

HUMAN HEALTH AND THE CLIMATE CRISIS



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About the Author

Gail L. Carlson, Ph.D., is director of the Buck Lab for Climate and Environment at Colby College in Waterville, Maine, and is on the faculty of Colby's Environmental Studies Program. Her course Climate Change, Justice and Health formed the basis for this textbook, and she teaches other courses on environmental health, global health, environmental justice, and

environmental activism. Her research focuses on the health hazards of chemical pollutants in the environment, as well as on climate change impacts and attitudes. She regularly advocates for safer chemicals policies and climate action in the media and in legislative campaigns in the state of Maine. Carlson earned a Ph.D. in biochemistry from the University of Wisconsin-Madison.

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Introduction

I wrote this textbook while on sabbatical during a pandemic, when I rarely left my house. In some ways, it was a great time to write a book, as I could stay laser-focused on the project, but in other ways, it was extraordinarily challenging. As the world was devastated by COVID-19 and as racial injustice and political turmoil rocked the United States, a glaring spotlight was cast on the profound ways that inequity creates overwhelming and disproportionate burdens on health and well-being for much of the world's population. Layer on climate change impacts, and the situation becomes even more grim, particularly for those who have contributed very little to the anthropogenic greenhouse gas emissions driving climate change.

In 2020, the world faced record-setting heat and some of the most extreme storms, floods, droughts, and wildfires in recent history. As I write this introduction in the summer of 2021, record high temperatures, deadly heat waves, and extreme weather are again devastating communities. In April 2021, the atmospheric carbon dioxide concentration exceeded 420 ppm for the first time in recorded history. Most people are feeling the impacts of climate change today, some directly and some indirectly, some moderately and some severely, and models predict worsening impacts in the future. We have a narrowing window of time in which to enact effective and equitable strategies to mitigate greenhouse gas emissions and adapt to change. Framing climate change as a public health issue (both a *threat* and an *opportunity*), as this textbook does, gives people a familiar context in which to understand how we are being impacted, what is at stake, and how to take action.

Still, characterizing the human health impacts of climate change is quite a challenge—one that requires detecting changing trends in health

outcomes and attributing at least a portion of these changes to exposure to a climate-related stressor, such as increasing temperature, air pollution, floods, or food scarcity. Many data gaps exist, especially in countries that lack the capacity to conduct robust public health surveillance, and at local scales where impacts may be apparent but are often not measured. In addition, we tend to prioritize readily quantifiable measures of health, such as mortality, case incidence, and prevalence, but many other measures and sources of information are important but not so easily quantified, including clinical anecdotes, first-person accounts, stories, and lived experiences of those impacted.

We also need to better understand how health is being affected in a wide range of populations. This requires catalyzing and amplifying research done by scholars from around the world, including from least developed countries and small island developing states. We must also listen closely to voices from diverse and particularly at-risk groups, including Indigenous peoples and communities of color, many of which have been marginalized and traumatized for centuries. These groups have their own experiences, modes of knowledge, and practices to build and sustain strength in the face of climate change and its health impacts.

This textbook is designed for undergraduate and graduate students in a range of disciplines, including environmental studies and sciences, biological sciences, public health, epidemiology, global health, sociology, and public policy, as well as those studying nursing, medicine, and other health professions. This textbook also serves as a valuable resource for professionals working on climate change and public health from within governments, businesses, and nongovernmental

organizations, and across civil society at local and global scales. We hope that this textbook is also of interest to those in the general public who wish to learn more about climate justice and climate change impacts on human health and well-being.

The content and organization of textbook chapters are designed to structure a course on climate change and public health. Chapter 1 introduces basic concepts and trends in climate science, policy, and action. Chapter 2 provides an overview of public health and epidemiology and introduces a wide range of sources of health information. Chapter 3 introduces climate justice concepts and examples of people dedicated to protecting the fundamental human rights to health, well-being, and a livable planet. Chapters 4–11 each describe a specific health impact of climate change: heat-related illnesses, health impacts of extreme weather, respiratory and vector-borne diseases, water- and foodborne illnesses, malnutrition, mental health, and the health impacts of human displacement. Chapter 12 describes intersections between climate change and health professions, including clinicians' perceptions about how climate change is affecting their patients, the roles and responsibilities of health professionals to communicate and advocate for climate action, and the ways that the healthcare sector contributes to greenhouse gas emissions. In each chapter, I emphasize climate justice and include stories from a few frontline communities, with the humble acknowledgment that many other critically important stories are not being heard or told that ought to be.

As much as possible, I have incorporated up-to-date information in this textbook, including the latest epidemiological data from impacted populations, but because our knowledge is constantly advancing, no doubt some descriptions will soon be outdated. Each chapter highlights relevant sources of information, and I encourage readers to keep up with the latest information and trends that are continually being described in the scholarly literature, in the media, and in high-level reports. In 2021 and 2022, the *Sixth Assessment Report (AR6)* on climate change will be released by the Intergovernmental Panel

on Climate Change, including *AR6 Climate Change 2022: Impacts, Adaptation and Vulnerability*, which summarizes the most recent evidence for human health impacts. In addition, information is available in numerous publicly available health databases that are continually updated, including those maintained by the World Health Organization and other United Nations agencies, the Institute for Health Metrics and Evaluation, the *Lancet* Countdown, the U.S. Centers for Disease Control and Prevention, and other national and local public health agencies. Readers are also encouraged to continue to listen closely to climate change stories from frontline communities.

The ways that the world is responding to climate change are constantly shifting. The book was finished after the United States announced its renewed commitment to climate action under the Paris Agreement. Who holds the reins of power makes a difference, and political transitions can be beneficial or detrimental for meaningful progress on climate action. Fortunately, many countries have pledged to work toward significant reductions in greenhouse gas emissions in the coming years, although details are scarce and commitments insufficient to limit warming to the Paris Agreement target of no more than 1.5°C. At the end of 2021, another UN climate conference (COP26 in Glasgow, Scotland) will have been convened and hopefully will have advanced global climate action even further.

In the meantime, people all over the world, notably people of color, Indigenous peoples, and youth, are engaging in inspiring activism to jump-start awareness and action on climate change. They are organizing people in their own communities and catching the attention of world leaders on the biggest stages. They provide a large measure of hope and a moral imperative to commit to taking action in time to protect the health and well-being of all people. My hope for this textbook is that it will provide critical information to help catalyze this urgent movement for change.

Gail Carlson
Waterville, Maine
July 12, 2021