



# Carolinas Integrated Sciences & Assessments

## About CISA

The Carolinas Integrated Sciences & Assessments (CISA) is 1 of 10 NOAA-funded Regional Integrated Sciences & Assessments teams. CISA works in North Carolina and South Carolina to integrate climate science into decision-making processes and improve society's ability to respond to climatic events and stresses.

CISA supports a North Carolina climate outreach and integration specialist to help engage decision makers and stakeholders in addressing the impacts of climate variability and change on public health.

## CISA Connects Climate and Health Science to Decision Making Through

- » Applied research to produce relevant climate information
- » Assessments of climate impacts
- » Processes to support and inform community planning
- » Fostering climate networks and climate communities of practice

## Climate and Health Partners

- » North Carolina Department of Health and Human Services
- » Southeast Regional Climate Center
- » State Climate Office of North Carolina

## FOCUS AREA: Climate and Health

### How does climate affect human health?

It is important to distinguish between people's vulnerability versus exposure to climate events. The severity of a climate impact often depends upon both a person's vulnerability and exposure to climate and weather extremes.

**Vulnerability** refers to the predisposition to suffer adverse effects when exposed to a climate event. Vulnerability is rooted in many social, economic, demographic, and geographic factors. For example, an individual's vulnerability to heat-related illness depends upon factors such as age, weight, and how much they are acclimated to the heat. This vulnerability would not vary if they were exposed to the same level of heat in one location or another, such as a rural or an urban area.

**Exposure** refers to the degree of contact. As the magnitude and frequency of extreme events such as hurricanes or high heat days increases, an individual's exposure, and thereby risk of adverse health effects, also grows. While exposure and vulnerability often work together to influence the impact of a climate event, it is not necessary to be both highly exposed and vulnerable to be affected. For example, an otherwise healthy person exposed to high temperatures may suffer from heat-related illness even though he or she would not be considered "vulnerable."

### Climate Impacts to Public Health

- » Temperature
  - › Rising temperatures
  - › Hotter and longer heat waves
- » Extreme Weather Events
  - › Increased heavy rain and flooding
  - › More severe impacts
- » Deterioration of air quality
  - › Increased length and severity of allergy seasons
- » Changes in Vector Habitat
  - › Increased length of warm seasons
  - › Changes in precipitation regimes
  - › Expanded ranges of vector habitat



Source: Fayetteville Observer

### Vulnerable Populations in the Carolinas

- » The elderly due to income limitations, pre-existing chronic health conditions, and social isolation
- » Outdoor and manufacturing workers (agriculture, natural resources, construction, or manufacturing) who are more likely to become dehydrated and suffer from heat-related illness
- » Student athletes who play or practice outdoors during high heat months, particularly when the humidity is also high, interrupting the body's normal cooling mechanisms
- » People without sufficient access to air conditioning, especially during prolonged periods of high heat when temperatures remain elevated overnight
- » Those who live in low-lying coastal areas or floodplains and are vulnerable to flooding from more frequent or intense extreme precipitation, hurricanes, and storm surge events
- » People who suffer from chronic illnesses such as diabetes or respiratory diseases such as asthma may experience higher vulnerability to extreme heat due to a diminished capability to regulate body temperature as well as higher vulnerability to poor air quality, which can trigger negative respiratory responses.

# CISA Climate and Health Projects

## Convergence: Climate-Health Vulnerabilities

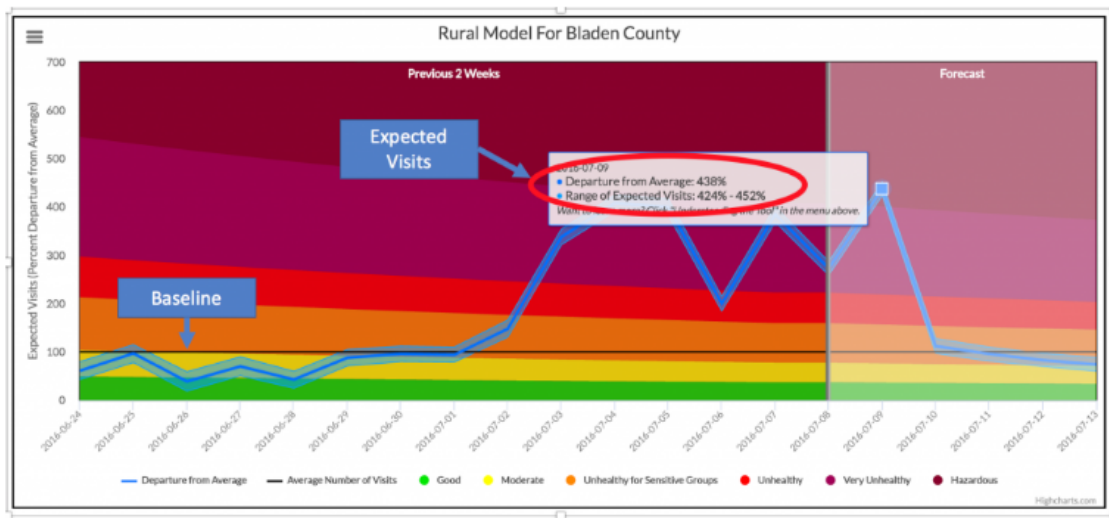
### Working to Reduce Vulnerabilities to Climate-Related Health Impacts

CISA seeks to better understand the relationships between climate and health. This work improves the prediction of weather-related public health impacts, risk communications such as heat advisories, and the adoption of long-term risk reduction strategies. The Convergence website is a repository for a variety of tools and resources we have developed to support community stakeholders in climate and health decision making.

Launched in May 2017, Convergence houses the Heat-Health Vulnerability Tool (HHVT), an open source journal article database, visualizations of vulnerabilities in the Carolinas, and infographics to build knowledge about climate concepts and health impacts. As we move forward, we are continuing to expand and improve projects available through Convergence in order to support community decision-making and build community capacity. Access Convergence at <https://convergence.unc.edu>.

### An Early Warning Messaging System for Heat Health Vulnerability

The Heat Health Vulnerability Tool (HHVT) predicts increased days of risk for heat-related illness, using heat-related illness rates and the forecasted heat index from the National Weather Service. It is geared towards public health officials and emergency management personnel across the state of North Carolina. In partnership with the NC State Climate Office and the Southeast Regional Climate Center, we are developing an early warning messaging system based off of the HHVT. The need for early warning messaging was identified by community stakeholders who otherwise do not have the capacity to alert vulnerable populations to these risks. Users will be able to select criteria, such as county name, and receive notifications based on self-selected thresholds of warning.



**Above:** The HHVT predicts the expected number of visits to the emergency room for heat-related illness and visualizes the percent departure from the baseline (solid black line) along with the degree of hazard, represented by the color scheme in the background of the graph. The degree of hazard indicates a community-level warning based on the nature of the community's population.

### HERA: The Hazardous Extremes Risk Assessment Tool

Another new tool in development for the Convergence website is the Hazardous Extremes Risk Assessment (HERA) tool. This tool will be designed to assist community agencies in planning and preparedness for extreme events. The tool will provide decision support through data visualizations, designed to provide:

- » County level data and information on extreme events
- » Information about how likely certain extremes are to occur in a county
- » Comparisons across counties and to state averages
- » Information on event-specific impacts

### Climate-Health Community Profiles for Native American Communities

In collaboration with the NC American Indian Health Board we are developing community profiles that connect climate with public health impacts. The profiles will help

- » Downscale climate data to be relevant for community level decisions
- » Highlight potential health impacts of extremes to Native American communities
- » Incorporate narratives from Native American community members about their lived experiences, adaptation strategies, and lessons learned.



## Contact Information

Chip Konrad  
Director of the Southeast Regional  
Climate Center (SERCC)  
Associate Professor  
Department of Geography  
UNC Chapel Hill  
919.843.4527  
[konrad@unc.edu](mailto:konrad@unc.edu)

Ashley Ward  
NC Climate Integration and  
Outreach Specialist  
Southeast Regional Climate Center  
UNC Chapel Hill  
919.962.7470  
[arward@email.unc.edu](mailto:arward@email.unc.edu)

## Other Ways to Connect

CISA publishes a quarterly newsletter, the Carolinas Climate Connection, and manages the Carolinas Climate Listserv in order to share up-to-date information about climate research, upcoming events, funding opportunities, or other relevant news.

CISA  
University of South Carolina  
Department of Geography  
709 Bull Street  
Columbia, SC 29208  
[cisa@sc.edu](mailto:cisa@sc.edu)  
(803) 777-6875  
[www.cisa.sc.edu](http://www.cisa.sc.edu)  
[@Carolinascisa](https://www.facebook.com/usccisa)