

Hence, in terms of visitor's knowledge as a part of disaster mitigation, most of the visitor can play a part in avoiding the threat of disaster. This high level of knowledge sources can come from education in formal or informal institution, training, and life experience. The sources of knowledge generally can come from life experiences and information that are achieved from various information sources or vicariously from other people ([Dewi, et.al., 2021](#)).

Table 1. Visitor Demographic Profile

No	Category	Sub-category	Number of People	(%)
1	Gender	Male	245	50
		Female	242	50
2	Adress	NTB (West Nusa Tenggara Province)	466	96
		Outside NTB	21	4
3	Education	Elementary & Junior High School/Equivalent	6	1
		Senior High School/Equivalent	202	42
		Diploma 3 (Associate Degree)	44	9
		Bachelor (D4/S1)	161	33
		Master's/Doctoral Degree (S2/S3)	6	1
4	Age	18–24 years	244	49
		25–34 years	186	38
		35–44 years	40	8
		>45 years	11	2
5	Length of Stay	Excursionist (day tripper)	360	74
		Tourist (overnight visitor)	127	26

Source: Analysis Result (2024)

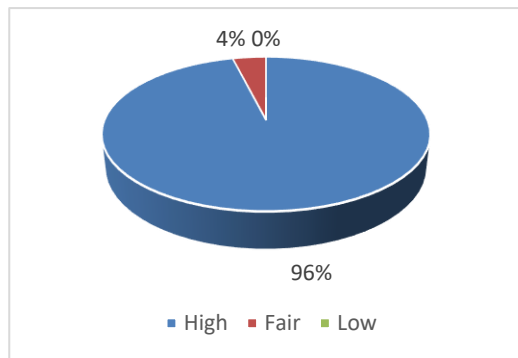


Figure 1. Visitors' disaster knowledge

Source: Analysis Results, 2024

Based on the education level, the group of respondents with the highest average score are respondents with high education level (bachelor and magistrate) with average score 85/100. This finding is also supported by the result of Spearman correlation test which shows that the education level of the respondents correlates with their disaster knowledge with a significance value of 0.001 (correlate significantly with a confidence level of 0.005). It means that education level has a significant impact on disaster knowledge.

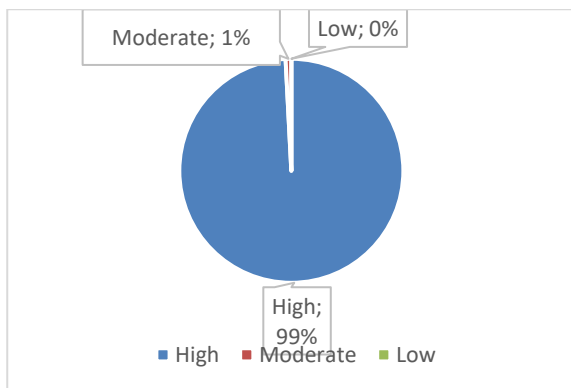
Furthermore, experiencing disaster, experience on being a volunteer, and disaster training experience shows no significant difference in score between group of respondents with experience or with no experience. This finding can happen because

visitors with experience and visitor without experience get their disaster knowledge mainly from information provided in education or other media. The sources of knowledge of the visitors are dominated by education and other sources of information such as social media and television. Other resource state that disaster training experience can has a low correlation with visitors disaster knowledge because the visitors disaster knowledge that they get from training is a knowledge about different type of disaster (Budiantiningsih & Rosyidie, 2022).

Based on their finding, the disaster training gave general information about disaster, but didn't give spesific information about other type of disaster. Based on the results of the Spearman correlation test, it shows that the age level of respondents correlates with their disaster knowledge with a significance value of 0.008 (significant with a confidence level of 0.05). This finding shows that age also play a contribution to visitors knowledge. It can happen because as people age, they can get more knowledge from the daily life experience, education, and media information.

### General Disaster Knowledge

Based on the results of the analysis, the average knowledge of visitors to Kuta Mandalika Beach related to general disaster knowledge is in the high category (Figure 2). Almost 100% of respondents, which are 483 people, have knowledge related to general knowledge of disasters in the high category, and only 4 respondents have a level of general knowledge related to disasters in the moderate category.



**Figure 2. Visitors' knowledge of general disaster knowledge**

Source: Analysis Results, 2024

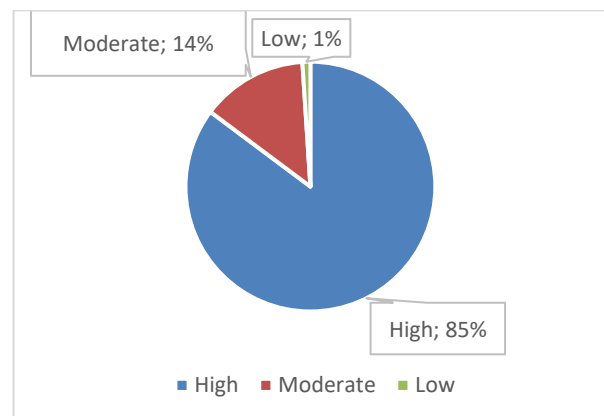
Visitors with disaster knowledge in the high category were able to recognize earthquakes and tsunamis as disaster events; estimate the direct impact caused by earthquakes and tsunamis; estimate other threats from earthquakes; know whether the timing of earthquakes and tsunamis can be predicted; understand tourism areas prone to earthquakes and tsunamis; understand disaster threats in disaster-prone tourism areas; recommend things that should be in tourism areas prone to earthquakes and tsunamis; determine safe places during earthquakes and tsunamis; know what to do when an earthquake occurs inside a building; know the main causes of earthquakes and tsunamis.

This high level of general disaster knowledge means that almost all of the visitor have a basic knowledge about disaster in general, especially about earthquake and tsunami as the main threat in Kuta Mandalika

Beach. This basic knowledge also means that the visitor have adequate knowledge to determine what can be classified as disaster, the impact, threat, and the recommended things to do when disaster occur. This basic knowledge serve as a foundation and preparedness in disaster mitigation that can be a trigger to do the right things to avoid a disaster when its occur. The high level of general knowledge of disaster can be maintained by education of disaster knowledge in formal education, informal education, or through various media.

### Disaster warnings, symptoms/signs of disaster

Based on the results of the analysis, the knowledge of Kuta Mandalika Beach's visitor regarding natural signs of disaster occurrence is in the high, moderate, and low categories (Figure 3).



**Figure 3. Visitors' knowledge of natural signs of disasters**

Source: Analysis Results, 2024

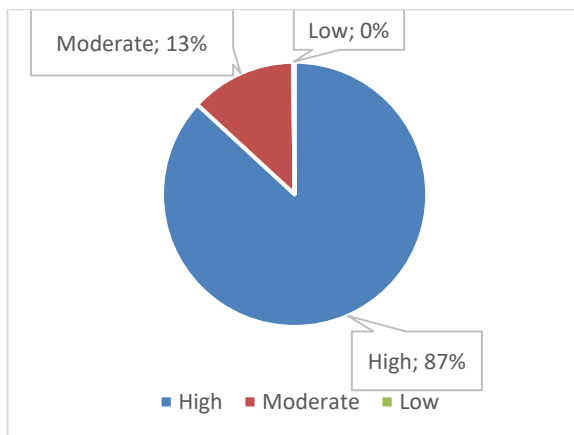
A total of 85% of respondents, or 415 visitors, have natural sign of disaster's knowledge in the high category; this shows that the respondents know that the occurrence of earthquakes and suddenly receding sea water are natural signs of a tsunami. While as many as 14% of respondents, or 67 visitors, had moderate knowledge; this shows that the respondents know that earthquakes or suddenly receding seawater are one of the natural signs of a tsunami. Meanwhile, 1% of

respondents, or 5 visitors, did not know at all that earthquakes and suddenly receding seawater are the natural signs of a tsunami.

The high level of disaster's natural sign knowledge shows that the respondents or visitors of Kuta Mandalika Beach are already equipped with adequate knowledge to know the natural signs when a tsunami will occur. Therefore, when the visitors encountering the disaster's natural sign, they will know that soon, a disaster will occur and they should evacuate from the area. Meanwhile, there are still visitors who don't know about the sign of disaster and need more education about disaster knowledge. Hence, a step to inform visitors about the natural signs of disaster is needed. The information can be in form of information panel, information board, or booklet for visitors that contain information about the natural sign of a disaster around the area.

### Actions to take during a disaster

Based on the results of the analysis, the knowledge of visitors to Kuta Mandalika Beach regarding actions to be taken when a disaster occurs is in the high, moderate and low categories (Figure 4).



**Figure 4. Visitors' knowledge about actions to take during a disaster**

*Source: Analysis Results, 2024*

A total of 87% of respondents, or 423 visitors, know the actions to be taken during emergency response, which are determining the right action when hearing early warnings,

when finding signs of disaster, and when hearing evacuation orders. While as many as 13% of respondents, or as many as 63 visitors, have moderate knowledge related to actions to be taken during emergency response, and only 1 visitor who has emergency response knowledge in low category. This data shows that some visitors are still unable to determine the right action when hearing early warnings, and / or when they find signs of a disaster, and / or when they hear evacuation orders. There is 1 respondent who has knowledge in the low category, indicating that the visitors do not know the right actions that have to be taken during an emergency response.

Based on the result, there are still visitors of Kuta Mandalika Beach who don't know what is the right things to do when they know that the disaster is about to happen. It means that the visitors could be confused and don't know what to do in time of emergency if the disasters occur, there is a possibility that they will do things that are counterproductive to avoid disaster. To address this problem, education is needed to the Kuta Mandalika Beach's visitor about what is the right things to do when the disaster is about to happen and the authorities has issued evacuation order. The education can be in form of regular training or disaster simulation by the government, education in social media, or physical booklet and signage for the visitors around Kuta Mandalika Beach areas.

### CONCLUSION

This study reveals that most visitors possess a high level of disaster knowledge, with a strong understanding of disaster types and signs. Additionally, a correlation between disaster knowledge and visitors' education level and age was found, with older and more educated visitors showing higher levels of awareness.

Despite the generally positive outcomes, there were notable gaps, especially in visitors' ability to interpret early warning signs and determine the correct emergency

actions during disasters. These gaps highlight the necessity for continuous improvement in disaster education targeted at visitors. These findings suggest that disaster risk communication must be further strengthened through educational signage, accessible materials, digital platforms, and collaborative disaster preparedness initiatives involving tourism stakeholders. Improving visitor disaster readiness is essential not only for safety but also for supporting the sustainable development of tourism in disaster-prone areas.

The limitation of this study is that the research respondents are all domestic tourists, with the majority coming from the NTB province, which does not yet represent the distribution of the general population. It would be beneficial to conduct further research with respondents who are more representative of the general population, including international tourists and visitors from diverse regions. It can provide more comprehensive understanding of disaster preparedness across different backgrounds. In addition, evaluating the effectiveness of various disaster education strategies tailored to different visitor profiles will be important for advancing disaster risk management efforts in tourism destinations.

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