



National Institutes of Health  
*Turning Discovery Into Health*

# NIH Climate Change and Health Initiative 2024 Annual Report





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# CCHI Executive Committee Message

Climate change is affecting global human health outcomes in both direct and indirect ways. In the United States, NOAA has confirmed that 24 weather- and climate-related disaster events exceeding \$1 billion in damages were experienced in the period between January and October of this year alone, as of November 1, 2024.<sup>1</sup> Some of these include Hurricanes Helene and Milton, floods in the Midwest, wildfires in New Mexico, and rain and hailstorms in Colorado. Over the course of three and a half months, extreme heat in India killed more than 100 people, many of whom were outdoor workers exposed to temperatures reaching as high as 116 degrees Fahrenheit.<sup>2</sup> On July 22, 2024, the hottest day ever on Earth was recorded, with an average global temperature of 62.8 degrees Fahrenheit.<sup>3</sup> Phoenix, AZ faced a record of 113 consecutive days of temperatures at or above 100 degrees Fahrenheit.<sup>4</sup> As climate-change related disasters and exposures become more frequent and detrimental to human health, NIH must continue to undertake the research needed to understand and address the health impacts of our changing climate—especially for vulnerable populations in the U.S. and globally.

The NIH-wide Climate Change and Health Initiative (CCHI) formally launched in 2021, released its strategic framework in 2022, received its first \$40M Congressional appropriation for climate change and health research in 2023, and was funded at the same level in 2024. The CCHI continues to build upon its robust foundation and strives to conduct activities that expand the scientific evidence and knowledge of global climate change health threats across vulnerable populations and the lifespan while providing funding and resources to an impactful research community.

Over the past year, the CCHI has put in place a number of programs that specifically focus on building transdisciplinary collaborations. NIH continues to stress community engagement to ensure health equity and just solutions to our planet's most complex environmental threats. The CCHI prioritizes research to better identify and address the complex direct and indirect threats of climate change on health. To promote transdisciplinary research strategies, the CCHI will continue working with its partners to align NIH research efforts with those of other federal agencies that are working in this space, helping to create comprehensive approaches that address the many facets of climate change health impacts.

## Governance

Administratively housed in the National Institute of Environmental Health Sciences (NIEHS), the CCHI has grown to involve over 200 staff from across 31 NIH Institutes, Centers, and Offices (ICOs) in the Initiative's Climate Change and Health Working Group. The CCHI Executive Committee has grown in 2024, as well, to 12 NIH member institutes and centers. Dr. Rick Woychik is the Chair of the Executive Committee and Dr. Kathleen Neuzil is the Co-Chair. The NIH ICs working together in a strong collaboration include National Institute of Environmental Health Sciences (NIEHS), Fogarty International Center (FIC), the National Cancer Institute (NCI), the National Center for Complementary and Integrative Health (NCCIH), the National Heart, Lung, and Blood Institute (NHLBI), the National Institute on Aging (NIA), the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute on Minority Health and Health Disparities (NIMHD), National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the National Institute of Mental Health (NIMH), and the National Institute of Nursing Research (NINR). Efforts to build strong collaboration across all NIH ICOs are yielding new and expanded participation, as well as expertise.

## NIH Climate Change and Health Initiative Executive Committee



**Rick Woychik, Ph.D.**  
**(Chair)**  
National Institute of  
Environmental Health  
Sciences (NIEHS)



**Gary Gibbons, M.D.**  
National Heart, Lung, and  
Blood Institute (NHLBI)



**Eliseo Pérez-Stable, M.D.**  
National Institute on  
Minority Health and Health  
Disparities (NIMHD)



**Shannon Zenk, Ph.D.,  
M.P.H., RN, FAAN**  
National Institute of  
Nursing Research (NINR)



**Diana Bianchi, M.D.**  
Eunice Kennedy  
Shriver National Institute  
of Child Health and Human  
Development (NICHD)



**Richard Hodes, M.D.**  
National Institute on  
Aging (NIA)



**Kathleen Neuzil  
M.D., M.P.H.**  
**(Co-Chair)**  
Fogarty International  
Center (FIC)



**Joshua Gordon,  
M.D., Ph.D.**  
National Institute of  
Mental Health (NIMH)



**Jeanne Marrazzo,  
M.D., M.P.H.**  
National Institute of  
Allergy and Infectious  
Diseases (NIAID)



**Helene Langevin, M.D.**  
National Center for  
Complementary and  
Integrative Health (NCCIH)



**Lindsey Criswell, M.D.,  
M.P.H., D.Sc.**  
National Institute  
of Arthritis and  
Musculoskeletal and Skin  
Diseases (NIAMS)



**W. Kimryn Rathmell,  
M.D., Ph.D., M.M.H.C.**  
National Cancer  
Institute (NCI)



**Executive Committee**

- Composed of: NIEHS, FIC, NIMHD, NIMH, NINR, NICHD, NHLBI, NIAID, NIAMS, NIA, NCCIH, NCI
- Visioning and decision-making

**Steering Committee**

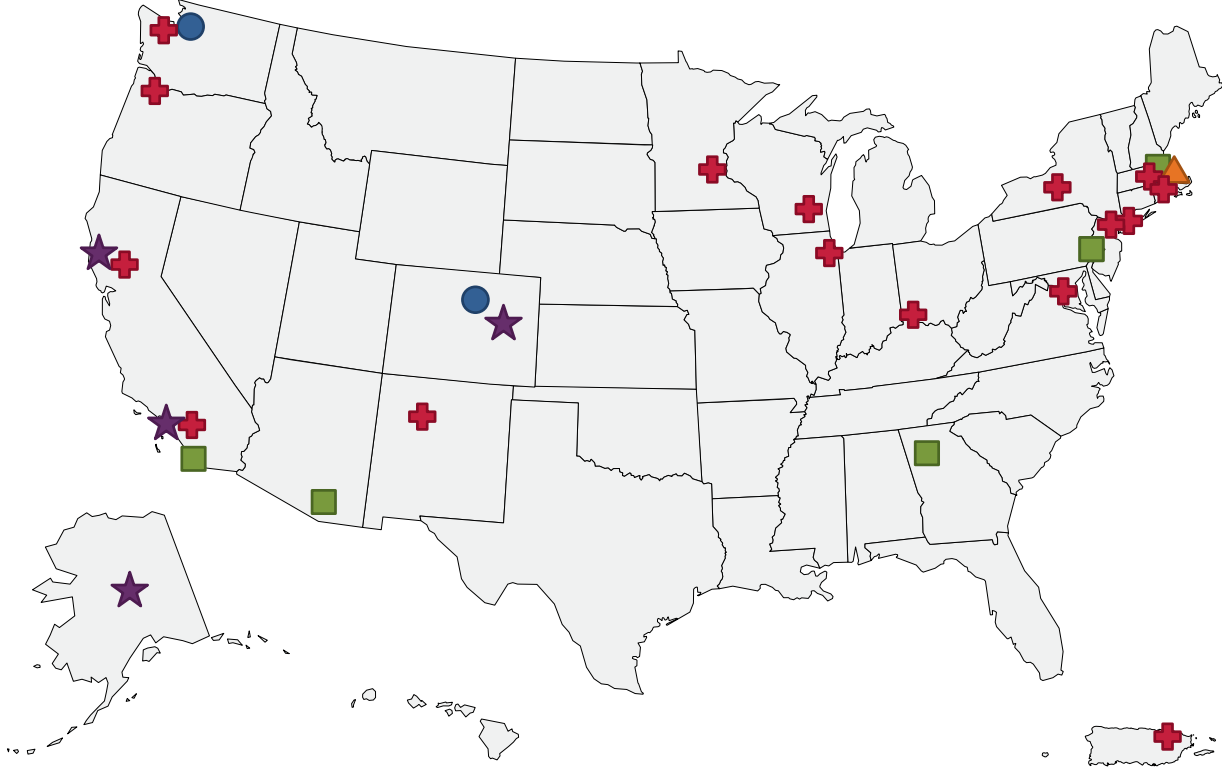
- Representatives of all EC ICs
- Planning, strategy, and implementation

**Climate Change and Health Working Group**

- 200+ members from 30 institutes, centers, and offices
- Interest group, engagement, and ideas

# Program Accomplishments

## Map of Current NIH CCHI Funded Activities



**▲ Research Coordinating Center**

- Boston University School of Public Health and Harvard T.H. Chan School of Public Health

**★ Alliance for Community Engagement Hubs**

- Colorado School of Public Health
- Public Health Institute
- University of Alaska, Fairbanks
- University of Southern California

**■ Exploratory Grants for Climate Change and Health Research Centers (FY23)**

- Drexel University\*
- Emory University
- Tufts University
- University of Arizona
- University of California, San Diego

**● National Science Foundation Collaborations**

- Natural Hazards Center- University of Colorado Boulder
- RAPID Facility- University of Washington

**✚ Exploratory Grants for Climate Change and Health Research Centers (FY24)**

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Brown University</li> <li>• Columbia University, Health Sciences†</li> <li>• Columbia University, New York Morningside</li> <li>• Comprehensive Cancer Center and University PR</li> <li>• Cornell University</li> <li>• George Washington University</li> <li>• Harvard School of Public Health</li> <li>• OCHIN, INC</li> </ul> | <ul style="list-style-type: none"> <li>• University of California, San Francisco</li> <li>• University of Cincinnati</li> <li>• University of Illinois, Chicago</li> <li>• University of Minnesota</li> <li>• University of New Mexico**</li> <li>• University of Southern California</li> <li>• University of Washington</li> <li>• University of Wisconsin, Madison</li> </ul> |
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- \* Funded by NIMHD
- \*\* Funded by NINR
- † Funded by NIA



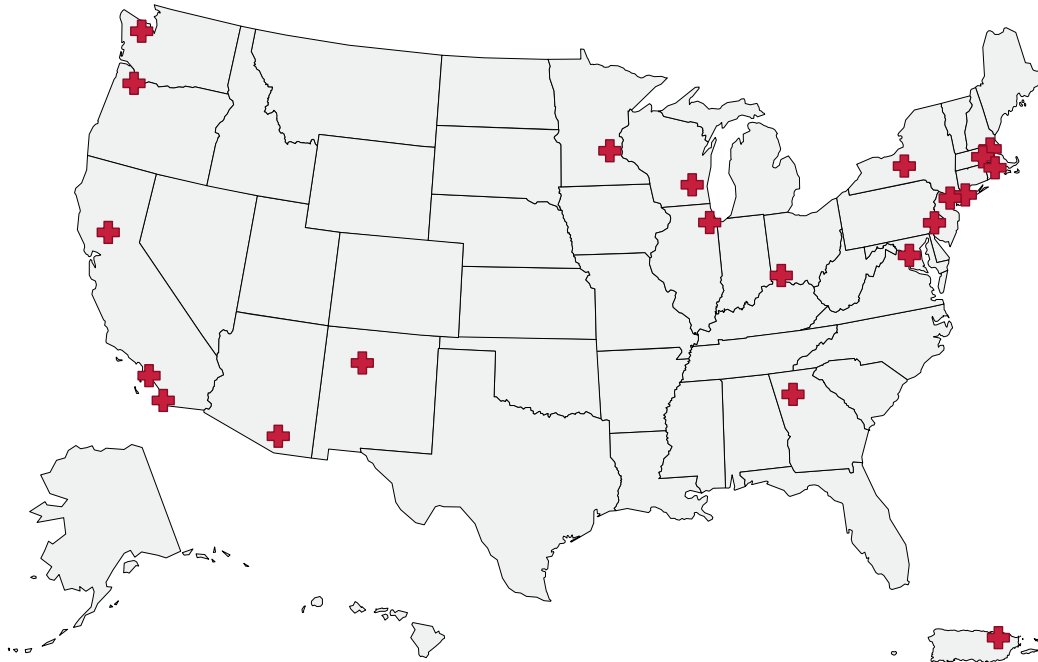
## Community of Practice

In 2023, the NIH CCHI [Research Coordinating Center](#), CAFÉ (Convene, Accelerate, Foster, and Expand), led by Boston University School of Public Health (SPH) and Harvard T.H. Chan SPH, began developing trainings, resources, and activities to build and support the climate and health research community of practice (CoP).

In 2024, CAFÉ:

- Hosted a three-day, virtual Climate and Health Conference in February 2024 with more than 900 CoP participants. Read the [Conference Report](#).
- Grew the climate and health CoP to over 2000 active members.
- Launched a mentorship program focused on grant writing that pairs mid-to-advanced career academics with researchers from underrepresented communities.
- Awarded [pilot project funding](#) to nine investigators in the U.S. and abroad to conduct preliminary research on innovative topics in climate and health.
- Provided an [educational webinar series](#) to the public on topics such as climate and data visualization, QGIS, and processing historic weather data for climate studies through CAFÉ university.
- Expanded the climate and health data available in Harvard Dataverse, which allows researchers to find, upload, and share public use datasets.
- Developed [processing and analysis guides](#), including a [collection of code and tutorials](#), for data processing, integration, harmonization, and analysis. This collection is intended to standardize data processes and to facilitate reproducibility and reusability for the climate and health CoP.
- Announced the first cohort of the [Research Translation Lab](#). The Lab will provide 19 researchers with a collaborative space to accelerate the translation of their climate and health research into evidence-based policy and practice. These 19 researchers represent eight states across the U.S. and five other countries: Australia, Bangladesh, Chile, Namibia, and Pakistan. These researchers are working on a variety of topics across a variety of career stages.
- Provided a recurring monthly newsletter to the CoP to share relevant funding opportunities, reports, webinars, and conferences.
  - [Join the CAFÉ COP and sign up for the newsletter.](#)

## Map of Currently Funded NIH CCHI Exploratory Research Centers



### CCH Exploratory Research Centers

The CCHI has expanded the climate and health [Exploratory Research Centers Program](#) designed to develop research capacity by building transdisciplinary teams and engaging with community stakeholders to tackle local, regional, and global climate and health issues of importance. In 2023, five Exploratory Research Centers were provided research funding, and in 2024, the number of Centers has more than quadrupled, with 16 new centers funded.

#### CHAIRS-C: Climate, Health, and Aging Innovation and Research Solutions for Communities

**Brown University | mPIs:** Allan Just and Theresa Shireman

CHAIRS-C will focus on older adults as a particularly vulnerable population to heat and air pollution in order to inform public health interventions that mitigate these health effects and reduce health inequities.

#### Climate and Health: Action and Research for Transformational Change (CHART)

**Columbia University, Health Sciences | mPIs:** Marianthi-Anna Kioumourtzoglou, Jeffrey Shaman, and Kiros Berhane

CHART will focus on the association between climate-relevant exposures, the aging brain, and neurodegenerative outcomes, based on both preliminary evidence and biological plausibility.

#### Anga Center for Climate Justice, Health Equity, and Community Wellbeing

**Columbia University, New York Morningside | mPIs:** Samantha Winter and David Musyimi Ndeti

This center will focus on climate vulnerable communities in East Africa, with a focus on mental health and interpersonal violence.



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The Caribbean Climate Change Adaption, Cancer, and Health Disparities Research Center

**University of Puerto Rico Comprehensive Cancer Center I mPIs:** Ana Patricia Ortiz, Noreen Michael, and Pablo Mendez-Lazaro

This center will utilize the strong regional partnership of institutions and community (Puerto Rico and the U.S. Virgin Islands) to focus on cancer patients as a climate vulnerable population.

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Center for Transformative Infectious Disease Research on Climate, Health and Equity in a Changing Environment (C-CHANGE)

**Cornell University I mPIs:** Alexander Travis and Marinda Oosthuizen

C-CHANGE will focus on vector borne diseases and spillover events in Northeastern U.S., South Africa, and Zimbabwe to create predictive models and early warning systems.

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Research and Engagement for Action on Climate and Health (REACH) Center

**George Washington University I mPIs:** Susan Anenberg, Robert Ortung, Daniel Tong, and Sarah Vogel

The REACH Center aims to bridge big data and climate solutions that advance health and environmental justice.

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Center for Climate: Equitable and Accessible Research-based Testing for Health (C-EARTH)

**Harvard School of Public Health I mPIs:** Kari Nadeau, Christopher Golden, and Mary Rice

The C-EARTH Center will assess the impact of multiple climate risks to human health, including heat stress on vulnerable populations, and then test and implement solutions that promote resilience for the most vulnerable members of these communities.

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CATALYST (Community ClimATe heALth equitY reSearch cenTer)

**OCHIN, INC. I mPIs:** Rachel Gold, Karen Albright, and Hossein Estiri

CATALYST will leverage a nationwide network of mostly low-income community health centers and will plan to develop a community prioritized research agenda.

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Equity and Climate Opportunities for Health (ECO-Health) Center

**University of California, San Francisco I PIs:** Sheri Dawn Weiser, Arianne Teherani, and Tarik Benmarhnia

The ECO-Health Center will work on modifiable factors of vulnerability to climate impacts, such as heat and wildfires, and work with communities engaged in research towards developing and implementing interventions.

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Cincinnati Climate Change and Health Research Center

**University of Cincinnati I mPIs:** Ardythe Morrow and George Douglas Leikauf

This center will focus on examining health outcomes of climate change-driven exposures to heat, pathogenic microbes, and environmental toxicants to identify novel interventions that promote resiliency in vulnerable populations.

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Center for Climate Health Equity (CECHE)

**University of Illinois, Chicago I PIs:** Kristen Mary and Chossek Malecki

CECHE will capitalize on ongoing greening initiatives in Chicago and focus on co-development of practical nature-based solutions in climate justice communities.

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### Mni Sota Center for Climate Change and Health

**University of Minnesota | mPIs:** Bruce Alexander and Jessica Hellmann

This center will focus on American Indian and rural populations in Minnesota, incorporating Indigenous Traditional Ecological Knowledges (ITEKS) and Western environmental health approaches in the co-development of the research agenda.

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### UNM Climate Change and Health for the Alliance and Novelty of Geospatial and Exposure Science (CHANGES) Center

**University of New Mexico | PI:** Jose Manuel Cerrato

The CHANGES Center will examine the long-term health impact of climate disasters on survivors, including the prevalence of asthma, depression, and vector-borne diseases up to 5 years following disasters, and will develop a GIS-based dashboard for data visualization.

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### CLIMAtE-related Exposures, Adaption, and Health Equity (CLIMA) Center

**University of Southern California | PI:** Rima Habre

The CLIMA Center will focus on concerns of Southern California communities, including cardiovascular impacts of heat and wildfires, to inform policy and strengthen local adaptive capacity and resilience.

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### Research and Engagement on Adaptation for Climate and Health

**University of Washington | PI:** Jeremy Hess

The Climate and Health (REACH) Center will focus on leveraging implementation science in support of implementing evidence-based health adaptation at scale.

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### A Community-Driven, Health-First Approach to Climate Action and the Energy Transition

**University of Wisconsin, Madison | PI:**

Jonathan Patz

This center will focus on the health impacts of energy transitions on air pollution and respiratory health to identify the best solutions for the community and impacts of climate actions.

## Climate and Health: Community Engagement

The CCHI Alliance for Community Engagement – Climate and Health Program has continued to fund four sites in their second year. These sites are working directly with communities to assess their knowledge and needs related to local climate change impacts and are co-designing solutions to help build resiliency.



### Alaska Alliance for Community Engagement – Climate and Health (AK ACE-CH)

**COMMUNITIES:** Indigenous Alaska Natives in rural/remote AK

**CLIMATE IMPACTS:** Food systems, infectious disease, mental health

**APPROACHES:** Pilot test strategies to assess multi-level risk and resilience factors; Disseminate and implement Indigenous-led strategies to build adaptive capacity



University of Colorado  
Boulder

### Mountain West ACE-CH Hub: Climate Change Engagement Platform to Support Resilient Rural and Urban Communities

**COMMUNITIES:** Economically disadvantaged, communities of color, immigrant groups, and vulnerable occupational groups near Denver

**CLIMATE IMPACTS:** Air quality, drought, wildfires, extreme heat

**APPROACHES:** Develop community-engaged survey about air quality concerns; Produce health impact assessment of local CC assets; Develop recommendations for each community



### Community-driven Approaches to EJ and Health in the Face of the Climate Crisis in Southern CA

**COMMUNITIES:** Economically disadvantaged, immigrant groups, people of color, unhoused and elderly communities in LA and Carson

**CLIMATE IMPACTS:** Environmental justice, extreme heat, air pollution, wildfires

**APPROACHES:** Assess neighborhood-scale vulnerability; Expand community air monitoring; Advance community education and research capacity



### Climate Health Adaptation and Resilience Mobilizing (CHARM) Lake County Project

**COMMUNITIES:** American Indian tribal, immigrant populations, rural and agricultural workers in Lake County, CA

**CLIMATE IMPACTS:** Extreme heat, harmful algal blooms (HABs)

**APPROACHES:** Continuous community engagement; Identify health impacts of HABs and heat events; Improve communication and collaboration in HABs and heat preparedness and response

### Alaska Alliance for Community Engagement (AK ACE-CH)

**University of Alaska Fairbanks | PI:** Stacy Rasmus and Karsten Hueffer

The Alliance is developing a strategic plan that is appropriate for Alaska Native groups to promote climate change and health equity. During 2024, this site:

- Held the second annual AK ACE-CH Meeting with the goal to engage new community partners; plan data collection procedures; and participate in interactive research activities to assess climate and health priorities.
- Developed and began implementing an innovative Rural Alaska Native Climate and Health Impact Assessment tool and strategies within target communities to generate, prioritize, and rank climate health concerns. These priorities will serve as the basis for the development of strategic action plans for each community.



Figure 1. University of Alaska Fairbanks AK ACE-CH 2nd Annual Meeting. (Graphic courtesy of the AK ACE-CH Hub)

### Mountain West (MW) Climate and Health Engagement Hub

**University of Colorado, Denver | PI:** Katherine (Kathy) A. James and Katherine (Katie) L. Dickinson

The Hub is engaging Mountain West communities to understand the impacts of climate on health in rural and urban communities. It aims to strengthen partnerships, build climate resiliency, enhance climate justice, and promote health equity. During 2024, this site:

- Stood up the Year 2 Climate Conversation Core, Action Planning Core, and Youth Core to identify climate and health strategies to best serve urban and rural communities in the Mountain West.
- Generated interview guides and published “Community Voices, Volume 1,” which summarizes findings from the Hub’s Year 1 advisory board members’ lived experiences and strategies to build resilience against climate stressors.
- Began developing a searchable database that will include funding, resources, and tools to support enhanced awareness of climate-and-health strategies and capacity to stimulate community-led climate action.



Figure 2. University of Colorado Denver Year 2 Hub Structure and Deliverables. (Graphic courtesy of the Mountain West Climate and Health Engagement Hub)

Prioritizing Local Action for Climate Equity (PLACE STUDY)

University of Southern California | PI: Jill Johnston

This study is co-developing an actionable climate and health resiliency tool kit and workshops to equitably serve historically marginalized communities to advance the climate justice framework. During 2024, this site:

- Developed a workshop curriculum and infographics and completed four action workshops in collaboration with partners in targeted communities.
- Performed post-heat wave semi-structured interviews with workshop participants.
- Began analyzing findings to inform the PLACE resiliency tool kit components.
- Started co-developing a community cooling map highlighting places where community members can find relief from the heat.



Figure 3. University of Southern California Heat Wave and Health Infographic. (Graphic courtesy of the PLACE Study Team)

Climate Health Adaptation and Resilience Mobilizing (CHARM) Lake County Project

Public Health Institute | PI: Susan Paulukonis

This project is working to develop a CHARM action plan that improves communication and collaboration for climate and health preparedness and response. During 2024 this site:

- Held an extreme heat emergency tabletop exercise in May 2024 to inform the development of a heat action plan for Lake County.
- Began implementing the CHARM general and targeted community heat and Harmful Algae Bloom (HABs) surveys that will inform their community engaged research plan.



Figure 4. Photo from extreme heat tabletop exercise in May 2024. (Photo courtesy of CHARM Lake County Project)

## Expanding CCH Research

NIH has been funding research on climate and health for many years, but the launch of the CCHI has catalyzed this research across the agency. In addition to the projects funded specifically through the Initiative, the NIH-wide research portfolio contains a growing collection of projects investigating climate change and health outcomes of interest across the NIH ICO focus areas.



### Investigator-Initiated Research Projects Examples

Examples of NIH-funded research projects in the scientific area of climate and health are highlighted below. For a full list of funded projects, you can click [here](#).

#### The Maui Wildfire Exposure Cohort Study on Community Health and Resilience

**University of Hawaii at Manoa | PI:** Ruben Juarez | 1R61MD019793-01- NIMHD

This project aims to initiate a comprehensive cohort study examining the socioeconomic and health impacts of wildfire exposure and deploy a data-driven toolkit supporting recovery efforts and enhancing preparedness strategies. This project aims to guide informed recovery strategies, highlight health implications, and empha-

size the need for disaster and resilience planning in the face of potential future catastrophes.

#### **Example of Health Effects Research**

##### Abandoned Settlements, Abandoned Health

**Florida State University | PI:** Mathew Hauer | 1R21AG088598-01- NIA

Climate change is projected to lead to increases in migration and forced displacement, with unknown impacts on health and longevity. This project aims to retrospectively investigate linkages between residential displacement and human longevity by systematically building the Settlement Abandonment Database, a comprehensive database of population counts for settlements both occupied and abandoned between 1890 and 2020. The project plans to directly inform the long-term health consequences of ongoing federal policy concerning managed retreat, a form of managed settlement abandonment.

#### **Example of Health Equity**

##### Understanding heat stress and adverse health outcomes in vulnerable populations in Bangladesh: Can we move the needle by designing low-cost, feasible and culturally acceptable interventions?

**University of California, Berkeley | PI:** Laura Hsi Kwong | 1R01ES035910-01- NIEHS

This project aims to determine personal heat stress of low-income individuals in Dhaka, Bangladesh who do not have access to air conditioning. The project will evaluate the effectiveness, acceptability, feasibility, and scalability of building-level cooling strategies to reduce indoor heat stress among vulnerable individuals. It will evaluate the impact of these interventions on cardiovascular indicators.

#### **Example of Intervention Research**



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### Empowering Rural Students to Address Public and Climate Health Through Research

**University of Montana | PI:** Tony John Ward | 1R25GM154354-01- NIGMS

The goal of this training program is to provide research opportunities for middle school and high school students related to climate change, wildfires, and public health. Through this research, the project hopes to raise awareness about the climate change crisis within rural communities, as well as increase students' interest in STEM careers and research.

#### ***Example of Training and Capacity Building***

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### Assessing the effects of a multisectoral climate-smart agricultural intervention on the reproductive and sexual health of adolescent girls and young women

**University of California, San Francisco | PI:** Sheri Dawn Weiser | 1R01MH138256-01- NIMH

This project proposes a plan to develop and test the impact of an innovative, climate-adaptive, school- and household-based Shamba Maisha intervention package on STI and HIV prevention outcomes. The intervention includes providing a water pump for use at home, training in climate-adaptive agriculture delivered at school-based demonstration farms, and adolescent-caregiver relationship strengthening training. This study may provide a model for a multi-pronged approach to decrease the occurrence of extreme weather events, food insecurity, and poor HIV-related outcomes among adolescent girls and young women.

#### ***Example of Adaptation Research***

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**Impact of insecticide control measures and temperature on Dengue Virus transmission by *Aedes aegypti* mosquitoes**

**University of Notre Dame | PI:** Patrick Heffernan | 1F31AI183638-01- NIAID

This project will develop temperature-dependent, trait-based transmission models to predict and control dengue virus (DENV) transmission by *Aedes aegypti* and *Aedes albopictus* mosquitoes. Through experiments crossing common insecticides with temperature treatments, this project will develop and parameterize an insecticide- and temperature-dependent trait-based transmission model for DENV that is expected to predict dengue incidence more accurately than current temperature-alone models. The project will also identify the extent to which temperature impacts the efficacy of common insecticides and determine how to respond to and leverage climate change in the face of range shifts and expansions.

***Example of Basic and Mechanistic Research***

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**A randomized-controlled evaluation of the effects of climate impact menu labels on dietary quality**

**Johns Hopkins University | PI:** Julia Wolfson | 1R01DK139327-01- NIDDK

This project will use randomized-controlled experiments to determine the degree to which climate-impact menu labels on fast-food restaurant menus influence the healthfulness of restaurant food choices and overall dietary intake. Results will provide critically important, timely, and actionable evidence to inform menu-label policy and voluntary interventions to improve dietary quality and diet-related health of Americans, while helping to address the urgent threat of climate change.

***Example of Behavioral and Social Sciences***

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**The Interaction of Public Health Emergencies: Understanding Nation-wide and City-wide Spatiotemporal Dynamics of COVID-19 Transmission in a Warming World**

**Weill Medical College of Cornell University | PI:** Arnab Ghosh | 1R03TR004976-01- NCATS

This project will study the association between extreme heat events and COVID-19 propagation, as well as identifying individual and other factors increasing risk of COVID-19 related morbidity during extreme heat events. It aims to provide data that can be translated into tools for pandemic preparedness in the age of climate change.

***Example of Data Integration***

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**Integrating Climate Impacts into a Community Health Assessment for Rural Communities**

**North Carolina State University, Raleigh | PI:** Jennifer Runkle | 1R21ES035968-01A1- NIEHS

The goal of this project is to integrate climate-change data into a regional health assessment planning process and overall framework to enhance the capacity of local public health systems to protect the health of rural communities. The community-driven project will work with rural community health networks to enhance the capacity of local health systems to identify, address, and monitor climate impacts on health in rural Appalachia.

***Example of Dissemination and Implementation Science***



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### Direct and Indirect Effects of Disasters on Drug-Related Outcomes

**Ohio State University | PI:** Michael C Vuolo | 1R01DA059826-01A1- NIDA

This study examines the relationship between disasters and adverse substance use through mechanisms such as psychological distress, treatment, and drug market disruption. This project aims to inform how resources and individual- and community-level interventions may be deployed to intervene on drug-related problems in the face of future disasters.

#### ***Example of Disaster Research Response***

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### Breast cancer survivorship in the era of climate change: Impact of extreme weather, air pollution, and cancer therapy on heart and lung health

**University of Utah | PI:** Anne Kirchhoff | 1R01CA282698-01A1- NCI

This project will study whether breast cancer survivors exposed to extreme temperature and air pollution prior to diagnosis have a higher risk for therapy-related cardiovascular and respiratory/pulmonary problems, and if post-diagnosis short term exposure to extreme temperature and air pollution during treatment increases survivors' risk for these health outcomes related to climate change.

#### ***Example of Epidemiology and Predictive Modeling***

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### Wildland-Urban Interface Fire Exposures, Effects, and Interventions: A Collaborative Research-to-Action Partnership with Firefighters

**University of Arizona | PI:** Jeffrey Burgess | 1R01ES035965-01- NIEHS

This project will work in partnership with firefighters to evaluate their exposures and toxic effects from wildland urban interface (WUI) fires and evaluate the effectiveness of exposure-reduction interventions. The research will provide a more complete measure of chemical exposures from WUI fires and associated health effects, as well as inform exposure prevention measures.

#### ***Example of Exposure and Risk Assessment***

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### Demographic and Health Effects of Climate Exposures Across the Life Course

**Pennsylvania State University | PI:** Brian Thiede | 1R03HD115792-01- NICHD

This project will measure how exposures to climatic variability (i.e., temperature and precipitation anomalies) during early-life and adolescence affect the fertility, health, migration, and socioeconomic statuses of working-age adults using demographic records from the Indonesian and Mexican Family Life Surveys linked to high-resolution climate data that measure individuals' climate exposures during early childhood (ages 1 to 4) and adolescence (ages 9 to 14).

#### ***Example of Global Cross Sector Interagency Community Partnership***

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## Responding to Disaster Research Needs

The NIH-NSF partnership has also supported the [University of Washington Natural Hazards Reconnaissance \(RAPID\) Facility](#) in providing technical instrumentation, training, and resources to researchers collecting perishable exposure and health data.

[The Natural Hazards Center at the University of Colorado-Boulder](#), with support from NIH and the National Science Foundation, has provided five rapid awards to researchers to get into the field quickly after an extreme climate event to work with communities and conduct health-related research. These awards allow for timely collection of perishable data for health research.

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### Transportation as a Social Determinant of Health During Hurricane Idalia

This research will advance knowledge on how transportation factors (e.g., vehicle ownership, disability) constitute a major barrier for people to evacuate before the hurricane and to access healthcare and food security throughout the period of Hurricane Idalia's impacts.

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### Ohio's 2024 Tornadoes Touchdown Impact on Mental Health among Socioeconomically Challenged Communities

This research examines the intersectionality of disasters, housing conditions, socioeconomic status, and mental health outcomes, with a focus on mental health outcomes in the aftermath of the 2024 tornadoes in Ohio.

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### Nebraska Tornado Quick Response: Assessing Community Impacts and Evaluating Early Warnings

This project will conduct modified RNAs in an urban and a rural community in Nebraska following the April 26, 2024 Arbor Day tornado outbreak to better understand the mental and physical health impacts and lived experiences of communities affected by tornadoes. The project will characterize formulation, deployment, and community reception, uptake, and action of early warning systems.

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### California Wildfire Smoke Events: Life Course Risk Perceptions and Mental Health Impacts

This project will focus on two understudied age cohorts, young adults (18-34) and late middle-aged/early older adults (50-64) and will assess the mental health impacts they face following the 2024 California wildfire season.

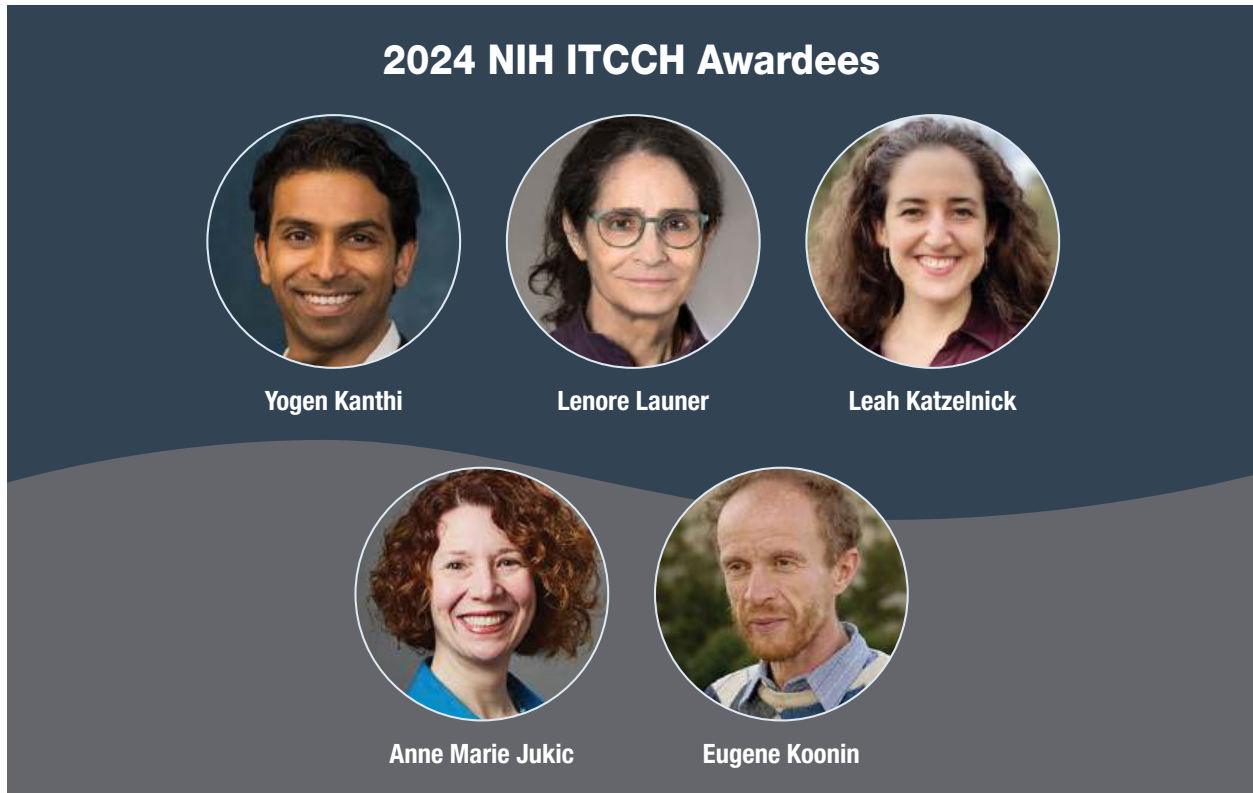
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### Assessing Health and Environmental Impacts of 2023 Maui Wildfires on Asian Americans

This study comprehensively examines the implications of soil contamination stemming from wildfires and its potential health effects on affected communities, thereby deepening comprehension of the health consequences of the 2023 Maui wildfire.

## Intramural CCH Research at NIH

In 2024, the NIH Intramural Targeted Climate Change and Health (ITCCH) Program awarded grants to five new principal investigators across the NIH. These awards will advance basic and applied climate-related research projects across the ICOs in the laboratory and in populations.



### Wildfire Smoke Exposure and Vascular Thromboinflammation

**PI:** Yogen Kanthi, M.D., NHLBI

**Objective:** To conduct the first mechanistic in vitro investigation of vascular cell responses to wildfire smoke particulate matter (PM) and define the impact of wildfire smoke PM exposure on immunothrombosis in the complex vascular environment in vivo.

**Impact:** This highly innovative project will establish a foundation for mechanistic and therapeutic studies in preventing wildfire smoke-related vascular disease. Studies will be conducted by a multidisciplinary team consisting of experts in thromboinflammation, aerosol science and particle health effects, endothelial function, bioinformatics, and platelet phenotyping.

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### Effect of a Climate Change Consequence on Markers of Senescence

**PIs:** Lenore Launer, Ph.D., NIA and Minkyong Song, M.D., Ph.D., NIA

**Objective:** To use existing data and biospecimens to study health effects related to displacement due to a hurricane using blood proteomics and assessing cognitive functions.

**Impact:** Findings will identify biologic markers that may inform the impact of a disaster on senescence. Results will contribute to reducing the major gap in understanding the health effects of a disaster relative to an individual's previous medical history.

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### Evaluating the Impact of Climate Change on Dengue Virus Evolution and Disease Burden

**PI:** Leah Katzelnick, Ph.D., NIAID

**Objective:** To better understand how climate change will impact communities that are currently affected by dengue viruses.

**Impact:** This project seeks to understand how climate change may impact the evolution, structure, and spread of four dengue virus serotypes (DENV1-4). The research team will incorporate a range of ecologically relevant temperatures into the experimental design and will also measure climatic and vector variables in impacted neighborhoods. This project will generate results that will inform interventions to help at-risk communities respond to climate change and an evolving DENV.

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### Quantifying the Effects of Climate Change on Expanding Vector Range and Global Viral Disease Burden

**PI:** Eugene Koonin, Ph.D., NLM

**Objective:** To develop an interactive web portal to display and predict trends in vector-borne infectious diseases for use by public health professionals and the public as an educational and predictive tool highlighting the impact of climate change on vector-borne infectious diseases burden.

**Impact:** Vector-borne pathogens represent a major source of mortality. Climate change is expected to dramatically alter global parasite ecology by disrupting ecological niches, increasing the probability of cross-species transmission and expanding vector range. Arthropod vector range is strongly temperature dependent. Despite the well-understood, straightforward association between temperature change and vector range, the interdisciplinary nature of forecasting disease burden as a result of climate change renders consensus-building among the research community challenging, and communication of public health impact to governmental stakeholders is yet more difficult. The expectation is that incorporation of the data made accessible through the portal will result in a substantial increase in the consensus predicted burden.



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### Endocrine Disrupting Effects of Ambient Temperature and Climate on Reproductive Health

**PIs:** Anne Marie Jukic, Ph.D., NIEHS and Donna Baird, Ph.D., NIEHS

**Objective:** To examine the effect of heat index and related climate variables on menstrual cycle hormones, cycle characteristics, and uterine stromal cells.

**Impact:** Most climate change research has focused on birth outcomes, with less attention given to fertility and reproductive function. Mechanisms by which heat may affect human reproductive function are unknown. This proposal addresses this knowledge gap by examining the association between ambient temperature and human reproductive endocrinology and menstrual cycle characteristics. In addition, the proposal examines the direct effects of heat on uterine stromal cells – cells that are of primary importance for uterine function during embryonic implantation. This proposal combines human epidemiologic research with mechanistic translational research and will create a resource for future studies of other climate-related endpoints.

## Training and Capacity Building

### CHORDS

The HHS Office of the Secretary's Patient-Centered Outcomes Research Trust Fund has continued to fund the **Climate and Health Outcomes Research Data Systems (CHORDS)** Project. CHORDS aims to integrate climate, environmental, and health data and develop complementary data resources, with a focus on wildfires, to further vital research to improve patient care and promote protective health measures in our communities. In 2024, CHORDS



Figure 5. Members of the CHORDS Team

launched a new **web-based catalog of resources on climate and health**, which includes datasets, tools, educational resources, engagement opportunities, and more.

### Climate and Health Scholars Program

The 2023-2024 cohort of the NIH Climate and Health Scholars consisted of **seven experienced climate and health scientists** from diverse research backgrounds who developed specific activities in their areas of expertise with their hosting ICOs. The goal of the program is to build and advance CCH knowledge, understanding, and research capacity across NIH. For example, members of the 2023-2024 cohort:

- Developed a strategic guide to incorporate climate change and health elements into the NIH **All of Us** research program.
- Organized a six-part **speaker series**, alongside the National Institute on Aging, on translating climate and health research insights into action that engaged over 800 individuals from 23 different countries.
- Created a systematic evidence map on the association between air pollution, climatic factors, and neurodevelopmental outcomes in human and animal studies for the NIEHS.
- Organized a two-day public **workshop** with the National Institute on Minority Health and Health Disparities on community-engaged research to promote health equity that engaged over 1,000 individuals over the two days.
- Conducted a scoping review on the impact of climate change on enteric diseases for the National Institute of Allergy and Infectious Diseases.
- Supported a systematic review of climate change communication methods and research for the National Cancer Institute.
- Conducted a scoping review on frameworks, measures, and indicators that can be used to assess the impact of climate change adaptation interventions on human health outcomes and health systems for the Fogarty International Center.

In addition, each scholar presented a public-facing webinar addressing a climate and health topic within their area of expertise, see below.

The third cohort, comprised of 13 Climate and Health Scholars, began work in November 2024 and will continue on through September 2025. To learn more about the 2024-2025 cohort, click [here](#).

## Seminar Series

The CCHI Seminar series aims to highlight the spectrum of climate change and human health impacts and share emerging research gaps. Launched in 2021, the seminar series has more than 25 unique recordings of scientists and experts presenting on a range of topics. The [available seminars from 2024](#) are:

- Climate Change Impacts on Enteric Diarrheal Diseases
- Climate Change, Health, and Justice: A Workshop on Community-Engaged Research to Promote Health Equity
- Talking and Chewing Bubble Gum at the Same Time: Action-Oriented Research to Protect Older Adults and Others Against Climate Threats
- Climate Change and Agricultural Worker Health
- Climate Change, Health Impacts, and Addressing the Challenges: Global Case Studies for Relevant Solutions
- Evidence-Based Climate Adaptation Strategies and Opportunities for Equitable Solutions
- Climate Change, Pregnancy, and Children's Health
- Best Practices for Communicating About Climate Change and Health: A Communication Critique
- The Complexities of Ensuring Sustainable and Healthy Diets for All
- Healthy Air as a Pathway to Climate Action



Figure 6. 2024 cohort of NIH Climate and Health Scholars

## NIEHS Climate Change Tools and Resources

NIEHS continues to maintain the [NIEHS Climate Change and Human Health Literature Portal](#) and NIEHS Climate Change and Human Health Glossary.

- The [NIEHS Climate Change and Human Health Literature Portal](#) has over 20,000 searchable, curated climate and health publications.
- The [NIEHS Climate Change and Human Health Glossary](#) is a searchable resource of over 300 terms and definitions that is updated and revised yearly.



## Partnerships

Cross-sector partnerships with other agencies and organizations in the climate change and health space are key to maintaining CCHI goals and activities. The co-chair of the CCHI Steering Committee is now also acting as a chair of the U.S. Global Change Research Program (USGCRP) Interagency Crosscutting Group on Climate Change and Human Health (CCHHG). NIH maintains active participation in a working group within the U.S. Climate Variability and Predictability Research Program (US CLIVAR). The Initiative also continues to explore partnership activities with the Office of Climate Change and Health Equity (OCCHE), National Academies of Sciences, Engineering, and Medicine (NASEM), World Health Organization (WHO), Centers for Disease Control (CDC), the National Science Foundation (NSF), and the U.S. Environmental Protection Agency (EPA).



## Looking Ahead to Fiscal Year 2025

In FY25, the CCHI will continue to focus on its existing programs. At the same time, CCHI efforts will expand to develop stronger transdisciplinary teams with diverse expertise areas in both climate sciences and health sciences. The CCHI will continue to support the growing climate change and health research community of practice with opportunities and resources and will make concerted efforts to address research gaps in intervention science, climate-health data needs, and training and capacity building. The CCHI will focus energy on bolstering interagency efforts to address climate change impacts on human health in a collaborative manner. The existing CCHI programs and efforts have built a strong foundation for the research community, and the Initiative's future efforts will further enhance climate change and health knowledge, adaptation and intervention abilities, and human resiliency to the impacts of climate change.



Figure 7. Members of the NIH CCHI Working Group and Steering Committee

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