2024

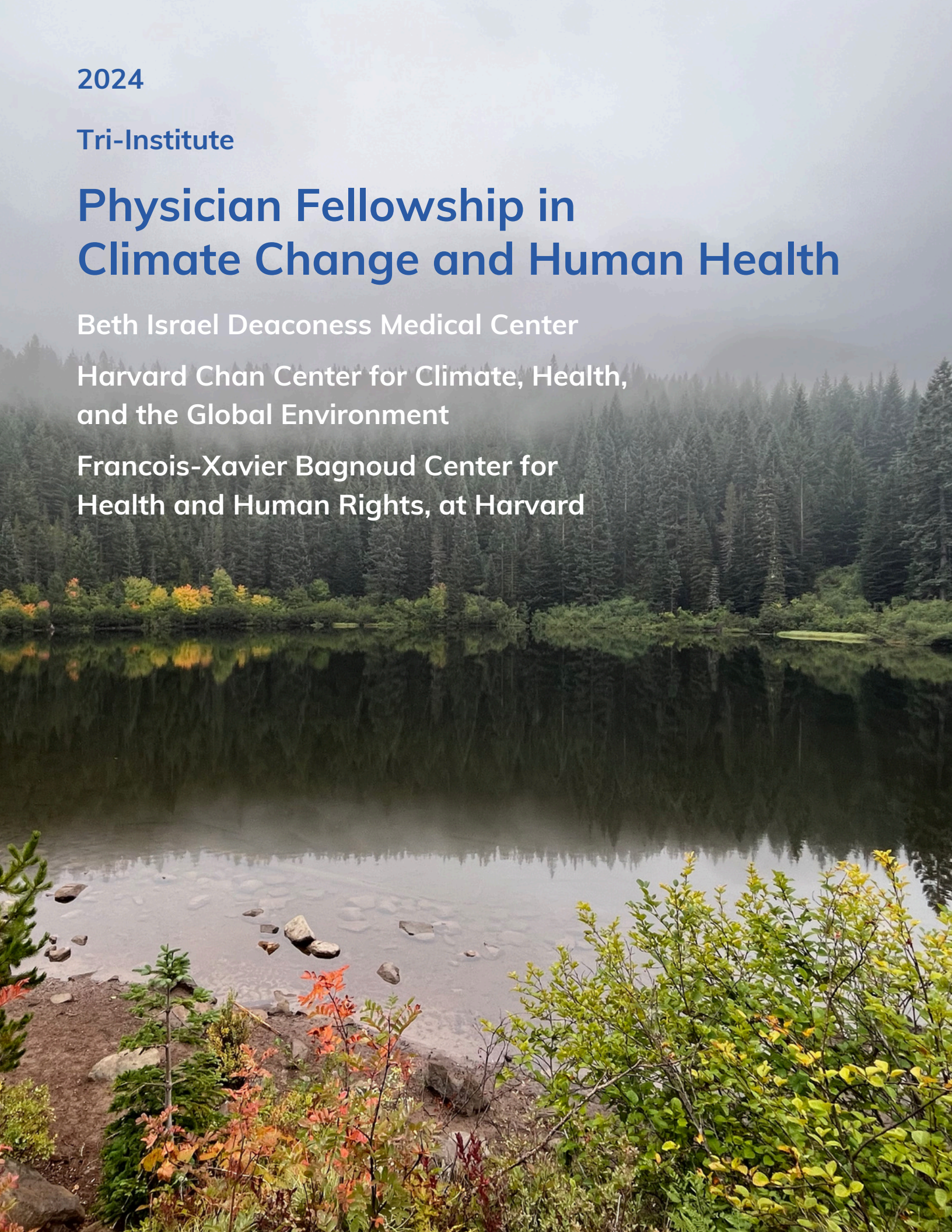
Tri-Institute

Physician Fellowship in Climate Change and Human Health

Beth Israel Deaconess Medical Center

Harvard Chan Center for Climate, Health, and the Global Environment

Francois-Xavier Bagnoud Center for Health and Human Rights, at Harvard




United Nations
Climate Change
COP28UAE

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Satchit Balsari MD MPH

Fellowship Director

Associate Professor,
Emergency Medicine,
Harvard Medical School

Associate Professor,
Global Health and Population,
Harvard T.H. Chan School of
Public Health

Co-director, CrisisReady.io

Caleb Dresser MD MPH

Assistant Fellowship Director

Assistant Professor,
Emergency Medicine,
Harvard Medical School

Assistant Professor,
Environmental Health,
Harvard T.H. Chan School of
Public Health

Climate Change is upon us, as increasing intensity and frequency of extreme weather events result in frequent health harms, population displacement, habitat destruction, and wage loss. The impact of climate change on human health is mediated through myriad pathways. Heatwaves, hurricanes, and floods cause direct bodily harm - but also impact population morbidity and mortality through prolonged interruptions in critical services and infrastructure, and through forced migration and loss of wages, among others. These phenomena also damage healthcare facilities, some permanently, especially in the poorest communities globally. Over longer time horizons, the changing climate will modify land-use patterns, crop cycles and human settlements; it will result in epidemiological shifts and the possible emergence of novel diseases.

Physicians have a long track record of leading societal change. They have been at the forefront of raising awareness about and successfully banning landmines, instrumental in promoting nuclear disarmament, and played critical roles in detoxifying our environment from industrial pollutants. It is now time for physicians to step up again - to help patients at the bedside and the communities they live in - to understand the impact of global climate change on their own health, on the lives of their loved ones, and on their communities. Dr Jay Lemery, one of the pioneers in our field at the intersection of climate change and human health, has long called for white coat diplomacy, rallying physicians to lead efforts to address the causes and impacts of climate change.

The Climate and Human Health Fellowship at Harvard is unique in many ways. It is hosted at three institutions: Beth Israel Deaconess Medical Center (BIDMC), one of Harvard's large academic teaching hospitals; the Harvard FXB Center for Health and Human Rights, and the Center for Climate, Health, and the Global Environment at Harvard's T.H. Chan School of Public Health. Our faculty advisors have a long history of engagement with vulnerable communities around the world, ranging from war-ravaged refugee populations in the Middle East to threatened coastal communities in the Caribbean. We bring to bear our expertise in research and advocacy among populations impacted by disasters and war to the cause of protecting and promoting health as our climate changes. We hope to train a cadre of physicians dedicating themselves to research, policy-making and advocacy in the evolving healthcare and legislative landscape, tackling climate change domestically and internationally. We believe the health agenda for climate change is a renewed commitment to the yet unfulfilled promises of Alma Ata - Health for All.

FELLOWSHIP OVERVIEW

The Climate and Human Health Fellowship prepares physicians to become leaders in climate and human health research, education, communication, policy and advocacy. The fellowship program is offered through a collaboration between Beth Israel Deaconess Medical Center, Harvard Chan C-CHANGE, and the FXB Center for Health and Human Rights at Harvard.

Fellows participate in core fellowship didactics, develop an area of individual focus, engage in original academic research, and receive mentorship from leaders in the field. Activities occur across Beth Israel Deaconess Medical Center and the Harvard T.H. Chan School of Public Health, with additional opportunities throughout the Harvard system.

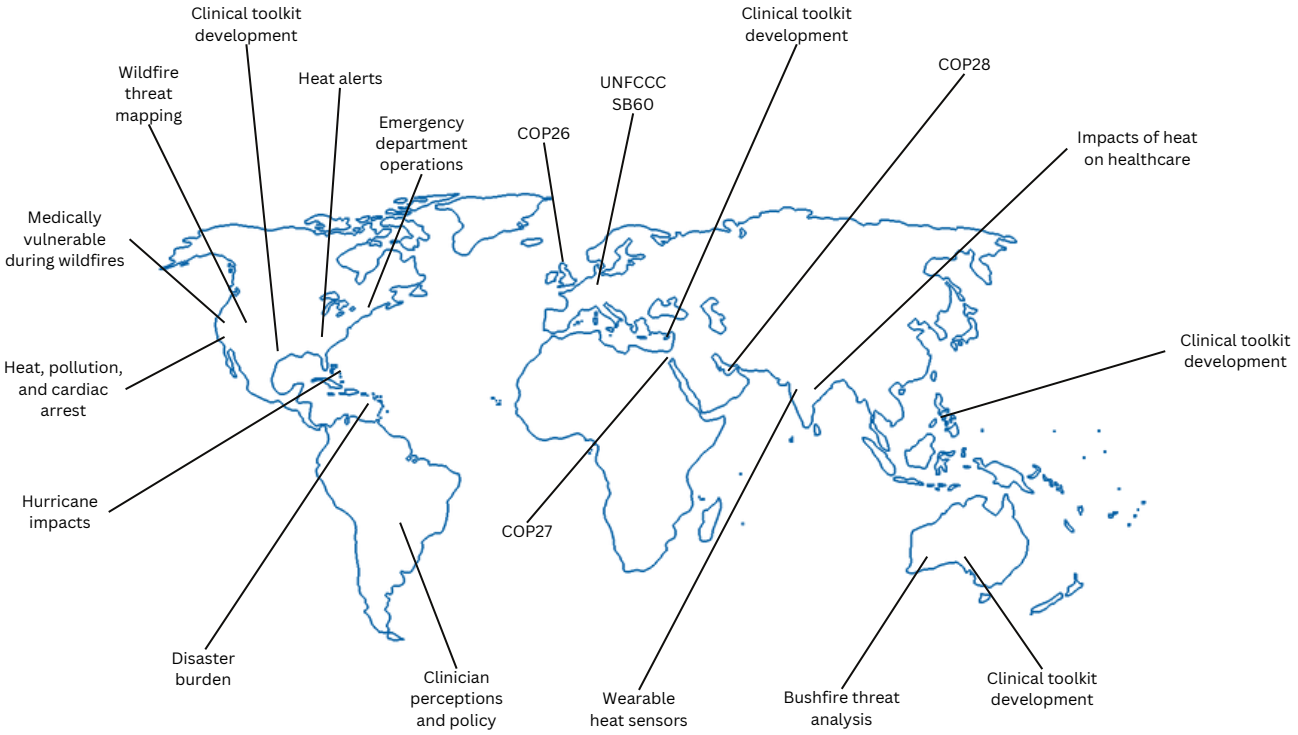
Fellows work on research projects throughout their fellowship, and are mentored by a combination of faculty from our collaborating centers relevant to their focus area. Fellows receive guidance on conducting and publishing high quality research with significant translational potential. Our large pool of faculty mentors allows us to accommodate and support a wide range of research interests that incoming fellows may wish to pursue. Fellows have access to a wide range of resources on and off campus, including research services through the Harvard Library system, statistical support, and GIS training opportunities.

External placements and collaborations at government agencies, research centers, and nonprofit or community-based organizations provide fellows with experiential learning, immersion in the communities they are advocating for, and participation in high-level deliberations in the corridors of power.

Fellows in the clinical track work part-time in our Emergency Department at Beth Israel Deaconess Medical Center and at affiliated community sites. In addition to functioning as an attending physician while in the Emergency Department, fellows may supervise residents in the BIDMC Harvard Affiliated Emergency Medicine Residency program and students at Harvard Medical School, depending on the sites at which they practice.

Fellows receive mentorship from our core fellowship faculty, and have opportunities to connect with a wide range of experts at Harvard and beyond. Interested fellows also work closely with statisticians and data scientists throughout the duration of their fellowship.

Global Engagement



Climate change is affecting our entire planet and everyone that lives on it, but some populations are facing particularly severe threats. The worst climate hazards often affect locations where resources with which to prepare and respond to climate shocks are limited and the scientific evidence to support specific courses of action is still being developed.

Our faculty and fellows bring a global perspective to their work, which includes projects ranging from developing clinical guidelines for limited resource settings to analyzing healthcare utilization. Fellows have had the opportunity to attend UNFCCC convenings, academic conferences, and stakeholder engagement workshops around the world.

2019 - 2021

Fellowship approved by BIDMC

2019

First fellow begins the program

Caribbean disaster conference

EMA Awards

Climate health policy externship Washington DC

2020

Heat stroke collaborative project

State house legislative briefing

COVID-19 field hospital service

Mystic River externship

First fellow graduates

2021

Brockton community heat workshops

2022 - 2024

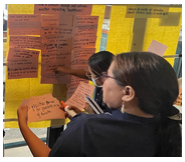
Second and third fellows arrive

Second fellow graduates

Fieldwork in India

COP26 Glasgow

Bahamas GCCHE workshop



Stakeholder workshop in Manila

White House Climate & Health Forum

2022

2023

2024

CleanMed 2022

BIDMC climate talks

Fourth fellow arrives

ACLA finalist

AMERICAN CLIMATE LEADERSHIP AWARDS

ecoAmerica
everyone, every day

First climate ID fellow

Resident MD waste reduction project

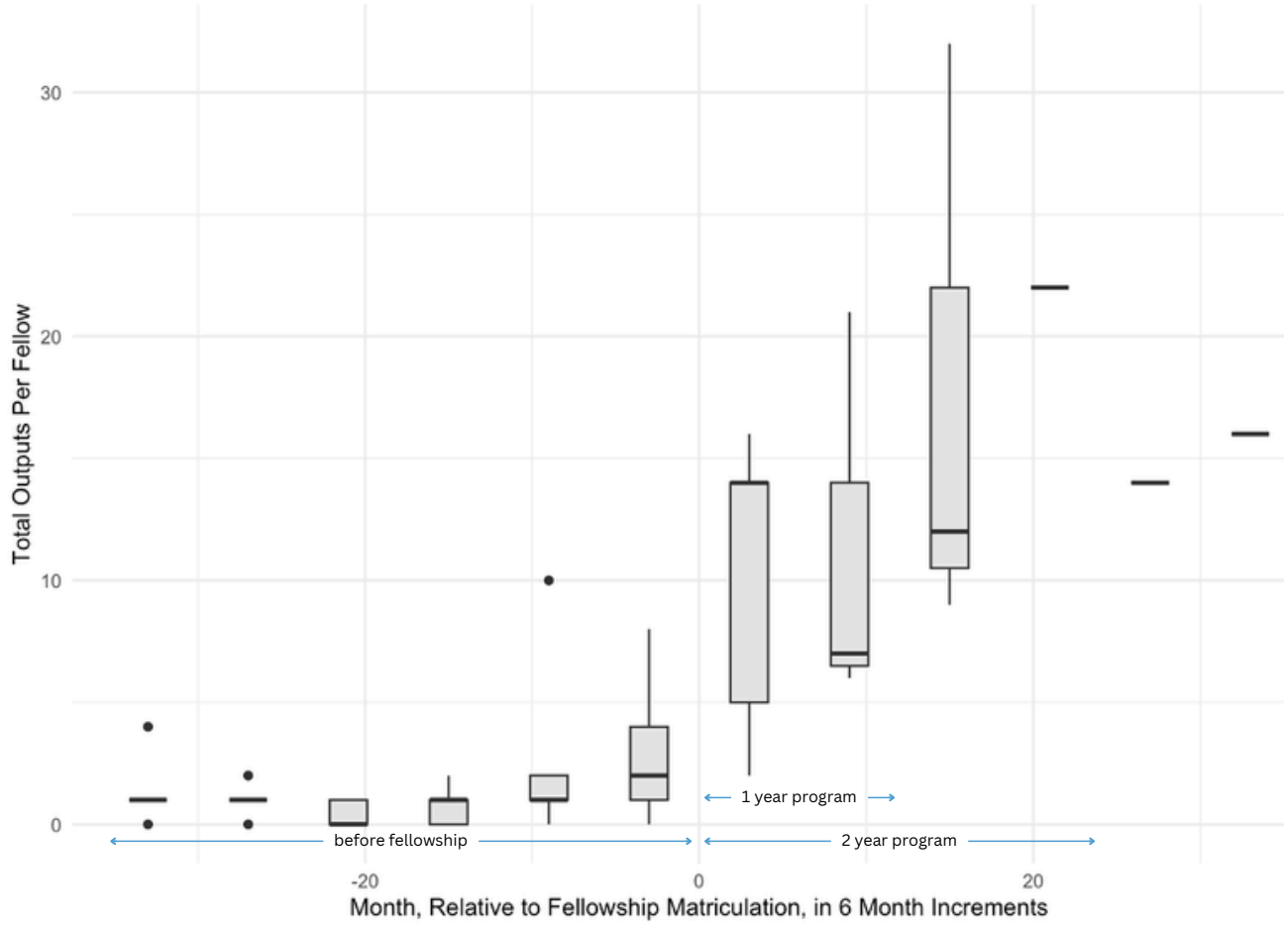
COP 27 Egypt

First climate disaster fellow

COP28 Dubai

Third and fourth fellows complete the program

Professional Activity



Supplementary Materials to: Dresser C, Wiskel T, Giudice C, Humphrey K, Storr L, Balsari S. A Graduate Medical Education Fellowship in Climate Change and Human Health: Experience and Outcomes From the First 5 Years. Journal of Graduate Medical Education, 2024, in press.

Our fellows have consistently increased their professional output across a variety of categories of activity while in the Climate and Human Health Fellowship. While the success of our fellows is about much more than their public-facing professional productivity, these outputs are nonetheless important milestones in their development, and can serve as important building blocks for a successful career in academia or public service.

Fellows participating in our program have tracked their professional activity before and after matriculating in the Climate Change and Human Health Fellowship. In the figure above, we show the total number of research papers, opinion articles, grants, public talks, posters, presentations, media interviews, teaching, and other activities completed in each six month period for three years before and after fellowship matriculation.

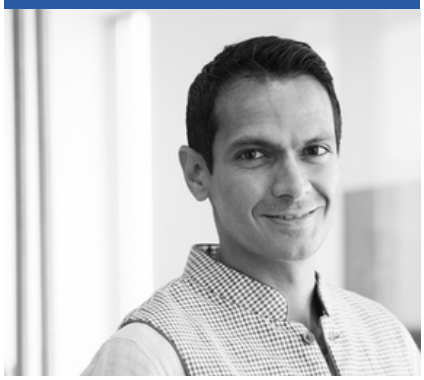
PEOPLE

The Climate and Human Health Fellowship brings together faculty at Beth Israel Deaconess Medical Center, a Harvard teaching hospital, and academic centers including Harvard Chan C-CHANGE and the FXB Center for Health and Human Rights at Harvard. Our program has been shaped by the vision of our founding directors is now guided by faculty advisors from a variety of disciplines and institutions.

Our fellows have the opportunity to learn from teachers and mentors across a wide range of disciplines, and have access to a variety of staff including statisticians, data scientists, communications specialists, and professional educators. We have also welcomed graduate student affiliates onto our team, where they have completed research projects as a component of their graduate degree programs.

Faculty

Satchit Balsari



Fellowship Director

Associate Professor of Emergency Medicine
Harvard Medical School

Associate Professor, Global Health & Population
Harvard T.H. Chan School of Public Health

Co-Director, CrisisReady.io

The Balsari lab (balsarilab.com) is committed to closing information asymmetries in vulnerable communities around the world, through research, training and advocacy. Applying novel data streams, and digital health tools, Balsari's research has resulted in a range of public health innovations that include cloud-based syndromic surveillance systems deployed at the world's largest mass gatherings, decision-support tools deployed at over 50 recent global disasters (crisisready.io/readymapper), and LLM-powered hyper-contextualized decision support tools for clinicians in the global south. He is currently lead investigator of the Community Heat Adaptation and Treatment Strategies project at Harvard's Salata and Mittal Institutes, that maps the impact of heat on the health and wages of 1000 poor women workers most vulnerable to climate change. He has taught extensively at Cornell and Harvard on digital health, social entrepreneurship, and disasters.

Caleb Dresser

Assistant Fellowship Director

Fellow (2019 - 2021)

Assistant Professor of Emergency Medicine
Harvard Medical School

Assistant Professor, Environmental Health
Harvard T.H. Chan School of Public Health

Dr Dresser is a practicing emergency physician whose research focuses on understanding how climate change is affecting healthcare organizations and the patients they serve, and developing solutions to address these impacts. In addition to his work with our fellows, Dr Dresser serves as Director of Healthcare Solutions at Harvard Chan C-CHANGE, where his work includes evaluation and refinement of toolkits for patients, administrators, and clinicians, a pilot assessment of the use of targeted heatwave alerts for clinic staff, and adaptation of these resources to new settings. He teaches a Harvard course on Human Health and Global Environmental Change for medical and graduate students and has lectured widely on the implications of climate change for health, healthcare, and societal preparedness.

Faculty

Tess Wiskel

Fellowship Faculty

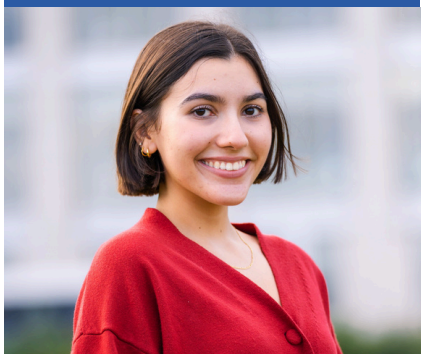
Fellow (2022 - 2024)

Instructor of Emergency Medicine
Harvard Medical School

Dr. Wiskel is an emergency medicine physician at Beth Israel Deaconess Medical Center in Boston and a graduate of the Climate and Human Health Fellowship with a Master of Public Health from Harvard. She has centered her career on improving care for at risk populations, both locally and globally. During medical school and residency, she conducted research, education and advocacy focusing on global and women's health, including developing an accident and emergency HIV testing program in Belize and an educational elective in reproductive health in emergency care. She is now a Burke Research Fellow at the Harvard Global Health Institute.

Staff

Ashley Smith



Program Coordinator

Department of Emergency Medicine
Beth Israel Deaconess Medical Center

Ashley is a graduate of UMass Boston with a background in communications, marketing, and events. She joins the fellowship as a Program Coordinator after her time as a Communications Intern at University of Massachusetts Boston's Sustainable Solutions Lab.

Faculty Advisors

Mary Bassett

Faculty Advisor

Director, Francois-Xavier Bagnoud
Center for Health and Human Rights

Professor, Practice of Health and Human Rights
Harvard T.H. Chan School of Public Health

Caroline Buckee

Faculty Advisor

Professor of Epidemiology,
Harvard T.H Chan School of Public Health

Co-Director, CrisisReady.io

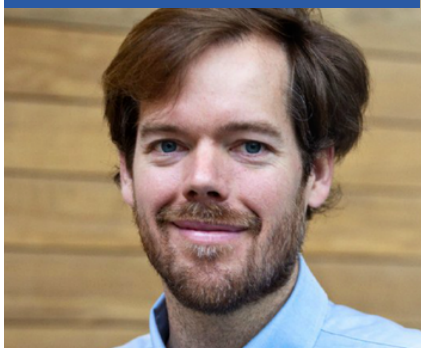
Chris Golden

Faculty Advisor

Director of Program on Nutrition and
Planetary Health

Associate Professor, Nutrition and Planetary Health
Harvard T.H. Chan School of Public Health

Peter Huybers



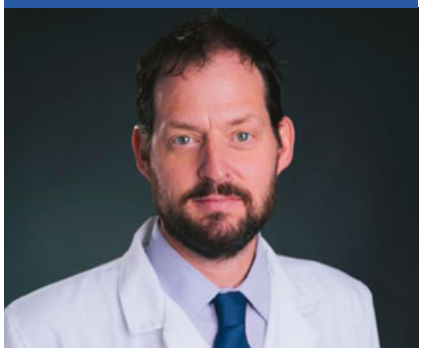
Faculty Advisor

Department Chair of Earth and Planetary Sciences

Professor of Environmental Science and Engineering
Harvard School of Engineering and Applied Sciences

Faculty Advisors

Jay Lemery



Faculty Advisor

Professor, Emergency Medicine,
University of Colorado School of Medicine

Chief, Section of Wilderness and
Environmental Medicine
The Colorado School of Public Health

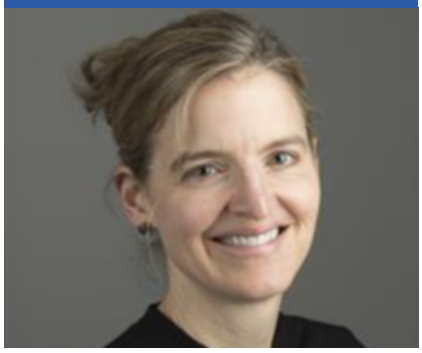
Mary Rice

Faculty Advisor

Director, Harvard Chan Center for Climate,
Health, and the Global Environment

Mark and Catherine Winkler Associate
Professor of Environmental Respiratory Health

Wendy Stead

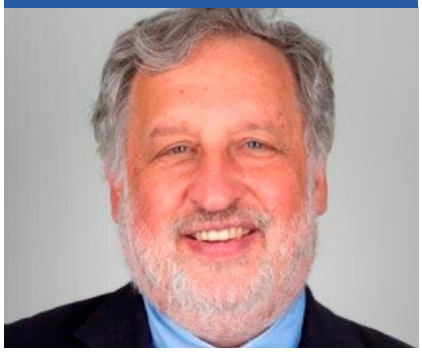


Faculty Advisor

Program Director, Infectious Disease Fellowship,
Beth Israel Deaconess Medical Center

Associate Professor, Medicine
Harvard Medical School

Richard Wolfe



Faculty Advisor

Chief of Emergency Medicine,
Beth Israel Deaconess Medical Center

Associate Professor of Emergency Medicine,
Harvard Medical School

Fellows

Catharina Giudice

2023 - 2025

Climate and Human Health Fellow
Emergency Medicine Clinical Track

Dr. Giudice is an emergency physician who joined the fellowship after completing her residency in Emergency Medicine at Los Angeles General Medical Center (former LAC+USC Medical Center) and medical school at the University of Colorado School of Medicine. Her current work focuses on understanding operationalization of climate preparedness within healthcare systems. She is evaluating the impacts of temperature and air pollution on out-of-hospital cardiac arrests and emergency department acuity. She is currently a guest researcher at the US Centers for Disease Control and Prevention (CDC), where she is focusing on projects to improve health during extreme heat.

Noah Rosenberg

2024 - 2026

Infectious Disease Fellow
Climate Change and Infectious Diseases Track

Dr. Rosenberg attended medical school at NYU before joining BIDMC for residency and chief residency. His research interests are at the intersection of infectious disease and climate change. His recent work also includes studying effects of heat exposure on readmission rates. He is excited to be pursuing the Climate Change and Infectious Diseases Track within the fellowship program to further study its effect on vector-borne, water-borne, and zoonotic diseases.

Fellows

Layota Storr

2023 - 2024

Fellowship Alumna

Dr. Latoya E. Storr, MBBS, is an Emergency Medicine Specialist and Consultant Physician in the Accident & Emergency Department at the Rand Memorial Hospital on the island of Grand Bahama in the Bahamas. Dr. Storr completed her medical school and residency training at the University of the West Indies and is an Associate Lecturer for the Emergency Medicine program at the University of the West Indies School of Clinical Medicine & Research in the Bahamas. She completed a Fellowship in Disaster Medicine in 2023 at Beth Israel Deaconess Medical Center and Climate and Human Health training in 2023-2024.

Kimberly Humphrey

2022 - 2023

Fellowship Alumna

Dr. Kimberly Humphrey is a senior emergency medicine physician, public health practitioner, and a graduate of the Climate Change and Human Health Fellowship. As the State Lead for Climate Change and Health for the Government of South Australia and a Clinical Senior Lecturer at the University of Adelaide, she is responsible for creating and implementing mitigation and adaptation policy and action for South Australia's health system. Dr Humphrey is a Board member of Doctors for the Environment Australia and holds multiple national and international committee and board appointments in emergency medicine, public health, and climate change.

Graduate Student Affiliates

Neil Singh Bedi

2024 - 2025

Neil Singh is working with our team to study the operational implications of climate-responsive hazards using medical records and geospatial data sets. His past work has included analyzing the exposure of hospitals in California to wildfires and analyzing the implications of climate change for healthcare in urban settings; his work has been published in the American Journal of Public Health.

Zilin Lu

2023 - 2024

Zilin worked with our team to assemble data on Emergency Department utilization and align it with local weather data from the National Weather Service. Her research helped identify relationships between heat and operationally relevant ED metrics.

Graduate Student Affiliates

Emma Webb

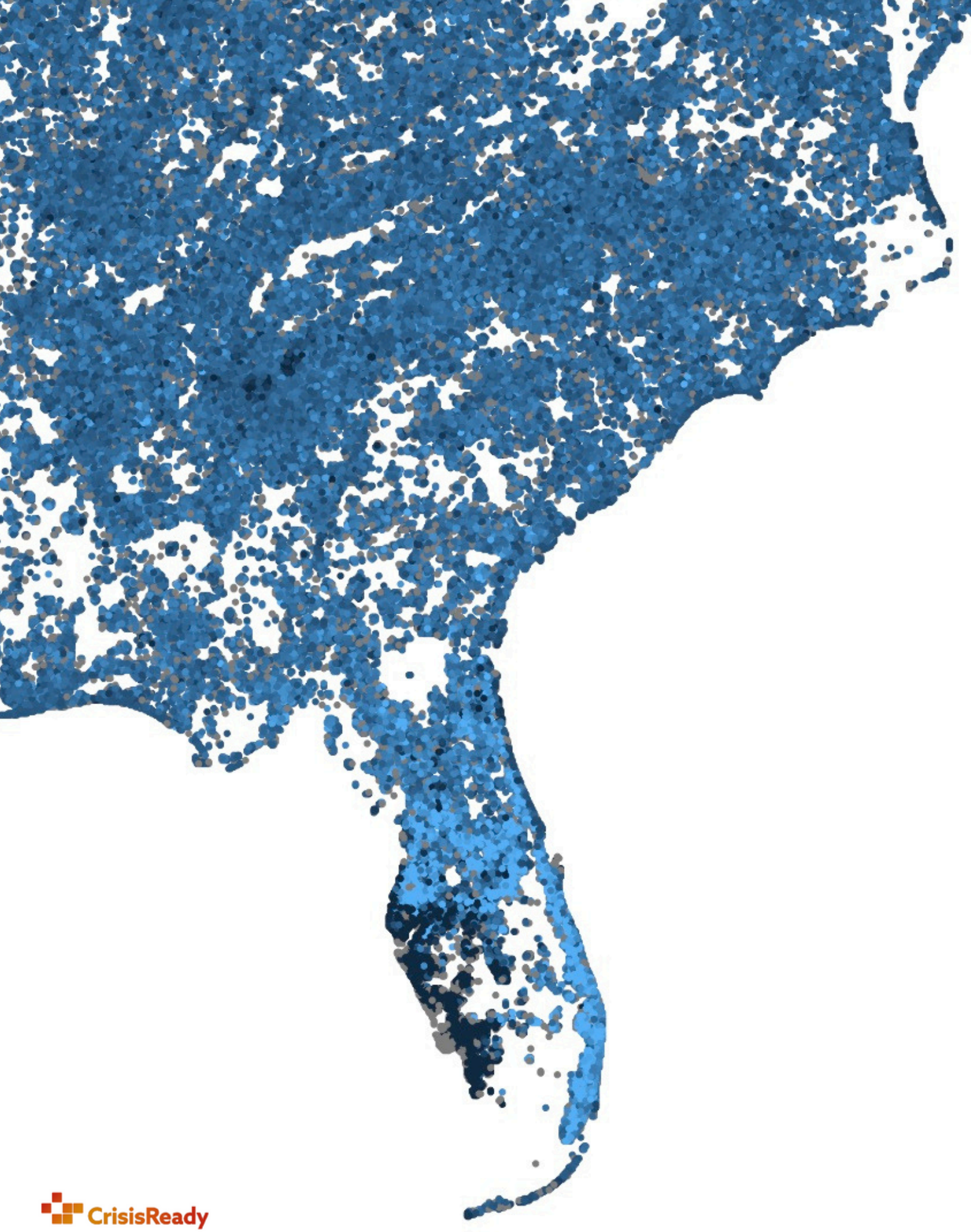
2020 - 2021

Emma worked with our team to study the exposure of patients who use electricity-dependent medical equipment to a locally relevant climate-responsive hazard, specifically storm surge flooding from hurricanes. Her research showing that a substantial number of patients who use home nebulizers live in areas at risk of flooding during future hurricanes was published in the Rhode Island Medical Journal.

Athanasios Burtolos

2022 - 2023

Athanasios worked with our team to analyze the relationship between local weather conditions and Emergency Department daily arrival volume at our medical center and led a project examining mortality in Portland during the 2021 heat dome. His work on mortality in Portland was published in Disaster Medicine and Public Health Preparedness, while his ED operations research was selected for the Master Scholar session at SAEM 2023, and is currently under review for publication.



CrisisReady

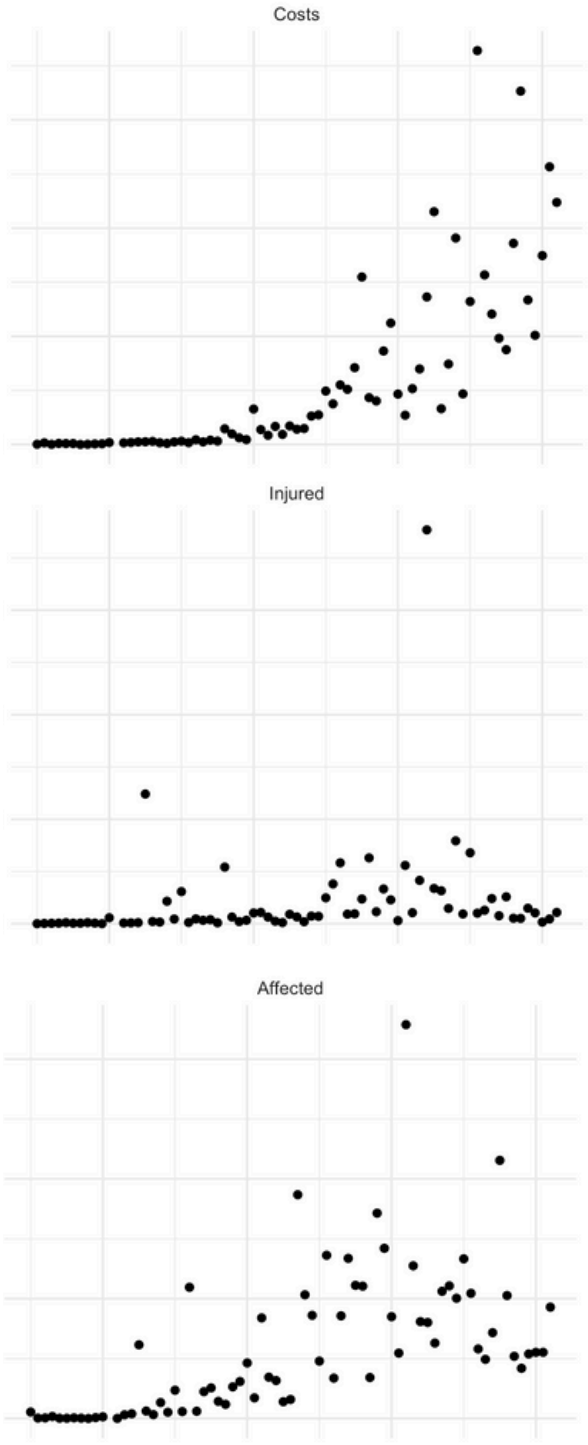
PROJECTS

Research is a core component of our fellowship program. All fellows undertake scholarly works throughout the course of their fellowship training, and are expected to develop relevant skills and work with appropriate experts to complete their research in a rigorous manner.

Collaboration across disciplines is a core element of the research experience. Our fellows have worked with data scientists, geographers, social scientists, disaster specialists, epidemiologists, and other experts to develop and conduct their research projects. The rich collaborative environment in which they work helps expose physician fellows to the complexities of adjacent fields and trains them to work across disciplinary boundaries.

The projects undertaken by each fellow are selected carefully on the basis of their personal interests, professional goals, and regional focus in discussion with fellowship faculty.

Research projects by our fellows have included analysis of Emergency Department utilization in relation to weather variables, surveys of medically vulnerable individuals in communities impacted by climate hazards, needs assessment surveys of healthcare workers, implementation assessments of ongoing projects, and development and testing of educational interventions.



Dresser C, Storr L, Jennifer Leaning J. Disasters and Emergency Planning, Editor(s): Stella R. Quah, International Encyclopedia of Public Health (Third Edition), Academic Press, 2025, pp 759-772

Wildfires

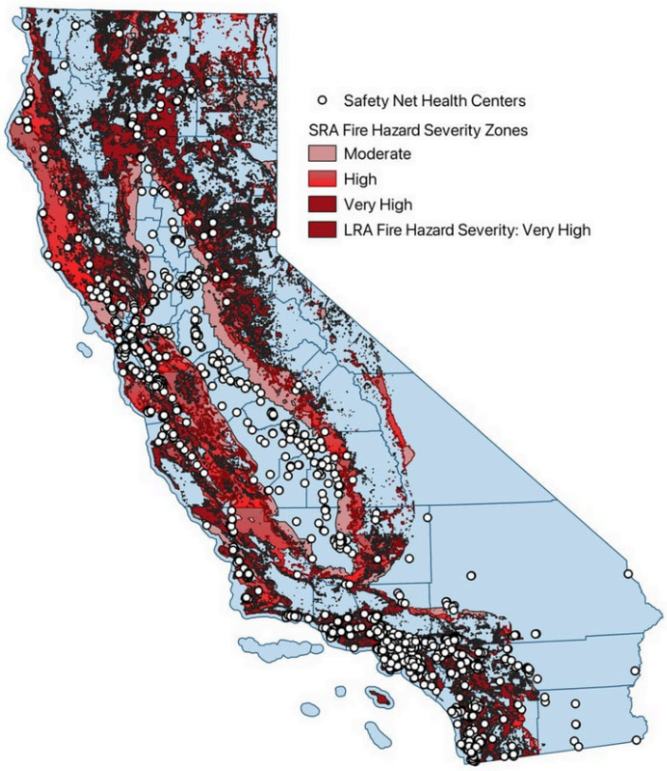
Climate change is leading to increasingly dangerous wildfires. Hot, dry summers with high winds and wet winters that promote the growth of flammable vegetation mean that larger wildfires are threatening more people in more places. While other factors including land use changes, settlement of wildland urban interfaces, human ignition sources, and other factors also play a role, there is substantial scientific evidence that wildfire will be an increasing health threat as climate change intensifies.

It is becoming increasingly important to understand how wildfires and wildfire smoke impact patients, healthcare access, and the operations of healthcare systems - and how to prepare for and respond to these events.

Our fellows, faculty, and affiliated graduate students have worked on a wide range of projects related to wildfires and the threat they pose to health and health-care in our changing climate. Starting in the fall of 2019, our program began engaging with officials and public health professionals who were dealing with increasingly intense wildfires and related public safety power shutoffs in California. This led to development of a survey to understand how medically vulnerable patients are being affected by wildfires and related evacuations. A survey of older adults following the Oak Fire in California found that wildfires are leading to interruptions in regular medical care that patients felt was affecting their health.

In parallel, other members of our team have examined what wildfires mean for human mobility and for healthcare facilities. Working with the team at CrisisReady (co-directed by fellowship director Satchit Balsari), members of our program contributed to the development of the ReadyMapper tool and lead spatial analyses of the threat posed by wildfires to healthcare facilities in California. The first component of this analysis has been published in the American Journal of Public Health.

More recently, our faculty and fellows have worked with collaborators at AmeriCares to develop and expand resources for patients, providers, and healthcare administrators in primary care and free clinics that are dealing with the effects of wildfires and wildfire smoke. These resources include action plans, tip sheets, and checklists for health professionals working to improve the readiness of their clinics for the impacts of wildfires on both their facility and their patients.



Heat

Dangerous heat is one of the preeminent concerns among medical and public health professionals who are studying and preparing for the impacts of climate change. A warmer planet means more extreme heat, a longer heatwave season, and in many cases higher humidity levels, all of which pose a substantial threat to human health. The frequency of heatwaves in major US cities has doubled since the 1960s; impacts in low and middle income countries are of even greater concern, as extreme temperatures, lack of worker protections, inadequate access to cool spaces, and in some cases limited access to water combine to create a looming public health disaster.

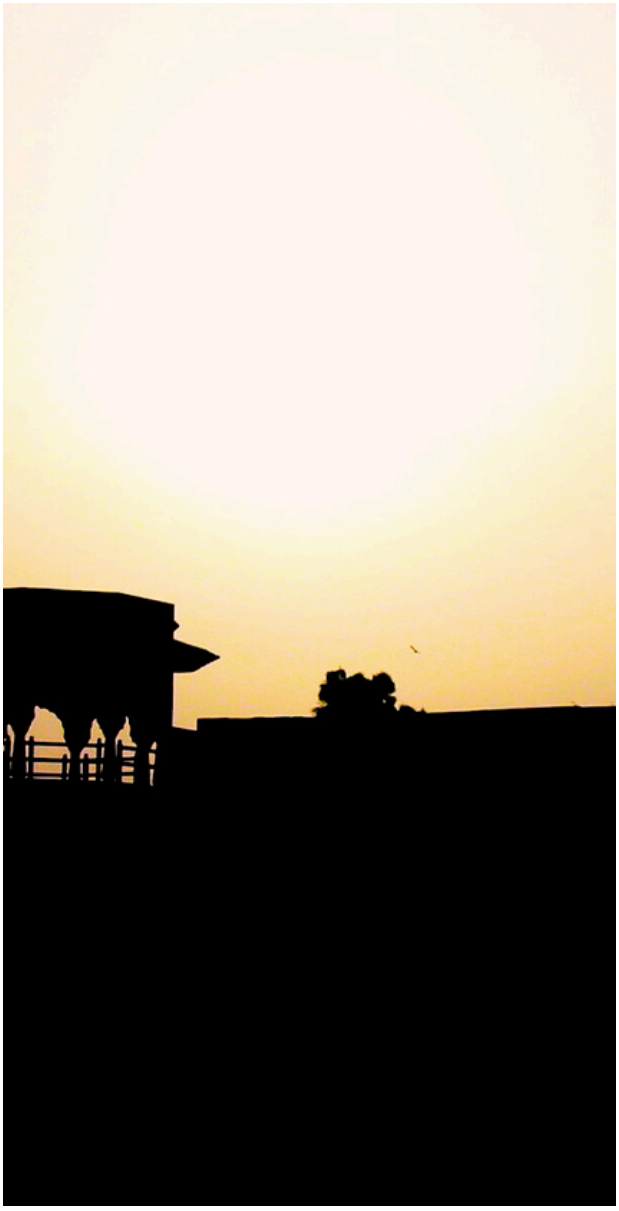
Our faculty and fellows are engaging with heat and heat related illness through a wide variety of activities. These have ranged from academic research to community engagement, policy, education, and the development of a toolkit and heat alert system for health professionals.

Early work on heat by members of our team included collaborating with faculty and fellows at with the University of Colorado Climate Medicine program on a review and the development of a identification and management pathway for heat stroke patients in emergency department settings.

As the scale of the threat posed by heat in our changing climate has become clear, members of our program have devoted an increasing amount of effort to identifying, developing, and testing solutions that have the potential to help avert health harms from extreme heat. Our work has focused on projects in the United States, India, and the Philippines.

Educational resources are one important approach. Public awareness of the threat posed by extreme heat remains limited in comparison to awareness of other climate hazards such as severe storms and sea level rise – yet heat is among the most immediately lethal health threats resulting from climate change, and the population exposed to dangerous heat annually worldwide is now in the billions. Work by members of our team has included development of educational video materials aimed at informal sector workers in India, expansion of the heat resources in the Harvard C-CHANGE / Americares Climate Resilience for Frontline Clinics toolkit, and delivery of community engagement sessions and medical lectures on the topic of heat related illness.

Early warning systems are another area in which there is opportunity to improve health protection from extreme heat. Many clinicians are not aware of the dangers their patients may be facing from extreme heat, or steps they can take to address them. Working with the Harvard Chan Center for Climate, Health, and the Global Environment and Climate Central, members of our program have helped develop a heat alert system for clinicians that combines forecasts from the CDC/NWS HeatRisk system with information on populations at risk and resources for heatwave safety .



Understanding heat exposure and impacts on populations in highly exposed, under resourced settings is of increasing importance. An ongoing project in India with a wide range of collaborators supported by the Harvard Salata Institute is deploying heat sensors to better understand heat exposure and its impacts on workers in the informal sector; one of our recent graduates has received a Burke Research Fellowship from the Harvard Global Health Institute to advance this work.

Tropical Cyclones

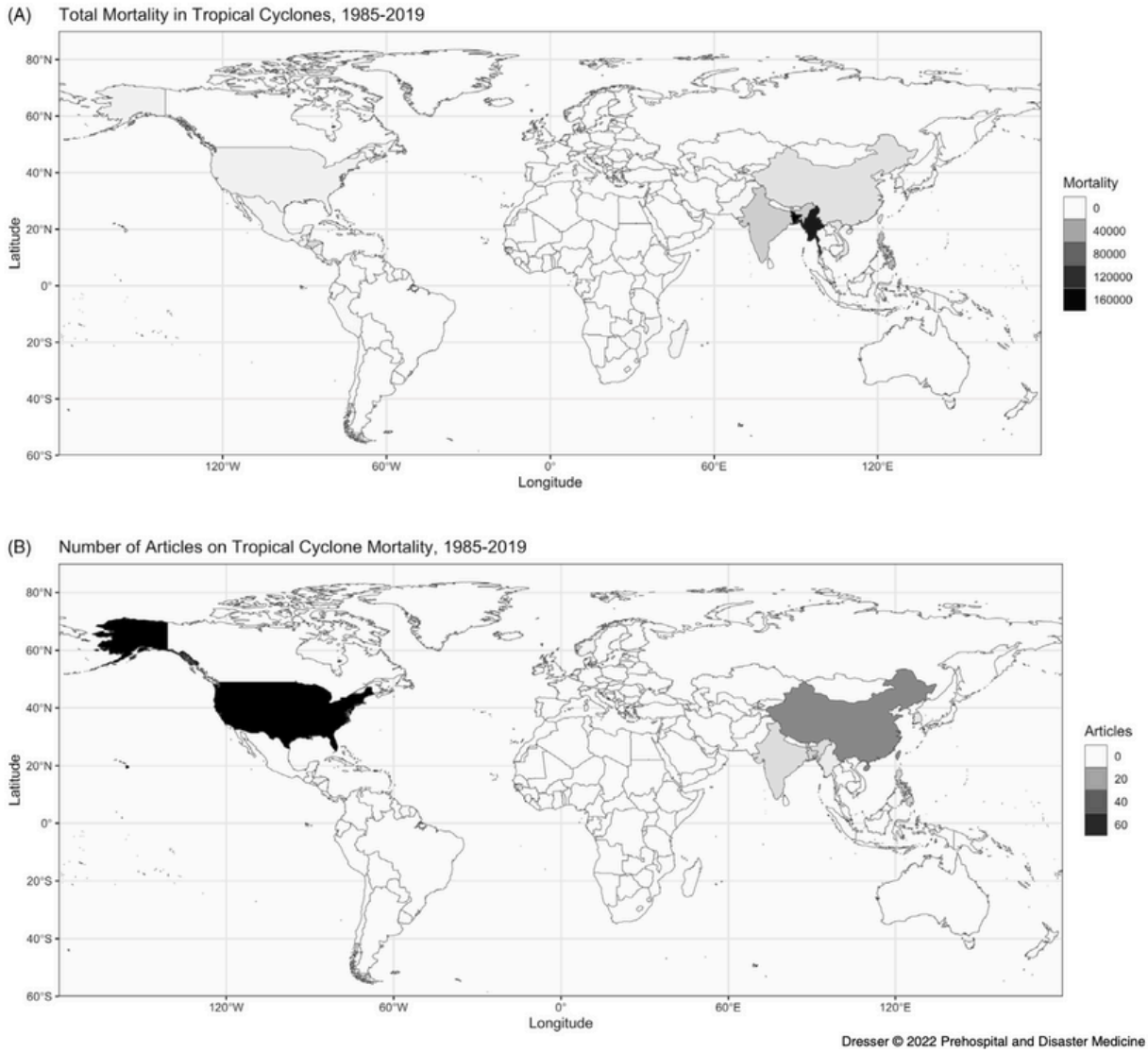
Tropical cyclones - also referred to as hurricanes and typhoons - are becoming increasingly dangerous as a result of climate change. The underlying dynamics are complex, and appear to result from increases in sea surface temperature, the increased moisture carrying capacity of warmer air, and other atmospheric factors.

While the exact effect of these influences is still being determined by scientists, trends toward increasing hurricane intensity and rainfall, increased risk of rapid intensification, decreased translocation, and poleward shift of the most intense phases of storms have been observed in many ocean basins. All of this is happening against a background of rising sea levels which increase the potential for destructive storm surges in coastal areas.

From a health standpoint, this means that these storms are becoming increasingly destructive, and are affecting people further from the equator. Prior to the creation of the Climate and Human Health fellowship, our future inaugural fellow published an analysis which showed that high wind speed and low per capita GDP are associated with increased fatalities during hurricanes in the Caribbean. The following year, our future fellowship director worked with faculty and students at multiple institutions to lead an assessment of mortality following Hurricane Maria in Puerto Rico, touching off an explosion of research on the impacts of the storm, which ultimately led to a upward revision of the official fatality count by thousands of deaths.

Since the creation of the Climate Change and Human Health fellowship, our fellows and faculty have engaged with tropical cyclones and climate change through a variety of projects. Early projects included analyses of the misalignment between where research on tropical cyclone mortality is conducted and where people are actually dying, reference articles for encyclopedias and textbooks, and a study assessing the hazard exposure of patients who use home nebulizers to coastal flooding.

More recently, one of our fellows worked with Harvard C-CHANGE and Americares to create expanded resources for patients, healthcare providers, and healthcare administrators that provide guidance on steps they can take before, during, and after hurricanes to prevent health harms and healthcare impacts. Another fellow conducted a study assessing the recurrence risk of disasters including tropical cyclones in Caribbean island nations – and then returned home to the Bahamas, where she will help improve preparedness for future storms.



Dresser C, Hart A, Kwok-Keung Law A, Yen Yen Poon G, Ciottone G, Balsari S. Where are People Dying in Disasters, and Where is it Being Studied? A Mapping Review of Scientific Articles on Tropical Cyclone Mortality in English and Chinese. Prehosp Disaster Med. 2022 Jun;37(3):409-416.

SELECT PUBLICATIONS

Toward a Climate-Ready Health Care System: Institutional Motivators and Workforce Engagement
Dresser, Johns, Palardy, McKinnon, Breakey, Ros, Nicholas
Milbank Quarterly, 2024

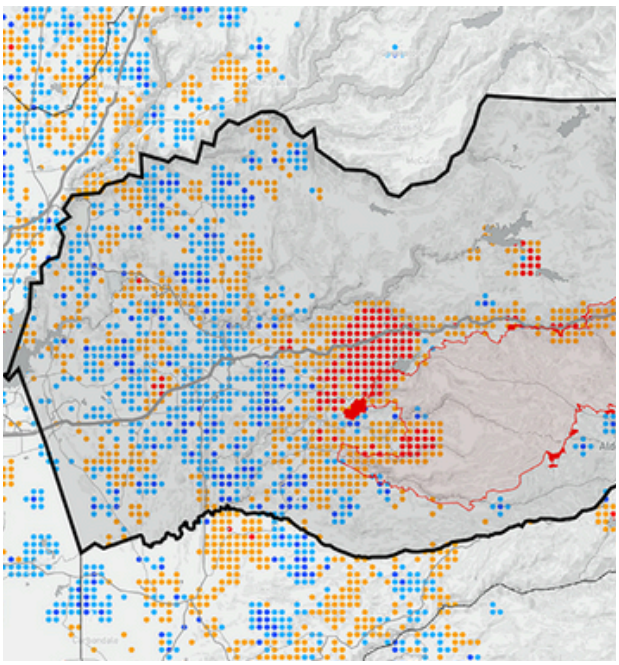
What we found: motivated institutions and an engaged health care workforce are essential to the development, implementation, and maintenance of a climate-ready US health care system.

Why it matters: policies must be developed to address institutional barriers to change and create incentives aligned with climate readiness goals.

CrisisReady's novel framework for transdisciplinary translation: Case-studies in wildfire and hurricane response
Schroeder, Dresser, Yadav, Chan, Jia, Buckee, Balsari
Journal of Climate Change and Health, 2023

What we did: we describe use of an interactive data visualization tool to track population mobility, infrastructure damage, and health system capacity during wildfires in California and Hurricane Ida in Louisiana.

Why it matters: The Data-Methods-Translational framework is a scalable approach to co-creating useful products with policy makers and response agencies.

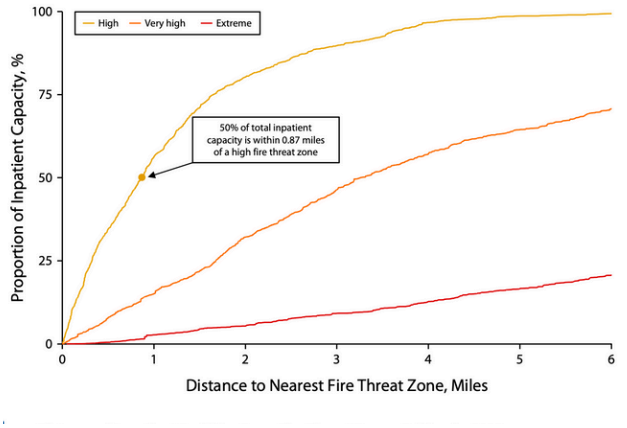


Select Publications

Climate Change, Migration, and Civil Strife
Balsari, Dresser, Leaning
Curr Environmental Health Reports, 2020.

What we found: migration is now recognized not only as a consequence of instability but as an adaptation strategy to the changing climate.

Why it matters: as climate change intensifies, migration must be anticipated as a certainty, and thereby planned for and supported.



Balsari S. Wildfire Threat to Inpatient Health Care Facilities in California, 2022
Bedi, Dresser, Yadav, Schroeder, Balsari
Am J Public Health. 2023

What we found: half of California's total inpatient hospital bed capacity is within 0.87 miles of a high fire threat zone and 95% is within 3.7 miles of a high fire threat zone.

Why it matters: policies should address facility-level preparedness including smoke mitigation, sheltering measures, evacuation procedures, and resource allocation. Regional evacuation needs, including access to emergency medical services and patient transportation, must also be considered.

Select Publications

Portland's response to the Western North American heatwave: A brief report
Burlotos, Dresser, Shandas
Disaster Medicine and Public Health Preparedness, 2023

What we found: in housing units with air conditioning, no deaths occurred. The majority of those who died had access to only a fan for cooling, and a significant portion had no fan and no air conditioning.

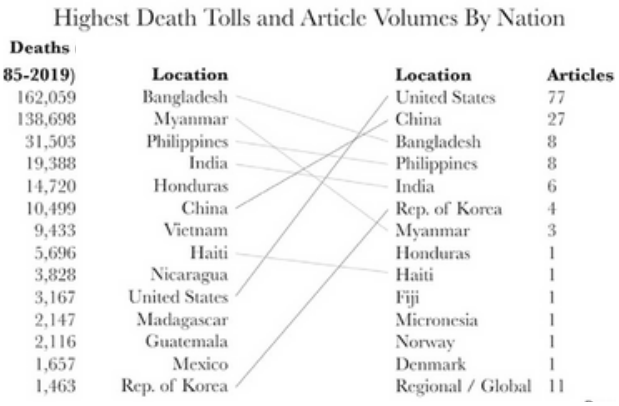
Why it matters: existing response-based efforts are necessary but are unable to prevent all heat-related mortality. Ensuring vulnerable people have cooling in their place of residence should be an immediate priority.

Intervention	Timeline	Notes/examples
Begin voluntary screening at health-care facilities to identify high-risk individuals.	Immediate	Those with medical risk factors could be screened for resources to support A/C access.
Provide A/C units to previously identified high-risk individuals without A/C access.	Immediate	Window air conditioning units are relatively affordable and can be easily retrofitted onto older buildings. Distribution programs have been used in New York and Massachusetts.
Formally organize the existing workforce of trained A/C technicians so that they are prepared to respond during extreme heat events.	Immediate	Technicians could confirm proper installation of window A/C units for high-risk individuals, as improper installation contributed to mortality during the 2021 heatwave in Portland. Additionally, technicians could travel regionally to areas of increased demand during a heatwave event, similar to the pooling of EMS resources during other natural disasters.
Limit employment involving outdoor work, or hot indoor work, to essential activities.	Immediate	Work-related outdoor activity contributes to mortality among younger individuals, despite lower baseline vulnerability. Limiting heat exposure across the population could reduce the number of excess EMS calls and emergency department visits during heatwaves.
Continue to provide emergency shelters during extreme heat events; specifically, ensure overnight availability of shelters. Improve access to shelters by opening multiple shelters in vulnerable communities, as opposed to relying on large, centrally placed shelters.	Immediate	Nighttime heat exposure is understood to be a key driver of mortality. Decentralized shelters are favored as extreme heat can disrupt public transportation infrastructure (which occurred in Portland). Factors such as limited mobility and poverty that increase risk during a heatwave often also make travel difficult.
Advocate for the inclusion of effective cooling as a legal obligation of landlords to provide tenets, especially in northern states which historically do not require this.	Short Term	After significant advocacy, the State of Oregon passed the "Right to Cooling Bill" following the 2021 extreme heat event, which prevents landlords from restricting tenet's access to air conditioning. In Vancouver, a new by-law requires the ability to maintain 26°C or lower temperatures in everything built after 2025. Future policies could make effective cooling to be a mandatory provision from landlords to tenants, similar to the status of heating in many areas.
Establish WiFi-enabled temperature monitors to track and provide real time alerts of dangerous temperatures in public housing, prisons, and other high-risk areas.	Short Term	Current project sponsored by the City of Portland's Bureau of Emergency Management and in partnership with Home Forward, CAPA Strategies LLC, and Multnomah County Public Health.
Develop municipal level multi-pronged heat action plans focused on community engagement when selecting among other strategies mentioned in this table.	Short Term	Community engagement aids in disseminating information regarding the threat of extreme heat, building local capacity, and selecting appropriate methods for the context and specific vulnerable communities.
Work with city planners to curb the urban heat island effect.	Medium Term	New York City commissioned the "CoolRoofs" project, which has coated roofs throughout the city with a white paint. This increases solar reflectance of the roofs and reduces radiative energy absorption. The City of Portland commissioned the "Planting a More Equitable Urban Forest" report, which aims to focus on low-income low-tree canopy neighborhoods.
Improve the resilience of the electrical grid.	Medium Term	A sustained power outage during a heatwave is a probable climate disaster in the United States. This could result in clinically significant extreme heat exposure to most of the population in many metropolitan areas of the United States.
Ensure resilience to hot summer climate is a focus when constructing new buildings in an urban setting.	Medium Term	New buildings should use a combination of urban form, passive measures, and mechanical cooling to become heat resilient. Passive cooling measures which have been used in hot environments for many years should be drawn upon to reduce the reliance on active cooling. Examples of these technologies include shutters, awnings, light colored building materials, and courtyards.
Increase climate change mitigation.	Long Term	Climate change mitigation, for example through reducing greenhouse gas emissions, can address the root cause of increasing extreme heat exposure.

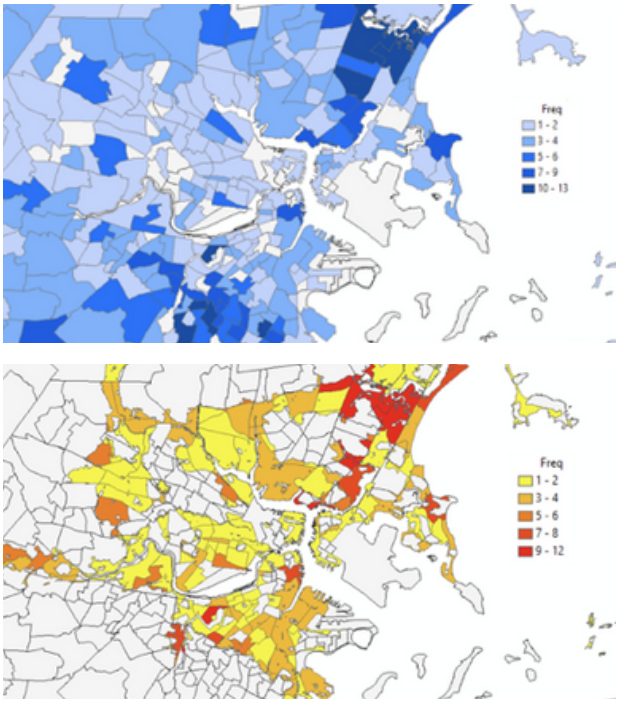
Where are People Dying in Disasters, and Where is it Being Studied? A Mapping Review of Scientific Articles on Tropical Cyclone Mortality in English and Chinese
Dresser, Hart, Law, Poon, Ciottone, Balsari
Prehospital and Disaster Medicine, 2022

What we found: there is a misalignment between where research on tropical cyclone mortality is being conducted and where the burden of mortality from these disasters is occurring.

Why it matters: increased study of tropical cyclone mortality in the most impacted locations should be prioritized.



Select Publications



Who's at Risk in a Changing Climate? Mapping Electricity-Dependent Patient Populations in a Coastal City
Webb, Balaji, Nathanson, Balsari, Dresser.
Rhode Island Medical Journal, 2021

What we found: a quarter of the patients at a major hospital in a coastal city who use home nebulizers are in locations that would be at risk of flooding in a major hurricane.

Why it matters: patients who rely on electricity-powered medical equipment are vulnerable to climate shocks that disrupt critical utilities. Healthcare systems and cities need to be prepared to meet the needs of this population during hurricanes and other disruptive events linked to climate change.

Designing digital health applications for climate change mitigation and adaptation
Lokmic-Tomkins, Borda, Humphrey
The Medical Journal of Australia, 2023

What we say: environmentally responsible digital health depends on transformation of care models and health system infrastructures to embed “green” approaches to routine practice along the continuum of design, implementation, evaluation, and consumer use.

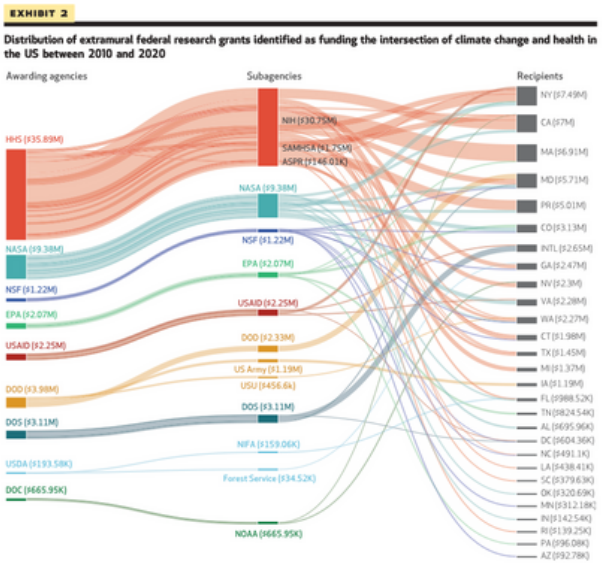
Why it matters: digital health can positively contribute to climate action if implemented and maintained with environmental sustainability in mind.

Select Publications

Extramural US Federal Research Grants For Health Outcomes Associated With Climate Change Inadequate, Too Narrow In Focus.
Sorensen, *Dresser*, Balakumar, Wheat, Yates, Healy, Brown, Butala, Lehmann, Malina, Redelmeier, Hess, Salas.
Health Affairs, 2023

What we found: federal funding for climate and health research between 2010 and 2020 did not align with level of need or populations that are believed to be at risk.

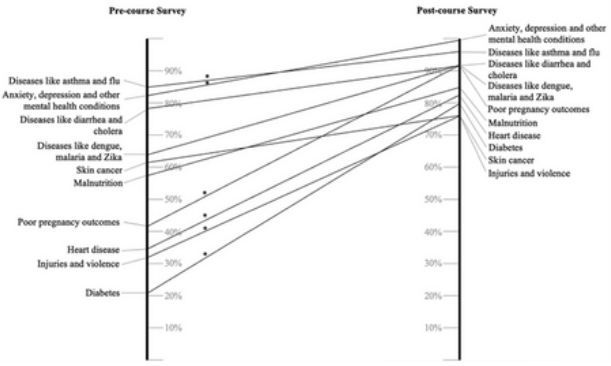
Why it matters: measuring funding helps highlight gaps and provides an impetus for more appropriate levels of investment.



Building capacity of healthcare professionals and community members to address climate and health threats in The Bahamas: Analysis of a green climate fund pilot workshop.
Hamilton, Philippe, Hospedales, *Dresser*, Colebrooke, Hamacher, Humphrey, Sorensen.
Dialogues in Health, 2023.

What we found: a climate and health workshop led to increased awareness of climate health threats amongst healthcare workers and members of civil society.

Why it matters: this study provides support for the usefulness of sensitization workshops on climate change and health for mixed professional audiences.

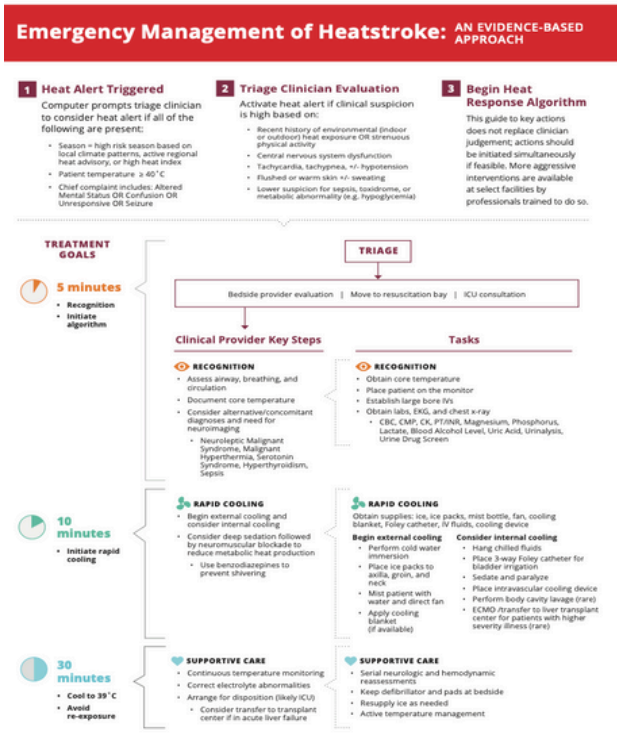


Select Publications

The United Nations Framework Convention on Climate Change (UNFCCC) 28th Conference of the Parties, Dubai (COP28): Implications for lung disease.
Beggs, Oliveira, *Giudice*.
Respirology, 2024

What we say: Healthcare providers have the opportunity to educate their patients on how climate change and pollution can impact their respiratory health, and how to stay healthy during heat waves, other weather extremes, and periods of elevated air pollution.

Why it matters: the present moment offers an opportunity to decarbonise our healthcare sector and invest in adaptation strategies.



Evidence-Based Heatstroke Management in the Emergency Department.
Rublee, *Dresser*, *Giudice*, Lemery, Sorenson.
Western J of Emergency Medicine, 2021

What we found: evidence supports rapid identification and cooling of heatstroke patients. Early measurement of core body temperature and immersion cooling should be prioritized.

Why it matters: acute management of heatstroke can save lives and improve outcomes. The diagnostic and management algorithm we developed provides a roadmap for health professionals and healthcare systems working to optimize care for people who experience this exquisitely time-sensitive emergency.

ENGAGEMENT

The Climate and Human Health Fellowship has a strong tradition of public engagement on climate change, its health impacts, and steps that can be taken to address them. Our faculty and fellows have participated in legislative briefings, amicus briefs, and other formal procedures for educating key decision-makers on the health impacts of climate change.

Fellows have also participated in externships with federal agencies, academic journals, and nonprofit organizations. Through these experiences, they have been able to participate in the development of policy guidance documents, resilience toolkits, academic publishing initiatives, and educational materials. Fellows gain first-hand exposure to how key organizations take action at the intersection of climate change and health - experience that helps prepare them for future leadership roles.

Past and present fellows have engaged in research collaborations, education activities, externships, or other activities with the following organizations:

- U.S. Centers for Disease Control and Prevention (CDC)
- U.S. Office of Climate Change and Health Equity (HHS)
- National Institute of Environmental Health Sciences (NIEHS)
- Americares
- CrisisReady
- The Journal of Climate Change and Health
- Global Consortium on Climate and Health Education
- University of Colorado Climate Medicine Program
- Communities Responding to Extreme Weather (CREW)
- Resilient Mystic Collaborative
- Mystic River Watershed Association

Media


The Boston Globe
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The Canberra Times
The Sydney Morning Herald
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BUSINESS INSIDER
Bloomberg
NBC 10 BOSTON


Health Relevance of Postal
limate Exposure History
Pouné Saberi, MD, MPH; PSR Pennsylvania, mod
Esther Obonyo, PhD; Penn State University
Julie Becker, MA, PhD, MPH, PSR Pennsylvania,
Tess Wiskel, MD, Crozer Health


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GETTING
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RISING

APPLY

The Fellowship in Climate and Human Health is designed to prepare physicians for leadership roles at the intersection of climate change, health, and healthcare.

We recognize that physicians at different points in their career who come from different parts of the world may have varying educational needs. As a result, we now offer a variety of fellowship formats for applicants interested in receiving dedicated climate and health education while taking advantage of the rich in-person learning, research, and networking opportunities at our Harvard-affiliated teaching hospital and collaborating centers across Harvard's campus.

Prospective applicants who are interested in learning about the Physician Fellowship in Climate Change and Human Health can view current fellowship format options and learn more about the application process on our website by scanning this QR code:

https://www.climateandhumanhealth.org

Physician Fellowship in Climate Change and Human Health

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