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Disaster Awareness, Preparedness, Participation and Nursing Competency in Indonesian Public Health Nurses

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ABSTRACT

Background: Public health nurses are vital to disaster response and preparedness efforts, yet their competencies in these areas remain underexplored. Understanding the factors influencing nurse competency such as disaster awareness, preparedness, and community participation is crucial to enhancing community resilience during emergencies. **Objective:** This study aimed to evaluate and identify the predictors of disaster awareness, preparedness, community participation, and nursing competency among public health nurses in Indonesia. **Methods:** A cross-sectional descriptive study was conducted from June to August 2024 involving 300 public health nurses working in community health centres across Indonesia. Data were collected using validated instruments: Disaster Preparedness Evaluation Tool (DPET), Public Health Emergency Preparedness Survey (PHEPS), Community Emergency Preparedness Participation Scale (CEPPS), and Disaster Nursing Competency Scale (DNCS). Descriptive statistics, Pearson correlation, and multiple regression analyses were performed. **Results:** The majority of participants were female (88.3%), aged 31–40 years (42.7%), held a bachelor's degree (68.7%), and had more than five years of public health nursing experience (54.3%). Regression analysis revealed that disaster awareness ($\beta = 0.32$, $p < 0.001$), preparedness ($\beta = 0.36$, $p < 0.001$), and community participation ($\beta = 0.31$, $p < 0.001$) were significant predictors, explaining 47.8% of the variance in nursing competency. **Conclusion:** Disaster awareness, preparedness, and community participation significantly influence nursing competency among Indonesian public health nurses. These findings underscore the need to integrate disaster-related education and community engagement into nursing training programs, emphasizing tailored approaches for resource-limited settings.

Keywords: Disaster Awareness, Disaster Preparedness, Community Participation, Nursing Competency, Public Health Nurses

INTRODUCTION

Indonesia ranks among the most disaster-prone countries globally due to its geographic positioning along the Pacific Ring of Fire, which subjects it to frequent earthquakes, tsunamis, volcanic eruptions, and floods. These disasters pose significant threats to the physical, psychological, and social well-being of affected populations, underscoring the urgent need for robust disaster preparedness and response strategies (Etkin, 2014). Public health nurses play a critical role in these efforts, leveraging their expertise in health education, community mobilisation, and emergency care (Al Thobaity, Plummer & Williams, 2017). However, disaster awareness and preparedness training within Indonesia's healthcare workforce—particularly among public health nurses—remains insufficient (Al Harthi *et al*., 2020).

Disaster preparedness encompasses a systematic approach to risk mitigation, strategic planning, and active community engagement in disaster management (Gundran *et al*., 2022). Public health nurses are integral to these efforts, directly engaging with communities to assess risks, provide education, and facilitate recovery processes (Al Khalaileh *et al*., 2012). Studies emphasise that adequate training and resources are essential to enhancing public health nurses' effectiveness in disaster scenarios (Elendu *et al*., 2024). Despite this, developing countries like Indonesia face persistent challenges in implementing comprehensive disaster

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preparedness programmes. Limited funding, inadequate training resources, and cultural barriers often hinder programme implementation (Khairina & Maisa, 2023). Furthermore, public health nurses frequently encounter difficulties in fostering community participation due to low levels of disaster awareness and preparedness among the general population (Safyaan *et al*., 2022).

A systematic review by Almarwani and Alzahrani (2023) identified key factors affecting clinical nursing competency, including years of experience, workplace environment, theoretical knowledge, educational level, marital status, clinical training, job satisfaction, turnover intention, job stress, and critical thinking. Hasan, Younos and Farid (2021) conducted a study among 410 nurses in Dhaka, Bangladesh, revealing that disaster knowledge, skills, and preparedness were significantly associated with prior disaster management training and response experience ($p < 0.001$). Similarly, Hasheesh (2023) explored disaster preparedness among 240 Jordanian nurses, finding that familiarity with disaster preparedness roles was moderate (mean score: 2.9 ± 0.84), attitudes were medium (mean score: 2.2 ± 0.38), and practice levels were low (mean score: 1.59 ± 0.45). Notably, experience and prior training were significantly related to improved familiarity and practices, underscoring the importance of targeted training programmes.

According to studies, Indonesian nurses are only moderately prepared for disasters, indicating significant room for improvement. More training and education are necessary, as Martono *et al*. (2019) highlighted that their understanding of their roles in crisis situations remains limited. The majority of nurses (51.7%) rated their competence in handling disasters as high, according to (Winarti & Gracya, 2023). Personal characteristics, such as knowledge of hospital disaster plans, degree of education, and exposure to catastrophe simulations, played a substantial role in shaping these views. The significance of further education and practical training in enhancing disaster readiness is highlighted by the fact that nurses with diploma credentials tended to assess their skills as lower (Alexandraki *et al*., 2021; Guraya & Chen, 2019).

Strengthening disaster nursing competencies can substantially enhance community resilience and emergency response outcomes (Kamal, 2013). Developing these competencies requires a balanced approach that integrates physical, psychological, and managerial skills (Susanti *et al*., 2023) underscoring the need for training programs that address all three domains, noting that existing programs often fail to achieve this balance, resulting in gaps in preparedness. Active participation in disaster management activities, including training and simulations, is also essential for improving nursing competencies. Kamal (2013) observed that nurses involved in disaster volunteer activities scored higher in competency assessments compared to their non-participating peers. However, the study also identified a lack of participation in such activities, highlighting the need for more opportunities and encouragement for nurses to engage in disaster response initiatives.

Persistent gaps in disaster preparedness, including insufficient knowledge and limited training opportunities, remain significant challenges for nurses in Indonesia. Winarti and Gracya (2023) suggest more educational opportunities, more frequent disaster simulations, and easier access to disaster plans. Innovative strategies have been proposed to address these challenges. For instance, technology-based training programmes have shown promise in enhancing disaster preparedness competencies among healthcare professionals (Hamdi & Al Thobaity, 2023). Community engagement initiatives, such as disaster simulation exercises, have also proven effective in building resilience and fostering collaboration between healthcare providers and community members (Aluisio *et al*., 2016). While existing research offers valuable insights into disaster preparedness and the contributions of public health nurses, there is limited focus on the unique challenges faced by these professionals in Indonesia Su *et al*., (2022) highlighted the need for research on disaster awareness, preparedness, and nursing competencies specific to Indonesia's public health context. Furthermore, evidence on the effectiveness of culturally adapted training programmes in overcoming these challenges remains scarce.

The purpose of this research is to fill these knowledge gaps by investigating how public health nurses in Indonesia are now prepared for and able to handle disasters. The results should help shape plans based on evidence to better prepare for and respond to disasters, which should increase communities' ability to withstand such events.

METHODOLOGY

Study Design

This study used a cross-sectional observational design to look at how well public health nurses in Indonesia knew about disasters, were ready for them, took part, and knew how to do their jobs as nurses. The data collection took place over three months, from June to August 2024.

Sample

The study participants consisted of public health nurses working in community health centres in West Java, Indonesia. Inclusion criteria required participants to have at least one year of experience in public health nursing and to provide informed consent for participation. Nurses who were on extended leave during the data collection period were excluded from the study.

In order to reach a medium effect size ($f2 = 0.15$), the sample size was estimated using the G* Power 3.1 program. This was done to conduct multiple regression analysis with a significance level of $\alpha = 0.05$ and a statistical power of 0.95. According to the findings of the analysis, the sample size should be at least 138 individuals. To enhance the dependability of the findings and take into consideration the possibility of non-responses, the intended sample size was extended to involve three hundred participants. The recruitment of participants for the study was accomplished using convenience sampling. The participation of public health nurses from a variety of community health centres located all over Indonesia was solicited to accomplish the goals of accessibility and practicability. The inclusion of nurses who were able to fulfil the eligibility requirements and were available throughout the duration of the trial was made easier by this technique.

Instrument

The Disaster Preparedness Evaluation Tool (DPET) was used to evaluate disaster awareness (Veenema *et al*., 2013). The first section of the report focused on disaster awareness measures. A total of ten items are included in this instrument, each of which is scored on a Likert scale with four points, with higher scores indicating a higher level of catastrophe awareness. The original DPET demonstrated a high level of internal consistency, as indicated by a Cronbach's alpha value of 0.89. On the other hand, the Bahasa Indonesia version demonstrated a reliability coefficient of 0.87, which ensured that it was suitable for the population that was being studied.

Disaster preparedness levels were evaluated with the use of the Public Health Emergency Preparedness Survey (PHEPS), which is a tool that was established by the (CDC) (2012). The following poll consists of fifteen questions, each of which is assessed on a Likert scale from one to five, with higher scores indicating a greater degree of preparedness for public health emergencies. The original edition of the PHEPS was found to have a Cronbach's alpha value of 0.92, which indicates that it has been validated with a high reliability score. It was also demonstrated that the translated Bahasa Indonesia version had strong dependability, with a coefficient of 0.90, which confirmed its validity in the context of the local environment.

The Community Emergency Preparedness Participation Scale (CEPPS), which was developed by (McCabe *et al*., 2010), was utilised in the third section to assess the level of community involvement in emergency preparedness. There are twelve elements on this scale, each of which is assessed on a Likert scale from one to five, with higher scores indicating a more active participation in contributing to community preparedness activities. The original instrument has a Cronbach's alpha of 0.88, which indicates that it is highly reliable. On the other hand, the Bahasa Indonesia version had a reliability coefficient of 0.85, which is also quite high.

The third portion utilised Disaster Nursing Competency Scale (DNCS), which was developed by the International Council of Nurses (ICN) in 2009. This scale was utilised to evaluate nursing ability in response to catastrophe situations. On this scale, there are 18 items that are scored using a Likert scale with five points, and higher scores correspond to better levels of nursing expertise in disaster response. A Cronbach's alpha value of 0.94 indicates that the DNCS, in its first iteration, demonstrated an exceptionally high level of reliability. This reliability was maintained by the Bahasa Indonesia version, which achieved a coefficient of 0.91. This ensured that the Bahasa Indonesia version was suitable for evaluating nursing competence within the cultural and

language context of the study.

Procedure

Prospective participants were given thorough information sheets that gave an explanation of the aims of the study, complete procedures, and assurances that the data would be kept secure and individuals would remain anonymous. Obtaining written informed consent from each participant prior to their participation in the study was a prerequisite. The collection of data was carried out through the utilisation of a protected online platform, where the questionnaires were filled out electronically by the participants. In order to increase the number of people who responded, follow-up reminders were sent out every two weeks. Following the completion of their participation, respondents were provided with individualised summaries of their results as well as educational resources that were intended to improve their understanding of risk management and emergency preparedness. This study adhered to ethical standards for human research. In line with this approval, additional permissions were obtained from the community health centres involved in participant recruitment. All participants were fully informed about the study through detailed information sheets that emphasized voluntary participation, the right to withdraw at any time without penalty, and the safeguarding of personal data. Confidentiality was maintained by anonymizing responses and storing data in encrypted, password-protected systems. The study followed all relevant ethical guidelines and regulations to ensure participant safety and integrity throughout the research process.

Data Analysis

The data were analysed with SPSS version 28. Descriptive statistics summarised demographic data and key variables. Multiple regression analyses were used to investigate the predicted associations between catastrophe awareness, readiness, involvement, and nursing skill. The assumptions of normality, linearity, multicollinearity, and homoscedasticity were evaluated and confirmed.

Ethical Consideration

Approval for the research was secured from the Research Ethics Committee for Human from the Faculty of Nursing, Helwan University, Egypt with the reference number 011/KEPK/FITKes-Unjani/VI/2024 on 1st April 2024.

RESULTS

The study included 300 public health nurses working in community health centres across Indonesia. Table 1 summarizes the demographic characteristics of the participants. The majority of participants were female (88.3%), aged between 31–40 years (42.7%). Most had a bachelor's degree (68.7%) and more than five years of experience in public health nursing (54.3%). No correlation was found between demographic characteristics of public health nurses with nurse competence ($p < 0.05$).

Table 1: Demographic Characteristics of Public Health Nurses and It's Associated with Nurse Competence (n = 300)

Variable	Categories	Frequency (n)	Percentage (%)	Correlation with Nurse Competence (*r*)	*p*-value
Gender	Male	35	11.7	0.12	0.055
	Female	265	88.3		
Age	≤30 years	74	24.7	0.18	0.108
	31–40 years	128	42.7		
	≥41 years	98	32.7		
Educational Level	Diploma	94	31.3	0.12	0.201
	Bachelor's Degree	206	68.7		
Work Experience	1–5 years	137	45.7	0.19	0.231
	>5 years	163	54.3		

The results show that participants had moderate to high disaster awareness (M = 31.4, SD = 4.5) and good preparedness (M = 58.6, SD = 7.2), though with some variability. Community participation was also moderate

to high (M = 44.1, SD = 6.8), while nursing competency scored highest (M = 71.9, SD = 8.4), indicating strong perceived capability (Table 2).

Table 2: Descriptive Statistics of Main Variables

Variable	Mean (SD)	Range
Disaster Awareness	31.4 (4.5)	10–40
Preparedness	58.6 (7.2)	15–75
Community Participation	44.1 (6.8)	12–60
Nursing Competency	71.9 (8.4)	18–90

The results show significant positive correlations among all variables. Disaster awareness is moderately correlated with preparedness (r = 0.48**) and community participation (r = 0.42**) and strongly correlated with nursing competency (r = 0.52**). Preparedness is strongly correlated with nursing competency (r = 0.60**) and moderately with participation (r = 0.45**). The strongest relationship is between nursing competency and community participation (r = 0.58**) (Table 3).

Table 3: Correlation Matrix Between Study Variables

Variable	Awareness	Preparedness	Participation	Nursing Competency
Disaster Awareness	1			
Preparedness	0.48**	1		
Community Participation	0.42**	0.45**	1	
Nursing Competency	0.52**	0.60**	0.58**	1

*Note: $p < 0.01$; **Significant*

All three predictor variables—Disaster Awareness (β = 0.32, $p < 0.001$), Preparedness (β = 0.36, $p < 0.001$), and Community Participation (β = 0.31, $p < 0.001$)—significantly and positively predict the outcome variable. Preparedness shows the strongest influence (B = 0.72, t = 7.20), followed by Disaster Awareness (B = 0.67, t = 6.09) and Community Participation (B = 0.65, t = 5.42) (Table 4).

Table 4: Predictors of Nursing Competency (Multiple Regression Analysis)

Predictor Variable	B	SE	β	t	p
Disaster Awareness	0.67	0.11	0.32	6.09	<0.001
Preparedness	0.72	0.10	0.36	7.20	<0.001
Community Participation	0.65	0.12	0.31	5.42	<0.001

B – Unstandardized Coefficient; SE – Standard Error; β – Standardized Beta Coefficient; t-value (Test Statistic); p-value (Significance Level)

DISCUSSION

The study found that disaster awareness, preparedness, and community participation are significant predictors of nursing competency amongst Indonesian public health nurses. The results corroborated previous research that demonstrated the importance of awareness and preparedness in building nurses' competency in disaster response. For instance, Chegini *et al*. (2022a) found that nurses with higher scores on disaster preparedness (mean = 78.6; SD = 9.4) performed significantly better in triage and emergency response ($p < 0.01$). In the same line, Said and Chiang (2020) established that 85% of the nurses with formal disaster training were quicker in decision-making and response as compared to those without training ($p < 0.05$). Furthermore, Achora and Kamanyire (2016) stated that public health nurses trained in simulation-based emergency response showed a 32% improvement in risk assessment and emergency response effectiveness. These findings collectively emphasise that disaster preparedness programmes enhance nursing competency by giving healthcare professionals the required skills to respond quickly and effectively to any disaster.

Furthermore, community participation emerged as a significant predictor, reinforcing earlier studies that emphasised the importance of collaborative engagement in disaster management (Kako & Hutton, 2023). Nurses who actively involve community members in preparedness initiatives often report enhanced self-efficacy and situational awareness, which lead to greater competency during disaster scenarios (Labrague *et al.*, 2018; Feng *et al*., 2025). These findings highlight the value of fostering partnerships between nurses and

communities to build resilience and improve disaster response capabilities. This grassroots effort not only facilitated the efficient distribution of medical supplies but also ensured that the specific needs of the community were met promptly. Such collaborative initiatives underscore the importance of community involvement in disaster preparedness and response, leading to improved health outcomes and resilience.

The results align with Songwathana and Timalsina, (2021), who identified disaster preparedness training as a critical factor in strengthening nursing competencies in disaster-prone regions. Additionally, (Chegini *et al*., 2022a) highlighted that community participation facilitates resource sharing and mutual understanding, both of which are essential for effective disaster management. While previous studies primarily focused on preparedness (Abuadas & Albikawi, 2022; Tas & Cakir, 2022), this research expands the literature by underscoring the equally significant roles of awareness and participation. However, differences in cultural and geographical contexts may account for variations in the predictive strength of these factors across studies (Labrague & Hammad, 2024).

These findings carry several implications for clinical practice. First, they emphasise the importance of incorporating disaster awareness and preparedness into nursing curricula and ongoing professional development programmes. Regular training on risk assessment, disaster planning, and emergency response should be mandatory for public health nurses. Second, promoting community participation can enhance disaster readiness at both individual and community levels. By involving communities in preparedness efforts, nurses can foster trust and collaboration, both of which are critical during emergencies. Lastly, policymakers should prioritise resource allocation and capacity-building initiatives to enhance disaster-related competencies among nurses.

Limitation

This study has limitations, including the use of non-probabilistic sampling, which may not be representative of the wider population, and the uneven distribution of respondents across different regions. The cross-sectional study design may not establish causal relationships between nursing competency and its predictors, necessitating longitudinal studies to understand these relationships over time. Additionally, self-reported measures may introduce social desirability bias, necessitating objective assessments of disaster competency. The study's focus on one province limits its generalisability, and further comparative studies in different regions, countries, and healthcare systems could provide more comprehensive explanations about the sources shaping nursing competency in disaster preparedness.

Recommendation

Public health policies should prioritise ongoing education and training programmes to enhance disaster awareness and preparedness among nurses. Collaboration between healthcare institutions, government agencies, and local communities is essential to build a more resilient healthcare workforce. Efforts should also focus on incorporating disaster management modules into nursing curricula and providing opportunities for simulation-based training. Encouraging community participation and fostering strong networks between nurses and community members can further support the development of effective disaster response strategies. Regular evaluation and updates of disaster management protocols are crucial to ensure they remain relevant and effective in addressing evolving challenges.

CONCLUSION

In summary, disaster awareness, preparedness, and community participation are significant predictors of nursing competency among Indonesian public health nurses. These findings underscore the necessity of integrating these dimensions into nursing education and training programmes to enhance disaster response capabilities. Strengthening these competencies can bolster the preparedness and effectiveness of public health systems during disasters. Future studies should explore the use of technology and simulation-based training to further advance disaster-related competencies in public health nursing. Additionally, expanding research to examine the role of cultural and regional factors in shaping disaster preparedness and competency could provide deeper insights. Investigating interdisciplinary approaches and collaborations between healthcare professionals, community leaders, and disaster management agencies may also offer valuable strategies for strengthening overall disaster response frameworks.

Conflict of Interest

The authors have no conflicts of interest to declare.

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