CLIMATE & HEALTH CORE CONCEPTS FOR HEALTH PROFESSIONALS

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ACKNOWLEDGEMENTS

Lynn R. Goldman, MD, MS, MPH, Dean, Milken Institute School of Public Health at George Washington University, Professor Environmental and Occupational Health, George Washington University

Jean-Francois Guégan, PhD, Senior Research Professor, Institut de recherche pour le développement (IRD)

Andy Haines (Sir Andrew Paul Haines), MD, F Med Sci, Professor Environmental Change and Public Health, London School of Hygiene & Tropical Medicine (LSHTM)

Keith Hansen, MPA, JD, Senior Adviser, The World Bank

Alice C. Hill, JD, Senior Fellow for Climate Change Policy, Council on Foreign Relations

Haidong Kan, MD, PhD, Professor Public Health and Environmental Sciences, Fudan University

Linda A. McCauley, PhD, RN, FAAN, FAAOHN, Dean and Professor, Nell Hodgson Woodruff School of Nursing at Emory University

Michael Myers, MA, Freelance, policy-related projects on social and racial justice, health and the environment

Jonathan Patz, MD, MPH, Professor and John P. Holton Chair of Health and the Environment, Director, Global Health Institute, University of Wisconsin

Jean-Marc de Royere, MBA, Senior Vice President, Corporate Sustainability Program (CSP), Air Liquide

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BACKGROUND

About the 2023 Iteration:

The vision of the Global Consortium on Climate and Health Education (GCCHE) is that all health professionals throughout the world will be trained to prevent, mitigate, and respond to the health impacts of climate change. Born from a meeting at the 2015 COP-21 conference in Paris and established in 2017, the GCCHE now has over 300 health professional member institutions from 56 countries, reaching an estimated 175,000 students annually. To advance progress towards equipping this generation of health professionals, the core concepts were created to serve as a guide for educational and curricular program development. First developed in 2018, now in their third iteration, the core concepts are reviewed every 18 months by our interprofessional and international coordinating committee and then vetted through our entire Consortium. These concepts are a living document, designed to be flexible enough to incorporate emerging science, yet stable in structure to allow thoughtful curricular planning. As climate and health science progresses, these competencies are designed to keep speed with science and best practices.

Since the last iteration of the GCCHE core concepts in 2021, the Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report[1] was released, which further documented

how climate change is harming human health and wellbeing across the globe. This report provided evidence that climate change is worsening health inequities, increasing the risk of emerging infectious diseases, and affecting the prevalence, intensity, and distribution of most communicable and non-communicable diseases. This report has been called a "code red" for humanity. Mitigation actions to halt further climate and ecosystem breakdown is of paramount urgency, and health professionals must use their voice to prevent escalating harm to current and future patients. The evidence also underscores that the "the severity of climate-related health risks is highly dependent on how well health systems can protect people." Further, we know that where one lives, the resources that are available, and the local, regional, and national policies influence health and health outcomes.

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[1] IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.

Health professionals occupy a critical position in the response to climate change. First, they are charged with protecting individual and community health in the face of multiple new and compounding health risks that in the future will grow more costly and complicated to address. For example, public health professionals will be tasked with preventing health risks, creating vulnerability assessments, and performing impact assessments resulting from climate-related events, and implementing community-based protective interventions. Clinical health professionals will increasingly care for patients whose disease processes are caused or accelerated by climate change and its consequences and will be tasked with counseling and treating these individuals to enhance their physical and mental well-being as well as readying healthcare systems to cope with increasing burdens of disease and challenges to healthcare infrastructure. Each group of health professionals will need to be aware of the important role performed by the other, and how to synergize.

Furthermore, health professionals are critical in creating a resilient, sustainable health care sector. The health care sector is responsible for 4.4% global net emissions of greenhouse gasses and if ranked as a country would be the 5th largest emitter in the world. It is widely acknowledged that reducing health care sector emissions, while taking urgent action to combat climate change and its impacts in alignment with the 2030 Agenda for Sustainable Development,[2] would have immense health, social, and economic benefits.

Rapid environmental change is undermining health equity and access to healthcare, economic well-being, environmental justice, and other social determinants of health, while compounding preexisting ill health, amplifying pandemic risk, and creating serious population-wide health threats. Furthermore, environmental crises are impeding progress on the UN Sustainable Development Goals. Health professional expertise must be brought to bear on cross-sectoral solutions to the climate crisis, and to articulate climate risks and solutions to patients, the public, and policy makers.

Health professionals are well placed to play a key role as change agents, through incorporating a climate and health lens in their professional practice and educating institutions, communities, and patients about climate and health while guiding policy transitions. As a trusted and respected source of knowledge, health professionals can advocate for solutions which build resilience and decrease health impacts while reducing overall greenhouse gas emissions.

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[2] UN General Assembly, Transforming our world : the 2030 Agenda for Sustainable Development, 21 October 2015, A/RES/70/1, available at: https://sdgs.un.org/publications/transforming-our-world-2030-agenda-sustainable-development-17981 [accessed 16 March 2023]

Furthermore, they can use their unique health expertise and community understanding to effectively influence environmental policy and advocate on behalf of vulnerable patients and communities.

Climate and Health Education in Context:

Climate change is inextricably linked to biodiversity loss, habitat loss, deforestation, and widespread pollution of air, water, and soil. It is certain that our health as humans is inseparably interconnected with the health of animals and ecosystems. This new iteration of the GCCHE core concepts is focused on climate change and how health professionals can prevent, prepare for, and respond to health impacts through clinical and public health practice, sustainable and resilient health systems, communication and collaboration, and policy and advocacy. It is not designed to provide comprehensive knowledge and skills related to Planetary Health, One Health, or Environmental Justice, although there is a large amount of overlap in many of the concepts presented.

Integration into Health Curriculum:

Over the last decades, the evidence on the adverse health effects of climate change has continued to grow. The framework presented here reflects this expanding foundational climate and health knowledge and is intended to act as a guide for equipping health professional students and practitioners with the knowledge, skills, abilities, and attitudes necessary to recognize and respond to the health impacts of climate change, regardless of their area of health focus. In this way, the core concepts support the notion that we as health professionals need a common core knowledge base to address climate change with an interprofessional and transdisciplinary lens. This document may also be a useful guide for those from non-health sectors who seek to highlight the connection of their discipline with health.

This framework is intended as a blueprint for developing climate and health education within health professional schools as well as in continuing education programs for practicing health professionals. This framework consists of **Domains, Concepts** and **Learning Objectives,** which can be applied and integrated as needed.

Definitions:

DOMAIN: Categories of educational activities

CONCEPTS: Overarching principles that form the foundation of climate and health knowledge and skills

LEARNING OBJECTIVE: A brief statement that describes what students can be expected to do after successful learning relating to a concept

Concepts and Learning Objectives presented in this framework are not exhaustive but are meant to equip learners with the latest evidence describing health impacts and viable health promotion strategies. Much work remains in elucidating best practices for preventing, recognizing, and responding to climate-driven exposures that affect health. Our goal is to give learners a flexible framework for understanding known challenges and adapting their health practice to those challenges of climate change that are not yet fully characterized.

GCCHE CORE CONCEPTS FOR HEALTH PROFESSIONALS

1.0 Domain: Knowledge and Analytical Skills	
Concepts	**Learning Objectives**
1.1.1 Climate change is one of the greatest threats to human health in the 21ˢᵗ century and urgent action is needed to affect its trajectory **1.1.2** Human health is highly dependent upon planetary health, including a stable climatic system which supports the foundations for all life such as air, water, and food **1.1.3** Climate change is a result of some natural and mostly human drivers **1.1.4** Climate change impacts vary by location and geography **1.1.5** Demographics, economic development, technology, and other activities create pressures on the climate and environment	- Describe the measurement and scientific basis of climate change, its drivers, and resulting exposures - Explain the social dimensions of climate drivers, including population growth and economic growth - Distinguish between "climate" and "weather," and between climate change and climate variability - Explain the general mechanism of the greenhouse effect and describe how human activities, mainly combustion of fossil fuels, are exacerbating this natural phenomenon. - Explain the increasing risk of climate tipping points at various levels of global heating - Identify relevant climatic changes in your state/region (e.g. flooding, extreme heat, sea level rise) - Identify the ways in which climate change preferentially impacts socioeconomically, racially, or ethnically marginalized communities locally and globally - Describe how climate change may interact with other environmental changes, such as land degradation and biodiversity shifts, to affect health
1.2.1 Climate change has broad and profound impacts on human health	- Describe major health outcomes associated with climate events, including both direct and indirect impacts, and their mechanisms. Impacts include, but are not limited to: **Increased Ambient Heat** – heat related illness, adverse perinatal outcomes, exacerbation of cardiovascular disease, respiratory disease, renal disease, risks to WASH infrastructure and water quality **Degraded air quality** – premature mortality, hypertension, coronary artery disease, congestive

	heart failure, arrhythmias, infections, dermatitis, respiratory allergies, asthma, COPD, cancer, neurodegenerative disease, perinatal outcomes
	Drought - Water pollution/scarcity, risks to Water, Sanitation and Hygiene (WASH) infrastructure, food insecurity, gastrointestinal disease, malnutrition, exacerbation of poverty (especially for women and marginalized groups) conflict, respiratory disease
	Extreme precipitation/sea level rise resulting in flooding – risks to WASH infrastructure/healthcare infrastructure, forced migration, mental health, trauma, drowning, vector-borne diseases, mold illness, drinking water contamination, gastrointestinal diseases, skin and eye diseases and infections, malnutrition
	Vector-borne and water-borne diseases - Changing distribution and ecology of zoonotic and vector-borne diseases, including but not limited to: malaria, dengue, Lyme disease, chikungunya, and various forms of encephalitis
	Extreme Weather – Wildfires, hurricane injuries, death, forced migration, mental health impacts
	Ecological degradation - forced migration; exacerbation of socioeconomic, demographic, political, cultural, or conflict-related threats to health security; heightening of existing health and economic inequities and their effects on access and the delivery of health care; consequences for mental 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.
	● Explain how health outcomes in response to climate events will vary within and among different communities and regions
● **1.3.1** Rapid climate mitigation and adaptation are needed to reduce health burdens now and, in the future ● **1.3.2** Near-term and	● Distinguish between climate mitigation, adaptation, and resilience ● Describe potential health interventions at the population and individual level to address climate-related exposures. ● Distinguish between primary, secondary, and tertiary levels of prevention as they relate to reducing

long-term health co-benefits can be gained from climate mitigation ● **1.3.3** Health systems can and must enact effective adaptation solutions at the individual and population level	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 ● Describe the determinants of adaptive capacity and apply the concept of adaptive capacity to assess health systems and communities ● Explain the concepts of health system resilience and describe frameworks for building resilience against climate effects
● **1.4.1** Planetary Health, Environmental Health, Climate Justice, and Eco-health, Health in All Policies, and One Health are overlapping frameworks which intersect with climate change and health	● Describe the foundations of and intersections between public health, population health, One Health, Eco-health, Planetary Health, Health in All Policies, and global health security ● Describe the concepts of climate justice and environmental justice
● **1.5.1** Climate change imposes significant risks to health infrastructure and impacts emergency and disaster planning	● Identify the risks and vulnerabilities to critical healthcare infrastructure, delivery, and supply chains from extreme weather events and other climate impacts ● Use emergency planning skills to plan for and respond to climate related extreme weather events and disasters, including workforce surge needs and disruption of infrastructure critical to maintaining access to healthcare and emergency services, and distinguish the roles of and interactions between agencies involved in emergency care
● **1.6.1** Global, regional, national, local, and Indigenous environmental data must be utilized to guide health decision making to prevent, prepare for and respond to climate-related events	● Demonstrate how to access and critically apply accurate data, science, and Indigenous knowledge about global, regional, national, and local environmental conditions (e.g., air quality during wildfires, local heat index) ● Identify climate and environmental threats to patients and community members and potential protection strategies
● **1.7.1** Health professionals must	● Demonstrate how to supplement theories of collective and transgenerational ethics, and ethical obligations

consider ethical, professional, and legal obligations relevant to climate and health	to the natural world with more individual-oriented, present-oriented, and human-centered frameworks of climate and health ethics, justice, and traditional knowledges

2.0 Domain: Communication and Collaboration	
Concepts	**Learning Objectives**
● **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 ● Identify challenges to climate communication (e.g. climate skepticism, climate despair and hopelessness, scientific literacy, misinformation, and special interest lobbying) ● Identify lessons derived from regional or local climate change threats and disasters that can serve as opportunities for communication about climate change
● **2.2.1** Work collaboratively and across disciplines on climate and health issues	● Identify and engage with your institution's 'green, sustainability, climate, etc.' team, seeking interdisciplinary representation from hospital administrators, front line staff, community leaders, government affairs, and other stakeholders ● Recognize and respect the unique roles and scopes of practice of other health professionals ● Describe best practices in interprofessional collaboration: information-sharing, collegial cooperation, and collective action ● Promote health profession-specific expertise and leadership around climate change ● Identify ways to engage in transdisciplinary and interprofessional climate responses to maximize impact

3.0 Domain: Policy	
Concepts	**Learning Objectives**
• **3.1.0** Subnational, national, and global policy frameworks and governance structures are necessary to address health risks associated with climate change	• Explain the role of current frameworks for assessing, managing, and reporting on health risks of climate and environmental change e.g., the United Nations Framework Convention on Climate Change (UNFCCC), including the Paris and subsequent agreements, and Sendai Framework for Disaster Risk Reduction • Describe how health professionals can partner with local and national public health organizations and health policy and governmental officials to promote health policy – using a Health in All Policies approach - and to advance and protect health in a changing climate • Discuss integrating climate change considerations into development policies
• **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 • Provide examples of sectoral policies (Energy, Transportation, Urban Planning, etc.) that can reduce greenhouse gas emissions and improve health
• **3.3.1** The voice of health professionals in advocacy and policy is essential to address the climate and health crisis	• Identify ways to act on climate and health policy solutions, including health co-benefits through health policy management and health system administration • Apply a health framework to drive positive action on climate change • Describe how health professionals can partner with health care institutions, professional organizations, and advocacy groups to reduce health care sector greenhouse gasses, minimize their ecologic footprint, and build health adaptation and climate mitigation measures in communities

4.0 Domain: Public Health Practice	
Concepts	**Learning Objectives**
● **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	● Gather evidence through research, tracking, monitoring, and surveillance to assess current and future health risks from climate and environmental 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 ● Provide examples of how climate health impacts in one location can affect public health in another, including through contagion, economic repercussions, and psychosocial well-being, considering impacts across regions and scales ● Use information on regional impacts to analyze the relationship between climate and public health data, deliver and improve local health services, and support public health impact assessment, intervention, and political engagement
● **4.2.1** Climate change, biodiversity loss and rapid environmental change affect disease emergence, distribution, and prevalence	● Describe the links between habitat loss, biodiversity loss, and potential for zoonotic transmission and develop a multi-disciplinary approach to addressing resulting health threats ● Analyze the trends of "climate-sensitive" diseases and conditions which are changing distribution and prevalence from local to global levels

5.0 Domain: Clinical Practice	
Concepts	**Learning Objectives**
• **5.1.1** Health care professionals in collaboration with facilities can prepare for and respond to climate-related health risks	• Identify health care facility climate vulnerabilities and evaluate their ability to respond to severe weather events and/or climate disasters • Identify ways in which health care facilities can become more resilient in the face of increasingly severe and/or frequent climate-related weather extremes and help build community climate resilience
• **5.2.1** Employ best practices of sustainable healthcare delivery	• Be able to locate free online resources for implementing environmentally sustainable practices in outpatient locations and hospitals • Understand, advocate for, and learn how to implement strategies to reduce health sector GHG emissions across all three Scopes, as part of taking urgent action to combat climate change in alignment with the United Nations 2023 agenda. • Describe the process of life-cycle analysis and how results can inform environmentally preferable and evidence-based clinical decisions to help reduce the environmental impact of clinical care. • Apply best practices for reducing the climate and environmental impact of clinical practice including prioritizing prevention, advocating for telehealth, reducing low-value, inefficient care and promoting actions to reduce the climate impact of pharmaceuticals.
• **5.3.1** Applying knowledge of climate and health to clinical care of patients can improve health outcomes	• Identify free online resources for educating patients and families about the health risks of climate change and how to protect themselves • 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 • Identify and describe patient symptoms and triage considerations as manifestations of direct and indirect weather and climate-related vector changes • Describe vulnerabilities in the patient care coordination process between health facility and

	community services that can be impacted by severe weather events and/or disasters ● Promote healthy and sustainable patient behavior through patient education, such as plant-based diets and active transportation (e.g., walking or cycling to work) as co-benefits