

Climate Change Should Be on Every Nursing Research Agenda

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Human-caused climate change is a global emergency, and its harms are predicted to increase exponentially in the coming years, particularly if unsustainable practices continue unmitigated. Adverse effects of climate change on communities affected by or at risk for cancer, such as frail older adults, are already measurable and deadly. If nurse scientists continue to ignore these realities, more people are likely to suffer and die as a result. The purpose of this critical reflection is to discuss the vital necessity of including climate change in the research agenda of the Oncology Nursing Society and all nursing science. Using an approach grounded in critical theory and design justice, the authors provide specific suggestions for the incorporation of scientific considerations and nursing measures related to climate change into oncology nursing science.

The urgency of the current global crisis that is human-caused climate change is undeniable. As of the submission of this manuscript on January 7, 2020, a quarter of the country of Australia is on fire, with more than 12.35 million acres already burned (McNamara, 2020). Experts have attributed these unprecedented wildfires to periods of drought, record-breaking heat, and strong winds—all phenomena associated with a changing climate (McNamara, 2020). Once considered impossible, research backing the association of specific disasters, such as the Australian wildfires, with the ongoing effects of human-caused climate change has grown exponentially in recent years (American Meteorological Society, 2020; Waldman, 2017). A 2019 special issue of the *New England Journal of Medicine* focused specifically on clinical guidance to manage increasingly evident health effects of a changing climate (Salas et al., 2019). The journal *Science* and numerous other scholarly institutions have declared climate change the greatest threat to humanity and global ecosystems (Hoegh-Guldberg et al., 2019). According to the World Health Organization (WHO) and other global health authorities, near-term health effects of climate change include direct effects from weather-related emergencies, such as periods of extreme heat

and dramatic changes in rainfall patterns leading to wildfires, hurricanes, mudslides, and floods; indirect effects through increased incidence of disease, particularly vector-borne illnesses, increased allergens, and other environmental pollutants; mental health crises related to climate-related stress and displacement; and major disruptions to economies and built infrastructures, such as electrical grids, roads, and other supply routes (Intergovernmental Panel on Climate Change, 2018; WHO, 2018). The *Fourth National Climate Assessment* found that the health and well-being of all Americans is already affected by climate change and that these effects are expected to worsen (U.S. Global Change Research Program [USGCRP], 2018). The Intergovernmental Panel on Climate Change, in a 2018 executive report, states that higher temperatures lead to greater health risks and increased poverty, with significantly higher harm associated with warming of 2°C compared to warming of 1.5°C. Anthropogenic climate change has the potential to affect every living being on the planet, particularly individuals at risk for or living with a cancer diagnosis. Evidence indicates that, among those at risk, individuals and communities who have been socially, economically, and geographically marginalized have already experienced significant harms (Levy & Patz, 2015; Sorenson & Garcia-Trabanino, 2019; Veenema et al., 2019). These harms include displacement, economic losses, psychological morbidity, chronic illness burden, physical trauma, and death. Such harms are predicted to increase and expand as the effects of climate change accrue and become more apparent (USGCRP, 2018).

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In 2019, the Oncology Nursing Society (ONS) released the results of an expert consensus study on contemporary oncology nursing research priorities (Von Ah et al., 2019). The top three priority areas for oncology nursing research identified were symptom science, particularly as it pertains to emergent cancer therapies such as immunotherapy, precision medicine, and the use of biosignatures; health disparities; and palliative and psychosocial care. Four “cross-cutting themes” designed to provide context and elaboration for each of these priorities were also named: aging, survivorship, healthcare delivery system implications, and the use of advanced research methods (Von Ah et al., 2019). Despite the direct and urgent threats posed by climate change to individuals with cancer and the delivery of high-quality oncology nursing care, climate change did not appear on ONS’s research agenda for 2019–2022. A search of the archives of ONS’s flagship journals, *Oncology Nursing Forum* and *Clinical Journal of Oncology Nursing (CJON)*, revealed only two articles, both commentaries in *CJON*, that

addressed this topic (Mayer & McCabe, 2013; Nix & Caldwell, 2018).

Climate change has serious implications for the practice of oncology nursing and for the communities that oncology nurses serve (Mayer & McCabe, 2013). For example, climate change–associated events, including increased “natural” disasters (e.g., wildfires, hurricanes), can damage critical infrastructure for delivering cancer care, such as hospitals and clinics, and may cut off access to vital resources, such as electricity, food, and clean water (Nix & Caldwell, 2018). Figure 1 describes how this occurred on the island of Puerto Rico following 2017’s Hurricane Maria, as told from the perspective of an oncology nurse living and working in San Juan (S.P.-M.). These emergencies disrupt care and supply chains for vital medications, such as chemotherapy, and other pharmacotherapies necessary for supportive care and symptom management (USGCRP, 2018).

Climate change–related disasters, such as the recent wildfires in northern California and Australia, also adversely affect air quality and other aspects of

FIGURE 1. Direct Effects of Hurricane Maria on Cancer Care in Puerto Rico

Hurricane Maria struck the U.S. island territory of Puerto Rico in September 2017. The storm was the 10th most intense hurricane recorded on the Atlantic Ocean and the most catastrophic (category 4–5) for the island since 1928. Hurricane Maria destroyed the electrical grid, leaving all residents across the island completely without electricity and other essential services, such as potable water and communications, in some cases for nearly 1 year after the hurricane. Resultant changes in access to food, electricity, housing, and potable water drove a range of adverse health outcomes, including injuries related to the storm and storm-related hazards, malnutrition because of devastated crops and lack of supply chains, exacerbations of cardiovascular and respiratory illness, and increased water-borne and insect-transmitted diseases. Individuals undergoing treatment for cancer when Hurricane Maria struck had their regimens interrupted, as did patients on dialysis. Supply chains for critical drugs, such as saline and chemotherapy, were disrupted. Delivery of cancer care, including primary cancer treatments, such as radiation therapy, and palliative and psychosocial care, was delayed and, in some cases, prevented entirely. This was especially

true for more rural and remote regions of the island and to individuals who were homebound. The estimated death toll was 2,975 in the 6 months after the storm.

This experience motivated nurse leaders and educators on the island to create new structures to manage emergencies associated with climate change–related events, such as the following:

- Implementation of serious illness care contingency plans occurred. Individuals with chronic conditions or serious illnesses requiring special management were identified through an island registry; specific contingency care plans can now be activated in coordination with the Puerto Rico Department of Health and appropriate health professionals to guarantee that these individuals receive services, such as chemotherapy and dialysis, during and after emergencies and natural disasters.
- A disaster response effort trained teams of nurses and healthcare professionals across the island, with emphasis on remote areas of the island.
- First response medical teams adopted new models for implementation during emergencies, like hurricanes and storms.

Note. These effects are told from the perspective of Sherily Pereira-Morales, PhD, RNA, an oncology nurse leader in San Juan, Puerto Rico.

Note. Based on information from George Washington University Milken Institute School of Public Health, 2018; Glaser, 2019; Martínez-Sánchez, 2018.

the natural and built environment that may increase risks for developing or exacerbating certain cancers and other chronic conditions, such as asthma and obstructive lung disease (Schweitzer et al., 2018). Various practices related to cancer care including drug manufacturing processes, disposal of cancer drugs, hospital-driven pollution, and carbon costs of cancer-related technologies (e.g., increased use of artificial intelligence for research involving big data and clinical decision support) have direct environmental effects that may also exacerbate some aspects of climate change (Glaser, 2019; McCarthy & Bernstein, 2019).

Critical Theory Perspectives on Climate Change and Oncology Nursing Science

Oncology nursing science is founded on a plurality of philosophical and theoretical traditions that are constantly evolving and that are derived from nursing, other scientific disciplines, and the humanities. These range from positivistic, biomedical models of health (e.g., those used to generate and test hypotheses in some genetics and precision health research) (Zhu et al., 2019), to descriptive, phenomenologic inquiries (Lundquist et al., 2019), to emancipatory, constructivist epistemologies (Driscoll & Goodman, 2019; Gifford et al., 2019). Critical theory represents a large and diverse body of philosophy and scholarship with origins in Germany's Frankfurt School of philosophers and social theorists (Mosqueda-Díaz et al., 2014). These scholars of the 1920s and 1930s distinguished critical theory from traditional theory by its goals: to critically assess and critique power dynamics and other social forces that shape culture and health in such a way as to move society closer toward collective liberation from all forms of structural oppression and inequity (Bohman, 2005). Since that time, critical theory has evolved to encompass numerous scholarly traditions with their own diverse canons of foundational literature, including, but not limited to, various feminisms, critical race theory, queer theory, postcolonial criticism, and the emergent fields of critical digital studies and design justice (Argüello, 2016; Benjamin, 2019; Bohman, 2005; Broussard, 2019; Costanza-Chock, 2018; Noble, 2018).

Critical theorists position individuals and communities as the experts of their own situated realities, as opposed to passive objects to be studied. In addition, critical theorists seek to engage and center the perspectives and leadership of the individuals who experience forms of injustice, such

as climate- and cancer-related health inequities. Critical theorists remain particularly attuned to individuals whose identities and voices are typically marginalized or silenced by structures of oppression in society, such as neighborhood segregation by class, economic status, gender essentialism, or institutionalized racism. Nurses maintain close proximity to and collaboration with the individuals and communities they serve, so it is not surprising that examples of critical theory in nursing scholarship abound, including applications to philosophical and political discourses in nursing (Aranda, 2019), nursing education (Georges, 2005), and oncology nursing practice (Ramvi & Ueland, 2019). Kagan et al.'s (2014) landmark anthology, *Philosophies and Practices of Emancipatory Nursing: Social Justice as Praxis*, is required reading in many U.S.-based nursing education programs.

Given the myriad ways in which planetary health intersects with and amplifies other structural and social determinants of health (Watts et al., 2018), a critical theory-informed approach that centers the individuals and communities at greatest risk for harm is essential for the generation of oncology nursing research priorities and strategies to address the global climate emergency. Epidemiologic studies indicate that the worst effects of climate change, so far, have largely been felt by communities pushed to the margins by what scholars of Black feminism such as Patricia Hill Collins have named the "matrix of domination" (Anderson et al., 2019; Collins, 1990; Shultz et al., 2019). This matrix includes structures of power and oppression that shape society, such as modern economic imperialism and settler colonialism (Barker, 2009), neoliberalism (Shrubsole, 2015), centered whiteness and white supremacy (Bailey et al., 2017; Berry & Gross, 2020; Crenshaw, 1991; Kendi, 2019), ableism (Barbarin, 2019), and heteropatriarchy (Collins, 1990; Costanza-Chock, 2018). Stated more specifically, critical theory indicates that some of the individuals at greater risk of harm from the effects of anthropogenic climate change and its intersections with other sociopolitical and economic structures of oppression include the following:

- Older adults, particularly those who are geographically or socially isolated (McDermott-Levy et al., 2019)
- Individuals not fluent in the dominant language of a region or country
- Migrants and climate refugees displaced from their homes by heat waves, floods, wildfires, or

other natural disasters and their resulting economic or political consequences (Benevolenza & DeRigne, 2019; Nix & Caldwell, 2018)

- Individuals who are unhoused or who do not have access to stable housing and, therefore, may be ineligible for financial support from disaster funds in the event of a catastrophic event (Gibson, 2019)
- Black communities, Indigenous communities, and other communities of color adversely affected by overexposure to ongoing and historical harms caused by White domination, imperialism, and settler colonialism (Berry & Gross, 2020; Kendi, 2019; Kim, 2018)
- Individuals who are lesbian, gay, bisexual,

TABLE 1. Principles of Design Justice

Principle	Implications
We use design to sustain, heal, and empower our communities, as well as to seek liberation from exploitative and oppressive systems.	Facilitate intentional reflection on and awareness of structures of power that create exploitation and oppression.
We center the voices of those who are directly impacted by the outcomes of the design process.	Problems are defined by the community and individuals most affected by them. Voices of community members are listened to and lead the collaborative codesign process, centering the strengths and resources of the community.
We prioritize design's impact on the community over the intentions of the designer.	Procedures for evaluating the quality of a particular design solution place the community's perspective and potential impact on and benefits to the community at the center.
We view change as emergent from an accountable, accessible, and collaborative process, rather than as a point at the end of a process.	Designing solutions is viewed as a longitudinal and evolving process, not something that can be accomplished in a single session.
We see the role of the designer as a facilitator rather than an expert.	Designers are facilitators of community-directed assessment, problem-defining, and design co-creation, not the ones offering solutions. Community members are considered the experts on their own experiences and the challenge to be addressed.
We believe that everyone is an expert based on their own lived experience, and that we all have unique and brilliant contributions to bring to a design process.	Every voice on the team is listened to and valued, particularly the voices of community members.
We share design knowledge and tools with our communities.	Design processes prioritize making resources and tools for codesign available to community members, as opposed to noncommunity members building things.
We work toward sustainable, community-led and -controlled outcomes.	Community members decide what designs work best for them.
We work toward nonexploitative solutions that reconnect us to the earth and to each other.	Potential for exploitation is part of design-oriented reflective processes and called out.
Before seeking new design solutions, we look for what is already working at the community level. We honor and uplift traditional, indigenous, and local knowledge and practices.	Defining the focus of design efforts includes strengths-based assessment and appreciative inquiry of what is already working for the community.

Note. Adapted from "Design Justice: Towards an Intersectional Feminist Framework for Design Theory and Practice," by S. Costanza-Chock, 2018 (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3189696), licensed under CC BY-ND 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0>).

transgender, queer, intersex, or asexual, who may be made to feel unwelcome and unsafe in climate shelters and care centers (Goodwin, 2019)

- Disabled or neurodiverse individuals (Barbarin, 2019)
- Individuals who are frail, immunosuppressed, or have multiple chronic conditions (Salas et al., 2019)
- Those with reduced agency for autonomous decision making, such as individuals in institutional settings, individuals involved with carceral systems, and the very young (Mrkusic & Gross, 2018)
- Resource-starved communities in poor and economically or politically unstable regions (Sorenson & Garcia-Trabanino, 2019; USGCRP, 2018; Veenema et al., 2019)

Climate Change as a Cross-Cutting Oncology Nursing Research Theme

This critical perspective explores opportunities for oncology nurses and nurse scientists to immediately incorporate climate change into their research and strategic priorities. A critical theory-informed nursing response to climate change requires design justice: centering the leadership and priorities of individuals and communities who have been pushed to the margins in decision-making processes related to research priorities, resource allocation, and other responses to anthropogenic climate change. Design justice requires intentional reflection on who is involved in the design of systems and nursing responses to cancer and climate change, who is benefiting from those systems, and who is most likely being harmed. In addition,

design justice focuses on the ways that design reproduces, is reproduced by, and/or challenges the matrix of domination . . . to ensure a more equitable distribution of design's benefits and burdens; fair and meaningful participation in design decisions; and recognition of community based design traditions, knowledge, and practices. (Costanza-Chock, 2018, pp. 1, 5)

Table 1 describes each of the 10 guiding principles of design justice and their implications for oncology nursing research priority-setting. Using the lens of critical theory, including the 10 principles of design justice, the current authors reviewed the 2019–2022 ONS Research Agenda (Von Ah et al., 2019). The first column of Table 2 displays the research priorities

outlined in the original agenda, whereas the second column provides descriptions of the current authors' corresponding suggestions for immediate incorporation of climate change as a cross-cutting oncology nursing research theme.

State of the Nursing Science on Climate Change

Nursing science and leadership to address the global climate emergency is rapidly emerging but not fast enough. A 2019 edition of the journal *Creative Nursing* was dedicated to addressing effects of climate change on health and nursing practice (Huffling, 2019; Kerr et al., 2019; Morgan, 2019; Potter, 2019). Nurse-led organizations, including the Alliance of Nurses for Healthy Environments, the Emergency Nurses Association, and the Public Health Nursing section of the American Public Health Association, have already publicly committed to supporting research, practice, and policy designed to address climate change and climate justice. Related resources created include the WHAM (Work–Home–Adaptation–Mitigation) Grid, which describes actions nurses can take at work and home to address climate change (<https://bit.ly/38t7CCI>); the Nurses Climate Challenge, which is a campaign to educate health professionals on the effects of climate change on human health (<https://nursesclimatechallenge.org>) (Demorest et al., 2019); and *Climate Change and Health: An Interprofessional Response*, a free, open-source health curriculum on climate change (<https://globalhealthcenter.umn.edu/education/climatehealth>). Measurement science on climate nursing is also evolving. The Climate, Health, and Nursing Tool (CHANT) is a psychometrically validated online survey to measure nurses' awareness of and engagement with issues pertaining to climate change (<https://envirn.org/nurses-climate-survey>) (Schenk et al., 2020).

The time is now for climate change to become a cross-cutting theme in every nursing research agenda. Indeed, oncology nurses can and must support science, practice, and policy that contributes to mitigation of climate change and increased resilience to related effects, improving the care and quality of life for individuals with cancer and other vulnerable groups across the globe. The reality of climate change necessitates the creation of a new vision for oncology nursing research, one that (a) begins by acknowledging societal structures of power and oppression that render privilege and relative protection to some while placing others directly in harm's way, (b) centers the voices and leadership of individuals and communities

TABLE 2. 2019–2022 ONS Research Agenda Priorities, With Suggestions for Incorporation of Climate Change

Priority	Suggestion
Symptom science	
<p>Develop, test, and refine reliable, valid, and sensitive PRO tools to capture treatment experiences in patients receiving IO, and link those measures to clinical decision support and treatment pathways to improve clinical outcomes.</p>	<p>PRO measures should inform understanding of treatment experiences related to health impacts of a changing climate, and clinical decision support and treatment pathways for individuals in regions affected by increasingly frequent severe weather events and environmental hazards, such as wildfires, floods, hurricanes, and sustained elevated heat and other temperature extremes. Center the leadership of the following individuals in the development and implementation of research agendas related to PROs: individuals who are Black, Indigenous, disabled and neurodiverse, LGBTQIA+, migrant and displaced, pregnant, poor, frail, or carceraly involved, and people of color.</p>
<p>Characterize variability in presentation, trajectory, and management of irAEs across various patient populations.</p>	<p>Consider the role of environmental pollutants and climate change–associated conditions, such as worsening air quality and severe weather events, on variability in presentation, trajectory, and management of irAEs, including efficacy and side effect profiles of irAE-related pharmacotherapies.</p>
<p>Examine factors (age, gender, diet, weight, exercise, stress, and sleep patterns) that may influence patient responses to ICPI therapy and irAE development.</p>	<p>Examine how environmental changes associated with climate change, including severe weather events and sequelae, such as property loss or displacement, directly influence patients’ responses to ICPIs, development of irAEs, and other factors, such as diet, stress and mental health, exercise, and sleep.</p>
<p>Conduct randomized trials to test the efficacy of supportive care interventions to alleviate irAEs.</p>	<p>Consider what types of supportive care interventions are needed to reduce climate impacts on possible irAEs and/or possible disruption of IO treatment or related supportive care and medications because of severe weather events and other disasters in affected areas.</p>
Precision health and biosignatures	
<p>Harmonize assessment measures and strengthen the use of CDEs.</p>	<p>CDEs should include climate-sensitive measures and account for indirect impacts. Center the leadership of the following individuals in the development and implementation of research agendas related to CDEs and precision health: individuals who are Black, Indigenous, disabled and neurodiverse, LGBTQIA+, migrant and displaced, pregnant, poor, frail, or carceraly involved, and people of color.</p>
<p>Identify the optimal approaches to characterize patients’ and survivors’ symptom profiles and their associated genotypes and phenotypes.</p>	<p>Consider potential epigenetic and epigenomic changes resulting from climate change–associated environmental influences on patients’ and survivors’ genotypes and phenotypes.</p>
<p>Comparatively evaluate approaches to examine the mechanisms underlying variation in patients’ and survivors’ symptom experiences.</p>	<p>Consider how mechanisms underlying symptom variations may be affected by changes in climate, such as worsening air quality or temperature extremes, and individuals’ capacity to adapt.</p>
<p>Determine optimal methodologic approaches to predict patients and survivors at greatest risk for symptom burden.</p>	<p>Incorporate climate change–associated considerations, such as modeling environmental endotypes (Castner et al., 2019), into methodologies for predicting risk of symptom burden.</p>
<p>Establish the biosignatures (i.e., phenotypic and molecular characteristics) of common individual symptoms and symptom clusters in patients and survivors.</p>	<p>Explore climate change–related impacts (e.g., possible adverse effects of worsening air quality on dyspnea, possible adverse effects of climate-related displacement on stress) on the biosignatures of individual symptoms and symptom clusters in patients and survivors.</p>
<p>Develop and test interventions to manage single symptoms and symptom clusters.</p>	<p>Develop and test interventions to support resilience to climate impacts and to reduce climate impacts on symptom-related morbidity. Examine the role of environmental endotypes (Castner et al., 2019) in symptoms and symptom clusters.</p>

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TABLE 2. 2019–2022 ONS Research Agenda Priorities, With Suggestions for Incorporation of Climate Change (Continued)

Priority	Suggestion
Health disparities	
Develop and test interventions to increase minority and vulnerable population participation in cancer clinical trials.	Examine environmental and structural mechanisms (e.g., the criminalization of poverty, neighborhood segregation, institutionalized racism) and the function of intersectionality (Crenshaw, 1991) driving exclusionary practices in cancer clinical trials and disproportionate exposures to harms associated with cancer and climate change. Center the leadership of the following individuals in the development and implementation of clinical trials and future research agendas: individuals who are Black, Indigenous, disabled and neurodiverse, LGBTQIA+, migrant and displaced, pregnant, poor, frail, or carceral involved, and people of color.
Examine the effects on cancer outcomes of social determinants of health (i.e., physical, social, and economic factors).	Examine the effects of anthropogenic climate change and associated structural determinants of health (such as racism and settler colonialism) on changes in cancer incidence, cancer outcomes, and the dynamics of relationships between social determinants of health (e.g., lack of access to reliable public transportation, food quality and security) and cancer outcomes.
Develop and test interventions to address health disparities related to behavioral factors such as obesity, physical inactivity, diet, tobacco use, and immunizations that can prevent malignancies associated with human papillomavirus and hepatitis B.	Develop and test policy and other structural interventions designed to support individuals' and communities' strengths and resilience to impacts of climate change or cancer, and to directly address or prevent anthropogenic climate change and injustices related to disproportionate impacts of climate change on communities affected by or at risk for cancer.
Evaluate interventions to address financial toxicity associated with cancer treatment.	Explore environmental impacts of neoliberalism, economic imperialism, and unsustainable practices in cancer care delivery driving exacerbation of anthropogenic climate change and financial toxicity. Work with individuals and communities most affected to propose and evaluate more sustainable alternatives.
Examine the role of technology, including telehealth strategies, to improve access to care particularly among rural populations.	Following 2017's Hurricane Maria, 1.5 million customers in Puerto Rico lost power; in addition, parts of Puerto Rico remained without power for 11 months (Campbell, 2018). Consider how technology-based or telehealth care delivery systems in some regions may be affected by disasters and severe weather events, such as hurricanes and wildfires, particularly in rural areas. Explore opportunities to support community-led strategies to improve infrastructure and increase resilience to such events and to deliver high-quality cancer care to individuals displaced by climate-related emergencies.
Palliative and psychosocial care	
Develop and test interventions for culturally sensitive palliative and psychosocial care.	Center the leadership of the following individuals in the development of palliative and psychosocial care scientific agendas related to cancer and anthropogenic climate change: individuals who are Black, Indigenous, disabled and neurodiverse, LGBTQIA+, migrant and displaced, pregnant, poor, frail, or carceral involved, and people of color.
Examine the effects of telehealth on improving patient and caregiver symptoms and health outcomes.	Consider the effects of telehealth or other mobile health, portable, and asynchronous care delivery strategies on improving patients' and caregivers' symptoms and health outcomes, including emotional and mental health outcomes related to cancer and climate impacts, including effects of isolation and possible displacement and preparedness for disasters and evacuation and other climate-associated emergencies.

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TABLE 2. 2019–2022 ONS Research Agenda Priorities, With Suggestions for Incorporation of Climate Change (Continued)

Priority	Suggestion
Palliative and psychosocial care (<i>continued</i>)	
Determine the most effective interventions to improve patient and caregiver HRQOL, satisfaction with care, and use of health-care resources.	Determine the most effective interventions to improve fair and equitable distribution of resources and institutional, community, patient, and caregiver resilience to climate change and more sustainable use of resources.
Determine the effects of early/integrated palliative care interventions on patient and family caregiver outcomes (e.g., symptoms, HRQOL, psychological health, rehospitalizations).	Determine the effects of immediate regulatory and other policy-based, educational, and sustainability-related interventions in mitigating health impacts of a changing climate.
Understand the impact of single or multiple symptoms on function, disease outcomes, HRQOL, and treatment decision making in seriously ill older adults with cancer, particularly those with multiple comorbidities.	Understand the interactions of anthropogenic climate change with single and multiple symptoms and their associated impacts on function, disease outcomes, HRQOL, and treatment decision making.
<p>CDE—common data element; HRQOL—health-related quality of life; ICPI—immune checkpoint inhibitor; IO—immunotherapy; irAE—immune-related adverse event; LGBTQIA+—lesbian, gay, bisexual, transgender, queer, intersex, asexual; ONS—Oncology Nursing Society; PRO—patient-reported outcome</p> <p>Note. Based on information from Von Ah et al., 2019.</p>	

at greatest risk for harm, and (c) promotes resilience and human health by nursing the health of the climate that supports it.

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REFERENCES

American Meteorological Society. (2020). *Explaining extreme events in 2018 from a climate perspective*. <https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective>

Anderson, G.B., Barnes, E.A., Bell, M.L., & Dominici, F. (2019). The future of climate epidemiology: Opportunities for advancing health research in the context of climate change. *American Journal of Epidemiology*, 188(5), 866–872. <https://doi.org/10.1093/aje/kwz034>

Aranda, K. (2019). The political matters: Exploring material feminist theories for understanding the political in health, inequalities and nursing. *Nursing Philosophy*, 20(4), e12278. <https://doi.org/10.1111/nup.12278>

Argüello, T.M. (2016). Fetishizing the health sciences: Queer theory as an intervention. *Journal of Gay and Lesbian Social Services*, 28(3), 231–244. <https://doi.org/10.1080/10538720.2016.1191407>

Bailey, Z.D., Krieger, N., Agénor, M., Graves, J., Linos, N., & Bassett, M.T. (2017). Structural racism and health inequities in the USA: Evidence and interventions. *Lancet*, 389(10077), 1453–1463. [https://doi.org/10.1016/S0140-6736\(17\)30569-X](https://doi.org/10.1016/S0140-6736(17)30569-X)

Barbarin, I. (2019, November 2). Climate Darwinism makes disabled people expendable. *Forbes*. <https://www.forbes.com/sites/imanibarbarin/2019/11/02/climate-darwinism-makes-disabled-people-expendable>

- Barker, A.J. (2009). The contemporary reality of Canadian imperialism: Settler colonialism and the hybrid colonial state. *American Indian Quarterly*, 33(3), 325–351. <https://doi.org/10.1353/aiq.0.0054>
- Benevolenza, M.A., & DeRigne, L. (2019). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, 29(2), 266–281. <https://doi.org/10.1080/10911359.2018.1527739>
- Benjamin, R. (2019). *Race after technology: Abolitionist tools for the New Jim Code*. Polity. <https://politybooks.com/bookdetail/?isbn=9781509526390>
- Berry, D.R., & Gross, K.N. (2020). *A Black women's history of the United States*. Beacon Press. <http://www.beacon.org/A-Black-Womens-History-of-the-United-States-P1524.aspx>
- Bohman, J. (2005). Critical theory. *Stanford Encyclopedia of Philosophy*. <https://plato.stanford.edu/entries/critical-theory>
- Broussard, M. (2019). *Artificial unintelligence: How computers misunderstand the world*. MIT Press. <https://mitpress.mit.edu/books/artificial-unintelligence>
- Campbell, A.F. (2018, August 15). It took 11 months to restore power to Puerto Rico after Hurricane Maria. A similar crisis could happen again. *Vox*. <https://www.vox.com/identities/2018/8/15/17692414/puerto-rico-power-electricity-restored-hurricane-maria>
- Castner, J., Amiri, A., Rodriguez, J., Huntington-Moskos, L., Thompson, L.M., Zhao, S., & Polivka, B. (2019). Advancing the symptom science model with environmental health. *Public Health Nursing*, 36(5), 716–725. <https://doi.org/10.1111/phn.12641>
- Collins, P.H. (1990). *Black feminist thought: Knowledge, consciousness, and the politics of empowerment* (1st ed.). Routledge.
- Costanza-Chock, S. (2018, June 3). Design justice: Towards an intersectional feminist framework for design theory and practice. *Proceedings of the Design Research Society 2018*. <https://srm.com/abstract=3189696>
- Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review*, 43(6), 1241–1299. <https://doi.org/10.2307/1229039>
- Demorest, S., Spengeman, S., Schenk, E., Cook, C., & Weston, H.L. (2019). The Nurses Climate Challenge: A national campaign to engage 5,000 health professionals around climate change. *Creative Nursing*, 25(3), 208–215. <https://doi.org/10.1891/1078-4535.25.3.208>
- Driscoll, S.D., & Goodman, R. (2019). Emancipatory praxis for cervical cancer health equity in Guatemala. *International Journal for Human Caring*, 23(1), 71–79. <https://doi.org/10.20467/1091-5710.23.1.71>
- Georges, J.M. (2005). Linking nursing theory and practice: A critical-feminist approach. *Advances in Nursing Science*, 28(1), 50–57. <https://doi.org/10.1097/00012272-200501000-00006>
- George Washington University Milken Institute School of Public Health. (2018). *Project report: Ascertainment of the estimated excess mortality from Hurricane Maria in Puerto Rico*. <https://publichealth.gwu.edu/sites/default/files/downloads/projects/PRstudy/Acertainment%20of%20the%20Estimated%20Excess%20Mortality%20from%20Hurricane%20Maria%20in%20Puerto%20Rico.pdf>
- Gibson, A. (2019). Climate change for individuals experiencing homelessness: Recommendations for improving policy, research, and services. *Environmental Justice*, 12(4), 159–163. <https://doi.org/10.1089/env.2018.0032>
- Gifford, W., Thomas, R., Barton, G., & Graham, I.D. (2019). Providing culturally safe cancer survivorship care with Indigenous communities: Study protocol for an integrated knowledge translation study. *Pilot and Feasibility Studies*, 26(5), 33. <https://doi.org/10.1186/s40814-019-0422-9>
- Glaser, A. (2019, September 20). Artificial intelligence can't think without polluting. *Slate*. <https://slate.com/technology/2019/09/artificial-intelligence-climate-change-carbon-emissions-roy-schwartz.html>
- Goodwin, N. (2019, March 15). There is no Planet B: Why climate change is an LGBTQ issue. *GLAAD*. <https://www.glaad.org/amp/no-planet-b-why-climate-change-is-an-lgbtq-issue>
- Hoegh-Guldberg, O., Jacob, D., Taylor, M., Guillén Bolaños, T., Bindi, M., Brown, S., . . . Zhou, G. (2019). The human imperative of stabilizing global climate change at 1.5°C. *Science*, 365(6459), eaaw6974. <https://doi.org/10.1126/science.aaw6974>
- Huffling, K. (2019). Building a global movement for health: Nurse leadership on climate change. *Creative Nursing*, 25(3), 191–194. <https://doi.org/10.1891/1078-4535.25.3.191>
- Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty: Summary for policy-makers*. http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf
- Kagan, P.N., Smith, M.C., & Chinn, P.L. (Eds.). (2014). *Philosophies and practices of emancipatory nursing: Social justice as praxis*. Routledge.
- Kendi, I.X. (2019). *How to be an anti-racist*. One World.
- Kerr, R., Nerbonne, J.F., & Potter, T. (2019). Sparking a movement for a healthy climate through leadership development. *Creative Nursing*, 25(3), 216–221. <https://doi.org/10.1891/1078-4535.25.3.216>
- Kim, J. (2018). Settler modernity, debt imperialism, and the neocolonialism of the promise. *Social Text*, 36(2), 41–61. <https://doi.org/10.1215/01642472-4362349>
- Levy, B.S., & Patz, J.A. (2015). Climate change, human rights, and social justice. *Annals of Global Health*, 81(3), 310–322. <https://doi.org/10.1016/j.aogh.2015.08.008>
- Lundquist, D.M., Berry, D.L., Boltz, M., DeSanto-Madeya, S.A., & Grace, P.J. (2019). Wearing the mask of wellness: The

- experience of young women living with advanced breast cancer. *Oncology Nursing Forum*, 46(3), 329–337. <https://doi.org/10.1188/19.ONF.329-337>
- Martinez-Sánchez, O. (2018). Impacts from hurricanes Irma and María in the Caribbean [Sidebar 7.1]. *Bulletin of the American Meteorological Society*, 99(8, Suppl.), S202–S203. <https://doi.org/10.1175/2018BAMSStateoftheClimate.1>
- Mayer, D.K., & McCabe, M. (2013). Climate change and cancer care. *Clinical Journal of Oncology Nursing*, 17(3), 231–232. <https://doi.org/10.1188/13.CJON.231-232>
- McCarthy, G., & Bernstein, A. (2019). Combating EPA rollbacks—Health care’s response to a retreat on climate. *New England Journal of Medicine*, 381(8), 696–698. <https://doi.org/10.1056/NEJMp1909643>
- McDermott-Levy, R., Kolanowski, A.M., Fick, D.M., & Mann, M.E. (2019). Addressing the health risks of climate change in older adults. *Journal of Gerontological Nursing*, 45(11), 21–29. <https://doi.org/10.3928/00989134-20191011-04>
- McNamara, A. (2020, January 2). Australia fires: 5 questions answered. *CBS News*. <https://www.cbsnews.com/news/australia-fires-fire-map-5-questions-answered-how-many-hectares-have-burnt-where-are-the-fires-burning>
- Morgan, R.E. (2019). Determined action to tackle health determinants: A collaborative response to the challenge of climate change mitigation in practice settings. *Creative Nursing*, 25(3), 195–200. <https://doi.org/10.1891/1078-4535.25.3.195>
- Mosqueda-Díaz, A., Vilchez-Barboza, V., Valenzuela-Suazo, S., & Sanhueza-Alvarado, O. (2014). Critical theory and its contribution to the nursing discipline. *Investigación y Educación en Enfermería*, 32(2), 356–363. <https://doi.org/10.17533/udea.iee.v32n2a18>
- Mrkusic, M., & Gross, D.A. (2018, December 5). Incarcerated people remain vulnerable to the worst ravages of a warming world. *NOVA Next*. <https://www.pbs.org/wgbh/nova/article/climate-change-mass-incarceration-prison>
- Noble, S.U. (2018). *Algorithms of oppression: How search engines reinforce racism*. NYU Press.
- Nix, M., & Caldwell, D. (2018). Natural disasters: A Louisiana gulf perspective of maintaining patient care. *Clinical Journal of Oncology Nursing*, 22(4), 460–463. <https://doi.org/10.1188/18.CJON.460-463>
- Potter, T. (2019). Planetary health: The next frontier in nursing education. *Creative Nursing*, 25(3), 201–207. <https://doi.org/10.1891/1078-4535.25.3.201>
- Ramvi, E., & Ueland, V.I. (2019). Between the patient and the next of kin in end-of-life care: A critical study based on feminist theory. *Nursing Ethics*, 26(1), 201–211. <https://doi.org/10.1177/0969733016688939>
- Salas, R.N., Malina, D., & Solomon, C.G. (2019). Prioritizing health in a changing climate. *New England Journal of Medicine*, 381(8), 773–774. <https://doi.org/10.1056/NEJMe1909957>
- Schenk, E.C., Cook, C., Demorest, S., & Burduli, E. (2020). CHANT: Climate, Health, and Nursing Tool: Item development and exploratory factor analysis. In E.C. Schenk (Ed.), *Annual review of nursing research: Vol. 38. Nursing perspectives on environmental health* (pp. 97–111). Springer Publishing Company.
- Schweitzer, M.D., Calzadilla, A.S., Salamo, O., Sharifi, A., Kumar, N., Holt, G., . . . Mirsaedi, M. (2018). Lung health in era of climate change and dust storms. *Environmental Research*, 163, 36–42. <https://doi.org/10.1016/j.envres.2018.02.001>
- Shrubsole, G. (2015). All that is solid melts into air: Climate change and neoliberalism. *Soundings*, 59, 115–128. <https://doi.org/10.3898/136266215814890486>
- Shultz, J.M., Kossin, J.P., Shepherd, J.M., Ransdell, J.M., Walshe, R., Kelman, I., & Galea, S. (2019). Risks, health consequences, and response challenges for small-island-based populations: Observations from the 2017 Atlantic hurricane season. *Disaster Medicine and Public Health Preparedness*, 13(1), 5–17. <https://doi.org/10.1017/dmp.2018.28>
- Sorenson, C., & Garcia-Trabanino, R. (2019). A new era of climate medicine—Addressing heat-triggered renal disease. *New England Journal of Medicine*, 381(8), 693–696. <https://doi.org/10.1056/NEJMp1907859>
- U.S. Global Change Research Program. (2018). *Fourth national climate assessment: Vol. II. Impacts, risks, and adaptation in the United States*. <https://nca2018.globalchange.gov>
- Veenema, T.G., Rush, Z., DePriest, K., & McCauley, L. (2019). Climate change-related hurricane impact on Puerto Rico and the U.S. Virgin Islands, environment risk reduction, and the social determinants of health. *Nursing Economic\$, 37(1)*, 13–22.
- Von Ah, D., Brown, C.G., Brown, S.J., Leak Bryant, A., Davies, M., Dodd, M., . . . Cooley, M.E. (2019). Research agenda of the Oncology Nursing Society: 2019–2022. *Oncology Nursing Forum*, 46(6), 654–669. <https://doi.org/10.1188/19.ONF.654-669>
- Waldman, S. (2017, December 14). Global warming tied to Hurricane Harvey. *Scientific American*. <https://www.scientificamerican.com/article/global-warming-tied-to-hurricane-harvey>
- Watts, N., Amann, M., Ayeb-Karlsson, S., Belesova, K., Bouley, T., Boykoff, M., . . . Costello, A. (2018). The *Lancet* Countdown on health and climate change: From 25 years of inaction to a global transformation for public health. *Lancet*, 391(10120), 581–630. [https://doi.org/10.1016/S0140-6736\(17\)32464-9](https://doi.org/10.1016/S0140-6736(17)32464-9)
- World Health Organization. (2018). Climate change and health. <https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>
- Zhu, Y., Koleck, T.A., Bender, C.M., & Conley, Y.P. (2019). Genetic underpinnings of musculoskeletal pain during treatment with aromatase inhibitors for breast cancer: A biological pathway analysis. *Biological Research for Nursing*. Advance online publication. <https://doi.org/10.1177/1099800419895114>