Geosfera Indonesia
p-ISSN 2598-9723, e-ISSN 2614-8528
available online at : https://jurnal.unej.ac.id/index.php/GEOSI
Vol. 7 No. 2, August 2022, 136-149

https://doi.org/10.19184/geosi.v7i2.30236

Research Article

The Effect of Gender and Academic Levels Differences on Disaster Preparedness Knowledge of Pre-Service Teachers

Rima Meilita Sari[1,*], Ridhwan Ridhwan[2]
[1]Geography Education Study Program, Faculty of Teacher Training and Education, Universitas Samudra, Langsa, Aceh, Indonesia
[2]Geography Education Study Program, STKIP Al-Washliyah, Banda Aceh, Aceh, Indonesia
*Corresponding author, E-mail address : rima.melita.sari@unsam.ac.id

ARTICLE INFO

Article history

Received :
19 February 2022

Revised :
16 July 2022

Accepted :
27 July 2022

Published :
28 August 2022

ABSTRACT

The earthquake and tsunami experienced in Aceh created the importance of disaster preparedness. Efforts to improve disaster literacy, including knowledge of its effects, should be conducted. The aims of this study are 1) knowing the level of student's disaster preparedness knowledge, 2) obtaining gender differences in disaster preparedness knowledge, 3) knowing the difference in academic level on disaster preparedness knowledge, 4) knowing the effect of interaction between gender and academic level on disaster preparedness knowledge. This research involved Geography pre-service teachers on STKIP Al-Washliyah. The results were quantitative data obtained from a disaster preparedness knowledge test, and data collection used multiple-choice tests. A knowledge test instrument was created and validated for data validity and reliability using a wondershare quiz generator. Data were analyzed using an index to decide the extent of knowledge on disaster preparedness. The ANCOVA approach was evaluated to examine the relationship between gender and educational degree. The results indicate that 1) the score for knowledge of disaster preparedness is 49.11, which indicates that knowledge is still in the low category, 2) there is a difference in knowledge of disaster preparedness between male and female pre-service geography teachers with a significant value of 0.004 (<0.05), 3) there is a difference in knowledge of pre-service geography teacher with different academic levels and significance value of 0.000 (<0.05), 4) when viewed from the interaction between gender and academic level, no significant relationship was found on knowledge of disaster preparedness with a score of 0.185 (p> 0.05). According to the findings, it is crucial to increase disaster preparedness knowledge in basic and advanced courses of geography education study programs. Therefore, pre-service geography teachers have good knowledge and skills in disaster preparedness. One of the steps to increase knowledge is providing teaching materials and disaster simulation programs.

Keywords : Disaster preparedness knowledge; Pre-service teacher; Gender; Academic levels

1. Introduction

In the aftermath of the 2004 earthquake and tsunami, all attention was paid to Aceh Province as the region most affected and suffered heavy losses causing the death of 166,541 people (BNPB, 2012). There have been 5 earthquakes in Aceh in the last five years, from 2018-2022. These include the earthquakes in Sabang, Semeulue, and Pidie in June 2020, January 2020, and February 2008,

respectively. Five disaster events from 2018 to 2022 caused property losses, including damage to 82 houses and 9 public facilities (BNPB, 2022).

The loss experienced after the 2004 earthquake and tsunami showed that community disaster mitigation is still less than optimal. Meanwhile, the Aceh disaster risk index is in the high class with a value of 153.58 (BNPB, 2021). The high hazard and vulnerability levels cause the increased disaster risk index, but the management capacity is still low due to a lack of information and revel of screw-ups (Havwina et al., 2016). Knowledge and experience will shape and influence actions against disasters to be faced. They provide data that determine catastrophic response, and a mature attitude formed from this knowledge will directly shape disaster preparedness actions (Pribadi et al., 2021; Tkachuck et al., 2018). Therefore, knowledge is needed as an initial effort to build resilience to disasters (Fatouros & Capetola, 2021; Ferdous & Mallick, 2019; Fuhrmann et al., 2008; Gouramanis & Morales Ramirez, 2021; Hoffmann & Muttarak, 2017; Oktari et al., 2021). One concrete effort to instill understanding in the network is through disaster education.

Catastrophe training has become the focal point of knowledge for improvement in Indonesia (Desvandi, 2014; Irawan et al., 2018). The development of disaster learning is found in Law No. 24 of 2007 regarding Disaster Management. Particularly in Aceh Province, a regional regulation (qanun) for the Governor integrates Disaster Education into the curriculum (Sakurai et al., 2018). Disaster education is also supported by increasing public consciousness of capacity failures. Education was determined to be an effective means of enhancing knowledge preparedness. Students and schools are better prepared for disasters when they have adequate information (Amirudin et al., 2015; Tkachuck et al., 2018). Education at the tertiary level is a remedy for initiatives to build catastrophe resilience capabilities.

Instilling knowledge of disaster preparedness in pre-service teachers is one of the basic steps. They will teach in several schools later to provide disaster education and counselling to students (Tkachuck et al., 2018). In addition, they are the most effective resource for instilling awareness through training, simulations and disaster management education (Kawasaki et al., 2022; Sakurai et al., 2018). Therefore, training pre-service teachers to know about disaster preparedness is very important.

The background above illustrates the importance of instilling disaster preparedness knowledge through geography (Gong et al., 2021). Research from Pribadi et al. (2021) explained that the lack of knowledge of earthquake-resistant infrastructure hinders decision-making and planning. Therefore, it requires increasing knowledge of earthquake-resistant information and infrastructure. Research results from Cvetković et al. (2015) showed that sources of disaster information would affect students' perceptions. The mature knowledge will directly form an attitude toward disaster preparedness (Syuaib, 2013). Understanding pre-service teachers' fundamental knowledge is critical to creating disaster preparation expertise.

The issue of gender differences and education levels is interesting to study. This study provides information on the influence of gender and academic level on disaster preparedness knowledge. The assessment is crucial to tally decision-making according to the conditions (Ferdous & Mallick, 2019). Several previous studies have examined gender differences in vulnerability to disasters (Fatouros & Capetola, 2021; Ferdous & Mallick, 2019; Fujii & Kanbara, 2019; Khan et al., 2020; Khandekar et al., 2019; Phan et al., 2019; Rahman et al., 2021; Ruszczyk et al., 2020; Sikandar & Khan, 2018). Other studies have investigated the effect of schooling on vulnerability and disaster preparedness (Alim et al., 2015; Amini et al., 2021; Baytiyeh & Naja, 2015; Ersoy et al., 2015; Hoffmann & Blecha, 2020; Tkachuck et al., 2018). The influence of gender and education on disaster preparedness has been examined. However, there is no report on the academic level in formal and pre-service teacher education or the relationship between gender and education level on disaster preparedness knowledge. Therefore, the combined perspective of gender and academic level on knowledge of disaster preparedness was analyzed. The aims of the study were: (1) Knowing the level of disaster preparedness knowledge; (2) Knowing the different knowledge of disaster preparedness in terms of gender differences; (3) Knowing

the difference in disaster preparedness knowledge in terms of differences in academic levels. (4) Determining the interaction effect between gender and academic level on knowledge of disaster preparedness.

2. Methods

2.1 Research Design

The research data was quantitatively generated from the answers to the disaster preparedness knowledge. A descriptive method was used to describe the data, compare, and draw conclusions comprehensively. The data utilized are the results of a disaster preparation knowledge assessment of pre-service geography teachers regarding gender disparities and academic levels.

2.2 Data Collection

The study involved 137 students of the geography education study program in STKIP Al-Washliyah who were still active, consisting of a 2016 – 2020 academic level. The pre-service geography teacher at STKIP Al-Washliyah selected the course since the school is located in an earthquake and tsunami-prone location. The population of teachers from Aceh regions was tormented by the earthquake and tsunami, such as on the west coast of Aceh Province (Nagan Raya District, West Aceh District, Southwest Aceh District, Aceh Singkil District, and South Aceh District). Another problem for selecting the research subjects is due to the condition of the disaster vulnerability of the coastal areas of Aceh is classified in the high category (Disaster risk index = 153.58)(BNPB, 2021). Based on these reasons, this research can be part of the basic information in designing policies to increase disaster preparedness expertise in schools, teachers and students.

The examination lasted three months, consisting of needs analysis, preparation of test instruments, and implementation. For clarity, the research subjects can be visible inside the following Table 1.

Table 1. Research subject

Academic Level	Male	Female
2016	9	8
2017	11	10
2018	23	5
2019	16	8
2020	20	27

Based on data from Table 1, a total of 137 research subjects comprised 79 males and 58 females aged 18-34. A personal identity form is provided in the test, and the study's anonymity was greatly appreciated. Therefore, the respondent's name was not attached in writing this manuscript. Statistics series strategies the usage of a questionnaire with the help of a wondershare quiz creator software, and the test consisted of 50 multiple choice questions.

a. Research Instrument

Instruments given to pre-service teachers amounted to 137 people, and the tests were given at the same time. The instrument used was similar to Sari et al. (2020) and was tested by material and language experts. Furthermore, it was developed with an academic qualification level under the subject of this research (pre-service teacher). The instrument has been integrated with the Wondershare quiz creator, a web assessment. Therefore, testing disaster preparedness knowledge is not limited by space

and time. The instrument contains four indicators focused on disaster knowledge of earthquakes, tsunamis, and floods. The indicators are 1) basic knowledge of disaster, 2) planned activities during disasters, 3) disaster warning systems, and 4) resource mobilization (Hidayati et al., 2011). The assessment of the instrument uses a scoring technique on multiple choice questions. A value of 0 and 1 means the answer is inaccurate and correct, respectively. Validity and reliability tests were conducted to assess disaster preparedness knowledge accurately. The test was conducted on 30 pre-service teachers who had taken a disaster geography course. The validity and the statistics reliability tests use Pearson and Cronbach alpha, and the results analyzed the four indicators showing a range of 0.000 – 0.028 and 0.970 > 0.306 (r table). The test instrument is considered suitable to test knowledge of disaster preparedness when the value is valid and reliable.

b. Data analysis

The data is generated in the shape of quantitative facts. Quantitative records become data consisting of numbers as the main material for conducting analyses to answer research questions (Sugiono, 2015). The level of students' disaster preparedness knowledge was determined by using the disaster preparedness knowledge index, which can be identified through the Eq. 1 :

$$\text{Index} = \frac{Real\ Value}{\text{Maximum Value}} x\ 100 \quad (1)$$

Source: Hidayati et al., (2011)

Disaster preparedness knowledge level was determined by using a disaster preparedness index. It was divided into 3 categories: low, medium, and high, which are viewed in Table 2.

Table 2. Disaster Preparedness Index

Index Value	Category
80 – 100	High
60 – 79	Medium
< 60	Low

Source: Hidayati et al., (2011)

ANCOVA data analysis was used with the assistance of SPSS 23 for windows to answer the question on disaster preparedness knowledge differences in gender and the level of academics. Figure 1 explains the framework of the research flow.

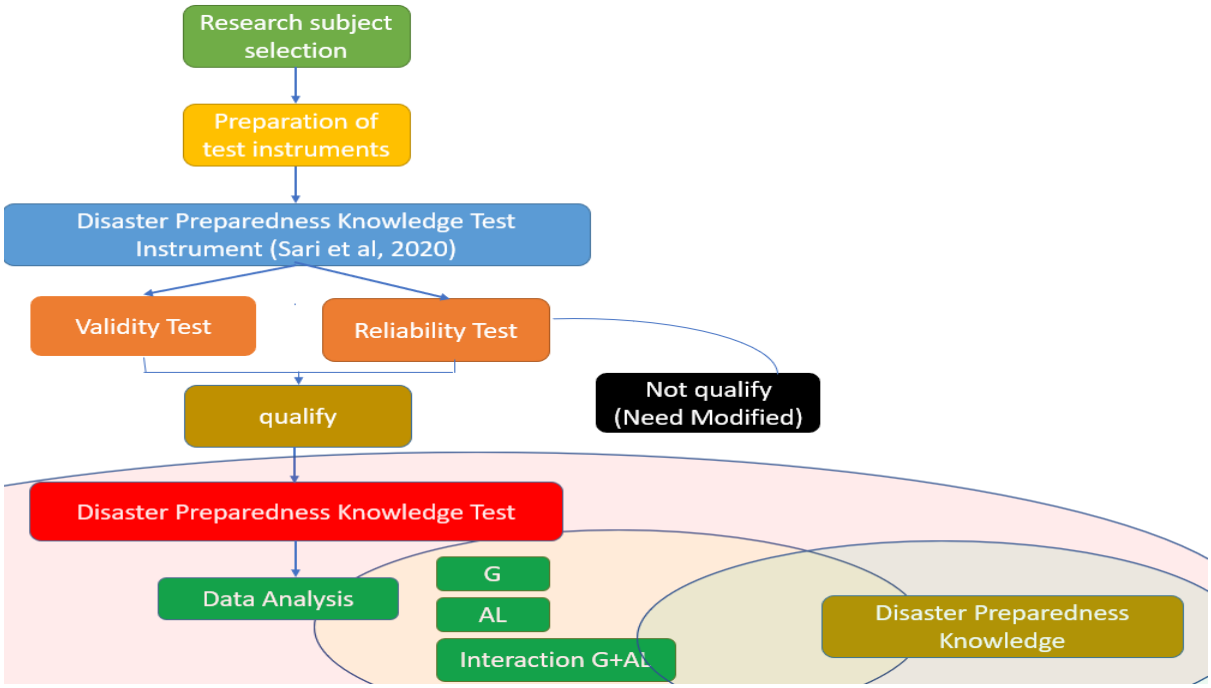

Figure 1. Research flow

3. Results and Discussion

The section provided answers to four research focuses, namely 1) the level of students' knowledge preparedness, 2) the students' preparedness knowledge viewed from gender differences, 3) the differences in students' knowledge when viewed from academic years, and 4) the effect of interaction between gender and years of academic to students' disaster preparedness knowledge.

3.1 Disaster Preparedness Knowledge Level

The parameters of disaster preparedness knowledge were used to decide the level of preparedness. It consisted of knowledge of disaster preparedness, planned activities during disasters, early caution systems, and useful resource mobilization (Table 3).

Table 3. Disaster preparedness knowledge level

Variable	Indicators of Disaster Preparedness Knowledge				Total
	Basic Knowledge	Planned Activities During Disasters	Early Warning System	Resource Mobilization	
Male	52.20	52.00	51.00	58.00	52.68
Female	45.70	41.00	45.00	43.70	44.70
2016	57.20	55.46	66.18	60.78	58.82
2017	58.29	59.86	61.90	69.04	60.38
2018	59.85	66.33	52.23	67.85	60.50
2019	43.10	39.29	47.91	52.78	44.50
2020	39.62	27.96	34.31	31.21	36.13
Total	49.41	46.10	48.54	51.95	49.11

Table 3 shows that disaster preparedness knowledge is covered within the low class with a total value of 49.11. Male and female preparedness knowledge level is in the low category of 52.68 and 44.70. From the perspective of academic level, students who entered in 2017 and 2018 had scores of 60.38 and 60.50 in the medium category. Meanwhile, those who entered the college in 2016, 2019 and 2020 have low levels with grades of 58.82, 44.50, and 36.13, respectively. The indicator of planned activities during a disaster is the lowest value compared to others, with a value of 46.10. The indicator of the plan of activities included actions taken when a disaster occurred. Resource mobilization is the indicator with the highest score, including knowledge of training, simulation, outreach and evacuation of the disaster site.

The low index of disaster preparedness knowledge in planned activities was caused by many students who did not know the action to be taken during a disaster. In the case of an earthquake, they did not know what to do while in the classrooms, tall buildings and open fields. All indicators assessed in the test have a low disaster preparedness knowledge index. The lowest knowledge index is on the activity plan indicators. The test analysis found that prospective teachers were unprepared for an earthquake hazard. For example, they were confused about giving directions to students to evacuate. Teachers should be prepared to lead the evacuation process to the assembly point in an emergency. Disaster education is needed in the form of technology and learning methods that support simulations and exercises for teacher readiness (Torani et al., 2019). Pre-service teachers do not have knowledge related to disaster conditions contextually. For example, in the question of the location of the meeting point in Banda Aceh City in the event of a disaster, many of them do not know the specifics. They can provide basic knowledge to students about the causes of earthquakes and tsunamis, as well as an overview of the conditions (Cabello, 2022). This is reinforced by research from Seddighi et al., (2021) & Syuaib (2013) which stated that knowledge of actions in the occasion of a disaster is important to prepare for attitudes in the occasion of a disaster.

3.2 The Differences in Disaster Preparedness Knowledge When Viewed From Gender

The research generated was in the form of gender data, academic year, and disaster preparedness knowledge. Normality and homogeneity tests were carried out on data analysis. The normality test on the disaster preparedness knowledge showed a p-value of 0.085, greater than the Asiymp.Sig (2tailed) value of 0.05. The results show that data was normal with homogeneity of 0.303, greater than the value of 0.05. In conclusion, the variance of disaster preparedness knowledge data was homogeneous. The ANCOVA test can be continued based on the prerequisites for normality and homogeneity tests, as summarized in Table 4.

Table 4. ANCOVA Test for disaster preparedness knowledge

Dependent Variable	Source	Type III Sum of Squares	Df	Means Square	F	Sig	ηp2
Knowledge Preparedness Disaster	Corrected Model	3631.056[a]	3	1210.352	55.456	.000	.556
	Intercept	8007.135	1	8007.135	366.872	.000	.734
	Gender	187.490	1	187.490	8.590	.004	.061
	Academic Level	3088.317	1	3088.317	141.501	.000	.516
	Gender*Level Academic	38.834	1	38.834	1.779	.185	.013
	Error	2902.783	133	21.825			
	Total	89136.000	137				
	Corrected Total	6533.839	136				

Note:
[a]R Squared= .556 (Adjusted R Squared = .546)

Table 4 shows that there have been variations in disaster preparedness knowledge between male and female students. The value of effect test was F = 8.590 with the level of significance at 0.004 (p> 0.05). However, the effective contribution of gender differences to disaster preparedness knowledge was very small at 0.061. Furthermore, the findings were described more deeply through the percentage of knowledge achievement seen in Figure 2 .

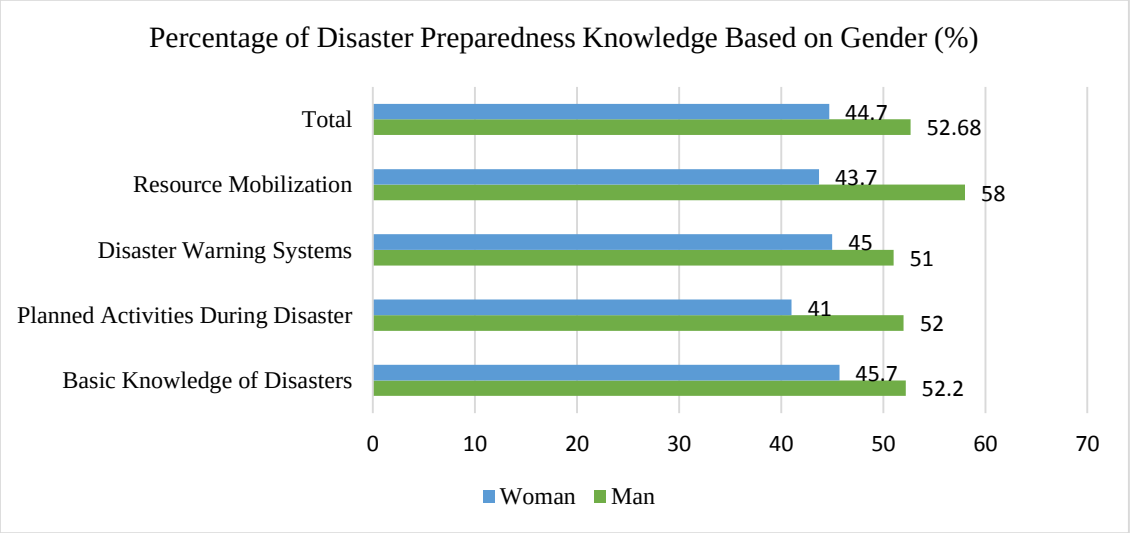

Figure 2. Percentage of disaster preparedness knowledge based on gender

According to Figure 2, male students are superior in disaster preparedness knowledge than females. This can be seen in the percentage of men totaling 52.68, confirming the findings of prior research by Norris et al. (2001), which stated the responsive attitudes of men are better than women in disaster mitigation efforts. The same is supported by research from Lavigne et al. (2008), where women are more panicked and have trauma to the incidence of disasters than men. Research findings from Fatouros & Capetola (2021); Ferdous & Mallick, (2019); Khandekar et al., (2019); Phan et al., (2019); Sikandar & Khan, (2019) explained that women have vulnerability to disasters, especially extreme climate events and natural disasters.

Men have more knowledge of disaster preparedness than women because of wider access to information. Research by Bhadra (2017); Cvetković et al., (2018); Sun & Sun, (2019) explained that men have better communication skills since they gather in communities, seek information, discuss, and provide solutions than women. Furthermore, research by Bhadra (2017) and Cvetković et al. (2018) stated that stress, fear of loss, anxiety, job security, and family welfare are very vulnerable to women during disaster. Another factor that lowers women's knowledge is limited access to information (Cvetković et al., 2018; Fatouros & Capetola, 2021).

Research from Rahman et al. (2020) showed that women have better knowledge than men. Roder et al., (2015) & Ruszczyk et al., (2020) reported that the duty of women is greater in disaster management, especially in small communities. This is because disaster education involves increasing knowledge, not physical strength (Hoffmann & Muttarak, 2017). Therefore, it provides an overview of the disaster situation with cultural changes and technological developments to obtain the same information related to disasters (Jose & Dufrene, 2014).

3.3 Disparity in Knowledge of Disaster Preparedness When Seen from the Academic Level

Results on the academic level variables Ancova test indicate differences in disaster preparedness knowledge between different academic levels (2016 - 2020). The value F = 141.501 has

a value p> 0.05, and academic level makes an effective contribution with a value of ηp2 = 0.516. Therefore, the differences in academic levels can affect knowledge of disaster preparedness. Further details for each indicator in terms of academic level can be seen in Figure 3.

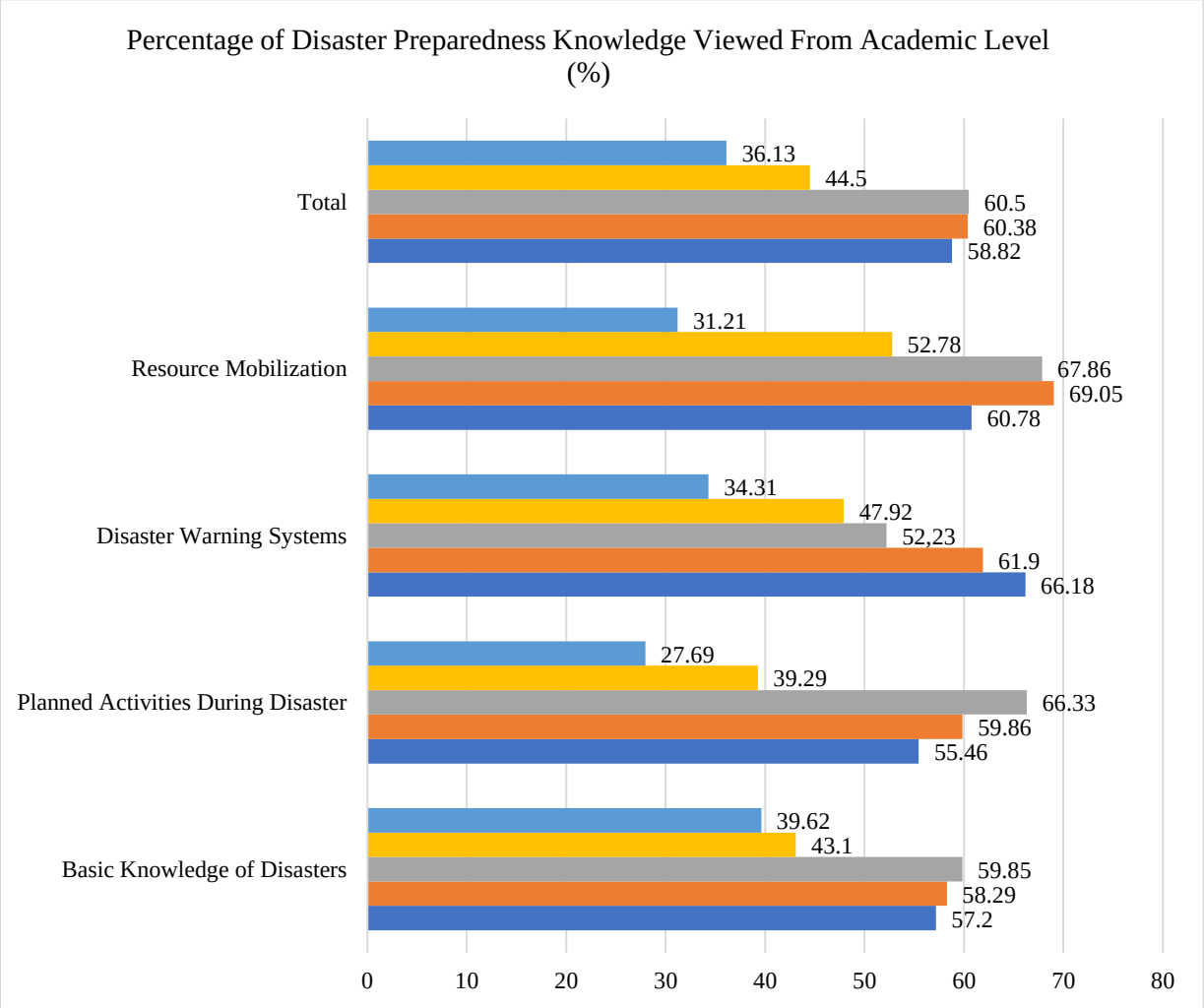

Figure 3. Percentage of disaster preparedness knowledge based on academic level

According to Figure 3, disaster preparedness knowledge differs from an academic level. This is evidenced by the percentage of total knowledge that appears to be significantly different. In the 2020 academic year students, the total achievement percentage was the lowest among the 2016-2019 academic years. This was because students at the 2020 academic level had less experience and knowledge. This is likely due to not yet taking a disaster subject and being relatively much younger than students of the previous batches.

Research by Syuaib (2013) supported this finding by stating that a person's age influences the level of thinking maturity. Age is also related to the amount of life experience gained. In this context, the disasters that had been experienced build more mature knowledge and readiness. Research from Cui & Han (2018); Hoffmann & Blecha (2020); Hoffmann & Muttarak (2017) explained that experience has a significant relationship to disaster knowledge. The average age of pre-service teachers at the 2020 academic level ranges from 18-20 years, and they did not have direct experience as in Aceh Tsunami 2004. On average, when the disaster occurred, they were still toddlers and did not remember how their parents and the community carried out the evacuation process.

At a higher academic level, the knowledge of disaster preparedness is also better. This is because pre-service teachers have received various experiences and training courses from seniors and lecturers in classroom education. Research from Yeon et al. (2020) stated that experience could provide an emotional response impacting the effectiveness of disaster education. The same result was reported by Daud et al. (2014), where learning makes students more prepared to anticipate future disasters. Widjanarko & Minnafiah (2018) stated that students who had been taught in disaster education are more aware of the conditions in the field.

Educational support facilities, such as teaching materials, learning media, and simulation training, are needed to provide better disaster education (Wahyuningtyas et al., 2021; Yeon et al., 2020). Furthermore, research by Cabello (2022); Sakurai et al. (2018); Sari & Ridhwan (2019) suggested that a compulsory disaster education curriculum is needed for all levels of education.

3.4 The Effects of Gender and Academic Levels on Disaster Preparedness Knowledge

Table 4 shows that the interaction between gender and academic level did not find a significant difference, as evidenced by the value of 0.185 ($p > 0.05$), and other external factors play a role in disaster preparedness knowledge. Vasques et al. (2018) stated that disaster preparedness could be caused by experience and knowledge. Furthermore, Desvandi (2014) & Permana et al. (2011) reported that it could also arise from regional conditions that provide natural learning to cope with disasters. This learning can be obtained through fairy tales and poetry, which are included in local wisdom. According to Overton (Overton, 2014), social and cognitive conditions can affect disaster management activities through physical and psychological actions. Disaster experience factors, response to disaster events, economic level, welfare, and information acquisition are important factors to be considered (Cui & Han, 2018; Ferdous & Mallick, 2019; Hoffmann & Blecha, 2020; Yeon et al., 2020)

4. Conclusion

Pre-service teachers' knowledge of disaster preparedness is still low, especially in the indicators of activity plans during a disaster. Based on the findings, it was found that pre-service teachers still cannot determine the initial rescue steps when a disaster occurs, such as not knowing how to evacuate when they are with students. The findings show that the difference in knowledge of disaster preparedness differs from a gender perspective. The value of the findings on knowledge between different genders found that women's knowledge differed from men's, with women getting lower scores. Furthermore, higher academic levels relate to disaster knowledge and simulation activities in geography courses. Pre-service teachers with lower academic levels do not receive training or disaster geography courses. Other external factors are economic level, experience, equality of treatment during tests and learning or disaster simulations.

Conflicts of Interest

The authors are not involved in a conflict of interest from funds, personal and institutional or any other relationships from this article.

Acknowledgements

The authors are grateful to the Universitas Samudra and STKIP Al-Washliyah for supporting this research. The gratitude is also for all people who helped in the research.

References

Alim, S., Kawabata, M., & Nakazawa, M. (2015). Evaluation of disaster preparedness training and disaster drill for nursing students. *Nurse Education Today*, *35*(1), 25–31. https://doi.org/10.1016/j.nedt.2014.04.016.

Amini, R., Biglari, F., Khodaveisi, M., & Tapak, L. (2021). Effect of education based on the health belief model on earthquake preparedness in women. *International Journal of Disaster Risk Reduction*, *52*(November), 101954. https://doi.org/10.1016/j.ijdrr.2020.101954.

Amirudin, A., Handoyo, B., & Soekamto, H. (2015). Characteristics of disaster pre liminary research in developing learning model of environment education based on the disaster in efford to grow an cultural anticipatory. *Jurnal Pendidikan Geografi*, *20*(1), 59–67. https://doi.org/10.17977/pg.v20i1.5012.

Baytiyeh, H., & Naja, M. K. (2015). Are colleges in Lebanon preparing students for future earthquake disasters? *International Journal of Disaster Risk Reduction*, *14*, 519–526. https://doi.org/10.1016/j.ijdrr.2015.10.007.

Betty Hearn Morrow, E. E. (1996). Hurricane andrew through women's eyes: issues and recommendations. In *International Journal of Mass Emergencies and Disasters 14*(1), 5–22.

Bhadra, S. (2017). Women in disasters and conflicts in india: interventions in view of the millennium development goals. *International Journal of Disaster Risk Science*, *8*(2), 196–207. https://doi.org/10.1007/S13753-017-0124.

BNPB. (2012). *Menuju Indonesia Tangguh Tsunami*. BNPB.

BNPB. (2021). Indeks Risiko Bencana Indonesia (IRBI) Tahun 2020. *Badan Nasional Penanggulangan Bencana*, 78. https://inarisk.bnpb.go.id/pdf/BUKU IRBI 2020 KP.pdf.

BNPB. (2022). *Geoportal Data Bencana Indonesia*. https://gis.bnpb.go.id/.

Cabello, V. M. (2022). Students Understanding of Earthquakes and Tsunamis in High Risk Areas. *Frontiers in Earth Science*. https://doi.org/10.3389/feart.2022.841251.

Cui, K., & Han, Z. (2018). Association between disaster experience and quality of life: the mediating role of disaster risk perception. *Quality of Life Research 2018 28:2*, *28*(2), 509–513. https://doi.org/10.1007/S11136-018-2011-4.

Cvetković, V. M., Dragićević, S., Petrović, M., Mijalković, S., Jakovljević, V., & Gačić, J. (2015). Knowledge and perception of secondary school students in belgrade about earthquakes as natural disasters. *Polish Journal of Environmental Studies*, *24*(4), 1553–1561. https://doi.org/10.15244/pjoes/39702.

Cvetković, V. M., Roder, G., Öcal, A., Tarolli, P., & Dragićević, S. (2018). The Role of gender in preparedness and response behaviors towards flood risk in Serbia. *International Journal of Environmental Research and Public Health*, *15*(12). https://doi.org/10.3390/IJERPH15122761.

Daud, R., D., Sari, S., A., Milfayetty, S., & Dirhamsyah, M. (2014). Penerapan pelatihan siaga bencana dalam meningkatkan pengetahuan, sikap, dan tindakan komunitas SMA Negeri 5 Banda Aceh. *Jurnal Ilmu Kebencanaan Pascasarjana Universitas Syiah Kuala*, *1*(1), 26–34.

Desvandi, M. (2014). Urgensi kurikulum pendidikan kebencanaan berbasis kearifan lokal di Indonesia. *Sosio Didaktika*, *1*(2), 191–198.

Ersoy, Ş., & Kocak, A. (2015). Disasters and earthquake preparedness of children and schools in Istanbul, Turkey. *Geomatics, Natural Hazards and Risk*, *7*(4), 1307-1336. https://doi.org/10.1080/19475705.2015.1060637.

Fatouros, S., & Capetola, T. (2021). Examining Gendered Expectations on Women's Vulnerability to Natural Hazards in Low to Middle Income Countries: A critical Literature Review. *International Journal of Disaster Risk Reduction*, *64*(January), 102495. https://doi.org/10.1016/j.ijdrr.2021.102495.

Ferdous, J., & Mallick, D. (2019). Norms, practices, and gendered vulnerabilities in the lower Teesta basin, Bangladesh. *Environmental Development*, *31*(October 2018), 88–96. https://doi.org/10.1016/j.envdev.2018.10.003.

Fuhrmann, S., Stone, L. D., Casey, M. C., Curtis, M. D., Doyle, A. L., Earle, B. D., Jones, D. J., Rodriguez, P., & Schermerhorn, S. M. (2008). Teaching disaster preparedness in geographic education. *Journal of Geography*, *107*(3), 112–120. https://doi.org/10.1080/00221340802458482.

Fujii, M., & Kanbara, S. (2019). Analysis of gender differences in disaster preparedness for nankai trough earthquake.*Health Science Journa*l, *13*(2), 3–6. https://doi.org/10.21767/1791-809X.1000644.

Gong, Q., Duan, Y., & Guo, F. (2021). Disaster risk reduction education in school geography curriculum: Review and outlook from a perspective of china. *Sustainability (Switzerland)*, *13*(7), 1–16. https://doi.org/10.3390/su13073963.

Gouramanis, C., & Morales Ramirez, C. A. (2021). Deep understanding of natural hazards based on the Sendai framework for disaster risk reduction in a higher education geography module in Singapore. *International Research in Geographical and Environmental Education*, *30*(1), 4–23. https://doi.org/10.1080/10382046.2020.1751391.

Havwina, T., Maryani, E., & Nandi, N. (2016). Pengaruh Pengalaman bencana terhadap kesiapsiagaan peserta didik dalam menghadapi ancaman gempa bumi dan tsunami. *Gea Jurnal Pendidikan Geografi*, *16*(2), 124–131.

Hidayati, D., Widayatun, Hartana, P., Triyono, & Kusumawati, T. (2011). *Panduan Mengukur Tingkat Kesiapsiagaan Masyarakat dan Komunitas Sekolah*. LIPI Press.

Hoffmann, R., & Blecha, D. (2020). Education and disaster vulnerability in Southeast Asia: Evidence and policy implications. *Sustainability (Switzerland)*, *12*(4), 1–17. https://doi.org/10.3390/su12041401.

Hoffmann, R., & Muttarak, R. (2017). Learn from the Past, Prepare for the Future: Impacts of Education and Experience on Disaster Preparedness in the Philippines and Thailand. *World Development*, *96*, 32–51. https://doi.org/10.1016/J.WORLDDEV.2017.02.016.

Irawan, L. ., Ayuni, I. K., & Sumarmi. (2018). School preparedness toward Kelud Eruption Hazard (Case Study on Kelud Disaster Prone Area). *IOP Conf. Series: Earth and Environmental Science 145*. https://doi.org/10.1088/1755-1315/145/1/012027.

Iskandar, A., Rizal, M., Kurniasih, N., Sutiksno, D. U., & Purnomo, A. (2018). The effects of multimedia learning on students achievement in terms of cognitive test results. *Journal of Physics: Conference Series*, *1114*(1). https://doi.org/10.1088/1742-6596/1114/1/012019.

Johnson, V. A. (2011). *Disaster Preparedness Education in Schools: Recommendations for New Zealand and the United States*. Fullbright.

Jose, M. M., & Dufrene, C. (2014). Educational competencies and technologies for disaster preparedness in undergraduate nursing education: An integrative review. *Nurse Education Today*, *34*(4), 543–551. https://doi.org/10.1016/J.NEDT.2013.07.021.

Kalanlar, B. (2018). Effects of disaster nursing education on nursing students' knowledge and preparedness for disasters. *International Journal of Disaster Risk Reduction*, *28*, 475–480. https://doi.org/10.1016/J.IJDRR.2017.12.008.

Kawasaki, H., Yamasaki, S., Yamakido, M., & Murata, Y. (2022). Introductory disaster training for aspiring teachers: a pilot study. *Sustainability (Switzerland)*, *14*(6). https://doi.org/10.3390/su14063492.

Khan, A. A., Rana, I. A., & Najam, F. A. (2020). Assessing school safety against natural and human-made hazards : A case study of Gilgit city , Pakistan. *Journal of Geography and Social Sciences*, *2*(2), 133-147.

Khandekar, N., Gorti, G., Bhadwal, S., & Rijhwani, V. (2019). Perceptions of climate shocks and gender vulnerabilities in the Upper Ganga Basin. *Environmental Development*, *31*(August), 97–109. https://doi.org/10.1016/j.envdev.2019.02.001

Lavigne, F., Coster, B. D., Juvin, N., Flohic, F., Gaillard, J. ., Texier, P., Morin, J., & Sartohadi, J. (2008). People's behaviour in the face of volcanic hazards: Perspectives from Javanese communities, Indonesia. *Journal Volcanol.Geotherm. Res*, *172*, 273–287. https://doi.org/10.1016/j.jvolgeores.2007.12.013.

Mardani, A., Suryani, N., & Ahmad, N. (2021). Development of interactive multimedia for earthquake disaster preparedness in elementary school. *IOP Conference Series: Earth and Environmental Science*, *683*(1). https://doi.org/10.1088/1755-1315/683/1/012044.

Norris, F. ., Perilla, J. L., Ibanez, G. E., & Murphy, A. D. (2001). Sex Differences in Symptoms of Posttraumatic Stress: Does Culture Play a Role? *Journal Trauma Stress*, *14*, 7–28.

Oktari, R. S., Kamaruzzaman, S., Fatimahsyam, F., Sofia, S., & Sari, D. K. (2021). Gender mainstreaming in a disaster-resilient village programme in Aceh Province, Indonesia: Towards disaster preparedness enhancement via an equal opportunity policy. *International Journal of Disaster Risk Reduction*, *52*(11), 101974. https://doi.org/10.1016/j.ijdrr.2020.101974.

Overton, L. R. (2014). From Vulnerability to Resilience: An exploration of gender performance art and how it has enabled young women's empowerment in post-hurricane new Orleans. *Procedia Econ. Financ*, *18*, 214–221.

Permana, R. C. E., Nasution, I, P., & Gunawijaya, J. (2011). Kearifan lokal tentang mitigasi bencana pada Masyarakat Baduy. *Makara, Sosial Humaniora*, *15*(1), 167–176.

Phan, L. T., Jou, S. C., & Lin, J. H. (2019). Gender inequality and adaptive capacity: The role of social capital on the impacts of climate change in Vietnam. *Sustainability (Switzerland)*, *11*(5). https://doi.org/10.3390/su11051257.

Pribadi, K. S., Abduh, M., Wirahadikusumah, R. D., Hanifa, N. R., Irsyam, M., Kusumaningrum, P., & Puri, E. (2021). Learning from past earthquake disasters: The need for knowledge management system to enhance infrastructure resilience in Indonesia. *International Journal of Disaster Risk Reduction*, *64*(June), 102424. https://doi.org/10.1016/j.ijdrr.2021.102424.

Rahman, M. M., Khan, S. J., Sakib, M. S., Halim, M. A., Rahman, M. M., Asikunnaby, & Jhinuk, J. M. (2021). COVID-19 responses among university students of Bangladesh: Assessment of status and individual view toward COVID-19. *Journal of Human Behavior in the Social Environment*, *31*(1-4), 512-531. https://doi.org/10.1080/10911359.2020.1822978.

Ridhwan R., Sumarmi S., Ruja, I. N., Utomo, D. H., & Sari, R. M. (2020). Measuring students environmental problem solving ability across gender and school differences using paper based testing. *International Journal of Emerging Technologies in Learning*, *15*(13), 303–320. https://doi.org/10.3991/ijet.v15i13.11709.

Robiansyah, I. E., Mudjito, Yuliyati, & Atiqoh. (2019). Developing interactive multimedia Flood Prevention Education (FPE) on disaster risk reduction learning for students with hearing impairment in special school. *2019 5th International Conference on Education and Technology, ICET 2019*, 135–138. https://doi.org/10.1109/ICET48172.2019.8987227.

Roder, G., Ruljigaljig, T., Lin, C. W., & Tarolli, P. (2015). Natural hazards knowledge and risk perception of Wujie indigenous community in Taiwan. *Natural Hazards 2015 81:1*, *81*(1), 641–662. https://doi.org/10.1007/S11069-015-2100-4.

Ruszczyk, H. A., Upadhyay, B. K., Kwong, Y. M. (Connie), Khanal, O., Bracken, L. J., Pandit, S., & Bastola, R. (2020). Empowering women through participatory action research in community-based disaster risk reduction efforts. *International Journal of Disaster Risk Reduction*, *51*(July), 101763. https://doi.org/10.1016/j.ijdrr.2020.101763.

Sakurai, A., Bisri, M. B. F., Oda, T., Oktari, R. S., Murayama, Y., Nizammudin, & Affan, M. (2018). Exploring minimum essentials for sustainable school disaster preparedness: A case of elementary schools in Banda Aceh City, Indonesia. *International Journal of Disaster Risk Reduction*, *29*, 73–83. https://doi.org/10.1016/J.IJDRR.2017.08.005.

Sari, R. M., & Ridhwan R. (2019). Investigasi pengetahuan kesiapsiagaan bencana pada mahasiswa ditinjau dari perbedaan gender. *Jurnal Georafflesia*, *4*(2), 101–110.

Sari, R. M., Ridhwan, & Sumarmi. (2020). Development of web-based disaster preparedness knowledge measurement instruments using the wondershare quiz creator software. In *International Conference on Online and Blended Learning 2019 (ICOBL 2019)* (pp. 85-89). Atlantis Press. https://doi.org/10.2991/assehr.k.200521.018.

Seddighi, H., Sajjadi, H., Yousefzadeh, S., López López, M., Vameghi, M., Rafiey, H., & Khankeh, H. R. (2021). Representation of disasters in school textbooks for children with intellectual disabilities in Iran: A qualitative content analysis. *International Journal of Disaster Risk Reduction*, *53*, 101987. https://doi.org/10.1016/j.ijdrr.2020.101987.

Sikandar, R., & Khan, A. (2019). Linking gender vulnerability and disasters. In *Disaster risk reduction* (pp. 215-230). Palgrave Macmillan, Singapore.

Sugiono. (2015). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualititif, dan RnD*. Alfabeta.

Sun, Y., & Sun, J. (2019). Perception, preparedness, and response to tsunami risks in an aging society: Evidence from Japan. *Safety Science*, *118*(April 2018), 466–474. https://doi.org/10.1016/j.ssci.2019.05.060.

Syuaib, M. Z. (2013). Pengaruh strategi pembelajaran simulasi Vs bermain peran dan sikap siswa terhadap pengetahuan dan kesiapsiagaan tentang bencana alam. *Jurnal Pendidikan Humaniora*, *1*(2), 177 – 189.

Tkachuck, M. A., Schulenberg, S., & Lair, E., C. (2018). Natural disasater preparedness in college student: implications for institutions of higher learning. *Journal America College Health*, *66*(4), 269 – 279. https://doi.org/10.1080/07448481.2018.1431897.

Torani, S., Majd, P., Maroufi, S., Dowlati, M., & Sheikhi, R. (2019). The importance of education on disasters and emergencies: A review article. *Journal of Education and Health Promotion*, *8*(1). https://doi.org/10.4103/JEHP.JEHP_262_18.

Tsai, M.-H., Wen, M.-C., Chang, Y.-L., & Kang, S.-C. (2015). Game-based education for disaster prevention. *AI & SOCIETY*, *1*, 463–475. https://doi.org/10.1007/s00146-014-0562-7.

Tsai, M. H., Chang, Y. L., Shiau, J. S., & Wang, S. M. (2020). Exploring the effects of a serious game-based learning package for disaster prevention education: The case of Battle of Flooding Protection. *International Journal of Disaster Risk Reduction*, *43*, 101393. https://doi.org/10.1016/J.IJDRR.2019.101393.

Vasquez, A., Marinkovic, K., Bernales, M., Leon, J., Gonzalez, J., & Castro, S. (2018). Children's views on evacuation drills and school preparedness: mapping experiences and unfolding perspectives. *International Journal of Disaster Risk Reduction*, *28*, 165–175. https://doi.org/10.1016/j.ijdrr.2018.03.001.

Wahyuningtyas, N., Ruja, I. N., Yahya, M. H., Wijaya, D. N., & Ibrahim, M. H. (2021). Developing of a learning media for smartphones for disaster mitigation education. *International Journal of Emerging Technologies in Learning*, *16*(7), 160–174. https://doi.org/10.3991/ijet.v16i07.21195.

Widjanarko, M., & Minnafiah, U. (2018). Pengaruh pendidikan kebencanaan pada perilaku kesiapsiagaan siswa. *Journal Ecopsy*, *5*(1), 1–7. https://doi.org/10.20527/ecopsy.v5i1.4878.

Yeon, D. H., Chung, J. B., & Im, D. H. (2020). The effects of earthquake experience on disaster education for children and teens. *International Journal of Environmental Research and Public Health, 17*(15), 5347. https://doi.org/10.3390/IJERPH17155347