Edu-Sibenawa App: A Digital Tool for Enhancing Disaster Preparedness Among Nursing and Midwifery Students in Indonesia

Lita[1*], Wahyu Widodo[2], Retno Anggraeni Puspita Sari[3], Tarudin[4], Siti Rohimah[5], Mukhlasin[6], Budi Astyandini[7], Ade Herman Surya Direja[8]

[1]Universitas Hang Tuah Pekanbaru, Riau, 28294, Email: lita@htp.ac.id
[2]Stikes Pemkab Purworejo, Central Java, 54224, Email: wahyu@akperkabpurworejo.ac.id
[3]UniversitasMedikaSuherman, West Java, 17530, Email: retnoang12@gmail.com
[4]UniversitasJenderalAchmadYaniCimahi, West Java, 40531, Email:tarudin_ners@yahoo.com
[5]UniversitasGaluh, West Java, 46196, Email: sitirohimahwibi@gmail.com
[6]UniversitasFaletehan, Banten, 42161, Email: mukhlasinuf@gmail.com
[7]KemenkesPoltekkes Semarang, Central Java, 51311, Email: budiasty23@gmail.com
[8]Stikes Tri Mandiri Sakti, Bengkulu, 38211, Email:adehermansuryadireja@gmail.com

Received: 19.04.2024 Revised : 18.05.2024 Accepted: 20.05.2024

ABSTRACT
Indonesia is highly prone to natural disasters due to its location along the Pacific Ring of Fire and its geological characteristics, such as above tectonic plates.The country faces risks from earthquakes, floods, landslides, tsunamis, and volcanic eruptions. These disasters often result in high death tolls and extensive property damage. This study aims to determine the effect of a learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students in Indonesia.This research used a pre-experimental one-group pre and post-test design. The population in this study were students from the Nursing and Midwifery Study Program in several provinces in Indonesia.The sampling technique in this study uses non-probability sampling with a quota sampling technique, the number of respondents who contributed to this research was 316 respondents. Data were analyzed using Univariate Analysis and Bivariate Analysis using the Wilcoxontest. The parameter indexes in the questionnaire that are assessed are Knowledge and Attitude (KA), Emergency Planning (EP), Warning System (WS), and Resource Mobilization Capacity (RMC).Based on the results of the data normality test using the Kolmogorov-Smirnov test, the P-value = 0.000<0.05 was obtained, so the residual value was not normally distributed, so the Wilcoxon test was used. The results of the research showedthat based on the Wilcoxon test was found that the p-value = 0.000 <0.05 was significant, H_o was rejected and H_a was acceptedthere is an effect of learning medium based on Android application (Edu-SIBENAWA App) on disaster preparedness among nursing and midwife students in Indonesia.

Key Words: Learning Medium, Android Application, Edu-SIBENAWAApp, Disaster Preparedness

1. INTRODUCTION

Indonesia, as an archipelagic country located at the convergence of the Indian-Australian, Eurasian, and Pacific tectonic plates, faces a significant risk of natural disasters, particularly earthquakes, volcanic eruptions, and tsunamis (1). The country has a history of devastating seismic events, with earthquakes causing substantial loss of life and damage to infrastructure (2). The geological setting of Indonesia, situated on the Pacific Ring of Fire, contributes to its high earthquake potential (Suwondo et al., 2022; Jufriansah et al., 2021). The collision of multiple tectonic plates in Indonesia, such as the Eurasian Plate, the Pacific Plate, the Indo-Australian Plate, and the Philippine Plate, creates an active seismic zone, further increasing the likelihood of earthquakes (5).Disasters, as defined by the World Health Organization (WHO), encompass events that result in damage, ecological disturbances, loss of human life, or deterioration of health or health services on a scale necessitating external intervention (6). These events lead to significant consequences such as loss of lives, destruction of livelihoods, interruption of normal life, and damage to infrastructure (7). The impact of disasters extends beyond immediate losses to affect the health of populations and the economy of nations (8). Disasters can be classified into natural

and man-made categories, both of which result in mass casualties (9). The scale and nature of disasters are evolving, with recent years witnessing an increase in the frequency and severity of such events (10).
The data from the BNPB (National Disaster Management Agency) underscores the urgent need for effective disaster management strategies, particularly in addressing the recurring issue of floods in Indonesia. Collaborative efforts involving governance, community institutions, structural mitigation measures, and psychological support are essential for enhancing disaster resilience and reducing the impact of natural disasters on the population. In 2022, Indonesia experienced a significant number of natural disasters, with the National Disaster Management Agency (BNPB) recording 3,531 events. Among these, floods were the most common, accounting for 1,524 incidents, followed by 1,062 extreme weather events, 634 landslides, 26 tidal waves & abrasion, 4 droughts, 1 volcanic eruption, and 28 earthquakes. The impact of these disasters resulted in 851 fatalities, 46 missing persons, 8,726 injuries, and 5,492,046 individuals displaced (11).
In disaster management, the involvement of healthcare professionals, particularly nurses and midwives, is crucial for comprehensive preparedness and response efforts (12). Nurses and midwivesneed to be well-trained in disaster management, including through simulations of various disaster scenarios, to effectively contribute to preparedness and response plans. The preparedness levels of individuals and communities are influenced by past disaster experiences, with disaster damage experience playing a role in raising preparedness levels (13). Furthermore, enhancing knowledge and preparedness among undergraduates is essential, especially in dealing with disasters like forest fires. The relationship between knowledge and preparedness has been emphasized, suggesting the need for regular disaster lectures, simulations, and training to empower students to make informed decisions during disasters (14).
Disaster education is essential for enhancing public knowledge and preparedness for potential disasters such as earthquakes. One effective method of disaster education is through the use of audiovisual media. Research has shown that community-based approaches significantly impact disaster preparedness (15). Additionally, continuous public education and campaigns are crucial to increase awareness and competency in disaster preparedness (16).Audiovisual media serves as a powerful tool in education and communication, offering a multi-sensory experience that can effectively convey information, influence behavior, and enhance learning outcomes across different domains. Audiovisual media, which combines audio and visual elements, plays a significant role in influencing knowledge, attitudes, and actions. Research has shown that advancements in technology have improved the quality of audiovisual content production (17).
Studies have demonstrated the positive impact of utilizing Android-based applications in disaster education. For instance, research has shown that implementing Android-based learning media integrated with disaster education can enhance critical thinking abilities and disaster preparedness (18). Furthermore, the development of Android-based learning media integrated with earthquake disaster education has been proven to increase student's knowledge about earthquake disaster preparedness (19). These findings highlight the effectiveness of incorporating digital tools in disaster education to improve preparedness levels. The integration of Android-based applications and various digital media tools in disaster education has proven to be effective in increasing disaster preparedness among students. These technological advancements offer interactive and engaging ways to educate individuals about disaster risks, thereby contributing to building more resilient and well-prepared communities. Using Android-based applications for educational purposes in disaster preparedness among students has shown promising results in various studies. Alcántara-Ayala et al. (2017) emphasized the effectiveness of Android-based media in helping students understand natural disasters, particularly through the development of integrated landslide disaster media. Similarly, Dewi et al., (2022) highlighted the importance of instructional media, such as animated videos and presentation slides, in improving students' understanding of natural disasters. Furthermore, (21) discussed leveraging informal learning pedagogies through social media platforms to empower coastal communities for disaster preparedness, indicating the potential of digital platforms in disseminating preparedness knowledge widely.
Developing technology plays a crucial role in enhancing disaster management efforts. Various technologies such as telehealth, smart web-GIS disaster monitoring, big data analytics, Internet of Things (IoT), eHealth, mobile crowdsensing, cloud computing, and augmented reality have been identified as instrumental in different phases of disaster management. These technologies offer benefits like faster information dissemination, improved decision-making, enhanced data collection, and increased community resilience (Nejadshafiee et al., 2020; Cicek & Kantarcı, 2023; Mahrin et al., 2023). For instance, the integration of eHealth technologies throughout the disaster management cycle has shown the potential to improve disaster health planning, response, and recovery (25). Currently, preparedness education is still limited to poster media provided by the government through the BNPB (National Disaster Management Agency). So creative efforts need to be made to reach the younger generation who

think practically, easily, and quickly in improving disaster preparedness. Therefore, researchers intend to develop an Android-based application as an educational medium for earthquake and tsunami disaster preparedness.

2. RESEARCH METHOD

The research used a pre-experimental design with a one-group pre and post-test design. In this design, direct observation will be carried out on one group of subjects or groups by giving an initial test (pre-test) before being given treatment and after being given a final test (post-test). The research aims to assess the effect of learning medium based on Android application "Edu-SIBENAWAApp" in improving knowledge, skills, and attitudes related to disaster preparedness in nursing and midwife students.The population in this study were students from the Nursing and Midwifery Study Program in 8 universities from 5 provinces in Indonesia. The sampling technique in this study uses non-probability sampling with a quota sampling technique, the number of respondents who contributed to this research was 316 respondents.Data were analyzed using Univariate Analysis and Bivariate Analysis using Wilcoxon test. The parameter indexes in the questionnaire that are assessed are Knowledge and Attitude (KA), Emergency Planning (EP), Warning System (WS), and Resource Mobilization Capacity (RMC).The data collection technique in this research uses primary data, namely by distributing questionnaires. The data collection method for this research is a questionnaire method that uses a disaster preparedness questionnaire with 20 question items for the disaster preparedness variable. This questionnaire consists of four parameter index sections. Each parameter is categorized into 5 levels of preparedness, namely very ready (index 80-100), ready (index 65-79), almost ready (index 55-64), less ready (index 40-54), and not ready (less than the index of 40). The questionnaire was adopted from Wihayati (2018) questionnaire which had been tested for validity and reliability with a validity value between 0.566 to 0.895 (r-table 0.361), and a reliability value of 0.969.

The way to calculate the questionnaire results per parameter is to first determine the index of all preparedness parameters using the formula (Source: LIPI-UNESCO/ISDR (2006):

$$\text{Index} = \frac{\text{Total skor real parameters}}{\text{Maximum score of the parameter}} \text{ x } 100$$

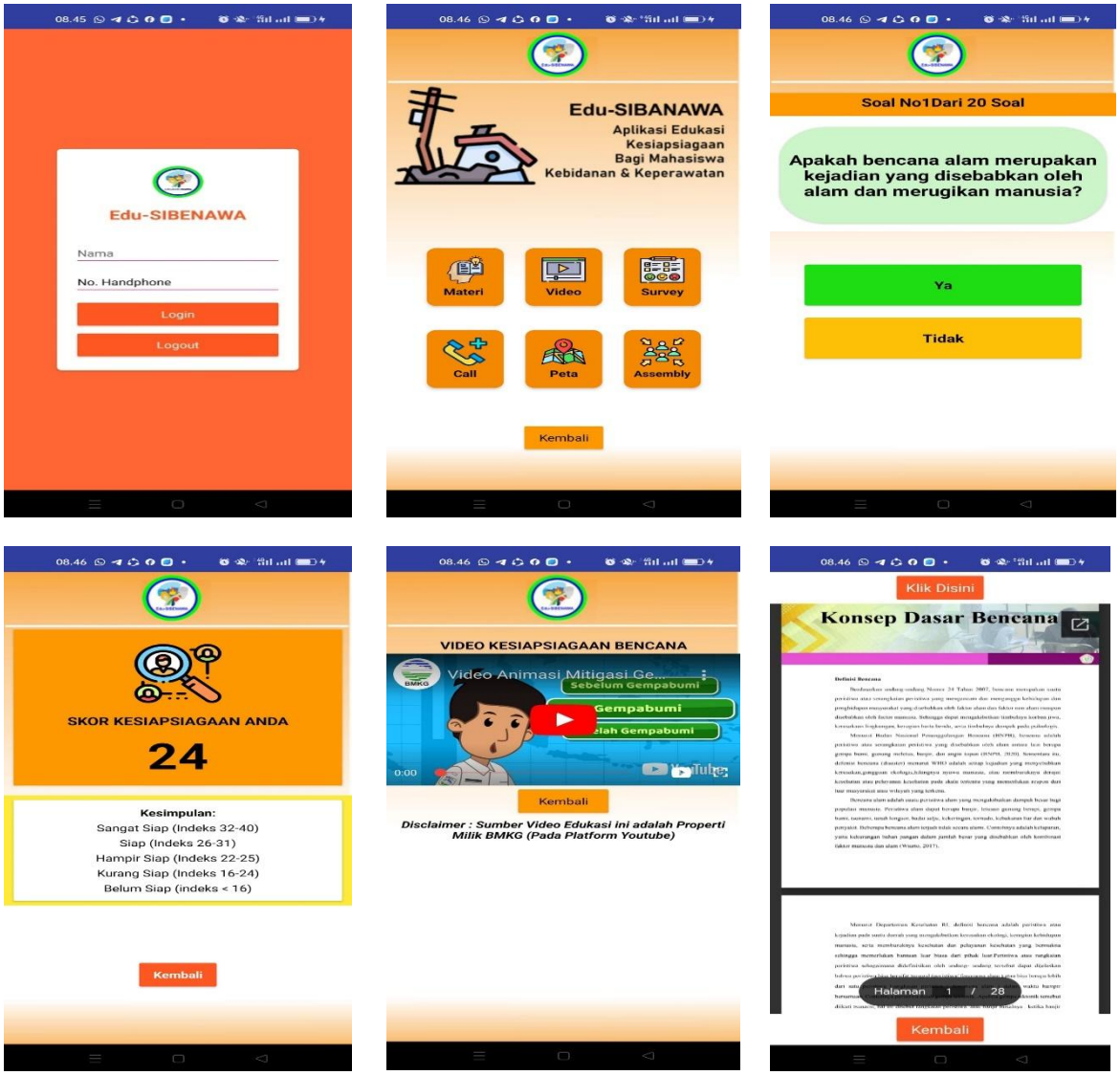
The total real parameter score is obtained from students' answers to all questions contained in each parameter (each question is worth one). If for example, from 20 question items, there are 10 questions with the parameters of knowledge, attitudes, and skills, then the student succeeds in answering the questions correctly. a total of 7 questions, then the total real parameter score is 7 (for knowledge, attitudes, and skills parameters). The maximum parameter score is obtained from the number of questions in the parameter index (each question is worth one). This also applies to other parameters. After obtaining the index value for each parameter, continue by adding up the four parameters with the formula:

$$(0{,}83 \text{ x indeks KA}) + (0{,}08 \text{ x indeks EP}) + (0{,}04 \text{ x indeks WS}) + (0{,}04 \text{ x indeks RMC})$$

KA : (Knowledge and Attitude/skill)
EP : (Emergency Preparedness)
WS : (Warning System)
RMC : (Resource Mobilization Capacity)

The data normality test is a test carried out to assess the distribution of data in a group of data or variables, whether the data distribution is normally distributed or not. The results of the data normality test are not normally distributed. Univariate analysis was used to determine learning medium based on Android Application (Edu-SIBENAWA App) on disaster preparedness before and after the intervention. Bivariate analysis was carried out to see the influence between the independent and dependent variables in the form of a cross-tabulation between the two tables. To find out learning medium based on Android Application (Edu-SIBENAWA App) on disaster preparedness, researchers use Wilcoxon test.

Learning media instrument used in this research is based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students:



Picture 1. Features and content section of learning medium for disaster preparedness based on Android Application (Edu-SIBENAWAApp)

3. RESULTS

This research was conducted to determine the effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students in Indonesia. The respondents in this research were 316 students from 8 universities and 5 provinces in Indonesia, who met the criteria desired by the researchers and had various characteristics. The research results are seen from the following characteristics:

Table 1. Characteristics of the number of respondents in research on the effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students in Indonesia

No	Name of University	Province	Frequency (n)	Percentage %
1	PemkabPurworejo Institute of Health Sciences	Central Java	66	21
2	University ofMedikaSuherman	West Java	60	19
3	Tri Mandiri Sakti Institute of Health Sciences	Bengkulu	57	18
4	University ofGaluh	West Java	32	10
5	University ofFaletehan	Banten	32	10
6	University of Hang TuahPekanbaru	Riau	29	9

7	Indonesian Ministry of Health Health Polytechnic ofSemarang	Central Java	29	9
8	University ofJenderalAchmadYaniCimahi	West Java	11	4
	Total	5 Province	316	100

Based on the table above, it can be seen that the characteristics of the number of respondents based on university in Indonesia consist of 5 provinces, namely Central Java, including PemkabPurworejo Institute of Health Sciences were 66 respondents (21%) and Indonesian Ministry of Health Health Polytechnic of Semarang were 29 respondents (9%), West Java Province consists of University of MedikaSuhermanwere 60 respondents (19%), University of Galuh were 32 respondents (10%) and University of JenderalAchmadYaniCimahi were 11 respondents (4%), Bengkulu Province namely Tri Mandiri Sakti Institute of Health Sciences 57 respondents (18%), and Banten Province namely University of Faletehan 32 respondents (10%), and Riau Province, namely University of Hang TuahPekanbaru, 29 respondents (9%).

Table 2. Characteristics of respondents based on gender in research on the effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students in Indonesia

No	Gender	Frequency (n)	Percentage %
1	Male	57	18
2	Female	259	82
	Total	316	100

Based on the table above, shows the characteristics of respondents based on gender in the research on the effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwife students in Indonesia, namely female were 254 people (82%) and male were 56 (18%).

Table 3. Disaster preparedness before being given learning media based on Android Application (Edu-SIBENAWAApp) among nursing and midwife students in Indonesia

No	Category	Frequency (n)	Percentage %
1	Prepared Well	19	6,2
2	Prepared	157	49,6
3	Almost Prepared	61	19,3
4	Less Prepared	68	21,5
5	Not Prepared	11	3,4
	Total	316	100

In the table above, it can be seen that the respondents before being given learning media based on Android Application (Edu-SIBENAWAApp) were in the highest prepared category, namely 157 respondents (49.6%), 19 respondents (6.2%) were Prepared Well. in the almost prepared category, 61 respondents (19.3%), in the less prepared category, 68 respondents (21.5%), and the lowest in the not prepared category, namely 11 respondents (3.4%).

Table 4. Disaster preparedness after being given learning media based on Android Application (Edu-SIBENAWAApp) among nursing and midwife students in Indonesia

No	Category	Frequency (n)	Percentage %
1	Prepared Well	80	25,3
2	Prepared	185	58,5
3	Almost Prepared	47	14,9
4	Less Prepared	4	1,3
5	Not Prepared	0	0
	Total	316	100

In the table above it can be seen that the respondents after being given learning media based on Android Application (Edu-SIBENAWAApp) were in the prepared well category, namely 80 respondents (25.3%), the prepared category was 185 respondents (58.5%), almost prepared category, namely 47 respondents

(14.9%), less prepared category, namely 4 respondents (1.3%), and no respondents were in the not prepared category.

Table 5. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		316
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	6,10677548
Most Extreme Differences	Absolute	,196
	Positive	,196
	Negative	-,137
Test Statistic		,196
Asymp. Sig. (2-tailed)		,000[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Based on the results of the data normality test using the Kolmogorov-Smirnov test, the P-value = 0.000<0.05 was obtained, so the residual value was not normally distributed, so the Wilcoxon test was used. Bivariate analysis was carried out to determine whether there was an effect between the independent variable (learning media based on Android Application (Edu-SIBENAWAApp) and the dependent variable (disaster preparedness) among nursing and midwife students in Indonesia. The research results were obtained using the Wilcoxon test.

Table 6. The effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwifery students in Indonesia

Test Statistics[a]	
	Posttest – Pretest
Z	-12,179[b]
Asymp. Sig. (2-tailed)	,000
a. Wilcoxon Signed Ranks Test	
b. Based on negative ranks.	

Based on the results of the Wilcoxon test, it was found that the p-value = 0.000 <0.05 was significant, so H_o was rejected and H_a was accepted. Conclusion: There is an effect of learning medium based on Android Application (Edu-SIBENAWAApp) on disaster preparedness among nursing and midwifery students in Indonesia.

4. DISCUSSIONS

The influence of learning media based on Android Application (Edu-SIBENAWAApp) on disaster preparedness for nursing and midwifery students can be seen from the results of the analysis using the Wilcoxon test statistical test which was carried out from respondents totaling 316 nursing and midwifery study program students at 8 universities in Indonesia Based on the results of the Wilcoxon test, the p-value = 0.000 <0.05 is significant, so Ho is rejected and Ha is accepted. There is an influence of learning media based on Android Application (Edu-SIBENAWAApp) on disaster preparedness for nursing and midwifery students. The utilization of learning media based on Android Application, such as the "Edu-SIBENAWA," has demonstrated a significant positive impact on disaster preparedness. Research has shown that Android-based disaster preparedness apps can enhance community knowledge and intentional behavior in hurricane-risk areas (25). Additionally, the development of learning media for earthquake disasters through physics subjects on Android platforms has been found to enhance problem-solving abilities and disaster preparedness skills (26). These findings underscore the importance of leveraging technology, specifically Android Application, to improve preparedness for various disasters.Labibah et al., (2021) found that using Android-based media for learning about landslides through physics education improved students' critical thinking ability and disaster preparedness.In broader contexts, the impact of Android Application on disaster preparedness has been explored. For instance, the effects of a disaster preparedness app on community knowledge and intentional behavior in hurricane-risk areas have been investigated, highlighting the potential of technology to improve disaster readiness (28). Similarly, the effect of an Android-based earthquake game on elementary school students'

knowledge about earthquake disaster preparedness has been discussed, emphasizing the role of interactive media in educating individuals about disasters (19). Mobile learning apps have been recognized as valuable tools for educating individuals on disaster preparedness, climate change impacts, and enhancing mental health providers' abilities to cope with stressful situations during disasters (29).
Studies have highlighted the importance of community-oriented training and disaster awareness programs facilitated through Android apps in improving individual disaster preparedness levels (Rangarirai et al., 2023; Gouda & Yang, 2023). Psychological preparedness has been underscored as a crucial component often overlooked in disaster risk reduction policies (31). Family-based education through Android apps has been effective in enhancing disaster preparedness among residents living in disaster-prone areas (Sari et al., 2022; Rachmawati et al., 2021). Android apps play a vital role in disseminating disaster preparedness information, improving knowledge, and fostering proactive behaviors among individuals and communities. By leveraging the accessibility and interactive features of Android apps, stakeholders can enhance disaster preparedness initiatives, increase community resilience, and effectively mitigate the impacts of disasters.
The research results showed that there was a difference between the scores of disaster preparedness before being given knowledge and the scores after being given knowledge through Android-based learning media among nursing and midwifery students.Disaster preparedness is influenced by a variety of factors including knowledge, socio-psychological aspects, environmental considerations, counseling, and media influence. Studies have identified key elements that are crucial in shaping individuals' readiness for disasters. Factors such as having adequate knowledge, sufficient income and resources, previous disaster experience, risk awareness, risk perception, vulnerability level, and the cost-effectiveness of preparedness measures are fundamental in disaster preparedness (34). Furthermore, community knowledge regarding natural disasters has been linked to community preparedness, indicating that lower knowledge levels result in decreased preparedness (35). Moreover, the effectiveness and efficiency of disaster preparedness activities are contingent upon the disaster literacy and health education levels of the population (36).
Adequate knowledge about preparedness is crucial in influencing individuals' behaviors and attitudes towards preparedness for various types of disasters. Numerous studies have underscored the importance of knowledge, attitudes, and behaviors in disaster preparedness. The analysis of preparedness factors in disaster-prone communities conducted by Emaliyawati et al., (2021) highlighted five key factors influencing disaster preparedness: knowledge, attitudes, policies and guidelines, emergency response plans, disaster simulations, and resource mobilization. Among these factors, the study concluded that knowledge plays the most significant role in influencing preparedness.Additionally, Guo et al., (2021) highlight the vulnerability of rural communities to natural hazards compared to urban areas, emphasizing the importance of understanding demographic factors in disaster preparedness. This complements the need for resource mobilization, to address the specific needs of different community settings.
Knowledge is a crucial factor influencing individuals to take action, particularly in disaster-prone areas. Research has consistently shown that good knowledge and positive attitudes towards disasters are directly linked to community preparedness (39). Individuals with higher levels of knowledge and positive attitudes are more likely to be well-prepared and ready to cope with disasters (40). Education and awareness programs have been identified as effective tools in enhancing disaster preparedness by improving knowledge and attitudes (41). The impact of knowledge on attitudes and behaviors related to disaster preparedness has been emphasized in various studies (Mariam et al., 2021; AlHarastani et al., 2020). Disaster management knowledge has been found to positively correlate with attitudes and behaviors, highlighting a holistic approach to preparedness (44). Additionally, past disaster experiences can prompt individuals to recognize the importance of being prepared for future events (45). In healthcare settings, the attitude of professionals, such as nurses and healthcare workers, significantly influences their response during emergencies (46). Studies have indicated that nurses' competency in disaster preparedness is closely linked to their knowledge levels (47). Moreover, gender differences have been observed, with women generally demonstrating higher awareness of disaster risks and consequences (48). In conclusion, the synthesis of these references underscores the critical role of knowledge in shaping attitudes and behaviors towards disaster preparedness. Education, training, and experience all play vital roles in enhancing community readiness and response to disasters, emphasizing the importance of continuous learning and preparedness efforts in disaster-prone areas.

5. CONCLUSIONS

This study explored the impact of utilizing the Edu-SIBENAWA App as a learning medium on disaster preparedness among nursing and midwife students in Indonesia. Through a comprehensive analysis of data collected from pre-test and post-test assessments, as well as qualitative feedback from participants,

several key findings emerged. Firstly, the use of the Edu-SIBENAWA App significantly enhanced the knowledge levels of nursing and midwife students regarding disaster preparedness concepts, including response strategies, risk assessment, and mitigation techniques. The interactive nature of the app, coupled with its multimedia content and real-life case studies, proved to be effective in engaging students and facilitating deeper learning. Secondly, the app's integration into the curriculum positively influenced students' attitudes and perceptions towards disaster preparedness. Participants reported increased confidence in their ability to respond to emergencies, heightened awareness of disaster risks in their communities, and a greater sense of responsibility toward promoting disaster resilience.

Additionally, the study revealed a notable improvement in practical skills related to disaster response and management among students who regularly engaged with the app. Virtual simulations, quizzes, and scenario-based exercises offered valuable hands-on experience and simulated real-world challenges, contributing to a more competent and prepared workforce in the nursing and midwifery sectors. Despite these positive outcomes, the study also identified areas for further enhancement. Factors such as technological accessibility, app usability, and ongoing support and training for users were identified as potential barriers that need to be addressed to maximize the app's effectiveness and reach a broader audience.

6. RECOMMENDATIONS:

Based on the results of the research conducted, several things can be recommended regarding the research topic, including:

1. **Integration into Curriculum:** Integrate the Edu-SIBENAWA App or similar learning medium into the curriculum of nursing and midwifery programs in Indonesia to ensure all students have access to disaster preparedness education.
2. **Training and Awareness:** Conduct training sessions and awareness programs for faculty members and students to familiarize them with the app's features and encourage its effective use.
3. **Collaboration with Stakeholders:** Collaborate with relevant stakeholders such as disaster management agencies, healthcare institutions, and educational bodies to strengthen the app's impact and reach.
4. **Community Engagement:** Encourage students to actively engage with their communities by organizing workshops, seminars, or awareness campaigns using the app to disseminate vital information on disaster preparedness.
5. **Continuous Evaluation:** Conduct regular evaluations and assessments to measure the long-term impact of the app on students' disaster preparedness knowledge, skills, and behaviors, and make necessary adjustments or improvements to enhance its effectiveness.

REFERENCES

[1] Ibtihaj I, Suparno S, Septyandy MR, Jabbar GA, Astuti TRP. Indonesia Paleotsunami Database as an Effort to Reduce the Tsunami Disasters in Indonesia. E3s Web of Conferences. 2022.
[2] Massinai MFI, Wijaya A, Jamaluddin J, Umar EP, Minarti M. Earthquake Recurrence Interval Based on Seismic Moment. Indonesian Physical Review. 2021.
[3] Suwondo R, Mellyati L, Alama S. Pushover Analysis of Reinforced Concrete Building Seismically Designed Based on SNI 1726-2019. Iop Conference Series Earth and Environmental Science. 2022.
[4] Jufriansah A, Pramudya Y, Khusnani A, Saputra S. Analysis of Earthquake Activity in Indonesia by Clustering Method. Journal of Physics Theories and Applications. 2021.
[5] Wulan EP, Madrinovella I, Saputra R, Asyidah SN, Haqi YS, Wijaya FC, et al. The Early Model of Tomography in Eastern Indonesia Using FMTOMO. Iop Conference Series Earth and Environmental Science. 2023.
[6] Oktari RS, Dwirahmadi F, Gan CCR, Darundiyah K, Nugroho PC, Wibowo A, et al. Indonesia's Climate-Related Disasters and Health Adaptation Policy in the Build-Up to COP26 and Beyond. Sustainability. 2022.
[7] Öcal A. Disaster Management in Turkey: A Spatial Approach. International Journal of Disaster Risk Management. 2021.
[8] Freitas AWQ de, Witt RR, Veiga ABG da. The Health Burden of Natural and Technological Disasters in Brazil From 2013 to 2021. Cadernos De Saúde Pública. 2023.
[9] Mishra V, Sharma MG. Understanding Humanitarian Supply Chain Through Causal Modelling. South Asian Journal of Business and Management Cases. 2020.
[10] Lim ET, Jung YH, Shin DY, Kim SS. Small Uavs-Based Disaster Damage Investigation: Focused on Flooding Disaster and Chemical Accident. The International Archives of the Photogrammetry Remote Sensing and Spatial Information Sciences. 2022.

[11] Handayani W, Chigbu UE, Rudiarto I, Putri IHS. Urbanization and Increasing Flood Risk in the Northern Coast of Central Java—Indonesia: An Assessment Towards Better Land Use Policy and Flood Management. Land. 2020.
[12] Harthi M Al, Thobaity A Al, Ahmari W Al, Almalki M. \≪p\>Challenges for Nurses in Disaster Management: A Scoping Review\</P\> Risk Management and Healthcare Policy. 2020.
[13] Lin H, Liu G, Cui Y, Gong K. Factors Influencing Preparedness Behavior for Different Lead Time Disasters. 2023.
[14] Wulandari F, Budijanto B, Bachri S, Utomo DH. The Relationship Between Knowledge and Disaster Preparedness of Undergraduates Responding to Forest Fires. Jàmbá Journal of Disaster Risk Studies. 2023.
[15] Rangarirai W, Marnani CS, Rahmat A. Analyzing the Impact of Community-Based Approaches on Disaster Preparedness to the Risk of Tropical Cyclone Induced Flooding in Chimanimani District, Zimbabwe. Iop Conference Series Earth and Environmental Science. 2023.
[16] Kim Y, Kim MY. Factors Affecting Household Disaster Preparedness in South Korea. Plos One. 2022.
[17] Jeljeli R, Farhi F, Hamdi ME, Saidani S. The Impact of Technology on Audiovisual Production in the Social Media Space. Academic Journal of Interdisciplinary Studies. 2022.
[18] Rahmawati L, Labibah UN, Kuswanto H. The Implementation of Android-Based Physics Learning Media Integrated With Landslide Disaster Education to Improve Critical Thinking Ability and Disaster Preparedness. Journal of Physics Conference Series. 2020.
[19] Winarni EW, Purwandari EP, Wachidi W. The Effect of Android-Based Earthquake Game Toward Bengkulu City Elementary School Student's Knowledge About Earthquake Disaster Preparedness. Journal of Physics Conference Series. 2021.
[20] Dewi RP, Suharjo, Dahroni, Sujalwo, Fatonah A, Wahyuningsih Y. Improving Natural Disater Understanding of Junior High School Students. Iop Conference Series Earth and Environmental Science. 2022.
[21] Pradhananga P, Elawady A, ElZomor M. Leveraging Informal Learning Pedagogies to Empower Coastal Communities for Disaster Preparedness. Frontiers in Built Environment. 2022.
[22] Nejadshafiee M, Bahaadinbeigy K, Kazemi M, Nekoei-Moghadam M. Telenursing in Incidents and Disasters: A Systematic Review of the Literature. Journal of Emergency Nursing. 2020.
[23] Cicek D, Kantarcı B. Use of Mobile Crowdsensing in Disaster Management: A Systematic Review, Challenges, and Open Issues. Sensors. 2023.
[24] Mahrin MN, Subbarao A, Chuprat S, Bakar NAA. Cloud-Based Big Data Framework Towards Strengthening Disaster Risk Reduction: Systematic Mapping. Journal of Science and Technology Policy Management. 2023.
[25] Madanian S, Norris AC, Parry D. Disaster eHealth: Scoping Review. Journal of Medical Internet Research. 2020.
[26] Rany TD, Mundilarto M. Development of Learning Media for Earthquake Disaster Through Physics Subjects to Improve Problem Solving Ability and Disaster Preparedness. Jurnal Pendidikan Fisika Indonesia. 2021.
[27] Labibah UN, Mundilarto M, Sulaiman S. Improvement of Critical Thinking Ability and Preparedness Assisted by Android-Based Media to Understand Landslide Through Physics Learning. Jurnal Ilmiah Pendidikan Fisika Al-Biruni. 2021.
[28] Susmini S, Feri J, Wijaya S, Wibowo WDA, Arifin H, Lee B. The Effects of a Disaster Preparedness App on Community Knowledge and Intentional Behavior in Hurricane Risk Areas. Disaster Medicine and Public Health Preparedness. 2022.
[29] Aydoğan E, Atik AD, Dikmen EŞ, Erkoç F. Development and Usability Testing of an Educational Mobile Learning App for Climate Change and Health Impacts. Turkish Journal of Biochemistry. 2021.
[30] Gouda M, Yang Y. Investigating the Impact of a Community Disaster Awareness Training on Subjective Disaster Preparedness: The Case of Myanmar's Ayeyarwaddy Region. Disasters. 2023.
[31] Palupi LS. Towards Sustainable Cities and Communities: Is Psychological Preparedness Include in the Disaster Risk Reduction Policy Framework in Indonesia. E3s Web of Conferences. 2022.
[32] Sari IW, Bahri AS, Rosiana UH. Effectiveness of Family-Based Education to Improve Disaster Preparedness Among Mount Merapi Residents. International Journal of Public Health Excellence (Ijphe). 2022.
[33] Rachmawati R, Novita R, Fitria I. The Effect of Disaster Management Education on Mother's Under Five Preparedness Facing Floods in Aceh Province. Open Access Macedonian Journal of Medical Sciences. 2021.
[34] Kivi HK, Peyravi M, Marzaleh MA. Investigating the Preparedness of Iranian Families in the Face of Disasters. Disaster Medicine and Public Health Preparedness. 2022.

[35] Ginting NA, Adisasmito W. Description Study of Pandeglang Community Knowledge on Natural Disasters and Government Policies Related to Natural Disaster Preparedness in 2022. Journal of Indonesian Health Policy and Administration. 2022.
[36] Inichinbia, Victoria E, U. AE. Implications for Preparedness for Disasters in Developing Countries for Health Education: A Literature Review. International Journal of Research and Innovation in Social Science. 2022.
[37] Emaliyawati E, Ibrahim K, Trisyani Y, Mirwanti R, Ilhami FM, Arifin H. Determinants of Nurse Preparedness in Disaster Management: A Cross-Sectional Study Among the Community Health Nurses in Coastal Areas. Open Access Emergency Medicine. 2021.
[38] Guo C, Sim T, Su G. Individual Disaster Preparedness in Drought-and-Flood-Prone Villages in Northwest China: Impact of Place, Out-Migration and Community. International Journal of Environmental Research and Public Health. 2021.
[39] Sekartaji DA, Mei ETW. The Effect of Disaster Knowledge on Community Preparedness in Dealing With Liquefaction Disaster in Palu City, Central Sulawesi. Iop Conference Series Earth and Environmental Science. 2023.
[40] Hariyanto T, Abubakar Y, Zainun I. The Impact of Disaster Knowledge and Attitudes on Community Preparedness in Facing Earthquakes. Kne Social Sciences. 2022.
[41] Emaliyawati E, Satiadi D, Sutini T, Jamaludin HNN, Khofifah IN, Manika LR, et al. The Effect of Disaster Education of Increasing Earthquake Disaster Preparedness : A Narrative Review. Jurnal Keperawatan Komprehensif. 2022.
[42] Mariam I, Budhiana J, Permana I, Dewi R, Rahmanishati W, Noviyanti L, et al. Knowledge, Attitudes, Disaster Training and Self Efficacy on Disaster Preparedness. Research Horizon. 2021.
[43] AlHarastani HAM, Alawad YI, Devi B, Mosqueda BG, Tamayo V, Kyoung F, et al. Emergency and Disaster Preparedness at a Tertiary Medical City. Disaster Medicine and Public Health Preparedness. 2020.
[44] Odai ED, Azodo CC, Chhabra KG. Disaster Management: Knowledge, Attitude, Behavior, Willingness, and Preparedness Among Nigerian Dentists. Prehospital and Disaster Medicine. 2019.
[45] Rahayu R, Khoiriyati A. Earthquake Preparedness Among Nursing Students. Ijnp (Indonesian Journal of Nursing Practices). 2019.
[46] Aurelio HSG, Bautista BJC, Casimiro RM, Dichoso NKR, Endaya RA, Ignacio SK V, et al. Knowledge, Attitude, and Practices of Nursing Students on Disaster Preparedness. Proceedings Series on Health \& Medical Sciences. 2022.
[47] Budiana I, Paschalia YPM, Woge Y, Supinganto A. Analysis of Nurses Competency to Preparedness in Facing Disasters in Regional Public Hospitals of Ende District, East Nusa Tenggara Province 2020. Strada Jurnal Ilmiah Kesehatan. 2021.
[48] Ahmadi AZ, Ghavami V, Shabanikiya H. Nurses' Preparedness for Disasters in a Crisis-Stricken Country: A Case Study in Afghanistan, in 2020. Health in Emergencies \& Disasters Quarterly. 2021.