

Roles for Maine's Physicians in the Climate Crisis

by Gail L. Carlson and Megan Andersen

ABSTRACT

Physicians have important roles to play in the climate crisis because they deal with the health impacts of climate change. We surveyed physicians in Maine about climate change and health, and of the 108 respondents, 84 (78 percent) believe that climate change poses a threat to the health of their patients, particularly for asthma, vector-borne diseases, heat-related illnesses, chronic obstructive pulmonary disease, and mental health problems. Most reported that these conditions are becoming more prevalent, and they identified children, older adults, and patients with chronic health conditions as those most at risk. Despite this awareness, most respondents did not discuss climate change as a health determinant with their patients, although they identified communicating with patients and the public as a role for physicians.

evolving health impacts of climate change, argue that “the health profession not only has the ability but the responsibility to act as public health advocates by communicating the threats and opportunities to the public and policy makers and ensuring climate change is understood as being central to human wellbeing” (Watts et al. 2018: 582).

To better understand how climate change is affecting the health of Maine residents and how health professionals define their roles and responsibilities related to climate change, we surveyed Maine physicians to get their perspectives on climate change and its impacts on their

patients. To our knowledge, this is the first survey focused on physicians in Maine. Our study adds to the growing understanding of health impacts in Maine and reveals the importance of elevating health professionals as key actors in the climate crisis.

INTRODUCTION

Among US states, Maine is leading the way on rapid and innovative climate action, guided by its climate plan, *Maine Won't Wait* (MCC 2020). Maine is experiencing sea-level rise, warming land and ocean temperatures, and increased risks of extreme precipitation, air pollution, wildfire smoke, and drought. These climate stressors have wide-ranging impacts across all human and ecological systems.

The human health impacts of climate change are broad, well documented, and in many cases, increasing in prevalence and severity; they include heat-related illnesses, vector-borne diseases, respiratory illnesses, food insecurity, and adverse mental health conditions (Carlson 2023). Emerging evidence suggests that in Maine, heat-related morbidity and mortality (Wellenius et al. 2017) and certain tick-borne diseases¹ are likely to be attributable, at least in part, to climate drivers. Much more research in Maine and elsewhere is needed so that we can effectively address the health burdens of climate change to protect all people, strengthen our health systems, and develop health-focused climate adaptation strategies.

Health professionals are on the frontlines of the climate crisis and have important roles to play because they directly observe and respond to these health impacts in their patients. Researchers with The Lancet Countdown, an international collaboration monitoring the

METHODS

We created a survey questionnaire using Qualtrics software ([Appendix 1](#)).² The survey included 25 questions with varied display logic depending on respondents' answers. Not every respondent answered every question. Most questions were single- or multiple-choice questions, and several required free answers. The first part of the survey (eight questions) was designed to collect consent and background information about the participants. The second part (16 questions) was designed to gather information about the health impacts of climate change observed by respondents in their patients, as well as their self-identified roles and responsibilities with regard to climate change. The third part was a single question designed to create incentives for participation by giving survey respondents the chance to enter a raffle to win one of four \$50 gift cards. The survey was projected to take less than 10 minutes. This research was approved by the Institutional Review Board at Colby College (IRB 2020-045).

Our targeted sample was members of Maine Medical Association (MMA), one of fifty state medical societies that make up the American Medical Association. A link to the survey was sent via an email from MMA to its members on October 22, 2020. The survey was open for one month.

RESULTS

Our survey yielded 108 responses, and all respondents were physicians who practiced in Maine (Table 1). Respondents had more than a dozen specialties, with family medicine, pediatrics, and internal medicine the most common, and they were evenly split between practicing in a hospital/in-patient setting or a clinic/out-patient setting. Respondents' ages ranged from 30 to 79, and males and females were fairly evenly represented.

When asked if they believed that climate change poses a threat to the health of their patients, most respondents (78 percent) answered *Yes* (Table 2). Only 10 percent answered *Maybe*, 4 percent answered *Not sure*, and 8 percent answered *No*. There were too few *No* responses (9) to identify determining factors, but age and medical specialty did not appear to be associated with not believing that climate change poses a threat. Interestingly, of the nine people who responded *No*, seven listed a specific gender identity and six of these seven were male. Despite most respondents believing that climate change affects their patients, a majority said that they had not personally experienced the health impacts of climate change or were not sure; only 26 percent said they had.

Two-thirds of respondents who answered the question "How concerned are you about current health impacts of climate change in your patients?" reported being *extremely* or *moderately* concerned. An even larger proportion (87 percent) reported being *extremely* or *moderately* concerned about the future health impacts of climate change in their patients (Table 2). Those who did not believe that climate change was a threat to their patients were not asked these two questions.

When asked if they were already observing the health impacts of climate change in their patients, 38 percent said *Yes*, 17 percent said *Maybe*, 30 percent said *Not sure*, and 15 percent said *No* (Table 2). Again, there were too few *No* responses (15) to determine if age or specialty had an effect, but of the 14 who said *No* and gave a gender, 12 were male. Those who did not believe that climate change was a threat to their patients were not asked this question.

TABLE 1: **Characteristics of Survey Respondents (n = 108)**

	#	%
Medical degree		
M.D.	99	92
D.O.	9	8
Medical specialty		
Family medicine	23	22
Pediatrics	15	14
Internal medicine	12	12
Surgery	9	9
Emergency medicine	8	8
Hospital medicine	6	6
Psychiatry	6	6
Anesthesiology	5	5
Cardiology	3	3
Pulmonology	3	3
OB/GYN	3	3
Other	12	12
Work setting		
Clinic/outpatient	57	53
Hospital/inpatient	49	45
Academic institution	13	12
Medical research institution	1	1
Other	6	6
Retired	4	4
Age		
30–39	12	11
40–49	25	23
50–59	36	33
60–69	29	27
70–79	6	6
Gender		
Male	56	52
Female	49	45
Prefer not to say	3	3

Note: All respondents were physicians practicing in the state of Maine. For each variable, both the number of responses and the percentage are indicated. For medical specialty, four did not respond. Some respondents reported more than one work setting.

TABLE 2: **Maine Physicians' Views on Impacts of Climate Change on Patient Health**

	#	%
"Do you believe that climate change poses a threat to the health of your patients?" (n=108)		
Yes	84	78
Maybe	11	10
Not sure	4	4
No	9	8
"How concerned are you about current health impacts of climate change in your patients?" (n=77)		
Extremely	10	13
Moderately	41	53
Somewhat	21	27
Slightly	5	6
Not at all	0	
"In your practice, are you already observing the health impacts of climate change in your patients?" (n=98)		
Yes	37	38
Maybe	17	17
Not sure	29	30
No	15	15
"How concerned are you about future health impacts of climate change in your patients?" (n=92)		
Extremely	58	63
Moderately	22	24
Somewhat	5	5
Slightly	5	5
Not at all	2	2

Respondents identified a wide range of specific illnesses in their patients that they believed were being affected by climate change (Figure 1). The top six illnesses were asthma, vector-borne diseases, heat-related illnesses, allergies, chronic obstructive pulmonary disease (COPD), and mental health problems. For specific vector-borne diseases, most respondents listed Lyme disease or anaplasmosis, but they also mentioned babesiosis, Powassan encephalitis, and West Nile virus.

Respondents were asked to elaborate with free answers about the most clear climate-change-attributable illnesses or conditions in their patients; 70 respondents

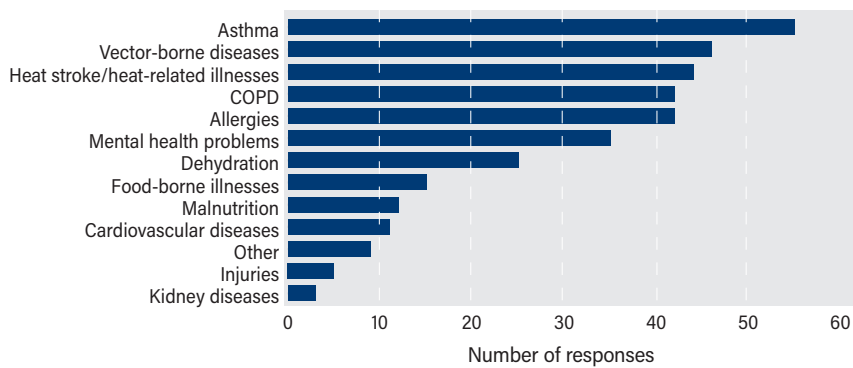
gave a specific answer. The most common health concerns were tick-borne diseases (34 responses) and respiratory conditions (27). Other concerns were heat stress (7), mental health (6), extreme weather (5), and food security/nutrition (5). Some answers addressed more than one health concern. A representative set of answers is given here; all answers are direct quotes:

- Pollution from burning fossil fuels exacerbating asthma and COPD.
- Higher temperatures leading to more exacerbation of lung and heart disease.
- Heat stress on elderly/ill patients who do not have access to cooling.
- Inability to exercise/stay active in extreme heat.
- Extreme weather shifts [a]ffect the living situations of families everywhere.
- Presence of tick-borne illnesses not previously seen in our area.
- Severe weather limiting patient ability to travel to the office to obtain care.
- Power outages affecting medical devices.
- Refugee populations arriving in the state, requiring new health care issues.
- Increasing anxiety and depression.
- I see many children who have a great deal of anxiety and in adolescents, they frequently verbalize worry specifically about climate change.

Several answers above related to mental health impacts. When asked specifically if climate change is contributing to mental health problems in their patients, a majority of respondents (53 percent) answered *Yes*, 43 percent answered *Not sure*, and 4 percent answered *No*. Elaborated responses are listed here (all are direct quotes) and add to the mental health quotes listed above:

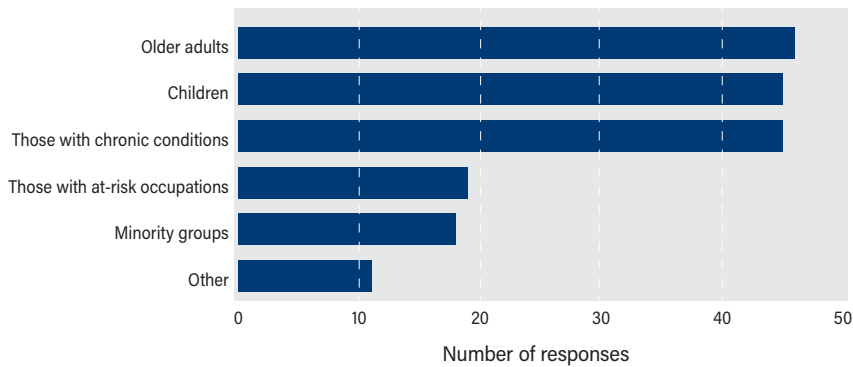
- Less able to leave home safely, less able to cope [with] illness.
- Increase[d] stress and instability increase inability to control and treat mental illness as effectively.
- The extreme weather issues and the unknowns associated with being a coastal state are creating significant distress. More worry about the future = more anxiety.
- Folks need to consider relocating their homes, changing professions, especially the lobstermen.
- Heat intolerance producing stress.
- Anxiety disorders in particular related to news about climate change.
- They feel helpless to change the process and let down in that they perceive a failure to act by leaders to help address the problem.

FIGURE 1: Illnesses and Conditions Affected by Climate Change



Note: Responses to the question “Which specific illnesses and conditions in your patients do you believe are being affected by climate change?” The total number of responses exceeds *n* because respondents were asked to check all that apply from a list of choices.

FIGURE 2: Patients Affected by Climate Change



Note: Responses to the question “Which of your patients do you think are most affected by climate change?” The total number of responses exceeds *n* because respondents were asked to check all that apply from a list of choices.

Respondents were asked if they believe these climate-related health impacts are increasing in prevalence over time. A majority (54 percent) answered *Yes*, 15 percent said *Maybe*, 23 percent said *Not sure*, and 8 percent said *No*. By far the most common illness reported as increasing in prevalence was Lyme disease, followed by respiratory diseases and mental health problems.

Respondents were asked which of their patients were most at risk. Older adults, children and those with chronic health conditions (primarily respiratory diseases) were most frequently identified (Figure 2). Those in certain risky occupations, specifically outdoor occupations, farmers, foresters, fishermen, and medical first responders, were also identified, as well as minority groups, with people of color and immigrants listed most frequently.

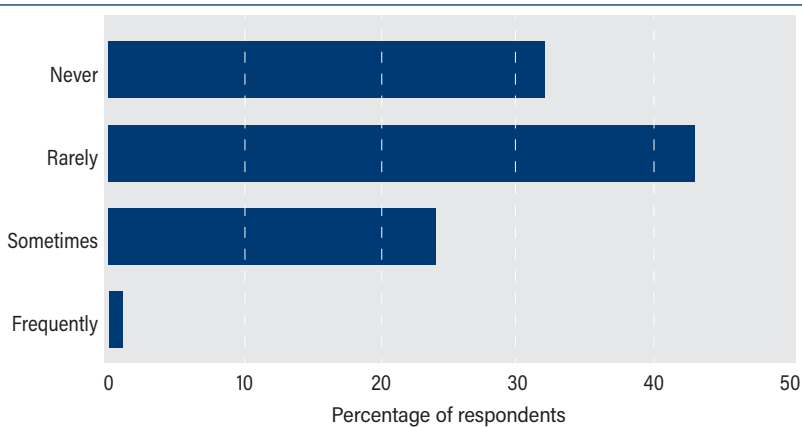
Respondents were then asked how frequently they discussed climate change as a health determinant with their patients (Figure 3). Most respondents *rarely* (43 percent) or *never* (32 percent) talked to their patients about climate change. Only 1 percent *frequently* discussed the issue, and 24 percent *sometimes* did.

Finally, participants were asked to describe the roles that healthcare professionals should play in the climate crisis. All answers were then categorized (Table 3). The most common response related to physicians being advocates for policy action to address climate change, followed by the importance of physicians communicating information about the health impacts of climate change to their patients or to the public. Other answers were paying attention to relevant research and changing their own personal habits to be more climate friendly. Only two respondents mentioned reducing the climate impacts of the healthcare sector.

DISCUSSION

Maine’s physicians are aware that climate change causes health problems that affect their patients. More physicians are concerned about future threats than they are about current threats, although many reported already seeing impacts in their patients and that these impacts are getting worse over time. In particular, respondents highlighted the risks of respiratory diseases (asthma, COPD, and allergies), vector-borne diseases (particularly Lyme disease), heat-related illnesses (including heat stroke, the deadliest form), and adverse mental health conditions. The burdens of all of these diseases and conditions in the United States are well known to be affected by climate change (Hayden et al. 2023).

FIGURE 3: Frequency of Climate Change Discussions between Doctors and Their Patients



Note: Responses to the question “How frequently do you discuss climate change with your patients as a determinant of their health?” (n = 92)

TABLE 3: Physicians’ Views on the Role of Healthcare Professionals in Addressing Climate Change

Response	Number of responses
Advocate for policies that address climate change	33
Communicate with patients about health impacts of climate change	16
Pay attention to research on health impacts of climate change	13
Communicate with the public/be an expert	11
Change personal habits	8
Reduce climate impacts coming from the healthcare sector	2
Unsure	5
None	2

Note: Categories of free answers given to the question “What role(s) should healthcare professionals play in addressing climate change?” Some responses fit more than one category, so the total number of responses exceeds the number of respondents (n = 78).

Physicians identified particularly vulnerable people in Maine as the very young and elderly, those with underlying chronic disease burdens, those in outdoor occupations, and racial and ethnic minorities. Many of Maine’s residents are indeed likely to be at risk, primarily because it is the oldest state in the country; has a large number of outdoor workers in the recreation, forestry, fishing, agriculture, and other such sectors; has high respiratory disease burdens; and has suitable conditions for tick-borne disease transmission. Understanding vulnerability is important to highlight where particular attention and investment in healthcare services should be prioritized, as

well as guiding policymakers who are developing health-related climate adaptation strategies in Maine.

Survey respondents who reported health impacts in their patients showed a fairly sophisticated understanding of precisely how climate change affects human health. For example, they attributed respiratory diseases to air pollutants produced by fossil fuel combustion and understood that heat exposure worsens cardiovascular and respiratory diseases, that heat stress is worse for those without access to cooling, and that ticks that transmit diseases are moving to new areas as suitable habitat shifts with climate change. They also identified risks such as power outages that may result from extreme weather interrupting medical care, the inability to be physically active during extreme heat, and the increasing number of immigrants in the state, who face unique health challenges.

Maine’s physicians are well aware of the threat of adverse mental health impacts due to climate change. It is important to note that mental health impacts include diagnosable mental disorders as well as emotional responses that are rational in the face of severe threat, such as *climate anxiety*, commonly experienced by people around the world, especially youth. While not captured in this survey, there are also positive mental health impacts of climate change and opportunities for psychological growth (Carlson 2023).

Our study shows that the perspectives of Maine’s physicians align with those of other health professionals who have been surveyed about climate change in the limited number of previous studies. For example, a majority (64 percent) of physicians in one practice in Madison, Wisconsin, reported that they had witnessed climate change impacts in their patients (Boland and Temte 2019). Three-quarters of physicians in a large global survey, as well as two-thirds of members of the National Medical Association, a professional organization of Black physicians in the United States, and two-thirds of members

of the international chapter of the American Thoracic Society reported that climate change will affect their patients a great deal or a moderate amount (Kotcher et al. 2021; Sarfaty et al. 2014, 2016). The illnesses identified as linked to climate change by respondents to our survey match what physicians have reported in these other studies. Focusing on the perspectives of Maine's physicians gives us valuable insight into how these findings align across various groups of health professionals and their patients.

Even though our survey respondents recognized their responsibility to communicate with patients about how climate change affects their health, very few actually did so. Other studies have identified key barriers to health professionals talking to patients, including a lack of physician knowledge about climate change, lack of time during appointments, and perceptions that patients may not be receptive to such conversations or that such conversations would have little impact (Sarfaty et al. 2014).

One important way to increase knowledge is to include climate change content in curricula of medical schools and other health professions training programs. Three-quarters of physicians surveyed in a recent global study indicated that “continuing professional education on climate change and health” would be helpful, along with “training to communicate effectively” (Kotcher et al. 2021). In 2019, the American Medical Association (AMA) adopted a policy to require inclusion of topics related to the health impacts of climate change at all levels of medical education.³ The only medical training program in Maine is at the University of New England College of Osteopathic Medicine. While there is no formal climate change content included in courses, there are many opportunities for students to learn about climate change via co- and extra-curricular programming (P. Segal, personal communication). A recent analysis of medical schools worldwide revealed that only 15 percent have incorporated climate change and health into their curricula (El Omrani et al. 2020).

Our survey captured perspectives of Maine physicians in the fall of 2020, which may have been a time of heightened awareness of climate change and its impacts because it followed a very warm summer in Maine. Indeed, the year 2020 tied with 2016 for the hottest year on record up to that time (NASA 2021). It is likely that responses today would indicate similar awareness of health impacts, as Maine continues to experience serious climate change impacts, and 2023 is now the hottest year on

record (NASA 2024). In addition, physicians' perspectives from 2020 may be less likely to be confounded by perspectives on the COVID-19 pandemic, which, while ongoing in the fall of 2020, had not yet seen the large spikes in hospitalizations and deaths in Maine due to COVID-19, which began in late November 2020, after the survey closed.⁴ Data collected more recently may be more influenced by physicians' significant experiences with COVID-19.

Many respondents recognized their role as advocates in the climate crisis. Some have argued that physicians have an ethical obligation to address climate change to safeguard the well-being of their patients (Wellbery 2019). Health professionals in Maine and representatives of the MMA, Maine Public Health Association, and other health organizations commonly testify at public hearings in Maine on environmental health policies. In 2022, the AMA adopted a policy that mobilizes the AMA to advocate for “policies that limit global warming to no more than 1.5 degrees Celsius, reduce U.S. greenhouse gas emissions aimed at carbon neutrality by 2050, and support rapid implementation and incentivization of clean energy solutions and significant investments in climate resilience through a climate justice lens” (AMA 2022). As part of this policy, the AMA will also develop strategies to decarbonize the health sector, which in the United States contributes an estimated 8.5 percent of all national greenhouse gas emissions (Dzau et al. 2021). Few of our survey respondents identified a role for them in reducing the climate impacts of the healthcare sector.

Limitations of our survey include that only a small percentage of Maine Medical Association members responded. We do not know how many MMA members received the email with the link to our survey, but MMA reports a membership of “over 4,100 doctors and doctors-in-training”;⁵ if all members received the survey link, our response rate was approximately 2.6 percent. In addition, physicians choosing to respond to the survey may have been more aware of or focused on climate change than the entire community of physicians in Maine. Other types of health professionals (e.g., nurses, psychologists, social workers) are also working on the frontlines of the climate crisis, and their perspectives should be considered but were not captured in this study.

Overall, it is clear that physicians have an informed perspective on how climate change is affecting the health of Maine residents, and their unique position at the frontlines of healthcare delivery means that they should be

recognized and empowered as relevant experts. As Maine continues to develop and enact policies and programs to tackle climate change, the knowledge of health professionals will be critical to incorporate into its responses. In addition, physicians' important role in communicating the health impacts of climate change will likely result in better protection of people's health and increased public support for climate action.

NOTES

- 1 <https://data.mainepublichealth.gov/tracking/tickborne>
- 2 <https://digitalcommons.library.umaine.edu/mpr/vol33/iss1/4/>
- 3 <https://policysearch.ama-assn.org/policyfinder/detail/climate%20change?uri=%2FAMADoc%2FHOD.xml-H-135.919.xml>
- 4 Based on data available at the New York Times website: <https://www.nytimes.com/interactive/2023/us/maine-covid-cases.html>.
- 5 <https://www.mainemed.com/patient-center>

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