

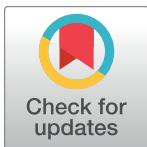
OPINION

Core competencies to prepare health professionals to respond to the climate crisis

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OPEN ACCESS

Citation: Sorensen C, Campbell H, Depoux A, Finkel M, Gilden R, Hadley K, et al. (2023) Core competencies to prepare health professionals to respond to the climate crisis. *PLOS Clim* 2(6): e0000230. <https://doi.org/10.1371/journal.pclm.0000230>

Editor: Jamie Males, PLOS Climate, UNITED KINGDOM

Published: June 14, 2023

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Funding: The authors received no specific funding for this work.

Competing interests: The authors have declared that no competing interests exist.

The now well-described climate change impacts on human health and disease present an urgent challenge to health professionals and health care systems, calling for a focus on efforts to mitigate harm. Yet, with a few exceptions, such as the United Kingdom [1], climate change education is generally absent in the mainstream health professional education curriculum, creating a situation in which health care professionals lack the knowledge and skills to recognize, prepare for, and respond to current and future climate change-related health and health system threats in a meaningful way [2].

The Intergovernmental Panel on Climate Change (IPCC) cautions that “the severity of climate-related health risks is highly dependent on how well health systems can protect people [3].” Climate-related physical and mental health impacts are among the key priorities for the World Health Organization [4], the United Nations Environmental Program [5], the United Nations Development Program [6], the United Nations Children’s Fund [7]. However, there is a large gap between these calls to action and the reality on the ground. Health systems will require substantial investment in increasing the competence of health workers in order to meet the needs of growing numbers of patients and communities affected physically and mentally by the consequences of climate and planetary change [2].

To initiate health system-wide effective responses commensurate with the risks posed by climate change, health professionals from all backgrounds will need to adapt new roles and responsibilities that may not traditionally fall within their scope of practice. For example, the public health community must build technical capacity for managing, analyzing, and disseminating high quality climate and health data [8]. Healthcare researchers need to design evidence-based studies to quantify and describe the effect of climate change on population health,

paying particular attention to vulnerable populations (e.g., the elderly, pregnant women, infants and children, immigrants, people with disabilities, people with chronic diseases), marginalized communities (e.g., the poor, minority groups), and populations in low- and middle-income countries. Clinicians must identify medical diagnoses, medications and other health determinants that make patients more vulnerable to climate-related health threats and augment treatment plans accordingly. Together the voice of all health professionals is urgently needed to advocate for policies that maximize health co-benefits while proactively addressing the social and structural determinants of ill-health.

Already, many health professionals globally, understand that climate change is a growing cause of health harms, feel a responsibility to act, and cite education as a key route to enable timely and effective action [9]. However, few institutions have the resources or expertise to design and deploy comprehensive climate and health training programs [10]. Perhaps, as a result, the uptake of climate and health education is highly variable between and within health professional educational institutions. A survey from the International Federation of Medical Students' Associations (IFMSA) found that climate change is taught in only 15% of medical schools worldwide [11]. In 12% of the medical schools, climate health teaching activities are led by students and not faculty members [11]. A 2020 survey conducted by the International Council of Nurses (ICN) found that 18% of respondents felt that they had received adequate education regarding the health impacts of climate change, and less than 25% felt confident in their ability to educate patients on the issue. As a result, ICN called for greater integration of climate change and planetary health topics into nursing education [12]. A similar lack of robust climate and health education has also been found among schools and programs of public health [13].

Founded in 2017, the Global Consortium on Climate and Health Education (GCCHE), with over 300 health professional member institutions from 56 countries, and reaching an estimated 175,000 students annually, mobilized to fill this gap. In order to fulfill its mission to encourage coordinated capacity building among health professional institutions and organizations on a global scale, the GCCHE developed a broad set of evidence-based core concepts and competencies for health professionals, the purpose of which is to serve as an evidence-based guide to enable health professionals to prevent, mitigate, and respond to the health impacts of climate change [14].

First developed in 2018 and now in their third iteration, the core concepts are reviewed every 18 months by our interprofessional and international coordinating committee and then peer-reviewed through member institutions and global Advisory Committee. These concepts are a living document, designed to be flexible enough to incorporate emerging science, yet stable enough in structure to allow thoughtful curricular planning. As climate change and health science progress, these concepts are designed to keep pace with science and best practices.

The core concepts framework (Table 1) is a blueprint that be used for novel curricular development or integration into existing programs within health professional schools and in continuing education programs for practicing health professionals [15]. The competencies are organized into five Domains, overarching categories in which the health professional is expected to be competent, including Knowledge and Analytic Skills, Collaboration and Communication, Policy, Public Health Practice and Clinical Practice. Within each domain, there are Concepts and Learning Objectives that are robust enough to provide health professionals foundational knowledge of climate change and health and necessary skills to protect human health while being adaptable as unanticipated developments that arise in the health sector. Learning objectives can be modified to meet the needs of the student and expectations of the institution or organization thereby providing learners and educators with a flexible curricular framework. Concepts and learning objectives within the GCCHE framework are not

Table 1. The five domains of the GCCHE core concepts, a summary of each domain, and examples of concepts and learning objectives. For full framework see: <https://www.publichealth.columbia.edu/file/11492/download?token=bBURLrFC>.

Domain	Summary of Domain	Example Concepts	Example Learning Objective
Knowledge and Analytic Skills	Current and future health practitioners must have sufficient foundational knowledge to understand the dynamics governing the effects of climate on health, the level of scientific understanding of those dynamics, and potential strategies for mitigation and adaptation.	1.2.1 Climate change has broad and profound impacts on human health	Explain how climate and environmental changes exacerbate mental health burdens. Identify biologic, social, and structural factors that make individuals and populations more vulnerable to health impacts from climate change.
		1.3.3 Health systems can and must enact effective adaptation solutions at the individual and population level	Distinguish between primary, secondary, and tertiary levels of prevention as they relate to reducing vulnerability and strengthening adaptive capacity Describe the near-term health co-benefits (e.g. improved air quality) that arise because of climate mitigation at the individual, local, and global scales
Collaboration and Communication	Expanded interdisciplinary cooperation and collaboration coupled with effective communication to a wide variety of stakeholders (e.g. policy makers, professional colleagues, communities, families, and patients) is needed to protect individual and community level health.	2.1.1 Employ effective communication skills with stakeholders about climate and health topics	Demonstrate the ability to communicate climate and health topics to different groups (e.g. policy makers, professional colleagues, communities, families, and patients) Practice and refine strategies and tools in disseminating climate and health information to key stakeholders, including information on the health co benefits of climate actions
Policy	The voice and perspective of health professionals is urgently needed to guide policies at local, subnational, national, and international levels. However, to be effective, health professionals must understand current political discourse related to climate change and how current and proposed policies may improve or exacerbate health impacts, especially for the most vulnerable patients and communities.	3.2.1 Policies that influence communities' access to resources and affect where they live have profound impacts on vulnerability and adaptive capacity	Recognize policies that intentionally and/or inadvertently differentially affect specific communities' access to safe housing, transportation infrastructure, or other climate-sensitive resources
Public Health Practice	The practice of public health has a unique role to play in addressing the impacts of climate change from a primary, secondary, and tertiary prevention perspective. While traditionally performed by members of the professional public health community, these practices must also be understood, supported, and implemented by other health professions as well.	4.1.1 Climate and health knowledge and skills are applied at all levels of public health action to improve population health and build resilience against climate change	Perform a vulnerability assessment and describe strategies for reducing vulnerability and strengthening adaptive capacity Assimilate findings from climate and health vulnerability and adaptation assessments into policy/plans and interventions for managing adverse health consequences specific to vulnerable populations
Clinical Practice	Health professionals need to promote health care facility resilience, prepare for emergencies and apply day-to-day practical knowledge in adjusting medications and reducing patient vulnerabilities to climate impacts.	5.3.1 Applying knowledge of climate and health to clinical care of patients can improve health outcomes	Identify medical diagnoses, medications, and other health determinants that make patients more vulnerable to climate-related health threats Explain ways climate vulnerable patients can decrease climate-related risks

<https://doi.org/10.1371/journal.pclm.0000230.t001>

exhaustive but are meant to equip learners with a foundation for them to respond effectively to the climate crisis. We recognize that much work remains in elucidating best practices for preventing and responding to climate-driven exposures that affect health, which is why we consider this to be an evolving document, that is updated every 18 months.

In practice, the core concepts are broadly adaptable and can be integrated into health professional education in a wide variety of ways, including, longitudinal integration throughout a degree program, within stand-alone courses, or as a foundation for masters degrees or certificate-based courses [11]. Through coordinated dissemination across institutions and

organizations, the core concepts can facilitate the development of common knowledge, skills, ethics and rhetoric among health professionals globally, thereby enabling more coordinated transdisciplinary action. Further, alignment of competencies will allow disparate institutions and programs to track and compare progress, encouraging collaboration and enabling the creation of metrics to gauge national and global climate adaptation. Finally, in addition to the strong foundational and analytical knowledge for which the core concepts provide a guide, learners are expected to contextualize this knowledge within different theories and frameworks, including but not limited to: One Health, Planetary Health, Indigenous Knowledge, collective and transgenerational ethics, humanity's ethical obligations to the natural world, climate and environmental justice, and traditional knowledge systems.

These concepts, with accompanying resources, can serve as a driver of curricular content, particularly if they are recognized, endorsed and/or promulgated by umbrella organizations involved in accreditation and standardized testing. On the institutional level, they can strengthen advocacy on behalf of new student and faculty-run endeavors and create more harmonized capacity building within and among health professions.

Coordinated, extensive health professional capacity must be built globally to tackle rapid environmental change, which is undermining health equity, access to healthcare, environmental justice, and other social and structural determinants of health. Our hope is that these concepts, with accompanying resources that are available through the GCCHE, can promote top-down as well as bottom-up action to build the capacity of tomorrow's public health professionals to respond to climate change in a robust and coordinated fashion. We as health professionals have a once in a generation opportunity to confront this crisis and create positive change. Education is our most powerful tool. We invite you to join us in disseminating and adopting these concepts.

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