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EcoAdapt: Climate-Informed Health Activities in SPARCC States



California,
Colorado,
Georgia,
Illinois, and
Tennessee



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Acknowledgements

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Executive Summary

This white paper is an extension of a previous report, *The State of Climate Adaptation in Public Health: An Assessment of 16 U.S. States*,¹ released in June 2019, and focuses on survey and interview results specific to states participating in the Strong, Prosperous, and Resilient Communities Challenge (SPARCC)—California, Colorado, Georgia, Illinois, and Tennessee. As part of EcoAdapt’s State of Adaptation Program,² we assessed the state of climate adaptation planning and implementation for climate-related threats to public health in these states. We conducted a series of surveys and interviews in order to (1) assess understanding among public health officials of climate change impacts, and (2) document activities—planned and underway—to prepare for and respond to climate-related challenges. This white paper presents the results of the survey and state profiles of initiatives addressing the impacts of climate change on public health and healthcare services.

It is important to note that project surveys and interviews were conducted between October 2018 and November 2019, and therefore the results do not explicitly reflect the compounding effects of the COVID-19 pandemic and its differential impacts on vulnerable communities on the public health system’s capacity to address climate change. However, the examples of state, tribal, and local initiatives addressing the impacts of climate change on public health and healthcare services highlight how improvements may be made to increase the resilience of our systems to global change.

¹ Gregg RM, Braddock KN, Kershner JM. 2019. *The State of Climate Adaptation in Public Health: An Assessment of 16 U.S. States*. EcoAdapt, Bainbridge Island, WA. Available at <https://www.cakex.org/documents/state-climate-adaptation-public-health-assessment-16-us-states>

² EcoAdapt State of Adaptation Program: <http://ecoadapt.org/programs/state-of-adaptation>

Connections Between Climate Change and Public Health

Climate change poses significant threats to the health of individuals and communities, as well as the delivery of healthcare services. Human morbidity and mortality rates are rising due to extreme heat events and changing patterns of water-borne and vector-borne diseases, and healthcare infrastructure is at risk from extreme events. Key stressors and effects are presented in Table 1.

Table 1. Examples of climate and non-climate factors that affect public health and healthcare services.

Exposure Pathways	Climatic and Non-Climatic Drivers and Stressors	Social Determinants	Examples of Effects on Health and Healthcare Services
<ul style="list-style-type: none"> Air Quality Extreme Heat Flooding Water Quality and Supply Vector Ecology Food Quality and Supply 	<ul style="list-style-type: none"> • Increasing air temperatures and heat waves • Increasing water temperatures • Changes in precipitation amount and timing • Increasing ground-level ozone and particulate matter • Wildfire • Drought • Sea level rise and saltwater intrusion • Frequency and severity of storms • Harmful algal blooms • Range shifts of pests • Airborne allergens (e.g., ragweed), toxins, and particulate matter • Flooding and land-based runoff of pollutants and pathogens • Urban heat islands 	<ul style="list-style-type: none"> • Race and ethnicity • Age and gender • Economic stability (e.g., living wage income) • Housing and transportation options • Poverty • Education • Access to services • Pre-existing health conditions • Geographic location 	<ul style="list-style-type: none"> • Respiratory and cardiovascular illnesses • Heat-related illnesses and mortality • Injuries and fatalities • Neurological diseases • Vector-borne diseases (e.g., Lyme disease, West Nile virus) • Emotional and psychological illnesses and grief • Negative birth outcomes • Displacement of individuals and communities • Food and water contamination (e.g., <i>Salmonella</i>, mercury contamination in seafood) • Food security and nutrition issues (e.g., disruption in food supply chain due to inaccessible transportation routes from extreme events) • Disruption or damage to healthcare infrastructure • Stress on energy systems that may lead to power outages

As of December 2020, California, Colorado, and Illinois have formally joined the U.S. Climate Alliance, a collaboration between states seeking to take climate adaptation and mitigation action, particularly by meeting the goals of the Paris Agreement to reduce greenhouse gas emissions by 26–28% below 2005 levels by 2025.³

In order to identify climate-informed public health activities underway and to better understand the needs of public health professionals, we conducted interviews and released a complementary online survey. A contact list was compiled of individuals from state public health departments and other agencies and organizations likely to know about climate-related public health efforts within the states. A unified set of questions and interview guide were created and a coding scheme for answers was designed in order to make tracking and cross-referencing possible. Survey responses were collected through SurveyMonkey, a web-based survey company, between October 2018 and November 2019. The results presented below include the responses of 27 unique individuals.

SURVEY RESPONDENTS

Participants in the interviews and surveys primarily included public health officials (30%) and epidemiologists (25%) (Figure 2). The largest number of participants overall represent nongovernmental organizations (37%) and state health agencies (22%), followed by county (15%), city (11%), and federal (4%) agencies (Figure 3).

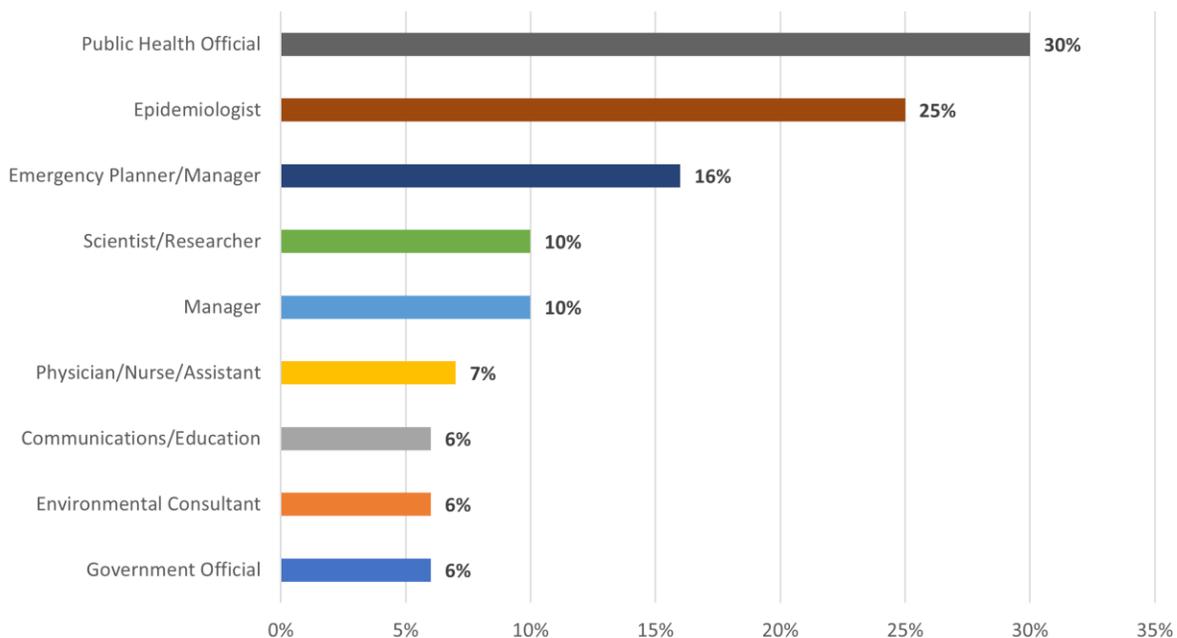


Figure 2. Interviewee and survey participants' position types (n=27).

³ U.S. Climate Alliance: <https://www.usclimatealliance.org/>

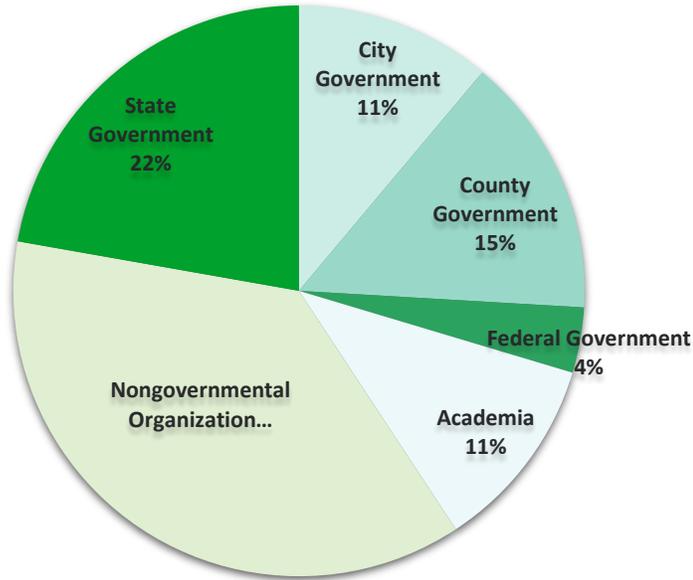


Figure 3. Professional affiliations of interviewees and survey respondents (n=27).

Respondents were also asked to indicate the state(s) in which they work (Figure 4). Most respondents represent California (45%), followed by Georgia (18%), Tennessee (14%), Colorado (14%), and Illinois (9%).

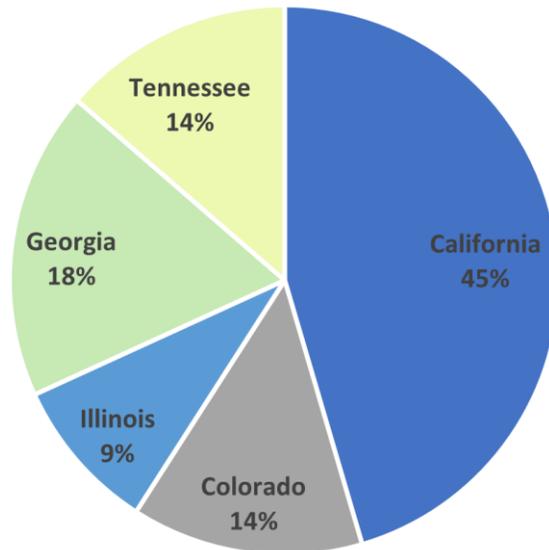


Figure 4. States in which respondents work (n=27).

One hundred percent of participants agree that climate change is having or is likely to have a significant effect on public health (Figure 5). Overall, respondents indicate that they are very (82%) or moderately (18%) knowledgeable about climate change (Figure 6).



Figure 5. Percentage of respondents who believe climate change is affecting public health (n=27).



Figure 6. Climate change knowledge level as identified by respondents

THREATS TO PUBLIC HEALTH

More than 90% of participants indicate that increasing air temperatures and extreme heat events are of the biggest concern with respect to climate change (Figure 7). Among state public health officials, extreme heat events are the highest concern followed by storms and extreme weather events. Wildfires and droughts are of more concern for respondents from California and Colorado than those in other SPARCC states.

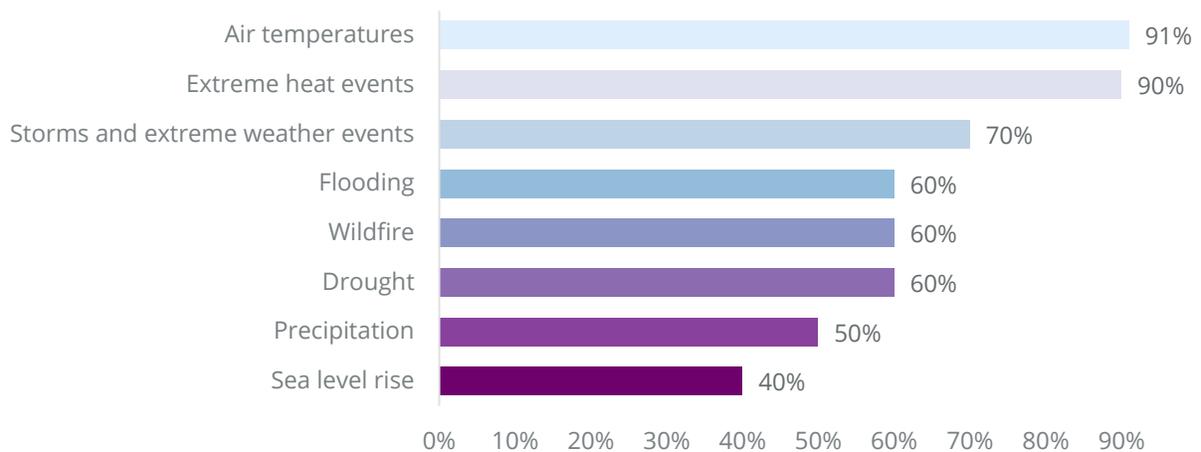


Figure 7. Climatic changes of concern (n=27).

Of the most likely impacts on public health and healthcare services, illnesses and fatalities related to vector-borne diseases and air quality are most frequently expressed by health professionals (Figure 8). Among state public health officials, air quality, heat-related illness, vector-borne disease, and displacement of individuals and communities rank as the highest concerns. Air quality, threats to biodiversity, heat-related illness or death, infrastructure damage, range shifts of pests, water supply issues, and chemical exposure all registered some level of concern from respondents.

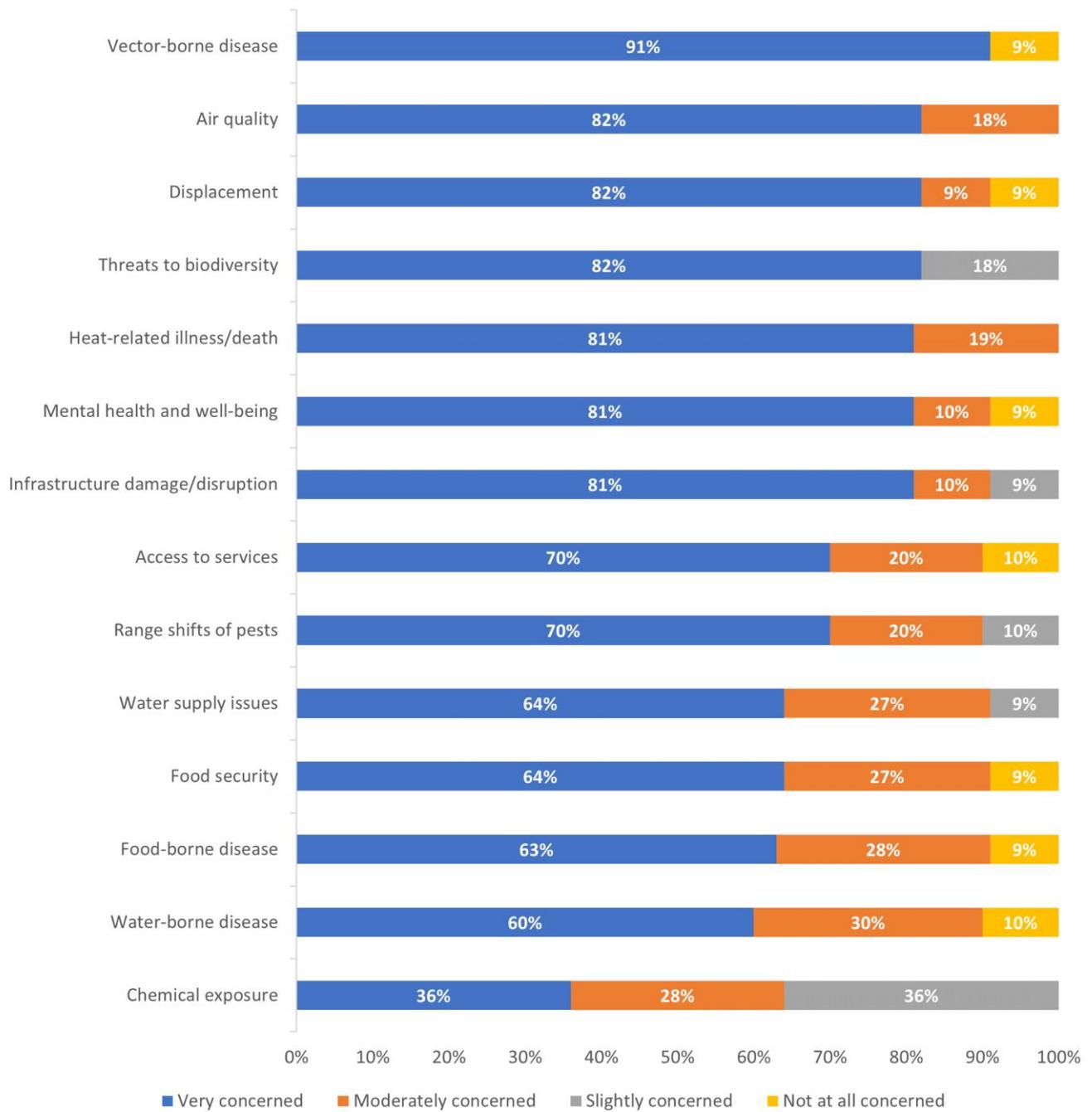


Figure 8. Climate-related public health impacts of concern (n=27).

ADAPTATION BARRIERS AND OPPORTUNITIES

About 85% of respondents report adjusting their health-related activities in some way to address climate change. Participants were asked to identify specific barriers and opportunities (e.g., strategies or actions) with respect to managing public health in a changing climate. The top two barriers to climate-informed public health efforts noted by respondents who are both engaged in climate adaptation and those who are not include insufficient staff resources and capacity and lack of leadership (Figure 9). The lack of or limitations in funding is the primary barrier noted by professionals engaged in climate action (88%), while current more pressing issues (e.g., local economy; 50%) and a perceived lack of scientific information on the relationship between health and climate change (40%) restricts climate action by those not taking action on climate change.

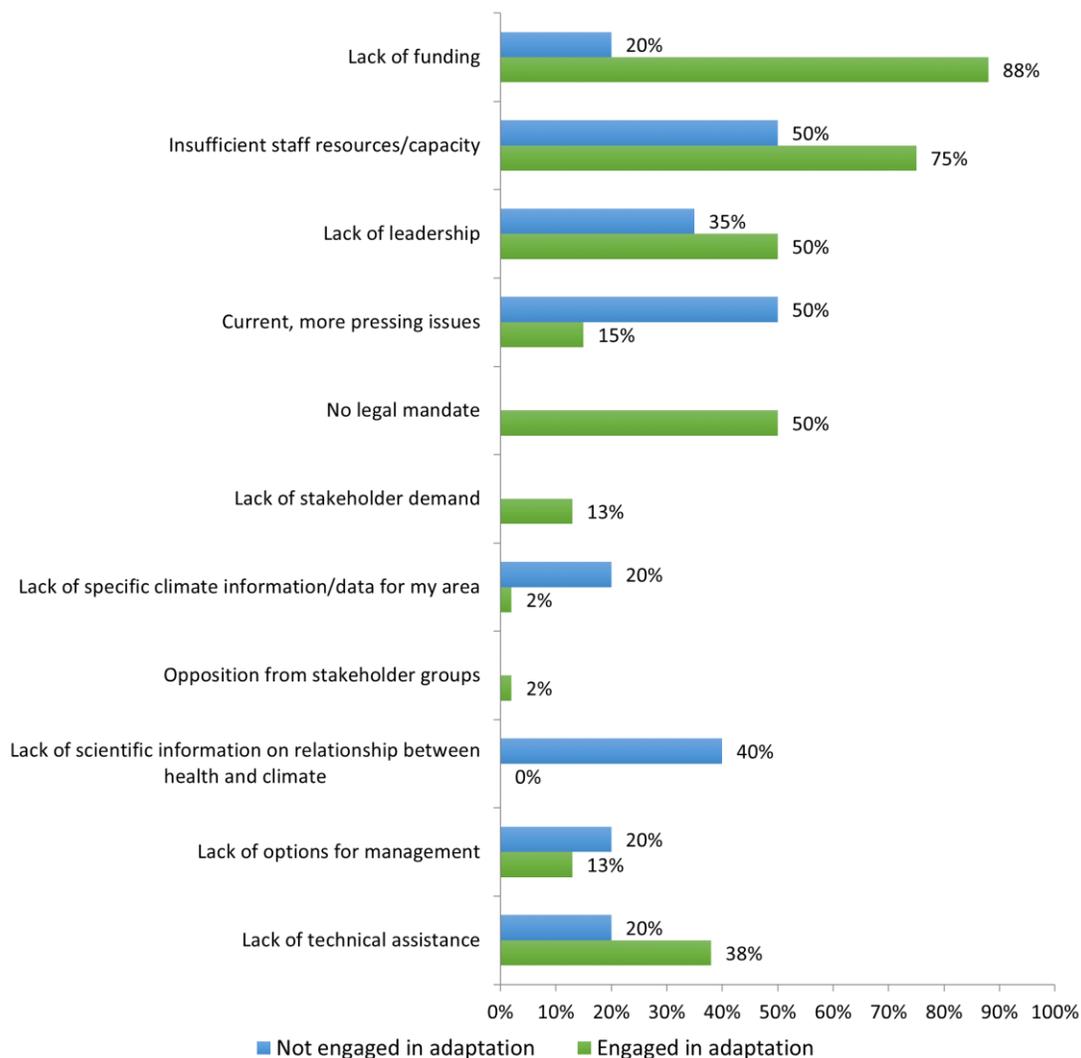


Figure 9. Key barriers noted by respondents who are currently engaged in climate adaptation (n=19; green) and those who are not (n=8; blue).

Of the more general strategies associated with climate adaptation (Figure 10), respondents who are currently engaged in adaptation efforts are prioritizing capacity building activities such as enhancing coordination and collaboration between individuals, communities, departments, and service providers (70%), creating resources and tools to improve decision-making (65%), increasing and improving public awareness and outreach efforts related to climate impacts (60%), and conducting research (60%).

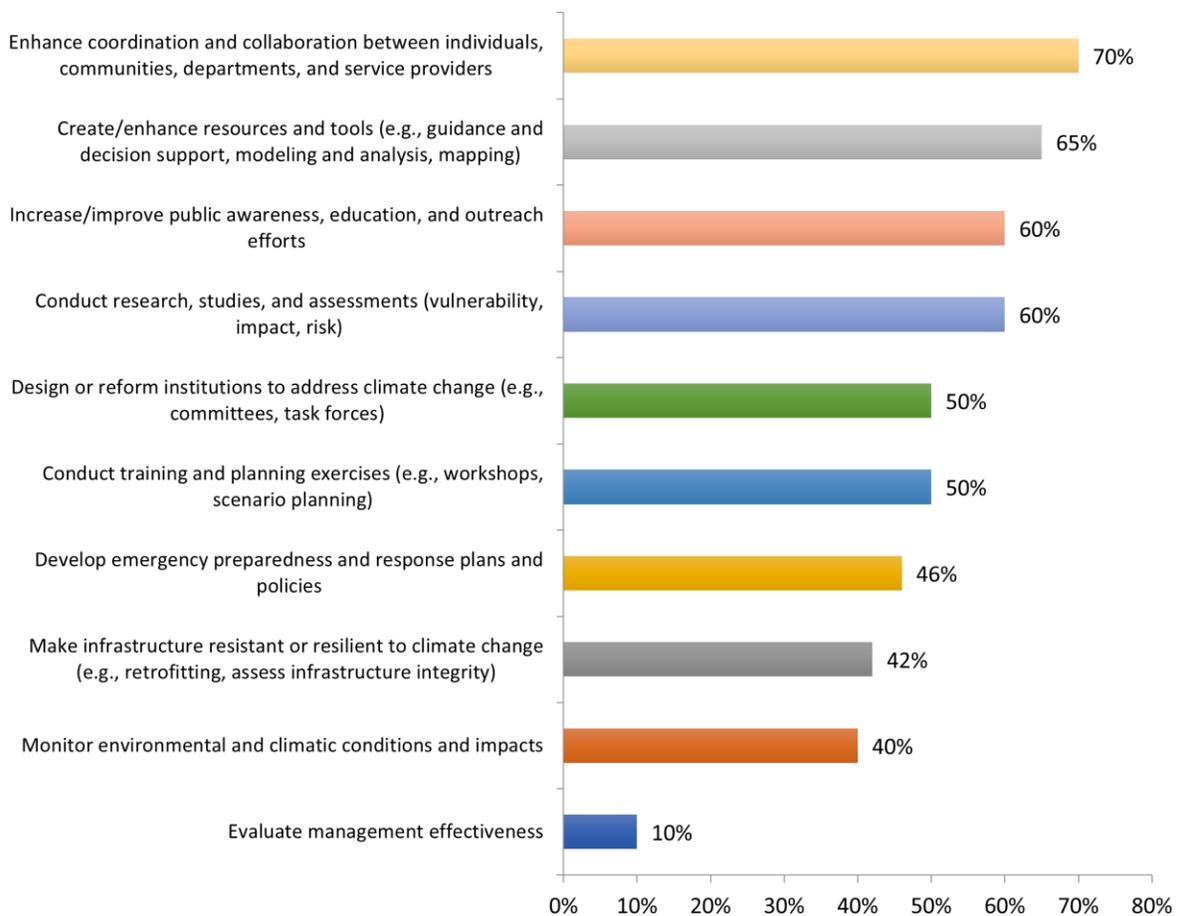


Figure 10. General strategies prioritized by respondents engaged in adaptation (n=27).

KNOWLEDGE, PRODUCTS, AND SERVICES

Participants were also asked what information they currently use to make decisions on climate change. Most frequently mentioned types of resources used include:

- » grey literature (e.g., agency reports, frameworks): **81%**
- » best practices and lessons learned from other public health professionals: **80%**
- » scientific literature and data (e.g., models, maps): **78%**

Additional resources needed to better address climate change in public health include:

- » case study examples from on-the-ground initiatives: **78%**
- » decision support tools for the purpose of integrating climate change and other stressors: **78%**
- » guidance on how to integrate climate change into planning and management: **75%**
- » information on how to communicate climate change to the public: **67%**
- » expert networks/associations: **67%**
- » trainings or webinars: **65%**

CASE STUDIES

California

Agencies and organizations in California are undertaking a wide variety of efforts to address public health concerns related to climate change. As part of the *Safeguarding California* adaptation plan,¹ the state health department developed an implementation plan for the public health sector, detailing efforts underway such as the development of tools to improve decision-making (e.g., Urban Heat Island Index) and the California Building Resilience Against Climate Effects (CalBRACE) program.² CalBRACE has developed county-level climate and health profiles, vulnerability indicators, and an Adaptation Planning Toolkit. Tribes such as the Blue Lake Rancheria and the Pala Band of Mission Indians are working to reduce air and water pollution and improve emergency response capabilities, while local health departments are educating the public and practitioners on the links between public health and climate change. Other key resources include websites, such as Tracking California, the state Adaptation Clearinghouse, and Cal-Adapt, which provide data and tools to support climate-informed decision-making.

California faces climate impacts such as extreme heat, drought, wildfires, sea level rise, and extreme weather events.³ These changes can lead to grave public health concerns such as degraded water quality, respiratory and heat-related illnesses, and vector-, water-, and food-borne diseases.⁴ Fires and droughts in Los Angeles and the Bay Area are causing increasing health problems along with forced displacement of individuals, households, and communities, exacerbated by various socioeconomic inequities.

Climate Action or Adaptation Plan 

Health Department Climate Plan 

Hazard Mitigation Plan 

Impacts of Concern for California

Extreme Heat 

Precipitation Changes 

Sea Level Rise 

Drought 

Wildfire 

Extreme Weather 

Flooding 

Water-borne disease 

Water Quality and Supply 

Air Quality 

Ecological Impacts: Pests, Invasives 

Food Impacts: Disease and Security 

Zoonotic and Vector-borne disease 

STATE CLIMATE AND HEALTH ADAPTATION EFFORTS

In response to Executive Order B-30-15 on greenhouse gas emissions reductions,⁵ various state agencies updated the state climate adaptation plan and developed implementation plans for different sectors (e.g., health, agriculture, emergency management, energy).⁶ The California Department of Public Health (CDPH) developed the public health sector plan around three priorities: (1) improving capacity of communities to prepare, respond, and recover from climate-related health risks; (2) increasing understanding of climate impacts on public health; and (3) promoting

information sharing and education. The plan highlights priority initiatives underway in the state including the Integrated Transport and Health Impacts Model (ITHIM), Urban Heat Island Index, and the California Building Resilience Against Climate Effects (CalBRACE) program. The ITHIM is a tool that estimates potential health co-benefits and tradeoffs from different transportation scenarios in urban centers (e.g., in San Francisco, walking and biking reduce cardiovascular disease risks by 14% and decrease greenhouse gas emissions by 14%). The tool is being used to inform land-use planning and transit decisions that support public health and reduce emissions.

Urban heat islands, which exacerbate heat-related illnesses, are the focus of a statewide index created by the California Environmental Protection Agency. CDPH and the California Environmental Protection Agency co-lead the Public Health Working Group of the California Climate Action Team, which is responsible for coordinating efforts to implement the state's greenhouse gas emissions reductions and adaptation strategies. In 2013, the working group sponsored the development of *Preparing California for Extreme Heat: Guidance and Recommendations*, which recommended strategies to prepare for and respond to heat-related illnesses and air quality degradation.⁷ Among the recommendations are calls to improve heat-health alert warnings; increase the health care system's ability to adequately respond, particularly for impacts on vulnerable populations; and the development of tools to quantify the urban heat island effect. The Urban Heat Island Index was created to help users visualize vulnerable areas and populations, and to assist local planners in prioritizing areas for green infrastructure and cool roofs and pavements to reduce the heat island effect.

The California Building Resilience Against Climate Effects (CalBRACE) initiative is part of the Centers for Disease Control's (CDC) Climate-Ready States and Cities Initiative. CalBRACE's climate priorities include increasing temperatures and extreme heat, wildfire, and sea level rise (including flooding). CalBRACE functions as an initiative of the CDPH and works in collaboration with local health departments throughout the state to build capacity for climate adaptation. CalBRACE followed the five-step framework designed by the CDC—(1) identifying impacts and assessing vulnerabilities, (2) quantifying projected health outcomes, (3) determining the most suitable interventions or adaptation options, (4) developing and implementing an adaptation plan, and (5) evaluating the impact of the implemented strategies. To identify the potential impacts of climate change on public health in California, CalBRACE developed several tools, including county-level climate and health profile reports and climate change and health vulnerability indicators. The profile reports for California's 58 counties include regional climate projections, the health impacts related to these projections, population vulnerabilities, and example adaptation strategies.⁸ The CDPH developed a Climate Change and Health Vulnerability Indicators (CCHViz) interactive data visualization platform to help users map indicators associated with environmental exposures, population sensitivity, and adaptive capacity, and may be used by local and state agencies to more effectively support the most at-risk communities. In addition, CalBRACE developed an Adaptation Planning Toolkit, a collection of tools, reports, and other resources to assist decision makers in developing and implementing adaptation strategies. CalBRACE is complementary to the CDPH's Climate Change and Health Equity Program (CCHPEP), which focuses on the intersections of climate change and equity in public health planning.⁹ CCHPEP considers how climate change mitigation and adaptation actions may benefit or harm vulnerable individuals and populations in the state by exacerbating existing inequities, and

provides critical input to statewide planning processes to ensure health equity concerns are addressed (e.g., on statewide housing and transportation plans).

In addition, California's 2018 State Hazard Mitigation Plan notes that climate change is a major risk factor for the state and public health and safety.¹⁰ The plan identifies climate-related effects linked to public health and safety, including air pollution, invasive species, droughts, vector-borne disease, extreme heat, and severe weather, and calls for the integration of climate change into local hazard profiles, risk assessments, and mitigation plans.

TRIBAL CLIMATE AND HEALTH ADAPTATION EFFORTS

The Blue Lake Rancheria Tribe of California has been acting on climate change for decades.¹¹ In 2002, the tribe embarked on an effort to transition to zero net carbon emissions by 2030 while reducing operational costs, creating economic opportunities, and reducing air and water pollution. By 2015, the tribe had built an energy efficient hotel, completed energy efficiency upgrades throughout the community, started producing biodiesel onsite, launched a low-carbon microgrid project, and was named a Climate Action Champion by the Obama Administration. As part of these efforts, the tribe has also expanded water conservation and drought-tolerant landscaping initiatives.

The Pala Band of Mission Indians completed a climate change vulnerability assessment¹² and adaptation plan¹³ in 2019. The adaptation planning process designed by the Pala Environmental Department (PED) as part of the national Tribal Climate Health Project is similar to the CDC BRACE framework. The Pala first identified climate-related concerns specific to human health, cultural and spiritual health, socioeconomic health, and the natural and built environment. Among the human health impacts prioritized by the tribe are heat-related illnesses, injuries and fatalities from wildfire and storms, inability to access medical services due to extreme events, disruptions in drinking water and food supplies, and vector-borne diseases. With respect to cultural and spiritual health, the tribe is concerned about potential declines in culturally-important species, loss of sacred sites or disruptions in community ceremonies, and potential dislocation or relocation. Tribal members voted on priority adaptation strategies, including providing early warning systems for extreme events; building alternative power supplies; increasing water storage capacity within the reservation; increasing public awareness campaigns; and developing emergency and health management plans. The adaptation plan builds upon these priority strategies with specific actions, implementation steps, and authorities responsible for implementation. Among the health-related actions in progress are:

- » Developing maps to identify at-risk individuals and creating a health safety plan to increase medical and community support;
- » Creating health emergency and management plans to outline procedures for pre- and post-event measures (e.g., access to services, evacuation plans, continuity of care) and onsite facilities that can serve as response centers (e.g., fire stations, faith-based organizations);
- » Establishing a referral system to ensure continuity of access to resources and services during and after climate events;
- » Conducting public campaigns to help residents avoid risks and cope with potential illnesses (e.g., food and water contamination);

- » Tracking environmental health indicators; and
- » Trained medical professionals to recognize symptoms of exposure as well as mental health impacts.

CITY AND COUNTY CLIMATE AND HEALTH ADAPTATION EFFORTS

CalBRACE, in partnership with the Bay Area Regional Health Inequalities Initiative (BARHII) and the Alliance Project, is working to collect data and provide recommendations on the state of climate resilience and health equity in California's local health departments. The preliminary findings of this ongoing project include an emphasis on the lack of staff and funding across departments that are dedicated to this type of work. Another major theme that emerged is the need for long-term community engagement and partnerships to sustain efforts and engage local governments. The findings emphasize the importance of local health departments working within communities to improve climate resilience outcomes as they relate to public health. BARHII supports a coalition of the Bay Area's eleven public health departments, and has developed five guiding documents to assist local health departments in understanding why and how climate change is a public health and equity issue and how to address climate change.¹⁴ BARHII collaborated with the North Bay Organizing Project to address health and displacement concerns after four destructive wildfires in 2017, which left many residents displaced. BARHII worked with Sonoma County to develop a recovery framework¹⁵ that embedded equity in strategies to address displacement and housing shortages.

The CalBRACE initiative has also released a series of case studies detailing public health impacts due to climate change and related efforts in county health departments across the state (e.g., Los Angeles, Mariposa, San Diego, San Luis Obispo, and Santa Clara).¹⁶ For example, the Los Angeles County Public Health Department created a working group to develop a department-wide adaptation plan. One of the outcomes was a partnership with the University of California Los Angeles Fielding School of Public Health to develop a curriculum for a climate and health workshop series for public health staff.

NONGOVERNMENTAL CLIMATE AND HEALTH ADAPTATION EFFORTS

Tracking California is a project of the Public Health Institute, funded through state, federal, and private sources. Core funding is received from the CDC National Environmental Public Health Tracking Program. The goal of the project is to track environmental health data to improve public health efforts in the state. Some of the data being tracked includes air quality, water quality, heat-related illness, and climate change. Specifically, the climate change data connects environmental and climatic changes such as wildfires, extreme heat, and sea level rise to public health impacts and related research and resources to address these concerns.

In January 2019, over 30 health organizations in California banded together in a Call to Action sent to Governor Gavin Newsom and other key California legislators. The Call to Action recognizes climate change as a public health emergency and focuses on the need to act on climate, health, and equity concerns.¹⁷ Among the endorsing organizations are the California Black Health Network, California Conference of Local Health Officers, Central California Asthma Collaborative, Climate Psychiatry

Alliance, Health Officers Association of California, Medical Society Consortium on Climate and Health, Public Health Institute, Roots of Change, and Service Employees International Union.

KEY RESOURCES

- » State Adaptation Clearinghouse: <http://resilientca.org>
- » Cal-Adapt: <http://cal-adapt.org>
- » Tracking California: <https://trackingcalifornia.org/climate-change/climate-change-landing>
- » CalBRACE Adaptation Toolkit:
<https://cdphdata.maps.arcgis.com/apps/MapSeries/index.html?appid=4093397556b4450ea563f23fcf353c64>
- » Climate Change and Health Vulnerability Indicators: <https://discovery.cdph.ca.gov/ohe/CCHVlz/>
- » California BRACE Program: <https://www.cdc.gov/climateandhealth/brace.htm>
- » Urban Heat Island Index for California: <http://www.calepa.ca.gov/UrbanHeat/>
- » 2012 Climate Action for Health: Integrating Public Health into Climate Action Planning:
[https://www.cdph.ca.gov/Programs/OHE/CDPH Document Library/CCHEP-General/CDPH-2012-Climate-Action-for-Health_accessible.pdf](https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CCHEP-General/CDPH-2012-Climate-Action-for-Health_accessible.pdf)

¹ Safeguarding California Plan: 2018 Update: <http://resources.ca.gov/docs/climate/safeguarding/update2018/safeguarding-california-plan-2018-update.pdf>

² Safeguarding California Implementation Action Plans: 2016 Public Health Sector Plan: <http://resources.ca.gov/docs/climate/safeguarding/Public%20Health%20Sector%20Plan.pdf>

³ What Climate Change Means for California: <https://www.epa.gov/sites/production/files/2016-09/documents/climate-change-ca.pdf>

⁴ Climate Change and Health in California: <https://www.nrdc.org/sites/default/files/climate-change-health-impacts-california-ib.pdf>

⁵ California Executive Order B-30-15: <https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html>

⁶ Safeguarding California Implementation Action Plans: <http://resources.ca.gov/docs/climate/safeguarding/Safeguarding%20California-Implementation%20Action%20Plans.pdf>

⁷ Preparing California for Extreme Heat: Guidance and Recommendations: http://healthyplacesindex.org/wp-content/uploads/2018/02/2013_cph_preparing_california_for_extreme_eat.pdf

⁸ CalBRACE 2017 Climate Change and Health Profile Reports: <https://www.cdph.ca.gov/Programs/OHE/Pages/ClimateHealthProfileReports.aspx>

⁹ Climate Change and Health Equity Program: <https://www.cdph.ca.gov/Programs/OHE/Pages/CCHEP.aspx>

¹⁰ 2018 State of California Hazard Mitigation Plan: https://www.caloes.ca.gov/HazardMitigationSite/Documents/002-2018_SHMP_FINAL_ENTIRE_PLAN.pdf

¹¹ Blue Lake Rancheria Tribe of California: <https://bluelakerancheria-nsn.gov>

¹² Pala Band of Mission Indians Climate Change Vulnerability Assessment: <http://ped.palatribe.com/wp-content/uploads/2019/07/Pala-Environmental-Department-Climate-Change-Vulnerability-Assessment-2019.pdf>

¹³ Pala Band of Mission Indians Climate Change Adaptation Plan: <http://ped.palatribe.com/wp-content/uploads/2019/07/Plan-PED-Pala-Adaptation-Plan-adopted-07032019.pdf>

¹⁴ BARHII Climate Change Quick Guides: <http://barhii.org/resources/climate-change-quick-guides/>

¹⁵ <https://sonomacounty.ca.gov/Office-of-Recovery-and-Resiliency/Recovery-Framework/>

¹⁶ California Climate and Health Case Stories: The Local Public Health Department Response: https://www.cdph.ca.gov/Programs/OHE/CDPH%20Document%20Library/CalBRACE%20Case%20Stories/Portfolio-CalBRACE-Climate-Health-Case_Story-Series-2rev2018-ADA.pdf

¹⁷ California Call to Action on Climate, Health, and Equity: <http://usclimateandhealthalliance.org/california-call-for-action-on-climate-health-and-equity/>

Colorado

Colorado is implementing climate change adaptation and action initiatives across agencies and scales throughout the state. However, the integration of climate change into public health is limited and planning, implementation, and evaluation efforts are variable across state-, county-, and city-level endeavors. For example, the Colorado Department of Public Health and Environment collaborated with the Department of Natural Resources, Colorado Energy Office, and other agencies in the development of the state Climate Action Plan; however, plans to implement these strategies and direct actions taken to address climate impacts on health at the state-level are largely unknown. Notable initiatives in the state include the dedication of the Colorado Resiliency Office to provide support during natural disasters that could threaten the health and safety of communities and individuals, the City of Denver’s strategic climate and health planning initiative, and the University of Colorado’s Consortium for Climate Change and Health, which conducts interdisciplinary research to track and develop clinical interventions for climate-driven diseases.

Primary climate-related impacts of concern for Colorado include extreme weather events, wildfires, drought, flooding, degraded air quality, and diminished water availability caused by reduced snowmelt and runoff, each of which has consequences for public health.^{18,19,20} For instance, displacement and insecurities in healthcare services, heat-related illnesses, reduced water supply and quality, water-borne diseases, and exacerbation of asthma and chronic disease are common concerns. In general, Colorado acknowledges climate change effects on human health at state and local levels, however, evidence of actions taken to address impacts is inconsistent.

Climate Action or Adaptation Plan	
Health Department Climate Plan	
Hazard Mitigation Plan	

Impacts of Concern for Colorado

- Extreme Heat 
- Precipitation Changes 
- Drought 
- Wildfire 
- Extreme Weather 
- Flooding 
- Water-borne disease 
- Water Quality and Supply 
- Air Quality 
- Ecological Impacts: Pests, Invasives 
- Food Impacts: Disease and Security 
- Zoonotic and Vector-borne disease 

STATE CLIMATE AND HEALTH ADAPTATION EFFORTS

Colorado's 2015 Climate Action Plan describes projected climate impacts (e.g., air quality, vector-borne disease, and extreme weather events) and potential health response strategies (e.g., monitoring, assessment, education, and outreach), however implementation details and direct

actions taken to address climate impacts on health are lacking.²¹ The 2018 Colorado Natural Hazard Mitigation Plan likewise notes that social determinants such as race, gender, and income affect individual vulnerability to natural disasters and climate change.²²

The Department of Public Health and Environment's website includes information on air quality issues and greenhouse gas emissions reporting,²³ and a local environmental health reporting tool.²⁴ The Colorado Public Health Tracking Portal serves as a data source for improved public health decision-making on factors related to air quality, drinking water quality, toxins, and harmful algal blooms. The portal is part of the National Environmental Public Health Tracking Program, funded by the CDC. Additional resources on the department's website that do not explicitly include climate change but may support climate-informed decision-making include:

- » The Engage-Calm-Distract resource kit, which provides strategies to help health providers rapidly respond to the psychological and emotional needs of children and parents in times of crisis;
- » Disaster recovery guides for local public health departments²⁵ and the public,²⁶ both of which detail human health concerns that arise from emergencies and disasters such as issues related to sanitation, disease, pollution, and shelter;
- » The multiagency Colorado Crisis Education and Response Network for behavioral health disaster response; and
- » Training related to field emergency response and psychological first aid.²⁷

The department also funds Supplemental Environmental Projects that benefit the environment or public health funded by monetary settlements of violations of environmental regulations. As of 2019, there have been two funded projects: one that promotes public health through green retrofits and another that focuses on solar energy.

The Colorado Resiliency Office (CRO) aims to empower Colorado to build stronger, safer, and more resilient communities in the face of natural disasters. The main climate impacts of concern for CRO include wildfires, drought, flooding, and subsequent impacts on air and water quality. While there is not a mandate for climate action work, CRO has recognized the need to address climate adaptation. In local-level initiatives, CRO encourages community resilience planning to incorporate climate change considerations (e.g., integration into comprehensive, hazard mitigation, land use, and economic development plans). CRO is working with the Colorado Department of Natural Resources' Water Conservation Board and Colorado's Division of Homeland Security and Emergency Management to develop a scenario-based risk assessment for the state to better understand the impacts of climate change on drought, wildfire, and flooding. The project's goals are to identify at both local and regional levels the impacts of climate change, the costs of inaction versus immediate action, tools for local-level decision-makers to better understand climate impacts, and needs for guidance on types of actions, best practices, and case studies. CRO and its partners recently secured funding for this project and aim to conduct outreach and education initiatives via its website; workshop series, such as the resilient Colorado communities workshop series;²⁸ and technical assistance on planning. CRO's Working Group investigates how to build resilience into state investments and operations (e.g., building resilience into competitive and discretionary grants, not

building a school in a flood zone); how to take broad criteria and apply them to a range of agencies (e.g., public health or transportation); and how to add weighting criteria to guidelines and metrics.

The Colorado Communities Symposium, which kicked off in January of 2018, brought together a consortium of city and county agencies, including CRO, throughout the state that agreed to meet the guidelines of the Paris Agreement.²⁹ The Symposium focused on transportation, energy, resilience, and aimed to identify goals for the state and communities. The Association of Climate Change Officers is leading the follow up to this symposium and is interested in developing peer-to-peer exchanges and a resilience forum.

CRO has used the guidance and resources of the Water Conservation Board and climate change specialists in its efforts to address climate adaptation needs. A challenge in CRO's work is proper framing during communication with communities, particularly making sure conversations are relevant at local levels and addressing impacts that communities are already experiencing firsthand (e.g., long-term drought). Factors that facilitate climate action within CRO include the support of the state climate plan (e.g., implementing and meeting goals in a top-down direction), community openness and willingness to work on adaptation issues, and research institutions (e.g., National Center for Atmospheric Research, National Renewable Energy Laboratory, and University of Colorado) that provide technical resources and guidance.

While CRO is pushing climate action forward in Colorado by participating in adaptation initiatives and projects, there is little focus on public health impacts in plans. CRO's new project is still in developmental stages and there is no detail on project implementation or evaluation to date. This is a similar finding with other state, city, and county adaptation plans—public health seemingly is not a true focal point of action planning, and many proposed strategies and goals regarding health, while well outlined, are not supported by results in implementation.

CITY AND COUNTY CLIMATE AND HEALTH ADAPTATION EFFORTS

At the local level, Denver is taking the lead on actions to address climate change effects on human health. The *City and County of Denver 2014 Climate Adaptation Plan* identifies extreme temperatures, urban heat islands, changes in disease patterns, air pollution, and water quality as priority concerns.³⁰ The plan aims to (1) safeguard the health of citizens in light of climate change; (2) preserve the ability of medical and healthcare providers to sustain services during extreme heat events; (3) conduct vector monitoring and control; and (4) provide sufficient emergency response measures during extreme heat events. Specific strategies and actions include:

- » Reducing health-related impacts of extreme weather events (e.g., increase number of shelters for at-risk populations, designate public cooling shelters, adopt a severe weather ordinance);
- » Reducing health-related vulnerabilities from vector-borne diseases (e.g., develop a vector-borne and zoonotic disease surveillance system to improve epidemic predictions);
- » Developing energy and communications systems that are resilient to power outages (e.g., install off-grid alternative systems, obtain reliable backup generation capacity); and

- » Advising medical providers on whether critical infrastructure is at risk and identifying risk mitigation solutions.

To date, the city has assessed extreme heat events, created a city-wide vector control plan, and drafted an extreme heat annex for the city's Emergency Operations Plan.³¹ In progress activities include creating and executing an extreme events public education campaign and identifying how Denver Environmental Health will cooperate with other agencies (e.g., Office of Emergency Management and Homeland Security) during extreme heat events. In 2018, Denver released the 80x50 Climate Action Plan, which identifies the need for increased access to transportation choices that help decrease air pollution, safer and more reliable energy sources that would reduce greenhouse gas emissions and improve air quality, and equitable health outcomes to preserve quality of life in light of climate change.³²

Other noteworthy local planning efforts in Colorado that incorporate health concerns include Pitkin and Boulder Counties. Boulder County's *Climate Change Preparedness Plan* directly identifies public health threats associated with climate change, outlining potential impacts, opportunities, policy recommendations, and suggestions for future study and action.³³ While the report details ideas, it does not provide information on any actions underway. Pitkin County's *Climate Action Plan* focuses on greenhouse gas emissions reductions, and information provided by the County Public Health Department regarding potential adaptation strategies.³⁴ These goals include building local resilience by identifying vulnerable populations; improving public health preparedness, response, and communication; and improving disease education, surveillance, and response to food-borne and zoonotic diseases.

NONGOVERNMENTAL CLIMATE AND HEALTH ADAPTATION EFFORTS

The Colorado Health Institute provides evidence-based data and analysis to inform policy making and support health care advancement in the state.³⁵ The Institute released *Colorado's Climate and Colorado's Health: Examining the Connection* in 2017, which synthesizes the links between human health and increasing temperatures, air quality, and wildfires.³⁶ The report also identifies populations that may be most acutely vulnerable to each of these stressors, and policy measures that may help to address these concerns such as the state's greenhouse gas emissions reduction targets.

The University of Colorado Consortium for Climate Change and Health aims to gather a multidisciplinary team of epidemiologists, clinicians, anthropologists, climatologists, and atmospheric scientists to conduct research, track climate-driven diseases, develop clinical interventions, and educate health practitioners on climate change.³⁷ The Consortium hosts a podcast (Attention Humans) leads a university course on climate and health, and conducts research on climate-driven heat stress, respiratory disease, infectious disease, and impacts on worker health.

KEY RESOURCES

- » Attention Humans podcast: <http://www.cuconsortium.org/podcast/>
 - » Engage-Calm-Distract Resource Kit: <https://www.colorado.gov/pacific/cdphe/engage-calm-distract>
 - » Colorado Environmental Public Health Tracking: <https://www.colorado.gov/coepht>
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¹⁸ NOAA National Centers for Environmental Information State Summaries: Colorado. <https://statesummaries.ncics.org/downloads/CO-print-2016.pdf>

¹⁹ What Climate Change Means for Colorado:

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-co.pdf>

²⁰ Climate Change and Health in Colorado: <https://www.nrdc.org/sites/default/files/climate-change-health-impacts-colorado-ib.pdf>

²¹ 2015 Colorado Climate Plan: <https://www.codot.gov/programs/environmental/Sustainability/colorado-climate-plan-2015>

²² 2018 Colorado Natural Hazard Mitigation Plan: <https://www.colorado.gov/pacific/mars/atom/151586>

²³ Colorado greenhouse gas reports: <https://www.colorado.gov/pacific/cdphe/colorado-greenhouse-gas-reports>

²⁴ Local Environmental Health Reporting Tool: <https://www.colorado.gov/pacific/coepht/local-environmental-health-reporting-tool>

²⁵ Disaster Recovery Guide for Local Public Health Agencies:

<https://www.colorado.gov/pacific/cdphe/cdphe-disaster-recovery-guide-local-public-health-agencies>

²⁶ Disaster Recovery Guide for the Public: <https://www.colorado.gov/pacific/cdphe/cdphe-disaster-recovery-guide-public>

²⁷ Disaster behavioral health training: <https://www.colorado.gov/pacific/cdphe/disaster-behavioral-health>

²⁸ Colorado Resiliency Resource Center Trainings and Events: <https://www.coresiliency.com/trainings>

²⁹ Colorado Communities Symposium: <https://www.coloradocommunities.org/>

³⁰ City and County of Denver Climate Adaptation Plan:

https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/Climate1/Climate_Adaptation_Final_with_letter.pdf

³¹ City and County Denver 2014 Climate Adaptation Update:

https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/Climate1/Adaptation_Update_-_final.pdf

³² Denver 80 x 50 Climate Action Plan:

https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/80x50/DDPHE_80x50_ClimateActionPlan.pdf

³³ Boulder County Climate Change Preparedness Plan: <https://assets.bouldercounty.org/wp-content/uploads/2017/03/climate-change-preparedness-plan.pdf>

³⁴ Pitkin County Climate Action Plan: <https://www.pitkincounty.com/DocumentCenter/View/14694/Climate-Action-Plan?bidId>

³⁵ Colorado Health Institute: <https://www.coloradohealthinstitute.org>

³⁶ Colorado's Climate and Colorado's Health: Examining the Connection:

https://www.coloradohealthinstitute.org/sites/default/files/file_attachments/Colorados%20Climate%20Colorados%20Health%20Final%20for%20Web_0.pdf

³⁷ University of Colorado Consortium for Climate Change and Health: <http://www.cuconsortium.org>

Georgia

Georgia does not have a state climate adaptation plan or a formal state-issued public health and climate adaptation plan. The state health department does, however, have several initiatives that aim to address the health and safety impacts of climate-related events. In addition, the state hazard mitigation plan directly addresses the effects of climate change and extreme weather events on public health and safety, including degraded air quality, extreme heat, flooding, and water-borne disease. Several notable city and nongovernmental initiatives also aim to increase action on climate change and public health. For example, the City of Atlanta was selected as one of the Rockefeller Foundation's 100 Resilient Cities and created a strategy to guide urban resilience in light of climate change and socioeconomic problems such as income and housing inequities. Notable nongovernmental efforts include those by the TransFormation Alliance, Southface Institute, and the Georgia Climate Project.

Climate impacts of concerns in Georgia include rising temperatures, wildfires, sea level rise, extreme weather events, flooding, and droughts,³⁸ which can affect the accessibility of healthcare, food, transportation, and housing. Temperature increases due to climate change puts Georgia at higher risk for extreme heat waves that can lead to heat-related illnesses such as heat stroke.³⁹ Additional health impacts include increasing rates of asthma; vector-, food-, and water-borne diseases; and mental stress and grief.

Climate Action or Adaptation Plan	✗
Health Department Climate Plan	✗
Hazard Mitigation Plan	✓

Impacts of Concern for Georgia

- Extreme Heat 
- Precipitation Changes 
- Sea Level Rise 
- Drought 
- Wildfire 
- Extreme Weather 
- Flooding 
- Water-borne disease 
- Water Quality and Supply 
- Air Quality 
- Ecological Impacts: Pests, Invasives 
- Food Impacts: Disease and Security 
- Zoonotic and Vector-borne disease 

STATE CLIMATE AND HEALTH ADAPTATION EFFORTS

In general, there are few state-initiated actions to integrate climate change into public health planning. However, some state-level programs that indirectly address climate change and associated health threats through environmental health emergency preparedness and hazard mitigation planning exist. The Georgia Department of Public Health (GDPH) hosts an Environmental Health Emergency Preparedness webpage that includes information on how severe weather impacts health; an Environmental Health Emergency Response Plan; disaster cleanup guides; and contact information for the agency and resource centers.⁴⁰ While climate change is not directly mentioned in these materials, there are many connections made between environmental events and public health

impacts. For example, the Environmental Health Emergency Response Plan accounts for emergency disaster preparedness, response, recovery, and hazard mitigation measures.⁴¹ The plan highlights topics such as wastewater, vector control, and food- and water-borne illnesses. Public Health and Medical Services are identified as emergency support functions responsible for providing the necessary measures to prevent and control emergency-related diseases. The plan provides a Disaster Action Chart, which lists emergencies and disasters that are most likely to occur, including hurricanes, flooding, extreme weather, and extreme heat. The GDPH also coordinates an Environmental Health Strike Team comprising state and county health professionals that serve as rapid responders to help communities recover from health impacts.⁴²

The GDPH, Georgia Emergency Management and Homeland Security Agency (GEM/HS), and the Citizen Corps developed the Ready Georgia campaign, a publicly-available mobile phone application that provides alerts regarding severe weather and potential disasters. The application provides information on drought, extreme heat, flooding, and general public health emergencies. In addition, Ready Georgia can be used to create a disaster plan, build a disaster kit, and support community emergency preparedness. GEM/HS also hosts a webpage of hazard mitigation resources, such as planning guides, handbooks, and example worksheets that communities can use.⁴³ Many of the resources included on the webpage are issued by the Federal Emergency Management Agency.

In addition, the State Hazard Mitigation Strategy includes explicit links between climate change and hazards.⁴⁴ The plan was updated in 2019 as a collaboration between GEM/HS and multiple state agencies, including the GDPH and the Georgia Department of Natural Resources. Hazards noted as likely to be impacted by climate-related stressors include extreme heat, drought, extreme weather events, flooding, wildfires, and coastal hazards such as sea level rise. The plan makes a connection between climate-related hazards and public health by providing the example that a decrease of air quality due to wildfire may result in negative health outcomes for impacted communities (e.g., respiratory illnesses). Public health concerns are also mentioned briefly in connection with major inland and coastal flooding events. Such events, exacerbated by climate change, often affect public health through the spread of water-borne diseases and may also threaten access to healthcare services via damage to transportation or infrastructure.

CITY AND COUNTY CLIMATE AND HEALTH ADAPTATION EFFORTS

The Social Vulnerability Index (SVI) that accounts for community vulnerability with respect to human health, natural disasters, disease outbreaks, and socioeconomic status on a scale of 0 (lowest vulnerability) to 1 (highest vulnerability).⁴⁵ The City of Atlanta straddles DeKalb and Fulton counties, which have overall SVI scores of 0.6982 and 0.5610 respectively. These scores indicate a moderate to high level of vulnerability. The highest scores between these counties include socioeconomic (e.g., unemployment, income status), housing and transportation (e.g., no vehicle, mobile homes, crowding), and minority/language (e.g., minority status, English as a Second Language) vulnerabilities.

In Atlanta, climate-related vulnerabilities include the flooding of homes, densely-packed development resulting in heat islands, and increasing energy bills. The city has taken several

measures to address these issues, most notably the 2015 Climate Action Plan, which highlights climate-related health impacts related to increasing air temperatures and air and water quality.⁴⁶ The plan focuses heavily on the reduction of greenhouse gas emissions within the city, which may lead to improvements in health impacts related to climate change (e.g., asthma). The city also released *Clean Energy Atlanta: A Vision for a 100% Clean Energy Future*, which addresses the positive effects greenhouse gas emissions reductions could have on air quality and public health.⁴⁷ In addition, Atlanta has implemented numerous green infrastructure projects that may improve air and water quality and enhance overall public health and wellbeing. As one of the Rockefeller Foundation's 100 Resilient Cities, Atlanta created the *Resilient Atlanta* strategy to guide urban resilience in light of climate change and socioeconomic problems such as income and housing inequities.⁴⁸ The strategy was created in 2017 in consultation with a 100-member advisory group comprising nonprofit, academic, business, and faith-based organizations as well as resident feedback. Implementation of the strategy is intended to be shared across sectors with the Mayor's Office of Resilience as the lead entity responsible for strategy updates and progress reports.

In 2016, the coastal city of Tybee Island released a Sea Level Rise Adaptation Plan to address flooding risks and options for action.⁴⁹ The plan was one of the first major climate-related adaptation reports out of Georgia and addresses some of the major impacts sea level rise will have on the island's infrastructure, including flooding of houses, backup of stormwater drainage systems, and tidal flooding that disrupts transit and emergency evacuation routes. While the plan mentions rising sea levels as a threat to public health, it does not include direct steps to tackle specific health concerns. Public health is addressed, however, in the plan's goal to elevate municipal well pumps, which will allow access to clean drinking water that is uncompromised by saltwater intrusion and minimize the threat of flooding and potential spread of water-borne diseases.

NONGOVERNMENTAL CLIMATE AND HEALTH ADAPTATION EFFORTS

Areas of high social vulnerability in Georgia (e.g., Southwest Atlanta) have traditionally been underrepresented in government initiatives to address climate change. This is being addressed by nongovernmental efforts, such as the TransFormation Alliance (TFA), Southface Institute, and the Georgia Climate Project. TFA, a collaboration of Atlanta-based organizations, offers residents opportunities for a higher quality of life. In 2019, TFA granted \$500,000 to organizations around Atlanta to promote climate, health, and racial equity programs.⁵⁰ One of the grantees—the Southface Institute—has created a workforce development program (Atlanta CREW [Culture-Resilience-Environment-Workforce]) to train communities in green infrastructure construction and maintenance, while promoting community arts and culture. Atlanta CREW is conducting training on green infrastructure best practices for builders and developers, and hands-on training of at least 60 local residents in green infrastructure installation and maintenance of seven projects. This program addresses some of the major climate threats to the city (e.g., flooding and rising temperatures) that affect community public health and the potential issues associated with green infrastructure. For example, a major concern related to green infrastructure and open space projects is the potential for displacement and gentrification from improvements to public facilities and community assets. Working directly with community members on the design and implementation of projects may alleviate these risks.

The Georgia Climate Project is another example of a nongovernmental initiative tackling the public health threats due to climate change. The Georgia Climate Project aims to push the state forward in tracking, analysis, and engagement concerning climate change. The Project conducts scientific investigations on climate-related topics such as food security impacts, water supply and quality, public health and healthcare services, and adaptation strategies.⁵¹

KEY RESOURCES

- » Georgia Climate Project: <https://www.georgiaclimatoproject.org>
- » Ready Georgia: <http://ready.ga.gov>
- » City of Atlanta Green Infrastructure Program: <https://www.arcgis.com/apps/MapSeries/index.html?appid=db24b57c2d7146c2a3f039d37d539737>

³⁸ What Climate Change Means for Georgia:

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-ga.pdf>

³⁹ Climate Change Indicators: Heat-Related Illnesses: <https://www.epa.gov/climate-indicators/heat-related-illnesses>

⁴⁰ Environmental Health Emergency Preparedness: <https://dph.georgia.gov/environmental-health-emergency-preparedness>

⁴¹ Environmental Health Emergency Response Plan:

<https://dph.georgia.gov/sites/dph.georgia.gov/files/EnvHealth/EmerPrep/EnvHealthEmergencyResponsePlan2018-07.pdf>

⁴² Environmental Health Strike Team Program Overview:

<https://dph.georgia.gov/sites/dph.georgia.gov/files/EnvHealth/EmerPrep/EH%20Strike%20Team%20Program%20Overview.pdf>

⁴³ Hazard Mitigation Resources: <https://gema.georgia.gov/hazard-mitigation-resources>

⁴⁴ 2019 Georgia Hazard Mitigation Strategy: <http://bit.ly/36lDrwB>

⁴⁵ Social Vulnerability Index: <https://svi.cdc.gov>

⁴⁶ City of Atlanta Climate Action Plan:

<https://atlantaclimateactionplan.files.wordpress.com/2016/02/atlanta-climate-action-plan-07-23-2015.pdf>

⁴⁷ Clean Energy Atlanta: A Vision for a 100% Clean Energy Future: <http://100atl.com/>

⁴⁸ Resilient Atlanta: https://issuu.com/resilientatlanta/docs/100rc_strategydocument_withcover

⁴⁹ Tybee Island Sea Level Rise Adaptation Plan:

https://www.researchgate.net/publication/289999590_Tybee_Island_Sea-Level_Rise_Adaptation_Plan

⁵⁰ TransFormation Alliance grants:

<https://atltransformationalliance.org/about/announcements/transformation-alliance-grants-500000-to-groups-for-soccer-fields-affordable-housing-and-other-projects-to-improve-climate-health-and-racial-equity/>

⁵¹ Georgia Climate Research Roadmap: <https://roadmap.georgiaclimatoproject.org>

Illinois

The 2006 *Report of the Illinois Climate Change Advisory Group* made several recommendations to then-Governor Rod Blagojevich on the need for smart growth principles, mass transit, and reductions in carbon emissions.⁵² However, Illinois has not yet developed a formal state climate action or adaptation plan. The 2018 Illinois Natural Hazard Mitigation Plan highlights extreme storms, flooding, drought, and extreme heat as major impacts of concern for public health and safety.⁵³ While the state health department does not have a formal adaptation plan, it is taking several resilience measures on climate and health. In addition, local health departments and nongovernmental actors are engaged in climate adaptation action.

Climate change impacts, including increases in extreme events such as flooding, heat waves, and drought, have already affected Illinois and are projected to continue. These kinds of extreme events can lead to health problems such as heat-related illnesses, asthma, vector- and water-borne diseases, and mental health issues. With funding from the CDC, the University of Illinois at Chicago School of Public Health (UIC) and the Illinois Department of Public Health (IDPH) are increasing knowledge and awareness of how climate change impacts public health, and improving the capacity of local health departments and emergency preparedness facilities to address the health effects of climate change.

Climate Action or Adaptation Plan	✗
Health Department Climate Plan	✗
Hazard Mitigation Plan	✓

Impacts of Concern for Illinois

- Extreme Heat 
- Precipitation Changes 
- Drought 
- Wildfire 
- Extreme Weather 
- Flooding 
- Water-borne disease 
- Water Quality and Supply 
- Air Quality 
- Ecological Impacts: Pests, Invasives 
- Food Impacts: Disease and Security 
- Zoonotic and Vector-borne disease 

STATE CLIMATE AND HEALTH ADAPTATION EFFORTS

In September 2012, UIC and IDPH received a three-year grant from the CDC’s Climate-Ready States and Cities Initiative to improve the capacity of the Illinois public health system to adequately address the health effects of climate change. Subsequent funding was awarded by the CDC in 2016 to continue implementing activities to help prepare for and respond to the health impacts of climate change in the state.

The project has prioritized heat-related illness, respiratory health, vector-borne diseases, extreme weather events (e.g., floods, water-borne diseases), and mental health. The long-term goal of this

project is to reduce climate-related health illnesses in the state, and activities have primarily focused on working with local public health departments and communities to achieve this goal. Specific project objectives include:

- » Increasing knowledge and awareness of climate change and public health within public health departments, physicians, and the general public;
- » Improving the capacity of local health departments and emergency preparedness facilities to be able to address the health effects of climate change; and
- » Contributing to the evidence-based field of climate change and public health (e.g., publishing in the peer-reviewed literature).

Project activities include:

- » Providing financial and technical support to five local public health departments, which includes facilitating strategic planning sessions to increase knowledge and awareness, prioritize health effects, identify adaptation strategies, generate an action plan, and provide guidance for implementation;
- » Creating an online heat toolkit for local health departments, which includes guidance around messaging for warning levels, social vulnerability and heat health data for each county, and templates (e.g., press releases, social media) for community outreach during extreme heat events;
- » Creating an online flood mapping toolkit for emergency preparedness professionals to use in hazard vulnerability planning activities;
- » Creating educational videos for emergency preparedness professionals as well as the general public to increase awareness of climate change and health issues;
- » Presenting to a variety of different audiences and professions (e.g., synagogues, churches, urban planners, engineering students, medical students) about the connections between climate change and health; and
- » Convening two forums on climate and health. One forum concentrated on the 1995 Chicago heat wave – what happened, why it was so bad, outcomes, and what it could be like in the future. The purpose of this event was to reflect on the past but also to prepare for the future with a specific focus on prioritizing and targeting vulnerable populations.

The following information and resources have been used in the project: (1) National Climate Assessment, particularly sections on climate and health and climate projections; (2) American Public Health Association guidance for local health departments addressing climate change, health, and equity (e.g., *Climate Change, Health, and Equity: A Guide For Local Health Departments*⁵⁴); (3) the CDC's BRACE framework; (4) data from the U.S. Environmental Protection Agency; and (5) Intergovernmental Panel on Climate Change reports and climate science, among others. Additionally, the project has used communication guidance and tools from the CDC's Climate and Health Program and the Yale Program on Climate Change and Communication.

As a result of this work, UIC has several products to help Illinois prepare for the public health impacts of climate change. Example products include:

- » Illinois Climate and Health Profile Report;
- » Videos on climate change health in Illinois⁵⁵ and preparing for extreme weather;⁵⁶
- » Summer heat toolkit;⁵⁷ and
- » Flood vulnerability maps.⁵⁸

The current CDC grant activities are focused on implementation and monitoring the effectiveness of implemented actions. Specifically, this project is assessing the effectiveness of different activities at the local health departments that were awarded funding. Examples of specific metrics include tracking the number of brochures handed out, the number of trainings, and website visits. UIC is also tracking the effectiveness of their trainings with physicians and other public health professionals by conducting pre- and post-training surveys. The surveys are intended to assess whether knowledge and awareness around climate change and public health has increased. Additionally, UIC evaluated the accessibility and usability of their heat toolkit and flood preparedness map.

Numerous factors have helped facilitate adaptation action throughout this project, including:

- » Funding from the CDC;
- » Experiencing recent extreme events (e.g., floods) that have brought attention to the need for planning and response; and
- » Gaining the support of leaders from within the public health department (e.g., local, city, or state).

Some barriers that have arisen include politicization of the climate change issue; challenges connecting communicating the connections between current extreme events (e.g., floods, fires, hurricanes) and climate change; and finding simple ways to communicate the health effects of climate change as it is a complicated topic.

CITY AND COUNTY CLIMATE AND HEALTH ADAPTATION EFFORTS

The Chicago Department of Public Health has engaged in complementary efforts. For example, the Healthy Chicago 2.0 plan includes 200 strategies to improve health, focusing on traditional health impacts as well as social determinants of health.⁵⁹ Some of the major objectives of the plan include: (1) coordinating with partner organizations for data collection, education, and planning; (2) launching public education campaigns on climate-informed health efforts; and (3) incorporating health, climate, and vulnerable populations into emergency planning. Successes include predicting emergent health issues among the most vulnerable populations; partnering with the Chicago Office of Emergency Management and Communications to develop an All-Hazards Emergency Operations Plan; collaborating with city hospitals to conduct syndromic surveillance to inform planning and response measures; collaborating to develop an urban sensing data network on airborne pollutants and

climate factors; and being the first major city to be awarded a 2017 ENERGY STAR Partner of the Year for advancing energy efficiency strategies through local programs and policies.

NONGOVERNMENTAL CLIMATE AND HEALTH ADAPTATION EFFORTS

The Illinois Public Health Association approved a resolution in 2019 on climate change. The resolution acknowledges the impacts of climate change on public health and wellbeing, particularly on vulnerable populations (e.g., poor, elderly, children), and calls for the implementation of climate change public awareness campaigns, surveillance and tracking of climate-related health impacts, increased funding for disaster readiness and response initiatives, public-private funding collaboratives to advance green building, and reducing reliance on carbon-based fuels.⁶⁰

KEY RESOURCES

- » Illinois BRACE Program: <https://braceillinois.uic.edu>
- » Illinois Heat Toolkit: <https://braceillinois.uic.edu/take-action-2/take-action/>

⁵² 2006 Report of the Illinois Climate Change Advisory Group:

<http://www.epa.state.il.us/air/climatechange/documents/iccag-final-report.pdf>

⁵³ 2018 Illinois Natural Hazard Mitigation Plan:

https://www2.illinois.gov/iema/Mitigation/documents/Plan_IllMitigationPlan.pdf

⁵⁴ Climate Change, Health, and Equity: A Guide for Local Health Departments:

<https://www.cakex.org/documents/climate-change-health-and-equity-guide-local-health-department>

⁵⁵ Climate Change and Health in Illinois: <https://youtu.be/AdRNm7vvlFc>

⁵⁶ Preparing for Extreme Weather: https://youtu.be/ST3Xs0H_NmU

⁵⁷ Illinois Heat Toolkit: <https://braceillinois.uic.edu/take-action-2/take-action/>

⁵⁸ Health, Climate, and Location: <https://braceillinois.uic.edu/take-action-2/flood-planning/>

⁵⁹ Healthy Chicago 2.0: Partnering to improve health equity 2016-2020:

<https://www.chicago.gov/content/dam/city/depts/cdph/CDPH/Healthy%20Chicago/HC2.0Upd4152016.pdf>

⁶⁰ Illinois Public Health Association Resolution No. 4 2019 Addressing Climate Change:

<https://ipha.com/content/uploads/Resolution%204%20-%20Climate%20Change%202019.pdf>

Tennessee

Tennessee does not have a formal statewide climate action plan or a public health climate adaptation plan. However, the state health department does include links to information on climate change on its website, and there are some local governmental and nongovernmental efforts to address the public health risks associated with climate change. While research and other initiatives are underway on climate change in the state, the connection to public health is either absent or minimal.

Tennessee can expect major climate change impacts such as extreme heat, increased flooding, drought, and decreased water quality and supply.^{61,62} These impacts pose great health and safety risks for vulnerable residents who are already experiencing health inequities and gaps in access to healthcare services.

STATE CLIMATE AND HEALTH ADAPTATION EFFORTS

The Tennessee Department of Health does not have an official climate adaptation plan but does devote a section on its website to climate change.⁶³ The site includes information on the impacts of health, how individuals can make a difference in their communities, and links to additional resources including websites and publications. The site highlights the CDC Building Resilience Against Climate Effects (BRACE) framework as a tool for identifying public health impacts of climate change and developing adaptation options. The department is in the early stages of building an Environmental Public Health Tracking platform to gather data on exposure and health effects as part of the CDC National Environmental Public Health Tracking Network. Examples include data dashboards for heat- and cold weather-related illnesses and maps of public cooling and warming centers. For example, the heat-related illness data is derived from estimated hospitalization and emergency room visits where heat stress was a primary or related diagnosis, and users can opt to visualize the data by county, year, race, and/or age group. The department also coordinates emergency preparedness networks such as Volunteer Mobilizer and the Health Alert Network.⁶⁴ The Tennessee Volunteer Mobilizer is an online registry for medical and non-medical volunteers to support disaster and hazard response efforts and public health initiatives.

Climate Action or Adaptation Plan	
Health Department Climate Plan	
Hazard Mitigation Plan	

Impacts of Concern for Tennessee

- Extreme Heat 
- Precipitation Changes 
- Drought 
- Wildfire 
- Extreme Weather 
- Flooding 
- Water-borne disease 
- Water Quality and Supply 
- Air Quality 
- Ecological Impacts: Pests, Invasives 
- Food Impacts: Disease and Security 
- Zoonotic and Vector-borne disease 

The Tennessee Health Alert Network disseminates time-sensitive health information to the public and local, state, and federal partners in case of emergencies.

The 2018 State of Tennessee Hazard Mitigation Plan, issued by the Tennessee Emergency Management Agency, includes hazard profiles and risk assessments for threats such as droughts, extreme temperatures, floods, severe storms, wildfires, communicable diseases, and severe weather.⁶⁵ Such hazards have been identified as natural threats to public health but the connection is not explicitly made in the plan. Climate change is only mentioned twice as an issue of future concern for the state.

CITY AND COUNTY CLIMATE AND HEALTH ADAPTATION EFFORTS

The Memphis-Shelby County Office of Sustainability developed an official Climate Action Plan focused on commitments to reduce greenhouse gas emissions.⁶⁶ Improved public health is one of the core goals of the plan's development and implementation, along with equitable and prosperous communities. Decreased air quality due to greenhouse gas emissions is the major concern expressed in the plan, particularly with respect to respiratory illnesses. Extreme weather events are also noted as threats to public health and safety. The plan highlights the Green and Healthy Homes Initiative as an example of working toward climate-related home improvements in low-income communities that will directly affect the health of residents (e.g., reducing hospital visits for asthma).⁶⁷

NONGOVERNMENTAL CLIMATE AND HEALTH ADAPTATION EFFORTS

The Neighborhood Collaborative for Resilience (NCR) is a SPARCC-sponsored collaborative comprising community leaders, activists, and citizens focused on improving the quality of life in North Memphis. NCR is steering investments in the city to provide opportunities for equitable urban development that incorporates diverse racial, economic, and cultural perspectives into community planning; addresses gaps in public transit connectivity; improves health outcomes for residents; and improves the climate resilience of neighborhoods. Some examples of these efforts include the development of a local grocery store and neighborhood farmers' markets, the Heights Line greenway project⁶⁸ and the Klondike Smokey City Community Development Corporation, which aims to improve community health through workforce and family development initiatives.⁶⁹ Public health-related benefits of these initiatives include access to healthy food, improvement in mental wellbeing, clean air and water, as well as greater mobility and access to needed community health resources.

Climate Nashville is a nonprofit organization connecting representatives across sectors to rally against climate change. While the organization does not currently have any campaigns concerning public health, the mission of Climate Nashville is to be a leader in the movement of making the city a 100% renewable energy economy. By reducing greenhouse gas emissions, there will be improvements to local air quality and public health.

KEY RESOURCES

- » Tennessee Environmental Health Tracking: <https://www.tn.gov/health/cedep/environmental/epht.html>
 - » Climate Nashville: <https://www.climatenashville.org/about>
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⁶¹ States at Risk: Tennessee: <https://statesatrisk.org/tennessee/extreme-heat>

⁶² What Climate Change Means for Tennessee:

<https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-tn.pdf>

⁶³ Tennessee Climate Change and Public Health: <https://www.tn.gov/health/cedep/environmental/climate-change.html>

⁶⁴ Tennessee Volunteer Mobilizer and Health Alert Network: <https://www.tn.gov/health/cedep/cedep-emergency-preparedness/volunteer-mobilizer/tnhan.html>

⁶⁵ 2018 State of Tennessee Hazard Mitigation Plan:

<https://www.tn.gov/content/dam/tn/tema/documents/hazard-mitigation-plan/Tennessee Hazard Mitigation Plan 2018 FINAL.pdf>

⁶⁶ Memphis Area Climate Action Plan: <https://www.develop901.com/osr/memphisClimateActionPlan>

⁶⁷ Green and Healthy Homes Initiative: <https://www.greenandhealthyhomes.org/services/memphis/>

⁶⁸ Heights Line: <https://www.heightsline.com>

⁶⁹ Klondike Smokey City Community Development Corporation: <http://www.ksccdc.org>

