

Identifying gaps in stakeholder needs regarding the climate-health connection

CLIMAS Investigators: Heidi Brown, Erika Austhof, Ladd Keith, Daniel Ferguson

Key Partners: Matt Roach, Hsini Lin (Arizona Department of Health Services)

Additional Investigator: Julie Jernberg, MD (College of Medicine, University of Arizona)

End Users: Arizona Department of Health Services (ADHS); Pima, Maricopa, and Pinal County Health Departments; Maricopa County Implementation & Monitoring Strategies (IMS)

Additional Support: Centers for Disease Control and Prevention – Climate and Health Adaptation Monitoring Program (CHAMP); Arizona Department of Health Services

Project Dates: 2017 – 2022

Summary of Impact

Building partnerships: This project connected CLIMAS researchers with state and county health departments in Arizona around climate impacts and human health. Initial work focused on identifying gaps in the fields of climate and health and building research partnerships to address those gaps.

Co-developing research: As part of these initial efforts, CLIMAS researchers co-authored adaptation and mitigation plans for the state of Arizona with the Arizona Department of Health Services. Research findings suggesting that people placed more trust in primary care physicians regarding health risks tied to climate led to development of training programs about climate-related health risks for medical students at the University of Arizona.

Responding to emerging needs: When the COVID-19 pandemic began, health departments across the state had to redirect most of their effort toward disease mitigation. The established partnership between CLIMAS and the ADHS allowed for heat resilience work to move forward while counties focused on the pandemic. CLIMAS researchers assessed the use of cooling centers and monitored heat temperatures at outdoor testing and vaccination sites. Results and suggestions were shared with county health departments to keep health workers and the public safe from heat exposure. This collection of work spurred new connections across the state to help heat and health related agencies and the CDC think about new ways to provide relief from extreme heat, looking beyond the models of cooling centers and increased shade.

Problem Statement

Communities need to be prepared for health impacts related to climate change and extreme events. Academic researchers working on climate and health issues can serve regional stakeholders actively working on climate and health adaptation planning.

Research Focus

This project aimed to build research and practitioner partnerships and connect academic research to climate and health planning efforts in Arizona. In 2009, the Center for Disease Control (CDC) engaged 16 states and 2 cities to implement a 5-step program Building Resilience Against Climate Effects (BRACE) to help communities prepare for the health effects of climate change. As BRACE ended, the CDC supported monitoring and evaluation of the efforts developed under BRACE through a new program called Climate and Health Adaptation Monitoring Program (CHAMP). To support these monitoring and evaluation efforts, CLIMAS researchers mapped an Arizona network of climate and health advocates, identified gaps in stakeholder needs regarding the climate-health connection, and developed strategies and partnerships to better support these efforts.

Project Activities

Survey: CLIMAS researchers co-designed a nationwide online community survey (n=504) with ADHS partner Matt Roach to investigate people’s motivations and beliefs around climate change and climate action which was distributed in summer 2020.

Interviews: CLIMAS researchers conducted key informant interviews with eight CDC BRACE recipients in 2021 to understand how health departments responded to the dual hazards of heat related illness and COVID-19. Three themes emerged about maintaining public health capacity throughout the pandemic: 1) adapting to changing roles and responsibilities; 2) building and strengthening inter-organizational partnerships; and 3) maintaining flexibility through cross-disciplinary training. With impending impacts of a changing climate and extreme events with subsequent public health impacts, responses that meet dual or multiple purposes are necessary.

Heat monitoring: In response to emerging climate and health needs during the COVID-19 pandemic, CLIMAS researchers monitored heat temperatures at three outdoor testing vaccination sites in Pima County from March 31 to April 1, 2021. They provided short reports to county health departments about implementing preventative measures to keep health workers and the public safe from heat exposure.

Cooling center analysis: CLIMAS researchers and ADHS mapped and evaluated the use of cooling centers (n=10) and heat respite locations (n=18) in Tucson, AZ. This map was used as a template for subsequent years’ cooling center maps and led to a stakeholder meeting in December 2022 which informed subsequent regional heat mitigation and planning efforts the following year.

On collaborative partnership:

There's a reliance on academic partnerships when health departments don't have the staff available to do the work. The partnership [between CLIMAS and ADHS] was really helpful...because ADHS had someone to rely on when they couldn't move [an initiative] forward.

—
Matt Roach, Arizona Department of Health Services

Project Outputs

Workshops:

- Tucson Heat Management Meeting. 2021. With representatives from National Weather Service, Tucson, Pima County Office of Emergency Management, Tucson Water, City of Tucson, Pima County Health Department, and Pima Association of Governments.
- 6th Annual Arizona Extreme Heat Planning Workshop. 2022. Hosted by University of Arizona, Arizona State University, & Arizona Department of Health Services, and NOAA.

Peer-reviewed Publications:

- Austhof, E., V. Berisha, B. McMahan, G. Owen, L. Keith, M. Roach, H. Brown. 2020. Participation and Engagement of Public Health Stakeholders in Climate and Health Adaptation. *Atmosphere* 11(3):265. <https://doi.org/10.3390/atmos11030265>
- Austhof, E., H.E. Brown. 2022. Global warming's six MTurks: a secondary analysis of a US-based online crowdsourcing market. *International Journal of Environmental Research and Public Health* 19(14):8320. <https://doi.org/10.3390/ijerph19148320>
- Austhof, E., H.E. Brown. 2021. Flexibility and partnerships perceived as supportive of dual hazard response: COVID-19 and heat related illness, Summer 2020. *Journal of Climate Change and Health* 4:100068. DOI: [10.1016/j.joclim.2021.100068](https://doi.org/10.1016/j.joclim.2021.100068)
- Chambers, S., H.E. Brown, L. Keith, E. Austhof. 2023. Application of the geographic human heat balance equation to public health in the Arizona urban sun corridor. *Remote Sensing Applications: Society and Environment* 34:101009. <https://doi.org/10.1016/j.rsase.2023.101009>
- Keith L., N. Iroz-Elardo, E. Austhof, I. Sami, M. Arora. 2021. Extreme Heat at Outdoor COVID-19 Vaccination Sites. *Journal of Climate Change and Health* 4: 100043. <https://doi.org/10.1016/j.joclim.2021.100043>
- Watkins, L., H. Brown, L. Keith, E. Austhof, H. Lin Cox, S. Chambers, J. Tabor, A. Gettel, M. Guardaro. 2024. A co-produced workflow for addressing inequities in cooling center access. *Community Science*, In press.

Reports:

- Austhof E.C., C.L. Anderson, V. Berisha, A. Gettel, I. Domky, A.F. Brown, D.M. Hondula, H.E. Brown, H. Nguyen. 2020. [*Gap Analysis of Climate and Health Research in Arizona: A report by the Research Action Team of Bridging Climate Change and Public Health in cooperation with the Maricopa County Department of Public Health.*](#)
- Brown, H.E., G. Hess, E. Austhof. 2018. Scoping report on the geospatial display of vector surveillance data and vector-borne disease outcomes. A report prepared for the Arizona Department of Health Services.
- Brown, H.E., J. Jernberg, J. Wishnie. 2024. Cooling Center Evaluation Pilot: A Summary Report. Arizona CDC Building Resilience Against Climate Effects (BRACE).
- Chambers, S., H.E. Brown, L. Keith, E. Austhof. 2022. Summary of Body Heat Storage Layer

- Development. 2022. Arizona CDC Building Resilience Against Climate Effects (BRACE).
- Roach, M., E. Barrett, H.E. Brown, B. Dufour, D.M. Hondula, H. Putnam, B. Sosa, B. 2017. [Arizona's Climate and Health Adaptation Plan](#). A report prepared for the United States Centers for Disease Control and Prevention Climate-Ready States and Cities Initiative.
- Roach, M., E. Austhof, V. Berisha, H.E. Brown, D. Carr, L. Harlow-Smith, D. Hondula, K. Snyder. 2018. [Addendum to the Arizona Climate and Health Adaptation Plan](#). A report prepared for the United States Centers for Disease Control and Prevention Climate-Ready States and Cities Initiative.
- Von Ohlen, K., H.E. Brown, L. Keith, E. Austhof, L. Watkins, S. Chambers. 2022. Summary of Pima County Cooling Center Spatial Optimization. Arizona CDC Building Resilience Against Climate Effects (BRACE).

Data Support:

[Maps of Cooling Centers in Tucson](#). In response to a 2020 heat wave, researchers created maps to help people to find cooling stations. This map was made starting with the Tucson Pima Collaboration to End Homelessness – Summer Sun Respite Sites, and included libraries, pools, and splash pads. Locations were updated by reaching out to organizations who been listed in prior years to confirm hours, restrictions, and COVID requirements. Maps used by Pima Association of Governments, Tucson Pima Collaboration to End Homelessness, and Chicanos Por La Causa.

Presentations:

- State of Practice, Public Health and Adaptation Issues in the Southwest. 2018.
- Facing the Future of Vector-Borne Disease” 2019. National Academies of Science by National Academy of Medicine and Burroughs Wellcome, Washington, DC
- Facing the Future of Vector Borne Diseases. 2021. Johns Hopkins University.
- Health and economic benefits are motivations for individual climate action. 2022. Annual Public Health Poster Forum. College of Nursing, University of Arizona.
- Climate Change & Health. 2021 & 2022. Guest Lectures for the University of Arizona College of Medicine
- Responding to the health effects of climate change. 2022. Psychological Science and the Climate Crisis: Thinking globally, Acting locally. University of Arizona
- Mitigating Climate Change through Public Health Strategies. 2022. Amrita University 5th International Public Health Conferences on Climate Change: A Public Health Threat.
- [Heat Awareness Week Press Conference](#). 2024. Panel Participant. Arizona Department of Health Services.

Media Coverage:

[‘Feels like the end of the world’: Tucson grapples with record heat during pandemic](#). 2020. Arizona Public Media.

[As Temperatures Rise, Workers in Southwest Face Health Issues](#). 2022. HealthDay. Recited by 7 additional media outlets.

[An unlikely line of defense during heat waves: Food banks](#). 2024. Grist. The Counter.

[Tips for staying safe in extreme heat](#). 2023. PBS.

Leveraged Funding:

Supporting this project:

- Centers for Disease Control and Prevention - Climate and Health Adaptation Monitoring Program (\$100,000)
- Office of Research, Innovation, and Impact, University of Arizona - Extreme Heat at Pima County COVID-19 Vaccination Sites (\$8,403)

Supporting new initiatives beyond this project:

- Arizona Institute for Resilience, Climate-Health Resilience through Physician Education (\$70,406)
- Arizona Department of Health Services - Building Resilience Against Climate Effects: Implementation and Evaluation \$486,504)

Selected Scientific Findings:

Trusted sources of climate information: Findings from the nationwide survey revealed that people believe their primary care physicians more than anyone else when it comes to climate change information.

How much do you trust or distrust each of the following as a source of information about health problems related to global warming?

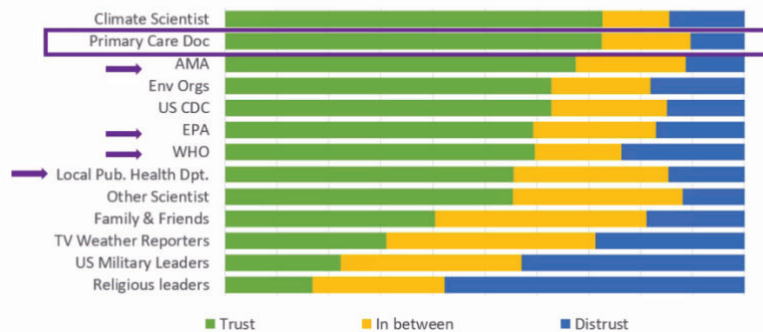


Figure 1. Primary care physicians were trusted on climate change information more than the American Medical Association, the Environmental Protection Agency, the World Health Organization, and local public health departments.

Responding to the dual hazards of Heat Related Illness (HRI) and COVID-19: Interviews with health departments in Arizona highlighted three themes to maintain the public health capacity throughout the pandemic: 1) adapting to changing roles and responsibilities; 2) building and strengthening inter-organizational partnerships; and 3) maintaining flexibility through cross-disciplinary training. With impending impacts of a changing climate and extreme events with subsequent public health impacts, responses that meet dual purposes are necessary.

Societal Impacts by Category

Conceptual:

- Research findings helped frame climate knowledge and risks for use in the context of healthcare. Research findings highlighted that healthcare providers are highly trusted on issues of climate, which supports opportunities for health services to implement climate education initiatives.

Connectivity:

- The established partnership between CLIMAS and ADHS allowed for heat resilience work to move forward in Pima and Maricopa counties while county health departments focused on COVID-19 mitigation efforts.
- This project directly led to the expansion of heat-related research and outreach with CLIMAS PI, Ladd Keith, and the expansion of the health portfolio within CLIMAS.

Capacity Building:

- Sustained engagement between CLIMAS Investigators and ADHS paved the way for a long-standing partnership and strengthened the connection between health and climate change for Pima, Maricopa, and Pinal County.
- New funding was acquired in 2021 through an additional Building Resilience Against Climate Effects (BRACE) grant from the U.S. Centers for Disease Control (\$2 million across 2022-2026) with ADHS and Pima County and Maricopa County Departments of Health.

On new BRACE grant:

There are only 11 awards in the country, and many of the States that were previous grantees did not get one. [Heidi Brown] is funded for an even larger amount and the goal of this new grant is to implement two interventions focused on heat and strategic plans, particularly working with Maricopa and Pima county and building a [heat] compendium.

Matt Roach, Arizona Department of Health Services

Instrumental:

- CLIMAS research directly informed the Arizona’s Climate and Health Adaptation Plan (2017) and its addendum (2018), which were prepared for the CDC’s Prevention Climate-Ready States and Cities Initiative.
- Maps of cooling centers in Tucson produced in connection with this project, were used by the Pima Association of Governments, Tucson Pima Collaboration to End Homelessness, and Chicanos Por La Causa, to inform strategies to help populations that experience high exposure to heat stress Pima County, including homeless populations and people without cooling systems in their homes.
- AZ Governor Katie Hobbs proclaimed Arizona Heat Awareness Week from May 6 to May 10, to increase awareness of extreme heat. Activities during this week focus on heat health and precautions.