Disaster Nursing: Preparedness and Response in Global Health Crises.

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ABSTRACT

Aim-This review aims to synthesize and highlight the critical and evolving role of disaster nursing amid the increasing frequency and complexity of global emergencies. It explores the multifaceted contributions of nurses across the disaster management continuum—mitigation, preparedness, response, and recovery—while identifying systemic gaps, challenges, and future priorities to strengthen global disaster resilience.

Methodology-A narrative literature review approach was employed, drawing on case studies, peer-reviewed articles, global health reports, and international frameworks that document nursing roles in major disaster events. Key events reviewed include the COVID-19 pandemic, the Haiti earthquake, and the Ebola outbreak. The analysis focused on nursing interventions, best practices, and systemic challenges, with emphasis on cultural competency, rapid needs assessment, ethical considerations, and interprofessional collaboration.

Results-The review found that nurses consistently serve as frontline responders in disaster contexts, performing diverse roles ranging from emergency triage, clinical care, and psychological support to health education and advocacy. Despite resource limitations and high-risk environments, nurses contribute significantly to community resilience and public health outcomes. The case studies illustrated how coordinated deployment, culturally sensitive approaches, and adaptive strategies lead to more effective disaster responses. However, persistent challenges such as limited infrastructure, mental health strain, workforce shortages, and ethical dilemmas were recurrent. Evidence supports the urgent need for expanded training programs, institutional backing, mental health support, and policy development to protect and empower nursing personnel. Technological integration, global collaboration, and ongoing research emerged as essential pillars for enhancing preparedness and response capabilities.

Conclusion-Nurses are indispensable to disaster management, not only as responders but as proactive leaders shaping community health resilience. Strengthening disaster nursing requires systemic investments in education, infrastructure, policy, and mental well-being. International cooperation, innovation, and strategic planning are imperative to equip nurses for future crises. Recognizing and reinforcing the leadership and contributions of nurses is crucial for achieving sustainable disaster preparedness and ensuring global health security.

Keywords: Disaster Nursing, Emergency Preparedness, Community Resilience, Nursing Leadership, Global Health Emergencies, Crisis Response and Recovery.

INTRODUCTION

Disaster nursing is the adaptation and systematic use of professional nursing knowledge, skills, and attitudes to recognise, meet, and manage the health, physical, and emotional needs of individuals or communities affected by disasters, whether natural or manmade.(1) In the context of global health crises, disaster nursing is crucial, as nurses serve on the frontlines—providing acute care, triage, patient education, infection prevention, and psychosocial support, particularly during pandemics or large-scale emergencies. Nurses are pivotal in disaster and global health crisis response, providing acute and chronic care, triage, infection prevention, patient education, and psychosocial support. Disaster nurses help design and implement operational protocols, manage shelters for displaced persons, coordinate logistics, and lead crisis communication. They play crucial roles within emergency command systems, ensuring a coordinated and effective response across health and community organisations. During events like the COVID-19 pandemic, nurses took on expanded roles ranging from direct patient care to community education and vaccination campaigns, often under challenging and hazardous conditions. The skills and reach of disaster nurses are especially important for protecting at-risk groups such as the elderly, those with chronic illnesses, and the economically disadvantaged, all of whom are often most affected during health emergencies. Nurses' community outreach, education, and advocacy are central to efforts to reduce health inequities during crises. They are especially vital in supporting vulnerable populations and reducing health inequities, often working in challenging environments with limited

resources.(2) The mass mobilisation of nurses, as seen in pandemics and major disaster response, has highlighted the need for systemic changes in nursing education, policy, and support to safeguard global populations and health infrastructure. Organizations like the World Health Organization and the International Council of Nurses have called for increased investment and better preparedness of the nursing workforce to meet the challenges of future global health crises. By participating in the phases of preparedness, immediate response, and recovery, disaster nurses help build resilient health systems and communities, highlighting the essential need for investment in their training and readiness.

In 2025, the world is confronting a convergence of severe global challenges—pandemics, natural disasters, and conflicts—each fueling humanitarian crises and straining health systems. Large-scale armed conflicts, including ongoing wars in Sudan, Gaza, Ukraine, and Myanmar, have led to unprecedented levels of displacement and left millions without access to essential healthcare, with Sudan now witnessing the fastest-growing displacement crisis on record. At the same time, extreme weather events such as wildfires, floods, and heatwaves—intensified by climate change—are occurring more frequently and causing massive social and economic disruption.(3) Public health threats persist as COVID-19's legacy continues, new infectious diseases like avian influenza and resurgent cholera outbreaks threaten vulnerable populations, and antimicrobial resistance escalates, undermining medical advances. Total, over 300 million people now require urgent humanitarian assistance globally, with almost half of the most severe health emergencies originating in settings where conflict, displacement, and natural disasters overlap, severely disrupting health services, access to clean water, and infrastructure. These overlapping crises highlight the fragility of current global systems and the critical need for robust, coordinated response and preparedness across borders. The objective of this paper is to highlight the role of disaster nursing in global health crises. It covers the types of disasters, their health impacts, and nurses' roles in each phase of disaster management. It also suggests future directions for education, policy, and global collaboration to strengthen disaster nursing efforts.

2. Classification of Disasters and Health Impact
Disasters are broadly classified into three main categories: natural disasters, man-made disasters, and global health emergencies, with each type exerting profound and often overlapping impacts on human health and health systems.

2.1 Natural Disasters
Geophysical events such as earthquakes, as well as hydrological and meteorological phenomena like floods and hurricanes. Earthquakes can result in large-scale destruction, causing immediate physical injuries—fractures, crush injuries, lacerations—and high mortality rates, especially in densely populated or inadequately prepared regions.(3) Floods and hurricanes create additional hazards through rapid-onset flooding, displacement, and exposure to contaminated water, which increase the risk of communicable diseases like diarrhea and cholera. Both types of events destroy critical infrastructure, disrupt clean water supplies, and limit access to healthcare services, potentially overwhelming local systems and leading to increased morbidity from both acute and chronic conditions.

2.2 Man-made disasters
Stem from human activities and include industrial accidents and armed conflicts or acts of terrorism. Industrial accidents—such as chemical spills, gas leaks, or nuclear plant meltdowns—can inflict both immediate and chronic health injuries, ranging from respiratory and neurological disorders to cancer due to exposure to toxic substances.(4) The Bhopal Gas Tragedy and Chernobyl accident serve as sobering examples of the enduring health problems arising from such incidents. Armed conflicts and terrorism contribute to high rates of trauma, loss of life, and disability through violence, while also facilitating the collapse of healthcare delivery, sanitation infrastructure, and the spread of infectious diseases in displaced populations. Beyond physical harm, these events can cause long-term psychological trauma, with elevated rates of anxiety, depression, and post-traumatic stress disorder (PTSD) persisting for years after the event, especially in survivors of violence or displacement.

2.3 Global health emergencies
Encompass pandemics, such as COVID-19, and events triggered or magnified by climate change. Pandemics disrupt societies worldwide, stretching health systems as they struggle to provide care amid surges in infections, shortages of personnel, and breakdowns in supply chains.(5)They also trigger indirect health impacts by delaying treatment for other diseases and contributing to mental health crises. Climate change-induced events—such as intensified hurricanes, wildfires, and prolonged heatwaves—have become more frequent and severe, increasing injuries, fatalities, and respiratory illnesses, and compounding stress on public health infrastructures globally. These emergencies often exacerbate pre-existing vulnerabilities, disproportionately affecting the most marginalized communities.

2.4 Health implications
Disasters are vast and interconnected. Physically, disasters routinely inflict injuries ranging from minor wounds to life-threatening trauma, and can cause substantial mortality. They often trigger the spread of infectious diseases due to displaced populations, overcrowding, and disrupted sanitation. Chronic illnesses typically worsen, as access to medications, dialysis, and medical follow-up is impeded. Psychologically, survivors frequently experience mental

health issues—grief, depression, anxiety, and PTSD—with long-term impacts documented in both natural and man-made disaster contexts.(6) Finally, disasters disrupt vital infrastructure—hospitals, clinics, power grids, and roads—rendering essential services inaccessible, delaying emergency responses, and hindering recovery for affected populations. These compounding effects underscore the critical importance of comprehensive disaster preparedness, effective emergency management, and resilient health systems able to withstand and recover from diverse and escalating hazards.

Role of Nurses in Disaster Management
Nurses play a critical, multifaceted role in disaster management, spanning all phases of the disaster cycle and engaging with diverse responsibilities that are central to effective responses and recovery. Their leadership, clinical expertise, and ethical commitment are essential to minimizing harm, addressing physical and psychological needs, and restoring community health after disasters.

3.1 Phases of Disaster Management
Globally, disaster management is conceptualized in four primary phases: mitigation, preparedness, response, and recovery. Nurses are deeply involved at every stage, ensuring not only the resilience of health systems but also the well-being of individuals and populations throughout the cycle. (7)

1) **Mitigation**: Nurses contribute to risk reduction by educating communities, advocating for improved infrastructure, and developing health promotion strategies to minimize disaster impacts. Their input is vital in identifying vulnerable groups, implementing public health initiatives, and supporting policy development aimed at reducing hazards and exposure. Nurse leadership is crucial in shaping community preparedness and resilience policies.(2)

2) **Preparedness**: Preparedness focuses on equipping healthcare systems and communities to respond effectively when disasters occur. Nurses engage in the development and delivery of disaster education programs, simulation drills, emergency operation planning, and stockpiling essential supplies. Their clinical skills, teamwork, and familiarity with triage protocols are reinforced through ongoing training, significantly raising organizational capacity for a coordinated disaster response. (8)

3) **Response**: During the acute disaster event, nurses are on the frontlines, responsible for triage, emergency care, psychological support, logistical organization, and the management of scarce resources. They implement rapid assessments, provide first aid, manage critical injuries, oversee shelter operations, administer medications, and facilitate communication between multidisciplinary teams.(9)

4) **Recovery**: As impacts abate, nurses play an indispensable role in the rehabilitation and reconstruction phases, providing long-term follow-up care, mental health interventions, infectious disease control, and community reintegration services. Their ongoing support assists survivors in regaining function and health, while their involvement in after-action reviews helps to inform future preparedness and policy.(10)

3.2 Core Responsibilities of Nurses
Nurses' responsibilities in disaster management are both broad and specialized, underpinning the effectiveness of the disaster response and recovery process.

3.2.1 Triage and Emergency Care
Nurses perform initial and ongoing patient assessment under pressure, prioritizing care based on severity (using established triage systems), administering life-saving interventions, managing trauma, infectious disease outbreaks, chronic illnesses, and facilitating patient flow to appropriate treatment centers. (11)Their experience is directly linked to more effective disaster response and better outcomes for victims.

3.2.2 Psychological Support:
The psychological toll of disasters can be profound. Nurses are trained to deliver psychological first aid, crisis counseling, and ongoing mental health support, critical for mitigating acute stress, grief, anxiety, and post-traumatic stress disorder in both victims and responders. (12)Their ability to provide reassurance, empathetic listening, and facilitate access to mental health resources makes them indispensable in both immediate and long-term responses.

3.2.3 Community Health Education
Nurses act as trusted health communicators, educating the public on preparedness measures, hygiene, disease prevention, coping strategies, and available resources before, during, and after disasters.(13) Their engagement increases public awareness and compliance, ultimately reducing morbidity and mortality.

3.3 Interdisciplinary Coordination
Disaster response necessitates tight collaboration across sectors. Nurses coordinate with physicians, emergency services, government agencies, non-governmental organizations, and community leaders to ensure efficient disaster response and recovery. This includes integrating into incident command systems, participating in the management of shelters and logistics, and contributing to the delivery of coordinated health and social services.(14) Effective teamwork

facilitates seamless care transitions, resource allocation, and information dissemination, maximizing collective impact during high-stress situations.

3.4 Ethical Considerations in Disaster Nursing
Ethical dilemmas are inherent to disaster situations, where resources are limited, needs are vast, and decisions may have life-or-death consequences. Nurses face complex issues such as:
1. **Triage under resource scarcity:** Making fair, transparent decisions about who receives immediate care when not all can be saved.
2. **Patient autonomy and confidentiality:** Maintaining respect for patients' choices and privacy in chaotic, overcrowded conditions.
3. **Duty to care vs. personal risk:** Balancing professional obligations with personal and family safety.
4. **Justice and equity:** Ensuring vulnerable and marginalized groups are not neglected, and advocating for nondiscriminatory allocation of care and resources.
5. **Emotional and moral distress:** Navigating the psychological burden of difficult decisions, possible moral injury, and the need for self-care and support among nurses themselves.

Virtue-based ethics—prudence, courage, charity, justice, and stewardship—are invaluable yet must be balanced with utilitarian ethics prioritizing the greatest good for the greatest number. (15)Ongoing education in ethical decision-making and legal requirements is essential to disaster nursing practice and should be integrated into training and policy development to ensure future readiness. (16)

4. Preparedness Strategies in Disaster Nursing
It has become more sophisticated and essential as the nature and scale of global disasters have evolved. Central to these strategies are comprehensive disaster response training programs that equip nurses with critical competencies, including emergency triage, clinical management, personal protection, and effective teamwork.(17) Recent research demonstrates that structured and multidisciplinary disaster management training, utilizing diverse teaching methods such as lectures, simulations, and real-life scenario exercises, substantially boosts nurses' readiness, knowledge, and confidence to respond efficiently to emergencies. (18)These training programs not only address theoretical understanding but also bridge the gap between knowledge and practice, enabling nurses to make informed, decisive actions in high-pressure environments.

4.1 Emergency simulation drills
Now a cornerstone in nursing education and continuing professional development, provide immersive, realistic experiences that allow both novice and experienced nurses to refine their skills in patient assessment, resource allocation, communication, and adaptive problem-solving.(19) Simulation-based exercises recreate the tension and unpredictability of disaster scenarios, giving participants safe opportunities to identify weaknesses, strengthen competencies, and foster collaborative teamwork. These drills are recognized for their capacity to improve both clinical performance and psychological preparedness, ensuring that nurses can maintain composure and effectiveness when confronted with mass casualty incidents or public health emergencies.

4.2 Development of Hospital and Community Response Plans
In tandem with training, the development and ongoing refinement of hospital and community response plans are vital. These plans are tailored to address specific local risks, available resources, and population needs, ensuring a seamless, coordinated response during actual disasters. They are crafted through interdisciplinary collaboration, integrating input from nursing leaders, emergency managers, and public health officials, and regularly tested through joint drills. Nursing input is particularly valued in these plans for its practical perspective on workflow, communication, and the psychosocial needs of both patients and healthcare teams.

4.3 Integration of Technology and Telehealth
The integration of technology and telehealth has become increasingly indispensable in contemporary disaster nursing. Telehealth platforms enable remote triage, real-time consultation, specialist support, and ongoing monitoring, extending the reach of limited healthcare personnel and expertise during both natural and anthropogenic crises.(20) Telenursing offers solutions for care continuity, collaboration, and resource optimization, particularly in areas with shortages of skilled providers or challenging access. Research points to telehealth as a "force multiplier" during disasters, overcoming geographic and logistical barriers and providing scalable support to overwhelmed local teams.

4.4 Policy and Regulatory Support for Nursing Preparedness
Policy and regulatory frameworks underpin all aspects of nursing preparedness. Effective preparedness demands supportive policies that standardize disaster nursing competencies, facilitate rapid credentialing and deployment of nurses, and prioritize the continual inclusion of disaster readiness within both nursing curricula and hospital accreditation standards. Professional bodies and regulatory agencies increasingly advocate for binding strategies

aligned with international frameworks—such as the Sendai Framework for Disaster Risk Reduction—to guide governments, hospitals, and educational institutions in establishing robust, sustainable preparedness structures.(2) Looking toward the future, there is a clear need for intensified investment in both the routine and advanced training of nurses for disaster response. Integration of artificial intelligence and advanced simulation technologies, as well as the development of international networks for rapid resource and expertise sharing, hold promise for addressing skill gaps and surge demands. Strengthening partnerships between academic institutions, healthcare systems, technology innovators, and policymakers will be critical for continual improvement of disaster readiness. Additionally, nurses must be empowered to lead preparedness initiatives—not only as clinicians but as educators, advocates, and leaders shaping policy and community resilience. As disaster frequency and complexity increase, a continuous readiness mindset, ongoing interdisciplinary research, and proactive policy evolution will ensure nurses remain a steadfast frontline resource in protecting public health and advancing global disaster resilience.

5. Response and Recovery: Best Practices and Case Studies
The response and recovery phases of disaster management are marked by best practices grounded in field experience and research, as illustrated by key case studies and thematic evidence from PubMed-indexed literature.

5.1 Case Study: COVID-19 Pandemic Response
During the COVID-19 pandemic, globally diverse public health responses characterized successful management efforts.(21) Countries implemented layered strategies—lockdowns, mask mandates, digital contact tracing, quarantine, and rapid deployment of home and community-based isolation centers—to limit viral spread and ease health system pressures. Case studies from Turkey, India, Thailand, and other nations highlight that initiatives such as flexible surge capacity, comprehensive community-based approaches, digital health innovation, and proactive government intervention were central in managing caseloads and reducing morbidity and mortality. Swift exchange of information, timely implementation of containment policies, and sustained international cooperation proved especially crucial in mitigating the pandemic's impact.(22)

5.2 Case Study: Haiti Earthquake
The 2010 Haiti earthquake exemplifies the profound challenges and lessons of disaster response in a low-resource, high-stakes context. A remarkable joint response mobilized local, military, and NGO actors to deliver life- and limb-saving care and stabilize survivors. However, the response was undermined by insufficient preliminary needs assessment, ad hoc coordination mechanisms, and limited integration of local Haitian leadership, which complicated resource allocation and long-term recovery efforts. This highlighted the need for pre-established interagency protocols, community-led planning, and inclusion of local capacities and stakeholders throughout the response and transition to recovery. (23)

5.3 Case Study: Ebola Outbreak in West Africa
The Ebola outbreak in West Africa (2014-2016) underscored the consequences of fragile health systems and the importance of building trust and collaborative networks between affected communities and responders. Outbreak control was achieved through the combination of classic public health measures—surveillance, case identification, quarantine, contact tracing—and community-driven behavior change initiatives. However, the availability of medical staff and supplies was insufficient in the hardest-hit countries, and a lack of social integration impeded both initial containment and resilience. The experience demonstrated that sustained investment in healthcare workforce training, stronger community engagement, and greater integration of local authorities are key to durable epidemic preparedness and response.(23)

5.4 Key Practices in Rapid Assessment and Deployment
Across these and other disasters, best practices in rapid assessment and deployment include structured triage protocols, systematic evaluation of victim and resources, and prioritization of critical infrastructure and immediate health needs. Nurses are pivotal, executing rapid assessment, primary life-saving actions, and logistical coordination—functions formally recognized in international disaster competency frameworks and supported by regular simulation drills and education. Early and ongoing assessment is essential, especially during the critical first 48 hours following a disaster event.

5.5 Cultural Sensitivity and Local Engagement
Cultural sensitivity and local engagement have emerged as critical to effective response and recovery. Research shows that cultural values and social norms drive community resilience, compliance, and trust. Addressing language, tradition, and local knowledge gaps with culturally competent care interventions fosters inclusivity, improves health outcomes, and addresses historical disparities. Theoretical and practical education in cultural competence is increasingly recognized as necessary for all disaster responders, and robust evidence supports the integration of such training at all stages of professional nursing development. (23)

5.6 Role of International Organizations

International organizations—including the WHO, International Federation of the Red Cross and Red Crescent Societies (IFRC), NGOs, and others—play fundamental roles in facilitating coordination, resource distribution, guidance, and governance during major emergencies. The WHO leads in setting standards, coordinating health clusters, and supporting rehabilitation and resource mobilization at the highest level. The Red Cross and its National Societies bridge local and international response, enabled by a unique mandate that allows flexible, context-sensitive intervention in disasters, conflicts, and epidemics. (24)

5.7 Rehabilitation and Long-Term Care in Recovery Phase

Rehabilitation and long-term care are now recognized as integral to disaster recovery. Early inclusion of rehabilitation professionals reduces disability, improves outcomes, and expedites community reintegration for survivors. Multidisciplinary teams—including nursing, allied health, and social work—deliver individualized and patient-centered rehabilitation, adapting goals to the realities of the disaster context. Both WHO and leading medical societies now advocate for prioritizing rehabilitation in policy frameworks, funding, and emergency team deployments to ensure continuity and sustainability of care long after the acute phase is over. (25) . A brief summary of case studies with key best practices are listed below in **Table-1.**

Table 1: A Brief Summary of Case Studies with Key Best Practices.

Sr.No.	Case Study	Key Points	Ref.
1.	COVID-19 Pandemic Response	Various countries implemented diverse strategies such as lockdowns, quarantine, use of masks, social distancing, and community-based isolation centers. Successful responses involved swift information exchange, global cooperation, and multidisciplinary surge capacity strategies.	(26)
2.	Haiti Earthquake	Collaborative efforts between NGOs, military, and local stakeholders saved many lives but faced challenges such as lack of preparedness, coordination, and adequate needs assessments. Haitian involvement was limited in early phases, highlighting the need for improved local engagement.	(27)
3.	Ebola Outbreak in West Africa	The outbreak underscored weak healthcare infrastructures, insufficient trained personnel, and lack of trust between communities and responders. Strategies included vaccine deployment, social mobilization, surveillance, contact tracing, and isolation to control the epidemic.	(28)
II	**Practice**	**Description**	**Source**
1.	Rapid Assessment and Deployment	Critical for effective disaster response; relies on systematic evaluation of injuries, resources, location, loss, and damage; nurses play key roles in initial assessments and mobilizing resources promptly.	(28)
2.	Cultural Sensitivity and Local Engagement	Essential to disaster nursing to build trust and promote resilience; involves understanding community values, traditions, and norms; improves compliance and reduces disparities.	(29)
3.	Role of International Organizations	WHO, Red Cross, NGOs play leadership, coordination, and operational roles; they provide resources, expertise, and facilitate multi-agency collaboration during disaster response and recovery.	(30)
4.	Rehabilitation and Long-term Care	Integral to recovery phase; focuses on restoring physical, psychological, social functioning; interdisciplinary teams deliver holistic care; emphasizes early initiation of rehab and sustained follow-up.	(31)

6. Challenges Faced in Disaster Nursing

The convergence of case-based experience with thematic best practices demonstrates that effective disaster response and recovery hinge on rapid mobilization, culturally attuned care, strong coordination between local and international actors, and a sustained commitment to holistic rehabilitation throughout the continuum of care. Disaster nursing presents a unique set of challenges that test the resilience, expertise, and ethical grounding of nurses working in

unpredictable and often hazardous environments. Among the most pressing obstacles are limited resources and infrastructure, high physical and emotional stress, ongoing safety and security concerns, workforce shortages and gaps in disaster-specific training, as well as complex legal and ethical dilemmas.

6.1 Limited Resources and Infrastructure
Resource constraints are a defining feature of disaster situations. Nurses regularly contend with inadequate infrastructure, shortages of medical supplies, limited access to essential medications, and disruptions in normal communication channels.(32) These limitations, especially pronounced in rural and low-resource settings, often hamper the effectiveness of care and exacerbate feelings of helplessness among nursing teams. Problems such as poor distribution of resources, outdated equipment, and insufficient staffing are further aggravated by logistical barriers, including damaged roads and inaccessible disaster sites.

6.2 High Physical and Emotional Stress
The physical and emotional demands placed on disaster nurses are immense. Long work shifts, insufficient rest, and exposure to traumatic events contribute to significant fatigue, burnout, and a host of psycho-emotional issues—ranging from acute stress disorder to depression and post-traumatic stress disorder. (33)Persistent worry about patients and personal safety, witnessing widespread suffering or loss of life, and the ongoing threat of violence or aggression from distressed patients or community members take a long-term toll, often straining family relationships and support networks. Many nurses report feelings of isolation, helplessness, or guilt, underscoring the substantial psychological burden inherent to disaster nursing.

6.3 Safety and Security Concerns for Nurses
Personal safety and security are prominent concerns, given that nurses frequently work in unpredictable or precarious settings where risks of violence, infection, or environmental hazards are high.(34) During large-scale emergencies, such as pandemics or armed conflicts, nurses may face aggression from patients' families or the public, as well as exposure to infectious diseases in the absence of adequate protective equipment. Additionally, nurses sometimes operate without proper organizational support or security measures, increasing their vulnerability.

6.4 Gaps in Training and Workforce Shortage
Another critical challenge is the persistent shortage of skilled nurses and the lack of comprehensive disaster-specific training programs. Many nurses feel underprepared to respond to the complex demands of disaster settings, citing gaps in knowledge, skills, and formal education. Training initiatives are sporadic and often lack practical, simulation-based components that are proven to enhance real-world competence. (35)The lack of standardized, evidence-based curricula and assessment tools for disaster preparedness hampers workforce development and can lead to diminished confidence and performance during actual emergencies. Furthermore, underinvestment in continuous education and limited managerial commitment to ongoing preparedness maneuvers contribute to these persistent gaps.

6.5 Legal and Ethical Dilemmas
Legal and ethical dilemmas further complicate nurses' roles in disaster settings. Nurses are often required to make difficult triage decisions with scarce resources, balancing the greatest good for the greatest number against individual patient needs. They must navigate rapidly changing standards of care, sometimes providing treatment in jurisdictions where their licensing status is unclear, or acting under crisis standards that relax traditional legal and ethical constraints.(36) Concerns about malpractice liability, informed consent under duress, documentation during chaos, and confidentiality in makeshift settings are routinely encountered. These factors are compounded by the ambiguity of professional codes of ethics during disasters, leaving nurses vulnerable to legal repercussions or moral distress in the aftermath of crisis events.

Collectively, these challenges underscore the need for systemic solutions. Improving disaster nursing requires investment in robust infrastructure, continuous training, and clear legal and ethical frameworks, as well as the provision of adequate support for the physical and mental well-being of nurses. Addressing these issues is critical to ensuring that nurses remain an effective and resilient frontline force in disaster management, capable of responding to increasingly complex global emergencies.

7. Future Directions and Recommendations
Future directions for disaster nursing are rapidly evolving, shaped by global experiences, technological advances, and the growing recognition of nurses' critical roles during crises.

7.1 Strengthening Global Nursing Collaboration Networks
The expansion and strengthening of global nursing collaboration networks is central to this transformation. International organizations like the World Health Organization and coalitions of nursing associations actively promote partnerships that foster capacity building, knowledge exchange, joint training, and research to maximize nursing's

contributions to disaster resilience. Web-based communities of practice, interprofessional education, and international workshops are being developed to break down geographic barriers and promote the exchange of experiences and best practices, building a more globally synchronized response to disasters.

7.2 Inclusion of Disaster Nursing in Academic Curriculum

Equally vital is the inclusion of disaster nursing as a core component in academic curricula. Researchers and educators increasingly advocate for disaster content in undergraduate and postgraduate nursing education as essential for preparing competent, resilient nurses ready to respond to emergencies. Integration approaches now combine didactic teaching about disaster theory, interactive modules, simulation-based learning, and interprofessional collaboration. Recent studies demonstrate that incorporating disaster nursing courses directly improves students' disaster literacy and preparedness, boosting confidence and competence—findings that support global efforts to standardize disaster education and ensure all nurses, not just specialists, have essential disaster response skills.(11)

7.3 Investment in Mental Health Support for Frontline Workers

Investment in mental health support for frontline workers is now recognized as both an ethical necessity and a workforce sustainability imperative. Disaster and pandemic responses have illuminated the substantial psychological toll on nurses—ranging from acute stress to long-term mental health challenges, including anxiety, depression, and post-traumatic stress.(36) Best practices include providing both individualized and organizational interventions: regular, accessible mental health training; routine peer support; professional psychological services; and robust policies reducing stigma and promoting early intervention. Evidence indicates these strategies improve emotional resilience, self-regulation, and adaptability, directly benefiting patient care and reducing burnout. Institutions and policymakers are urged to develop permanent, well-funded mental health support systems, not just reactive or temporary programs.

7.4 Policy Advocacy and Government Support

Policy advocacy and government action are pivotal to institutionalizing these advances. Leading nursing bodies and experts stress that requiring robust disaster policies—through national disaster plans, regulatory frameworks, and the integration of nurses in leadership and planning—will ensure nurses are not only protected in their practice but empowered to contribute strategically.(37) These policies need to provide for ongoing credentialing arrangements, clear legal protections during emergencies, adequate remuneration and resource allocation, and, importantly, inclusion of nurses' voices in all disaster planning and recovery processes. Such engagement secures both justice and equity for nurses and those they serve, especially marginalized communities.

7.5 Research and Innovation in Disaster Nursing Preparedness

Ongoing research and innovation in disaster nursing preparedness will underpin long-term progress. Recent studies underline the importance of engaging nurses in participatory research, focusing on real-world challenges and competencies. Key areas include the application of simulation and virtual reality in disaster education, the use of mobile technology and telehealth for remote triage and resource allocation, and the development of best-practice guidelines for holistic patient care—including psychosocial support, rehabilitation, and nurse well-being. Investment in research infrastructure and academic-industry partnerships, as well as a focus on cross-national and cross-disciplinary research, will continue to fuel improvements in training, practice, and policy.(37) High-quality studies evaluating the effectiveness of educational interventions, mental health support models, and technology integration are crucial for building a rigorous evidence base guiding future action.

Looking ahead, disaster nursing will increasingly require visionary, coordinated efforts across sectors. Strengthening international networks, embedding disaster competencies in all nursing education, investing in comprehensive mental health and organizational support, engaging in bold policy advocacy, and driving research and innovation are all essential. Nursing leaders, educators, governments, and communities must commit to this agenda to build a resilient nursing workforce capable of meeting the unprecedented challenges of the future—ensuring humanity's health security in an era of escalating global risks.

CONCLUSION

The evolving landscape of global disasters—marked by the intersecting threats of pandemics, climate-induced catastrophes, and persistent conflicts—has underscored the irreplaceable role of nurses as the backbone of disaster response and recovery efforts. Nurses stand at the forefront across every phase of the disaster management cycle, from proactive risk mitigation and preparedness planning to decisive emergency response and holistic, long-term rehabilitation. Their clinical expertise, leadership, and profound ethical commitment are pivotal in safeguarding health, fostering community resilience, and attenuating the devastating impacts of crises on vulnerable populations. Importantly, nurses do not merely respond to immediate injuries and illnesses; they extend their reach into psychosocial support, health education, and advocacy for inclusive, equitable care, often under the most strenuous conditions of resource scarcity and risk.

Key findings from past disasters—ranging from the COVID-19 pandemic and the Haiti earthquake to the Ebola outbreak in West Africa—demonstrate that best practices hinge upon rapid deployment, robust assessment, interdisciplinary coordination, and culturally attuned engagement with affected communities. These experiences reveal that sustainable resilience requires more than clinical acumen: it depends on continuous investment in disaster training, the integration of technology and policy support, and the embedding of disaster nursing as a core element of both professional education and health system planning. The immense physical, emotional, and ethical challenges faced by nurses in disaster settings further highlight the necessity of ongoing mental health support, adequate legal frameworks, and fair resource allocation.

Looking forward, the call for global action is urgent and clear. International collaboration, policy innovation, and steadfast advocacy are essential to empower nursing workforces and ensure that healthcare systems are both prepared and adaptable. Nursing must be firmly positioned within intersectoral, international strategies for disaster preparedness, leveraging research, innovation, and cross-border knowledge-sharing to close gaps, anticipate emerging threats, and enhance collective resilience. The sustainability of global health and security hinges on proactive efforts to build resilient nursing infrastructures, promote mental well-being among frontline workers, and uphold the principles of justice, equity, and compassion in disaster care. By embracing these imperatives, the global community not only honors the profound contributions of nurses but also lays the foundation for a safer, more resilient world—one capable of withstanding the complex emergencies of our era and those yet to come.

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