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Disaster preparedness among nurses in India: A cross-sectional study

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Abstract
Global disasters like the coronavirus disease in 2019 pose a threat to human life and health at an increasing rate. Countries have been urged by the World Health Organization to develop comprehensive disaster preparedness plans. Examining and evaluating nurses' preparedness for disasters is crucial. This study was intended to research the catastrophe readiness and mental state of attendants in India and break down the critical elements affecting their calamity readiness. In 2020, a cross-sectional survey was carried out, and convenience sampling was used to enroll 1,440 nurses. A networking platform that was comparable to Amazon Mechanical Turk was used to distribute and collect the study questionnaires. The Hospital Anxiety and Depression Scale was used to assess anxiety and depression status, the Disaster Preparedness Evaluation Tool was used to measure respondents' disaster preparedness, and a self-designed questionnaire based on a literature review was used to investigate the potential factors that influence disaster preparedness. The participants' disaster preparedness scores were, on average, 186.34 (SD = 40.80), which indicated a moderate level, particularly in terms of skill (mean score = 42.01, SD = 12.39). Support for the government, personal protection, and health education received higher scores, while nursing community leadership, the capacity to cope with chemical or biological attacks, and posttraumatic stress disorder assessment received lower scores. Depression and anxiety were found to be negatively correlated with disaster preparedness. Educational background, nursing specialty, prior disaster training, prior disaster rescue experience, and depression level were the main factors affecting disaster preparedness. Indian nurses' disaster preparedness needs to be improved. Future tailored interventions are urgently required to promote nursing leadership in the community, the capacity to cope with chemical or biological attacks, and posttraumatic stress disorder assessments. Additionally, disaster preparedness among nurses should receive more attention. Additionally, nurses' mental health should be bolstered by alleviating negative emotions.

Keywords: Disaster, preparedness, nurses, World Health Organization

Introduction

As of July 3, 2020, the coronavirus disease 2019 (COVID-19) pandemic had more than 12 million confirmed cases and 517,877 confirmed deaths worldwide (World Health Organization, 2020). Interventions that focus on contact tracing, quarantine, and social distancing are crucial because there is currently no medicine that works. Based the findings on the COVID-19 postpandemic period's transmission dynamics (2020) noted that social isolation may be required into 2022 for a long time or for a short time. The aforementioned unfavorable conditions may present new difficulties for disaster preparedness.

The United Nations Office for Disaster Risk Reduction (2015) defines disaster preparedness as the "reserve of knowledge and capacity to effectively respond to disasters," which is the foundation of disaster nursing. Nursing disaster preparedness can be broken down into four periods (prevention, preparedness, response, and recovery) and three dimensions (knowledge, skills, and post crisis management) within the disaster nursing capacity framework. International Nurses Association, 2009). Medical caretakers assume different parts at each phase of a debacle, including as guardians, instructors, facilitators, and supervisors. Since the Indian Nursing Council's Disaster Nursing Specialized Committee has prioritized disaster nursing development with the goal of improving nurses' disaster response capabilities. 2015).

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According to a recent study (Y. Y. Zhang *et al*.,), disaster preparedness, prevention, and recovery have received insufficient attention in India's disaster nursing education. 2018). Additionally, studies have indicated that Indian nurses lack confidence in their ability to respond to disasters, particularly in terms of their disaster nursing skills). During the current pandemic, the Indian government-run medical systems prioritized disaster response skills training, which resulted in the training of a large number of nurses, particularly across all states.

Methods and Materials
The study was a cross-sectional study. From April 21 to May 5, 2020, convenience sampling was used to recruit nurses from Grade III hospitals in India's Delhi, Chennai, Kolkata, and Hyderabad Provinces. The first location in the world to report and detect COVID-19 was Hubei province. According to the Hospital Grading System (National Health Commission of the People's India 2011), Grade III hospitals maintain the highest level of medical and nursing competence in India. Being a registered nurse and being willing to participate in the study were the two requirements for inclusion. Excluded were nurses who were on vacation or in training at another hospital. The sample size was calculated using G*Power 3.1. The statistical power (1) and minimum significance levels were set at.05 and 0.99, respectively. The F2 was set to 0.15 (medium). The required sample size for linear multiple regression analysis was determined to be 341, with a sample loss rate buffer of 20%, according to calculations.

Assesses nurses' preparedness for disasters The Disaster Preparedness Evaluation Tool (DPET), developed by Bond and Tichy to assess nurses' preparedness for disasters (Tichy *et al*., 2009). A 6-point Likert scale is used to assign scores to each item, with 1 representing a strong disagreement and 6 representing a strong agreement. The scale has a total of 270 possible scores, with higher scores indicating greater preparedness for disasters (13–78 in the knowledge dimension, 11–66 in the skill dimension, and 21–126 in the postdisaster management dimension). Items with scores of 1–2.99, 3–4.99, and 5–6 indicate, respectively, poor, moderate, and excellent disaster preparedness. With an overall Cronbach's alpha of.87, the DPET-C has been shown to be reliable and is widely used in India.

Depression and anxiety The Hospital Anxiety and Depression Scale was used to measure depression and anxiety. Leung and others, 1999). Zigmond and Snaith's (1983) HADS is a widely used scale for assessing an individual's anxiety and depression levels. HADS is a 14-thing instrument with two 7-thing subscales that individually measure tension and despondency. A four-point Likert scale, ranging from 0 to 3, is used to assign scores to each item. The total number of possible subscale scores is between 0 and 21, with higher scores indicating greater levels of depression or anxiety. Bjelland *et al*.'s systematic review 2002) distinguished that an end score of 8 for tension and gloom and accomplished an ideal harmony among responsiveness and particularity.

Data on personal characteristics A self-designed questionnaire based on a literature review was used to collect data on potential factors influencing disaster preparedness. Age, marital status, educational background, hospital location, department, work seniority, professional title, nursing position, COVID-19 work experience, volunteering to work on the front lines of COVID-19, prior experience with disaster response, and prior experience with disaster education and training were among these factors.

Results
53067 attendants submitted finished surveys. 54 entries were prohibited in light of counter-intuitive responses, leaving 1,313 substantial poll informational collections (96.0%) accessible for examination.

Characteristics of participants
Most of the participants were 25–35 years old (52.2%), female (96.5%), married (55.4%), and educated to the undergraduate level (88.9%). About half of the sample were recruited from hospitals in Delhi Province (60.6%), with the remaining 40.4% recruited from chennai (*n* = 494), kolkata (*n* = 12), Mumbai (*n* = 7), and other provinces (*n* = 18). Most had volunteered to work on the front lines of COVID-19 (67.0%), whereas 34.4% had actual frontline experience. Participants with prior disaster response experience and disaster education/training experience accounted for 3.9% and 28.9% of the sample, respectively, whereas those with prior infectious disease response and infectious disease education/training experience accounted for 2.4% and 16.0% of the sample.

Disaster preparedness of Chinese nurses in the post-coronavirus-disease era
The mean scores for overall disaster preparedness, knowledge, skills, and postdisaster management were 186.34 ± 40.80, 57.27 ± 11.61, 42.01 ± 12.39, and 87.06 ± 19.96, respectively. The average item score was 4.14 ± 0.91, indicating a moderate level of disaster preparedness. In addition, the average sores for each item in the knowledge, skills, and postdisaster management subscales were 4.41 ± 0.89, 3.81 ± 1.13, and 4.14 ± 0.95, respectively. Details on the Top 3 items with the highest and lowest score in each dimension of disaster preparedness are presented in Tables 1 and 2. The item with the highest score was "In case of a disaster situation, I think that there is sufficient support from officials at the county, regional, or national government level." Meanwhile, the item with the lowest score was "I would be considered a key leadership figure in my community during a disaster situation."

Table 1: Top 3 Items with the highest score in each dimension of disaster preparedness

	Item	Mean	SD
	Knowledge		
Q14	In case of a disaster situation, I think that there is sufficient support from officials at the county, regional, or national government level.	5.08	1.00
Q1	I participate in disaster drills or exercises at my workplace (clinic, hospital, etc.) on a regular basis.	4.88	1.26
Q13	I have a list of contacts in the medical or health community in which I practice. I know referral contacts in case of a disaster situation (e.g., health department)	4.83	1.19
	Skill		

Q25	I have an agreement with loved ones and family members on how to execute our personal family emergency plans.	4.24	1.26
Q10	In case of bioterrorist/biological or chemical attacks, I know how to use personal protective equipment.	4.13	1.29
Q19	I consider myself prepared for the management of disasters.	4.04	1.28
	Postdisaster management		
Q18	I know the limits of my knowledge, skills, and authority as an RN to act in disaster situations, and I would know when I exceed them.	4.60	1.03
Q34	As an RN, I feel reasonably confident in my abilities to be a member of a decontamination team.	4.41	1.07
Q39	I would feel confident providing patient education on stress and abnormal functioning related to trauma.	4.36	1.08

Note: RN = registered nurse.

Table 2: Top 3 Items with the lowest score in each dimension of disaster preparedness

	Item	Mean	SD
	Knowledge		
Q2	I have participated in emergency plan drafting and emergency planning for disaster situations in my community.	3.31	1.75
Q3	I know who to contact (chain of command) in disaster situations in my community.	4.00	1.67
Q4	I participate in one of the following educational activities on a regular basis: continuing education classes, seminars, or conferences dealing with disaster preparedness.	4.10	1.52
	Skill		
Q16	I would be considered a key leadership figure in my community in a disaster situation.	3.06	1.59
Q15	I participate/have participated in creating new guidelines or emergency plans, or lobbying for improvements on the local or national level.	3.46	1.76
Q17	I am aware of what the potential risks in my community are (e.g., earthquake, floods, terrorism, etc.).	3.61	1.54
	Postdisaster management		
Q30	I am familiar with the main groups (A, B, C) of biological weapons (anthrax, plague, botulism, smallpox, etc.), their signs and symptoms, and effective treatments.	3.70	1.29
Q31	I feel confident recognizing differences in health assessments indicating potential exposure to biological or chemical agents.	3.74	1.28
Q44	I am familiar with how to perform focused health assessments for PTSD.	3.89	1.24

Note: PTSD = posttraumatic stress disorder.

Univariate Analyses of Disaster Preparedness

Independent sample t tests and one-way analyses of variance indicated statistically significant differences in disaster preparedness scores among nurses with different educational backgrounds, departments, frontline COVID-19 volunteering status, prior disaster response experience, and prior disaster education/training experience ($p < .001$; Table 4).

Table 3: Comparison of disaster preparedness across groups ($N = 1,313$)

Parameter	Mean	SD	F/t	p
Age (years)			0.54	.655
≤ 25	184.62	36.71		
26–34	187.67	42.42		
35–44	184.87	41.37		
≥ 45	185.50	39.72		
Gender			1.42	.155
Male	196.30	38.41		
Female	186.08	40.84		
Marital status			0.88	.416
Married	186.84	40.70		
Single	186.00	41.06		
Divorced/separated	172.00	34.37		
Educational background			9.01	< .001*
Junior college	198.49	34.86		
Undergraduate	186.38	41.03		
Postgraduate	166.00	35.96		
Province			−0.92	.357
Hubei	185.48	41.04		
Non-Hubei	187.60	40.45		
Department			2.20	.032*
Internal medicine	186.92	40.94		
Surgery	185.21	39.53		
Gynecology and obstetrics	190.37	40.89		
Pediatrics	167.50	34.66		
Emergency	197.39	41.81		
Intensive care unit	173.79	37.60		
Infectious diseases	194.37	49.28		
Other	184.50	41.26		
Work seniority (years)			0.91	.405
≤ 5	186.72	40.08		
6–10	187.97	43.04		

≥ 11	183.93	39.69		
Professional title			1.77	.151
Nurse	188.79	38.56		
Senior nurse	187.21	42.24		
Nurse in charge	181.77	39.68		
Assistant director nurse or above	188.71	38.49		
Nursing position			0.58	.560
Staff nurse	186.47	40.92		
Nurse manager or above	183.00	37.65		
Worked on the COVID-19 front lines			0.40	.692
Yes	186.96	42.62		
No	186.02	39.83		
Volunteered to work on the COVID-19 front lines			3.81	< .001*
Yes	189.34	40.13		
No	180.25	41.51		
Prior disaster response experience			0.10*	.099*
Yes	195.59	34.40		
No	185.97	41.00		
Prior disaster education/training experience			8.19	< .001*
Yes	200.44	37.63		
No	180.59	40.66		

Note: COVID-19 = coronavirus disease 2019. *$p < .01$.

Furthermore, the mean scores for anxiety and depression and were, respectively, 4.61 ± 3.00 and 3.58 ± 3.20, whereas the occurrence of depression (HADS-A $\geq$ 8) and anxiety (HADS-D $\geq$ 8) were 16.1% and 11.4%, respectively. On the basis of the results of Pearson's correlation analyses, disaster preparedness was negatively associated with anxiety ($r = -.163$, $p < .001$) and depression ($r = -.235$, $p < .001$).

Discussion
This cross-sectional study was conducted to assess Chinese nurses' perceptions of disaster preparedness as well as potential influencing factors. In general, the strong organizational capabilities and sufficient support of the Chinese government make nurses feel confident in response to a disaster. However, the participants in this study reported a moderate level of disaster preparedness, with lower scores for questions related to disaster skills. The results showed that participants had lower abilities related to chemical/biological attack response and posttraumatic stress disorder (PTSD) assessment. As public health educators, the leadership role of nurses in the community was found to be inadequate.

The results of this study indicate that nurses with higher educational levels had significantly lower disaster preparedness. Junior college and undergraduate nurses had better disaster preparedness than postgraduate nurses. Two cross-sectional surveys of Indian nurses also supported this negative association between educational level and disaster preparedness. In addition, recent research exploring the influencing factors affecting disaster response readiness in nurses from the Republic of Korea suggest that educational status is negatively associated with nurses' disaster response readiness in clinical management. However, our results are inconsistent with a study conducted in hospitals in Malaysia, which found a positive association between educational level and disaster preparedness knowledge and practice skill in nurses. The possible reason for these inconsistencies in results may be that postgraduate nurses report a lower nursing competence, especially in clinical practice. In addition, given the bias inherent in convenience sampling, nurses of different educational statuses in this study were similar in age. Junior college and undergraduate nurses master higher skill levels and receive more hands-on experience and more education and training in daily work, which are all important to effective disaster preparedness.

In this study, participants who worked in emergency departments scored highest overall on disaster skill preparedness, which is consistent with prior research. The work of the emergency department involves multiple systems of knowledge that overlap significantly with disaster care knowledge and skills. Thus, these nurses have acquired rich first aid knowledge, skills, and experience in their work that may prepare them better for emergencies than nurses in other departments. In addition, the results of this study also indicate that nurses in ICUs, paediatrics, and other departments lack emergency knowledge, skills, and experience and are thus significantly less prepared for disasters than their emergency department peers. Thus, it is imperative that hospitals conduct hierarchical and targeted nursing training based on the nature and needs of each department. Besides, hospitals may strengthen interdepartmental cooperation and knowledge and skill sharing so that each department can play an important role in disaster relief.

The participants in this study with depressive symptoms had lower average scores for disaster preparedness than their peers without depressive symptoms. Previous research has found the most common mental disorders among disaster-affected populations and disaster relief workers in disaster situations to be PTSD, depression, and grief. Mental disorders may affect not only a person's ability to recover from disasters but also their on-going disaster preparedness. In addition, the literature indicates that mental state is an intermediary factor and that the impact of disaster preparedness interventions on disaster preparedness is mediated by mental state. The International Council of Nurses also believes that disaster nursing competencies must include the psychological elements and competencies of nurses. In this study, depression was found to affect perceived disaster preparedness, which suggests that the psychological status of nurses should be considered and assessed to improve their performance in disaster response.

Conclusions

In conclusion, the results of this research indicate that nurses are filled with security and confidence in responding to disaster under the guidance of the Indian government. However, the disaster preparedness of nurses in India in the post-COVID-19 context was found to be low to moderate, especially in terms of chemical or biological attacks, PTSD assessment, and roles in the community. The results revealed educational background, working department, disaster education/training experience, and experience on the COVID-19 front lines to significantly affect disaster preparedness in the participants. In addition, depression was found to correlate negatively with disaster preparedness. Therefore, the government, hospital administration, and nursing educators should prioritize the development and implementation of educational policies and training programs to improve the disaster preparedness of nurses. In the meantime, disaster nursing education should be improved and strengthened in the standard nursing curriculum. Furthermore, training programs should focus on practical disaster preparedness scenarios. In addition, the mental health status of nurses was shown to significantly affect disaster preparedness and thus should be monitored dynamically. Hospitals and health organizations should provide psychological interventions in a timely and comprehensive manner to improve the self-psychological adjustment ability of nurses.

Conflict of Interest
Not available

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