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Individual and organizational factors associated with disaster preparedness and resilience among Indonesian hospital nurses: a cross-sectional study

Wiwin Winarti[1]*, Laksita Barbara[1], Ronny Basirun Simatupang[1], Siti Luthfiana Hasena[1], and VK Dielfanie[1]

[1] Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia

*Correspondence: Wiwin Winarti. Address: Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia. Email: wiwin.winarti@upnvj.ac.id

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ABSTRACT

Introduction: The significance of nurses' disaster preparedness and resilience in diverse settings has become increasingly apparent due to the rise in global crises. This study aimed to investigate nurses' perspectives on these two factors and to examine their intricate relationships and nuances.

Methods: A cross-sectional framework was used to evaluate 390 nurses using the Disaster Preparedness Evaluation Tool (DPET) and the Connor-Davidson Resilience Scale (CD-RISC). Descriptive statistics, Mann-Whitney U-test, Kruskal-Wallis H test, Spearman's correlation analysis, and the generalized linear model were employed to determine the relationships between nurses' characteristics, self-regulation, work culture perception, and their DPET and CD-RISC scores.

Results: The results revealed that 79.7% of the participants were female, but male nurses consistently scored higher on both the assessments. The average DPET score was 172.29, and the average CD-RISC score was 27.34. Self-regulation and work culture perception were the most influential factors in raising DPET and CD-RISC scores by 4.032 and 1.454 units (p=0.000), and 1.112 and 0.34 units (p=0.000).

Conclusions: This study emphasizes the need for ongoing training of nurses in disaster preparedness and resilience to promote introspective learning and collaborative best practices. It also highlights the role of hospitals in optimizing resources and creating a supportive environment for enhanced disaster preparedness and resilience, given the impact of organizational work culture. The study findings suggest a nuanced understanding of gender dynamics in disaster preparedness and resilience, emphasizing the importance of further exploration of these disparities for effective nursing practices.

Keywords: disaster, preparedness, resilience, self-regulation, work culture

Introduction

Disaster preparedness and resilience have gained significant importance because of the surge in global disasters. Indonesia, located in the unstable Pacific Ring of Fire and comprising numerous islands, faces heightened susceptibility to various natural disasters, such as earthquakes, tsunamis, volcanic eruptions, and floods (Mercy Corps, 2020). These disasters pose considerable challenges to healthcare delivery and disaster response, necessitating tailored approaches to accommodate the country's diverse landscape. Indonesia's large population requires greater medical assistance, which can exacerbate concerns regarding disease outbreaks, as demonstrated by the COVID-19 pandemic. Although disaster incidents declined by

33.5% in 2021, fatalities have surged by 76.9% (The National Agency for Disaster Countermeasure, 2021), emphasizing the need for comprehensive strategies to fortify the healthcare sector against potential threats (Alameddine et al., 2021; Mohtady Ali et al., 2023). Indonesia's vulnerability highlights the critical need for proactive disaster preparedness measures and resilience-building efforts in the healthcare system. These efforts can provide valuable insights for enhancing global disaster response and mitigating future crises.

Nurses play a crucial role in healthcare and have a multifaceted role in disaster preparedness and emergency response. Their duties extend beyond standard clinical care and are critical in shaping disaster preparedness and ensuring effective responses to crises (Baskin and Bartlett, 2021; Songwathana and Timalsina, 2021). Therefore, it is important to enhance nurses' disaster preparedness competencies and integrate vital skills, knowledge, and attitudes to ensure effective crisis management (Said & Chiang, 2020).

Several studies have investigated disaster preparedness among nurses worldwide, revealing moderate levels of preparedness. King et al. (2019) and Wang et al. (2023) found this in high-income countries, though Almukhlifi et al. (2021) highlighted exceptions. Indonesian studies by Rizqillah and Suna (2018), Martono et al. (2019), and Setyawati et al. (2020) also reported moderate preparedness levels. Reports by Said and Chiang (2020) and Almukhlifi et al. (2021) raised concerns about bioterrorism and biological threats. To ensure effective crisis management, it is crucial to enhance nurses' disaster-related skills and knowledge, given their vital role in healthcare response. Research reveals a gap between nurses' perceptions and reality of preparedness, as demonstrated by Winarti and Gracya (2023). Nurses in susceptible regions, such as Indonesia, may overestimate their competencies despite individual experiences, prior disaster interactions, and institutional dynamics impacting their perceptions, as shown by Al-Hunaishi et al. (2019) and Ghavami et al. (2022).

Resilience, a topic of significant interest in nursing, has been extensively studied. It refers to an individual's ability to cope with stress, adversity, and challenges. According to Abualruz and Hayajneh (2019), resilience enables nurses to adapt effectively to difficult situations regardless of their source. Mao et al. (2019) highlight its role in promoting positive outcomes and reducing negative psychological impacts during traumatic events. Lin et al. (2020) view resilience as a psychosocial asset that helps nurses navigate potential threats and maintain well-being. Resilience is influenced by both individual characteristics and organizational support, making it critical for nurses to handle complex healthcare situations effectively and maintain their overall health and effectiveness (Arbon et al., 2013; Luo et al., 2021).

Research on resilience among nurses has yielded mixed results. Lin et al. (2020) found that nurses generally exhibit high resilience, with lower levels of anxiety and depression and higher levels of active coping mechanisms. However, the study also showed that nurses had lower resilience than other medical professionals, likely due to their heavy work commitments and direct patient engagement. In contrast, Alameddine et al. (2021) reported that most participants exhibited moderate resilience, with a smaller group showing low resilience and a smaller group showing high resilience. Kılınç and Çelik (2021) also observed a moderate prevalence of resilience. In the context of the COVID-19 pandemic, Afshari, Nourollahi-Darabad, and Chinisaz (2021) noted a trend toward decreased resilience.

Nurses' preparedness and resilience are essential in healthcare during crises, and understanding these factors is crucial. Training in emergency care techniques and triage procedures (Almukhlifi et al., 2021; King et al., 2019), as well as promoting resilience, enable nurses to effectively respond to disasters and maintain their well-being (Alameddine et al., 2021; Yu et al., 2019). Strong teamwork skills are fostered through preparedness efforts and resilience, which also allows nurses to effectively navigate difficulties within multidisciplinary teams (Alameddine et al., 2021). Additionally, preparedness measures strengthen the adaptive capacity of healthcare systems, while resilience empowers nurses to remain flexible, resourceful, and innovative in delivering care amid changing circumstances.

This study, conducted across two naval hospitals in Jakarta, aimed to explore nurses' perceptions of disaster preparedness and resilience, and investigate the individual and organizational factors that influence them. This study used a cross-sectional paper-based survey with instruments such as the Disaster Preparedness Evaluation Tool (DPET) and the Connor-Davidson Resilience Scale (CD-RISC) to gather insights. Research questions focused on nurses' perceptions of their level of disaster preparedness and resilience and the factors that contribute to or hinder their preparedness and resilience. The study provided insights into the influencing factors and aimed to inform policy frameworks and refine clinical practice. Understanding these factors can lead to targeted

interventions, training modules, and policy changes that enhance nurses' disaster preparedness and resilience.

Materials and Methods

Study Design

This study used a cross-sectional paper-based survey to determine nurses' perceptions of disaster preparedness and resilience along with the factors that influence these perceptions. This approach was selected because of its ability to capture data at a specific point in time, thereby providing a snapshot of the views of the nursing community.

Population Sample and Sampling

The participants in this study were nurses from two naval hospitals in Jakarta who were recruited using total sampling. The study included 464 registered nurses and permanent staff members with at least one year of professional experience. The sampling approach aimed to ensure comprehensive coverage of the target population and to maximize the representativeness of the findings. The response rate was 84.1%, with 390 nurses responding and 74 choosing not to participate.

Measurements

Participants completed an information sheet to provide sociodemographic details, including gender, age, educational level, length of employment, prior disaster training, and previous disaster duty experience. The Disaster Preparedness Evaluation Tool (DPET) (Tichy et al., 2009) was used to assess nurses' perceptions of disaster preparedness. The DPET comprises 47 items across seven dimensions: disaster knowledge, disaster skills, family preparedness, knowledge-specific response, patient management during response, recovery knowledge, and recovery management. Each item uses a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree.'

We used the Connor-Davidson Resilience Scale (CD-RISC) (Campbell-Sills and Stein, 2007) to evaluate nurses' perceptions of disaster resilience, which contains ten items rated on a 5-point scale from 'not true at all' to 'true nearly all of the time.' A score of up to 40 points indicates heightened resilience. Additionally, we explored nurses' self-regulation of community disaster engagement using the Baack and Alfred Self-Regulation Scale (Baack and Alfred, 2013), which has three items rated on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree.'

The questionnaire for evaluating organizational culture was created by integrating the Short Version of the Practice Environment Scale-Nursing Work Index (PES-NWI) (Caballero et al., 2019) with the Nurse Leadership and Organizational Culture (N-LOC) Questionnaire (Lui and Johnston, 2019) to form an initial set of 23 questions. However, after validity testing, five questions were removed because they had an r-value below the predetermined threshold of 3.339. The revised questionnaire, consisting of 18 questions, was designed to reflect the specific culture of the participant population, and included aspects such as leadership perceptions, nursing care quality, interpersonal relationships, and nurse participation levels. To gather participants' perspectives, a 5-point Likert scale ranging from 'very likely' to 'very unlikely' was used.

This study used rigorously validated standardized assessment tools to ensure accurate data collection. Validity was assessed by comparing the r values to a predetermined threshold of 3.339 for 34 participants, whereas reliability was determined using Cronbach's alpha. The reliability coefficients for the DPET, CD-RISC, self-regulation, and organizational work culture questionnaires were high with values of 0.96, 0.97, 0.91, and 0.79, respectively. These findings were derived from a pilot study of 34 nurses from a military hospital in Jakarta, which closely resembled the main study's demographics and demonstrated the strength of the research instruments.

Data Collection

Data collection involved the distribution of paper-based questionnaires using a total sampling approach across multiple wards in two naval hospitals in Jakarta. After obtaining approval from the hospital directors, the process began with the heads of the nursing departments, facilitating communication with ward-specific heads of nurses. Introductory meetings were held with the heads of the nurses to explain the study's objectives and methodology, followed by detailed briefings and written informed consent acquisition from the participants. Participants completed the questionnaires over five days, with follow-up reminders sent to the heads of the nurses on days 3 and 5. The questionnaires provided contact information for the investigator team, allowing respondents to seek clarification on any questions that they might have had.

Data Analysis

Statistical methods were carefully selected based on the study objectives and data characteristics. Given the skewness of the data, indicative of deviation from a normal distribution, non-parametric tests, such as the Mann-Whitney U-test and Kruskal-Wallis H-test, were employed to analyze continuous variables. These tests

are suitable for skewed datasets and provide reliable inferential statistics without assuming normality. Spearman's correlation coefficient was utilized to explore relationships between nurses' perceptions of self-regulation, work culture, DPET, and CD-RISC scores. Additionally, a generalized linear model was employed to investigate the factors influencing nurses' perceptions of DPET and CD-RISC scores, facilitating a comprehensive assessment of the factors involved.

Ethical Approval

This study was approved by the hospital's Health Research Ethics Committee (HREC), which ensures adherence to ethical protocols. Approval was confirmed through two letters: one dated June 22, 2023, with number 17, and the other dated July 14, 2023, with reference number B/19/EC/LKS/VII. All participants provided written informed consent before participating in the study, confirming their willingness to participate. To maintain the ethical integrity and confidentiality of the participants, the questionnaires administered were anonymous and free of any personally identifiable information.

Results

Characteristics of the Respondents

We conducted a survey of 390 nurses, resulting in an 84.1% response rate. The respondent demographics, presented in Tables 1 and 2, varied. Notably, 79.7% of the participants were female and 88.2% held nursing diplomas. The most common workplace was the ward (60.5%). Regarding emergency training, a significant number of participants had Basic Life Support (BLS) or Basic Trauma and Cardiac Life Support (BTCLS) certification. However, only 49.7% had received disaster training and 15.9% had been deployed in disaster settings.

Respondents' ages ranged from 22 to 50 years, with a median of 40 years. Their average professional experience was 14.31 years, with a median employment duration of 15 years. The average tenure in their current unit was 7.81 years, and the median duration was four years. The respondents scored an average of 11.02 on self-regulation, with a median of 12. Their perception of work culture averaged 64.75, with a standard deviation of 9.13 and a median score of 66, as shown in Table 2.

Table 3 presents an analysis of the DPET and CD-RISC cores. The average DPET score was 172.29, with a standard deviation of 23.683; the median was calculated

Table 1. Differences in DPET and CD-RISC based on nurses' characteristics (N=390).

Characteristics		DPET			CDRISC		
	n (%)	Mean (SD)	Median (P25,P75)	P-Value	Mean (SD)	Median (P25,P75)	P-Value
Sex							
Male	79 (20.3)	178.97 (24.143)	179 (166,188)	**0,005 **[a]**	28.92 (5.844)	30 (27,30)	**0.003 **[a]**
Female	311 (79.7)	170.59 (23.299)	174 (152,186)		26.93 (5.536)	28 (22,30)	
Education							
Ners	46 (11.8)	169.91 (21.966)	176 (157, 186)	0.776[a]	27.37 (5.519)	28 (24,30)	0.984[a]
Diploma	344 (88.2)	172.60 (23.915)	174.50 (155,187)		27.33 (5.674)	28.50 (23,30)	
Unit of Work							
ED	42 (10.8)	178.50 (20.182)	183.50 (171,188)	**0.000 ***[b]**	29.26 (4.478)	30 (28,30)	**0.000 ***[b]**
OR	16 (4.1)	169.81 (27.530)	159.50 (154,180)		27.38 (7.117)	27 (23,32)	
ICU	32 (8.2)	158.56 (27.451)	153.50 (141,171)		25.34 (6.964)	22.50 (20,30)	
Wards	236 (60.5)	173.02 (23.810)	173 (156,188)		27.14 (5.911)	28 (22,30)	
OPD	58 (14.9)	174.83 (19.692)	180 (168,187)		28.26 (3.187)	30 (27,30)	
Hemodialysis	6 (1.5)	155.33 (17.072)	151.5 (141,174)		23.33 (4.457)	21 (20,29)	
Emergency Training							
ACLS/ATCLS	10 (2.6)	172.80 (33.911)	177 (159,194)	0.820[b]	27.70 (6.684)	29 (26,31)	0.210[b]
BLS/BTCLS	318 (81.5)	172.85 (24.046)	174 (155,188)		27.24 (5.863)	28 (22,30)	
Basic Surgery	2 (0.5)	155.50 (0.707)	155.50 (155,-)		24.50 (3.536)	24.50 (22,-)	
ICU	4 (1.0)	168.75 (20.419)	168.50 (150,188)		23.75 (3.304)	23.50 (21,27)	
Other	4 (1.0)	167.75 (16.879)	174.50 (150,179)		26 (6.164)	28.5 (20,30)	
Never	52 (13.3)	170 (20.462)	178 (155,186)		28.35 (4.014)	28.35 (27,30)	
Disaster Training							
Yes	194 (49.7)	173.06 (23.621)	175 (156,187)	0.558[a]	27.23 (5.872)	28 (22,30)	0.576[a]
Never	196 (50.3)	171.52 (23.779)	174 (155,188)		27.44 (5.432)	28 (24,30)	
Duty in Disaster							
Yes	62 (15.9)	175.81 (22.737)	177.5 (162,188)	0.104[a]	27.90 (4.661)	29 (26,30)	0.275[a]
Never	328 (84.1)	171.62 (23.833)	174 (153,187)		27.23 (5.817)	28 (22,30)	

ED, Emergency Department; OR, Operating Room; ICU, Intensive Care Unit, OPD, Outpatient Department
P25 and P75 are the lower and upper quartiles, respectively.
a Mann–Whitney U test.
b Kruskal–Wallis H test.
SD, standard deviation.
* p<0.05; ** p<0.01; *** p<0.001

Table 3. Score of the Disaster Preparedness Evaluation Tool (DPET) and the Connor-Davidson Resilience Scale (CD-RISC)

Variable	Number of Question	Mean (SD)	Median (P25,P75)	Min-Max
DPET	47	172.29 (23.683)	175 (156,187)	94-235
Disaster knowledge	16	60.11 (8.017)	61 (55, 64)	33-80
Disaster skills	7	25.79 (3.869)	27 (23, 28)	13-35
Family preparedness for a disaster	2	7.41 (1.267)	8 (6, 8)	2-10
Knowledge-specific response	4	14.80 (2.190)	15 (13, 16)	8-20
Patient management during response	12	42.86 (7.055)	44 (36, 48)	24-60
Recovery knowledge	1	3.75 (0.712)	4 (3, 4)	1-5
Recovery management	5	17.57 (3.185)	17 (25, 20)	10-25
CD-RISC	10	27.34 (5.649)	28 (23, 30)	10-40

as 175. Additionally, the study assessed seven dimensions of DPET, including disaster knowledge, disaster skills, family preparedness, knowledge-specific response, patient management, recovery knowledge, and recovery management, with their respective mean scores. The mean CD-RISC score was 27.34, with a standard deviation of 5.649. The median scores were 28.

Bivariate Analyses of Factors Related to Total DPET and CD-RISC Scores

The results of the bivariate analyses for DPET and CDRISC scores are presented in Tables 1 and 2. The data showed variations in scores based on sex, with male nurses having a higher mean DPET score of 178.97 with a standard deviation of 24.143, and ED nurses having a noteworthy mean score of 178.50 with a standard deviation of 20.182. Spearman's correlation analysis revealed a positive correlation between self-regulation and perception of work culture scores and the DPET total score. Additionally, significant differences in CD-RISC scores were observed based on sex and working units, with male nurses achieving a higher mean score of 28.92 and ED nurses having the highest mean score of 29.26. Similar to the DPET scores, Spearman's correlation analysis confirmed a positive association between self-regulation and the perception of work culture scores and the CD-RISC total score.

Generalized Linear Models of DPET and CD-RISC

The study analyzed the DPET and CD-RISC scores using generalized linear models. Table 4 presents the factors affecting nurses' scores, including the regression coefficients (B), standard errors (SE), and significance levels (Sig.). The analysis showed that, although male nurses had higher DPET scores than female nurses, the difference was not statistically significant (p=0.097). Nurses with a diploma degree had lower DPET scores than those with a nursing degree, and this difference was statistically significant (B=-4.74, p=0.024). The study also found that, while differences in DPET scores were observed across various working units, most were not statistically significant. However, nurses who underwent ICU training demonstrated higher DPET scores than those who did not (B=15.92, p=0.026). Furthermore, disaster training experience positively correlated with higher DPET scores (B=3.866, p=0.009). Notably, the perception of self-regulation and work culture significantly increased the DPET scores (SRC: p<0.001; work culture: p<0.001).

A generalized linear model of nurses' perceptions of resilience, measured using the CD-RISC score, revealed that male nurses had slightly higher scores than female nurses; however, the difference was not statistically significant (B=0.632, p=0.116). The analysis showed that educational background and working units did not significantly impact the scores, but nurses with emergency training in all groups had lower scores. CD-RISC scores decreased across all emergency training categories, with statistical significance only in the BLS/BTCLS (p=0.009) and other non-specific emergency training (p=0.025) groups. Experience in the current unit significantly affected the perceived resilience (B=0.048, p=0.032). Self-regulation and work culture were the most influential factors shaping nurses' CD-RISC scores, indicating their critical role in shaping perceptions of

Table 2. Differences in DPET and CD-RISC based on nurses' age, working experience, self-regulation and work cultures perception scores (N=390).

Characteristics			DPET		CDRISC	
	Mean (SD)	Median (P25, P75)	r	P-Value	r	P-Value
Age	37.41 (9.518)	40 (28, 45)	0.001	0.983c	-0.029	0.570c
Working Experience (years)	14.31 (9.578)	15 (5, 22)	-0.015	0.775c	-0.006	0.911c
Current Unit Work Experience (Years)	7.81 (7.925)	4 (2, 13)	0.028	0.582c	0.039	0.439c
Self-Regulation	11.02 (2.020)	12 (9, 12)	0.725	**0.000*****c**	0.763	**0.000*****c**
Work Culture	64.75 (9.311)	66 (62, 72)	0.741	**0.000*****c**	0.775	**0.000*****c**

P25 and P75 were the lower and upper quartiles, respectively.
c Spearman Correlation test
SD, standard deviation.
* p<0.05; ** p<0.01; *** p<0.001

Table 4. Generalized linear model for factors associated with nurses' DPET and CDRISC score (N=390).

Variable	DPET			CDRISC		
	B	SE	P-Value	B	SE	P-Value
Intercept	21.040	88.465	0.017	-6.654	19.423	0.001
Sex						
Male	3.040	18.311	0.097	0.632	0.4020	0.116
Female	0a	.	.	0a	.	.
Education						
Ners	-4.740	20.977	**0.024***	-0.133	0.4606	0.772
Diploma	0a	.	.	0a	.	.
Working Unit						
ED	5.342	58.029	0.357	1.184	12.741	0.353
Operating Room	2.865	65.096	0.660	0.557	14.292	0.697
ICU	-1.282	59.387	0.829	1.098	13.039	0.400
Wards	6.810	54.830	0.214	0.806	12.038	0.503
OPD	6.546	57.526	0.255	0.991	12.630	0.433
Hemodialysis	0a	.	.	0a	.	.
Emergency Training Experience						
ACLS/ATCLS	1.457	46.238	0.753	-1.080	10.152	0.287
BLS/BTCLS	2.328	21.227	0.273	-1.214	0.4660	**0.009****
Basic Surgery	-5.336	100.173	0.594	-2.403	21.993	0.274
ICU	15.921	71.737	**0.026***	-2.471	15.750	0.117
Other	-7.102	67.601	0.293	-3.320	14.842	**0.025***
Never	0a	.	.	0a	.	.
Disaster Training Experience						
Yes	3.866	14.734	**0.009****	0.480	0.3235	0.138
Never	0a	.	.	0a	.	.
Disaster Duty Experience						
Yes	-1.845	20.878	0.377	-0.534	0.4584	0.244
Never	0a	.	.	0a	.	.
Age	0.049	0.1709	0.776	-0.035	0.0375	0.346
Total Working Experience	-0.133	0.1711	0.438	-0.001	0.0376	0.971
Total Working Experience in the current Unit	0.072	0.1014	0.476	0.048	0.0223	**0.032***
Self-Regulation	4.032	0.4338	**0.000*****	1.112	0.0952	**0.000*****
Work Culture	1.454	0.0970	**0.000*****	0.340	0.0213	**0.000*****

a Reference; * p<0.05; ** p<0.01; *** p<0.001

disaster readiness and resilience, with both showing significant results ($p < 0.001$).

Discussions

This study investigated nurses' disaster preparedness and resilience by focusing on individual and organizational dynamics. Variations in scores revealed by the generalized linear models were observed. Key determinants of these scores include education, disaster- and emergency-related training, self-regulation, and work culture, highlighting the intricate balance between personal attributes and organizational context, which can provide valuable insights for enhancing disaster readiness in the nursing profession.

Factors which Influenced DPET Scores

Demographic Factors: Gender and Education Levels on DPET Score

Although the difference in disaster preparedness scores between male and female nurses was not statistically significant, male nurses achieved higher scores on the DPET than their female counterparts did. This aligns with previous research that reported mixed results on gender disparities in disaster preparedness (Almukhlifi et al., 2021). Previous studies have found that males generally have higher levels of preparedness (Almukhlifi et al., 2021; Chegini et al., 2022; Farajzadeh et al., 2017; King et al., 2019; Younos et al., 2021), but the reasons for this are complex and may involve sociocultural, professional, or training-related factors. Gender roles can impact male nurses' perceptions of their abilities and empowerment during disasters, affecting their preparedness. Gender differences in education can also affect disaster preparedness. These findings emphasize the need for thorough examination of gender roles and their potential influence on disaster preparedness in the nursing profession.

This study found an association between education level and DPET scores. Unexpectedly, nurses with bachelor's degrees had lower DPET scores than those with a diploma. The reasons for this difference are unclear but may be due to differences in curriculum focus or practical training. Previous research by Farajzadeh et al. (2017) and Martono et al. (2019) suggests that higher qualifications do not always lead to

better disaster preparedness, while Setyawati et al. (2020) and Chegini et al. (2022) showed that nurses with bachelor's or PhD degrees are better prepared. This highlights the complexity of the relationship between education and disaster preparedness, and emphasizes the importance of uniform and effective disaster training at all academic levels.

Training and Experience: Emergency Preparedness Training and Disaster Duty Experience on DPET Score

Similar to previous research (Almukhlifi et al., 2021; Rizqillah & Suna, 2018), this study revealed a strong relationship between disaster training and improved disaster preparedness scores. Trained individuals, such as nurses, consistently outperformed untrained individuals in DPET assessments. King et al. (2019) and Martono et al. (2019) emphasize the importance of specialized bioterrorism training, while Setyawati et al. (2020) and Younos et al. (2021) suggest that general training may not always lead to actual preparedness. Tailored training in disaster management generally enhances the perceived readiness of professionals (Kimin et al., 2022). Disaster training equips nurses with the necessary knowledge, skills, and resources to handle emergencies effectively, including protocols, triage procedures, and emergency care procedures (Almukhlifi et al., 2021; King et al., 2019).

The relationship between disaster experience and preparedness was not statistically significant; however, those who experienced disasters scored higher on preparedness measures. This knowledge suggests that first-hand exposure to disasters can lead to valuable experiential knowledge and reduce fear and anxiety. For instance, nurses with more disaster experiences feel more prepared than their peers in other professions, as demonstrated in studies by Rizqillah and Suna (2018), King et al. (2019), and Abuadas and Albikawi (2022). However, discordant literature like Farajzadeh et al. (2017) may offer a different perspective on the relationship between disaster experience and preparedness. Both training and first-hand experience play important roles in enhancing disaster preparedness, but their impact may vary based on various factors.

The primary data showed a nonsignificant negative correlation between work experience and disaster preparedness. In other words, as work experience increases, DPET scores decrease. Although more experience often provides opportunities for training, simulations, and real-world disaster scenarios (Almukhlifi 2021), it does not necessarily enhance disaster preparedness. Martono et al. (2019) and Setyawati et al. (2020) found no correlation between work experience and disaster preparedness. These studies suggest that experienced nurses may be more prepared for disaster management. However, there may be a gap between the perceived and actual preparedness. This discrepancy may be due to seasoned nurses becoming complacent or overly confident, or being less receptive to new methods and technologies than less experienced individuals.

As experience in a specific area or unit increased, so did perceived disaster preparedness. However, the correlation was not statistically significant. Specialized knowledge and skills honed through intensive training in a particular field contributed to this perception. However, this expertise may not extend to broader disaster scenarios, emphasizing the need for comprehensive training that encompasses both specialized and general situations. Rizqillah and Suna (2018) and King et al. (2019) found that tenure as an emergency nurse or specialist did not necessarily lead to higher disaster readiness. These studies indicate that specialization plays a role in disaster preparedness, but it is not the sole determinant. Continuous learning, versatility, and adaptability are essential to effective disaster management.

Self-Regulation and Workplace Culture on DPET Score

Our research revealed a connection between nurses' self-regulation scores and elevated DPET scores, highlighting the importance of self-regulation in disaster preparedness. According to Ryan and Deci's Self-Determination Theory (SDT), individuals with higher self-regulation levels exhibit intrinsic motivation during disasters (Ryan & Deci, 2022). Our findings align with those of Abuadas and Albikawi (2022), who demonstrated a strong correlation between self-regulation and disaster preparedness among nurses. Baker et al.(2019) discovered that more self-regulated nurses were proactive in disaster situations. These outcomes align with Wang and Tsai (2022) and Cai et al. (2023), who propose that strong intentions for disaster risk reduction lead to proactive behavior.

Our study revealed that a positive work culture characterized by supportive leadership, good interpersonal relationships, and active participation significantly enhanced disaster preparedness scores. This finding aligns with the observations of Lim et al. (2020) and Abuadas and Albikawi (2022), who emphasized the importance of leadership in fostering a conducive environment for commitment and social interaction and in boosting nurses' preparedness. Cai et al. (2023) also highlighted the role of trust in disaster risk

reduction, stating that it thrives in a positive work environment. Abenir et al. (2022) further stressed the importance of leadership in communication, networking, and engagement in the relationship between resilience factors and preparedness. These findings underscore the crucial role of active work culture, particularly leadership, in disaster preparedness.

Factors which Influenced CD-RISC Score

Demographic Factors: Gender and Education Levels on CD-RISC Score

Our study revealed that males exhibited higher resilience scores than females, which aligns with previous research on disaster preparedness showing that male nurses have higher resilience and lower psychological distress (Alameddine et al., 2021; Sierra-García et al., 2022). However, Kılınç and Çelik (2021) found no gender disparities in resilience. The factors contributing to higher resilience scores in males are not entirely clear, but sociocultural influences and innate gender-based characteristics may play a role. These findings emphasize the complex interplay between sociocultural and intrinsic factors in nursing that should be considered in broader professional contexts.

Our study found no relationship between educational level and resilience. Surprisingly, individuals with 'Ners' degrees, which surpassed diplomas, scored lower. This warrants an examination of the curricula and personal development components of educational frameworks. Our findings align with those of Alameddine et al. (2021) and Kılınç and Sis Çelik (2021), who reported no significant variation in resilience among nurses from different educational backgrounds. Conversely, Afshari, Nourollahi-Darabad, and Chinisaz (2021) found that education significantly affected resilience, with more highly educated nurses displaying greater resilience. Further research is needed to understand how educational programs, especially in emergencies, influence resilience in nurses and equip them with the knowledge and skills necessary to handle challenging situations.

Training and Experience: Emergency Preparedness Training and Disaster Duty Experience on CD-RISC Score

This study emphasizes the importance of disaster training in building resilience, despite the surprising finding that those without training had slightly higher CD-RISC scores. Further investigation is needed to understand this unexpected observation, which contradicts the results of previous studies. Previous research has demonstrated the significance of disaster preparedness, including training, in fostering resilience, for example,), Mao et al. (2020), Sierra-García et al. (2022) and Zhang et al. (2022). Adequate preparation and training are crucial for fostering resilience among rescue workers, as emphasized by Mao et al. (2019). However, the relationship between training and resilience may be influenced by factors such as quality of training, inherent resilience, or external support.

Our research showed that nurses' work experiences did not have a direct impact on their resilience. However, the duration of service in their current units positively affected their perceived resilience. This finding aligns with resilience theory, which suggests that facing challenges can enhance resilience over time. The results of our study are consistent with those of Alameddine et al. (2021), who found that merely accumulating years in a profession does not necessarily lead to increased resilience. Additionally, Afshari et al. (2021) supported the positive effect of experience in the current unit on resilience. Our study highlighted the significance of a supportive work environment in promoting resilience among nurses.

Self-Regulation and Workplace Culture on CD-RISC Score

Our research identified a connection between nurses' self-regulation and resilience as indicated by their CD-RISC scores. Theoretically, self-regulation enables individuals to regulate their emotions, thoughts, and actions during high stress events. This is especially important for nurses whose professions are demanding. Studies by Abualruz and Hayajneh (2019), Kim and Chang (2022), Sierra-García et al. (2022), and Lu et al. (2023) have also found that self-regulation is essential for nursing resilience. Our findings and a significant body of literature support the importance of self-regulation in fostering resilience among nurses.

Our research underscores the importance of a positive work environment in bolstering nurses' resilience in challenging situations. A supportive work climate, characterized by mutual respect and reciprocal trust, plays a crucial role in fostering posttraumatic growth and enhancing nurses' adaptability to disasters. According to Abualruz and Hayajneh (2019) and Mao, Hu, and Loke (2021), a positive work environment with social support and resources is vital. Scrymgeour et al. (2020) also emphasize the significance of professional duty as an intrinsic motivator, with peer and team cohesion amplifying its impact. However, our findings are in contrast with the literature on workplace bullying, which can negatively affect supportive work

environments (Yu et al., 2019). To ensure nurses' resilience during crises, organizations must prioritize factors such as leadership, peer support, and engagement.

This study on naval hospital preparedness and resilience in Jakarta provides valuable insights, emphasizing the need for continuous training and self-assessment among nurses in disaster preparedness. Collaboration and standardized protocols can lead to coordinated responses and optimal resource utilization. Healthcare systems can create environments that foster a sense of belonging and mutual support by aligning organizational values with preparedness goals and providing resources for nurses' training. However, acknowledging the study's constraints is essential, as the cross-sectional design limits the comprehensive examination of temporal changes, necessitating longitudinal studies. The generalizability of the findings is also limited due to the concentration of naval hospitals in Jakarta; therefore, future research should adopt qualitative methodologies in diverse settings. Furthermore, additional research is needed to explore gender dynamics in disaster preparedness and resilience and to address disparities through targeted interventions.

Conclusion

This study offers vital information on the factors affecting nurses' disaster preparedness and resilience in naval hospitals in Jakarta. This study emphasizes the intricate role of demographic factors, such as gender and education, in shaping nurses' perceptions. Disaster-specific training and real-world experiences play key roles in preparedness and resilience. Additionally, self-regulation and supportive work environments are crucial for an effective disaster response. However, this study's focus on Jakarta's naval hospitals may limit its applicability to other healthcare settings. Future research should use qualitative methodologies to gain a more comprehensive understanding of disaster preparedness and resilience. Improving the impact of future research on nurses' disaster preparedness requires addressing the study's limitations, such as its cross-sectional design and limited generalizability. Exploring gender dynamics in disaster preparedness is necessary to promote equitable outcomes in nursing practice.

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Conflict of interest

The authors confirm that there is no conflict of interest regarding the submission of this article.

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