

Knowledge of Disaster Risk and Perceptions of Climate Change among College Students

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Article Info

Article History

Submitted :
June, 11th 2024
Final Revised:
June, 18th 2024
Accepted:
June, 20th 2024

Abstract

Background: Indonesia is on the path of the Pacific Ring of Fire so all regions in Indonesia are prone to disasters. The last ten years have also seen many disasters in several areas. The reason is climate change which has an impact on erratic weather. **Objective:** This study aims to determine the effect of knowledge of disaster risk on perceptions of climate change in college students. **Method:** Quantitative research method with 101 student subjects. The measurement tools used are disaster risk knowledge and climate change perceptions. **Results:** The results of the study show that there is a relationship between knowledge of disaster risk and perceptions of climate change among college students. The effective contribution shows 39.3%, meaning that disaster risk knowledge contributes 39.3% to climate change perceptions. The results also show that students' knowledge of disaster risk is low and students' perceptions of climate change are negative. **Conclusion:** The results of this study are important as a basis for making interventions in the form of more effective and massive education for students about disaster risk.

Keywords: Climate change, disaster risk, collage students

Abstrak

Latar belakang: Indonesia merupakan jalur The Pasific Ring of Fire (cincin api Pasifik) sehingga semua daerah di Indonesia rawan terhadap bencana. Sepuluh tahun terakhir juga terdapat banyak bencana di beberapa daerah. Penyebabnya adalah perubahan iklim yang berdampak pada cuaca yang tidak menentu. **Tujuan:** Penelitian ini bertujuan untuk mengetahui pengaruh pengetahuan risiko bencana dengan persepsi perubahan iklim pada mahasiswa. **Metode:** Metode penelitian kuantitatif dengan 101 subjek mahasiswa. Alat ukur yang digunakan ialah pengetahuan risiko bencana dan persepsi perubahan iklim. **Hasil:** Hasil penelitian menunjukkan bahwa terdapat hubungan antara pengetahuan risiko bencana dengan persepsi terhadap perubahan iklim pada mahasiswa. Sumbangan efektif menunjukkan 39,3%, artinya pengetahuan risiko bencana berkontribusi sebesar 39,3% terhadap persepsi perubahan iklim. Pengetahuan risiko bencana pada mahasiswa tergolong rendah dan persepsi perubahan iklim pada mahasiswa tergolong negatif. **Kesimpulan:** Hasil penelitian ini penting sebagai dasar untuk membuat intervensi berupa edukasi yang lebih efektif dan massif kepada mahasiswa tentang risiko bencana..

Kata kunci: Perubahan iklim, risiko bencana, mahasiswa

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Surabaya

The climate crisis is a common problem for all countries in the world. Some developed countries have started steps to overcome the impacts of climate change, while developing countries such as Indonesia are experiencing different challenges. CfDS UGM conducted a survey of 2,401 respondents regarding three aspects, namely understanding and awareness of the climate crisis, information consumption patterns, and digital literacy skills. The survey findings revealed that 21.5% agreed and 11% strongly agreed that the climate crisis was caused by the increasing number of people committing immoral acts and not adhering to their religion. Furthermore, 25% of respondents also agreed that scientists researching the climate crisis are controlled by elites (CfDS, 2024). Research by Nurhayati et.al shows that public perception of climate change is still low, even though the public admits that they have felt the impact of climate change. Community knowledge of climate change influences the adaptation strategies carried out (Nurhayati et al., 2020).

The impact of climate change is very complex because it occurs in various sectors covering various aspects of life, including health, agriculture, forestry, infrastructure, transportation, tourism, energy and social. Potential disasters related to climate change account for almost 80% of the various natural disasters in the world. These potential disasters include floods, drought, tornadoes, land erosion, coastal erosion, forest fires, disease outbreaks and food insecurity (Dewi & Istiadi, 2016). The most immediate impact of climate change is the increasing intensity of hydrometeorological disasters in Indonesia. This disaster dominated Indonesia in 2010 – 2020 (Azizah et al., 2022).

Then BNPB in 2024 released at the beginning of the year the number of disasters in Indonesia increased. During April 2024, 122 disaster events hit the territory of Indonesia. Of the total disaster events that occurred, 98.36% were hydrometeorological disasters both dry and wet hydrometeorology, the rest were geological disaster events. Flood was the disaster with the highest frequency with 88 events. Landslides occurred 12 times, extreme weather 11 times, and forest and land fires occurred 9 times. Geological disasters, earthquakes and volcanic eruptions, each occurred once.

Climate change also affects the likelihood of natural disasters. Based on the results of the International Disaster Database search of various natural disasters that fall into the category of global disasters, there are 345 disasters. About 60% of these natural disasters are natural disasters caused by extreme climate events such as floods, forest fires, strong winds/storms, droughts, landslides, high waves and disease outbreaks (Perdinan, 2014).

All of these phenomena require mitigation efforts by increasing knowledge of disaster risks and adapting to various climate changes. Disaster risk reduction seeks to reduce the impact of disasters, while climate change adaptation allows humans to adapt to the changing environment for a safe and comfortable life.

Hariharan et al, revealed that one way to raise positive awareness about climate change is to create awareness and increase knowledge of disaster risks in the community. Communities must be involved in climate change adaptation and mitigation efforts (Hariharan et al., 2020). Community-based climate change adaptation has been developed in several countries recently, carried out by building the priorities, knowledge and capacity of local communities. The community-based approach considers that adaptation strategies must be produced through a participatory process, involving local stakeholders and development and disaster risk reduction practitioners (Ayers & Forsyth, 2009). Innovative participatory methods are also emerging to help communities analyze the causes and impacts of climate change, to integrate scientific and societal knowledge about climate change, and to plan adaptation measures (Asiyo & Afullo, 2016).

The younger generation has enormous potential to be active in environmental concerns. The involvement of young people in global environmental concerns is due to their desire to address various issues and they tend to have more favorable attitudes towards the environment (Diamantopoulos et al., 2003). They also seem to be more concerned about environmental quality than older people (Boeve-de Pauw & Van Petegem, 2010). In addition, the younger generation is prepared to make financial sacrifices to create a better environment (Wesley, 2011).

The involvement of the younger generation can be implemented in the form of conceptual and

operational activities in environmental issues. Knowledge, understanding and attitude are needed to support this participation (Ancok, 2003). Perception occurs through the five human senses, namely sight, sound, smell, taste and touch. When someone uses their senses or mind to recognize something they have never seen or felt before, they are said to have gained knowledge.

Harmuningsih and Saul (2017) research with young people aged between 15-35 years showed that knowledge, perceptions and attitudes about climate change have a positive and significant effect on the environmental care behavior of young people. In addition, among the three elements, the impression of climate change is a factor that has a stronger influence on the environmental care behavior of the younger generation. Young people need more opportunities and access to information sources and channels to enhance their knowledge of strategic environmental issues, particularly climate change and its impacts. This will help them develop a better understanding of environmental climate change, which will help them develop a more sympathetic attitude towards climate change. Therefore, one way is to encourage the organizations in which they are involved through regular, purposeful and planned activities to improve their knowledge, shape their perceptions and attitudes and generate their intention to behave pro-environmentally (Harmuningsih & Saleky, 2017).

Risk is known as the combination of the probability of an event occurring and the resulting negative consequences (UNISDR, 2009). Meanwhile, disaster risk refers to the potential losses arising from disasters in a certain area and period of time. These potential losses include various things such as casualties, injuries, impaired health, loss of security, displacement, damage or loss of property, and disruption to social activities (BNPB, 2012). Bubeck, et al in their research explained that the way people assess disaster risk and their responses are closely related to the way they understand the risk (Bubeck et al., 2012). Risk perception is how people assess the likelihood and negative impact of a hazard, based on the interpretation of the information they receive. This is in line with what is described by WHO (2008) that risk perception is the process by which individuals interpret the information they receive about risk. Thus, risk perception can be explained as an individual's assessment of the hazards and negative impacts around them, based on how they interpret the information they receive.

Schmidt study explains that there are several factors that influence risk management including voluntariness, controllability, delay effect, natural vs manmade, familiarity and habituation, benefits and risk-benefit distribution, and the role of the media (Schmidt, 2004). Birkholz, et al in their study of disaster risk management, it is important to pay attention to individual views and community views of risk (Birkholz et al., 2014). This study helps in understanding the way people assess the risks they face, which has an impact on the effectiveness of risk management around them (Prabhakar et al., 2009).

Research conducted by Terpstra found that disaster experience increases individuals' awareness of vulnerability and strengthens their understanding of the associated risks (Terpstra, 2011). It is also supported by many studies that there is a positive and significant correlation between experience and risk perception (Ho et al., 2008; Kung & Chen, 2012; Wachinger et al., 2013). Later research from Ruin, Gaillard and Lutoff (2007) found that people who have never experienced flooding tend to underestimate the risks, while those who have experienced it will better understand the level of danger (Ruin et al., 2007).

Based on the description of the background of the problem, this study identifies disaster knowledge and its relationship with students' perceptions of climate change. This study aims to empirically test the relationship between disaster knowledge and students' perceptions of climate change. The hypothesis in this study is that disaster knowledge in college students is related to perceptions of climate change.

Method

This study uses a correlational quantitative research approach. Disaster risk knowledge is the main reason for a person to carry out protection activities or preparedness efforts measured using disaster risk indicators from LIPI (2021). The higher the disaster risk knowledge score, the higher the disaster preparedness management. Conversely, the lower the disaster risk knowledge score, the lower the preparedness management of the younger generation in facing disasters.

Perception of climate change is the young generation's view of climate change and its impact on the survival of humanity, which is measured using the climate change perception indicator from Valkengoed, et al (2022). The higher the climate change perception scale score, the higher the young generation's positive assessment of the impacts and dangers of climate change. Conversely, the lower the climate change perception score, the more negative the younger generation is in assessing climate change.

Sample or Population

The research subjects in this study were students in Surakarta aged 18-35 years. A population is a group of individuals who have characteristics or traits that are similar to those designated as research subjects. From this population, data was then sampled using a non-probability sampling technique, namely purposive sampling. So in this study the number of respondents taken was 101 college students.

Data Collection

The data collection instrument in this study adapts the climate change perception measuring instrument from Valkengoed, et al (2022), with a total of 14 items with convergent validity scores of 0.54 to 0.87, predictive validity of 0.16 to 0.73 and a reliability score of 0.987. Aspects of climate change consist of reality, causes, consequences, spatial distance and time distance. Meanwhile, the disaster risk knowledge instrument in this study adapts the LIPI (2021) measuring instrument, which consists of 12 items with a reliability score of 0.932. Aspects of disaster risk knowledge consist of knowledge and attitudes, policies, emergency response plans, disaster warning systems and resource mobility.

Data Analysis

This research data analysis uses classic assumption test analysis which includes residual normality test, linearity test, multicollinearity test and simple regression test.

Result

The results of this study contain some data including the categorization of respondents based on gender, age, disaster risk knowledge score, climate change perception score, classical assumption test and simple regression test.

Table 1. Categorization of respondents based on gender

Male	49
Female	52
Total	101

Respondents of this study were 101 people who had filled out questionnaires online. The tabulation results show the characteristics of respondents according to gender, consisting of 49 men and 52 women.

Table 2. Categorization of respondents by age.

Age	Frequency	Percentage
18 - 20 years	46	45%
21 - 25 years	34	34%
26 - 30 years	11	11%
31 - 35 years	10	10%
old		
Total	101	100%

Furthermore, the categorization of respondents is based on age. This study is dominated by young people aged 18-20 years (45%), then 21-25 years old (34%), 26-30 years old (11%) and 31- 35 years old (10%).

Normality Test

Table 3. Residual Normality Test

No.	N	Kolmogorov Smirnov Test
1	101	0,893

Based on the table, it is known that the value of Kolmogorov-Smirnov $Z = 0.893$. The data shows that the distribution of disaster risk knowledge and climate change perception variables is normally distributed. This means that this study has a normal distribution of scale data.

Linearity Test

Table 4. Linearity Test

No.	Variables	F	Signification(p)
1	Disaster Risk with Climate Change	3,171	0,200

Based on the results of the linearity test calculation as presented in the table above, shows that the relationship between knowledge of disaster risk and perceptions of climate change. This is evidenced by a significant $p = 0.200$ or $p > 0.05$ and a linear F value = 3.171. This means that there is a relationship between the disaster risk knowledge variable and the perception of climate change in the younger generation.

Multicollinearity Test

The multicollinearity test results on this research variable show a *tolerance* value of 0.80 ($p > 0.10$) and a variance inflation factor value of 1.00 ($p < 0.10$). Based on this value, it can be concluded that there is no multicollinearity between variables. This means that there is a correlation between the independent variable and the dependent variable.

Regression Test

Table 5. Simple Regression Test

R	R Square	Sig.
0,627	0,393	000

The correlation test results show that there is a positive relationship between disaster risk knowledge and climate change perceptions in students. It is known that the significance value of the two variables is $000 < 0.05$, so the relationship between the two is significant. While the relationship between the two is correlated, it is known that the value of r Table (0.195) is greater than r Count which is 0.627. This means that the higher the knowledge of disaster risk in the younger generation, the more positive the younger generation's perception of climate change. While the effective contribution shows 39.3%, which means that disaster risk knowledge affects the perception of climate change by 39.3% and 69.7% is influenced by other factors.

Discussion

This study examines how the relationship between disaster risk knowledge and climate change perceptions in college students. The hypothesis of this study is accepted because the results of the study show empirical evidence that there is a significant relationship between disaster knowledge and climate change perceptions. r Table (0.195) is greater than r Count, which is 0.627. The effective contribution

shows 39.3%, which means that disaster risk knowledge affects the perception of climate change by 39.3% and 69.7% is influenced by other factors.

These results are by the framework of Notoatmodjo that perception is influenced by two major parts, namely external factors and internal factors (Notoatmodjo et al., 2012). One of them is knowledge, where the experience or knowledge that a person has is a very instrumental factor in interpreting the stimulus obtained. Furthermore, according to Robbins and Timothy (2008), perception is a process by which people organize and interpret their sensory impressions to give meaning to the surrounding environment (Robbins, n.d.). However, what a person perceives can be fundamentally different from objective reality. Thus, each individual has a different stimulus even though the same object is in front of them. The way individuals perceive the situation tends to be more significant than the situation itself.

The results of the study showing that there is a relationship between disaster risk knowledge is in linewith research conducted by Pan (2012) on community perceptions in Qingyuan revealed that residents believe that earthquakes occur periodically every five years. However, their knowledge of preventive measures during disasters was low, and their belief in the ability to control hazards and the perception of threats to their lives was also less strong (Pan, 2012).

According to Daryono, et al.'s (2009) research on multirisk, factors that influence how people perceive disaster risk include not only time, disaster scale and livelihoods (Daryono, 2009). In addition, other factors include information in all its forms, such as news, scientific knowledge and general knowledge. The more information received, the more people's perception of life will change. This research shows that it is important to increase disaster risk knowledge to obtain positive perceptions, especially regarding perceptions of climate change in Indonesia.

Utami (2019) reinforces that one of the important factors in the increase of disasters is climate change. Climate change has the potential to accelerate erosion and runoff and result in drought, and excess water that can lead to floods and landslides (Nurbayani & Utami, 2019). Increased rainfall levels due to climate change can also trigger flooding. Therefore, measures are needed to reduce risks and prevent these impacts (Tingsanchali, 2012). Therefore, increasing disaster risk knowledge makes the community's perception of climate change grow positively and the community can participate in preserving nature to minimize the impacts of climate change (Tingsanchali, 2012).

This study also found that the perception of climate change in students obtained results in the negative category. This is indicated by the average score of climate change perception reaching 33.78. Explained that evidence of climate change can be seen from the increase in global temperatures caused by human activities, such as the use of agricultural dust, biomass burning that emits organic droplets and soot particles, industrial processes that produce aerosols, and exhaust emissions from various human transportation (Shahzad, 2015).

The low perception of climate change in society has long been a focus of research. Climate change has had diverse effects on natural disasters and natural resources in African, Asian and Latin American countries, which can threaten food security (Pohl et al., 2010; Seo & Mendelsohn, 2008). Developed countries tend to be less exposed to the impacts of climate change than Indonesia, a developing country. This is based on previous studies (Calzadilla et al., 2013; Chapagain et al., 2009; Manandhar et al., 2011; Mertz et al., 2009; Sarr et al., 2015), indicating that factors such as the focus on rainfed agriculture, limited capital for adaptation, higher baseline temperatures, and greater exposure to extreme events tend to be more dominant in developing countries.

About perceptions of climate change, Valkengoed et.al focus on four things: reality, causes, consequences and timeframe (Van Valkengoed et al., 2022). These four things can have important implications for their behavior and support for climate change mitigation and adaptation policies. Various studies have examined which factors influence climate change perceptions, and how climate change perceptions in turn influence behavior and policy support (Clayton & Myers, 2015; Swim et al., 2011)

One of the reasons why perceptions of climate change can be negative is because people believe that the changes are mainly caused by natural factors. According to research conducted by Gifford et.al when a person believes that climate change is mainly caused by natural factors, their belief that the problem is beyond human control is strong (Gifford et al., 2011). When a person believes that the environmental problem at hand is something that is beyond human control, then it can be an internal obstacle in motivating individuals to find solutions. According to Heath and Gifford in 2006, this is related to the

extent to which individuals believe that the actions they take will have real effects or not (Swim et al., 2011).

Previous research has highlighted the importance of a positive outlook on climate change. This suggests that individuals who are active in addressing climate change issues are influenced by several factors, such as a strong belief that climate change is happening (Haryanto & Prahara, 2017; Milfont et al., 2015), as well as individuals' understanding of the causes of climate change and responsibility in addressing it, known as responsibility attribution (Jang, 2013; Swim et al., 2011). According to Weber, these factors can be significant in driving action both individually and collectively in response to climate change challenges (Weber, 2015).

The next result of this research is to contain data on the low knowledge of students about disaster risk in the surrounding environment. The average score obtained was 30.54. This low knowledge has an impact on casualties in disasters that have occurred in the last five years in Indonesia. Data from the National Disaster Management Agency (BNPB) noted that in the last five years (2016-2021) there have been 17,032 natural disaster events in Indonesia. Thousands of these events have caused 30,139,694 people to be displaced, 28,928 people injured, 6,655 people dead and 1,043 people missing to date. The data is dominated by extreme weather disasters, then floods and landslides (Antaranews, 2021).

The importance of knowledge about disaster risk is by research by Nurdin et.al that increasing understanding and ability to deal with disasters has great potential to save more lives and become capital in dealing with disaster situations (Nurdin et al., 2017). It can also reduce negative impacts on people and property when disasters occur, as stated by Nurdin et.al. (2017). This confirms the need to continuously develop capacity through increased knowledge and skills in disaster management, so that the risks and consequences of disasters can be minimized.

One way to improve understanding of disaster risk is to coordinate all the strengths, resources and support from communities or organizations that can contribute to achieving common goals, including efforts to reduce disaster risk (Syarif et al., 2022). One method to strengthen community preparedness for disasters is through the implementation of programs organized by both the government and related institutions. The stronger the capacity, the fewer losses that may occur due to disasters (Setiawan, 2014).

Conclusion

Based on the results of the study, it can be concluded that there is a significant relationship between disaster risk knowledge and climate change perceptions in students. In addition, the results also show that disaster risk knowledge in students is in the low category and the perception of climate change in students is in the negative category.

The results showed the need for disaster mitigation education among students to increase disaster risk knowledge so that students' perceptions of climate change can also be positive in responding to the situation. This recommendation can be a valuable input for universities and the Ministry of Education and Culture to include disaster-related material in enrichment programs for students.

Suggestion

This research can be a study material for agencies engaged in the field of disaster, especially in reducing disaster risk. In addition, this research can also be a reference to provide education to students about climate change and its impacts and disaster mitigation education for students.

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