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# The Effect of Climate Change on Nursing: Climate Health Emergencies Preparedness Amidst Extreme Weather Conditions

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## Abstract

Climate change poses stringent challenges in world healthcare systems with extreme weather events like heatwaves, hurricanes, floods, as well as wildfires, accelerating public health crises. As front-line healthcare practitioners, nurses have vital roles in treating such crises, but the profession of nursing encompasses distinct challenges in climate-associated health effects. This in-depth review aims to discuss climate change impacts in nursing with emphasis on health crises due to extreme weather triggers. It discusses the health consequences of climate-induced events, nurse roles in changing times, response-limiting factors, preparedness, as well as training initiatives, as well as policy recommendations. Respiratory as well as cardiovascular disease increases, mental illness, as well as disease incidents of infectious kinds with augmented effects in vulnerable groups of individuals have primary healthcare implications. Resource lack, insufficient adequate training, as well as systematic disparities, serve as response-limiting factors in nursing. Climate-specific educational interventions at nursing school, disaster response training, as well as telehealth engagement, have potential in strengthening resilience. Competency in adaptive measures, nurse advocacy in sustainable healthcare operations, as well as multi-professional care provision, serve as essential nurse roles in treating such issues. Future considerations encompass climate change incorporation in courses at nursing school, healthcare facilities strengthening, as well as health inequality issues. There is a great need in this review for climate change-knowledge nurse preparation with competency as well as essential resources in reducing climate change healthcare implications with effective care in extreme weather events.

Keywords: Climate change, nursing, weather disasters, health crises, disaster preparedness.


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**Introduction**

Climate change is a global emergency with titanic consequences for human health, caused by the surge in temperature, extreme weather, as well as environmental deterioration (Watts et al., 2021). There is an increased frequency of heatwaves, storms, floods, as well as fires, with dire health crises such as heat disorders, respiratory illness, as well as mental diseases (IPCC, 2022; Ebi et al., 2018). With most healthcare workers, nurses take the lead in this emergency, delivering acute care, community care, as well as population-based outreach in health issues (ANA, 2020; Leffers et al., 2017). However, nursing is challenged by building resilience in the face of multi-dimensional impacts of climate change in health, such as resource constraints, training needs, as well as structural disparities exacerbating susceptibilities in susceptible groups (Barna et al., 2020).

The health effects of climate change extend widely, touching both physical as well as mental well-being. For instance, heatwaves increase rates of heatstroke as well as cardiovascular events, while hurricanes as well as floods enhance predisposition to water-borne diseases, besides psychiatric disease (Patz et al., 2014; Clayton et al., 2017). Vulnerable groups such as older persons, children, as well as low-income individuals bear the greatest burden since they lack or have no access to healthcare units as well as adaptation strategies (Gamble et al., 2016). Professionals have to grapple with these concerns in addition to addressing concerns of social determinants of health, which exacerbate climate disparities (WHO, 2018). In this review, available literature related to climate change implications on nurses is synthesized with a focus on emergency planning for health due to extreme weather. It discusses impacts on health, roles of nurses, challenges, educational interventions, as well as policy interventions using 46 peer-reviewed articles with a perspective of carrying out in-depth exploration.

## 1. Effects of Adverse Weather Conditions on Health

Extreme weather events due to climate change have severe health impacts, causing increased nursing care demands. Heatwaves, rising in frequency with global warming, lead to heatstroke, dehydration, and aggravation of cardiovascular as well as respiratory diseases (Anderson & Bell, 2011; Gasparrini et al., 2015). Europe in 2003 had a heatwave, with excess deaths of 70,000, being managed by nurses with increased hospital admissions (Robine et al., 2008). Floods, as well as hurricanes, such as Hurricane Katrina in 2005, have a greater risk of water-based diseases such as cholera, as well as vector-based diseases, such as dengue, due to contaminated facilities of sanitation with standing water (Frumkin et al., 2008; McMichael et al., 2006).

Wildfires fueled by prolonged droughts emit particulate matter as PM2.5 that exacerbates asthma as well as chronic obstructive pulmonary disease (COPD), necessitating nurse management of acute respiratory distress (Reid et al., 2016). Psychological effects are enormous too, with severe weather events correlating with higher incidence of post-traumatic stress disorder (PTSD), anxiety, as well as depression (Cianconi et al., 2020). For instance, survivors of Hurricane Maria in 2017 indicated higher mental health challenges with nurses taking up key psychosocial care roles (Orengo-Aguayo et al., 2019). Vulnerable populations, such as low-income groups as well as racial groups, have further adverse effects due to restricted healthcare access as well as adaptive strategies (Rudolph et al., 2018; Fussell et al., 2017). Such healthcare effects reveal nurse readiness needs in addressing variables as well as richly complex clinical needs. Figure 1 summarizes the health impacts of climate-linked weather events.

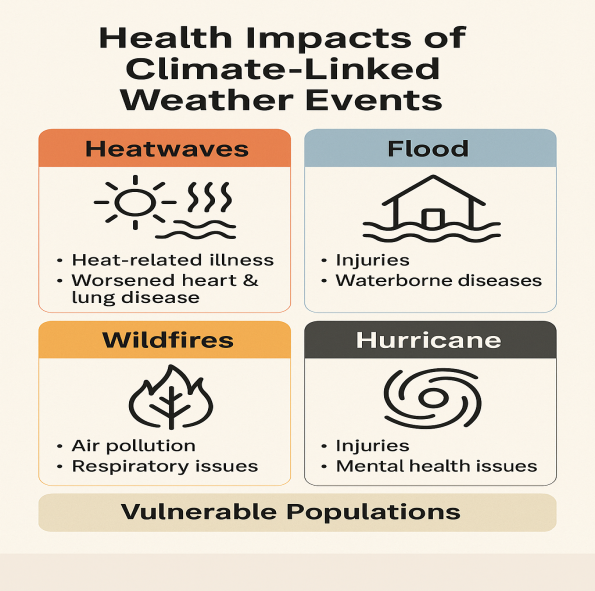


**Figure 1: Health Impacts of Climate-Linked Weather Events**

## 2. The Emerging Role of Nurses During Climate Emergencies

Nurses are the most uniquely placed with climate-associated health emergencies because they are at points of first-contact primary care, population-based interventions for health, and community action (Lilienfeld et al., 2018). During weather disasters, nurses deliver acute care in emergency rooms, treat chronic conditions provoked by environmental condition, as well as lead in disaster response (Veenema et al., 2017). During heatwaves, for instance, nurses screen heat-vulnerable populations for heat illness as well as educate groups on reduction strategies of heat as well as on hydration strategies (Balbus & Malina, 2009). During flood-prone areas, nurses immunize against water-based ill health as well as treat water-based ill health epidemics, at times in limited-resource settings (Keim, 2006).

Nurses are also core in mental health care provision, balancing climate disasters' psychological effect with counseling as well as with community interventions (Hayes et al., 2018). Their roles further involve in enhancing environmental care practices, such as reducing hospitals' carbon footprint as well as adding climate resilience in care provision (Anåker & Elf, 2014). However, shifting nurse practice trends require new skillsets, such as disaster preparedness, environmental health training, as well as cultural competency in order to reduce population groups' disparities (George et al., 2021; WHO, 2020). Nurses should work with profession-based groups, such as collaboration with emergency response teams as well as with public healthcare managers, in order to offer whole-of-person care in response to climate disasters (ICN, 2019; Figure 2).

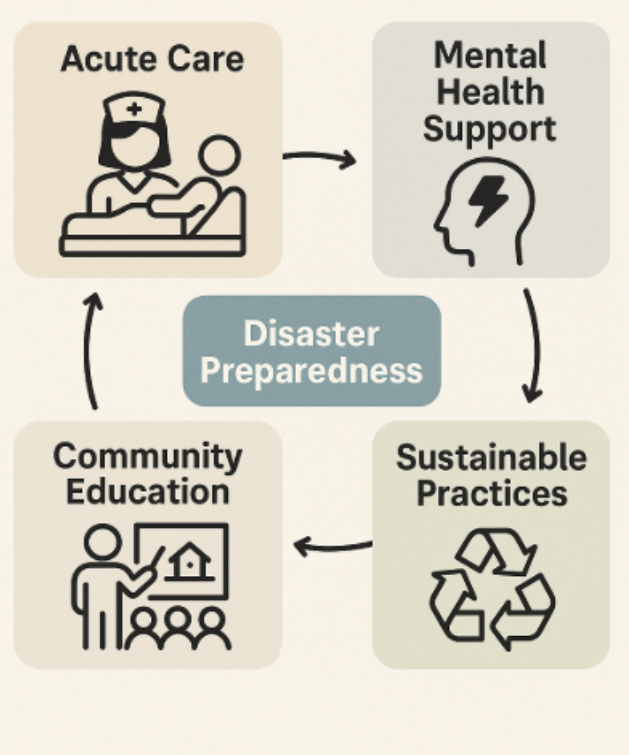


**Figure 2. Nursing response framework for climate emergencies.**

## 3. Challenges to Effective Nursing Response

Nurses have encountered several challenges in climate-related health emergency response as presented in Table 1.

**Table 1: Barriers towards Effective Nursing Response to Climate Change Health Emergencies.**

| Barrier | Description | Impact | References |
|---|---|---|---|
| **Inadequate Training** | Limited education on climate change and disaster response in nursing curricula | Reduced preparedness for managing complex climate-related health issues | Leffers et al., 2017; Nicholas & Breakey, 2019 |
| **Resource Constraints** | Shortages of staff, equipment, and supplies in disaster-affected areas | Hinders timely and effective care delivery | Barna et al., 2020; Agyeman et al., 2023 |
| **Systemic Inequities** | Disparities in healthcare access for | Exacerbates health | Gamble et al., 2016; |

| | | | |
|---|---|---|---|
| | marginalized populations | inequities during crises | Rudolph et al., 2018 |
| **Infrastructure Limitations** | Vulnerable healthcare facilities are prone to damage during extreme weather | Disrupts care continuity and emergency response | Balbus et al., 2016; Paterson et al., 2014 |
| **Mental Health Strain** | Increased stress and burnout among nurses during prolonged crises | Reduces workforce capacity and care quality | Adams & Berry, 2012; Slobodin et al., 2021 |

Another primary deterrent is a lack of experience with climate-specific nursing school competency in a manner that environmental health or disaster preparedness does not find a place in most curricula (Leffers et al., 2017; Nicholas & Breakey, 2019). Resource issues, such as understaffing with a lack of supplies, especially in low-resource environments, hinder the ability of nurses to effectively manage (Barna et al., 2020; Agyeman et al., 2023). Systemic injustices exacerbate susceptibilities as already underprivileged groups, such as minorities, have a lack of timely care in disasters (Gamble et al., 2016). Structural susceptibilities to health, such as hospitals lost in storms or through flooding, cause interruptions in care delivery (Balbus et al., 2016; Paterson et al., 2014). There is also added mental health burden and nursing burnout in prolonged crises with subsequent workforce impact on capacity (Adams & Berry, 2012; Slobodin et al., 2021).

## 4. Training and Preparation Tactics

Training interventions can equip nurses with skills in response to climate-linked health emergencies. In Table 2, we present a summary of important interventions, examples, results, and related references.

**Table 2: Strategies for Nurse Training and Preparation**

| Intervention Type | Example | Outcomes | References |
|---|---|---|---|
| **Climate-Focused Curricula** | Integration of environmental health into nursing education | Improved knowledge of climate-related health risks | Butterfield et al., 2021; Leffers & Butterfield, 2018 |
| **Disaster Preparedness Training** | Simulation-based exercises for emergency response | Enhanced skills in managing acute crises and triage | Veenema et al., 2017; Jose & Dufrene, 2014 |
| **Telehealth Training** | Education on virtual care delivery during disasters | Increased access to care in disrupted settings | Uscher-Pines et al., 2020; Tuckson et al., 2017 |
| **Community-Based Interventions** | Training on community health education for climate resilience | Empowered communities to adopt preventive measures | George et al., 2021; Schenk et al., 2017 |
| **Interdisciplinary Collaboration** | Joint training with public health and emergency response teams | Improved coordination and response efficiency | ICN, 2019; WHO, 2020 |

Climate-themed nursing education, course content like climate-based environmental health and climate adaptation, raises climate-based hazards knowledge for nurses (Butterfield et al., 2021; Leffers & Butterfield, 2018). Simulation-based disaster training enhances competency in crisis resource allocation, emergency care, and triage (Veenema et al., 2017; Jose & Dufrene, 2014). Telehealth training facilitates nurse care delivery in the disruption of physical infrastructure, like as Hurricane Harvey (Uscher-Pines et al., 2020; Tuckson et al., 2017). Community-based interventions, like population-based heatwave prevention messages, empower vulnerable groups in learning resilience strategies (George et al., 2021; Schenk et al., 2017).

Multidisciplinary training enhances liaison with emergency response agencies and with public health units, enhancing response effectiveness (ICN, 2019; WHO, 2020). These interventions only work with sustained implementation and evaluation, nonetheless (Slobodin et al., 2021).

## 5. Progressing Effective Nursing Strategies

There are certain means by which nurse practitioners can effectively manage climate-informed health emergencies. First, environmental health screenings of patient care plans can allow nurse practitioners to detect climate-informed hazards, e.g., heat or breathing issues, and tailor interventions (Lilienfeld et al., 2018). Second, nurse practitioners should champion sustainable healthcare efforts, e.g., hospital energy conservation as well as green programs (Anåker & Elf, 2014). Third, telehealth can maintain care during severe weather events, for example, in rural or disadvantaged groups (Uscher-Pines et al., 2020).

Participation of the community is necessary, such as population-level education on climate adaptation measures, such as heatwave hydration or flood evacuation planning (Schenk et al., 2017). Cultural competence is needed in managing vulnerable populations of individuals, with flexibility to varying needs and cooperation in mitigating inequities (Fussell et al., 2017). Disaster preparedness training and resilient health infrastructure with severe weather are needed roles of nurses, as well as policy advocacy on this issue (Balbus et al., 2016). A networking organization, such as the Alliance of Nurses for Healthy Environments (ANHE), offers educational as well as advocacy resources (ANHE, 2021).

## 6. Challenges to Preparing Nurses for Climate Crises

Despite preparedness being essential, there is no shortage of obstacles. Curricular time being limited means issues of climate change cannot be taught, leaving nurses unskilled (Nicholas & Breakey, 2019). Low numbers of prepared teachers with specialist environmental health expertise delay comprehensive training (Leffers et al., 2017). Resources being limited in general, especially in resource-poor regions, restrict equipment accessibility in the disaster period as well as in training (Agyeman et al., 2023). Systemic disparities exacerbate problems as needy groups at times of disaster receive suboptimal care (Rudolph et al., 2018). Above all, there is also a psychological consequence of long-term disasters on nurses in burnout as well as in compassion fatigue, decreasing workforce resilience (Adams & Berry, 2012). It is necessary to tackle these problems with systematic solutions in training, policy, as well as in funding.

## 7. Policy Recommendations

Policies must give climate resilience priority to facilitate nursing practice. Embedding climate change in national nursing curricula, as the International Council of Nurses (ICN, 2019) recommends, provides level training. Governments and the healthcare industry must invest in healthcare facilities with resilience, such as floodproof hospitals to support care (Balbus et al., 2016). Policies that support health equity, such as specialized funding of vulnerable populations, may ward off discrimination during crises (Gamble et al., 2016). Telehealth adoption incentives and access to tools from a mental health nursing care perspective can build response capacity (Tuckson et al., 2017; Adams & Berry, 2012). Global agendas such as the WHO's (2020) climate and health strategy guide policy, highlighting interprofessional collaboration and nurse leadership.

## 8. Future Directions

Future efforts must strive to incorporate climate change education into nursing school curricula at all degrees, as supported by the AACN (2021). New training modalities, such as simulated training in virtual reality and interprofessional disaster training, hold promise in enhancing readiness (Veenema et al., 2017). Future research into the longer-term effects of climate training on patient care is necessary in developing evidence-based care (Butterfield et al., 2021). Health infrastructure requires

climate-resilient construction as well as sustainable practice in order to maintain nursing care (Paterson et al., 2014). International partnerships with health authorities as well as community agencies can further solidify nurse roles in climate adaptation as well as in advocacy efforts (ANHE, 2021; WHO, 2020). Health inequities must be reduced with targeted interventions among vulnerable populations (Fussell et al., 2017).

## 9. Conclusion

Climate change significantly affects nursing since extreme weather generates health crises that require an adaptive, quick response. Nurses are significant in handling such conditions, in addition to offering acute care, mental health care, as well as community education. Such programs have, however, been hampered by issues of insufficiently trained practitioners, resource shortages, as well as structural disparities. Through gaining climate-specific training, disaster preparedness training, as well as policy intervention, such capacity can be established among nurses. Through sustainable action, through telehealth use, as well as inter-professional collaboration, professional nurse practice can reduce climate change as well as advance health equity. Through raising such a requirement, through this review, an imperative of systematic changes in preparing nurses as they encounter emerging demands of climate-based health crises is noted, in order to offer quality, equitable care in handling extreme weather events.

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