Nurse management and Preparedness for Disasters: A systematic Review

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Abstract:

Aim: This systematic review investigates peer-reviewed publications assessing nurses' readiness for disaster response.

Background: With disasters occurring more frequently worldwide, nurses must adequately prepare to mitigate their adverse effects on affected populations. Despite increasing efforts to prepare nurses for disasters, evidence suggests they are often ill-prepared for effective response.

Methods: A systematic review of scientific articles from 2006 to 2016 on nurses' disaster preparedness was conducted. SCOPUS, MEDLINE, PubMed, CINAHL, and PsychINFO were the primary databases used. Keywords included 'emergency,' 'disaster,' 'disaster preparedness,' 'disaster competencies,' 'disaster nursing,' 'disaster role,' and 'nurse.' Seventeen articles were selected.

Findings: Previous disaster response experience and disaster-related training are key factors in increasing preparedness. However, many nurses feel insufficiently prepared and lack confidence in responding to disasters effectively.

Conclusion: This review contributes to the understanding of disaster preparedness among nurses, with implications for academia, hospital administration, and nursing educators. The findings underscore the need for nurse educators and administrators to better equip nurses for disaster response.

Implications for nursing and health policy: Hospitals should implement policies to address the lack of preparedness among nurses. Additionally, there is a need for further research and the provision of realistic disaster exercises to enhance nursing workforce preparedness.

Keywords: Disaster, Disaster Competencies, Disaster Nursing, Disaster Preparedness, Disaster Role, Emergency, Nurse

Background:

Nurses have historically played a crucial role in disaster response, a tradition that continues today (Turale 2014; Veenema 2013). Disasters can strike any community worldwide, as evidenced by the 99 countries affected by natural disasters in 2015 alone, resulting in displacement, fatalities, and significant economic damage (Guha-Sapir et al. 2015).

These occurrences are on the rise, underscoring the urgent need for nurses to be prepared to mitigate their impact on public health.Although a universally agreed-upon definition of a disaster is lacking, the World Health Organization (WHO) draws on definitions from the International Strategy for Disaster Risk Reduction (ISDR) and the Centre for Research on the Epidemiology of Disaster (CRED). These definitions encompass incidents with the potential to affect individuals, communities, or entire countries, necessitating local or international assistance (CRED, 2009).

Disasters overwhelm existing resources and have profound implications for public health, highlighting the central role of nurses in disaster response (Perron et al. 2010; WHO, 2009). Recognizing this, health policies emphasize the importance of adequately preparing nurses for disaster response, exemplified by the International Council of Nurses' (ICN) framework of Disaster Nursing Competencies, outlining ten competency domains for nurses (ICN 2009). However, despite numerous competency frameworks, inconsistencies and a lack of validation persist (Daily et al. 2010).

Recent literature has increasingly focused on nurses' disaster preparedness (Chapman & Arbon 2008; Fox & Timm 2008; Labrague et al. 2016; Mayumi et al. 2009), with initiatives integrating disaster preparedness into nursing curricula (Labrague et al. 2016; Mayumi et al. 2009). Despite these efforts, evidence suggests that nurses remain inadequately prepared and uncertain of their roles during disasters (Duong 2009; Melnikov et al. 2014; Usher et al. 2015). A comprehensive review of nurses' disaster preparedness is crucial to improve readiness for future events.

Methods:

Aim: This systematic review aimed to explore peer-reviewed publications assessing nurses' preparedness for disaster response.

Search strategy: Electronic databases, including SCOPUS, MEDLINE, PubMed, CINAHL, and PsychINFO, were searched to identify relevant studies. Keywords used for the search included: 'emergency,' 'disaster,' 'disaster preparedness,' 'disaster competencies,' 'disaster nursing,' 'disaster role,' and 'nurse.'

Inclusion and exclusion criteria: Articles were included if they measured disaster preparedness in nurses, were peer-reviewed, published in English between 2006 and 2016, and focused solely on nurses. Studies including nurses alongside other professionals or measuring preparedness for events other than disaster response were excluded.

Search outcomes: Initially, 332 papers were identified. After screening titles and abstracts, 272 irrelevant articles were excluded, leaving 60 papers for full-text review. Ultimately, seventeen (17) studies met the inclusion criteria for the review.

Quality appraisal and data synthesis: The methodological quality of the included studies was assessed using the appraisal checklist for quantitative studies by Kmet et al. (2004), which consists of ten components with scores ranging from 0 to 2. Quality scores ranged from 80% to 100%. Due to methodological heterogeneity, meta-analysis was not feasible, and a thematic analysis approach was employed for data synthesis. Data extraction included authors/year, country, samples/sampling technique, research design, research aim, instrumentation, and findings.

The process for identifying relevant articles is illustrated in Figure 1.

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│ and PubMed                  │
│ 332 titles                  │
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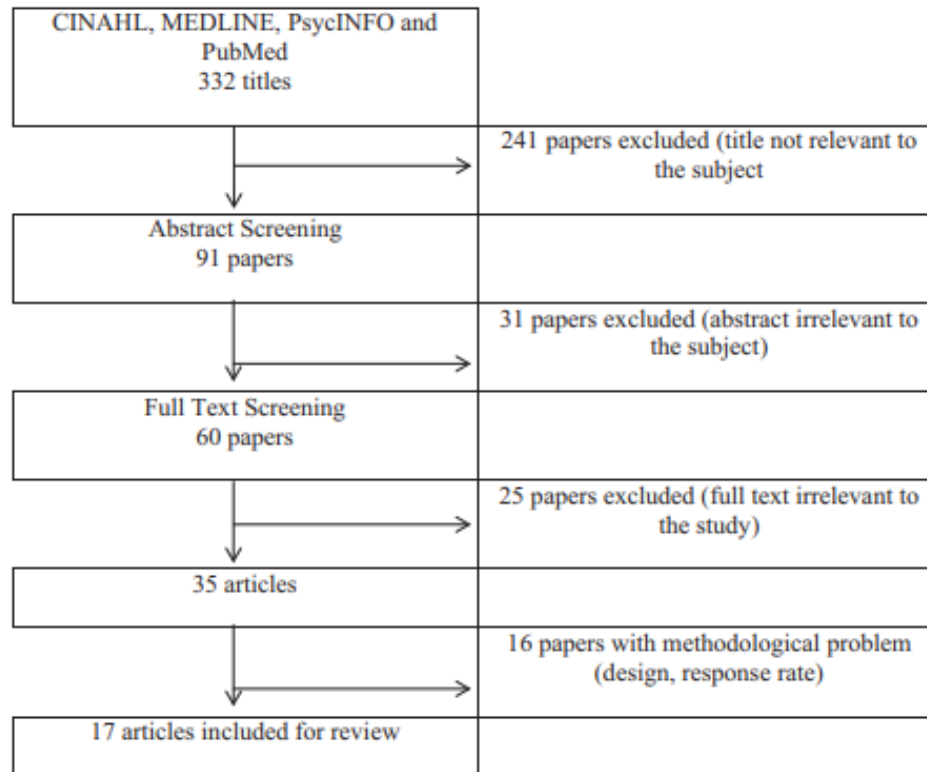
Fig. 1 Flow diagram of the process used to identify references for the systematic review.

Results:

Findings of this review are organized by: (1) methodology, (2) reported level of disaster preparedness in nurses, (3) previous disaster response experience, (4) the role of disaster training or courses, (5) awareness and execution of workplace disaster plans, and (6) strategies to enhance disaster preparedness. Refer to Table 1 for a summary of articles reviewed.

Methodology:

The majority of studies (n=5) were conducted in the United States (US; Baack & Alfred 2013; Goodhue et al. 2012; Hodge et al. 2015; Jacobson et al. 2010; Whetzel et al. 2013). Others originated from Australia (Duong 2009), Canada (O'Sullivan et al. 2008), Hong Kong (Fung et al. 2008), Indonesia (Putra et al. 2011), Japan (Oztekin et al. 2016), Jordan (Al Khalaileh et al. 2012), Saudi Arabia (Al Thobaity et al. 2015; Ibrahim 2014), Sweden (Nilsson et al. 2016), Taiwan (Tzeng et al. 2016), and the Philippines (Labrague et al. 2016). One study was conducted across multiple countries including Bangladesh, Bhutan, Cambodia, Laos, Nepal, and the Solomon Islands (Usher et al. 2015).

All studies employed a cross-sectional research design using a survey approach with questionnaires. Sample sizes ranged from 164 to 2627 nurses, originating from various specialty

areas including medical, surgical, pediatric, psychiatric, operating room, critical care units, and accident and emergency units.

Various tools were utilized by researchers to measure nurses' disaster preparedness. Notably, four studies employed the Disaster Preparedness Evaluation Tool (DPET) to assess nurses' readiness for disaster response and management (Al Khalaileh et al. 2012; Al Thobaity et al. 2015; Oztekin et al. 2016; Usher et al. 2015). Other validated tools included the Emergency Preparedness Information Questionnaire (EPIQ) and the Disaster Preparedness Questionnaire. Some studies employed self-designed questionnaires to measure education, training, preparedness, knowledge, and awareness among nurses.

Table 1. Quantitative studies on disaster preparedness in nurses

Author & Year	Samples	Sampling Method	Research Design	Instrument	Major Findings
Baack & Alfred (2013)	620 nurses	Convenience sampling	Descriptive correlational	Emergency Preparedness Information Questionnaire (EPIQ) (Garbutt et al., 2008)	Perceived competence with regards to disasters was considered low. Nurses were not fully prepared to respond effectively with disasters. Cronbach's alpha 0.97. Nurses Assessment Readiness (NAR) (Baack & Alfred, 2013). Cronbach's alpha 0.90. Job Satisfaction Questionnaire (Wieck et al., 2009). Cronbach's alpha 0.85.
Duong (2009)	152 nurses	Convenience Sampling	Descriptive Study	Research-made questionnaire. Questions were based on literature review	Nearly half (45%) of nurses perceived themselves to have low level of disaster preparedness. Less than a quarter (19%) of nurses felt confident with their own level of disaster preparedness.
Hodge et al. (2015)	307 nurses	Convenience Sampling	Descriptive Study	Emergency Preparedness Information Questionnaire (EPIQ) (Garbutt et al., 2008)	Nearly half (44.6%) of the respondents rated themselves as less prepared for disasters. Nurses' age and experience increased preparedness for disasters in nurses. Emergency nurses had higher level of preparedness than nurses in other units. Cronbach's alpha 0.972. Nurses Assessment Readiness (NAR) (Baack & Alfred, 2013). Cronbach's alpha 0.92.
Jacobson et al. (2010)	941 nurses	Convenience Sampling	Descriptive Study	Research-made questionnaire. Questions were based on literature review	More than half (58%, n = 546) of nurses were not confident in their ability to care for disaster patients.
Nilsson et al. (2016)	227 nurses	569 student nurse	Sampling size determined. To describe and compare	Descriptive Study	Nurse Professional Competence (NPC) Scale (Nilsson et al. 2016)

					self-reported disaster nursing competence in nursing students and registered nurses with professional experience	
Ibrahim (2014)	252 nurses	Convenience Sampling	Cross-sectional design	Emergency Preparedness Information Questionnaire (EPIQ) (Garbutt et al., 2008)	Nurses obtained EPIQ mean score of below the accepted level.	
Usher et al. (2015)	757 nurses	Convenience sampling	Cross-sectional design	Modified Disaster Preparedness Evaluation Tool (Tichy et al. 2009)	Nurses reported low to moderate level of disaster preparedness. Disaster knowledge and skills were rated below acceptable score. Cronbach's alpha 0.90.	
Fung et al. (2008)	164 nurses	Convenience sampling	Questionnaire survey	Research-made questionnaire. Questions were based on literature review	Majority of nurses (97.5%) were not adequately prepared to respond to disaster situations. Content validity was 0.94.	
O'Sullivan et al. (2008)	1543 nurses	Convenience sampling	Web-based survey	Canadian Community Health Survey (CCHS)	Nurses reported to be inadequately prepared to respond to different disaster events. Higher ratings of preparedness were noted in responding to outbreak of disease and natural hazards. Low rating of preparedness was noted for CBRN events (radiological, nuclear attacks and accidents).	
Labrague et al. (2016)	170 nurses	Convenience sampling	Descriptive, cross-sectional	Modified Disaster Preparedness Questionnaire (Fung et al. 2008)	Three fourths of nurses (80%) reported that they are not fully prepared for disasters.	
Goodhue et al. (2012)	2627 paediatric nurses	Convenience sampling	Survey approach	Personal Preparation Survey (PNP) (Chokshi et al., 2008)	Majority of nurses (93.2%) reported not fully prepared for disaster situations in general: natural disasters (92%), biological attack (98.9%), and terrorist attack (98.5%).	
Whetzel et al. (2013)	177 nurses	Convenience sampling	Descriptive survey	Researcher-made survey questionnaire consisting of 56 questions.	Less than 40% of nurses reported that they are not personally prepared to care for patients during disaster events.	

				Questions were developed based on an extensive literature review	
Al Khalaileh et al. (2012)	474 nurses	Convenience sampling	Cross-sectional study	Disaster Preparedness Evaluation Tool (DPET) (Tichy et al. 2009)	Majority of nurses considers themselves having low to moderately prepare for disasters. Low levels of preparedness were seen in relation to response to biological and chemical attacks. Cronbach's alpha is 0.91.
Putra et al. (2011)	252 public health nurses	Stratified proportionate random sampling	Cross-sectional design	Public Health Nurse's Perceived Ability to Practice regarding Disaster Management Questionnaire (PHNPP-DMQ)	Nurses' level of preparedness and readiness to practice regarding disaster management was moderate. Cronbach's alpha ranged is 0.92.
Al Thobaity et al. (2015)	429 nurses from six hospitals	Convenience sampling, with sampling size computed	Descriptive research design	Disaster preparedness Evaluation Tool (DPET) (Tichy et al. 2009)	In general, nurses perceived themselves as moderately prepared for disasters with mean score of 4.16 out of a possible mean score of 5. Cronbach's alpha is 0.90.
Öztekin et al. (2016)	902 nurses	Convenience sampling, with sampling size not specified	Cross-sectional survey	Disaster preparedness Evaluation Tool (DPET) (Tichy et al. 2009)	Mean scores for preparedness, response abilities, and evaluation all scored below normal on a 6-point Likert scale, suggesting poor disaster preparedness. Cronbach's alpha is 0.90
Tzeng et al. (2016)	311 nurses	Convenience sampling, with sampling size not specified	Cross-sectional study	Researcher-made instrument consisting of 42 items	Mean item scores for personal preparation, self-protection, emergency response, and clinical management indicate a low level of self-reported readiness for disaster responses. Cronbach's alpha is 0.96.

Discussion

The literature consistently indicates that nurses possess a suboptimal level of preparedness for disaster response, as measured across various studies using different assessment scales (Al Khalaileh et al. 2012; Al Thobaity et al. 2015; Baack & Alfred 2013; Duong 2009; Fung et al. 2008; Goodhue et al. 2012; Hodge et al. 2015; Ibrahim 2014; Jacobson et al. 2010; Labrague et al.

2016; Nilsson et al. 2016; O'Sullivan et al. 2008; Öztekin et al. 2016; Putra et al. 2011; Tzeng et al. 2016; Usher et al. 2015; Whetzel et al. 2013).

In the Philippines, Labrague et al. (2016) found that a significant majority of nurses lacked confidence in their ability to respond effectively to disasters, with only a small fraction considering themselves fully prepared. Similarly, Nilsson et al. (2016) reported moderate preparedness among Swedish nurses, while Öztekin et al. (2016) revealed low scores indicating inadequate readiness among Japanese nurses. Tzeng et al. (2016) observed low mean scores in various disaster readiness domains among Taiwanese nurses, reflecting a general lack of preparedness.

In Saudi Arabia, nurses perceived themselves as moderately prepared for disasters (Al Thobaity et al. 2015; Ibrahim 2014), while studies in Asia-Pacific countries and the United States showed varying levels of preparedness and identified specific areas of deficiency (Usher et al. 2015; Hodge et al. 2015). Baack & Alfred (2013) and Whetzel et al. (2013) found suboptimal levels of preparedness among US nurses using different assessment tools.

Al Khalaileh et al. (2012) highlighted inadequate disaster preparedness among Jordanian nurses, whereas Goodhue et al. (2012) reported a lack of preparedness among pediatric nurses in the US. Rural nurses in the US also expressed inadequacy in disaster response (Jacobson et al. 2010).

In Indonesia, Putra et al. (2011) found moderate readiness among public health nurses, while Duong (2009) reported poor disaster preparedness among Australian emergency nurses. Fung et al. (2008) identified significant gaps in disaster preparedness among Hong Kong nurses, and O'Sullivan et al. (2008) highlighted Canadian nurses' inadequacies in responding to various disaster scenarios.

Previous disaster response experience was associated with higher perceived preparedness in several studies (Al Thobaity et al. 2015; Baack & Alfred 2013; Nilsson et al. 2016; O'Sullivan et al. 2008; Tzeng et al. 2016; Usher et al. 2015). Disaster training was recognized as crucial for enhancing nurses' disaster knowledge and skills (Al Thobaity et al. 2015; Fung et al. 2008; Labrague et al. 2016; Öztekin et al. 2016; Tzeng et al. 2016). Awareness and execution of workplace disaster plans varied across settings (Al Khalaileh et al. 2012; Duong 2009; Fung et al. 2008; Ibrahim 2014; Labrague et al. 2016; Öztekin et al. 2016; Whetzel et al. 2013).

Recommendations included offering disaster training and drills, improving disaster preparedness through extensive training, involving nurses in disaster planning, and providing realistic threat-based simulation exercises (Labrague et al. 2016; Baack & Alfred 2013; Duong 2009; O'Sullivan et al. 2008; Öztekin et al. 2016; Nilsson et al. 2016; Ibrahim 2014; Goodhue et al. 2012; Hodge et al. 2015).

The synthesis of the reviewed literature underscores a concerning trend: nurses are generally ill-prepared for disaster response. This finding is particularly significant when considering that much of the research originates from Asian countries, which frequently experience disaster events. This emphasizes the necessity for broader global research encompassing diverse nursing populations with varying levels of disaster response experience. Disasters can strike anywhere and anytime, demanding that nurses possess adequate preparedness to effectively mitigate their impact on affected communities. Therefore, a more comprehensive understanding of nursing preparedness worldwide is imperative to inform effective disaster response strategies.

However, it's important to note that much of the evidence regarding nurses' disaster preparedness relies heavily on self-reported perceptions rather than objective data. This highlights the need for further research to identify the underlying factors contributing to low preparedness for actual disaster response.

Moreover, the methodological variability across the reviewed studies calls for a more rigorous approach to research in this area. Many studies used instruments that were not specifically tailored to measure disaster preparedness in nurses, and the reliance on convenience sampling and small sample sizes limits the generalizability of findings. Future studies should employ validated tools, rigorous sampling methods, and larger sample sizes to ensure the reliability and applicability of results across diverse settings.

Furthermore, while individual studies may lack generalizability due to sampling limitations, the collective findings consistently indicate that nurses across different cultures and regions feel generally under-prepared for disaster response. This underscores the urgent need for interventions to enhance nurses' disaster preparedness globally.

Previous disaster response experience and disaster-related training emerge as significant factors associated with higher levels of preparedness among nurses. However, there remains a need to identify the most effective types of disaster-related training to adequately prepare nurses for various disaster scenarios.

Additionally, the lack of awareness and clarity regarding institutional disaster plans among nurses underscores the importance of their active involvement in all stages of disaster planning. This would enable nurses to better understand their roles and responsibilities during disaster events, ultimately improving overall preparedness and response efforts.

.Conclusion

In conclusion, this systematic review highlights the pressing need for interventions to improve nurses' readiness for disaster response. By implementing policies, enhancing nursing practice, and integrating disaster-related education into nursing curricula, healthcare institutions can better prepare their nursing workforce to effectively respond to disasters and mitigate their impact on affected communities. Further research is warranted to identify additional factors influencing nurses' disaster preparedness and to develop evidence-based strategies to address existing gaps in disaster readiness among nurses.

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