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ORIGINAL RESEARCH

Exploring Nurses' Perceptions of Disaster Preparedness Competencies

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Abstract

Background: Indonesia frequently experiences natural disasters, underscoring the importance of nursing competencies in disaster preparedness. Nevertheless, especially among general nurses, the factors shaping these competencies are not well understood.
Purpose: This study aimed to explore Indonesian nurses' perceptions of disaster preparedness competencies and compare these perceptions across distinct characteristics.
Methods: Adopting a cross-sectional design, 230 nurses from all wards of a public hospital in Jakarta Province were selected via quota sampling. The Nurses' Perceptions of Disaster Core Competencies Scale (NPDCC) questionnaire was utilized to assess nurses' perceptions of competencies across five domains. The study employed Chi-square, Fisher's exact, and Likelihood ratio tests, followed by backward (likelihood ratio) multiple logistic regression, to analyze the relationship between nurses' characteristics and their perception of disaster preparedness competencies.
Results: Results indicated that 51.7% of nurses perceived their disaster competencies as high, with an average score of 175.84(25.017). Further analysis revealed that nurses' perceptions of these competencies were influenced by education (p=0.002), disaster simulation experience (p=0.036), and awareness of hospital disaster plans (p=0.012), with Nagelkerke's R2=0.140. Nurses with a diploma qualification were 2.569 times more likely to perceive their skills as lower. Lack of simulation experience and unawareness of the plan further diminished perceived competencies, with ORs of 2.050 and 5.420, respectively.
Conclusion: While education, disaster simulation experience, and plan awareness are crucial for nurses' perceptions of disaster competencies, enhancing other supportive factors is also vital. This study recommends that hospitals increase educational opportunities, emphasizing regular disaster simulations and granting better access to disaster plans, to bolster nurses' disaster preparedness competencies.

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1. Introduction

Indonesia, profoundly affected by global climate change, stands as one of the most disaster-prone countries in the world. Since the catastrophic 2004 tsunami, the nation has grappled with, on average, one disaster every month, ranging from earthquakes and tsunamis to volcanic eruptions (Mercy Corps, 2020). Interestingly, while there was a 33.5% decrease in disasters in 2021, the death toll surged by 76.9% compared to the previous year (The National Agency for Disaster Management, 2021). Victims of disasters often necessitate prompt and suitable treatments, highlighting the vital roles of nurses in disaster emergency response. This significance was further emphasized by the year 2022 when the nursing population in Indonesia reached 511,191 individuals (Mahmudan, 2021). Nurses, constituting the most substantial component of the healthcare workforce, must actively participate in disaster management by serving as educators, information providers, care providers, and first-aid responders (Kalanlar, 2018).

The International Council of Nurses (ICN) introduced the Core Competencies in Disaster Version 2.0 in 2019. This set of guidelines encompasses eight competency domains for nurses: preparation and planning, communication, incident management systems, safety and security, assessment, intervention, recovery, and law and ethics (International Council of Nurses, 2019).

While this framework equips nurses to address disasters with professional expertise, there remains a gap in understanding the preparedness competency level required by nurses. Numerous studies have consistently found that nurses' disaster management competencies range from moderate to low (Labrague et al., 2018; Said & Chiang, 2020; Songwathana & Timalsina, 2021). In Indonesia, three separate studies also found that nurses displayed only a moderate level of preparedness (Martono et al., 2019; Sangkala & Gerdtz, 2018; Setyawati et al., 2020). Common factors hindering optimal nurse preparedness include insufficient education, knowledge, and disaster-related skills (Al Harthi et al., 2020; Setyawati et al., 2020). While nurses often possess knowledge and skills in areas such as triage, emergencies, and patient care during natural calamities or pandemics, they frequently fall short in handling pandemics, accessing psychological support, and utilizing early warning systems (Ituma et al., 2022; Li et al., 2021; Songwathana & Timalsina, 2021).

To empower nurses as frontline responders to disasters, it is pivotal to evaluate their competencies in alignment with the Core Competencies in Disaster Version 2.0 of ICN. While tools like the Disaster Preparedness Evaluation Tools (DPET), introduced by Bond and Tichy (2007), are globally recognized for gauging perceptions, their subjective nature makes them less than ideal. Their primary limitation is the challenge they present in objectively measuring competencies outside the realm of theoretical knowledge in real-world disaster scenarios. In Indonesia, DPET has been a popular choice for evaluating nurses' perceptions of their disaster skills (Martono et al., 2019; Sangkala & Gerdtz, 2018; Setyawati et al., 2020). Even as it offers insights into all disaster phases, DPET misses out on incorporating essential ethical competencies, which form a cornerstone of the ICN Core Competencies in Disaster Version 2.0. This oversight is significant given that ethical considerations play a critical role in effective disaster response, as noted by Al Thobaity et al. (2015).

In contrast, the Nurses Perception of Disaster Core Competencies (NPDCC) questionnaire provides a unique perspective, although it offers a limited emphasis on ethics (Celik, 2010). While this tool has been used in countries such as China, Iran, and Turkey, there is a noticeable gap in research exploring the factors influencing disaster emergency response competencies among Indonesian nurses using the NPDCC. To address this gap, this study aimed to explore Indonesian nurses' perceptions of disaster preparedness as captured by the NPDCC. Specifically, this study sought to identify and compare these perceptions across various characteristics to illuminate the factors influencing their understanding of disaster preparedness competencies.

2. Methods

2.1 Research design

This study employed a cross-sectional design, which is appropriate for capturing nurses' perceptions of disaster preparedness and contrasting these perceptions based on distinct characteristics at a specific point in time.

2.2 Setting and samples

The study population comprised nurses from all departments in a regional general hospital in Jakarta with a total of 480 nurses. A representative subset of 230 respondents was selected using the quota sampling technique. This approach was adopted to ensure that each department within the hospital was proportionately represented, reflecting the actual distribution of each department in the broader nursing population. The selected sample size was strategically derived using the Slovin formula, incorporating a specified 5% standard error (Adam, 2020). The study considered nurses who were permanent members of the hospital staff. New recruits (those with less than one year of experience) and volunteer nurses, often brought in for specific periods such as pandemics or to address nurse shortages through programs by the Ministry of Health or the DKI Jakarta Provincial Health Office, were excluded following the hospital's protocol. This decision was rooted in the unique probationary period for new recruits involving rotations across different units. This study focused on total service duration and current department tenure as essential parameters in gauging disaster preparedness competencies.

2.3 Measurement and data collection

Data collection was undertaken from April to May 2022. Brief meetings were convened with head and on-duty nurses in each ward in which the study objectives, respondents' rights, and

questionnaire completion guidance were detailed. Questionnaires were entrusted to head nurses for distribution and were collected after five days, with a three-day follow-up by the research team. The head nurses informed nurses who were not present at the meetings. Only after securing written informed consent from those who were willing to participate did the data collection process commence.

Central to this study was the use of the Nurses' Perceptions of Disaster Core Competencies Scale (NPDCC), which comprised 45 questions (Celik, 2010). The NPDCC was translated into Indonesian by a certified translator and back-translated by the main investigator for accuracy and relevance. Two expert nurses specializing in emergency and disaster nursing then reviewed the translated version for cultural and contextual appropriateness. This instrument gauged perceptions on disaster response competencies, categorized into domains such as critical thinking, special diagnosis, general diagnosis, technical skills, and communication skills. Responses on the Likert scale ranged from 1 (indicating 'this needs to be taught') to 5 (indicating 'I can do and teach it'). In addition to competency perceptions, the instrument also delved into respondent demographics, encompassing age, sex, education, work experience, and their current roles within hospital settings. Furthermore, participants' involvement in emergency or disaster-related training, familiarity with hospital disaster plans, and prior disaster response experiences were assessed. To guarantee the soundness and applicability of the NPDCC, its validity, and reliability were thoroughly examined within a general hospital located in Depok, Indonesia. This chosen hospital shared attributes similar to the primary study locale, enhancing the instrument's credibility. Validity values ranged between 0.526 and 0.925, firmly surpassing the critical r-table benchmark of 0.349, thus affirming the instrument's content validity. Furthermore, the instrument demonstrated commendable reliability with a coefficient of 0.986.

2.4 Data analysis

The analysis was performed using the Statistical Package for the Social Sciences (SPSS) data processing software, version 25.0 (SPSS Inc., NY, USA). The study utilized descriptive and comparative statistics to analyze respondents' characteristics, including age, sex, education level, working experience, and current hospital units. Additionally, it evaluated the participants' attendance in emergency or disaster-related training, their experience with drills pertaining to such scenarios, their familiarity with the hospital's disaster plan, and any prior disaster response experiences they may have had. Due to the non-Gaussian nature of the data, scores within the disaster competency domain were segmented into 'low' and 'high' categories, using their median values as the basis for classification.

The analyzed results included absolute frequencies (f), percentages (%), median, mean, and standard deviation. The Chi-square test, Fisher's exact, and the Likelihood ratio tests were employed to investigate significant associations between groups. Furthermore, a multiple logistic regression analysis using the backward (likelihood ratio) method was applied to determine the relationship between the independent variables and the outcome variable, which is the perception of disaster competencies. In assessing the models, we employed the likelihood ratio and Hosmer and Lemeshow's goodness-of-fit test to evaluate the alignment between the observed and predicted data. The findings from the multiple logistic regression analysis are showcased as odds ratios (ORs), accompanied by 95% confidence intervals (CIs) and p values to indicate statistical significance ($p<0.05$).

2.5 Ethical considerations

The study received ethical clearance from the Health Research Ethics Committee (HREC) of the hospital, as evidenced by the approval letter of 17/KEPK/RSUDPM/V/2022, dated 31 May 2022. All participants provided informed consent before participating, fully aware of the study's objectives and their rights. Furthermore, the principles enshrined in the Declaration of Geneva were adhered to, ensuring all participants' rights, autonomy, and safety.

3. Results

3.1 Characteristics of the participants

Based on the distribution of respondents' characteristics in Table 1, most respondents were more than 30 years old (53%) and female (75.7%). Moreover, most were diploma nurses (67.4%) with 6–10 years of service (59.6) and worked in the wards (49.1%). Based on variables related to

disasters, 96.1% of respondents stated that they had attended training related to emergencies or disasters; however, only 23.5% filling out the survey had completed a drill simulation disaster. In addition, 27.4% of respondents stated that they had experience of disaster assignments, and most knew that the hospital had a hospital disaster plan (92.6%).

Interestingly, the majority of nurses undergoing professional nursing education, specifically those who completed the nurse profession education *(ners)* program, perceived a high level of disaster preparedness competency, with 52 out of 75 holding this view. In contrast, a significant proportion of diploma-educated nurses assessed their competency as low, accounting for 88 of 155. Furthermore, a heightened perception of competence was evident among nurses who participated in disaster drills and those who were familiar with their hospital's disaster preparedness plans. For both categories, more nurses exhibited a higher perception of their competency than those with a lower perception (36 of 54 and 116 of 213, respectively), as illustrated in Table 1. Bivariate analysis, as shown in Table 1, indicated that education (p=0.000) had a pivotal influence on nurses' perceived disaster response competencies. Other significant factors shaping this perception included disaster simulation experience (p=0.012), hands-on disaster assignments (p=0.028), and awareness of hospital's disaster preparedness plan (p=0.003).

Table 1. Characteristics of the participants (n=230)

Characteristics	Perception of Disaster Preparedness Competencies						*p*
	Low		High		Total		
	f	%	f	%	f	%	
Age (years)							
≤30	55	49.5	53	44.5	108	47	0.447[a]
>30	56	50.5	66	55.5	122	53	
Sex							
Female	87	78.4	87	73.1	174	75.7	0.352[a]
Male	24	21.6	32	26.9	56	24.3	
Education							
Diploma	88	79.3	67	56.3	155	67.4	0.000*[b]
Ners	23	20.7	52	42.7	75	32.6	
Working Experience							
≤ 5 Years	33	29.7	26	21.8	59	25.7	0.331[c]
6-10 Years	64	57.7	73	61.3	137	59.6	
>10 Years	14	12.6	20	16.8	34	14.8	
Working Unit							
OPD	14	12.6	6	5	20	8.7	0.224[c]
Ward	49	44.1	64	53.8	113	49.1	
Covid-19 unit	12	10.8	12	10.1	24	10.4	
ICU	19	17.1	16	13.4	35	15.2	
ER	17	15.3	21	17.6	38	16.5	
Attended Emergency or disaster-related training							
Never	7	6.3	2	1.7	9	3.9	0.093[b]
Yes	104	93.7	117	98.3	221	96.1	
Drills experience							
Never	93	83.8	83	69.7	176	76.5	0.012*[a]
Yes	18	16.2	36	30.3	54	23.5	
Awareness of Disaster Plan							
No	14	12.6	3	2.5	17	7.4	0.003*[a]
Yes	97	87.4	116	97.5	213	92.6	
Disaster response experience							
Never	88	79.3	79	66.4	167	72.6	0.028*[a]
Yes	23	20.7	40	33.6	63	27.4	

Note. [a]The Chi-square, [b]Fisher's exact, [c]likelihood ratios tests, *significance (p<0.05)

3.2 Perceptions of disaster preparedness competencies

Table 2 delineates that 51.7% of the respondents perceived themselves as having high disaster competencies (175.84(25.017)), slightly outweighing those who viewed their competencies as low (122.50(17.073)), with a substantial mean difference. Dissecting individual competencies, communication skills (70.9%; 28.81(5.402)) and critical thinking (68.3%; 14.55(2.642)) emerged as the predominant perceived competencies. In contrast, technical competence lagged, with only 51.7% (59.37(6.335)) perceiving it as high, the lowest among all competencies evaluated.

Table 2. Nurses' perception of disaster core competencies

Competencies	f (%)	Mean (SD)	Median
Global Disaster Competencies		150.10 (34.295)	140
Low	111 (48.3)	122.5 (17.073)	129
High	119 (51.7)	175.84 (25.017)	173
Critical Thinking		12.78 (3.542)	12
Low	73 (31.7)	8.99 (1.838)	9
High	157 (68.3)	14.55 (2.642)	14
Special Diagnosis		18.17 (5.289)	18
Low	95 (41.3)	13.48 (2.824)	14
High	135 (58.7)	21.47 (3.955)	20
General Diagnosis		43.2 (10.437)	40
Low	104 (45.2)	34.61 (5.743)	37
High	126 (54.8)	50.29 (7.759)	51
Technical skills		50.22 (11.141)	49
Low	111 (48.3)	40.41 (5.268)	42
High	119 (51.7)	59.37 (6.335)	58
Communication skills		25.72 (6.93)	24
Low	67 (29.1)	18.19 (3.73)	18
High	163 (70.9)	28.81 (5.402)	26

3.3 Related factors of nurses' perception of disaster preparedness competencies

The multiple logistic regression analysis, validated by the omnibus test, revealed that nurses with a diploma educational background were 2.569 times more likely to have low perceived disaster competencies (See Table 3). Similarly, those without disaster simulation experience (OR=2.050) and those who were unaware of the hospital's disaster preparedness initiatives (OR=5.420) were more inclined towards lower perceived disaster competencies.

Table 3. Factors of nurses' perception of disaster preparedness competencies

Variables	Odds ratio (OR)	95% CI	*p**
Education			
Diploma	2.569	1.405-4.697	0.002
Ners	(Ref)		
Drills experience			
Never	2.050	1.046-4.018	0.036
Yes	(Ref)		
Awareness of Disaster Plan			
No	5.420	1.444-20.336	0.012
Yes	(Ref)		

Note: Cox and Snell R^2= 0.105. Nagelkerke's R^2= 0.140 (n=230). Omnibus test (p=0.000) *p<0.05

4. Discussion

The primary aim of this study was to explore Indonesian nurses' perceptions of disaster preparedness competencies using the NPDCC and compare these perceptions across distinct characteristics. This study found that education, participation in disaster simulations, and familiarity with hospital disaster plans stood out as significant related factors to perceptions.

4.1 The perception of disaster preparedness competencies

Our findings indicated that a majority of nurses perceived high disaster preparedness competence. This finding is in line with findings from other countries, which highlighted that nurses in Saudi Arabia, particularly those who were employed in military hospitals, often perceived themselves as having advanced disaster management skills (Al Thobaity et al., 2015) and that there were elevated preparedness levels in regions prone to disasters (Labrague et al., 2018). Such international consistency might point to a prioritized or standardized approach to disaster training in high-risk regions, possibly driven by the experiences of professionals who have faced real-world disasters. The prevailing trends argue the importance of delving deeper into the shape of disaster preparedness perceptions. However, our results diverged from prior Indonesian studies (Martono et al., 2019; Rizqillah & Suna, 2018; Sangkala & Gerdtz, 2018; Setyawati et al., 2020) that emphasized a moderate perceived readiness of the disaster competencies. This disparity could stem from evolving training practices, increased awareness, or variations in the sample populations of the studies. The observed patterns in Indonesia affirmed its vulnerability to disasters and the resultant efforts to bolster disaster preparation in nursing education.

Within our study, nurses predominantly felt that their strengths lay in critical thinking and communication skills. This encompasses skills such as triage determination, ethical adherence, and managing disaster nursing care. Our results mirror those of Taskiran and Baykal (2019) but significantly differ from the findings of Chegini et al. (2022) despite using similar assessment tools. Potential factors such as training emphasis differences or varied interpretations of the tools might account for these disparities. This divergence warrants a deeper investigation into regional educational disparities and cultural influences on decision-making.

In this study, communication skills were deemed pivotal, yet their perception differed in global research. While Taskiran and Baykal (2019) found a strong communication competency among Turkish nurses, studies like Chegini et al. (2022) pinpointed notable deficiencies. Such variations might hint at regional training or cultural differences. The importance of effective communication is undeniable in disaster scenarios for seamless collaboration, as emphasized by Shinchi et al. (2019).

Interestingly, the study revealed competencies related to general diagnostic ability and special diagnosis as the least proficient, focusing particularly on addressing the psychosocial needs of disaster victims. Echoing our observations, Chegini et al. (2022) found diagnostic abilities lacking among respondents despite high technical competence—a divergence potentially due to regional training variations or education shifts. Their findings hint at nurses' proficiency in hands-on tasks yet gaps in analytical skills like diagnosis. Research has highlighted nurses expressed needs to better address the psychosocial impacts of disasters on victims and themselves (Brewer et al., 2020; Goniewicz et al., 2021). Ranse et al. (2022) pointed out wellness as a key competence for disaster-response nurses. There is a contrast between managing physical trauma, which is emphasized in many training programs, and addressing psychosocial impacts, which are often overlooked (Karnjuš et al., 2021).

4.2 Related factors of nurses' perception of disaster preparedness competencies

In this study, it was established that the level of education, prior experience with disaster simulations, and familiarity with disaster guidelines within institutions exhibited notable correlations with nurses' perceptual assessment of their own competencies in disaster preparedness. The relationship between education and nurses' preparedness was also established in previous studies (Brewer et al., 2020; Chegini et al., 2022; Songwathana & Timalsina, 2021). Nurses feel formal education to be very effective in increasing their knowledge and skills related to disasters (Sangkala & Gerdtz, 2018). The higher the education of nurses, the more competent they are at dealing with disasters (Brewer et al., 2020; Chegini et al., 2022). Previous research also found that nurses with a high education level tend to have good critical thinking skills and decision-making abilities (Chiang et al., 2020). In order to increase the competence of disaster nurses, it is essential that specific disaster modules be included in nurses' formal education (Ranse et al., 2022; Veenema et al., 2019); however, the implementation of the majority of disaster education curricula has not been optimal (Al Harthi et al., 2020; Perpiñá-Galvañ et al., 2021; Ranse et al., 2022). For formal disaster education to be effective, it must be continuous (Perpiñá-Galvañ et al., 2021) and must be a combination of

education, training, and simulation using settings that closely resemble actual conditions (Perpiñá-Galvañ et al., 2021; Ranse et al., 2022).

Regarding the experience of disaster simulation, previous studies also found similar findings that simulation positively affected disaster preparedness among nurses (Brewer et al., 2020; Sangkala & Gerdtz, 2018; Songwathana & Timalsina, 2021). Indeed, disaster simulation assists health workers by illustrating what events would really be like during a disaster and enhances their responsiveness, better preparing them to provide care during disasters (Said & Chiang, 2020). Moreover, disaster simulations train nurses to understand their roles in disasters and to upskill their leadership and coordination abilities (Kim & Lee, 2020), while drills and tabletop simulations that closely resemble real situations can increase knowledge, skills, and willingness to engage in disasters (Ituma et al., 2022; Unver et al., 2018). In fact, regular disaster drills have been found to be adequate in preparing nurses to deal with disaster situations (Labrague et al., 2018).

Disaster simulations, while integral to disaster preparedness, are just one facet of ensuring nurses' preparedness in disaster situations. An equally pivotal factor is the awareness of the existence and accessibility of disaster guidelines. It is not merely about having the guidelines available but also ensuring that nurses are actively informed about them. This awareness extends beyond mere knowledge. While knowledge implies an understanding or familiarity with specific information, awareness emphasizes recognition and consciousness of the broader picture. Labrague et al. (2018) affirmed the critical role of such awareness in bolstering nurses' preparedness competencies. On a related note, possessing concrete knowledge of disaster plans and emergency codes is vital. Jeong and Lee (2020) highlighted that when nurses are well-acquainted with these protocols, not only does their confidence in handling disaster assignments increase but there is also a marked improvement in their overall disaster preparedness. This emphasizes the necessity for a dual approach, which promotes broad awareness of available guidelines and ensures in-depth knowledge of specific disaster procedures.

On the other hand, Songwathana and Timalsina (2021) discovered that numerous nurses did not possess a detailed understanding of their hospital's disaster plan while they were still deemed competent. This competence was not solely dependent on familiarity with the disaster plan but was also influenced by a combination of factors. Notably, education and training emerged as paramount influencers. This raises a critical point of consideration that while institutional protocols like disaster plans are undeniably important, they might not be the sole determinants of a nurse's disaster preparedness. Instead, comprehensive education and specialized training could potentially compensate for gaps in knowledge regarding specific institutional guidelines. This further strengthens the call for a balanced emphasis in nursing education, both in institutional procedure knowledge and broader disaster response training.

5. Implication and limitation

The findings of this study indicated that nurses' perceptions regarding their competencies in disaster preparedness were significantly associated with their educational background, exposure to disaster simulation exercises, and awareness of disaster guidelines within their respective institutions. These findings point towards a significant need for robust national and organizational support to strengthen hospitals' capacity to enhance their nursing staff's understanding and confidence in disaster-related topics. This can be achieved through formal education or targeted courses. Moreover, it emphasizes the value of hospitals placing importance on regular disaster simulations and ensuring consistent communication of their disaster plans, aiming to refine nurses' perceived capabilities and readiness for disaster situations.

However, several limitations accompanied this research. At its core, the findings rest on nurses' self-reported perceptions, which might not mirror objective evaluations of actual competencies. The scope of the study did not extend to detailed scrutiny of each specific skill encompassing the overall perceived preparedness nor differentiated the perceived competencies among nurses from varied units. While the use of multivariate analysis aids in reducing the effects of potential confounding factors, there is undeniable room for more in-depth inquiry. In forthcoming research, integrating direct observation could facilitate the collection of data on

actual competency, leading to a more comprehensive evaluation of nurses' disaster preparedness.

6. Conclusion

Our findings indicated that a majority of nurses perceived a high disaster preparedness competence. In this study, nurses identified their strengths in disaster preparedness as critical thinking and communication skills. However, competencies in areas such as general diagnostic ability and knowledge of specific disaster types showed room for improvement. Notably, education level, experience with disaster simulations, and knowledge of hospital disaster plans influenced their perceptions, with more educated nurses feeling better prepared. Prioritizing disaster education, targeted training, and frequent simulations can enhance their actual competencies. Hospitals should emphasize ongoing education, simulations, and accessibility of disaster plans to boost nurse confidence in handling disasters. Future research using direct observation can further assess these competencies in real-world settings.

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Author contribution

WW: Conceptualization, methodology, data curation, formal analysis, software, writing original draft, writing review, and editing. NG: Conceptualization, methodology, investigation, data curation, and writing the original draft.

Conflict of interest

The authors report no conflict of interest.

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