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Enhancing Flood Preparedness: The Influence of Students' Knowledge and Experience

Hana Rifky Puspitasari[1], Nurul Khotimah[2*]

[1,2]Master of Geographical Education, Faculty of Social, Law and Political Sciences, Universitas Negeri Yogyakarta, Indonesia

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Corresponding Author:
Author Name*: Nurul Khotimah
Email*:nurulkhotimah@uny.ac.id

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ABSTRACT

Flood disasters often occur in Mentarang Hulu sub-district, Malinau Regency, North Kalimantan. The risk of flooding can be reduced if the community has knowledge and experience related to flood disasters. The purpose of this study was to determine the effect of students' knowledge and experience in dealing with flood disasters. This type of research is descriptive quantitative. The sampling technique used was purposive sampling, and a sample size of 80 students from elementary, junior high, and high school levels. Data collection techniques used observation, interviews, and documentation. The data collection instrument used a questionnaire. While the data analysis technique used descriptive statistics. The results of the study showed that the knowledge of elementary, junior high, and high school students about flood disasters was included in the GOOD category. This can be interpreted that most elementary, junior high, and high school students have good knowledge about floods. The percentage obtained was elementary school students of 85%, junior high school students of 81%, and high school students of 90%. These results also show that the experiences of elementary, junior high, and high school students about flood disasters are included in the GOOD category.

Keywords: flood disaster, knowledge, experience, flood preparedness

INTRODUCTION

Indonesia is located in the meeting zone of the world's major plates. In addition, approximately 5,590 river basins (DAS) in Indonesia, which are located between Sabang and Merauke, make Indonesia one of the countries at high risk of disaster threats[1]. There are various types of natural disasters in Indonesia, such as earthquakes, volcanic eruptions, tsunamis, and landslides. Indonesia is in a tropical climate, so there is the potential for seasonal disasters. During the rainy season, there is the potential for wet hydrometeorological disasters such as floods, extreme weather, landslides, and tidal waves/abrasion, while during the dry season, there is the potential for dry hydrometeorological disasters, such as drought and forest and land fires[2].

A disaster is an event or series of events that threaten and disrupt the lives and livelihoods of a community caused by natural or unnatural factors. A disaster is an extreme disruption of the function of a community that causes widespread social, material, and environmental losses and exceeds the ability of the affected community to cope[3]. Disasters can be caused by natural disasters or man-made disasters[4]. Natural disasters can occur naturally or as a result of human actions. Natural disasters that occur naturally include tornadoes, volcanic eruptions, and tsunamis[1]. Disasters can occur gradually and over a certain period of time, or in certain cases, occur very suddenly and without warning[5]. Natural disasters can be seen by the human senses and can be explained scientifically[6]. The increases in the frequency of disasters are influenced by various factors, including climate change, which causes unpredictable weather, Indonesia's geographical conditions, illegal logging activities, and other factors. Of the various types of disasters, hydrometeorological disasters such as floods, landslides, and hurricanes are the most dominant[7].

Natural disasters are events that cannot be known exactly when and where they will occur. Humans are only able to predict and recognize the early symptoms that arise. The sophistication of human-made technology to date has only been able to make predictions based on the early symptoms of a disaster. Predictions made by technology are useful so that humans can prepare themselves to face natural disasters. Preparations that can be made include preparations before a disaster occurs, during a disaster, and after a disaster occurs. These preparations can minimize the risk of losses experienced by humans due to natural disasters. The negative impacts caused by natural disasters can harm humans materially and non-

materially. Losses due to natural disasters are classified into several groups, such as victims who died, disappeared, were displaced, were injured, suffered, damaged houses, damaged health facilities and schools, damaged roads, and damaged land[1]. Many losses and victims are due to a lack of awareness and knowledge about disasters, both the vulnerability of residential areas and the lack of knowledge about rescue actions during a disasters[8].

Based on statistical data from BNPB in 2014-2023, there are 5 natural disasters that most often occur in Indonesia, namely tornadoes with 8,511 incidents, floods with 8,226 incidents, landslides with 7,309 incidents, forest and land fires with 4,088 incidents, and droughts with 397 incidents. Floods are the second most frequent natural disaster in Indonesia after tornadoes. Based on statistical data from BNPB in 2023, there were 1,325 forest and land fires, 299 landslides, 264 tornadoes, and 244 floods [2]. Floods are a major disaster in the world. The incidence and victims of flood disasters rank first in the world, reaching 55%. The percentage of flood incidents in Indonesia reaches 38% of all disaster incidents[9]. Floods are inundated land due to overflowing rivers, which are caused by heavy rain or floods due to water from other areas at higher elevations. Floods are one of the natural disasters that need serious attention, because they have the potential to cause loss of life and material losses in society. Globally, floods are ranked third as the biggest disaster, considering the high number of victims and the large loss of property caused[10]. Floods are events when the land surface is inundated with water. This incident is generally caused by overflowing rivers driven by high-intensity rainfall[11].

There are at least four main factors that can cause many victims and great losses, namely lack of understanding of the characteristics of hazards, attitudes or behaviors that result in a decrease in the quality of natural resources (vulnerability), lack of information/early warnings that cause unpreparedness, and helplessness/inability to face the threat of danger[12]. One of the causes of disasters in Indonesia is the lack of understanding of the characteristics of disaster threats. Often, it seems as if disasters occur suddenly so that people are less prepared to face them. Knowledge of disasters is the main reason for someone to carry out protection activities or existing preparedness efforts. Individual attitudes in anticipating disaster risks are influenced by the knowledge they have[13].

Knowledge about disasters should be given to school-age children. Disaster victims never look at age, whether children, teenagers, or adults [14], [15]. Knowledge is a key factor in preparedness that influences attitudes to be ready and alert to face disasters[16]. Indicators of individual knowledge and attitudes are basic knowledge that should be possessed by individuals, including knowledge about disasters, causes and symptoms, and what to do if a flood occurs[7]. To reduce the impact of disasters, there needs to be knowledge and preparedness of the entire community, including students who are part of the community that is vulnerable to disasters[8].

Disaster preparedness is an effort to reduce the risk of disasters and prevent many victims affected by floods[5]. One thing that can affect individual preparedness is the knowledge and experience of disasters in the past, both directly and indirectly. Disaster experiences that have been experienced by the community before will be a lesson so that the community is ready to face earthquakes in the future[3].

Malinau Regency is one of the regencies in North Kalimantan Province. Malinau Regency is an area that is often affected by floods. Malinau Regency has the potential for hydrometeorological disasters, especially floods and forest and land fires. Realizing the risk of disasters that occur in Malinau Regency, especially in Mentarang Hulu District, it is important to raise awareness and cultivate disaster reduction. The absence of disaster counseling and training as an effort to mitigate flood disasters in Mentarang Hulu District has resulted in an increase in the risk of losses becoming even greater. Therefore, it is necessary to have knowledge of being prepared for flood disasters that often hit the area where they live. Seeing this, the researcher took the research title " Enhancing Flood Preparedness: The Influence of Students' Knowledge and Experiencein Mentarang Hulu District, Malinau Regency on Flood Disaster Preparedness".

RESEARCH METHODS

This type of research is quantitative descriptive research that aims to determine the influence of knowledge and experience on flood disaster preparedness. This research is related to disaster management which is included in disaster studies. The population of this study was all school students affected by the flood disaster in Mentarang Hulu District. The schools affected by the flood disaster in Mentarang Hulu District were 4 elementary schools (SD Negeri 001 Long Berang Village, SD Negeri 003 Semamu Village, SD Negeri 004 Long Simau Village, and SD Negeri 006 Long Sulit Village), and 1 junior high school (SMP Negeri 1 Mentarang Hulu) and 1 senior high school (SMA Negeri 11 Malinau).

The research sample was determined purposively, considering schools that have a high risk of being affected by flood disasters, in this case limited to schools with a distance of 100 meters from the river. The school samples taken in this study were 1 elementary school, 1 junior high school, and 1 senior high school, namely SD Negeri 001 Long Berang Village, SMP Negeri 1 Mentarang Hulu, and SMA Negeri 11 Malinau. The number of samples for the elementary school level was 6 students in grade 5 and 7 students in grade 6, the sample for the junior high school level was all junior high school students totaling 26 students and the sample for the senior high school level was all senior high school students totaling 41 students.

Data collection techniques in this study used observation, documentation, and interview techniques. The instruments in this study were a set of questions

(questionnaires) and interview sheets. Data analysis used in this study was descriptive analysis with a quantitative approach that aims to provide a description of the research subject. Data analysis in this study used non-statistical analysis, using a frequency table.

Table 1. Score of Student Knowledge and Experience Parameters Regarding Flood Disasters

Parameter Category	Score Intervals
Good	65 – 85
Enough	41 – 64
Less	17 – 40

RESULTAND DISCUSSION

Mentarang Hulu District is one of the areas in Malinau Regency that is prone to flooding. There are 4 elementary schools, 1 junior high school, and 1 senior high school that are prone to flooding in Mentarang Hulu District. The schools are located in Long Berang Village, Long Sulit Village, Long Simau Village, and Semamu Village. Mentarang Hulu District is crossed by the Mentarang River (DAS Malinau) with many tributaries such as the Furu River, Tidung River, Semamu River, Bisai River, and Kinaye River. Mentarang Hulu District is an area affected by flooding due to its location close to the river. Students' knowledge in dealing with floods is an important indicator in flood disaster mitigation. This is because floods can occur at any time, so with good knowledge, it is hoped that the threat to safety and losses can be minimized. Based on research conducted at 3 schools with different levels of education, the following description of students' knowledge in dealing with floods is obtained.

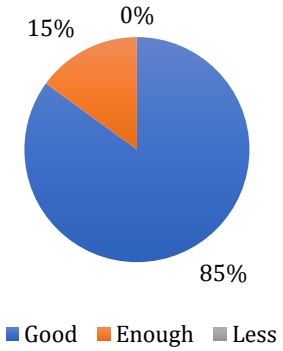

Figure 1. Diagram of Students' Knowledge of SDN 001 Mentarang Hulu Regarding Flood Disasters

It is known that most of the students of SDN 001 Mentarang Hulu, namely 11 students out of 13 samples or 85% of students, have good knowledge in dealing with flood disasters. Only 15% of students with a total of 2 students, are included in the category of sufficient knowledge in dealing with floods. Student knowledge is said to be good if it meets the parameters of student knowledge in dealing with floods, namely, knowledge about floods, knowledge about the causes of floods, knowledge about the impacts of floods, knowledge about efforts to prevent flood disasters, and knowledge about efforts to increase flood disaster preparedness. Knowledge is the main factor and is the key to preparedness. The knowledge possessed can usually influence attitudes and concerns to be prepared in anticipating flood disasters [9]. Factors that influence these results can be identified from the details of the parameters of student knowledge in dealing with floods, which can be seen in the following Table2.

Table 2. Details of Knowledge Parameters of Students of SDN 001 Mentarang Hulu Regarding Flood Disasters

Parameters	Category	**Frequency**	**Percentage (%)**
Knowledge about floods	Good	10	76,92
	Enough	3	23.08
	Less	0	0.00
Knowledge about the causes of floods	Good	12	92.31
	Enough	1	7.69
	Less	0	0.00
Knowledge about the impacts of floods	Good	11	84.62
	Enough	2	15.38
	Less	0	0.00
Knowledge about efforts to prevent flood disasters	Good	12	92.31
	Enough	1	7.69
	Less	0	0.00
Knowledge about efforts to increase flood disaster preparedness	Good	4	30.77
	Enough	9	69.23
	Less	0	0.00

Based on Table 2, it can be seen that in general, each parameter of students' knowledge of flood disasters can be answered well by students, so that a good accumulated score is obtained. There is 1

parameter that more than 50% of students are not in the good category, namely the parameter of knowledge about efforts to increase flood disaster preparedness. This is because many students have never participated in counseling on early signs of flooding, evacuation methods, and self-protection steps. Next is the data on junior high school students' knowledge of flood disasters in Mentarang Hulu District. The results of the study can be seen in the following figure.

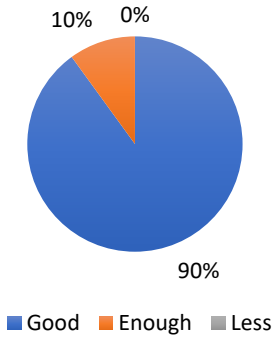

Figure 2. Knowledge Diagram of Students of SMPN 01 Mentarang Hulu Regarding Flood Disasters

Based on Figure 2, it is known that most of the students of SMPN 01 Mentarang Hulu, namely 21 students out of 26 students or 81% of students, have good knowledge of flood disasters. Students who are included in the category of sufficient knowledge are only 18%. The results of the student knowledge data were analyzed through detailed parameters of student knowledge in dealing with flood disasters. The following is a frequency table of junior high school students' knowledge levels of flood disasters.

Table 3. Details of Knowledge Parameters of SMPN 01 Mentarang Hulu Students Regarding Flood Disasters

Parameters	Category	Frequency	Percentage (%)
Knowledge about floods	Good	23	88.46
	Enough	3	11.54
	Less	0	0.00
Knowledge about the causes of floods	Good	24	92.31
	Enough	2	7.69
	Less	0	0.00
Knowledge about the impacts of floods	Good	26	100.00
	Enough	0	0.00
	Less	0	0.00
Knowledge about efforts to prevent flood disasters	Good	25	96.15
	Enough	1	3.85
	Less	0	0.00
Knowledge about efforts to increase flood disaster preparedness	Good	6	23.08
	Enough	20	76.92
	Less	0	0.00

Table 3 shows that there is one parameter that needs to be analyzed further, because as many as 76% of students are included in the sufficient category. The parameter concerns knowledge about efforts to improve flood disaster preparedness, meaning that more than half of the students have sufficient knowledge. This is because most students have never attended counseling on the early signs of flooding, evacuation methods, and self-protection steps. Therefore, counseling, socialization, and disaster training activities are needed so that students can improve flood preparedness. The latest data is on high school students' knowledge of flood disasters in Mentarang Hulu District.

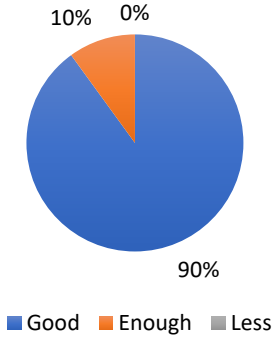

Figure 3. Diagram of Knowledge of Students of SMAN 11 Malinau Regarding Flood Disasters

The results of the study on high school students' knowledge of flood disasters are shown in Table 3. The table shows that as many as 90% of students, or 37 students of SMAN 11 Malinau, have good knowledge of flood disasters. Only 10% of students are in the category of sufficient knowledge, and no students have insufficient knowledge of flood disasters. The following are the results of the scores and percentages of each parameter of high school students' knowledge of flood disasters.

Table 4. Details of Knowledge Parameters of SMAN 11 Malinau Students Regarding Flood Disasters

Parameters	Category	Frequency	Percentage (%)
Knowledge about floods	Good	35	85.37
	Enough	6	14.63
	Less	0	0.00
Knowledge about the causes of floods	Good	37	90.24
	Enough	4	9.76
	Less	0	0.00
Knowledge about the impacts of floods	Good	41	100.00
	Enough	0	0.00
	Less	0	0.00
Knowledge about efforts to prevent flood disasters	Good	24	58.54
	Enough	17	41.46
	Less	0	0.00
Knowledge about efforts to increase flood disaster preparedness	Good	27	65.85
	Enough	14	34.15
	Less	0	0.00

Based on the data in Table 4, it is known that the parameter of knowledge about the impact of floods gets the highest percentage, which is 100%. This can be interpreted that all students have good knowledge about the impact of flood disasters. The parameters that still require attention are the parameters of knowledge about efforts to prevent flood disasters, as much as 41% of students, and knowledge about efforts to increase flood disaster preparedness, as much as 34% of students, are still included in the sufficient criteria. However, the level of knowledge of students at SMAN 11 Malinau is included in the good criteria, so it is necessary to carry out assistance, socialization, counseling, and flood disaster simulations.

Based on the presentation of the research results on the level of knowledge of students of SDN 001 Mentarang Hulu, SMPN 01 Mentarang Hulu, and SMAN 11 Malinau about flood disasters, it can be seen that there are differences in the level of knowledge of students between elementary, junior high, and high school students. Elementary school students have a percentage of knowledge about flood disasters of 85% of students, including good criteria, and 15% of students including sufficient criteria. Junior high school students have a percentage of knowledge about flood disasters of 81% of students including good criteria and 19% of student,s including sufficient criteria, while high school students have the highest percentage of 90% of students including good criteria and 10% of students including sufficient criteria.

Students' experience in dealing with floods is one of the important indicators in flood disaster mitigation. This is because floods are natural disasters that can occur at any time, so if students have good experience in dealing with floods, the risk of property loss and safety threats can be minimized. Based on research conducted in 3 schools at different levels, the following description of students' experiences with flood disasters in Mentarang Hulu District can be seen.

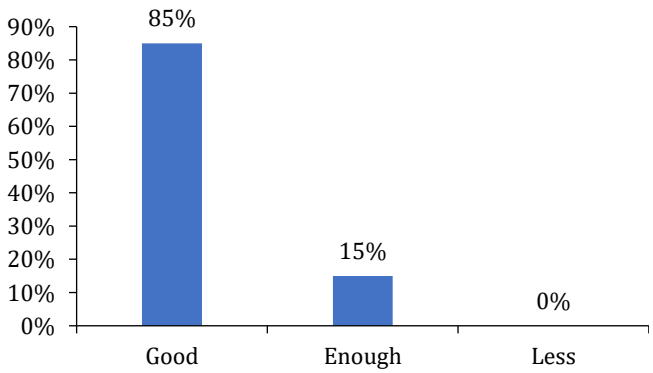

Figure 4. Diagram of Students' Experiences at SDN 001 Mentarang Hulu Regarding Flood Disasters

It is known that most of the students of SDN 001 Mentarang Hulu, namely 85% of students or 11 students out of 13 students in grades 5 and 6 have good experiences in dealing with flood disasters. Student experiences can be said to be good if they meet the good criteria in the parameters of student experience in dealing with floods. Factors that influence the above results are identified in the following table.

Table 5. Details of Experience Parameters of SDN 001 Mentarang Hulu Against Floods

Parameters	Category	Frequency	Percentage (%)
Types of experiences students affected by floods	Good	8	61.54
	Enough	5	38.46
	Less	0	0.00
Frequency of students affected by floods in the last 5 years	Good	12	92.31
	Enough	1	7.69
	Less	0	0.00
Types of damage and losses experienced by students affected by floods	Good	13	100.00
	Enough	0	0.00
	Less	0	0.00
Actions taken during a flood disaster	Good	13	100.00
	Enough	0	0.00
	Less	0	0.00

Based on Table 5, it can be seen that each parameter of student experience in dealing with disasters can be answered well by students, so that an accumulation of values is obtained that is included in the good criteria. The parameter of the type of student experience affected by floods is the student's feelings when a flood occurs. The parameter of the type of student experience affected by floods shows that 38.46% of students fall into the sufficient criteria. This shows that some students still feel afraid, worried, and traumatized by floods. The parameter of the type of damage and loss experienced by students affected by floods and the actions taken during a flood disaster obtained a percentage of 100%. This shows that all students of SDN 001 Mentarang Hulu have had good experiences with flood disasters. The next data is the experience of students of SMPN 01 Mentarang Hulu in dealing with flood disasters. The results of the study can be seen in the following figure.

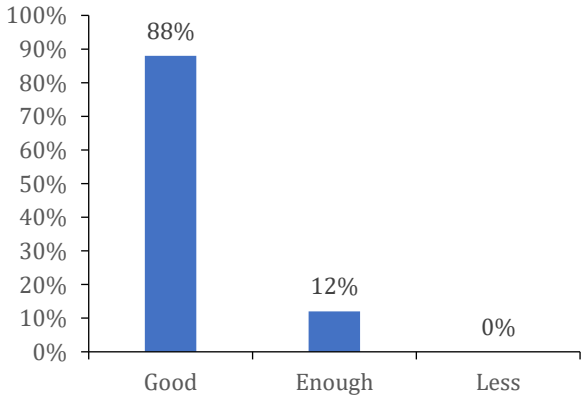

Figure 5. Diagram of Students' Experiences at SMPN 01 Mentarang Hulu Regarding Flood Disasters

The level of experience of SMPN 01 Mentarang Hulu students towards flood disasters is included in the good criteria. Based on the table above, it can be seen that as many as 23 students out of 26 students, or 88% of students, have good experience in dealing with flood disasters. As many as 12% of students, or 3 students out of 26 students, have sufficient experience in dealing with flood disasters. These results can be analyzed through the details of the parameters of the student experience variable towards flood disasters. The following is a frequency table of details of the parameters of the level of student experience towards flood disasters.

Table 6. Details of SMPN 01 Mentarang Hulu Experience Parameters Against Floods

Parameters	Category	Frequency	Percentage (%)
Types of experiences students affected by floods	Good	15	57.69
	Enough	11	42.31
	Less	0	0.00
Frequency of students affected by floods in the last 5 years	Good	24	92.31
	Enough	2	7.69
	Less	0	0.00

Parameters	Category	Frequency	Percentage (%)
Types of damage and losses experienced by students affected by floods	Good	26	100.00
	Enough	0	0.00
	Less	0	0.00
Actions taken during a flood disaster	Good	26	100.00
	Enough	0	0.00
	Less	0	0.00

Table 6 shows that there is one parameter that needs to be analyzed further because as many as 42.31% of students are not included in the good criteria. The parameter that needs to be analyzed is the type of student experience affected by floods, meaning that almost half of the students of SMPN 01 Mentarang Hulu are still afraid, worried, and traumatized if the flood disaster occurs again. Therefore, socialization, assistance, and disaster training are needed so that students can anticipate the risk of losses arising from flood disasters. The following is an explanation of the results of the experiences of students of SMAN 11 Malinau regarding flood disasters.

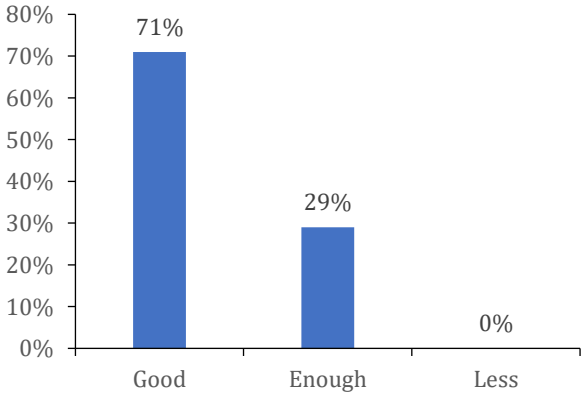

Figure 6. Diagram of Students' Experiences of SMAN 11 Malinau Regarding Flood Disasters

Based on the research that has been conducted, there are 71% of students or 29 students out of 41 students who have experience with a good category. As many as 29% or 12 students are in the sufficient category. The following are the scores and percentages of the parameters of the experience of students of SMAN 11 Malinau towards flood disasters.

Table 7. Details of Experience Parameters of SMAN 11 Malinau Regarding Floods

Parameters	Category	Frequency	Percentage (%)
Types of experiences students affected by floods	Good	19	46.34
	Enough	22	53.66
	Less	0	00.0
Frequency of students affected by floods in the last 5 years	Good	41	100.00
	Enough	0	0.00
	Less	0	0.00
Types of damage and losses experienced by students affected by floods	Good	41	100.00
	Enough	0	0.00
	Less	0	0.00
Actions taken during a flood disaster	Good	41	100.00
	Enough	0	0.00
	Less	0	0.00

Based on Table 7, it is known that the parameters of the types of student experiences affected by floods need to be analyzed more deeply. This is because, as many as 53.66% or 22 students out of 41 students are in the sufficient category. This condition can be interpreted that half of the students of SMAN 11 Malinau feel afraid, worried, and traumatized by the flood disaster. Overall, the experience of students of SMAN 11 Malinau is in the good category, so if it is to be improved, it is necessary to conduct disaster simulations, mentoring, and counseling regarding flood disasters so that all students of SMAN 11 Malinau have a good level of experience in dealing with flood disasters.

Based on the presentation of the research results above, it can be seen that the level of experience of students of SDN 001 Mentarang Hulu, SMPN 01 Mentarang Hulu and SMAN 11 Malinau towards flood disasters is known to have differences in the level of student experience. Elementary school students have a percentage of experience of 85% of students in the good category and 15% of students in the sufficient category. Junior high school students have the highest percentage

of experience, namely 88% in the good category and 12% in the sufficient category. High school students have a percentage of experience towards flood disasters, namely 71% in the good category and 29% in the sufficient category.

The results of the study indicate that most elementary, junior high, and senior high school students possess good knowledge and experience related to flood disasters. Students' knowledge is considered good when it meets key indicators, including understanding the definition of floods, causes of flooding, impacts of floods, and strategies to enhance preparedness for flood disasters. However, the findings reveal a notable gap in the indicator related to efforts to enhance flood disaster preparedness. Many students have not yet participated in outreach activities, counseling sessions, or flood disaster simulations. This suggests that although students may have a solid conceptual understanding of floods, their practical exposure to disaster mitigation practices remains limitedan aspect that should be a core component of disaster education.

In addition to knowledge, students' experiences in dealing with flood disasters also significantly influence their level of preparedness. The data show that students across all education levels have had meaningful experiences facing flood situations, either directly or indirectly. These experiences include involvement in emergency response activities, such as self-evacuation, as well as awareness of early warning signs of flooding. A particularly encouraging finding is that many students have taken proactive measures before flood events, such as understanding early warning systems implemented by their schools or communities, and promptly following official instructions during self-rescue efforts.

However, a gap between theoretical knowledge and practical experience remains evident. This is reflected in the low participation rates in structured disaster simulation programs. The lack of hands-on training or emergency drills may limit students' ability to effectively apply their knowledge in real flood situations. Therefore, the integration of educational activitiessuch as simulations, disaster preparedness workshops, and involvement in local mitigation programsneeds to be strengthened. These activities should not merely supplement the curriculum, but rather be embedded within a context-based, risk-aware learning framework.

Overall, this study reveals that although students demonstrate a relatively high level of knowledge and experience concerning flood disasters, there is still a pressing need to reinforce the practical aspects of preparedness through active engagement in preparedness programs. Schools, local governments, and disaster management agencies must collaborate to develop a more comprehensive and practical disaster education system. This will help foster a generation that is not only aware of disaster risks but also equipped to respond effectively and swiftly when disasters strike.Individual experience has a significant influence on the level of disaster preparedness. Positively, those who have experienced a disaster tend to be more prepared when facing similar events in the future. Thus, disaster experience can be considered as one of the important factors that shape preparedness, because this experience can motivate individuals to be more alert and ready to take mitigation actions and early warning[10].Experience in mastering a situation (mastery experience) plays an important role in shaping a person's level of self-efficacy. Students who have experienced a flood disaster tend to show a faster response when facing a similar situation. This is because previous experience provides adequate knowledge and understanding of the causes and signs of flooding. As a result, students with such experiences have higher self-efficacy and can take the right steps before, during, and after a disaster occurs[17].Every disaster experience provides the possibility to be able to prepare oneself to anticipate threats that can occur at any time. Disaster experiences that individuals have will tend to increase disaster preparedness, because with existing experiences, they can stimulate actions that must be taken when a disaster occurs quickly and effectively[18].

CONCLUSION

Based on the analysis and discussion, the following conclusions can be drawn.

1. Elementary, junior high, and high school students' knowledge of flood disasters is included in the GOOD category. This can be interpreted that most elementary, junior high, and high school students have good knowledge of floods, causes of floods, impacts of floods, flood prevention efforts, and efforts to increase flood disaster preparedness. The percentages obtained were 85% for elementary school students, 81% for junior high school students, and 90% for high school students.
2. Elementary, junior high, and high school students' experiences of flood disasters are included in the GOOD category, meaning that most students can manage feelings of fear, trauma, and worry if a flood occurs in the future, students know the losses that can occur due to floods, and students know the actions to take when a flood disaster occurs. The percentages obtained by elementary school students were 85%, junior high school students were 88%, and high school students were 71%.

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