BRACE

Building Resilience Against Climate Effects

IMPLEMENTATION GUIDE

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Executive Summary

Climate change is threatening the foundations of human health and wellbeing.

Greenhouse gas emissions from human activities are causing large-scale changes to the planet. The impact on human health from these changes is profound. The harms of climate change will reach all Americans, but the impacts will not be evenly distributed. Communities that have been overburdened by harmful social, environmental, and economic conditions over generations are most impacted; climate change worsens these long-standing inequities and intergenerational harms. Equitable public health climate action can promote health, resilience, and communities where everyone thrives.

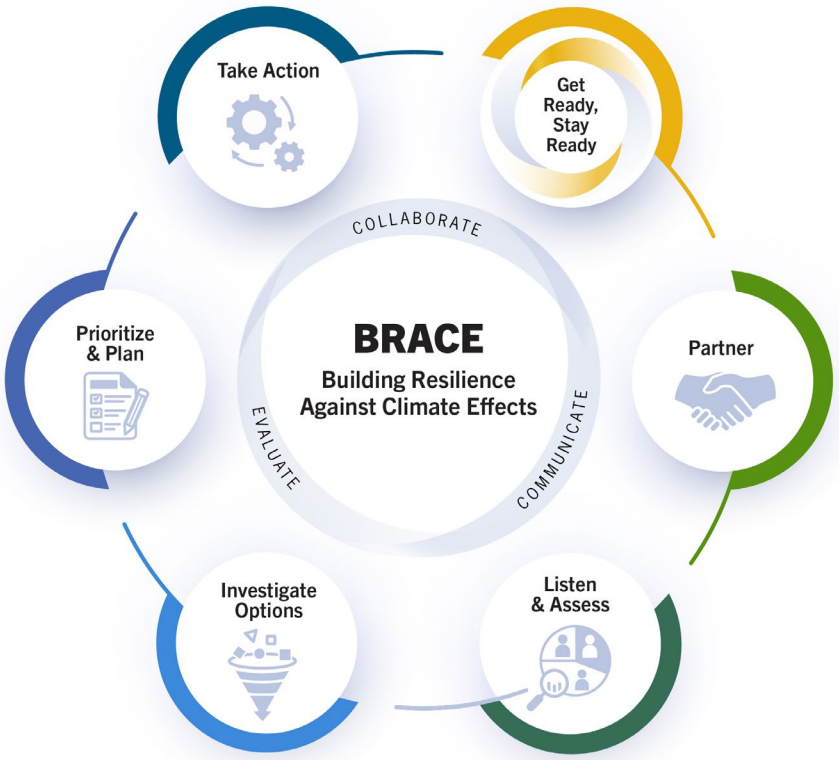
Health departments have essential skill sets and resources to track and project climate impacts on health and develop solutions based on evidence and community input. As trusted public authorities, health departments can collaborate with other sectors to support initiatives that increase resilience. Health departments can also work with partners and communities to promote health equity and climate justice.

Developed by the Centers for Disease Control and Prevention (CDC)'s Climate and Health Program (CHP), the Building Resilience Against Climate Effects (BRACE) framework is designed to support public health climate action to protect and promote human health in the context of climate change. BRACE helps health departments at all jurisdictional levels collaborate with partners and communities to assess climate and health threats, develop and evaluate effective strategies, and take action to promote health and climate resilience.

The BRACE framework, originally created in 2011, was revised in 2024. This revision included the development of the first BRACE Implementation Guide (henceforth referred to as "the Guide"), which provides practical, flexible, and action-oriented approaches to accommodate a range of contexts and capacities.

In addition, the 2024 revision accomplished the following:

- Prioritized justice, equity, and belonging
- Expanded to include climate mitigation, in addition to adaptation
- Updated terms, methods, science, and best practices to respond to rapidly evolving climate science and policy



The six elements of BRACE are a logical way of moving health departments and their partners to public health climate action. In **Get Ready, Stay Ready**, practitioners take stock of organizational readiness and local context and identify potential opportunities and partners. In **Partner**, practitioners establish and build partnerships, especially with communities disproportionately affected by climate change. In **Listen & Assess**, practitioners learn about community needs and strengths by engaging partners and assessing relevant climate threats, health impacts, and mitigation opportunities. In **Investigate Options**, practitioners identify potential adaptation and mitigation strategies to promote climate resilience and reduce health threats. In **Prioritize & Plan**, practitioners select strategies and develop plans for action, communication, and evaluation. And, finally, in **Take Action**, practitioners implement and evaluate those efforts. The framework is designed to be flexible, so that health departments may start anywhere in the framework or move in a different order of steps depending on their capacity and context. The Implementation Guide anticipates that climate action planning is a complex, locally-driven process that will not look identical across communities. Throughout BRACE, users are also encouraged to prioritize three essential cross-cutting activities: collaboration, communication, and evaluation.

The risks of climate change are expected to intensify over time. Health departments are increasingly leveraging their unique roles, skills, and strengths to promote health in this complex and evolving landscape. The BRACE framework and Implementation Guide support this transformation in public health practice and inspire practitioners to work collaboratively to seize the tremendous opportunities to protect and improve human and ecosystem resilience, health equity, and wellbeing.

Get Ready, Stay Ready

Take stock of organizational readiness, local context, and opportunities; reassess over time.

Partner

Establish and build partnerships across sectors and with communities that are disproportionately affected.

Listen & Assess

Learn about community needs and strengths and assess relevant climate threats, health impacts, and mitigation opportunities.

Investigate Options

Identify potential adaptation and mitigation strategies to promote climate resilience and health.

Prioritize & Plan

Select strategies and develop plans for action, communication, and evaluation.

Take Action

Implement plans and adjust as needed.

Table of Contents

Introduction

What is BRACE?

The Building Resilience Against Climate Effects (BRACE) framework is designed to support public health climate action to protect and promote human health in the context of climate change. Developed by Centers for Disease Control and Prevention (CDC)'s Climate and Health Program (CHP), BRACE helps health departments at all jurisdictional levels collaborate with partners and communities to assess climate and health threats, develop effective strategies, and act to promote health and climate resilience. BRACE is a revision of the original Building Resilience against Climate Effects framework created by CHP in 2011.

The BRACE Implementation Guide (henceforth referred to as "the Guide") provides practical, flexible, and action-oriented approaches to accommodate a range of contexts and capacities. While BRACE primarily supports the activities of state, Tribal, local, and territorial (STLT) health departments, community-based organizations, and partners from other sectors may also find the Guide useful.

Building Resilience Against Climate Effects

Climate Change: A Fundamental Threat to Health

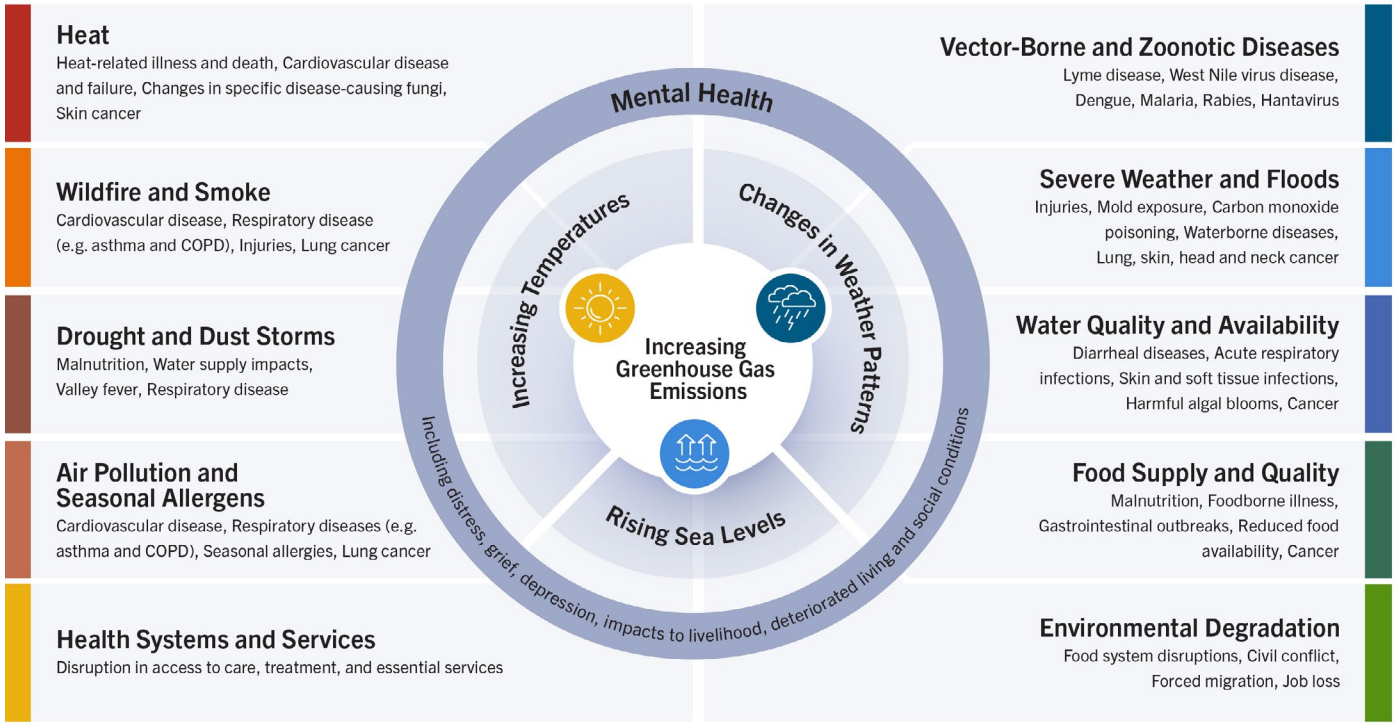
Climate change is threatening the foundations of human health and wellbeing.[1,2] Over the past 150 years, human activities—particularly the production and burning of fossil fuels for energy—have increasingly harmed human health. These actions have increased greenhouse gases (GHG) in the atmosphere that trap heat, resulting in a planet that is 2°F warmer in 2024 than in the late 1800s.[3] GHG emissions are causing rapid warming and other large-scale changes to the planet, such as rising seas, melting ice, changing rainfall patterns, shifts in timing of seasonal events, and ocean warming and acidification.[3] Methane gas, often referred to as natural gas, is a significant contributor to GHG emissions because it is more potent than carbon dioxide at trapping heat in the atmosphere, making its reduction critical to combating climate change.

Extreme weather events, such as extreme heat, hurricanes, winter storms, and droughts are becoming more frequent and severe.[3,4] The increase in extreme weath-

er events driven by climate change leads to direct human suffering through loss of life, homes, and livelihoods. Other related threats include forced displacement, shortages of food and water, and a related rise in war and conflict. Climate health threats are growing in all regions in the United States.[2,4] The impact on human health from these changes is profound, leading to disaster-driven deaths, injuries, an increase in vector- and water-borne illnesses, lack of availability of and access to food, exposure to extreme temperatures, exacerbation of existing conditions such as asthma, and significant impacts on mental health.

While everyone will feel the impacts of climate change, the harms are not evenly distributed.[5,6] Many differences in climate vulnerability stem from discriminatory structures that harm groups such as Indigenous communities and other racial and ethnic minority groups, including Black or African American and, Latino, persons, as well as people with disabilities, the LGBTQ+ community, women, people with lower incomes,

FIGURE 0.a: Climate Change Impacts on Health



people who are incarcerated, and people experiencing homelessness. These harms may be greater when identities or experiences combine, overlap, or intersect. In addition, many of these communities have been overburdened by the increasing effects of harmful environmental and economic conditions over generations. Climate change worsens these long-standing inequities and intergenerational harms.[3] Climate change also disproportionately burdens the groups that have contributed the least to cause it, globally and within the U.S.[7] Efforts to address climate change must prioritize the needs of the populations with the most vulnerabilities, ensuring that climate policies do not further contribute to existing disparities. As climate solutions are developed, investments and policy changes provide an opportunity to improve inequities and work toward communities where everyone thrives.

GLOSSARY

Throughout the Implementation Guide, you will see bolded words that are defined in the Glossary, starting on page 193.

Using Climate Action to Improve Health and Wellbeing

Climate change presents enormous challenges for public health. The good news is each fraction of a degree of warming that we prevent reduces the risks and harms.[3] Climate action—both mitigating further climate change and adapting to it—can promote health and reduce health threats to current and future generations.

Mitigation refers to measures to reduce the amount and rate of future climate change by decreasing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere.[8]

Adaptation is the process of adjusting to the effects of the changing climate to moderate harm. It is also important to recognize that increased warming makes adaptation more difficult and brings us closer to reaching human and natural system adaptation limits.[9]

Adaptation can be incremental or transformative. Incremental adaptation involves minor shifts in usual practices and does not disrupt the essence and integrity of a system or process. In contrast, transformative adaptation changes the fundamental attributes of a system and can involve significant, new, and lasting changes to institutions, technology, behaviors, and values across multiple sectors.[10] Transformative adaptation addresses the root causes of climate vulnerability and injustice.[11,12]

Adaptation and mitigation can be seen as processes to achieve climate resilience. BRACE defines **climate resilience** as the capacity of communities and their inter-

connected social, economic, and ecological systems to cope with and respond to climate disruption in ways that yield overall improvements in wellbeing. Resilience allows faster or easier recovery from problems and proactive, strength-based action to reduce risk.[12]

Mitigation and adaptation actions produce benefits beyond their climate impacts. The multiple health and societal benefits of mitigation and adaptation investments are expected to far outweigh the costs of these actions.[10,13] For example, an estimated 5 to 8.7 million people globally die prematurely each year due to fossil fuel air pollution. Reductions in fossil fuel use will both mitigate climate change and also reduce these premature deaths.[14,15] Limiting fossil fuel combustion could yield health benefits that would be equivalent to tens of trillions of dollars by the end of this century.[16]

We can steer climate actions and investments to increase health benefits and address racial, social, and economic inequities, making our world safer, healthier, and fairer for everyone.

Health Departments: Essential Champions

Across the country, health practitioners are broadening their scope and developing new expertise to address the health impacts of climate change. Health departments bring key strengths to the areas of public health climate action. Health departments are well-positioned to collaborate across sectors to advance climate resilience, building on existing work to support systems change across many sectors that shape our physical environment and social conditions.[17] Health departments serve as a trusted authority on community health; they provide other sectors with the credibility and data to support initiatives with the potential to protect communities against climate-related health impacts. Health departments can also promote **health equity** and **climate justice** and lead or collaborate on specific strategies to achieve these aims.[18] Many health departments, especially at the local and Tribal level, have existing connections to the communities most affected by climate change and can engage with communities to ensure that proposed solutions align with community priorities.[17] As described further below, working closely with community groups and members is crucial to ensure that proposed solutions reflect local priorities.

BRACE and the Implementation Guide

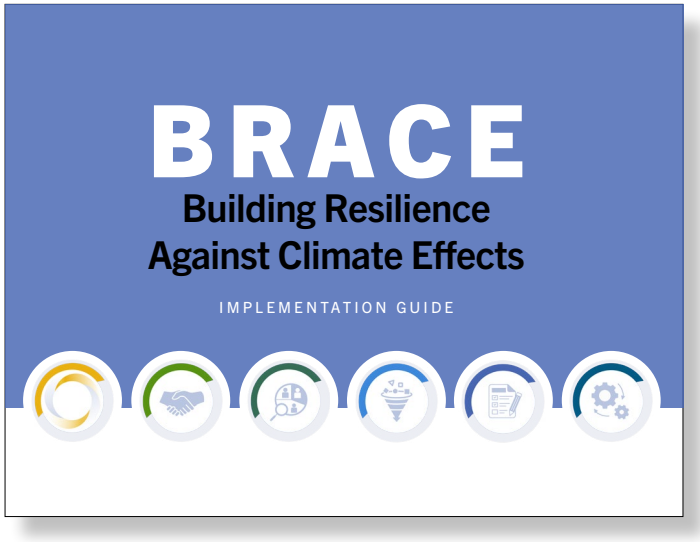
BRACE is comprised of six key elements that guide users through a process for taking public health climate action. Each element is represented by a chapter in the Guide and each chapter is organized by key tactics that detail how to implement the necessary activities for each element. Chapters include prompts for reflection, key resources, examples, and guidance.

BRACE Revision

The original BRACE framework, Building Resilience Against Climate Effects, was developed by the CDC's Climate and Health Program in 2011; an overview of the framework was published in 2014.[19] Guidance documents, evaluations, and reports reflected on and informed practice guided by the original framework.[20–28]

Since 2011, BRACE has been used by grant recipients of CDC's Climate Ready States and Cities Initiative (CRSCI). The American Public Health Association (APHA) and CDC's report, Adaptation in Action, showcases the strategies and achievements of CRSCI grantees and CDC's report, Preparing for the Regional Impacts of Climate Change in the U.S., highlights success stories of program grantees and partners.

In 2022, a revision of the BRACE framework was initiated to address lessons learned from health departments implementing the initial version of the framework, incorporate scientific advances and allow input from an Expert Panel of interest holders.[29] Following an extensive, systematic approach, the BRACE framework revision was completed in 2024. A report on the methods used to revise BRACE has been published.[29]



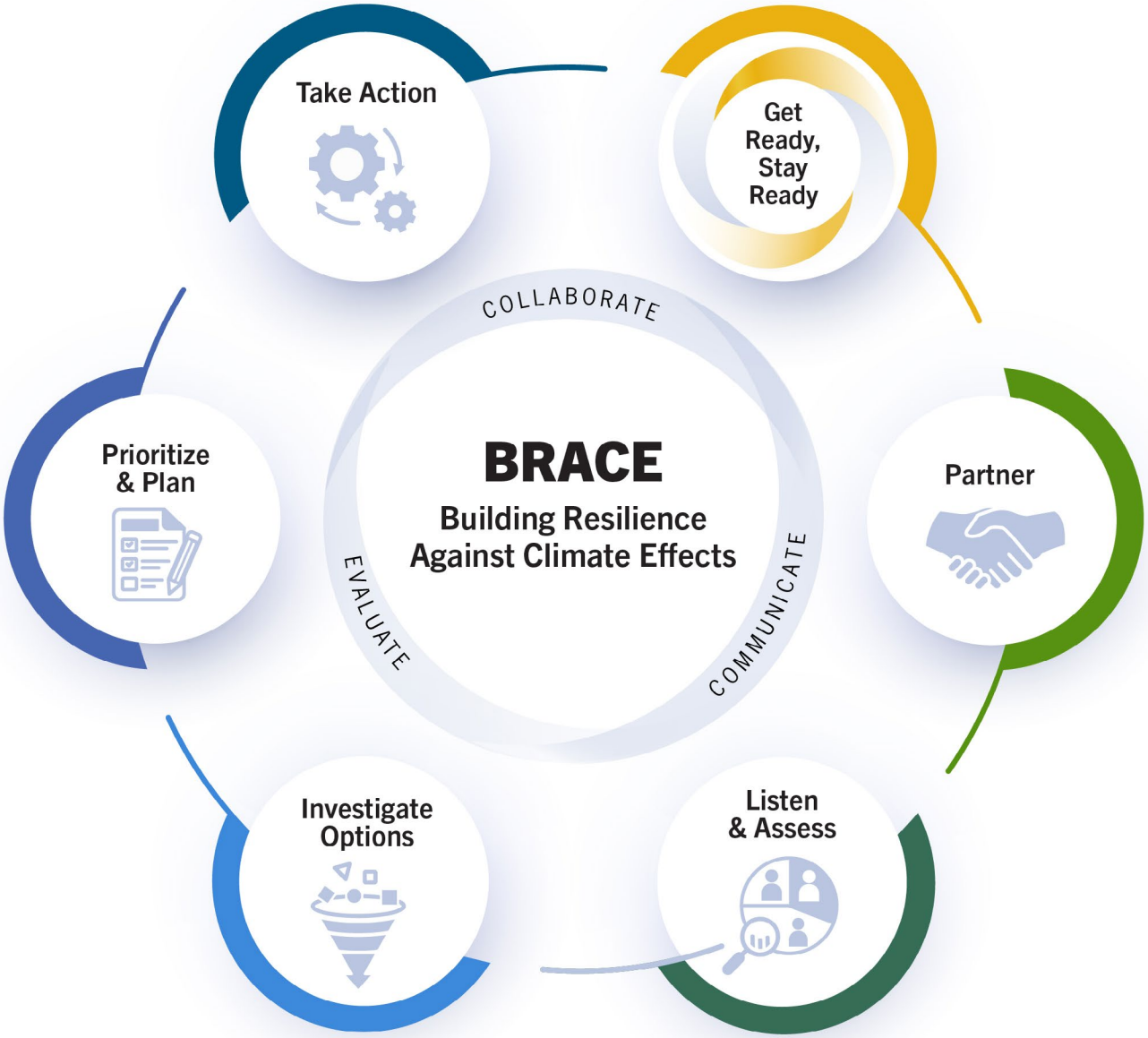
The revision accomplished the following:

- Elevated the centrality of justice, equity, and belonging.
- Expanded the framework's purview to include climate mitigation, in addition to adaptation.
- Provided guidance and implementation resources to improve BRACE's usability and assist in implementation by health departments of different capacities and contexts.
- Updated terms, methods, science, and best practices to respond to the rapidly evolving climate science and policy landscape.

This is the first BRACE Implementation Guide. In addition to the input provided by an Expert Panel, the Guide has drawn on other resources and peer-reviewed evidence.[29] An especially important contribution came from National Oceanic and Atmospheric Administration's (NOAA) Steps to Resilience, which includes extensive guidance, case studies, and data portals. Readers are encouraged to explore the support offered through NOAA's extensive website and Implementing the Steps to Resilience: A Practitioner's Guide.[30]

The revised BRACE continues the legacy of the original framework through its commitment to up-to-date, evidence-based action. Like the original BRACE, the revised BRACE supports STLT health departments in selecting, implementing, and evaluating climate actions that will benefit health.

FIGURE 0.b: The BRACE framework



The Six Elements

Each element is broken into several key tactics to set out specific steps and recommended activities. These elements will typically be implemented as part of a continuous cycle. However, as mentioned below, users can progress through the elements and key tactics in a different order depending on needs and capacity.

Get Ready, Stay Ready

Take stock of organizational readiness and local context and identify potential opportunities and partners; reassess over time.

In Get Ready, Stay Ready, practitioners begin by considering community history and local perspectives, then they assess their capacity to engage in equitable public health climate action. Next, practitioners list potential opportunities and partnerships; work to build internal and external capacity; and collaboratively develop the health department's broad and overarching climate and health vision, values, and goals for the community or jurisdiction.

Partner

Establish and build partnerships, including with communities that are disproportionately affected and across sectors.

Here, practitioners work to engage new and existing cross-sector and community partners, Tribes, and those who are already working in this area. To build and sustain partnerships, practitioners should also work with partners to develop an inclusive and collaborative approach that explicitly outlines the leadership structure, principles, and decision-making processes.

Listen & Assess

With a focus on communities that are disproportionately affected, learn about community needs and strengths by engaging partners and assessing relevant climate threats, health impacts, and mitigation opportunities.

In Listen & Assess, practitioners learn from partners and community members about their priorities, concerns, and realities related to climate change and wellbeing. Next, practitioners take a data-driven approach to assess climate hazards, health, and equity impacts, vulnerability, and resilience in their jurisdiction, as well as opportunities for mitigation. Practitioners are also encouraged to interpret data in collaboration with community members and partners, construct data stories, and evaluate the overall process to support improvements over time.

Investigate Options

Identify potential adaptation and mitigation strategies to promote climate resilience and reduce health threats to communities that are disproportionately affected.

Investigate Options involves reflection on all of the information and insights gathered in the previous three elements and creating a short list of climate action strategies that highlight potential solutions to reduce climate-related health threats. Practitioners then investigate each of these options based on the evidence base for effective climate actions, potential implications for health equity, partner perceptions, resource requirements, and time frames.

Prioritize & Plan

Select strategies and develop plans for action, communication, and evaluation.

In Prioritize & Plan, practitioners co-develop a prioritization process with partners to select one or more climate action strategies. Prioritize & Plan addresses development of an action plan, communications plan, and monitoring and evaluation plan.

Take Action

Implement plans and adjust as needed.

Take Action highlights the need to adjust actions when necessary and encourages practitioners to share findings and lessons learned in order to improve over time and build capacity.

Three Cross-Cutting Activities

Throughout BRACE, users should prioritize three essential cross-cutting activities: Collaborate, Communicate, and Evaluate. These activities are embedded as reflection questions at the end of each chapter, reminding users to pause and consider the degree to which these aspects have been addressed and to reprioritize if they require more consideration.

COLLABORATE

Work together with a wide range of partners to identify goals, co-design approaches and actions, and achieve common aims of community-driven, equitable public health climate action

This cross-cutting activity emphasizes the commitment to engaging communities and partnering to break down silos to more effectively enhance wellbeing. Concretely, this activity involves collaborating with community members, community-based organizations, grassroots coalitions, Tribes, academia, government agencies, and the private sector.

COMMUNICATE

Routinely share progress, strategies, successes, and challenges with partners and constituents

Climate and health users should communicate the importance of their public health climate actions in a way that is accessible, effective, and ongoing so communities, partners, and other interest holders stay informed, engaged, and invested. Communicating means more than just one-way communication to inform interest holders; it involves listening and promoting bi-directional feedback.

EVALUATE

Encourage reflection, systematically assess effectiveness of efforts, monitor to identify successes and opportunities for improvement, and distill lessons to strengthen ongoing and new efforts

Evaluation considerations are important for every stage of climate action, not just after a project is complete. Evaluative thinking should not be limited to trained

"evaluators." Evaluative thinking is a type of critical thinking characterized by curiosity, inquiry, and valuing of evidence in decision-making.[31] This practice entails "identifying assumptions, posing thoughtful questions, and trying to understand different perspectives to inform decision-making."[32] In fact, when those working in climate ignore evaluative thinking, efforts are less likely to meet community needs, perpetuating harms and failing to achieve goals.

While there is a formal monitoring and evaluation process described in the Prioritize & Plan and Take Action elements, evaluation reflection questions and considerations are woven throughout the Guide.

Key Principles of BRACE

Ten key principles inform BRACE and are intended to guide public health climate action. Practitioners are invited to use these principles as the foundation of their own efforts. Alternatively, these principles can serve as a starting place for BRACE teams that may want to develop new key principles to guide their efforts. **The BRACE key principles are:**

1 Take timely, evidence-informed action:
Respond to the urgency of climate change by acting quickly, sustaining efforts, and using the best available evidence to prevent further climate change and minimize its harmful effects on human health and wellbeing. Ensure that resilience efforts are responsive to acute disruptions and disasters, slower onset threats, and cascading and compounding effects of climate change.

2 Prioritize community experience:
Climate action should focus on community-level lived experience by seeking input and engagement, especially from representatives of the communities most affected, including Tribes and communities of color. Bolster community resilience by fostering trust, building upon existing strengths and resources, co-implementing programs, and sharing decision-making.

3 Understand injustice and work towards justice:
To ensure that everyone reaps the benefits for health and wellbeing of BRACE programming, public health climate action must acknowledge the historical and contemporary contexts that create ongoing systems of injustice based on race, gender, class, locality, and other identities.

4 Promote climate, justice, and health in all policies:
Integrate climate, justice, and health considerations into policymaking, policy revision, and associated activities in health and non-health sectors.

5 Work across sectors to increase impact:
Health departments should collaborate across sectors (i.e. outside of public health) and partner with interest holders such as community-based organizations, grassroots coalitions, Tribes, academia, government agencies, and the private sector.

6 Address the causes of climate change:
Appreciate the limits to adaptation and promote climate change mitigation. Initiate and support actions, policies, and partnerships that prevent climate change by reducing use of fossil fuels and lowering GHG emissions.

7 Prioritize inclusive and sustainable nature-based solutions:
Act and think holistically, recognizing that humans are a part of nature and healthy ecosystems have benefits for human health. Support actions that protect, sustainably manage, or restore ecosystems in ways that promote nature, biodiversity, and human wellbeing.[33,34]

8 Minimize harms:
Consider a range of possible outcomes of actions and work to prevent negative effects, particularly those with justice impacts.

9 Emphasize multiple benefits:
Design public health climate actions to address multiple problems. Communicate the range of health and societal benefits of climate mitigation and adaptation strategies across sectors to increase partnerships and support.

10 Promote a culture of learning:
Acknowledge uncertainty and the dynamic aspects of climate change and continuously integrate emerging evidence, programmatic observations, evaluation results, and community insights to iterate and make decisions. Share results and lessons learned.

The BRACE Implementation Guide contains practical application of these principles throughout the chapters describing the six elements.

Essential Ideas of BRACE

Several essential ideas have informed the development of the Guide and should be kept in mind throughout the BRACE process. These ideas are woven into BRACE elements and operationalized throughout the key tactics.

Flexibility

BRACE presents the six elements in an intentional sequence for progressing through the convening, planning, and action stages of public health climate action. The elements will often work best when they are implemented as a continuous cycle. However, the framework is intended to be flexible and practical; navigating the elements and tactics within each element in a different order may make sense depending on a health department's needs and circumstances.

Different Settings and Capacities

Health departments vary in organizational capacity, social and political context, and other implementation influencing circumstances. In particular, capacity—staff expertise, administrative and leadership support, staff availability, and financial capital—will be a crucial factor for BRACE implementation. The Guide suggests gauging program readiness and strategies to scale up capacity over time in Get Ready, Stay Ready. Throughout the guide, users are reminded to add, adapt, or skip activities as needed. In some cases, BRACE suggests activities that may be most appropriate for low-, medium-, and high-capacity programs.

Justice, Equity, and Belonging

Public health climate action must center justice, equity, and belonging to address widening disparities in climate change harms, achieve true resilience, and create opportunities for all people to thrive. BRACE strongly encourages users to prioritize justice, equity, and belonging throughout each of the elements and associated tactics. BRACE uses this trio of terms to bring together crucial aspects of efforts to increase fairness, support a more equal society, and reduce the harms of prejudice and systemic oppression.

Building Resilience Against Climate Effects

The Guide uses the following definitions:

JUSTICE: The principle of fairness in treatment of people and groups, including a fair distribution of benefits and burdens, fair access to rights, resources, opportunities, and power, and remedy of past harms. Achieving justice involves dismantling systems of oppression and privilege that create systemic disadvantages and barriers for certain individuals and groups.[35]

EQUITY: The consistent and systematic fair and just treatment of all individuals and groups, with particular attention to race, ethnicity, ability status, gender identity, sexual orientation, and income status. Achieving equity involves recognizing that individuals and groups have different circumstances and needs, often due to systems of oppression, and providing resources and opportunities to address those needs.[8,35]

BRACE is primarily focused on two types of equity. Practitioners should be familiar with each of these dimensions of equity.

- **Climate equity:** The goal of recognizing and addressing the unequal burdens made worse by climate change, while ensuring that all people share the benefits of climate protection efforts.
- **Health equity:** The attainment of the highest level of health for all people, where everyone has a fair and just opportunity to attain their optimal health regardless of race, ethnicity, disability, sexual orientation, gender identity, socioeconomic status, geography, preferred language, or other factors that affect access to care and health outcomes.

There are different ways to realize climate and health equity.

- **Procedural equity:** Ensures that processes are fair and inclusive in the development and implementation of any program or policy.
- **Distributional equity:** Ensures the resources or benefits and burdens of a policy or program are distributed fairly.
- **Structural (intergenerational) equity:** Entails a commitment and action to correct past harms and prevent future negative consequences by institutionalizing accountability and decision-making structures that aim to sustain positive outcomes.

- **Cultural equity:** Reflects a commitment to undoing racism and other systems of oppression through an intentional deconstruction of White supremacist and other discriminatory assumptions and behaviors and the concurrent construction of equitable multicultural norms. This equity aspect is overarching and integrates with the previous types of equity.

BELONGING: Belonging is a fundamental human need—the feeling of deep connection with social groups, physical places, and individual and collective experiences.[36] It is achieved when all people are treated like and feel like full members of the overall community. Belonging builds upon concepts of diversity and inclusion: diversity is getting in the door; inclusion is having a seat at the table; and belonging is having your voice matter in discussions and decision-making.

Each element of BRACE includes actions users can take to operationalize justice, equity, and belonging. Each chapter concludes with reflection questions that prompt users to consider how their implementation decisions regarding the element's key tactics align with these concepts. Transformative adaptation and equal access to climate resilience among all communities will hinge on our ability to put justice, equity, and belonging into action.

Community Engagement

To work towards justice, equity, and belonging, BRACE users must engage and partner with those most affected by climate change and the organizations that serve them.

Throughout the Guide, the term **community** refers to a group experiencing common conditions, which can indicate a group of individuals living in geographic proximity or a group that has a shared set of experiences based on shared aspects of identity.[37] BRACE defines **community engagement** as "building sustainable relationships through trust and collaboration, strengthening community well-being. The process should be enduring, equitable, and culturally sensitive to all participants, with a shared goal of addressing the concerns of the community."[38] BRACE promotes prioritizing actions that are community-driven and integrate the voices and experiences of community members, particularly those who have historically been left out of decision-making. Community engagement can also include outreach, long-term engagement, and partnership with Indigenous individuals and Tribal agencies and organizations.

Part of community engagement requires moving away from narrow understandings of expertise. Achieving climate justice requires recognizing, valuing, and incorporating different types of expertise, like local and Indigenous forms of knowledge. Community-based organizations, grassroots coalitions, and people living and working in areas most affected by climate change are deeply aware of the impacts and obstacles to their health; they are experts on their own experiences.[38]

Strong social relationships and community engagement are themselves assets that enhance resilience. Building and sustaining partnerships and collaborations through BRACE ensures that both the process and the outcomes lead to transformative adaptation—a state in which governments and communities work together to create more sustainable systems by addressing the root causes of climate vulnerability to thrive despite change and uncertainty.

Cross-Sectoral Partnerships

In addition to working across and within communities, BRACE encourages health departments to work across sectors and disciplines to increase their public health climate action's impact. Agencies and organizations in areas like urban planning, housing, natural resources, transportation, and energy, may already have established goals, strategies, mandates, and funding aimed at enhancing climate resilience. This exchange should be bidirectional—public health professionals can support other sector efforts by bringing a health equity perspective, specialized skill sets, and credibility. In return, they can learn from those who may be more experienced or advanced in their climate action efforts or view resilience with another lens. Currently, many health departments may not have adequate expertise or staff capacity to fully engage in climate change; partners can bring additional areas of knowledge, relationships, and skills.[39] Partnerships are an essential strategy for leveraging resources, implementing actions, and expanding reach and impact.

Vital Conditions

BRACE encourages broader framing of health, wellbeing, and public health climate actions. The Vital Conditions framework, along with systems thinking (discussed in the following section), are two approaches that can help users approach public health climate action holistically. The Vital Conditions framework provides a big picture conceptualization that brings together the major determinants of health and wellbeing. The framework makes a crucial shift from public health's more familiar concept of social determinants of health by identifying the core elements collectively needed to create thriving communities instead of focusing on factors that result in vulnerabilities and inequities.[40] Developed by the Robert Wood Johnson Foundation and ReThink Health, Vital Conditions is increasingly being used by the U.S. federal government and others; for example, it serves as the guiding framework for the interagency Federal Plan for Equitable Long-Term Recovery and Resilience. In the context of BRACE, the Vital Conditions framework reminds us that physical health is just one part of wellbeing and elevates opportunities to work with partners across sectors to influence the broader conditions shaping health. The Vital Conditions framework provides a bridge for practitioners from different sectors to communicate about joint priorities.

FIGURE 0.c: Vital Conditions Framework

THRIVING NATURAL WORLD
Sustainable resources, contact with nature, freedom from hazards
Clean air, water, soil; healthy ecosystems able to sustainably provide necessary resources; accessible natural spaces; freedom from the extreme heat, flooding, wind, radiation, earthquakes, pathogens

BASIC NEEDS FOR HEALTH + SAFETY
Basic requirements for health and safety
Nutritious food, safe drinking water; fresh air; sufficient sleep; routine physical activity; safe, satisfying sexuality and reproduction; freedom from trauma, violence, addiction, and crime; routine care for physical and behavioral health

HUMANE HOUSING
Humane, consistent housing
Adequate space per person; safe structures; affordable costs; diverse neighborhoods (without gentrification, segregation, concentrated poverty); close to work, school, food, recreation, and nature

MEANINGFUL WORK + WEALTH
Rewarding work, careers, and standards of living
Job training/retraining; good-paying and fulfilling jobs; family and community wealth savings and limited debt

LIFELONG LEARNING
Continuous learning, education, and literacy
Continuous development of cognitive, social, emotional abilities; early childhood experiences; elementary, high school, and higher education; career and adult education

RELIABLE TRANSPORTATION
Reliable, safe, and accessible transportation
Close to work, school, food, leisure; safe transport; active transport; efficient energy use; few environmental hazards

BELONGING + CIVIC MUSCLE
Sense of belonging and power to shape a common world
Social support; civic association; freedom from stigma, discrimination, oppression; support for civil rights, human rights; civic agency; collective efficacy; vibrant arts, culture, and spiritual life; equitable access to information; many opportunities for civic engagement (voting, volunteering, public work)

Belonging & Civic Muscle is at the center because it is both a vital condition and a practical capacity that is necessary for equitable success in every other kind of work.

Source: Developed by ReThink Health at the Rippel Foundation and the Robert Wood Johnson Foundation. Click here to learn more.

Systems Thinking

While Vital Conditions identify the different factors related to health, it also reinforces the fact that these factors are interdependent and work together as a whole to promote health. Systems thinking enables practitioners to consider the connections and interrelationships between these factors to enhance holistic problem solving for health. It recognizes and prioritizes an understanding of the interdependencies among the components of a system that explains its functioning.[41] Systems thinking encourages the recognition of patterns and how changes in one aspect of a system may affect other parts of the system in positive or negative ways.

Systems thinking focuses on influencing these interdependent relationships through levers and interventions to more effectively achieve goals. This approach helps identify higher impact intervention points, but also allows for a recognition of uncertainty, evolving conditions, and difficult to predict relationships, facilitating solutions that can reduce unintended consequences and address root causes of problems.[30,42,43]

Systems thinking is especially appropriate for guiding complex and multifaceted decisions, such as those needed to minimize the harms of climate change. Traditional scientific methods, such as isolated experimentation in a controlled and stable context, do not easily apply to addressing urgent climate harms in the real world. Systems thinking methods can assist with this challenge and are well suited to collaborative multi-disciplinary teams with different concepts of how the world works.[44] This approach supports the implementation of policies and programs across a variety of disciplines, settings, and institutional arenas.

Systems thinking methods can range from simple, requiring no prior experience or specialized skills, to complicated, requiring specialized expertise and analytic software. Throughout the guidance, BRACE encourages straightforward, low-technology approaches that facilitate dialogue and lead to practical action at feasible scales.

Learning and Adapting

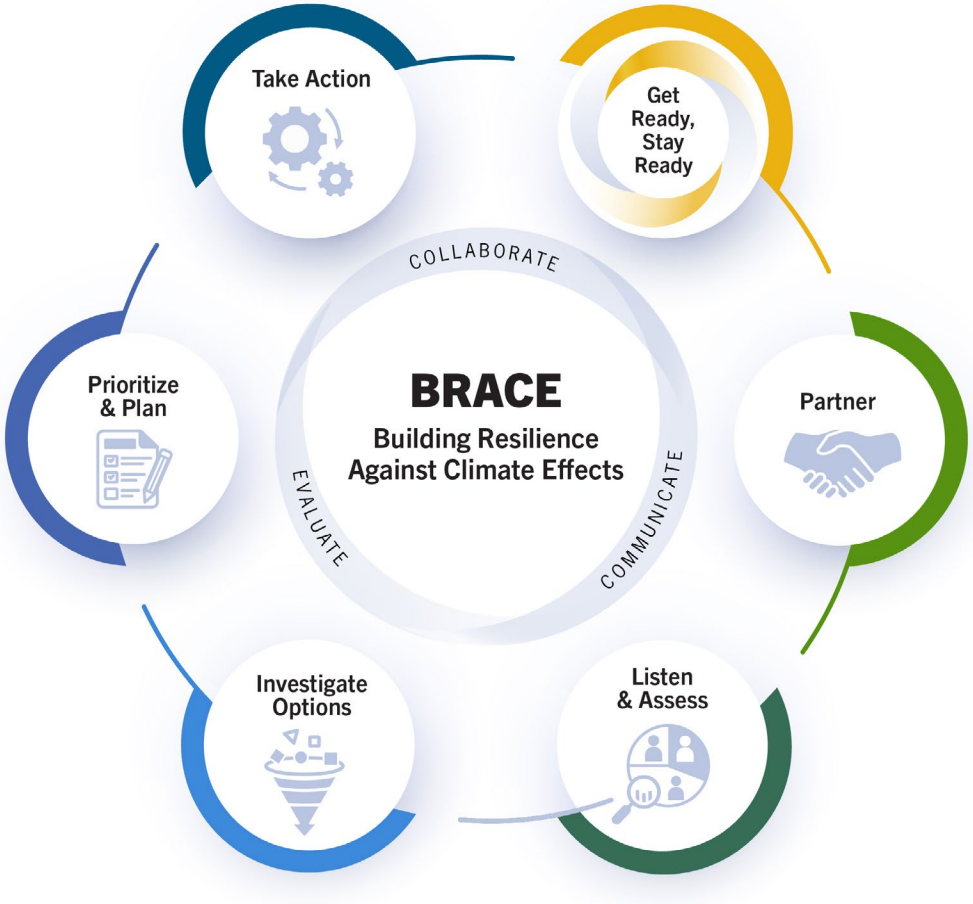
Aligned with systems thinking, **adaptive management** is an iterative, learning-based approach to the design, implementation, and evaluation of interventions in complex changing systems.[19,45] It can be used to make small stepwise actions and to implement strategies rapidly.[46] Starting from the understanding that current knowledge is incomplete, adaptive management integrates the need to regularly update strategies and management approaches. Because the science and reality of climate change and climate solutions are dynamic, adaptive management provides relevant lessons for public health climate action.[46] Adaptive management requires a commitment to monitoring and evaluation, a cross-cutting activity in BRACE.

Adaptive management may be less familiar to public health practitioners, but is well established in areas such as ecosystem management, watershed management, emissions trading, and air quality monitoring.[47–51] BRACE features components of adaptive management, such as incorporating learning into decisions; creating collaborative structures for interest holders' participation and learning; revising goals; and monitoring and evaluating outcomes.[52] Both adaptive management and systems thinking recognize that public health climate action often involves unexpected deviations from the plan, cycles of trial and error, and the need for agile decision-making.

Conclusion

Climate change threatens the foundations of human health and wellbeing, and the risks and harms are expected to intensify over time. Health departments are being called upon to leverage their unique roles, skills, and strengths to promote health in this complex and evolving landscape.

BRACE is designed to support this transformation in public health practice and inspire users to grasp and work towards realizing the tremendous opportunities for human and eco-system resilience, health equity, and wellbeing.



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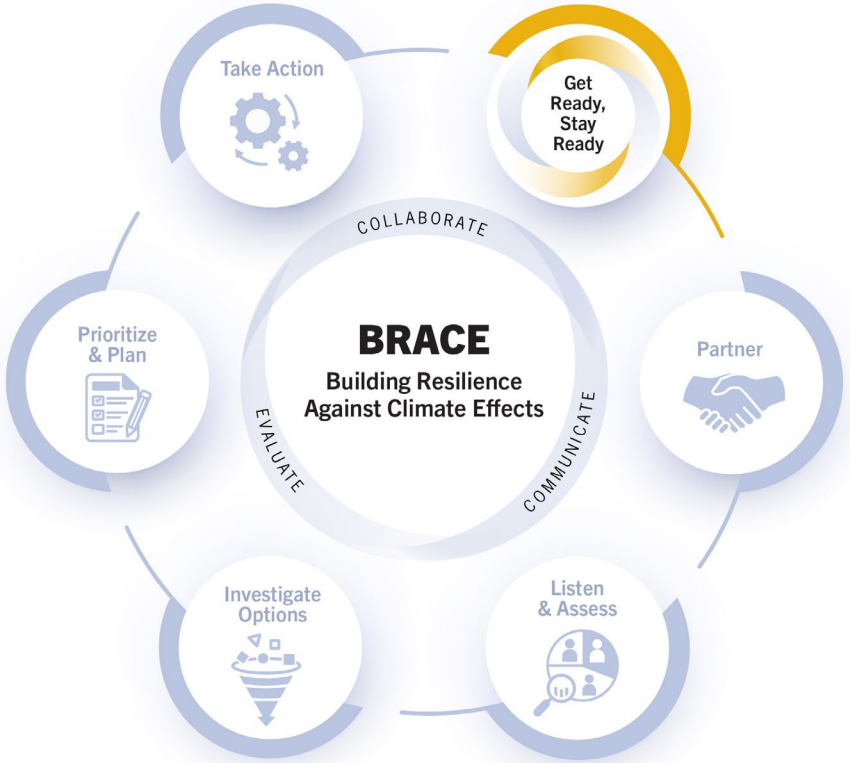
Get Ready, Stay Ready

CHAPTER 1



The urgency and scale of the current climate crisis can make approaching this work daunting. In response, the first element in BRACE, Get Ready, Stay Ready, breaks down the process of preparing for public health climate action into manageable tactics that can help health departments succeed in later elements.

Key Tactics

KEY TACTIC 1.1 Consider community history and local perspectives

KEY TACTIC 1.2 Consider current capacity

KEY TACTIC 1.3 List potential opportunities and partnerships

KEY TACTIC 1.4 Build capacity

KEY TACTIC 1.5 Develop the health department's climate and health vision, goals, and values

Get Ready, Stay Ready

Outputs

- Initial understanding of community history and perspectives
- Internal assessment of capacity and capacity-building needs
- Plan to track and build capacity over time
- Scan of existing opportunities
- Partner map
- Guiding climate and health vision and goals for health department

Chapter Resources and Worksheets

WORKSHEET 1.a:
Partnership Mapping Worksheet

Introduction

Communities face different climate impacts and related health threats and approach public health climate action with different levels of readiness and capacity. Get Ready, Stay Ready is an opportunity for state, Tribal, local and territorial health departments to pause, gather information, build capacity, and develop a vision for action.

This step precedes the rest of BRACE to remind and encourage users to learn more about the community they are working in, better understand the opportunities and constraints within their own organizations, and learn about possible opportunities for collaboration before diving into action planning.

Why start here?

The health department might be just beginning to discuss starting points for addressing climate change or might be trying to expand how it operationalizes justice, equity, and belonging in their established climate portfolio. No matter the stage of development, this element is a chance to pause, assess, and identify local history, partnerships, resources, existing plans, and opportunities that might be available or needed for effective public health climate action.

Before you begin

Remember that this element should not be a long, drawn-out process. Instead work through this stage in a few months (three to six months or less) to efficiently understand and build foundational aspects to achieve successful implementation of BRACE. Use this element as an opportunity to forecast the capacity, time, and breadth of potential action planning.

CONTEXT MATTERS

While Get Ready, Stay Ready provides an opportunity to broadly consider capacity, there are differences between the users of this Guide. Get Ready, Stay Ready prepares for the Partner element by encouraging practitioners to begin thinking about the types of partnerships available to them. Smaller health departments—specifically local or Tribal departments—might have stronger direct connections to potential community partners and community members while having fewer resources at their disposal. Conversely, territorial and large state health departments may be less connected to community members but have more resources and stronger relationships with other local or state health departments. Honest considerations of capacity will help users develop realistic plans to guide their public health climate action.

CONTEXT MATTERS

Throughout the Guide, you will find special "Context Matters" boxes that provide considerations and options related to health department and community context.

HOW TO MANAGE AND STRUCTURE BRACE EFFORTS

There is no single right way to structure climate and health activities.

The National Association of County and City Health Officials (NACCHO) has defined practical models for investment and climate and health action for local health departments.[1] These models could also be adapted to the state, Tribal, and territorial health department setting. The typology includes four models along a continuum of scope and resources. The guide includes an assessment of each model across the domains of cost, sustainability, programmatic scope, and process scope.

The four climate and health models are:

- **Climate and Health Champion:** A staff person who coordinates climate and health-related actions in addition to their day-to-day assigned job duties
- **Climate and Health Committee:** A standing climate-focused committee with representatives from different programs or branches
- **Climate and Health Coordinator:** A dedicated coordinator (with or without support staff) who plans, designs, and implements climate and health efforts
- **Full Climate and Health Program:** A dedicated coordinator, support staff, and committee collaborating together on the planning, design, and implementation of climate and health efforts

See NACCHO's Guide to Climate and Health Programs for more details about each model. Identify where in this typology your agency sits today.[1] Consider whether this is a strategic time to identify a more developed model to work toward. Find additional discussion of organizational capacity in Key Tactic 1.2.

Whichever model or approach is most applicable to a particular health department, it is essential to recognize that BRACE implementation will be more successful with designated staff who are responsible for coordinating and facilitating climate-related activities.[2] However, since climate change affects virtually all aspects of health, it may be strategic to integrate climate perspectives across programmatic areas rather than siloing this topic (e.g., creating a Climate and Health Program without a cross-agency committee), which can inadvertently lead to competition for scarce resources. Effective public health climate actions have been based in and led by staff in environmental health, policy and planning, emergency preparedness, chronic disease, and epidemiology programs.[3]

KEY TACTIC 1.1

Consider community history and local perspectives

Before beginning the work of selecting and implementing public health climate actions, start by learning about the community or geographic area. For example, learn about the political and social history, local perceptions of climate change, Indigenous peoples and organizations, and past relevant projects, programs, or initiatives in the area.

Review community history to get a sense of local and community specific climate context

A community's history carries an indelible impact on its present perspectives. If this work does not start with history, the analysis of present circumstances will be incomplete. Consider consulting assessments, plans, reports, laws, and regulations. Take the time to speak directly with residents and others who have knowledge and experience within the community. A repeating theme of BRACE is to acknowledge the wealth of experience that community members have; here that experience helps build knowledge about community history.

After determining who to learn from, think about the questions needed to better understand community history. Some questions that can be adapted to most contexts include the following [4]:

- What is the environmental and land use history of this community?
- What are the demographics of this community? How has it evolved over time?

SOLUTION SPOTLIGHT

North Carolina Department of Health and Human Services

Sea level rise, hurricane intensity, and inland flooding intensify water management challenges in North Carolina. To help protect residents living in flood-prone regions, the North Carolina Department of Health interviewed community members disproportionately at risk about flooding-related knowledge and resources. Additionally, with the National Weather Service, a river monitoring program was established in 2023. The river gauge on the Black River near Tomahawk has already been used to give residents real-time information regarding river flooding following Hurricane Ida in 2023 and will continue to help protect residents.[5]

- What is the presence and history of Tribes or Indigenous residents?
- What policies and zoning practices have shaped the demographics of the community?
- In what ways have policies and programs been exclusionary toward groups that have been marginalized?
- For what reasons have people moved into this community or left it?
- How engaged have community members been in community development?
- What unintended consequences have occurred as the result of community changes like additional green space or green infrastructure?

Knowing the historical context and building relationships with community members will help generate trust and seed authentic community engagement for the long-term.[4] NOAA's Centering Equity in Climate Resilience Planning & Action includes examples of how past events and policies may impact community climate vulnerability today (see Centering Equity in Climate Resilience Planning & Action for more information).

As with many BRACE tactics, it is often possible to tailor community-level activities to state or territorial levels. This can entail working with community-embedded organizations if the work may be feasibly focused to smaller geographic areas, such as counties. Or, consider more broadly how issues addressed by the questions above have impacted communities differentially across a state or territory.

Understand current local perspectives on climate change and other environmental or social issues

This may be an informal scan of present context (Listen & Assess includes a more thorough process). Many of the same methods applied in the previous activities may be helpful here. It may also be useful to consult assessments, plans, reports, laws, regulations, and workshop proceedings with community members, governmental partners, and other community organizations.

Attitudes about climate change are complex and dynamic. Consult local sources on public opinion or nationally available data downscaled to a relevant geographical area. For example, the Yale Program on Climate Change Communication offers modeled

> "The health department needs to look at the **values of the community.** Is it safety? Is it a sense of belonging? Is it a sense of community? What are those values? Is it freedom? Is it liberty? Depends on where you are. Then, assess the climate vulnerabilities. Because without knowing where the community is, we can map out where flooding is going to be more likely to happen, but the **solutions might be different.**"
>
> *- National organization staff*

The Guide includes quotes from Expert Panel members that highlight key concepts. The Expert Panel was composed of health department practitioners, Tribal, community, and national organization representatives, scientists, and federal government partners who were convened to guide the revision of BRACE. Panelists were interviewed to gather their insights.

data on climate attitudes available at the state, congressional district, and county levels (See the Climate Change in the American Mind Project for more information).

Realizing we all have our own mental models, consider how the lived experience of health department staff may affect, or bias, interpretations of the insights gathered. Make a concerted effort to consult a diverse set of viewpoints as this can assist in better understanding how people and their identities may shape how residents experience their community.

The following questions may be helpful when assessing current perspectives:

- What does it feel like to live in this community?
- What are the organizations that connect community members to each other?
- What are the needs of this community?
- What challenges are there in advancing equity?

KEY TACTIC 1.2

Consider current capacity

Successful BRACE implementation depends on a sound understanding of organizational capacity. Capacity can be measured in many ways, such as available funds, staff expertise, community knowledge about climate, leadership support, or community capital and trust.

BRACE recommends a rapid, informal readiness assessment focused on current capacity to help prepare for the next elements.

A 2020 ASTHO survey of state and territorial health agency staff reported that health department capacity to address climate change is low.[7] Almost 70% of respondents indicated low capacity for staff availability, while almost 80% reported low capacity for financial capital. Almost 40% of respondents reported low capacity in both staff expertise and leadership support, as well. This underscores the importance of scaling and scoping activities to align with current capacity and build more capacity across four domains:

1. staff expertise
2. administrative and leadership support
3. staff availability
4. financial capital

BRACE suggests practitioners classify their health department according to high, medium, and low capacity with these four domains in mind. Specific rankings for each domain may be particularly useful. Further, the relevance of these factors may differ across elements. In some BRACE elements leadership support may be more constraining while in others, staff expertise might be the limiting factor.

There is no one ideal way to measure capacity. However, an approach that is practical and can be replicated over time may be most useful, as capacity is likely to change. For example, staff expertise will likely grow with more experience in using

SOLUTION SPOTLIGHT

Franklin County Human Service Chamber, Ohio

Local health departments often do not have the resources or staff to manage climate change adaptation or mitigation programs. Using mini-grant funds from the CDC via the National Association of County and City Health Officials (NACCHO), Franklin County established a health educator position to focus on developing climate change adaptation and mitigation projects, community outreach, and data gathering. Additionally, Franklin County developed indicators for climate health surveillance and is analyzing their metrics with climate science experts from Bird Polar and Climate Research Center. Ultimately, the goal was to provide their county climate health data to the public via their website.[5]

BRACE. Programs can track evolving capacity in annual or biannual assessments that can indicate where to focus capacity building efforts.

The Guide will refer to different options and considerations that may be applicable depending on organizational capacity. For simplicity the Guide refers to low-, medium-, and high-capacity programs, cueing users to reflect on how capacity in staff expertise, administrative and leadership support, staff availability, and financial capital may affect the organization's ability to successfully implement a suggested tactic.

Also consider how current capacity supports or constrains achieving a more developed program model, described above.[1]

The following activities can also help operationalize capacity and readiness.

Do a quick scan of health department programs

Many health departments have programs that are already climate-aligned and can be leveraged for coordination and collaboration. For instance, air quality programs may already lead mitigation efforts or manage health effects of GHG emissions and chronic disease divisions may have efforts to increase active transportation and green spaces.

A quick scan of a health department's programs may turn up a wide range of climate-specific or climate-related programs that can be engaged to build support for future work. Some health department programs to consider include:

- Community health
- Built environment
- Environmental health
- Data analytics and evaluation
- Health equity or Minority health
- Vector control
- Injury control
- Emergency response
- Nursing
- Chronic disease prevention
- Aging
- Maternal and child health

> "We've just started looking at what are some **practical ways that we can focus our work** around things that already fit into our Department of Health role and move forward on those areas. Then we're going to look at **identifying partners** and how we can really practically play that out. There's so much **data that can be looked at from a climate perspective** and that's why we are really looking to take a leadership perspective. So far, there's been a lot of siloed work."
>
> *- State health department staff*

Use available workforce data to understand if critical skill sets are missing

Start by considering necessary skill sets. Look ahead to the next five elements of BRACE to get a sense for what kind of capacity and skills will be necessary. Some essential skills are outlined in Figure 1.a.

Each of the three cross-cutting activities—Collaborate, Evaluate, and Communicate—come with their own set of necessary competencies and skills. Assess the degree to which these skills are available for BRACE efforts.

Evaluation capacity is especially important, as weaving evaluation into regular practice helps normalize principles of adaptive management and institutionalizes constant learning and iteration. While a professional evaluator can be an asset, this is not always possible. Teams can designate naturally allied staff, such as epidemiologists, analysts, and social scientists, to lead evaluation activities and improve evaluation capacity through professional development and technical assistance.

Now that key skills necessary to implement BRACE have been determined, identify gaps and catalog skills within the health department. Several strategies to assess workforce skills include:

- Reviewing health department workforce data via position descriptions
- Discussing necessary skills and staff competencies with human resources and management staff
- Developing a survey for staff to share skills and competencies

Staff availability is also relevant. It may be helpful to assess workloads and time availability in the review of organizational readiness. Strategies include having conversations with management staff and supervisors to assess capacity and using surveys to engage staff to self-report.

INTERPERSONAL COMPETENCE

Effective public health climate action requires engaging various perspectives. Approaching climate work with this in mind means understanding that cultural responsiveness and interpersonal competence are critical skills. It is important to recognize that conflict can accompany diversity, particularly when collaborators share differing world views, concerns, or proximities to the problem or potential solutions. If not managed correctly, conflict can limit partner input and participation, consume time and other resources, and even derail the process.

BRACE users must become adept at managing conflict, ideally in ways that attempt to satisfy all partners. This may involve facilitating difficult conversations, helping health department staff and partners to articulate their views respectfully and understand other points of view, and leading shared problem-solving and consensus-making.

—Adapted from CDC's Planting the Seeds [8]

FIGURE 1.a: Essential Skill Sets for the 6 BRACE Elements

Assess leadership support

Another important aspect of capacity is the level of support from leadership. Leadership support may be essential when approvals are needed to pursue new strategies or to reallocate resources. Leadership perspectives may also influence how actions are framed and discussed.

Key steps include identifying the appropriate leadership staff and assessing their level of support for public health climate action. Some agencies will also need to understand the level of support from higher organizational levels or wider jurisdictional levels (e.g. state health departments, the Mayor's Office, state legislature, or the Governor's Office).

Once leadership is identified, think about engagement strategies. Is there a direct relationship with leadership? What are the appropriate channels of communication? Understanding a leader's specific priorities or existing initiatives may also give insight into their level of support for climate action.

If leadership is not supportive of climate action, look for alternative pathways. Find strategies to enhance leadership support in Key Tactic 1.4.

KEY TACTIC 1.3

List potential opportunities and partnerships

BRACE is designed to be implemented by collaborative programs, teams, and coalitions, not one individual. BRACE will be most effective when health departments partner with other organizations and agencies. While more in-depth work on partnership occurs in Partner, this chapter invites consideration of the types and depths of partnership the health department can sustain.

Consideration of partnerships from the beginning of BRACE will ground efforts in realistic, feasible, and effective solutions, and will minimize unintended consequences. Opportunities and needs will change over time so reassessing partnerships regularly is important.

Identify potential collaborators

You may have already surfaced a list of potential people and agencies, these are potential collaborators.

Use the snowball approach to finding partnerships; existing partners will likely be a good source of new partners. Be prepared to extend beyond existing partnerships to ensure that you connect with different demographic groups or communities.

CONTEXT MATTERS

Partnership strategies will vary for different types of health departments. Higher capacity state and territorial health departments may be better equipped to form relationships with statewide or regional organizations while also being able to serve as connectors for local health departments. Local and Tribal health departments may be better equipped to engage directly with communities or to collaborate with local organizations.

Add different types of partners to the list

Consider how potential partnerships may expand racial, ethnic, gender, cultural, and other types of diversity. Partnerships can also reflect experiential and organizational diversity.

Four key categories of non-health department partners include:

1. Community-based organizations and coalitions that advocate for change and have deep connections with community members:
    - Environmental justice groups
    - Housing rights groups, especially those recognizing the role climate change serves in the housing crisis
    - Indigenous rights organizations
    - Active transportation and public transportation advocates
    - Conservation, gardening, and green space groups
    - Food security groups
    - Mental health advocates
2. Community institutions that provide goods and services:
    - Local small businesses
    - Influential local industries, large and small
    - Health care institutions
    - Faith-based groups
    - Local philanthropies supporting climate-related initiatives
3. Other municipal, regional, Tribal, and state government agencies:
    - Community development offices
    - Public works or transportation agencies
    - Planning agencies
    - Agencies responsible for public safety
    - Agencies responsible for healthy aging
    - Local Tribal governments

> If we had a blank slate, a **big piece of our work would be coalition building and getting the support of senior officials** in a jurisdiction, whether it's the mayor, the city council, the county commission, and then convening the agencies that need to be working together to tackle the climate challenge.
>
> *- National organization staff*

4. Institutions that can bring technical expertise
    - Colleges and universities
    - Public health institutes
    - Sustainability focused nonprofits and consulting firms

Create a partner map

A partner map is a visual approach to compile information about who the health department might work with throughout BRACE. While developing a partner map consider:

- Who are the health department's current partners?
- What can each partner bring to the table?
- What types of resources might partners share?
- How might partners benefit from working with the health department?
- Who is not represented? How might they be?

WORKSHEET 1.a: Partner Map

Partner maps are living documents, reflecting the reality that partnerships will grow, change, and reset over time. As a result, drafting a partner map should not take much time; focus on setting up the map framework and climate action planning. Use Worksheet 1a. to develop your own.

KEY TACTIC 1.4

Build capacity

After assessing organizational and community capacity, work toward addressing identified capacity gaps.

Engage collaborators within the health department

Before deepening engagement and partnership with other organizations or agencies, start with potential intradepartmental collaborators. There might be some obvious collaborators to engage first—such as program staff focused on climate sensitive health outcomes.

Approach other intradepartmental collaborators with the acknowledgement that, in some settings and circumstances, there may be minimal support or resources for climate action. Start two-way conversations to construct mutually beneficial collaborations. Center the importance and urgency of climate change, how climate change affects the exposures or health outcomes of greatest interest to the program, and the many ancillary benefits of action. Seek to understand the perspectives and priorities of other staff, who may feel overwhelmed by the notion of expanding initiatives or assuming additional responsibility. It may be most strategic to "start small" with the aspiration of expanding collaboration over time. Alternatively, take an opportunistic approach that seizes upon new opportunities, especially those with additional funding.

Consider initial conversations a capacity- and awareness-building process. Seek practical strategies such as connecting staff and organizations, creating opportunities for co-learning and growth, and inviting external speakers to educate staff and share insights.[9]

> "There's almost a pre-engagement that's needed, before we can even start these projects, of **getting to know each other, learning from each other, and learning to trust each other.** It's not like everybody has to be at the table at the same time. It may be a big, jumbled mess. But it's like, a core group who are moving this ball forward, and then, knowing when it's the right time to bring in these other members at strategic moments."
>
> *- National organization staff*

If needed, build leadership support

If previous efforts revealed a gap in leadership support, consider the following ways to enhance or build support:

- Highlight the risks and opportunities to health implicated by climate change. Use locally relevant examples.
- Highlight the costs of inaction.
- Show how addressing climate change aligns with existing strategic objectives that leadership already supports.
- Leverage existing relationships with external interest holders to create pressure on leadership to support climate action.
- Identify champions within the health department who are already engaging in climate change work, lift up their perspectives, and showcase their success.
- Preemptively consider political barriers or roadblocks and identify strategies to work around them. Make these considerations explicit in discussions with leaders.

Hire to address gaps in workforce skill sets

When circumstances allow, hire to fill the gaps identified in workforce skills. Refer to Figure 1.a to review these skills.

In situations where capacity and funding are limited, look for creative solutions such as fellowships or internships, recruiting at or partnering with universities, and recruiting or sharing capacity with partner organizations and others with climate expertise.

Be mindful that teams with diverse skills, backgrounds, and life experiences are more likely to successfully implement BRACE. Consider how recruitment and hiring practices support key tenets of justice, equity, and belonging and whether the workplace is equipped to support staff with different lived experiences. Will staff feel a meaningful sense of belonging? Will staff trust that their voices will be heard and their perspectives taken seriously? Are the lived experiences they bring to their work valued?

SOLUTION SPOTLIGHT

Commonwealth Healthcare Corporation of the Northern Mariana Islands

To bolster capacity to address the public health threats associated with climate change, the Commonwealth of the Northern Mariana Islands (CNMI) Commonwealth Health Care Corporation planned and executed a climate change training for staff throughout the agency. This helped to build knowledge and expertise locally. In addition, the project team also developed a CNMI-specific health impact scoping report to assess the local risk of various impacts. Throughout the project, the team also identified and built relationships with key partners outside of public health, including other governmental agencies, who can provide expertise and input on climate and health work across CNMI.[5]

Facilitate sustained mechanisms for staff to network and share ideas with each other and use trainings to build staff awareness and knowledge

Acknowledge that learning and growth can occur both through formal training and learning experiences as well as through informal staff interactions, such as communities of practice.

Some topics and trainings to consider:

- Encourage participation in free online climate and health training. Examples include:
  - CDC's Climate and Health Training for Health Department Staff: This course focuses on ways climate change impacts health and how to integrate climate change considerations into existing public health programming. It is designed for any public health professional working in a state, Tribal, local, or territorial health department.
  - ASTHO's Climate and Health Ambassador Training: This training is tailored to state and territorial health agency staff and equips trainees with the knowledge, skills, and resources to integrate climate and health into their work by examining case studies from different jurisdictions.
  - Preparing for the Health Impacts of Climate Change: Developed by the Swinomish Indian Tribal Community for practitioners to learn about climate action in Indigenous communities.[10]
  - Climate for Health: A self-paced training that helps prepare health professionals to take action on climate change across different settings.
- Provide locally tailored workshops and training to staff.
- Provide workshops and training about the intersection of health, climate change, justice, equity, and belonging.
- Provide specific training on key BRACE skill sets, such as climate communications, community engagement, and evaluation.

> "I came from an environmental public health background. A lot of the community engagement experience wasn't naturally in my wheelhouse. It wasn't something I was actually trained to do in public health school. I think it's important to have **more training for public and community engagement, how to build trust, and the importance of having key community partners.**"
>
> *- Local health department staff*

Look for external capacity building support

National, regional, and state public health organizations and institutes seek to enhance STLT health department capacity for public health climate action.

- The National Association of County and City Health Officials (NACCHO) supports city and county health officials through several initiatives, including a Global Climate Change Workgroup, a community of practice, webinars, newsletters, guidance documents, and an inventory of climate change success stories from local health departments.
- The Association of State and Territorial Health Officials (ASTHO) supports state and territorial health agencies through the Climate Change Collaborative which is a network for peer-to-peer learning, mentoring fellowships pairing health departments with varying adaptation capacity, training and direct technical assistance for territorial health departments, and maintaining an inventory of state climate and health adaptation plans, toolkits, and case studies.
- The National Environmental Health Association (NEHA) has developed a Climate Ambassador program, webinars, and guides for environmental public health programs to integrate climate into environmental health programming and healthcare sector partnerships.
- The American Public Health Association's Center for Climate, Health, and Equity builds capacity through its annual conference, webinars, workshops, fact sheets, toolkits, university accreditation programs, and training curricula for educational settings.

These organizations and others can be powerful resources to build capacity by providing specific examples of successful programs and initiatives and connecting practitioners across the country who share a common mission and purpose. Engaging with these networks and resources will facilitate greater success with BRACE implementation.

START THINKING ABOUT ADAPTIVE MANAGEMENT NOW

This is a good time to consider how the existing organizational culture handles uncertainty and actively learns. The challenges of management in the context of climate change, including complexity, uncertainty, and time and spatial scales, necessitate management approaches that center learning and allow modifications to plans in real time.

Several reports have explored the value of adaptive management practices in the context of climate change and health.[11,12] See the US Department of the Interior's Adaptive Management Technical Guide[13], which presents 6 key components : a) selection of clear management objectives, b) a model of the system being managed, c) different management choices, d) monitoring and evaluation of outcomes, e) ways to bring learning into future decisions, and f) a structure for interest holder collaboration and learning. Look for opportunities in the BRACE process to address these components.

Now is also a good time to begin conversations with health department managers and decision-makers about how to increase the organization's capacity to learn and adapt. Read more about adaptive management in Take Action.

KEY TACTIC 1.5

Develop the health department's climate and health vision, goals, and values

Effective climate action requires shared visions for success.

While more formal planning and goal setting occurs in Prioritize & Plan, taking the time to set some early high-level goals to contribute to staff and partner buy-in can promote continued interest and investment throughout the process. These are not project-level goals, but rather focus on the big picture. These kinds of goals answer questions like, *"What does a healthy and resilient city look like?"* and, *"How can we create the healthiest community for all people?"* Goals can provide inspiration and a shared vision for the ultimate outcomes that public health climate action will achieve. Specifically elevate goals that center equity, promote a sense of belonging, advance power-sharing, and foster community wellbeing.

The outputs of this Key Tactic can be shared with partners engaged in Partner. It may also be ideal to return to this Key Tactic once partners have been more formally onboarded, as it may help build trust and buy-in to co-develop goals, vision, and mission with partners.

Establish what kind of goals and vision will be set and for what purpose

Goal setting can be used to engage staff from different health department programs and organizations by pulling them into dialogue with each other about climate and

health. Co-develop a clear rationale so everyone engaged understands the value of the exercise and how it will lead to future work. Being accountable to a set of goals also supports future evaluation.

The following questions can guide this initial stage of the goal-setting process:

- What will be done with the goals?
- Who will be accountable for reaching them?
- What is the best time horizon for the goals? What reflects the urgency of the situation but will also be realistic?
- Who needs to agree upon the goals?
- How can participants be engaged in a sustained manner?
- Are we considering potential power imbalances between who is setting goals, who will be implementing actions, and who will be affected by those actions?

Once an early agreement on the role of these goals is reached, facilitate a group dialogue to come to a consensus and set the goals. Some prompts include:

- What do we hope will be true about the community and surrounding areas in the future?
- What do we want to see preserved?
- What do we want to see improved, enhanced, or even created if it doesn't exist now?
- How can the health department help accomplish these?

Determine values that will guide the overall approach to climate and health equity

Similar to goal setting, value setting is an important early process. Values shape not just the work done, but how a group makes decisions about which actions to take. Like goal setting, include as many partners—internally and externally—as feasible to value-setting discussions to create shared buy-in. To create values, facilitate conversations that identify a value system that provides specific insight on the health department's intentions to both mitigate and adapt to climate effects. Be willing to consult internal and external partners with lived experience with climate change harms and impacts.

Vet and communicate selected goals and visions

Once goals, visions, and values have been drafted, review with partners, iterate as needed, and share outside the department. Again, these goals and values are not specific to a project or single initiative. These goals can help foster support, interest, enthusiasm, engagement, and buy-in from potential collaborators.

PRACTITIONER RESILIENCE

The scope and scale of the climate crisis presents unparalleled challenges to human wellbeing. Many people feel stress, anxiety, and grief about the rapid change and degradation to our environment, which affects almost every aspect of life. At the same time, public health practitioners have a professional obligation to respond to these threats to human health.

If you are just starting to work in this arena or if you have been engaged for many years already, you may experience stress, sadness, fear, or burnout or notice these reactions in your colleagues. This is an understandable reaction to circumstances characterized by loss, suffering, lack of control, and uncertainty.

How do we maintain our own personal resilience and psychosocial wellness? BRACE recommends a prevention-oriented approach that draws from recommendations shared by climate-focused community mental health professionals.[14,15] A first step is to become more educated about emotional distress, which may take the form of burn-out, trauma, or climate grief. This can help practitioners identify what they are experiencing and understand what kinds of support and resources would be most helpful. Self-care practices such as mindfulness, journaling, creative artistic expression, spending time in nature, and connecting with peer support groups, family, and friends are commonly promoted by psychologists, who are increasingly trained to understand and treat climate distress.[14,16,17]

Climate work is collective work. BRACE recommends that no one do this work in isolation. Partners, within and outside of the health department, can become a source of empathy, shared experience, inspiration, and belonging. *Climate Cafes* are facilitated spaces where people can share their concerns with others who may be experiencing similar effects.[17]

The Climate Psychology Alliance and the Climate Psychiatry Alliance provide many free resources.[19,20] Newsletters, such as "The Climate Optimist" offer timely stories about climate action, what is working, and a menu of options to help practitioners find their niche in the effort.[21]

Public health agencies can support the mental resilience of the workforce by facilitating peer-to-peer conversations, acknowledging the challenges faced by public health staff, documenting staff needs, training staff and supervisors in mental health, and listening to champions willing to promote these issues.

The already high demands on the public health workforce will only intensify with climate change. Thus, it will be essential to expand our skills and capacities, through individual as well as institutional action. Maintaining our own personal resilience will serve our collective mission to build community resilience and promote wellbeing.

Key Reflections

NOTE: Throughout the BRACE Implementation Guide, the Key Reflections section will serve as a guidepost to ensure that the implementation of each element consistently calls back to values of justice, equity, and belonging and the cross-cutting activities.

Justice, Equity, and Belonging

- While assembling a team within the health department, are you ensuring that there is diversity of both skills and demographic characteristics, enabling you to serve and represent different groups in your community?
- What have you learned about historical and contemporary dynamics related to race, nationality, immigration status, and languages? How do different groups understand the history of the area as it relates to their group and others? How much integration or segregation exists in neighborhoods, schools, religious communities, and occupations?
- Are there concerns or examples of previous climate actions, such as incentives for electric vehicles, exacerbating existing inequities?
- Have you identified potential partners with representation from key groups that experience disproportionate health impacts of climate change who are trusted in the community?
- What kinds of opportunities have been identified that could build the capacity of partner agencies?
- Have you created a guiding vision and goals that incorporate justice, equity and belonging?
- Have you considered and acknowledged power imbalances between the health department as a government agency and the community?

Cross-Cutting Activities

COLLABORATE

- How have internal and external partners participated in this planning and capacity building stage?
- Are you creating space so that external partners can build their capacity and help to build your capacity?
- Are there opportunities to include partners in the early stages of visioning and goal setting?

COMMUNICATE

- Are you communicating what is being learned throughout Get Ready, Stay Ready with internal partners and gate keepers?
- Are you communicating key information through the formats and channels the audience needs?
- Have you considered how you will routinely share progress, strategies, successes, and challenges with partners and constituents throughout the BRACE process?
- What frequency, modes, and messages will be appropriate for different groups?

EVALUATE

- Have you identified internal and external partners to assist with evaluation throughout the BRACE process?
- Are you considering evaluation as you think about resource allocation and capacity building?
- Have you considered what evaluating overall goals will look like or how you will know if you have met a goal?
- If you are revisiting Get Ready, Stay Ready, how are lessons learned from past BRACE work and evaluation being incorporated?

Priority Principles for Get Ready, Stay Ready

The BRACE Framework is informed by ten key principles, which are intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, we highlight three principles that are key to the chapter's content.

PRINCIPLE 2. **Prioritize community experience**

This principle underscores the importance of centering local knowledge and consistently engaging diverse community stakeholders to inform the BRACE implementation process.

PRINCIPLE 3. **Understand injustice and work towards justice**

This principle encourages health departments to understand the local and historical context in which they implement BRACE and consider how this history promotes or challenges the key tenets of justice, equity, and belonging.

PRINCIPLE 5. **Work across sectors to increase impact**

This principle highlights the importance of cross sector collaboration and partnerships as a means to promote diversity, build capacity, broaden expertise, and extend community impact.

Conclusion

When to move to Partner

After preliminary work to better understand local context, constraints, and opportunities for partnership and collaborative action is completed, it is time to move on to the next elements of BRACE.

This initial work in Get Ready, Stay Ready is intended to be fairly quick, rather than an exhaustive, time-intensive process. Use Get Ready, Stay Ready as an opportunity to learn about the history of climate action in the community, understand the current and past social and political context, and identify a broad range of collaborators.

When to revisit this element

Though this element should not impede progress, vital and foundational work is done here. Return to the outputs of Get Ready, Stay Ready throughout the BRACE process. Specifically, revisit this stage as new partners are engaged and updates to the partner map are made or when it is time to reassess goals and vision.

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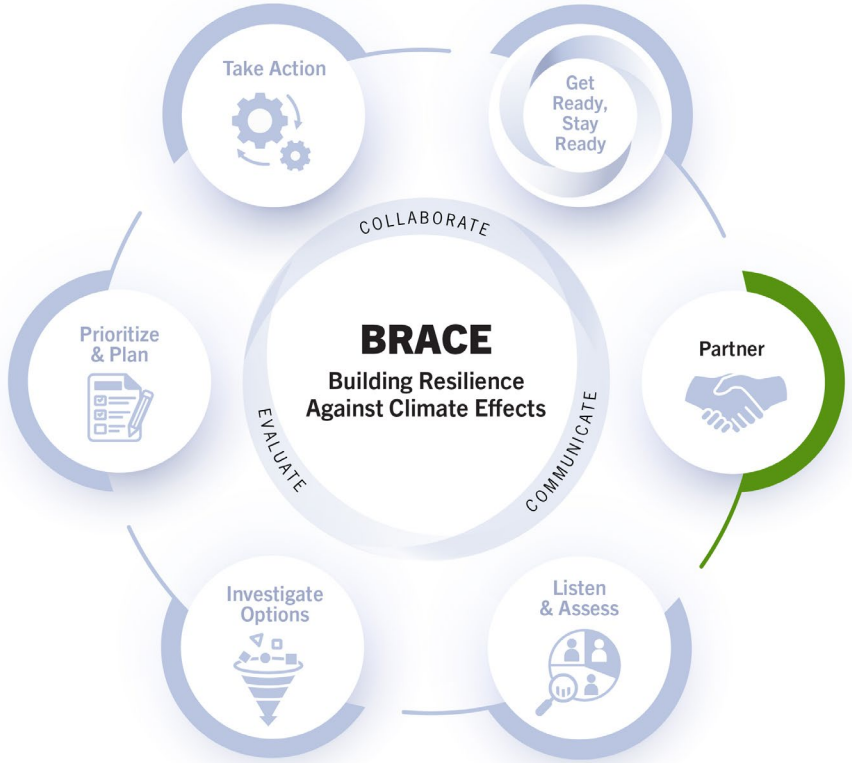
Partner

CHAPTER 2



Public health climate action is most impactful when undertaken with partners who bring diverse perspectives and strengths. This chapter focuses on establishing and building partnerships with communities and across sectors for effective and equitable public health climate action.

Key Tactics

KEY TACTIC 2.1 Engage cross-sector partners

KEY TACTIC 2.2 Engage communities, especially those disproportionately affected

KEY TACTIC 2.3 Develop an inclusive and collaborative approach to partnership

Partner

Outputs

- Initial cross-sector partners identified and engaged
- Initial community partners identified and engaged
- Collaborative leadership structure and approach to partnership established

Chapter Resources and Worksheets

RESOURCE 2.a.
Best Practices for Climate Communications

Introduction

Why do this after Get Ready, Stay Ready?

In Get Ready, Stay Ready, users cataloged potential collaborators and assessed existing partnerships. Partner takes that work a step forward, formalizing partnerships, building and maintaining strong relationships, and deepening community engagement. This is the second element of BRACE because establishing partners at the onset of public health climate action work helps ensure that a collaborative approach will be used throughout the entire process and that proposed solutions are more likely to produce and sustain positive change.[1]

To begin this process, acknowledge the time it takes to build strong and effective partnerships characterized by trust, respect, and transparency. Start building partnerships early. Review the agencies, organizations, coalitions, and people identified in Get Ready, Stay Ready. Scan the list for partners with justice, equity, and belonging aligned missions; entities that can bring critical skill sets for the rest of BRACE; and those already working with communities most disproportionately affected by climate change.

Lastly, consider the necessary skill sets for this work. In Get Ready, Stay Ready, you learned about the various skills essential for each element and those applicable to all.

Before you begin

Throughout this chapter, users will notice several types of partnership. The term "partnership" encompasses a wide range of relationships necessary to sustain strong and effective public health climate action. The three key types of partnership described throughout the Implementation Guide are:

Cross-sectoral Partnerships

Cross-sectoral partnerships are those with agencies, professional organizations, institutions, and entities focused on sectors other than health, such as transportation or education.

CONTEXT MATTERS

Local and Tribal health departments may have stronger collaboration opportunities at the local level, including with community-based organizations, grassroots coalitions, and community members, than state or territorial health departments.

Conversely, state and territorial health departments may be better prepared to bring health perspectives to state-level climate initiatives.

Health departments will vary in the quality of existing partnerships, available partnership types, staffing, resources, and degree of community trust. Keep in mind that some communities may have negative impressions stemming from histories of governmental harm. Any invitation for partnership should avoid further harm and be sensitive to these histories. Consideration of the intended and unintended outcomes of partnership is important for fostering positive community engagement.

Community Engagement

Community engagement involves working collaboratively with and through groups of people to address climate and health issues affecting the wellbeing of those people. Engagement can include collaborating with community-based organizations, Tribes, or directly with community members.

Intradepartmental Collaboration

Get Ready, Stay Ready emphasized the need to build support for climate and health within the agency. This collaboration is less explicit in the Partner element, but remains an important consideration for implementing the other two types of partnership efforts.

CLIMATE COMMUNICATIONS

Communication is a central component of BRACE—including communication with partners, leadership, other agencies, and the public.

Below are a few best practices for effective climate communication:

1. Emphasize the health angle.
2. Identify your main point, goal, and message.
3. Know your audience.
4. Identify and utilize trusted sources and social networks relevant to the audience of focus.
5. Frame messages for the audience.
6. Provide actionable information and solutions.
7. Co-develop and test your messages.
8. Keep it local and relevant.
9. Capitalize on the power of storytelling and visuals.
10. Be thoughtful in using statistics.
11. Provide actionable information and solutions.
12. Be persistent and clear to make the most of people's scarce time and attention.

RESOURCE 2.a: Best Practices for Climate Communications

KEY TACTIC 2.1

Engage cross-sector partners

The most impactful public health climate actions—especially those that are transformative and address the root causes of climate vulnerability—require multi-sector approaches that combine government, public, and private agencies working outside of health. This kind of approach is integral to the Vital Conditions framework and aligns with systems-thinking.

Keep in mind that the field of public health has been relatively slow to address climate change. There is much to learn by working with partners with more experience and expertise in design and implementation of climate action. By fostering curiosity and promoting a culture of learning within each partnership, health departments can increase their capacity and expertise through practice. Review Figure 2.a on Cross-Sector Collaboration for a graphic illustration on how to build these partnerships.

Identify and engage potential partners from different sectors

To begin this process, revisit the partner map from Get Ready, Stay Ready. Identify potential government, Tribal government, and non-government agencies who work in climate or climate-aligned areas.

Beyond health departments, consider government, non-profit, and private sector agencies that focus on[3]:

- Agriculture
- Sustainability and green design
- Emergency response and disaster preparedness
- Transportation planning
- Planning, zoning, and land use
- Energy and utilities
- Healthcare
- Water utilities, sewer, and watershed management

> “Every public health person ought to be very conversant on climate change. And that includes not just the impacts on the health but more importantly, “How do we decarbonize our society?” And second, we need to be extremely **skilled at bridge building with other sectors** because they need to understand that most of the impact they can have lies with other people’s actions, not with their own actions. Part of the job description is ‘forms and maintains really effective working relationships with transportation and housing and energy’ and so on. So, if we have a good understanding of **what needs to happen to decarbonize our society and can then support and collaborate with the sectors** where that has to happen, that’s the path to success.”
>
> *- National organization staff*

- Meteorology and climatology
- Wildlife management and forestry
- Natural resources
- Cultural preservation
- Sacred land protection
- Waste and sanitation
- Economic development
- Parks and recreation
- Education

Also consider partnerships across geographic scales. The effects of climate change and the mitigation and adaptation efforts needed often stretch across community or jurisdictional boundaries. Consider regional and community responses, and think about partnering with agencies with wider catchment areas for multi-scalar collaborations.

This is also a good moment to revisit the vision, values, and goals developed in Get Ready, Stay Ready. Are there concepts contained in these that might direct potential new partnerships? For example, if the health department would like to pursue or support nature-based solutions with public health and ecological benefits, agencies focused on natural resources, sustainability, or parks and education may be good candidates for partnership.

Understanding partners' priorities and current intiatives will help narrow the partnership list. Some questions to consider include[4,5]:

- What existing collaborations could be expanded?
- What other agencies are currently pursuing climate change mitigation and adaptation efforts?
- Are there existing interagency initiatives that address climate change or impacts and opportunities for agency participation?
- Is any agency engaged in strategic planning related to climate change for which the health department could provide a health and justice, equity, and belonging lens?

Once a list of potential organizations has been identified, start scheduling meetings. Lower-capacity health departments can start with one or two organizations or do this in phases. Approach these meetings with flexibility, ask about potential partners' work, experience, and areas of interest. Make an effort to open bidirectional communication; these meetings aren't interviews. Rather they should be conversations that serve as the base for future collaboration.

SOLUTION SPOTLIGHT

Minnesota Department of Health

Extreme rainfall can wash contaminants into drinking water resources. This is particularly concerning for Minnesota as one in five Minnesotans use private wells and must maintain water quality themselves. Through multi-agency collaboration, MDPH was able to convey the climate risks to the water quality of private wells to improve and enhance private well water testing. This was the first time climate knowledge was institutionalized into drinking water programs in the state, and it established new and continuing collaborations.

Simultaneously, growing wildfire frequency means more exposure to smoke and other air pollutants. The Minnesota Climate and Health Program engaged in an interagency initiative to launch a new air quality forecast and alert program. This program ensures consistent messaging and that information reaches those most at-risk and key stakeholders. They also established an ongoing multi-agency relationship to develop climate related health messaging to protect health and engage new audiences and those sensitive to poor air quality. This work has not only been supported by the CDC's Climate-Ready States & Cities Initiative (CRSCI) but also through a 2019 mini-grant via the National Environmental Health Association

FIGURE 2.a: Cross-Sector Collaboration

Many sectors outside of public health are already engaging in community climate adaptation and mitigation. There is increasing recognition of the need to address health impacts as part of this work. This figure highlights a few of the many sectors and how their focus areas can relate to health.

Specific leverage points and strategies will become clearer in later elements of BRACE. Understanding the opportunity landscape, queuing up potential partners and understanding their perspectives will support a more robust process for identifying and selecting strategies in Investigate Options and Prioritize & Plan. Review Figure 2.b for a representation of the opportunities landscape.

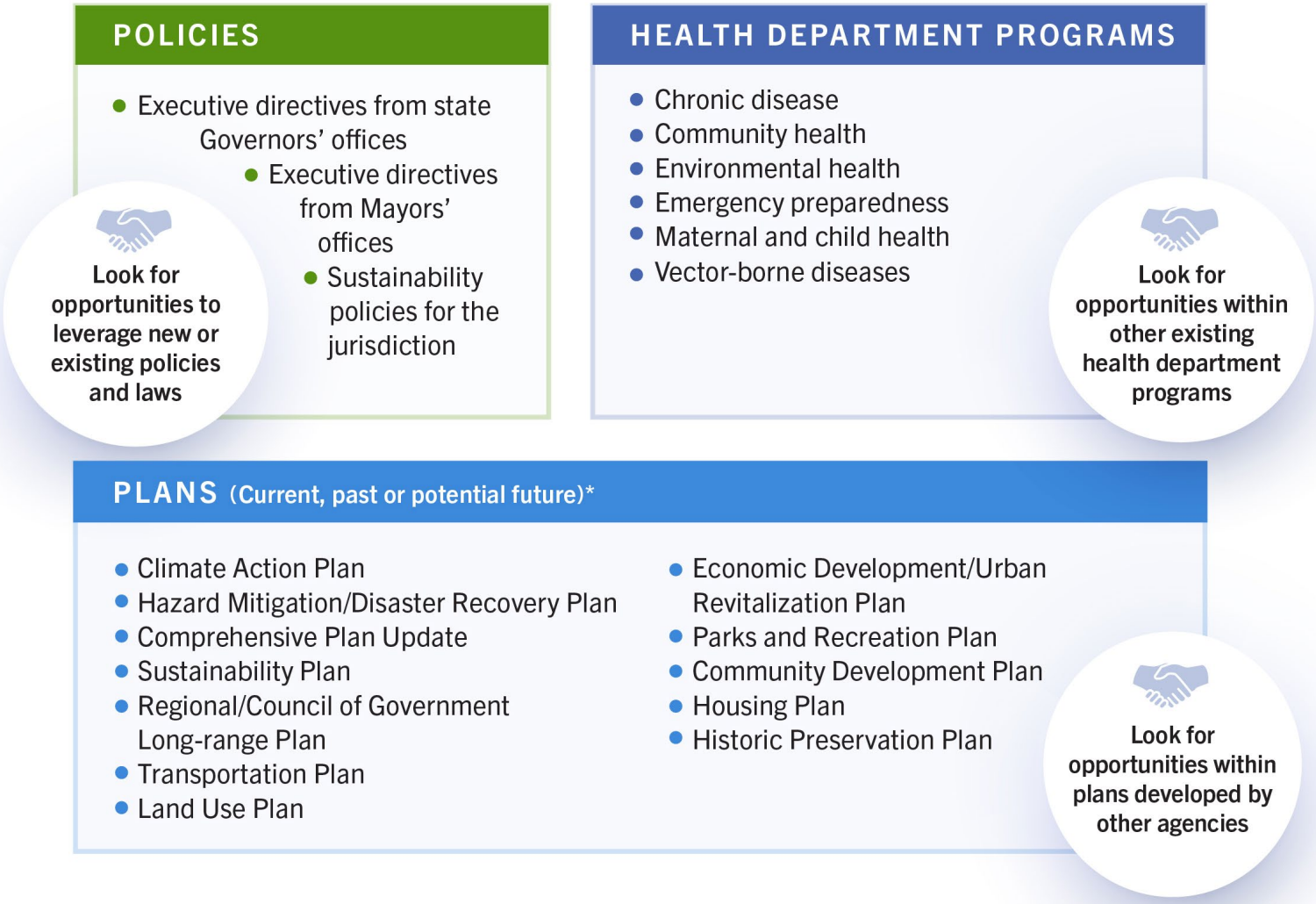
Some helpful prompts for initial conversations with partners include[4,5]:

- What are their priorities, concerns, and constraints?
- Who are their partners and interest holders?
- How do agency interests and goals align?
- Why is it important for the agency to be involved?
- Does the partner have specific concerns about the health department's perspective or involvement?
- What might the health department bring to the table to help the new partner reach their own objectives or strengthen a particular initiative or process?
- What specifically can the health department offer? (For example, data, assistance with community engagement, information, contacts, or staff resources)
- Is there something specific other agencies could do? (For example, integrate health data into their analysis, or share resources)
- Are there specific opportunities already in progress or envisioned for win-win climate action strategies with health and equity benefits? (For example, urban greening, local food systems, active transportation, or housing)

Strong partnerships are built on trust, accountability, and consistency. Co-decide whether additional meetings would be beneficial. In every partnership conversation, offer clear next steps and follow through on them.

FIGURE 2.b: Opportunities Landscape

These are a few examples of potential opportunities health departments can leverage.



Source: Adapted from NOAA's "Implementing the Steps to Resilience: A Practitioner's Guide". Click here to learn more.

KEY TACTIC 2.2

Engage communities, especially those disproportionately affected

The impacts of climate change most significantly impact communities that have been harmed by histories of racism, sexism, and other systems of oppression. Meaningful and sustained engagement with the communities most impacted by the effects of climate change is a means of procedural equity.

Identify and engage potential partners that serve and represent communities disproportionately affected by climate change

The priorities and lived experience of those most disproportionately affected by climate change should be central to public health climate action.[3,7] Consider new or non-traditional sources of influence, awareness, and knowledge that might differ from the typical places STLT health departments look. For example, in Tribal communities, elders are often great sources of wisdom and knowledge and have strong connections within their respective Tribal communities, Tribal councils, advisory groups, or other local initiatives.

Start by reviewing the partner map developed in Get Ready, Stay Ready. Identify community-based organizations who could serve as strong partners. While organizations already engaged in climate change related fields may serve as effective partners, consider engaging others focused on a range of topics including[7]:

CONTEXT MATTERS

Community-based organizations may already be conducting their own work at the grassroots level and STLT health departments might be late to the scene. As a health department, consider how closely connected the organization might already be to the community—the residents themselves and the organizations and coalitions at work. A 2023 survey of community-based organizations indicated that only 18% reported a high level of trust between their community and the health department.[7]

Some of this history was explored in Get Ready, Stay Ready, but continue to reflect and engage with a transparent and culturally responsive approach. Keep power and access in mind. Reflective inquiry on this issue may include questions like[5]:

- Has everyone been meaningfully involved?
- Who is in the room?
- Whose room is it?
- Who is trying to get into the room but can't?
- Have everyone's ideas been heard?

- Healthy eating and active living
- Food justice and healthy food systems
- Transportation access and public transit
- Justice, equity, and belonging for people from racial and ethnic minority groups, people with disabilities, members of the LGBTQ+ community, women, Indigenous communities, people with low income, people who are incarcerated
- Those working with demographic groups known to be at greater risk from climate hazards—such as the older adults, outdoor workers, and people experiencing homelessness

Once a list of potential partners has been identified, begin introductory meetings. Show up to these meetings with curiosity, not agendas. Ask about potential partners' priorities, activities, histories, and experiences. Review the historical context uncovered in Get Ready, Stay Ready and be willing to have those histories unsettled as new things are learned.

Organizations that don't primarily work in climate change might benefit from seeing how their work is relevant. Be responsive to a partner's identification of their community's needs and be willing to offer a climate or public health perspective when appropriate. Communicating the range of health and societal benefits that public health climate action offers, highlight a specific co-benefit that connects to an organization's mission or focus. Conversely, consider how the health department can support efforts that seem to extend beyond climate-relevant issues. In some cases, these issues may be proximally impacted by climate change, such as food security or affordable housing. Community-based organizations do not typically operate in a siloed, disease-specific way. Building and sustaining strong partnerships requires frank conversation about partner priorities, even if those needs may appear outside of traditional public health spheres.[3]

Decisions about partnership can be made over the course of several meetings, rather than just in one quick decision. Set clear expectations about partnership, including timelines, opportunities for involvement, the power potential partners will have within the program, and what the goals and values sustaining the program are. After every meeting, set clear next steps and follow through. Build partnerships based on trust that are geared to last the duration, not partnerships that are transactional and only built to meet immediate needs.

ACKNOWLEDGING POWER

There will likely be power imbalances that may affect relationships between STLT health departments, community-based organizations, grassroots coalitions, Tribes, community members, and other interest holders. Remember that addressing these power dynamics is important to build trust. Be willing to acknowledge the various societal systems that might create power imbalances across race, ethnicity, ability status, economic power, education level, gender, gender identity, and sexual orientation, among other identities. Show up to a new partnership willing to acknowledge past history and start relationships built on trust.

Reflect on the health department's capacity for community engagement

When working with community partners, a well-articulated and thought-out community engagement approach will benefit the process. Use the Spectrum of Community Engagement to Ownership in Figure 2.c to identify where the proposed engagement approach falls along the spectrum and confirm this aligns with original intentions.[8]

It is unrealistic for every health department to utilize the most community-engaged approach at the beginning. However, BRACE challenges health departments to move toward more inclusive community engagement practices that share decision-making with community-based organizations and community members.

Sustained, equitable community engagement is a skill to cultivate, practice, and refine. Encourage learning and adaptation; adjust your community engagement strategy as you gather new information. Also, consider the health department's capacity, especially in terms of staff expertise, staff availability, and leadership support, to implement the activities implied for each level of engagement. Consult health department staff with expertise in community engagement. Alternatively, look outside of the agency; local health departments, urban planners, neighborhood associations, civic organizations, special interest groups, or community-based organizations with experience in convening can augment capacity.

Update the partner map from Get Ready, Stay Ready based on what has been accomplished with partnerships thus far.

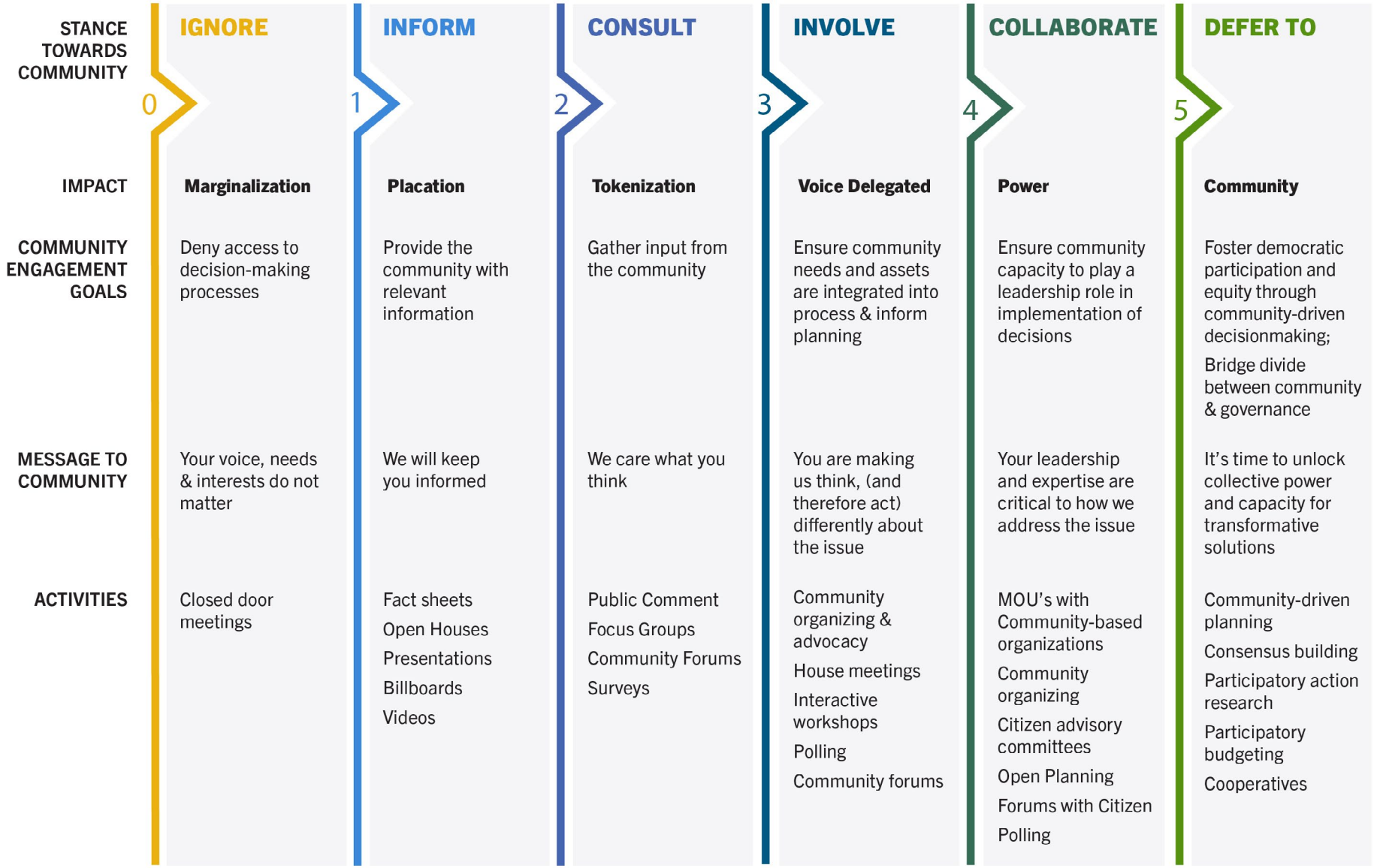
> "I think it's useful to have **trained staff that can better work with the community.** It's a capacity building thing. Having a community engagement person in your Climate and Health Office would be really helpful."
>
> *- State health department staff*

SOLUTION SPOTLIGHT

Blackfeet Nation

In 2017, the Blackfeet Nation (located in what is now called Montana) received a mini-grant from the CDC via the National Indian Health Board (NIHB). With these funds, they produced a Blackfeet Community Climate Health Guide that addresses climate impacts and develops activities for engaging Tribal community members and leaders in best practices for addressing climate-related health impacts. This collaborative process was community-driven and responsive to local climate and health needs. Community leaders now have a path for building community engagement and awareness surrounding the health impacts of climate change.[4]

FIGURE 2.c: Community Engagement Spectrum



Source: Adapted from Facilitating Power's "Spectrum of Community Engagement to Ownership". Click here to learn more.

KEY TACTIC 2.3

Develop an inclusive and collaborative approach to partnership

Maintaining meaningful engagement of interest holders is a key tenet of adaptive management practice, which encourages open, transparent, and accessible processes.[9]

Once partners have been selected and engaged, the next step is to co-develop intentional and structured partnership processes. Create transparent leadership structures, rooted in agreed upon sets of values on partnership and community engagement. Successful partnerships are critical to implementing BRACE and planning, commitment, assessment, and evaluation are needed to support their creation.

Partners may leave and partnerships may change. There will be times when it is necessary for organizations to step back or realign. Be flexible to allow new partnerships to grow or established partnerships to evolve.

Invest in building relationships

Strong relationships are built on trust, and trust takes time to build.

Make space to acknowledge the historical and current injustices different partners may bring into the space. STLT health departments need to recognize the roles played by government and other agencies in contributing to inequities, particularly among people from Black, Indigenous, and other racial and ethnic minority groups.[3] Invest time to create a sense of belonging that prioritizes interest holders being present, invited, welcomed, known, accepted, supported, and heard.[3]

SOLUTION SPOTLIGHT

Oregon Health Authority

Wildfire smoke and water insecurity disproportionately impact people of color, Tribal communities, and communities of lower income. The Oregon Health Authority's (OHA's) Public Health Division identified the power of community partners and recognized community-based organizations as part of Oregon's public health system. Oregon provided technical assistance, tools, and evaluation to local public health agencies (LPHAs), community-based organizations, and Tribes implementing community-led adaptation actions to improve resilience to wildfire smoke and water insecurity. As a result of their work, 38 organizations and 36 LPHAs have received assistance in advancing climate equity, building community resilience, and implementing climate adaptation actions.[3]

Partnership and relationship building are not always about *doing* something. It is expected that it will take time to build relationships, which may mean there is no rapid attempt to efficiently complete a task. Acknowledge the potential frustration that can come with feeling like nothing is being *accomplished* early in the partnership process; this is not time wasted, but rather time invested.

Establish principles of partnership

At the outset of establishing a partnership, draft a set of principles to help guide all members. These principles should be collaboratively chosen and align with or support the goals and values established in Get Ready, Stay Ready. The principles should guide multi-sector partners and community-based organizations and reflect local needs and perspectives. Figure 2.d includes example guiding principles for partnership.[2] These principles are intended to:

- **Provide guidance**
- **Be useful**
- **Inspire**
- **Support collaborative action**
- **Hold partners accountable**

Agree upon plans for partnership

Several concrete pieces of a partnership's structure should be decided at the outset and revisited often to establish a collaborative and transparent working structure.

PARTNERSHIP STRUCTURE, ROLES, AND RESPONSIBILITIES

Build on the principles for partnership drafted in the previous activity by setting clear roles and responsibilities for each partner. Ensure that responsibilities are appropriately matched to a partner's strengths, capacity, assets, and interests.

Be open to a variety of different role types. Some partners may serve as advisors; consultants; workgroup, task force, or coalition members; or on coalitions, steering committees, or advisory boards. Some may be engaged throughout the process, others may be consulted during specific elements of BRACE, like assessment or evaluation. Regardless of the agreed upon roles and responsibilities, ensure that the structures, roles, and responsibilities drafted in this tactic—even the role the leading health department will play—are clearly documented and shared with all engaged partners.

> "We're really trying to operationalize mechanisms for meaningful engagement with populations who are overburdened as part of assessment and decision-making and planning. That participatory piece of assessing and prioritizing interventions with communities, and in particular with overburdened communities, is critical and also takes a long time. **You have to develop the relationships.**"
>
> *- State health department staff*

FIGURE 2.d: Guiding Principles of Partnership

These principles were developed by Community Campus Partnership for Health (CCPH), which has studied, examined, engaged in, and evaluated what makes partnerships work, sustain authenticity, and achieve the change they want to see in their community. They note that the CCPH Guiding Principles of Partnership are not meant to be prescriptive, but rather can be tailored or adapted based on the partnership needs.

01 The Partnership forms to serve a specific purpose and may take on new goals over time.

02 The Partnership agrees upon mission, values, goals, measurable outcomes, and processes for accountability.

03 The relationship between partners in the Partnership is characterized by mutual trust, respect, genuineness, and commitment.

04 The Partnership builds upon identified strengths and assets, but also works to address needs and increase capacity of all partners.

05 The Partnership balances power among partners and enables resources among partners to be shared.

06 Partners make clear and open communication an ongoing priority in the Partnership by striving to understand each other's needs and self-interests, and developing a common language.

07 Principles and processes for the Partnership are established with the input and agreement of all partners, especially for decision-making and conflict resolution.

08 There is feedback among all interest holders in the Partnership, with the goal of continuously improving the Partnership and its outcomes.

09 Partners share the benefits of the Partnership's accomplishments.

10 Partnerships can dissolve, and when they do, need to plan a process for closure.

11 Partnerships consider the nature of the environment within which they exist as a principle of their design, evaluation, and sustainability.

12 The Partnership values multiple kinds of knowledge and life experiences.

Source: Developed by Community Campus Partnerships for Health. Click here to learn more.

Be open to different approaches and work styles partners may bring. It may take time to adjust to and come to consensus on how partners with different styles can effectively work together.

BUDGET ALLOCATION

Consistently engaged partnership requires time, effort, and commitment. As such, plan to compensate partners for their involvement. The compensation of partners may look different depending on the type of partner and their agreed upon responsibilities.

Community partners and members should be compensated for their time and effort on BRACE-related work from the outset. These decisions should be transparent and fair and made with community input.

Consult the Urban Institute's Equitable Compensation for Community Engagement Guidebook for guidance on models for compensating community partners.[10]

If financial constraints prevent compensating community members, this must be made clear up front, so that the community members can make informed decisions about whether or not to partner with the health department.

Conversely, multi-sector partners may join climate-related efforts within the context of their professional roles, meaning compensation is not expected. Be clear and fair about who will receive compensation and for what at the initiation of a partnership.

DECISION-MAKING PROCESS AND AUTHORITY

All partnerships should be rooted in a transparent and agreed upon decision-making process. Key considerations about sharing and establishing decision-making authority are:

- If the role of partners, especially community members, is considered an advisory role and the health department retains final decision-making authority, this should be well communicated and understood from the beginning.
- If a more collaborative, participatory decision-making process will be used, ensure all partners understand and agree with their roles and responsibilities. This may require that partners be properly onboarded to the role they will play.
- Conflict is expected in any partnership. Part of creating a shared decision-making process is to understand how to resolve conflicts and better understand when and where those conflicts arise. Whenever possible, attempt to uphold a consensus decision-making structure, but recognize this is not always possible and be transparent about how this will be handled.

> **Building trust and relationships** with communities is as foundational a step as anticipating climate impacts.
>
> *- State health department staff*

COMMUNICATIONS

To establish a sense of connectedness, ensure that one staff person or team is responsible for leading outreach and communications with members of the partnership. Relevant tasks include gathering contact information, setting up email distribution lists, and sharing meeting minutes and agendas. Consider how frequently and through what channels members want to receive communication and make plans accordingly.

MEETING SCHEDULE

Secure buy-in on the cadence and purpose of meetings to sustain effort and ensure no one feels their time is being wasted. Agree on basic meeting structure, agendas, facilitators, meeting frequency, and method of meeting (if virtual or in-person). Ensure that meetings are scheduled at times all partners can attend and meet their physical needs.

CAPACITY BUILDING

Building strong partnerships requires being attentive to both the health department's and partners' skills and capacities.[6] Take the time to set expectations and allocate ample resources to building capacity between partner organizations, especially community-based organizations. Consider inviting external partners to ongoing or existing capacity-building opportunities. Also make space for co-learning to coalesce on shared language and understanding on key topics such as climate change trends, available data, and emerging climate solutions that promote climate resilience, justice, equity, and belonging. These practices can help prevent conflict in later elements of BRACE.

Where the health department has resources and capacity, extend tangible support to partners. These opportunities can be via the extension of financial or funding resources or by offering technical assistance and learning collaborative opportunities. More resourced health departments might consider extending grants, mini-grants, or other financial opportunities. Less resourced health departments can focus on training, technical assistance, and capacity building.

> "Let's also think about community capacity…For instance, before a community that's under-resourced can even get to the point where they're identifying 'this is what we want to see,' they're applying for funding, they have a shovel ready project. So there needs to be some of these **core pieces around institutional infrastructure.** Is there a local health department that is actually staffed to support that work? Is there just access to technical assistance and information to be able to understand the climate vulnerabilities and how we can address them? That capacity building piece oftentimes gets left out in a lot of these conversations."
>
> *- Community organization staff*

Assess the partnership(s)

It is important to consistently ask how effective partnerships are over time and how they can be improved. There is no standard metric that defines an effective partnership; however, BRACE considers an effective partnership as one that brings together important interest holders and then organizes and engages them to achieve the agreed upon objectives.[11]

To ensure that a partnership is effective, take the time for honest reflection about what is working well, potential gaps, and areas for improvement. Use the outputs from Get Ready, Stay Ready to create an evaluation organized around shared priorities. The needs of those directly involved in managing the partnership, those who may be affected by changes that occur as a result of the evaluation findings, and those who may have an interest in the partnership evaluation's results should drive the development of the assessment.[11]

Conduct partnership evaluations in ways that most align with the needs and capacities of key interest holders. Potential assessment approaches include:

- **Informal Discussions:** Use a meeting to review agreed upon organizational structure, decision-making processes, roles, and responsibilities to discuss how closely these structures have been abided by.
- **Facilitated Group Discussions or Individual Interviews:** Invite an external facilitator to lead a series of discussions—either group or individual sessions—to collect feedback and share an anonymous summary report on how partners feel the partnership is abiding by its values.
- **Anonymous Surveys:** Use an anonymous survey to collect information on how interest holders feel the partnership is meeting agreed upon structures, principles, and values.

See CDC's Planting the Seeds e-textbook on program evaluation. Take Action provides in-depth guidance on partnership evaluation, including potential evaluation questions, methods, and examples.

Key Reflections

Justice, Equity, and Belonging

- Are you partnering with groups with justice, equity and belonging aligned missions? How?
- Do the partners represent communities most disproportionately affected by climate change, including groups with intersectional identities related to factors such as race, ethnicity, gender, gender identity, sexual orientation, ability status, income level, etc., who might be differentially affected by climate change?
- How are communities most affected by climate change involved in developing the partnership structure, with clear and agreed upon roles and responsibilities, compensation, and decision-making authority?
- How have issues of power and power dynamics been addressed?
- How do the partners contribute to and agree upon the principles of partnership?
- How are potential areas of conflict being anticipated, and how are you setting up conflict resolution processes to support positive movement forward?

Cross-Cutting Activities

COLLABORATE

- How are you bringing members of communities disproportionately affected by climate change in at the earliest stages?
- How are non-health sectors involved?
- How are partners meaningfully involved in developing an approach to partnership that will guide how the other BRACE elements will be implemented?
- Have you established a plan to work together with a wide range of partners to identify goals, co-design approaches and actions, increase buy in, and achieve common aims and equitable, community-driven outcomes?
- If trust was harmed or undermined in the past, how can you rebuild or make amends?
- How are communities being involved in the different stages of evaluation?

COMMUNICATE

- Are the organizational structure, roles and responsibilities, and decision-making processes agreed upon and communicated with all partners?
- How is the process for internal communication among partners working? Have you made sure that all partners are clear about the frequency, mode, and approach to communications and updates?

EVALUATE

- How will the partnerships be meaningfully assessed and improved upon over time?
- Are the principles the partners decided on applicable for a variety of contexts?
- Through this process, who will be considered an interest holder for evaluation? Will any of these individuals be included on the evaluation team?
- How will this evaluation be beneficial to communities?

Priority Principles for Partner

The BRACE Framework is informed by ten key principles, which are intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, we highlight three salient principles to demonstrate their practical relevance in diverse contexts.

PRINCIPLE 2. **Prioritize community experience**

This principle establishes community members as critical to the effectiveness of the BRACE Framework. Health departments should invest time and resources into understanding community members' lived experiences and collaborating with them to develop meaningful solutions.

PRINCIPLE 3. **Understand injustice and work towards justice**

This principle underscores the importance of addressing power dynamics and acknowledging legacies of historical injustice within scales of implementation. Partnerships should be used to invite those who have historically been marginalized into decision-making.

PRINCIPLE 5. **Work across sectors to increase impact**

The principle advocates for cross-sector collaboration with diverse stakeholders such as community-based organizations, Tribes, academia, and government and private entities. This approach aims to leverage combined strengths for effective public health climate action.

Conclusion

When to move to Listen & Assess

When key partnerships have been established with an agreed upon structure, roles, responsibilities, and goals, it is time to move on to Listen & Assess.

When to revisit this element

Sustaining partnerships requires deep and consistent engagement. Revisit this element whenever the team needs new partners, whenever conflict arises, to re-engage existing partners, or to update and reassess roles as the scope of public health climate action planning evolves.

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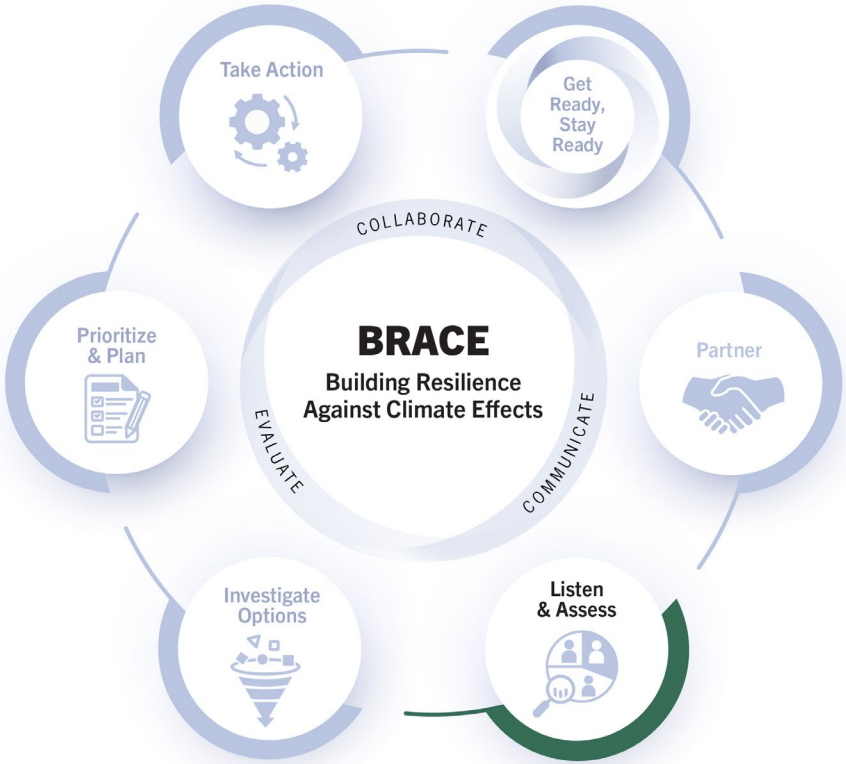
Listen & Assess

CHAPTER 3



Successful public health climate action is data-informed and rooted in the lived experience of groups disproportionately affected by climate threats. This chapter guides users through the collection of pertinent data, gathering of community perspective, and collaborative interpretation of data and insights.

Key Tactics

KEY TACTIC 3.1 Listen to community members and partners

KEY TACTIC 3.2 Assess climate hazards, health impacts, and resilience

KEY TACTIC 3.3 Assess climate mitigation opportunities and connections to disease prevention, health promotion, and equity efforts across sectors

KEY TACTIC 3.4 Collaborate with partners, Tribes, and communities to interpret the data and develop integrated data stories

Listen & Assess

Outputs

- Documentation of community needs and perspectives
- A vulnerability and resilience assessment informed by community and partner priorities and concerns with diagrams and other visual representations of health impacts, maps, indices, and matrices
- List of climate mitigation opportunities, data and resources on jurisdictional health, and related benefits of climate mitigation
- Data stories

Chapter Resources and Worksheets

RESOURCE 3.a:
Community Engaged Methods

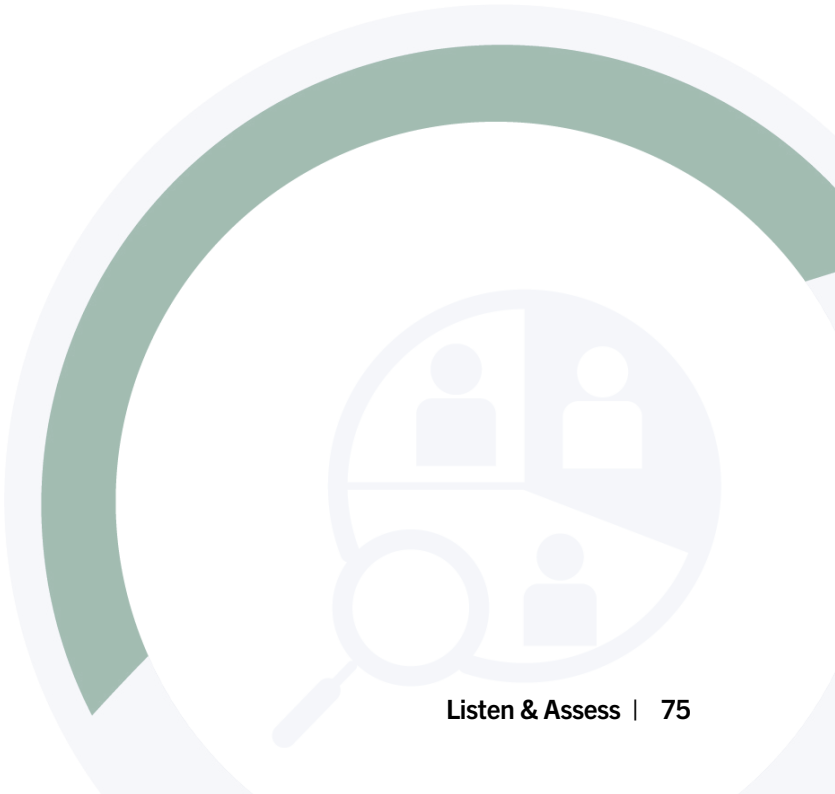
RESOURCE 3.b:
Methods for Listen & Assess Key Tactic 3.2: Options for Low, Medium, and High Capacity Programs

RESOURCE 3.c:
How to Use Climate and Health Data & Selected Resources

RESOURCE 3.d:
Systems Thinking Overview and Key Methods for BRACE

RESOURCE 3.e:
Case Study: Using Maps to Visualize Vulnerability and Assets for Flooding Exposure in the New Hampshire Hampton-Seabrook Estuary

WORKSHEET 3.a:
Linking Climate Hazards and Health Outcomes



Introduction

Why do this after Partner?

Listen & Assess leverages and builds from the partnerships formed during the Partner element to understand community perspectives on vulnerability and resilience, identify opportunities to mitigate risks, and inform public health climate action. Use the Partner Map created in previous elements to begin thinking about which partners may have resources, skills, and perspectives to contribute to Listen & Assess. Additionally, think about how existing staff skills in the health department can support partners.

Before you begin

Listen & Assess includes four key tactics with different points of emphasis:

- **Key Tactic 3.1** focuses on learning about community priorities, concerns, and experiences related to climate and health.
- **Key Tactics 3.2** and **3.3** focus on assessment and use of existing data resources. These two tactics address climate vulnerability and mitigation opportunities separately, as the processes and information sources will likely differ.
- **Key Tactic 3.4** describes data sense-making through data storytelling. Creating compelling data stories informs climate action in subsequent BRACE elements.

This chapter is the most extensive of the Guide because each Key Tactic requires quantitative and qualitative data-related activities and includes a range of options, suited to different levels of capacity. Users should select activities that best align with their circumstances.

Refer to the internal capacity assessment, the partner map, and scan of available opportunities conducted in Get Ready, Stay Ready and consult with initial partners identified in Partner. Identify and engage partners both within your institution and externally, such as community members with lived experience, community-based

> "I think this step is critical. For health departments, for communities, for Tribal governments, **if you don't know what the potential impacts are going to be, how are you supposed to plan and prepare?**"
>
> *- Tribal government staff*

organizations, grassroots coalitions, Tribes, academia, government agencies, and the private sector.

BRACE also encourages practitioners to incorporate an asset-based perspective in Listen & Assess. A deficit-based approach focuses on the problems or needs of a community and often identifies solutions that are external to the community.[1] Focusing only on deficits can be counterproductive, because defining a person or a community only by their challenges is stigmatizing and can encourage patronizing interventions disconnected from the lives of community members.[2] In contrast, an asset-based approach identifies, appreciates, values, and incorporates existing community assets or strengths into planning and climate action. In the context of health, an asset is any resource that improves an individual's or community's ability to maintain good health and wellbeing while reducing inequity. Assets can be within or outside the health sector. While working through Listen & Assess, incorporate a systems thinking approach and the Vital Conditions.

The principles of data sovereignty and governance can help you advance a co-productive model of knowledge generation while respecting community desires around ownership of data. Four principles of good data management and stewardship—findability, accessibility, interoperability, and reusability—should be used to make data easier to share and reuse.[3] See Figure 3.a for the CARE Principles for Indigenous Data Governance—collective benefit, authority for control, responsibility, and ethics. These principles have been designed as "people and purpose-oriented, reflecting the crucial role of data in advancing Indigenous innovation and self-determination".[4] These principles are particularly important when working with Tribal groups but are applicable to any community.

Listen & Assess is a multi-component, iterative process that will take time and resources. It is important to reflect on whether the process as well as the methods used are inclusive, equitable, and representative. Some Listen & Assess tactics may not readily lend themselves to formal evaluation. However, practitioners can use self-reflective practice to ask questions about the process. Establish a simple plan for this kind of reflection to hold yourself accountable to check in, inquire, and reflect.

CONTEXT MATTERS

State and territorial health departments can focus on supporting local health departments and community agencies by providing financial support, technical support, and relevant data. Local, Tribal, and smaller territorial health departments may have stronger direct connections to community partners and the lived experiences of community members. Local and Tribal health departments, being closest to community needs, have a unique opportunity to listen attentively to the concerns and priorities of communities. They can leverage existing community networks and partnerships to facilitate meaningful dialogue and ensure a diverse range of voices are heard. These insights can be channeled back to state and territorial health departments to inform higher-level planning and priority setting.

To enhance capacity, health departments can leverage partnerships with academic institutions, consultants, or hire professional climate assessment and adaptation practitioners to assist with risk and vulnerability assessments.[5–7] They may also work with existing risk and vulnerability assessments.

High-capacity health departments may be better positioned to conduct more complex analyses; whereas smaller health departments or those with less resources or staff expertise may need to strategically focus and prioritize, relying more heavily on existing data, narratives, surveys, or other community engagement and assessment outputs.

FIGURE 3.a: FAIR+CARE Principles

F	A	I	R
Findable	**Accessible**	**Interoperable**	**Reusable**
Data should be easy to find for both humans and computers	Data is retrievable using a standardized communications protocol	Data needs to be in a format that makes it possible to integrate with other data	Data should be well-described so that it can be replicated or combined in different settings

C	A	R	E
Collective Benefit	**Authority to Control**	**Responsibility**	**Ethics**
Data ecosystems are designed and function in ways that enable Indigenous Peoples to derive benefit from the data	Indigenous Peoples' rights and interests in Indigenous data are recognized and their authority to control such data be empowered	Those working with Indigenous data have responsibility to share how those data are used to support Indigenous Peoples' self determination and collective benefit	Indigenous Peoples' rights and wellbeing are the primary concern at all stages of the data life cycle and across the data ecosystem

Source: The FAIR principles are promulgated by the GO FAIR Initiative. Click here to learn more.

Source: The "CARE Principles for Indigenous Data Governance" were developed by the Research Data Alliance International Indigenous Data Sovereignty Interest Group of the Global Indigenous Data Alliance. Click here to learn more.

KEY TACTIC 3.1

Listen to community members and partners

By fostering dialogue with local communities, STLT health departments can enhance understanding about the multiple and interconnected ways that climate threats impact residents and understand their perspectives on mitigation and adaptation solutions. Historically, community input has not always been central to climate science and action. However, assessments and processes that do not create space to learn about issues deemed most important by the affected groups will be less likely to succeed.[8] Both qualitative and quantitative data can capture the lived experiences and perspectives of groups disproportionately affected by climate threats. The insights and data gained from this Key Tactic will set the stage for informing, contextualizing, integrating, and interpreting data gathered later in the chapter. A base of community perspective provides a strong foundation for data storytelling. Regardless of capacity, STLT health departments should prioritize equitable engagement in Listen & Assess. This Key Tactic is a first step towards both procedural and structural equity.

This Key Tactic will answer questions such as:

- What are community perspectives on how climate change is affecting their lives? Their health?
- What are new or growing challenges that affect community members' daily lives?
- What are community members' priorities for community wellbeing?
- What are community-defined strengths and assets?

SOLUTION SPOTLIGHT

Alameda County, California

Often, populations at increased risk to the health impacts of climate change do not receive adequate communications about air quality alerts during wildfire smoke events. In 2020, Alameda County received a mini-grant from CDC via the National Association of County and City Health Officials (NACCHO). With this support, Alameda County engaged community stakeholders through focus groups to develop preferred methods of communication regarding air quality levels and protective action. Using this information, they aim to develop an informed governmental communication protocol to send smoke alerts and information to communities that are disadvantaged and those vulnerable to smoke impacts. Community members at higher risk will receive more prompt and relevant messages to take preventive actions, potentially reducing asthma attacks and other respiratory problems.[11]

This Key Tactic will generate local, place-based data that can be used on its own or to complement and contextualize quantitative data. In addition, community-generated perspectives may suggest or imply solutions and interventions that can be cataloged and revisited in Investigate Options. Bridging different types of knowledge systems opens space for valuable contributions that reflect different ways of understanding and solving problems. Finding ways to braid knowledge from different sources can enhance a system's capacity for collaborative relationships, trust building, exchange, and the generation of new ideas, insights, and solutions.[9,10]

Identify collaborators and cultivate trust

Partners with strong ties to communities are particularly important for credibility, making connections with community members and conducting data collection and analysis with community members. Consider a range of collaborators, including partners who are not directly focused on climate change but whose activities overlap with mitigation and adaptation.

Listening is hard work. It is not about educating, nor is it a singular, standalone activity. By design, it is an ongoing process that involves building trust over time. As described in Partner, community and partner engagement in BRACE involves setting up structures that generate trust and strong relationships.[12] Refer to the Spectrum of Community Engagement in Figure 2.c for potential approaches.

Work with community members and partners to co-design a transparent process. Particular attention should be directed to establishing community agreements around privacy, confidentiality, and ethical use of community data and knowledge. Be purposeful about reflecting on internal biases, assumptions, and agendas the health department team may bring. These mental models may inhibit active listening and receptivity to new information.

Select methods to listen to and learn from communities

There are many different approaches for engaging with and listening to communities; the most appropriate approach will depend on internal capacity, resources, community preferences, and relationships with partners. Consider using methods that can grow organizational capacity for all collaborators.[13] Some local communi-

SOLUTION SPOTLIGHT

California Department of Public Health (CDPH)

In the past decade, California experienced more frequent and intense heat events, wildfires and droughts, and reduced air quality that outpaced historic records. Aligned with BRACE, CDPH maintains web-based tools and resources for adaptation planning, including consultation and engagement, hazard, vulnerability, disease burden assessments, and strategies for implementation and evaluation. Some online resources include CDPH syndromic surveillance, the Climate Change and Health Vulnerability Indicators interactive data platform, and digital stories narrated by community residents about adverse social, economic, and health impacts from extreme heat events.[11]

ty-based organizations may be well positioned to coordinate the process to collect, analyze, and interpret data themselves. Consider the kinds of resources or training a health department can provide to expand partners' skills and capacities.

Resource 3.a provides examples that reflect varying levels of capacity and community engagement. A range of options, such as community forums, listening sessions, surveys, interviews, or participatory workshops can gather insights into the lived experiences of residents. When possible, provide multiple, varied opportunities for residents and partners to share their perspectives. Co-develop data collection tools, such as interview guides and surveys, with partners and be certain to include items that assess assets.

RESOURCE 3.a: Community Engaged Methods

Pay close attention to who is invited to participate. Ensure the inclusion of communities most impacted by climate threats. Whenever possible, provide childcare, transportation, and food. Work closely with partners to facilitate representation of individuals from different racial, ethnic, sex, gender identity, sexual orientation, socioeconomic, age, and ability status backgrounds. Also ensure representation from different neighborhoods and groups with different experiences related to climate impacts and fossil fuel pollution.

When budgeting for this engagement, plan for equitable compensation of community members' time and contributions.[14] Consult the Urban Institute's Equitable Compensation for Community Engagement Guidebook for guidance on models for compensating community participants.[15]

Plan for information exchange

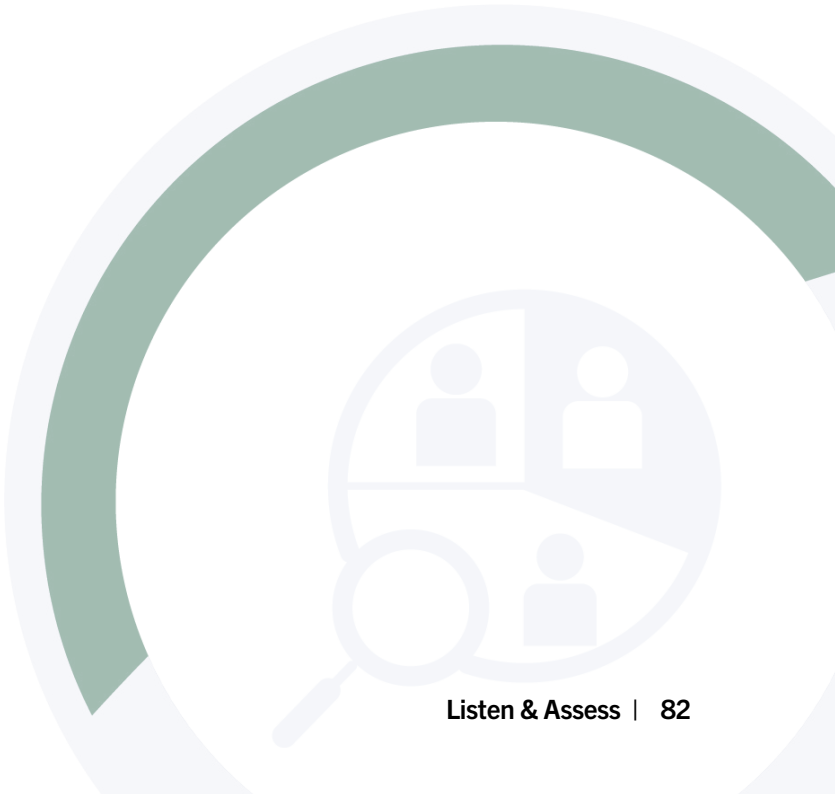
In some situations, it may be beneficial to the health department, community, and other interest holders to utilize events or other interactions with community members as an opportunity for knowledge exchange. The goal is to present avail-

able information that might interest and level set understandings on a climate and health-related topics of interest. Develop a plan that centers questions top of mind for communities. Information that could be shared with communities in this process might include health inequities, climate forecasts, critical infrastructure, and natural resources. Communities and partners may share information about places they value, social networks, cultural contexts, or access to health-promoting resources.

Conduct data "ground truthing"

After data has been collected, ground truth by sharing initial findings with communities and Tribes throughout the analytic process. Integrate their perspectives and work iteratively, rather than waiting for a full synthesis of a more formal assessment. Early, iterative information exchange can help determine what additional data is needed, and community co-design can improve the legitimacy and transparency of the final products. In instances where participants disagree with conclusions that have been drawn, more dialogue, additional data, or adjustments to interpretations may be needed.

> **The entities that tend to be in charge of collecting the data that generates the lists of vulnerabilities are likely flawed because** they tend to be local governments or entities that are not really on the ground and working with frontline communities. **It's a challenge to get frontline and Tribal voices in those spaces, let alone, in the driver's seat - shaping what kinds of questions are asked and being really involved** in the development of the reports that come out of those processes. The link between colonization and climate change is a hugely important topic to Tribes. And it's something that I've never really seen represented in reports on climate vulnerabilities.
>
> *- Community organization staff*



KEY TACTIC 3.2

Assess climate hazards, health impacts, and resilience

In this Key Tactic, systematically gather information to characterize climate-related exposures and identify which groups are most impacted. Several example methods are referenced in this Key Tactic, and more complete descriptions of visualization, mapping and spatial analysis, indices, profiles, and matrices are provided in Sub-tactic 2.4. Some example methods are distilled in Resource 3.b.

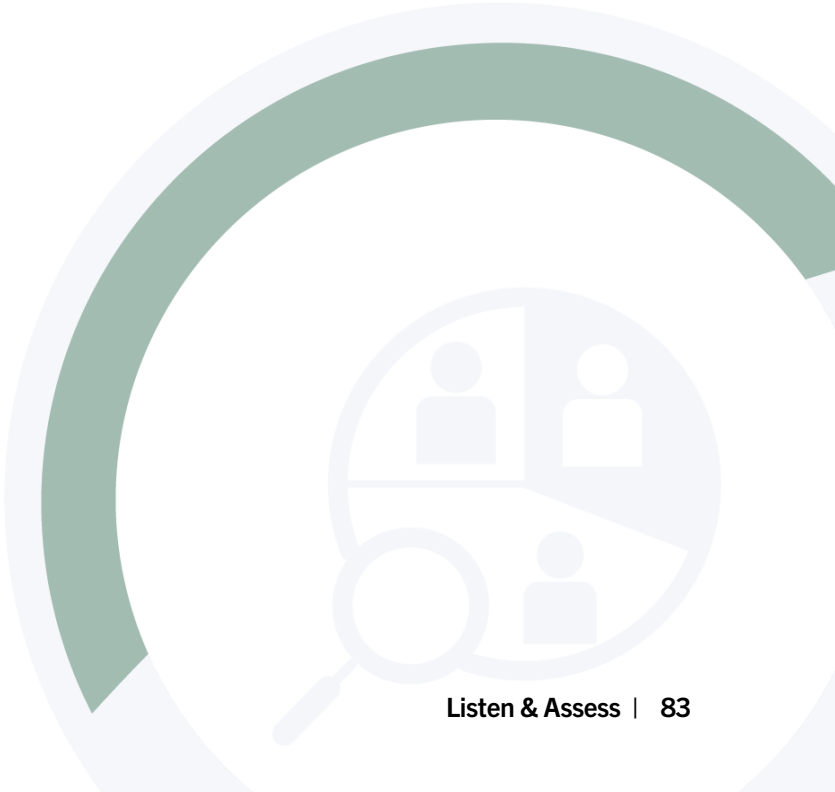
RESOURCE 3.b: Methods for Key Tactic 3.2: Options for Low, Medium, and High Capacity Programs.

Before embarking on data collection efforts, consider whether the data needed to answer the suggested guiding questions is already available. Many climate and health-relevant national datasets scaled to the community level are accessible at no cost. Additionally, in some larger cities, other departments or entities as utility companies may have data relevant to adaptive capacity, critical infrastructure, and natural resources. Resource 3.c provides a listing of many existing databases with climate and health-related data.

RESOURCE 3.c: How to Use Climate and Health Data & Selected Resources

Considerations

Climate vulnerability and resilience assessments enable data-informed approaches to design and advance public health climate action.[16] These assessments allow health departments to understand the people and places more susceptible to climate change related health impacts. These can be formal written reports for technical audiences or informal compilations of data.



The focus of this Key Tactic is on current and future climate hazards and vulnerability. Findings from this Key Tactic will often support discussions of solutions.

Sub-Tactic 3.2.1: Identify relevant climate hazards affecting your community

This Sub-Tactic will answer questions such as:

- What are the climate trends affecting the jurisdiction?
- How is climate change impacting health outcomes now?
- How will climate change impact health outcomes in the future?
- What communities are experiencing disproportionate climate-sensitive negative health outcomes?
- Where are the communities who are experiencing climate-sensitive negative health outcomes or are most likely to experience these?

Establish the relevant climate hazards and their scale of impacts

Start by identifying the current climate hazards in your jurisdiction. Hazards may be shocks—or acute events that can overwhelm, damage, or destroy infrastructure, such as hurricanes—or chronic stressors that stress jurisdictional services—such as extended heat seasons, increased pollen and other aeroallergens, or high tide flooding. Alternatively, hazards may be slow onset, such as changing seasonal temperatures that allow vectors to reproduce at higher rates, expanding the geographic distribution and season for vector-borne diseases.

When identifying locally relevant hazards, consider what hazards have occurred in the past and are projected to emerge or increase in the near- to medium-term future. Draw on local knowledge, historical records, online databases, media, and newspaper archives to identify extreme weather events or changing conditions.

Remember the potential for cascading events, where one event triggers a chain reaction of subsequent events. For example, a severe drought and extreme heat can lead to wildfires that decrease air quality. Also consider compound events where multiple co-occurring climate or environmental events have a greater impact than would any of the events individually.

ORDERING OF TACTICS

Key Tactic 3.3 focuses specifically on how to identify climate mitigation opportunities, because the same sources of climate change also contribute to health and climate resilience inequities. These tactics are meant to be flexible and iterative; combine Key Tactics 3.2 and 3.3, do them in parallel, or work through them sequentially, as appropriate for your setting.

FIGURE 3.b: Climate Hazards and Non-Climate Stressors

	CLIMATE STRESSORS	NON-CLIMATE STRESSORS	GENERAL NON-CLIMATE STRESSORS
Tidal flooding	• Sea level rise • Heavy precipitation	• Aging infrastructure • Development and impervious surfaces • Toxins in soil and groundwater	• Inflation • Economic shocks • Increasing crime • Population displacement • Population growth • Poor governance • Pollution • Poor housing quality
Storm surge	• Sea level rise • Storms	• Aging infrastructure • Development and impervious surfaces	
Floodplain inundation	• Sea level rise • Rainfall frequency and intensity	• Aging infrastructure • Development and impervious surfaces	
Extreme heat	• Temperature variability	• Development and impervious surfaces	
Wildfire	• Drought • Temperature variability	• Human caused ignitions • Historic fire suppression • Development in wildland-urban interface	
Landslides	• Rainfall frequency and intensity • High temperatures • Snowstorms	• Development and removal of vegetation	

Adapted from NOAA's "Implementing the Steps to Resilience: A Practitioner's Guide". Click here to learn more.

Non-climate stressors should also be considered because they directly affect health and wellbeing. In some cases, these stressors overshadow or exacerbate the impact of climate stressors. Figure 3.a. identifies Climate Hazards and Non-climate Stressors.

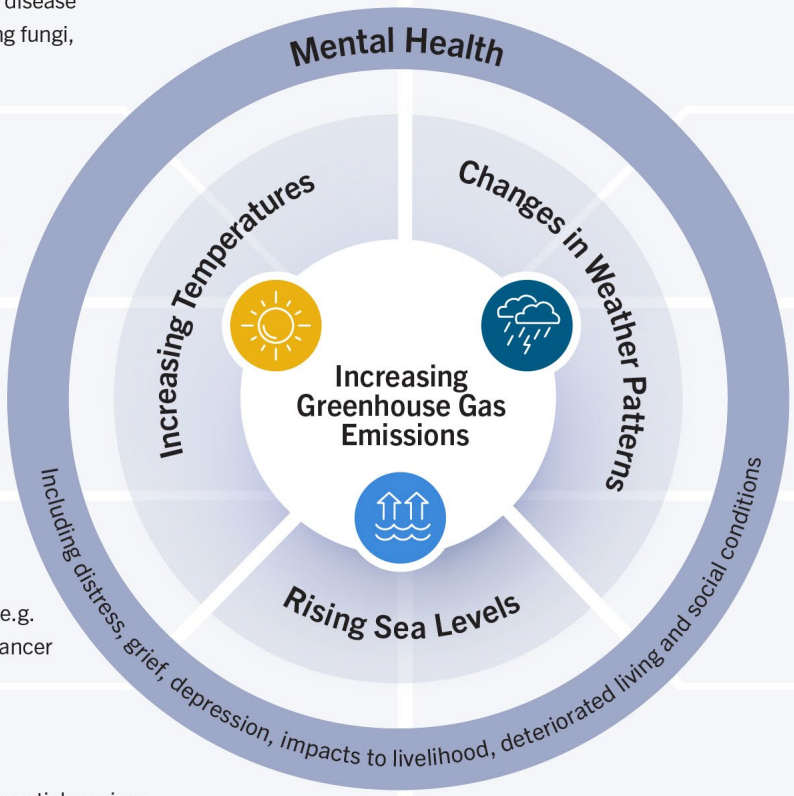
In most cases, the process of identifying climate hazards does not need to entail precise quantitative modeling. There are many existing data sources, for more information refer to the BRACE How To Guide. Other helpful resources are the Fifth National Climate Assessment (NCA5) Atlas and CDC's Environmental Tracking Network's data explorer. In addition, the Regional chapters of the National Climate Assessment can help identify relevant hazards and trends. The Assessment's National Topics chapters, such as Water, Land, Ecosystems, and Built Environment will also deepen understanding of climate change fundamentals.

Establish how health pathways are being or will be impacted

Climate hazards can result in a range of health harms. The pathways through which climate-related exposures affect human health can be direct or indirect and are illustrated in Figure 3.c.

- **Direct impacts:** Immediate health harms resulting from exposure to an acute or chronic climate hazard. These can result from changes in temperature and precipitation, heatwaves, wildfires, floods, and droughts. Examples include increases in cardiovascular mortality or chronic kidney disease during heatwaves, road fatalities during extreme weather, or fatalities and multiple negative health consequences from wildfire smoke inhalation.
- **Indirect impacts:** Harms that are mediated through changes in natural, social, or economic systems and may occur over a longer time span. These may be triggered by climate change-induced environmental and ecosystem alterations, such as crop failures or geographic range expansion of disease vectors.[17] Increased mosquito-borne disease transmission, like Dengue Fever or Chikungunya, can be an indirect climate impact on health due to ecological alterations resulting from temperature and precipitation changes. Increased pollen production and lengthening of the pollen season can lead to increased allergic respiratory illness.[16,18]

FIGURE 3.c: Climate Change Impacts on Health



Heat
Heat-related illness and death, Cardiovascular disease and failure, Changes in specific disease-causing fungi, Skin cancer

Wildfire and Smoke
Cardiovascular disease, Respiratory disease (e.g. asthma and COPD), Injuries, Lung cancer

Drought and Dust Storms
Malnutrition, Water supply impacts, Valley fever, Respiratory disease

Air Pollution and Seasonal Allergens
Cardiovascular disease, Respiratory diseases (e.g. asthma and COPD), Seasonal allergies, Lung cancer

Health Systems and Services
Disruption in access to care, treatment, and essential services

Vector-Borne and Zoonotic Diseases
Lyme disease, West Nile virus disease, Dengue, Malaria, Rabies, Hantavirus

Severe Weather and Floods
Injuries, Mold exposure, Carbon monoxide poisoning, Waterborne diseases, Lung, skin, head and neck cancer

Water Quality and Availability
Diarrheal diseases, Acute respiratory infections, Skin and soft tissue infections, Harmful algal blooms, Cancer

Food Supply and Quality
Malnutrition, Foodborne illness, Gastrointestinal outbreaks, Reduced food availability, Cancer

Environmental Degradation
Food system disruptions, Civil conflict, Forced migration, Job loss

Consider mental health as well as physical health impacts. According to the NCA5, "mental health conditions including anxiety, depression, and suicide have become more prevalent in the U.S. in the past decade, especially among adolescents. Climate change may increase these mental health burdens, particularly among adolescents."[19,20] Mental health impacts include post-disaster stressors[21] as well as pre-traumatic stress, increased suicide and interpersonal violence, anticipatory grief, and solastalgia, the emotional distress or sense of loss people experience due to environmental degradation of their home regions.[19,22,23]

Consult the National Climate Assessment Human Health chapter to understand the range of health outcomes sensitive to climate change. The Tribes and Indigenous Peoples chapter also describes how climate change affects the livelihood, health and cultural practices of Indigenous peoples.[24] CDC's report on the regional health impacts of climate change can provide a general overview of region specific climate-sensitive health outcomes.

Figure 3.d provides a snapshot of several important pathways affecting many U.S. communities today and exemplifies the importance of considering drivers, exposures, and health outcomes in sequential pathways.

It may be helpful to generate more contextualized pictures of climate drivers and non-climate stressors affecting a particular community. Health impact pathway diagrams, like the examples in Figure 3.e, are visual representations that show the relationships between identified hazards and health impacts for specific populations in a given location. These can be done simply or by depicting more complex interrelationships.[25]

In most cases, the evidence base exists to establish relationships between drivers, exposures, and outcomes, relieving public health agencies from the need to measure and predict specific health outcomes resulting from changing climate hazards. However, in some cases, it may be useful to document the negative health outcomes already occurring because of exposure to increasing climate hazards. In these cases, conduct analyses with existing data (e.g., syndromic surveillance data) to document trends. Collect new data, as needed and feasible. More advanced analyses, including detection and attribution studies[26], may be conducted with partners who have biostatistics and data science capacity.[27–29]

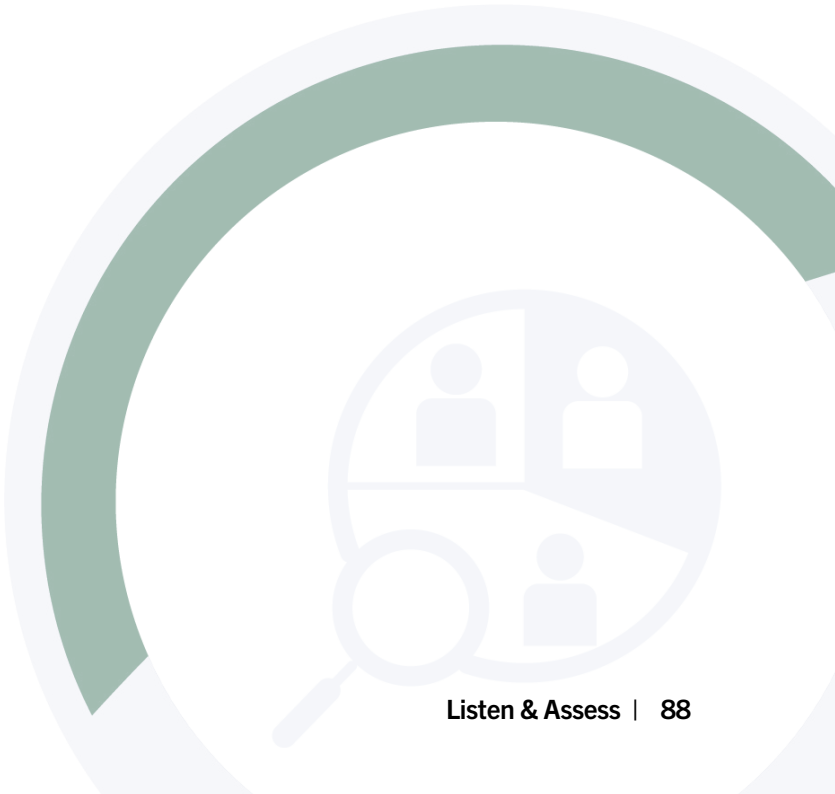


FIGURE 3.d: Examples of Climate Drivers, Exposures and Health Outcomes

	CLIMATE DRIVER	EXPOSURE	HEALTH OUTCOME	SUMMARY
Extreme Heat	**More frequent, severe, prolonged heat events**	Elevated temperatures	Heat-related deaths and illness	Rising temperatures are leading to an increase in heat-related deaths and illnesses.
Outdoor Air Quality	**Increasing temperatures and changing precipitation patterns**	Worsened air quality (ozone, particulate matters, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperature and wildfires and decreasing precipitation are leading to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
Flooding	**Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events**	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illnesses	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events.
Vector-Borne Infection (Ex. Lyme disease)	**Changes in temperature extremes and seasonal weather patterns**	Earlier and geographically expanded tick activity	Lyme disease	Ticks are showing earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme disease-causing bacteria.
Water-related Infection (Ex. *Vibrio vulnificus*)	**Rising sea surface temperature, changes in precipitation and runoff affecting coastal salinity**	Recreational water or shell contaminated with *Vibrio vulnificus*	*Vibrio vulnificus* induced diarrhea and intestinal illness, wound and bloodstream infections, death	Increases in water temperatures are altering timing and locations of *Vibrio vulnificus* growth, increasing exposure and risk of water-borne illness.
Food-Related Infection (Ex. *Salmonella*)	**Increases in temperature, humidity, and season length**	Increased growth of pathogens, seasonal shifts in incidence of *Salmonella* exposure	*Salmonella* infection, gastrointestinal outbreaks	Rising temperatures increase *Salmonella* prevalence in food; longer seasons and warming winters increase risk of exposure and infection.
Mental Health and Well-Being	**Climate change impacts, especially extreme weather**	Exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Exposure to climate or weather-related disasters causes or exacerbates stress and mental health consequences.

Source: Developed by the U.S. Global Change Research Program's "The Impact of Climate Change on Human Health in the United States: A Scientific Assessment". Click here to learn more.

It may also be helpful to consult the following two resources:

- CDC's National Environmental Public Health Tracking Network integrates health, exposure, and hazard information to identify health impacts to determine local climate and health relationships.
- NIH's Climate Change and Human Health Literature Portal is an integrated, curated bibliographic database of global peer-reviewed research and gray literature on the science of climate impacts on human health.

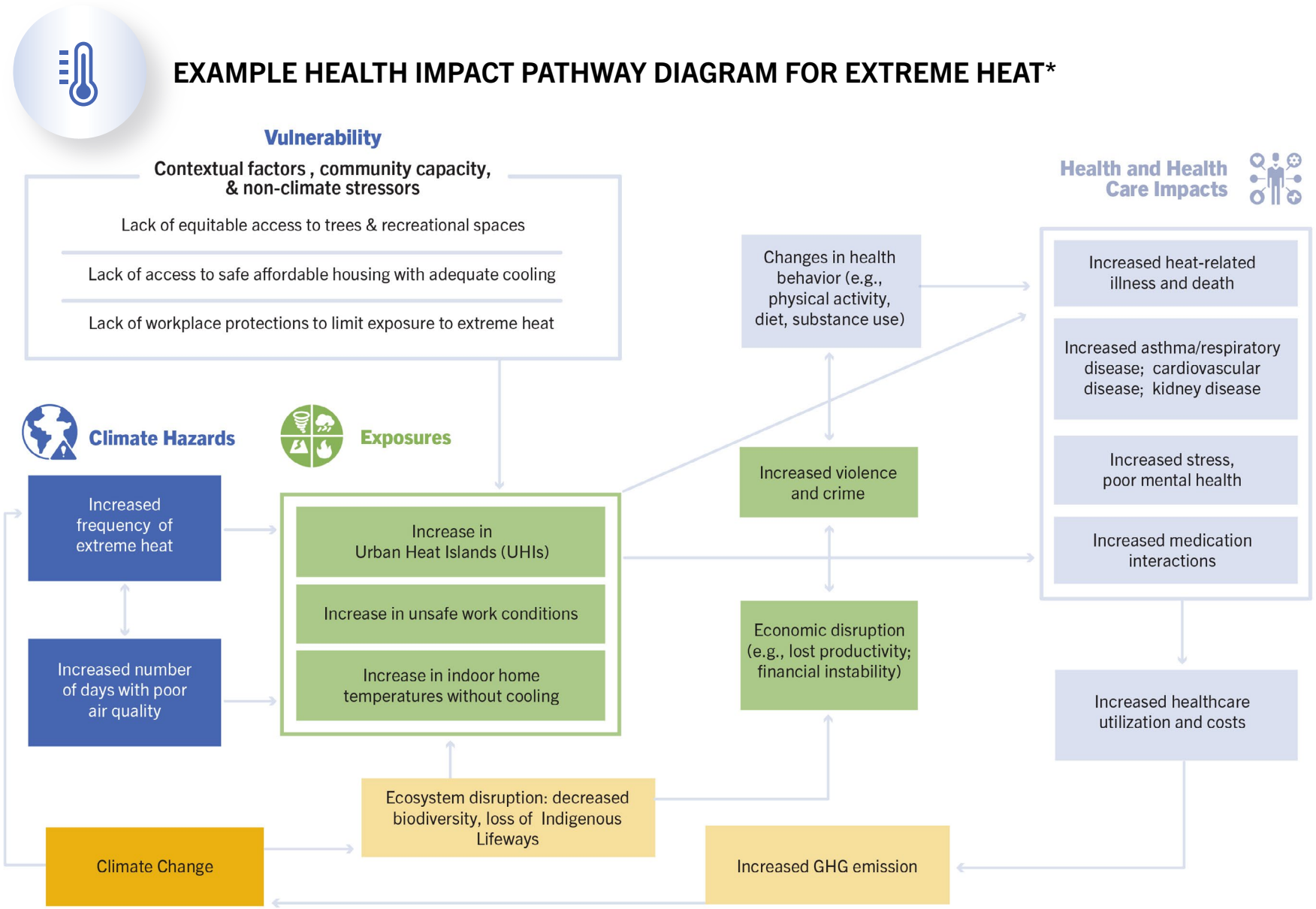
When time, resources, and capacity do not allow for more complex approaches, use simpler qualitative methods to delineate climate hazards, trends, and observed or potential health impacts from the sources above. A practitioner could use a simple table format to document locally relevant hazards to health. These types of simpler approaches can catalog direct and indirect impact scenarios. Worksheet 3.a links several climate hazards with health outcomes.

WORKSHEET 3.a: Linking Local Climate Hazards and Health Outcomes

As in prior tactics, community input is key for interpretation and insight generation. Communities and Tribes may define and prioritize health impacts differently. Consider priority outputs that emerged when engaging community perspectives that may not be reflected in existing national or regional data sources.

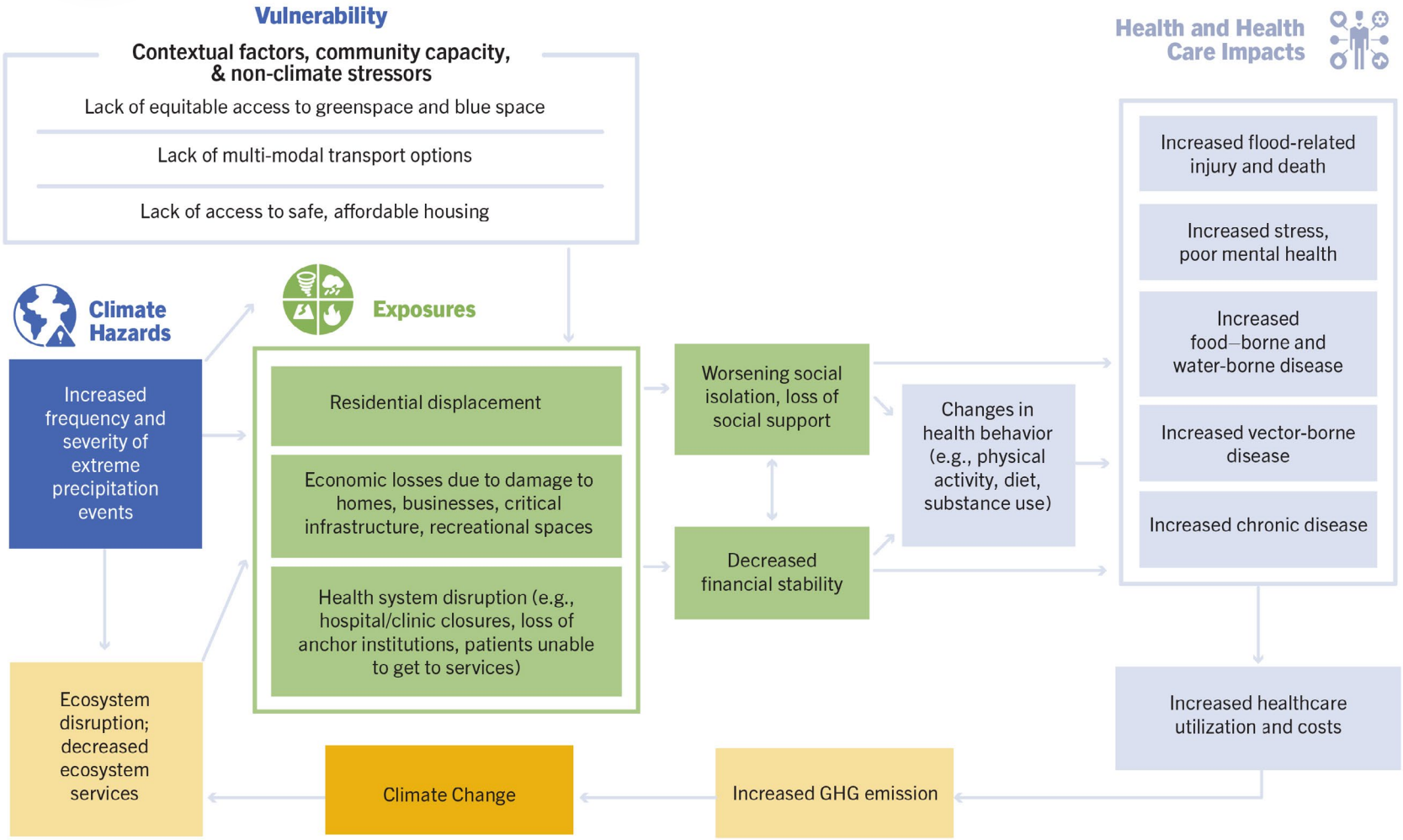
> **There's an opportunity to really look at extreme heat, which kills more people than any other climate-related event,** but tends not to show up when we talk about major events because heat doesn't have the level of property damage that a tornado or a hurricane does. So, there are some opportunities around working with healthcare partners to activate early warning systems for extreme heat to actually utilize systems like health information exchange, continuity-of-care documents from hospitals and health systems, as well as admission, discharge, transfer documents, to start painting a picture of morbidity as it pertains to issues that are exacerbated by extreme heat.
>
> *- National organization staff*

FIGURE 3.e: Example visual depictions of health impact pathway diagrams



**This diagram is intended as a hypothetical example of how extreme heat may impact health in a given community and not a comprehensive depiction of how heat impacts health.*

EXAMPLE HEALTH IMPACT PATHWAY DIAGRAM FOR FLOODING*



*This diagram is intended as a hypothetical example of how flooding may impact health in a given community and not a comprehensive depiction of pathways of how flooding impacts health.

A NOTE ABOUT RISK

In some cases, it may be helpful to consider risk, which adds a distinct understanding that complements vulnerability analysis. Risk is the combination of probability of the hazard occurring and the magnitude of impact. Risk can be expressed as: Risk = Hazard Probability x Magnitude of Impact.

Probability is often determined using the annualized likelihood of the hazard occurring. **Magnitude** relates to the degree of seriousness or significance if an event were to occur.

An event may have low probability within a given time frame, but it could have a high magnitude of impact, such as a multi-day blackout caused by a heat wave. Conversely, an event may have high probability, but relatively low direct impact to human health, such as sunny day flooding in low-lying neighborhoods.

Risk can be assessed quantitatively, qualitatively, or using a mixed-methods approach.

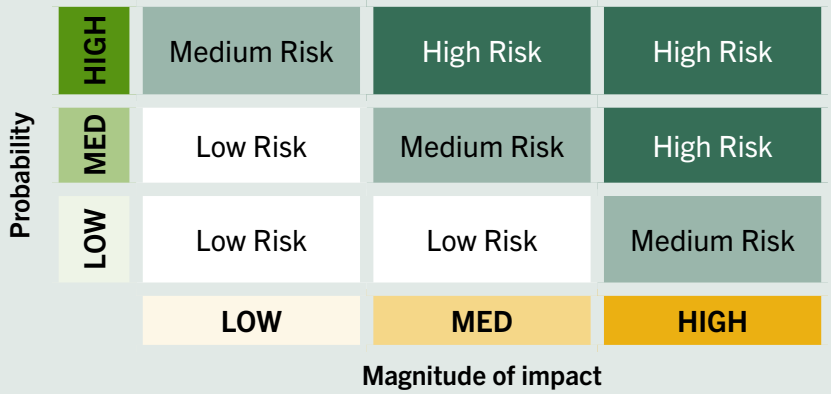
An example of a quantitative approach to heat risk is reflected in New Hampshire's climate risk assessment. For each hazard—heat, precipitation, drought, flooding, and fire—a team analyzed the modeled frequency and severity of extreme events, in the past and through 2050, to create a 1-100 rating relative to the data coverage area.[30]

However, it is often not necessary or advisable for public health agencies to conduct quantitative assessments of health risk in the climate context, as this kind of analysis may exceed typical capacity.

To qualitatively assess risk, practitioners can examine historic occurrences of the hazard for the area and climate projections that assess the frequency or severity of the hazard over time. After action reports, previous hazard-related plans, media, or anecdotal information can help identify the potential magnitude of risk in a given jurisdiction. Academic partners can also be helpful; a mixed-methods example can be found in Kirshen et al, 2023.[31]

Understanding risk conceptually as an input to prioritize health-related climate hazards may be a useful exercise. For example, it may be helpful to **plot hazard-health impact pairs into** a matrix similar to Figure 3.f below. Existing quantitative thresholds can be used to guide classification, but this will not always be possible. It can be useful for teams to set guideposts for classification a priori.

FIGURE 3.f: Classification of risk.



Source: Developed by Fernleaf for NOAA's "Implementing the Steps to Resilience: A Practitioner's Guide". Click here to learn more.

Sub-Tactic 3.2.2: Identify which communities are most impacted by climate hazards and why

This Sub-Tactic will answer questions such as:

- What groups are most exposed to climate hazards?
- What groups have higher sensitivity, for example disproportionately burdened by poor baseline health or have other characteristics that make them more sensitive to climate change?
- What groups experience less adaptive capacity?
- How and where do these groups overlap? What groups are more exposed, which groups are more sensitive, and which have the least adaptive capacity?

Identify groups that are most exposed to climate hazards

Exposure is contact between a person and one or more climate change-related hazards, such as heat waves, extreme cold, wildfires, or floods. Exposure may be driven by where people live, work, play, pray, or study. Spatial patterns of unequal exposure to climate threats are often the product of differential access to resources, structural barriers, social inequities, and power dynamics.

An example of how groups are disproportionately exposed to climate hazards can be found in urban heat islands (UHIs). An EPA review found that in the U.S., the UHI effect can result in daytime temperatures that are 1–7°F higher than temperatures in outlying areas and nighttime temperatures about 2–5°F higher.[32] However, afternoon temperature differences can reach up to 15°F to 20°F in some areas.[33]

It has been well established that people with low incomes and people from racial and ethnic minority groups are disproportionately exposed to heat islands.[32,34–36] These disparities persist due to legacies of redlining, discriminatory practices in which certain neighborhoods, often based on racial factors, were designated as high-risk areas for investment by financial institutions. Redlining was federal policy during the mid-20th century and has had lasting effects on urban development. Neighborhoods that were formerly redlined have fewer green spaces, parks, and tree canopy coverage compared to non-redlined areas, contributing to the formation of UHIs.[37,38] These patterns have also been found in association with flooding.[39,40]

ROOT CAUSES OF CLIMATE VULNERABILITY AND CLIMATE INEQUITY

Climate vulnerability is influenced by three primary factors: exposure to climate hazards, sensitivity to adverse impacts of climate change, and capacity to adapt to these factors. People and communities with higher exposure, higher sensitivity, and lower capacity experience the most climate vulnerability.

A root cause of climate vulnerability is climate change, primarily caused by extraction and combustion of fossil fuels. Another perspective on root causes of climate change vulnerability focuses on procedural, structural, and distributive inequities. Differences in health and wellbeing outcomes can be observed across various demographic factors, including race, ethnicity, socioeconomic status, age, and other individual characteristics. These disparities often reflect and are reinforced by the uneven distribution of resources and opportunities within communities. These populations, often under-resourced and overburdened, are thus impacted disproportionately by climate change.[19]

Differences in social, economic, political power, and resources are intersectional, interacting in complex ways to exacerbate climate vulnerability. And climate change can act as a threat multiplier by intensifying existing challenges such as food insecurity, infrastructure vulnerabilities, and other public health risks.[41,42] Differences in climate vulnerability may also relate to historic settlement patterns or different cultural preferences and practices.

Keep these factors in mind when pursuing a deeper understanding of the root causes of vulnerability.

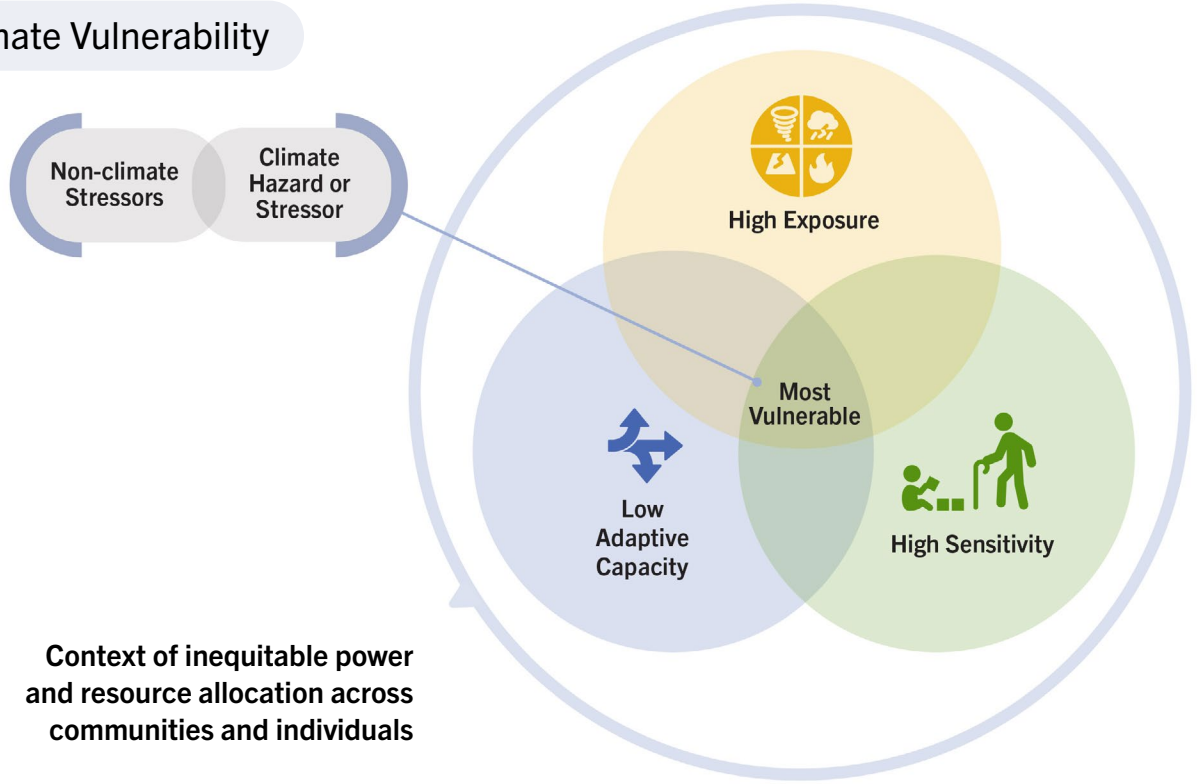
Identify groups who are most sensitive to the local climate hazard exposures

Some groups and communities are more sensitive to climate hazard exposures than others. Sensitivity is the degree to which people are negatively affected by climate hazards if exposed. For example, populations with pre-existing medical conditions, such as asthma, are more likely to have poor outcomes when exposed to poor air quality associated with climate change. Because of their developing airways, children who breathe in wildfire smoke are more likely to be affected than adults. People taking certain medications for chronic health conditions, such as epilepsy, heart disease, depression, and schizophrenia, may similarly be more sensitive to heat because the medications can affect thermoregulation.[43] A community with a high proportion of more sensitive residents may be particularly vulnerable to heat and extreme weather events like floods.

For Indigenous communities, the destruction of culturally significant places, plants, animals, and resources disrupts intergenerational sharing of knowledge, threatening traditions, livelihoods, and lifeways which puts mental and spiritual health at risk.[19,44,45] Every Indigenous community is unique and culturally significant effects must be determined on a Tribe-by-Tribe basis.

As with exposure, sensitivity often reflects unequal access to baseline health and wellbeing due to structural inequalities in power and resource distribution. For example, communities near industrial sites may be overburdened by exposure to poor air quality that causes chronic disease and respiratory disease, leading to greater sensitivity to wildfire

FIGURE 3.g: Dimensions of Climate Vulnerability



Exposure is contact between people and one or more climate change-related hazards, such as heat waves, wildfires, or floods. **Sensitivity** is the degree to which people are negatively affected by climate hazards if exposed. **Adaptive capacity** is the ability of people to adjust to potential hazards, take advantage of opportunities, or respond to the consequences of climate hazards. These concepts can be applied at the individual or community level.

smoke. Diabetes disproportionately impacts Black and Latino persons.[46] Researchers have pointed to a history of nonconsensual medical and research experimentation on vulnerable groups, especially African Americans.[47,48] Along with implicit bias, these have contributed to residual health care provider biases toward minority patients and patient distrust of medical systems,[47,49–51] resulting in substandard medical care.[52–54] The harms of these disparities are worsened by extreme heat. Several studies suggest an association between heat waves and a greater number of ED visits and hospitalizations of people with diabetes.[55–57]

Identify which groups have lower capacities to adapt to local climate hazard exposures

Adaptive capacity refers to the ability of people, communities, systems and institutions to adjust to potential hazards, take advantage of opportunities, or respond to the consequences of climate change. In communities, this is often directly related to the material or social resources that can be drawn upon to avoid or lessen negative impacts.

As with sensitivity and exposure, adaptive capacity often reflects unequal access to resources, structural inequalities, and power dynamics. Some communities recover more quickly than others from disasters such as hurricanes or floods.[58–60] It is important to distinguish lack of resources from unequal distribution of available resources, both of which are critical.[61–64] Lack of resources results in low capacity to address climate-related impacts. This often results from people's inability to control their daily life, choose where they live, and how and where they earn a paycheck.[61,64] People with fewer resources may be less prepared for disasters.[65] Many preparedness actions, such as buying flood insurance, having savings to draw from in emergencies, or having transportation out of the affected area, are unaffordable for people experiencing poverty.[65,66] There is also evidence of structural inequities in post-disaster recovery aid.[67–69] For example, homeowners often receive aid while renters do not, and homeowners with higher incomes receive disproportionately more aid than homeowners with lower incomes.[70] There are also practical barriers to receiving housing and other types of aid faced by people with lower incomes. Barriers include complicated eligibility systems, lack of translation or interpreters, and challenges getting to and from disaster assistance centers.[65,71] For those with low capacity to adapt, undergoing one climate disaster can further undermine capacity to cope with the next one.

> "Focusing on climate impact is a good piece of information and it's one piece of information, but there should be a lot of other stuff that's taken into account. So, not just accessing climate impacts and vulnerabilities, but also asking what's the state of your affordable housing? What's the state of your public transportation? What is your employment level? What's your median income? **All of those things that are indicators of living conditions and health equity are also really, really important at this stage because it sets your planning team up for starting upstream.**"
>
> *- National organization staff*

Sub-Tactic 3.2.3: Consider existing community strengths and assets

This Sub-Tactic will answer questions such as:

- What are the community assets and strengths that protect against negative health impacts?
- How can these assets be leveraged to help address the impacts of climate change?
- Who has access to these community assets?
- To what extent do these assets offset other climate vulnerabilities?

Adopt an asset-based mindset

Using an asset-based approach aims to identify and use existing community assets and strengths to enable its members to have more control over their health and wellbeing. This approach aims to value connections and potential within a community rather than simply responding to problems and needs. It often entails reframing assessments to identify and incorporate assets.[72] Questions asked should center aspirations, motivations, and relationships rather than only challenges and problems. Recognizing assets suggests that inquiry should invite assessment and discussion about what makes the community unique, strong, and resilient rather than simply focusing on what makes it vulnerable. Strong community and partner relationships, social ties, and civic engagement are types of assets, and these can be nourished by the approaches described in Partner and other community-engaged methods. Taking an asset-based approach can simultaneously build adaptive capacity. Figure 3.h lists several potential assets and vulnerabilities that correspond with the Vital Conditions.

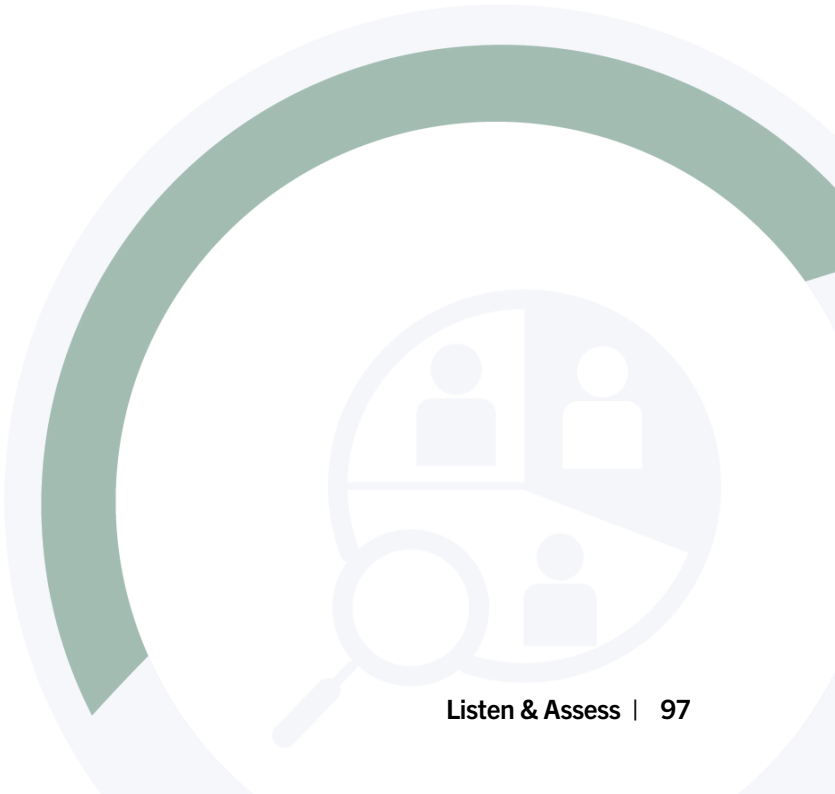


FIGURE 3.h: Potential Assets and Vulnerabilities by Vital Conditions

POTENTIAL ASSETS AND VULNERABILITIES ACROSS THE SEVEN VITAL CONDITIONS

This table can help generate ideas about what factors may be assets or vulnerabilities in a given community. These factors may be dynamic and could be assets in some communities or vulnerabilities in others. The table sorts the factors in potential assets or vulnerabilities, but this may not be applicable in all settings.

	Humane Housing	Belonging & Civic Muscle	Basic Needs for Health & Safety	Reliable Transportation	Meaningful Work	Lifelong Learning	Thriving Natural World
Potential Assets	• Home ownership • Resident-owned communities (ROCs) • Homeowners and renters insurance • Property value • Living conditions • Flood proofing • Domestic violence shelters • Shelters for LGBTQ+ youth and adults	• Civic participation • Social connectedness • Adaptive governance • Citizenship • Nationality • Voting access • Representation in Congress • Marital status	• Hospitals and health care centers • Recreational amenities • Domestic abuse support and hotline • Substance abuse treatment • Emergency response • Health insurance • Doctors and nurses per capita • Supermarket availability • Community gardens • Waste management	• Vehicle ownership/ access • Public transportation • Active transportation options • Evacuation routes	• Employment status • Occupation • Net worth • Educational level • Earning potential • Job opportunities • Community GDP per capita • Two parent household	• Educational attainment • High school graduation rates • Public schools • Libraries	• Air quality • Clean water • Access to green space • Access to blue space • Access to forests/ tree equity • Access to nature-based solutions (e.g, green infrastructure, rain gardens, regenerative agriculture, living shorelines)
Potential Vulnerabilities	• Homelessness • Flammability of housing materials • Value quality and density of residential construction	• Legal immigration status • Voting restrictions • Non-English speaking households	• Disability status • Crime • Food costs	• Traffic density • Suburban sprawl	• Criminal record • One parent household		• Lack of running water • Industrial production or pollution sources

Source: Adapted from NOAA's "Centering Equity in Climate Resilience Planning and Action". Click here to learn more.

LANGUAGE AND COMMUNICATION CONSIDERATIONS

The term "vulnerability" has a specific meaning in the context of climate. Maintain conceptual clarity and specifically use the term only when it applies and helps clarify meaning related to climate threats and climate action. Be specific about which climate vulnerability factor (i.e., exposure, sensitivity, or ability to adapt) is the focus of discussion or measurement.

It is contrary to asset framing to simply label communities as "vulnerable." Exclusively emphasizing vulnerability can fail to inspire collaboration, inspiration, and motivation and may signal stereotypical attitudes about the lived experience of community members. When compiling and disseminating community data via a comprehensive report or presentation, carefully consider the title. Would titles such as "vulnerability and resilience assessment" or "resilience assessment" provide a more balanced framing than "vulnerability assessment"?

When referring to a specific community, refer to them by name, including correct pronunciation, population group, and location. When in doubt, ask community members how they prefer to be described or referred to. It may be more complicated to identify correct terminology when describing communities across a wider area, but try to describe the community in neutral or self-selected terms. Use person-first or community-first language, such as "neighborhood that is disproportionately affected," rather than "disproportionately affected neighborhood." Utilize the CDC's Health Equity Guide for Inclusive Communication as a reference when selecting terminology.[82]

Select and implement appropriate methods

There are no universal methods for identifying or incorporating assets, and approaches can range in terms of complexity and formality. Asset-based approaches are context specific and emphasize people and relationships in a place and time.[73] Assessing community assets should be done in collaboration with community partners and members. Community assets can be identified through qualitative methods, such as listening sessions, focus groups, ArcGIS StoryMaps, PhotoVoice, and storytelling.[74–78] Community engaged methods, in Resource 3.b, may also be used to document assets that people feel are important to them, with assurances of confidentiality and protection for culturally sensitive information.

Maps and models can show how climate change may affect community assets, infrastructure, built environments, and natural environments that people depend on and care about.[79,80] Many state and municipal governments have Geographic Information Systems (GIS) data that documents these assets, which may be available upon request. Publicly available data sources such as the Environmental Defense Fund's Climate Vulnerability Index and CDC's PLACES dataset provide

basic asset-related data such as the number of volunteer and civic organizations in a jurisdiction. Ripple effect mapping[81] can be another way to illustrate how parts of a system, including a community's assets and strengths, are linked.

Sub-Tactic 3.2.4: Establish an integrated understanding of vulnerability and resilience

The data generated in this Sub-Tactic will answer questions such as:

- Considering all of the data amassed about hazards, climate sensitive health outcomes, vulnerability, and assets, which communities or populations are most harmed by climate change?
- What are the upstream and downstream drivers of these harms?
- How do community perspectives align or contrast with other kinds of data?

Select appropriate methods

After compiling and collecting data in Sub-Tactics 3.2.1-3.2.3, the next step is to integrate data sources. The methods described below are different ways climate hazards, exposure, sensitivity, adaptive capacity, and assets data can be considered or analyzed simultaneously to paint a more comprehensive and integrated picture of local climate vulnerability and resilience. Each method can be performed with a range of technical requirements allowing STLT health departments at different capacity levels to identify the most suitable approach. Each of the approaches can result in visual representations of data that can be used to help tell a data story.

Participatory Diagrams

Visualizing the relationships between climate drivers, moderating, and mediating factors, and health outcomes can be a helpful way to refine and deepen understanding of climate vulnerability. These elements exist within a complex socio-ecological system and everyone carries assumptions and mental models that influence their perspectives on how the system works. Systems thinking strategies can help move beyond assumptions to understand the complexity in a way that better reflects reality. Ultimately, this approach can also inform the implementation of

> "There's going to be a whole list of potential health impacts. **But the communities themselves can give you priorities.** If you know those to start, just focus on those instead of spending a ton of time going all the way down the list."
>
> *- Tribal government staff*

policies and programs across a variety of disciplines, settings, and institutional arenas—which will be the focus of subsequent BRACE elements.

A "rich picture" is an example of a visual diagramming method that can be used to tease out and illustrate the complexity of climate vulnerability.[83] Rich pictures are drawings that represent elements, relationships, emotions, and interactions using mostly symbols and few words. They can be simple or complex. Using a visual method can help participants reveal knowledge they would not have otherwise shared and make assumptions explicit.[84] Resource 3.d includes more guidance on systems thinking and steps for developing a rich picture.

RESOURCE 3.d: Systems Thinking Overview and Key Methods for BRACE

More than likely, the process of creating rich pictures and the understanding that follows will help participants build consensus about concerns related to vulnerability. The outputs can be shared with interest holders to verify whether the perspective a team has about the harms and risks faced in a community reflects common understandings and quantitative data. Rich pictures can also be a starting point for other systems mapping tools relevant to identifying interventions in Investigate Options. The visual output can be considered a living document, evolving as circumstances and perspectives change.

Mapping and Spatial Analysis

GIS and spatial techniques can be used to produce maps that overlay climate, health, vulnerability, and resilience indicators along with infrastructure and facilities at risk.[85] These maps are useful tools for assessing and communicating the spatial nature of vulnerability, including changes over time. Maps can rely on a variety of inputs, ranging from qualitative interest holder knowledge to quantitative GIS analytics. They can be used as a communications tool during interest holder consultations, during the technical assessment itself, or to explain the assessment results, especially as a visual element of a data story. Two GIS-based approaches include overlay analyses of multiple characteristics and spatial ecologic studies, sometimes referred to as 'hotspot' analysis. This approach requires locational information (e.g., latitude, longitude) where people are potentially exposed to hazards.[76]

An overlay analysis combines multiple layers of risk factors to spatially define and assess potential vulnerabilities to climate change. An example of overlay analysis for flood hazards in New Hampshire can be found in Resource 3.e.

RESOURCE 3.e: Using Maps to Visualize Vulnerability and Assets for Flooding Exposure in the Hampton-Seabrook Estuary

A spatial ecologic study can build upon overlay analysis by establishing exposure and vulnerability characteristics associated with a health outcome.

Other maps can be less technical. Hand-drawn maps, developed in group settings, can be useful for gathering input for participatory assessments. Participants may find it helpful to draw places they care about on paper maps, using markers or sticky notes. This process can stimulate rich dialogue and support other analyses.

Seek assistance from epidemiologists, statisticians, data scientists, GIS specialists, and qualitative analysts as needed. Inevitably challenges will arise; a common example is small sample sizes. Consider using Small Area Analysis, otherwise known as Small Area Estimation, to obtain indirect quantitative estimates in geographic areas where there are insufficient data to obtain direct estimates.[86,87]

Indices

A vulnerability index typically involves estimating vulnerability to climate hazards in a given geographic area based on an analysis of multiple indicators that account for exposure, sensitivity, capacity to adapt or a combination of these factors. A vulnerability index can be useful for assessing current conditions and change over time or for comparing the vulnerability of different areas within a jurisdiction.[88] These indices can help to convey complex, multivariate relationships in a simpler format.

BRACE users can create a new index or use existing vulnerability indices to assess vulnerability.[88–90] Keep in mind, an index is only as good as the input data. Indicators must be selected with care. There is no clear consensus on methods, partly due to the many contextualized assumptions used in aggregating and weighting indicators and the difficulty in obtaining data at the appropriate geographic scale that are consistent and high-quality across a geographic area of interest. Some commonly used vulnerability indices are shown in Resource 3.c. Qualitative data can complement and contex-

> **One of the best ways for local agencies to advance is to work across silos.** Mapping where the hottest places are, the most natured-deprived places are, the most vulnerable to storms, and then using that geospatial information through joint efforts with Parks and Rec departments can direct investments in programming in ways that deliver disaster resilience, health and equity in between disasters. That's a whole set of opportunities.
>
> *- National organization staff*

tualize quantitative vulnerability indices, improving internal and external validity. Above all, the indicators and the analysis process should be transparent and aligned with the assessment objectives and scope.[88]

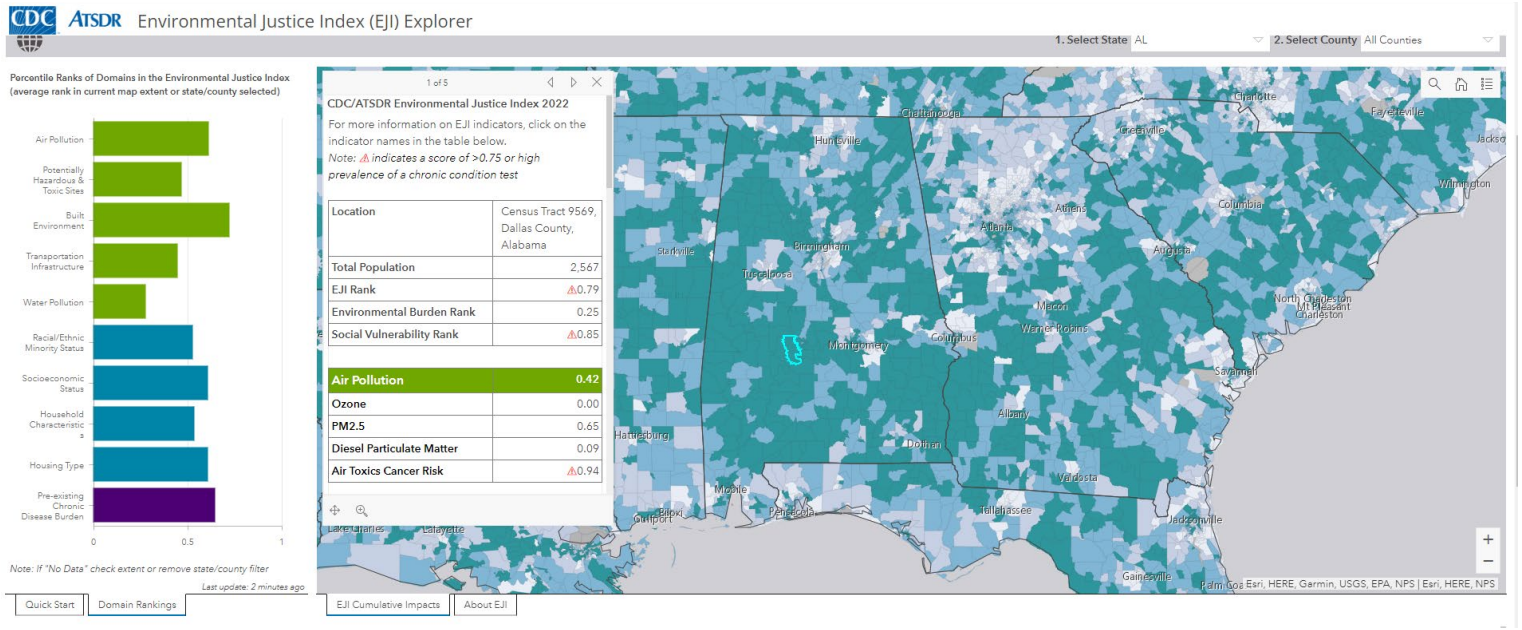
Include a diverse set of interest holders when designing indices, involving local experts and interest holders whose jurisdictions are being represented by the data. Using a participatory process for designing indices can help build consensus and promote collaborative, coordinated, and collective action. Collaboratively interpret data to avoid misinterpretation or incomplete assessment.[88]

Several indices with downscaled geospatial data exist. Examples include the CDC's Environmental Justice Index Explorer,[91] the Environmental Defense Fund's Climate Vulnerability Index[92] (CVI) and the ATSDR/CDC Social Vulnerability Index.[93]

The visualization demonstrates the capability of CDC's Environmental Justice Index Explorer Counties distinguished by a dark green color are ranked in the highest quartile for the Environmental Justice Index (EJI). For example, an EJI ranking of 0.85 signifies that 85% of tracts in the nation likely experience less severe cumulative impacts on health and wellbeing than the tract of interest.

CDC's PLACES data provides modeled health data for small areas across the country. It can be merged with climate data, such as NOAA's Climate Data Online, to help health departments, regardless of population size and rurality, to better understand the burden and geographic distribution of health measures and assist in planning public health interventions. PLACES provides model-based, population-level analysis and community estimates of health measures to all counties, places (incorporated and census designated places), census tracts, and ZIP Code Tabulation Areas across the U.S.[95]

FIGURE 3.i: CDC/ATSDR's Environmental Justice Index Explorer



In addition to these national data sets, some places or groups may have their own indicators and data resources. A few examples are noted below:

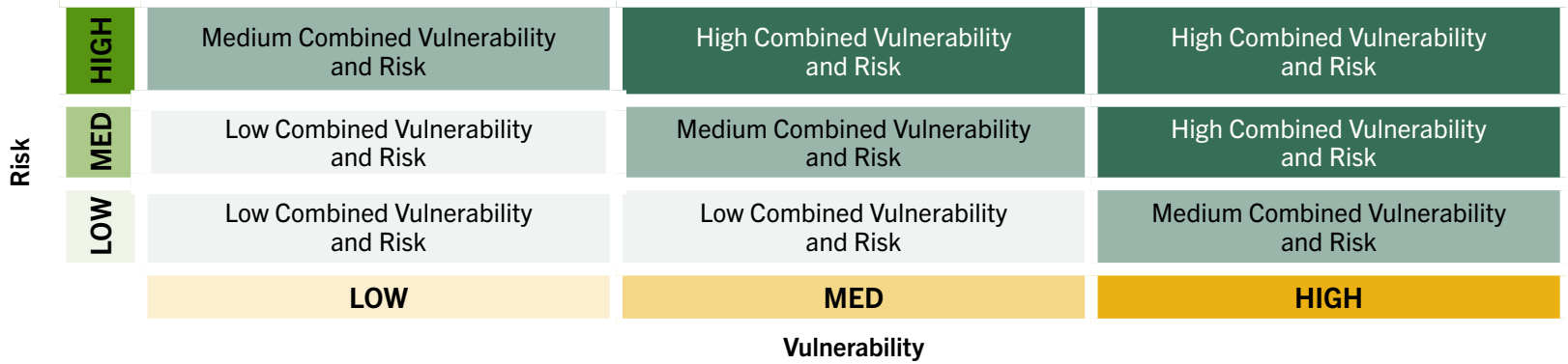
- Healthy Places Index (California)
- New York State Mapping tools
- Puget Sound Coastal Storm Modeling System

Matrices

Matrices can be used as a tool to classify, screen, and rank smaller geographic units, such as census blocks. For example, units can be characterized as having "high, medium, or low" sensitivity. This approach can also be used to "roll up" several characteristics into one score or ranking that can be easily visualized.

It is important to include a clear explanation of how units were classified, articulating what factors were included and excluded. These rankings or prioritizations can be based on quantitative information, qualitative information, expert judgment, or a combination and are typically categorical (e.g., high, medium, low or on a scale of 1–5). When a ranking system is used, a description or definition of each category is typically provided, along with data uncertainties. A matrix is most helpful when both quantitative thresholds and local knowledge are used to guide classification. Figure 3.h offers on visualization of a vulnerability and risk matrix.

FIGURE 3.j: Classifications of combined vulnerability and risk



Source: Developed by Fernleaf for NOAA's "Implementing the Steps to Resilience: A Practitioner's Guide". Click here to learn more.

KEY TACTIC 3.3

Consider climate mitigation opportunities that promote health

By promoting climate change mitigation, public health can help jurisdictions contribute to global reductions for GHGs that will reduce future climate harms. Increased warming from the accumulation of GHGs makes adaptation more difficult and brings us closer to reaching human and natural system adaptation limits.[96] In this Key Tactic, BRACE encourages gathering data and other information to support and promote climate mitigation efforts that will deliver health benefits.

Robust evidence demonstrates the harms of fossil fuels to ecosystems and human health. This begins with fossil fuel extraction; extends to refining and manufacturing of byproducts and the creation of petroleum-based products including plastics; and concludes with the transportation, distribution, and disposal of waste.[97–103] Burning fossil fuels, especially coal, petrol, and diesel, is the major source of not just CO2, but also other health-harming pollutants, such as sulfur dioxide, nitrogen oxides, ozone, volatile organic compounds, fine particulate matter (PM10 and PM2.5) and mercury.[104,105] Emissions sources include not only stationary sources such as coal plants and refineries, but other more dispersed sources such as diesel trucks and combined animal feeding operations.[106–109]

Fossil fuel associated air pollutants lead to numerous chronic diseases and health conditions including asthma,[110] heart disease,[111] certain cancers,[112,113] type 2 diabetes,[114] obesity,[115] Alzheimer's disease,[116] low birth weight,[117] preterm birth,[118] premature death,[119] lost work days,[120] and increased hospitalizations and emergency department use.[110,121,122] A study found that in 2018 a total of 8.7 million premature deaths globally, or 1 in 5 deaths—and 350,000 deaths in the U.S.—were attributable to the fossil-fuel component of PM2.5.[123]

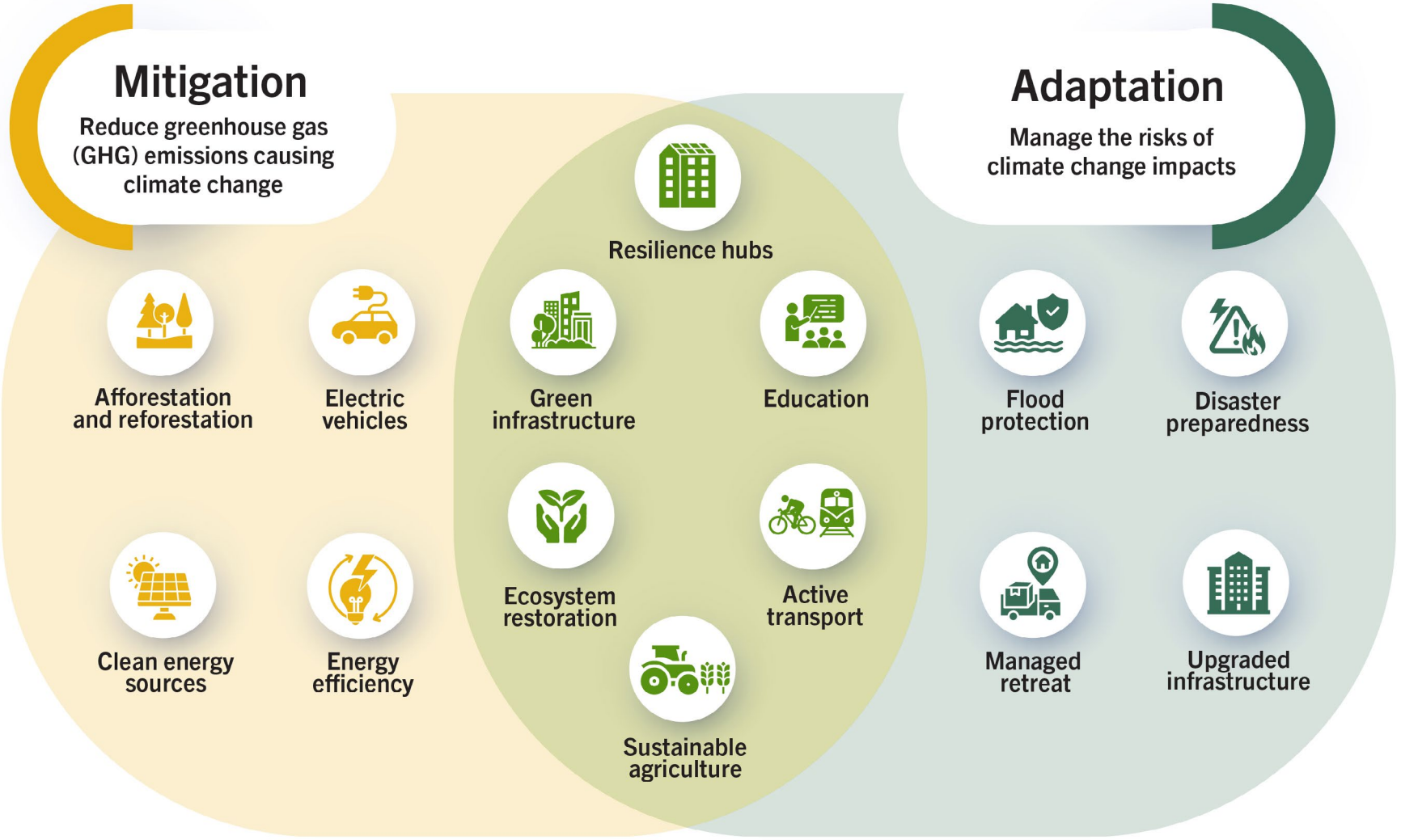
In the U.S., emissions sources are disproportionately located in communities with lower incomes and higher proportions of people from racial and ethnic minority groups.[124–126] Some communities with lower incomes and a higher proportion of people from racial and ethnic minority groups may also have less access to safe, connected transportation networks compared to communities with more upper income households and White persons.[127–130] Communities that are economically marginalized experience low rates of car access in a car-dependent system and less access to safe street infrastructure.[129,131] Other issues centrally implicated in climate mitigation include the need for equitable access to good jobs, apprenticeships, and economic opportunities as climate change alters the economic landscape; support for clean energy transition for renters and people with lower incomes; and equitable access to green space, safe streets, and active transit.[132,133]

Some mitigation actions also have adaptation benefits. For example, planting trees sequesters carbon and creates cool shady areas that help avoid health harms of heat and actions that allow people to replace car trips with walking or bicycling, reduce GHG emissions, increase physical activity and mental health, improve air quality, and enhance flood resilience.[134] See Figure 3.i for some examples of mitigation and adaptation overlap.

Some activities suggested below involve quantitative analysis that may extend beyond a health department's technical and resource capacity. However, having even a general understanding of fossil fuel health impacts within the jurisdiction will better position the health department and its partners to understand and communicate the rationale for state, local, and Tribal climate mitigation action. Providing even a qualitative characterization of the health benefits of mitigation helps advance cross-sectoral and community-based initiatives and clarify the importance of mitigation across different sectors.

When feasible, health departments may also consider applying a Health Impact Assessment (HIA) methodology to work through the Key Tactics described below. An HIA is a process to evaluate the potential positive and negative public health effects of a plan, project, or policy before it is approved, built, or implemented.[135] This approach has been successfully applied to climate change and may be more familiar to public health practitioners.[136,137] See CDC's Environmental Public Health Tracking Program for more information about Health Impact Assessments.

FIGURE 3.k: Complementary Types of Climate Action



This Key Tactic will answer questions such as:

- What are the biggest sources of GHG emissions in your jurisdiction?
- What types of health conditions in your jurisdiction are associated with GHG emissions? Which groups are disproportionately affected?
- What are the potential health and other benefits of mitigation solutions?
- Which groups could benefit most from solutions with climate and health benefits?

Considerations

If mitigation is a newer concept or lacks support among decision-makers in the jurisdiction, find common ground through framing an initiative around other benefits. Mitigation may be a component of other public health initiatives with an adaptation focus, such as nature-based solutions that offer carbon sinks.[80] In addition, many strategies with mitigation benefits are popular in public health or other sectors because they align well with the core functions of public health.[138–140] Appealing to different frames can help better position efforts when emphasizing mitigation benefits meets resistance.

In this Key Tactic, focus on collecting and analyzing data to understand the mitigation landscape and inform the consideration of mitigation options. The next element, Investigate Options, provides guidance on identifying mitigation opportunities. Thus, it may be helpful to return to this Key Tactic after identifying potential mitigation strategies in Investigate Options.

Identify local emissions sources and GHG reduction opportunities

Some of the sectors with the greatest opportunities for benefiting public health through emissions reductions include transportation (i.e., vehicles, public transit), building energy use (i.e., residential, commercial, and industrial), industry and manufacturing, waste management, landfills, wastewater treatment, agriculture and food production, electricity generation, construction, and development.

Also consider sources of carbon sinks or sequestration and associated opportunities for expansion. These may include reforestation and afforestation, urban forestry

SOLUTION SPOTLIGHT

Clackamas County Public Health, Oregon

Clackamas County Public Health partnered with multiple neighboring counties (Multnomah County Health Department and Washington County Public Health) to form a regional collaboration. Together, they developed a comprehensive climate change and health impact assessment report and an accompanying data visualization tool for the Portland metropolitan region. The project involved the engagement of stakeholders to ensure the inclusion of local needs. The assessment data will drive policy efforts related to climate change and highlight how social determinants are the primary driver of climate vulnerability. Clackamas County has been supported with several mini-grants by CDC via the National Environmental Health Association, and the National Association of County and City Health Officials.[11]

and green spaces, parks and natural reserves, wetlands and marsh restoration, soil management practices and other agricultural practices, green infrastructure, marine initiatives to preserve seagrass, and other vegetation and ecosystems.

More information about GHG reductions opportunities can be found in Investigate Options.

Drawing from the plans and resources gathered in Get Ready, Stay Ready and Partner, examine data and information already assembled about emissions and GHG reductions opportunities at the local, state, or other relevant jurisdictional level. Most states and many cities have a GHG emissions inventory that contains detailed information about the most significant categories of CO2 emissions and associated air pollutant sources.[141] Universities and other entities like the Bureau of Land Management may also have relevant data, even in states without a comprehensive inventory.

For jurisdictions that do not have an existing GHG emissions inventory, developing an inventory is unlikely to be within the scope of a health department's capacity. Consult Resource 3.c for sources that link to existing state and local climate action plans, most of which include GHG emissions inventories.

It is also important to listen to community perspectives on issues such as transportation, affordable housing, gentrification, displacement, and inequitable distribution of cost increases like utilities and food.[142] Consider what equity needs, challenges, and opportunities may relate to mitigation.

Identify health risks potentially associated with emissions sources

In some instances, it may be helpful to characterize health risks or outcomes potentially associated with local GHG emissions sources.

As described above, emissions-related air pollutants can cause many poor health outcomes, such as premature mortality,[119] chronic bronchitis,[143] heart attacks,[121] hospital admissions for respiratory and cardiovascular diseases, [110,121,122] and asthma attacks.[110,144,145] Health departments may have access to local data to track and report health care utilization, mortality, and the incidence, prevalence, or trends of

diseases. Health equity focused analyses that discern disparities in these metrics will also be helpful in developing a full picture of the health risk burden potentially associated with emissions sources in the jurisdiction or community.

Health departments can also examine emissions-related risk factors and exposures, such as poor indoor or outdoor air quality. Census data and land use data can indicate other kinds of relevant factors or exposures, such as inadequately weatherized housing. Look for data about disparate air quality impacts in different regions or neighborhoods in your jurisdiction. Consider the locations of busy arterials, freeways, ports, warehouses, and distribution centers, which may expose people to substantial emissions from trucks, vehicles, and other sources.

In practical terms, it will be necessary to define a geographic scope for these analyses; the time frame of reference; data sources; and the specific health risks, emissions-related risk factors, and exposures to be measured. It is also important to articulate the purpose of the analysis. For example, these analyses can suggest ways in which emissions sources are currently harming health. They can also be used as a baseline estimate when selecting or comparing different mitigation strategies, described later in this Key Tactic.

Characterize the potential health benefits of mitigation strategies

Some health departments may also partner with other agencies to support selection, justification, or comparison of different mitigation strategies. This can be done qualitatively through reviewing existing scientific resources. See ChangeLab Solutions's report describing the health benefits across seven different classes of climate mitigation strategies, such as transportation and building efficiency.

Health analysts can also estimate the health benefits of strategies through modeling.[140,146,147] These analyses can estimate the changes in risk or exposure, such as air pollution in response to specific mitigation strategies. Alternatively, models can link exposure changes to projected health outcomes using already established concentration-response functions found in the scientific literature.[138] These approaches can help characterize the potential health equity benefits.

Health benefits can be framed as the prevention of negative health outcomes or as gains stemming from enhanced access to health promoting assets, such as increased physical activity from active transportation, improved mental health from increased green spaces, and reduced heat-related illnesses from urban greening. Most benefits analyses do not include the longer-term health benefits from reducing future health harms of climate change, but they can.[138]

In addition to assessing health benefits, these analyses often estimate the projected emissions savings from the selected strategy. This process is beyond the scope of this guidance; health departments would typically rely on other agencies or data sources for these estimates.

Last, health departments can conduct cost-benefit analyses that assess the economic value of health benefits, as well as other ancillary benefits such as increased productivity. Conducting a sensitivity analysis can assess the robustness of the results from a cost-benefit analysis and measure them against key assumptions and parameters.

Some of these methods are likely to be outside the scope of even high-capacity health departments. Partnerships with academic institutions or other technical experts will likely be required. There are also tools available.[138] Examples include EPA's CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool (COBRA) and Environmental Benefits Mapping and Analysis Program - Community Edition (BenMAP-CE). See Resource 3.c for more tools and resources.

KEY TACTIC 3.4

Collaborate to interpret the data and develop integrated data stories

Now is the time to integrate what has been learned thus far in a way that sets the stage for Investigate Options. The insights gathered from community voices, climate vulnerability data, mitigation assessments, and asset considerations can be synthesized to generate a comprehensive picture of how climate change, and the systems that cause it, impact the health of the community and identify opportunities for resilience.

Data storytelling combines data, both quantitative and qualitative, with visualizations and narrative.[148] Integrating different types of data in a way that is compelling, clear, and actionable can engage and build a shared understanding with partners, community members, and other interest holders to inform collaborative decision-making and action.

Data stories communicate data-driven insights in a manner that is clear and understandable to interest holders to inform action and facilitate change.[149–153] An effective data story will:

1. Explain to the intended audience what has been observed in the data with narrative approaches,
2. Enlighten the audience about what data suggest by creating visuals that portray key findings, and
3. Engage the audience by increasing their interest, understanding, and investment in what has been shared in the data story.

> “Some health departments are better than others at this. [The way we have sometimes shared data] has been seen by residents in impacted communities as dismissive. Or we don’t believe them. That’s something we’re going to have to get over at some point. We need to work with community-based organizations that have relationships with residents. Health departments often do not do a good job of talking about issues in a personal or empathetic way. And so, **that’s where community organizations can provide support and bridge the divides.**”
>
> *- Community organization staff*

Data stories can center equity by showcasing the lived experiences of communities experiencing disproportionate impacts of climate change.[150] While traditional presentations of data rely on sharing data as facts and appealing to logic, data stories merge logic with emotion, by integrating facts with human experiences and insights, making what is presented more likely to resonate with the audience.[154] Figure 3.j shows how data stories drive change.

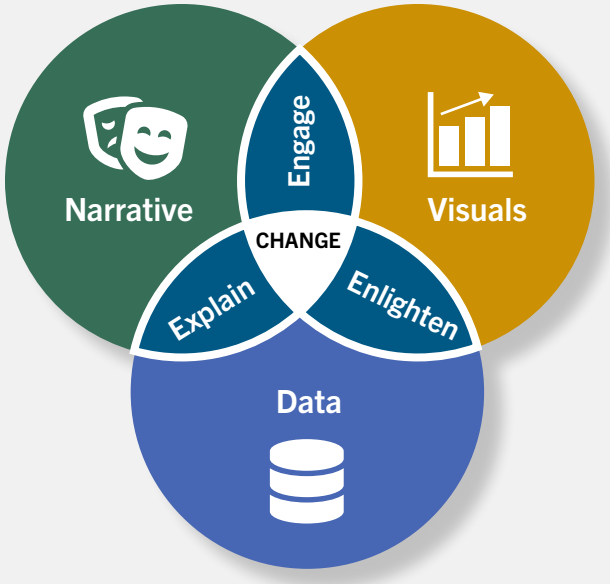
Considerations

Consider the storyteller when developing and sharing a data story. Data storytelling should not be conducted in isolation.[148] Rather, work with internal and external partners to ensure the engagement process and final products will be credible to all interest holders. Effective data storytelling relies on good relationships with community members and partners who can help to bring a place-based story to life, rather than on technical capacity. The success of a data story is tied to the quality of listening at the start of this element and continued engagement throughout all Listen & Assess Key Tactics.

Sharing results can be a fundamentally democratizing process. Co-ownership of community information and data can help build capacity and increase awareness of the interconnected nature of community risk. This also allows other partners to engage in data driven public health climate actions and enable informed engagement to prioritize or decide on next steps.[155]

There will likely be iteration between the activities of this element; the process of capturing relevant data and creating a data story may not always be linear. In some cases, as the story is being created, gaps may be identified that require collecting additional data to tell a more complete story. As the data stories unfold, insights gathered from subsequent BRACE elements can be added to data stories generated in this Key Tactic.

FIGURE 3.I: Effective data stories can drive change



Source: Dykes[148]

Collaborate to plan an integrated data story

There are six essential elements of a good data story[148]:

- **Data foundation**: Data stories have a foundation in data.
- **Main point**: Data stories have a key idea or insight. Good data stories stay on track and have a main point or take-home message. Use the answers to the guiding analytic questions outlined in previous Key Tactics as a starting place to identify the main point.
- **Explanatory focus**: Data stories do more than just describe data, which can focus on questions related to "who", "what", "when", and "where". Data stories also help to interpret data by emphasizing or explaining "how" and "why".
- **Linear sequence**: Data presented in a data story should follow a logical, linear sequence with supporting narrative and visuals that help make the case for the main point being portrayed.
- **Dramatic elements**: Also known as the data storytelling arc or dramatic structure, the plot can be simplified to four sequential components:
  - The first is the **setting**, this includes background on the current situation, character or characters, and the hook, which is the inciting incident or notable observation that acts as a turning point and reveals a problem or an opportunity.
  - The second component is **rising insights**, which are supporting details that reveal deeper insights into the problem or opportunity. This involves peeling back the layers in a directed, focused manner, including only information that is necessary to advance the narrative.
  - The **climax** is the "aha moment," when the major finding or insight is revealed. Some may be straightforward to explain, while others require additional supporting details for the audience to understand or accept.
  - And last, there is the **solution and next steps phase**, which lays out how the new insight should be leveraged by the audience. Not being proactive in providing next steps or suggesting a potential solution may cause an initiative to lose the opportunity to drive change. Keeping the purpose in mind while creating the data story will help keep it focused and actionable.

SOLUTION SPOTLIGHT

University of the Virgin Islands, U.S. Virgin Islands

The U.S. Virgin Islands are projected to lose 4.6% of their total coastal land area due to rising sea levels. These losses could negatively impact drinking water supplies, sewage systems, and historical infrastructure. In 2017, the University of the Virgin Islands received a mini-grant from CDC via the Association of State and Territorial Health Officials to strengthen their community resilience. Through informal community focus groups and surveys, this project captured community-level knowledge and perceptions of climate change and water safety. Families residing in communities with lower incomes in St. Thomas, St. John, and St Croix were invited to participate in educational focus groups wherein they discussed climate change, food and water safety, as well as extreme weather. Participants were then surveyed to assess their knowledge and perceptions of those topics leading to a better understanding of where future education should be offered. These new climate actions will help communities better adapt to rising sea levels, which can protect water quality and infrastructure.[11]

- **Visual anchors**: Visual depictions of data are often more powerful than numbers or words. Well-constructed visuals make data more understandable, relevant, and salient.

What narrative should a data story tell? This decision will be context specific but should respond to partner priorities and generated findings. While there are no universal directives for this, stories focused on a theme of community resilience, justice, or primary prevention in the form of climate mitigation efforts that deliver health benefits may be particularly impactful and resonant.

NOTE: Health departments are gaining experience and growing their expertise with data stories and other innovative participatory approaches. Some of these examples have been showcased in Resource 3.c.

Select data story outputs

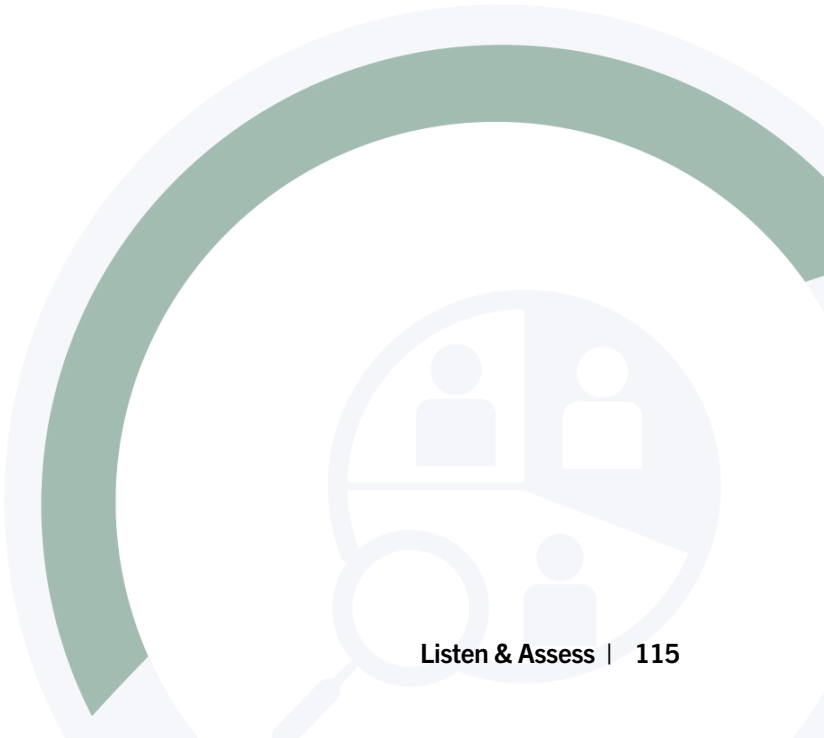
There are many ways to portray a data story. Consider the wide array of formats for representing integrated data available including, spatial maps, reports, story maps, infographics, timelines, calendars, photos, videos, film shorts, long form documentaries, PhotoVoice, websites, field stories, and success stories.

Multiple factors should be considered when establishing data story outputs:

- Determine with partners which formats would best resonate with the audience of focus.
- Consider the resources and capacity available to create these different approaches and the timeline.
- Consider the level of sophistication needed as it relates to the communication goal or need. In some cases, it may be appropriate to generate a comprehensive output. In other scenarios, more expeditious or basic approaches may be more appropriate.
- While the development of extensive outputs may take time, it is critical that this not impede progress in working toward the next element, Investigate Options. The data story is a tool that will be used to inform climate action, not the end product of BRACE. Thus, pay careful attention to timelines and level of effort.

Increasingly, the power of the arts and humanities, including theater and visual arts, are being invoked to communicate both climate risk and resilience.[156] Museums, schools of design, and performing arts groups may be valuable partners to seek out as partners. Examples include:

- New Hampshire used theater and the performing arts to communicate climate risks related to flooding, and to navigate difficult conversations about managed retreat.
- The Museum of the White Mountains hosted a series of lectures and exhibits related to climate change, health, culture and ecology.
- Seattle King County Public Health developed "Climate and Health" comic book graphics to depict ways in which climate change impacts human health.



Key Reflections

Justice, Equity, and Belonging

- How are the voices of impacted communities being heard? How are new voices invited into these conversations?
- How are community strengths and assets included in a complete picture of vulnerability and resilience? How is an asset-based approach being used in framing discussions with community members and partners?
- Are communities and partners meaningfully involved in data collection, analysis, interpretation, ownership and dissemination? Are they involved in the development and telling of the data story?
- Are you considering different and intersectional aspects of equity (e.g., gender, disability, race, age, intersectional identity) throughout this element, particularly in terms of how climate hazards may affect different populations?
- Are you considering ways to integrate qualitative and quantitative information to develop a more complete picture of resilience?
- How are community engaged methods being used? Are you investigating whether some data collection methods would be more aligned with the community's culture and identity? How were different notions of credible data incorporated into the selected data sources and methods?
- If working with Tribal partners or Indigenous communities, are you considering CARE and FAIR data principles?

Cross-Cutting Activities

COLLABORATE

- Are you bringing internal and external partners with an interest in assessment results to the table?
- Who is not at the table?
- Are there data sources, data collection activities, engagement processes, or analytic functions that partners can lead or participate in?
- How are you returning to community partners to ground-truth data and discuss analytic findings?
- How are you addressing points of data conflicts, misalignment, or disagreement?

COMMUNICATE

- How are you communicating in ways that promote sustained and meaningful engagement?
- How are data and data stories being shared with communities and partners in ways that build their capacity?
- Are findings being presented to partners and the community, before sharing with wider audiences?
- How are data and data stories being shared with decision-makers?
- Are communication strategies, formats, and venues tailored and accessible to different audiences?

EVALUATE

- How did the Listen & Assess process meet interest-holders' expectations and needs?
- Are the data sources and impacts valid and meaningful for the communities and partners you are working with?
- How does data help to tell a story that helps people to connect the dots between climate change, health, and equity?
- How were the processes used in Listen & Assess documented to inform subsequent BRACE elements and future use of the BRACE framework?

Priority Principles for Listen & Assess

The BRACE Framework is informed by ten key principles, which are intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, we highlight three salient principles to demonstrate their practical relevance in diverse contexts.

PRINCIPLE 4. **Promote climate, justice, and health in all policies**

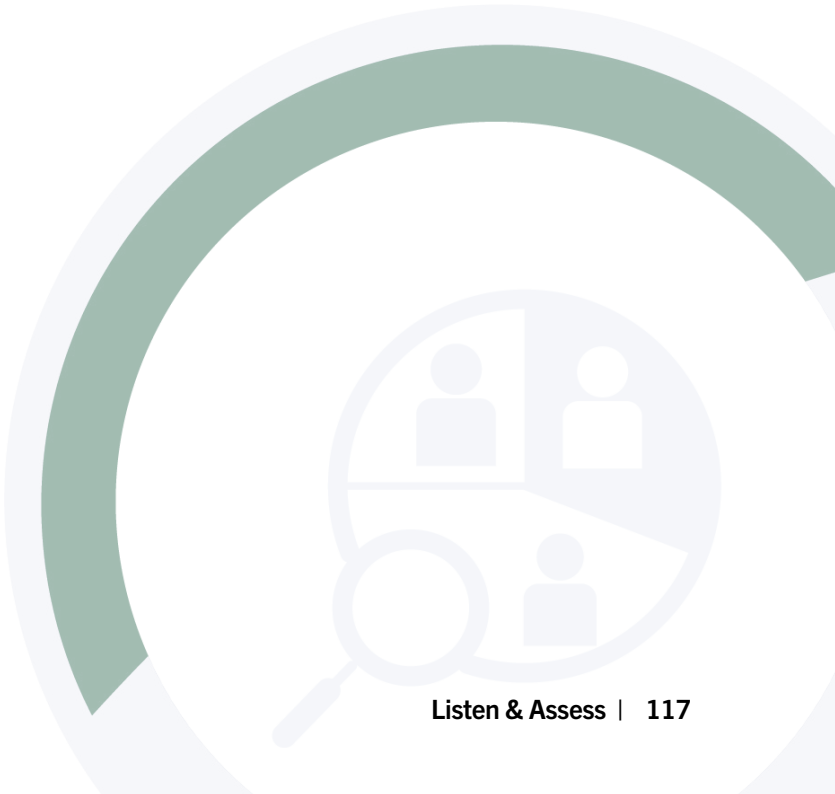
This principle establishes that climate, justice, and health are intersectional and must be considered as such in every phase of data collection and processing.

PRINCIPLE 9. **Emphasize multiple benefits**

This principle encourages health departments to highlight the economic and health benefits of climate mitigation to build consensus among cross-sectoral and community-based initiatives.

PRINCIPLE 10. **Promote a culture of learning**

This principle encourages continuous integration of new evidence, community perspectives, program observations and evaluation findings to inform iterative decision-making.



Conclusion

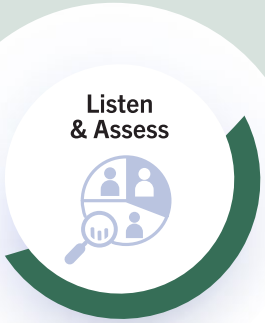
When to move to Investigate Options

Climate change will continue to affect communities in complex, variable and sometimes unpredictable ways. The goal of Listen & Assess is thus to establish a reasonable, integrated understanding of the community hazards, sensitivities, vulnerabilities, capacities, and community priorities and experiences. This work will likely never be perfect and will require updates over time. With this understanding, move to Investigate Options when there is general consensus among the partners that a sufficient understanding has been achieved to inform the selection of public health climate action.

When to revisit this element

Outputs from Listen & Assess should be considered living documents, with updates made as needed. Revisit this element in response to climate hazards and emerging health impacts changing and warranting new analyses.

Insights from Investigate Options may also present new learnings or direction that will move users back to this element. Available data, resources, and practices are always evolving, and new partners bring new perspectives. Update the outputs of this element to respond to all of these new sources of input.



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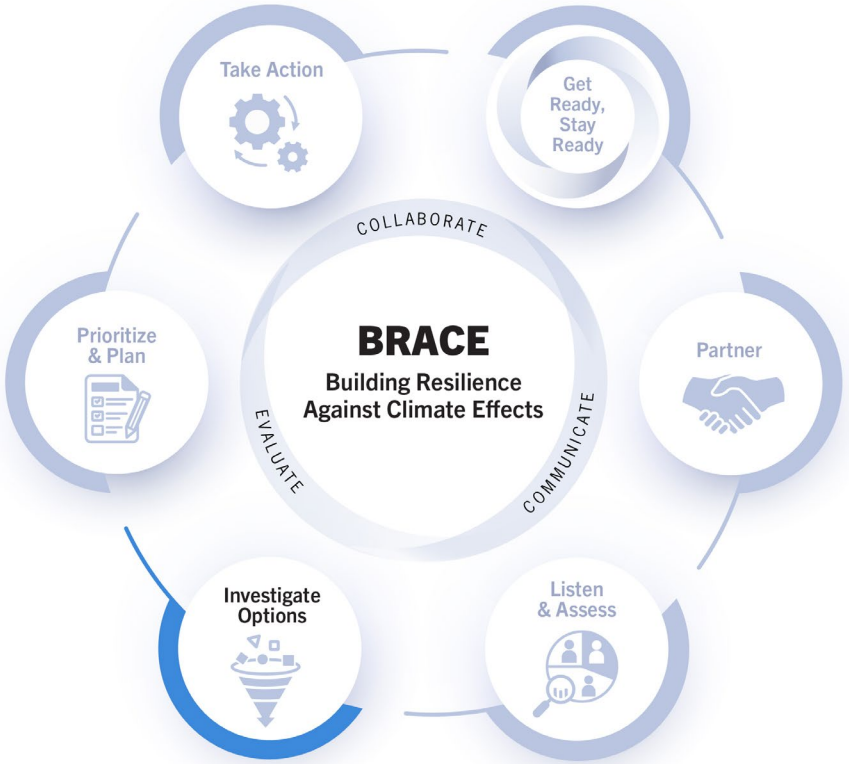
Investigate Options

CHAPTER 4



By this point, partnerships are in place and the community's climate and health needs and opportunities are captured. Now comes the work of identifying solutions. In this chapter, BRACE users generate a list of public health climate action strategies that will be refined and narrowed in the next chapter, Prioritize & Plan.

Key Tactics

KEY TACTIC 4.1 Create a list of potential solutions to the identified challenges

KEY TACTIC 4.2 Systematically investigate identified options

Investigate Options

Outputs

- List of potential adaptation and mitigation strategies
- For each strategy, an assessment of the evidence base, potential health and health equity impacts of strategies, partners' perspectives, capacity requirements, feasibility, resources, and time requirements

Chapter Resources and Worksheets

RESOURCE 4.a:
Adaptation and Mitigation Strategies for Health Departments

RESOURCE 4.b:
Classes of Mitigation Strategies, Health Pathways, and Health Outcomes

WORKSHEET 4.a:
Equity Disaggregation in Climate and Health Planning

Introduction

Why do this after Listen & Assess?

In the previous element, Listen & Assess, a range of community-specific information likely surfaced: climate-related hazards, health impacts and vulnerabilities, community strengths and assets, and aspirations for a healthier and more equitable community. This chapter helps users develop community-appropriate options for public health climate action. If a user moves to investigating options without the outputs from Listen & Assess they might select options that do not meet actual community needs.

Before you begin

At the end of this chapter, BRACE users will have a list of potential public health climate actions to take into their prioritization and planning processes. However, these potential options are not supposed to be created by individuals themselves, this element is designed to be done in teams and in partnership.

CONTEXT MATTERS

Health departments working at different jurisdictional levels will vary in how they approach this process. State or regional-level health departments may have more staff, resources, and funding to gather more robust information. Local and Tribal health departments or community-based organizations may have a better understanding of their communities and may more easily be able to ascertain which options are best aligned with local needs and circumstances.

KEY TACTIC 4.1

Create a list of potential solutions to the identified challenges

It is important to re-engage partners and community members. Return to agreements made in Partner and ensure that the process aligns with agreed upon levels of engagement and inclusion. Together, review collected data and develop strategies to draw from community members' experiences. Collective review will maximize community support for selected strategies and increase sustainability of efforts.

Review data and other sources

The findings and data stories generated in Listen & Assess can help focus this work, so start by reviewing those outputs including:

1. Priorities and concerns expressed by community
2. Vulnerability and resilience findings
3. Community strengths findings
4. Mitigation-related findings
5. Data story outputs

Likewise, review and update scans and partner maps developed in Get Ready, Stay Ready that identify existing or emerging opportunities that could be leveraged.

Use systems thinking to identify opportunities for action

Now is the time to start identifying potential points of action. Systems thinking can be helpful for BRACE users to move from reaction towards transformation.

CONTEXT MATTERS

Consider organizational capacity as it will affect the number and type of strategies listed. You might have assessed capacity in terms of staff expertise, staff availability, financial resources, and leadership support; each of these will imply different constraints and opportunities to the number of options that can be investigated.

The iceberg model may offer a useful metaphor.[2] (Note: this iceberg model is different from the epidemiological concept of the 'iceberg' of disease.) In this systems thinking tool, what is visible above water is only 10% of the iceberg; the other 90% is underwater and dictates how the iceberg behaves. By focusing on the 10% above water, practitioners only address symptoms rather than root causes.

The iceberg in Figure 4.a is broken into four sections—events, patterns, structures, and mental models. Many public health activities "react"—chronic or acute events happen, then health departments attempt to respond. Transformative adaptation and mitigation, discussed below, moves the action or solution farther down the iceberg.

BRACE challenges users to look below the surface to see what other opportunities exist for strategies that anticipate, design, and support transformative adaptation and mitigation.[3,4] The data stories developed in Listen & Assess, as well as health impact pathway diagrams or rich pictures, can provide insights to answer the questions posed in the figure.

Figure 4.b depicts how one might think about heat-related interventions with this model in mind, with the events in this example being prolonged extreme heat days.

As users move through the remainder of Investigate Options, keep this concept front and center. Is the action or strategy under consideration reactive? What are the opportunities to anticipate, design, and transform instead?

There are other, more complex and time-intensive systems thinking methods, such as causal loop diagrams, that could be considered here. These diagrams can help identify specific feedback loops and leverage points that can bring about substantial change. If your organization has the capacity and resources, BRACE recommends working with a facilitator trained in these methods. However, many health departments may be better equipped to use simpler approaches. Additionally, if proposed options seek to address the "structures" section of the iceberg through policy change, see CDC's Office of Policy, Performance, and Evaluation's guidance on thinking in systems.

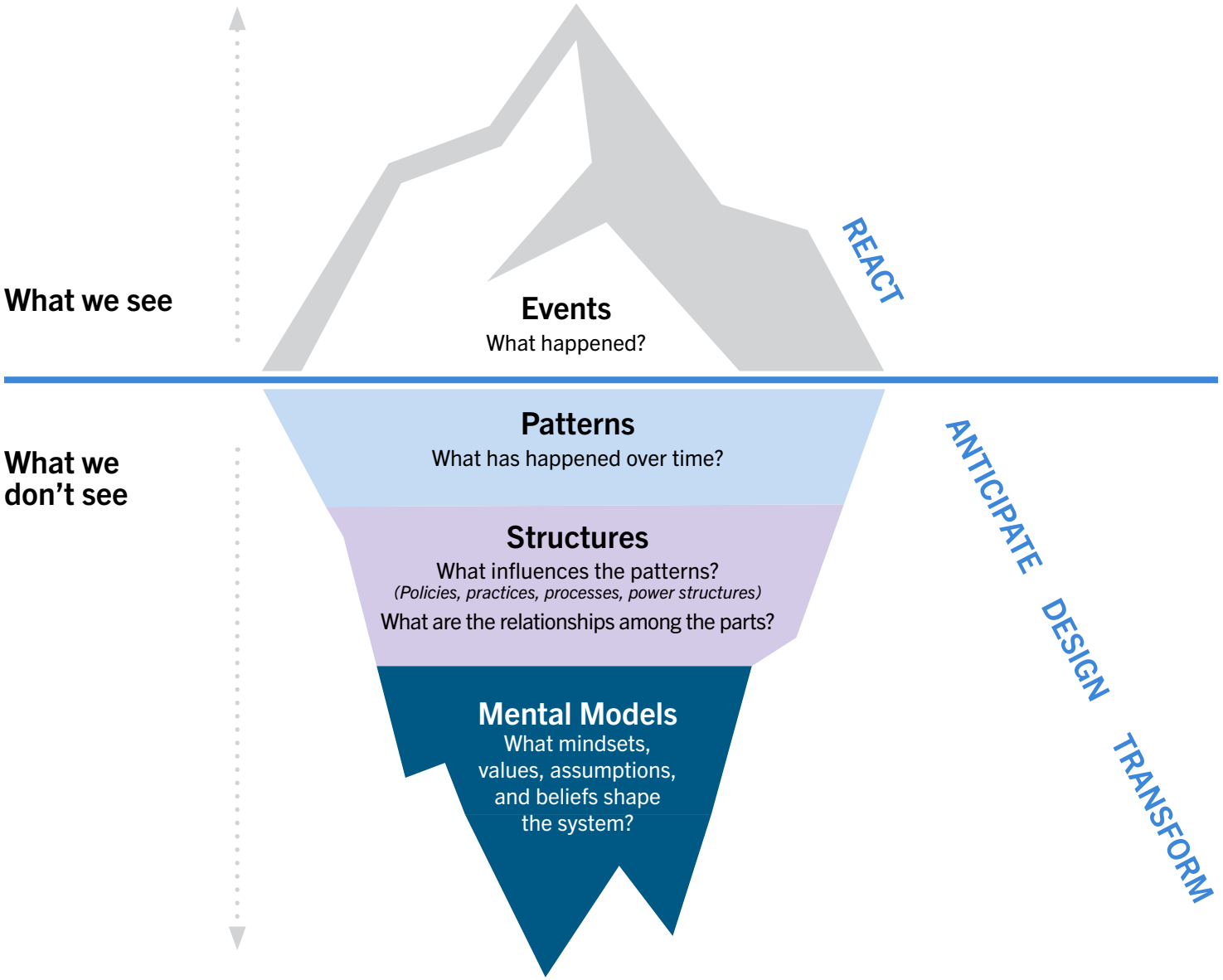
For a brief primer on systems thinking, revisit **RESOURCE 3.d:** Systems Thinking Overview and Key Methods for BRACE.

SOLUTION SPOTLIGHT

Alameda County, California

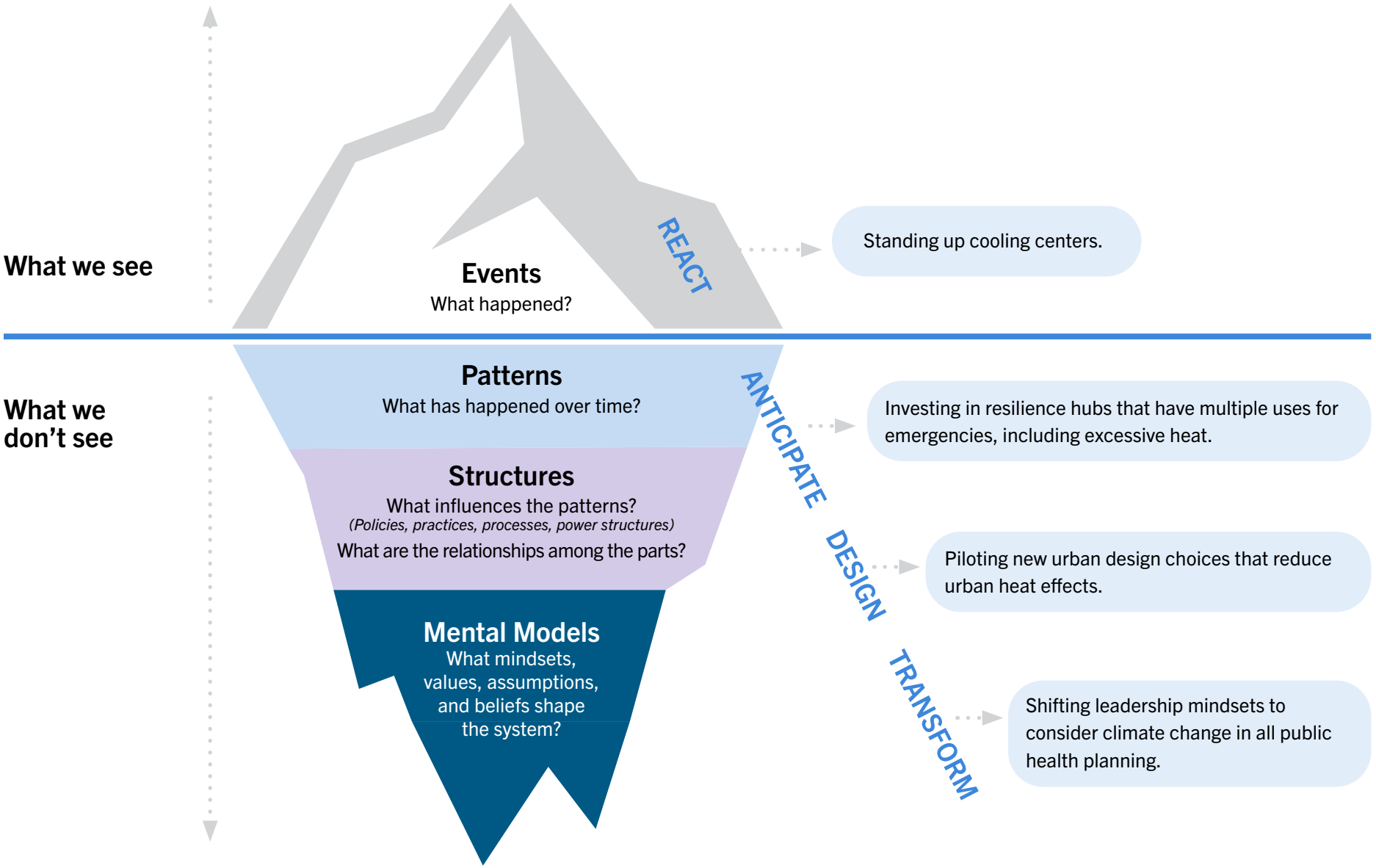
Often, populations at increased risk to the health impacts of climate change do not receive adequate communications about air quality alerts during wildfire smoke events. In 2020, Alameda County received a mini-grant from CDC via the National Association of County and City Health Officials (NACCHO). With this support, Alameda County engaged community stakeholders through focus groups to develop preferred methods of communication regarding air quality levels and protective action. Using this information, they aim to develop an informed governmental communication protocol to send smoke alerts and information to communities which are disadvantaged and those vulnerable to smoke impacts. Community members at higher risk will receive more prompt and relevant messages to take preventive actions, potentially reducing asthma attacks and other respiratory problems.[1]

FIGURE 4.a: Iceberg Model to Identify Opportunities for Action



Source: Adapted from The Iceberg Model (Goodman, 2002) and Think NPC. Click here to learn more.

FIGURE 4.b: Iceberg Model with Example Opportunities



Source: Adapted from The Iceberg Model (Goodman, 2002) and Think NPC. Click here to learn more.

NATURE-BASED SOLUTIONS

Nature-based solutions are actions that protect, sustainably manage, or restore ecosystems in ways that promote nature, biodiversity, and human wellbeing. Such actions are designed to address a range of environmental challenges, including climate mitigation and adaptation, and provide economic, social, and environmental benefits.[5] While not historically viewed through a public health lens, nature-based solutions are increasingly shown to support public health and wellbeing,[6–9] and the potential health and societal benefits greatly expand the range of possible partnerships.

Natural places, including wildlands, waters, and open spaces, provide substantial natural carbon sequestration, enhance biodiversity, and support mental health and physical wellbeing. It is widely agreed that climate solutions that protect and enhance natural places are essential. However, experts, including Indigenous leaders, academics, and other interest holders, have noted a range of potential unintended consequences and harms associated with the uncritical promotion of "nature-based solutions," including using the concept to distract from real protections of nature, engaging in quick fixes with harmful side effects, and the perpetuation of ongoing emissions, inequities, and other harms to communities and the environment.[10]

Four key principles ensure that nature-based solutions are inclusive and sustainable. These guarantee that nature-based solutions (1) do not serve as a substitute for the rapid phase out of fossil fuels; (2) protect a wide range of ecosystems; (3) are implemented with the full engagement and consent of Indigenous Peoples and local communities; and (4) provide measurable benefits for biodiversity.[9] Related principles are embodied in the International Union for Conservation of Nature (IUCN) Global Standards, which provide an example of emerging protocols within this rapidly evolving field.[11,12] Implementing genuine nature-based solutions requires an understanding that Indigenous People are leaders in advancing reciprocal relationships between people and the Earth's life-giving systems, and that such solutions must reflect a commitment to Indigenous leadership, human resilience, and biodiversity.[13]

In addition, it is important to deliberately consider equity in design and implementation of nature-based solutions, as they have the potential to both address equity concerns (improved mental health and physical health, social and ecological cohesion) and perpetuate health disparities (e.g., the pattern that green infrastructure has historically benefitted predominantly White and affluent communities).[6–8,11,14,15] Moreover, mitigation and adaptation impacts of nature-based solutions can be considered separately, but it may be valuable to examine the simultaneous benefits as well.

Identify potential strategies related to adaptation

The often synergistic relationship between adaptation and mitigation was discussed in Listen & Assess.

At this initial stage, it may be helpful to review strategies separately, to envision the full scope of possibilities. The next two activities guide BRACE users through a process to identify strategies focused on each class of strategy independently.

> When you're assessing strategies, it's really like a brainstorming process and then a winnowing down of strategies that match your vulnerabilities. **You're looking for whatever works to protect people. But it's not always going to be a health intervention.** That's a really big point.
>
> *- Community organization staff*

The Intergovernmental Panel on Climate Change (IPCC) has declared that adaptation is effective in reducing risks to people and nature.[3] Solutions that are integrated, multi-sectoral, address social inequities, respond to specific climate risks, and cut across systems increase feasibility and effectiveness. However, increased warming makes adaptation more difficult and brings us closer to reaching human and natural system adaptation limits.[3]

The NCA5 identified that transformative adaptation will be needed to adequately address climate risks. Cognitive biases toward the status quo can lead to favoring incremental changes instead of systemic change.[16] However, incremental changes can effectively perpetuate systems of inequality and harm or only shift risk to different groups. An overemphasis on incremental change can cause maladaptation. A classic example is that increased use of air conditioning to cope with extreme heat events can increase fossil fuel use, leading to more climate change.[16]

Some sources to help identify potential adaptation related strategies include:

- CDC's Climate Ready States and Cities Initiative, which has historically focused on adaptation[17–21]
- CDC's Intervention Assessment for promising climate and health adaptation strategies[22]
- Peer-reviewed and gray literature, to see what might exist to address priority issues
  - PubMed, a free resource of the U.S. National Library of Medicine, and Google Scholar are good places to start for peer-reviewed or academic research.[23]
- NOAA's US Climate Resilience Toolkit Case Studies, for examples of how other practitioners have addressed climate health hazards in their area[24]
- NOAA's US Climate Resilience Toolkit Options Inventory, for over 1000 adaptation options gleaned from case studies
- Environmental Protection Agency (EPA)'s Public Health Adaptation Strategies for Climate Change[25]
- EPA's Heat Island Community Actions Database[26] and American Society of Adaptation Practitioner Ready-to-Fund Projects toolkit[27]

> "We see climate resilience as bridging mitigation and adaptation. **Identifying policies, initiatives, and interventions that are not just preparing folks to weather extreme climate events or disruptions, but also reducing greenhouse gas emissions that could exacerbate future climate impacts.** They're definitely tied together. A good example are community resilience centers which, on the one hand, are powered by clean energy and located in places that folks can get to with ease and don't have to drive far to get to them. And then also, at the same time, they're perfect for activating during acute climate crises."
>
> *- Community organization staff*

- NACCHO's Stories from the Field
- EcoAdapt's Climate Adaptation Knowledge Exchange (CAKE-X) for an inventory of climate adaptation plans, guides, and tools
- Georgetown Climate Center's State Adaptation Progress Tracker, for an inventory of state adaptation plans
- Urban Sustainability Directors Network (USDN)'s Resilience Hubs resource

While reviewing these sources, also pay attention to what would be most relevant or responsive to the local context. Revisit local sources including:

- Existing local plans identified in earlier elements of BRACE
- Climate and health plans from neighboring jurisdictions
- Other programs within the health department, to find opportunities to link hazards and mainstream climate and health work into traditional public health programming[28,29]
- Anecdotal best practices from nearby communities, including strategies, evaluation measures, and equity emphasis
- Suggestions surfaced by the community during Listen & Assess

See Resource 4.a for a listing of potential adaptation strategies found in the scientific literature or implemented by grantees of CDC's Climate Ready States and Cities Initiative or grantees of CDC's partners, such as NACCHO.

RESOURCE 4.a: Adaptation & Mitigation Strategies & Actions for Health Department Lead

MAINSTREAMING

The concept of mainstreaming involves embedding a particular focus—here, climate change —into the core structure, funding and decision-making of a health department.[30] This approach can be equally applicable to adaptation and mitigation.

Similar to Health in All Policies, this approach can also be interpreted and implemented to integrate health and climate across sectors, agencies, policies and actions, rather than addressed only through an isolated set of specific activities.

> **We've just started looking at what are some practical ways that we can focus our work around things that already fit into our Department of Health role and move forward on those areas.** Then we're going to look at identifying partners and how we can really practically play that out. There's so much data that can be looked at from a climate perspective and that's why we are really looking to take a leadership perspective. So far, there's been a lot of siloed work.
>
> *- State health department staff*

Identify potential strategies related to mitigation

Mitigating climate change presents tremendous opportunities for improving public health in the long term, by slowing climate change, and in the short term, through the health benefits many of these strategies can produce.[31] See Listen & Assess for more information about the significant public health benefits of mitigation strategies.

Use this step to identify potential public health strategies that serve mitigation purposes. Similar to adaptation, refer back to insights gathered in previous elements. Also, consider how to communicate mitigation concepts to community members; emphasizing the broad benefits can expand public support for mitigation initiatives.[32]

Consult ChangeLab Solution's evidence snapshot of six classes of mitigation strategies: transportation, greening, building systems and performance, waste management, food systems, and land use and development. Here you will find evidence of health pathways and health outcomes associated with different climate change mitigation strategies. You can also find insights with practical applications about how public health has supported state and local climate action planning. See Resource 4.b for a listing of potential mitigation strategies found in the scientific literature or implemented by grantees of CDC's CRCSI or grantees of CDC's partners, such as NACCHO. This resource presents different types of mitigation strategies, the pathways by which they can improve health outcomes, and evidence-based health outcomes that can be achieved.

RESOURCE 4.b: Classes of Mitigation Strategies, Mitigation Strategies, Health Pathways, and Health Outcomes

BRACE recommends working closely with agencies and organizations with experience in GHG emissions reductions. These partnerships will expand the resources available and bring the benefit of specialized expertise. A CDC analysis of 50 local climate action plans found that the top ten areas of action were energy efficiency in buildings, investing in electric vehicle charging and infrastructure, diverting waste, improving public transportation, investing in renewable energy, environmental justice, climate resilience, density and land use, sustainable food, and air quality.[33]

> "I think it was a missed opportunity for a long time to not be thinking about mitigation because it's where a lot of the community energy was – around active transportation, water retention policies, wastewater retention to alleviate flooding, green infrastructure, energy efficiency in homes and schools to reduce greenhouse gases. **There is a huge opportunity for those co-benefits. And it brings in environmental organizations that maybe didn't align entirely with just a health focus, but certainly brings new partners to the table.**"
>
> *- State health department staff*

Places to explore potential mitigation strategies include:

- Peer-reviewed and gray literature (see above guidance for adaptation strategies)
- Inventories of effective mitigation actions, such as Project Drawdown[34]
- Policy initiatives and program recommendations, such as the Lancet Countdown or US Call to Action on Climate, Health, and Equity[35]

Similar to the review done for adaptation strategies, consider what is most appropriate in your local context. Revisit locally relevant sources including:

- Links to plans for states, Tribes, and territories, and large city regions (metropolitan statistical areas)[36]
- Climate Xchange tracks plans at the state level, as well as other state climate policies across topic areas[37]
- Tracking of climate action plans at the city level; this is less consistent, but a few resources exist[38–40]
- Existing information on GHG reduction opportunities in your jurisdiction

Greenhouse gas reduction opportunities in your jurisdiction may have been gathered in Listen & Assess. There may be GHG reduction opportunities in an existing climate action plan, which the health department can contribute to or help implement. The Inflation Reduction Act provided funding for climate action planning for states, Tribes, territories, and large cities as part of the EPA's Climate Pollution Reduction Grants Program. Forty-five states developed priority climate action plans through this program.

Generate manageable lists

Now you should have a list of potential strategies, including distinct sets with adaptation and mitigation emphases. Start grouping similar topics, look for themes, and consider how strategies compare and contrast with each other. While there exists a wide range of possible public health climate actions, winnowing options down into a shorter list helps focus the process. To start narrowing, consider several key attributes of public health climate actions that may have the greatest impact:

- Addresses both adaptation and mitigation
- Transforms systems that produce climate vulnerability and inequity

PURSUING GHG MITIGATION EFFORTS

As described in Key Tactic 3.3 of Listen & Assess, mitigation initiatives usually begin with an inventory of GHG emissions and emissions targets accounting for indirect and direct emissions, as well as upstream and downstream emissions. Subsequent steps are to quantify GHG emissions reductions from selected approaches, estimate improvements in air quality resulting from emissions reductions, and estimate the health and related economic benefits of air quality improvements. See the How to Guide for more resources on these procedures.

- Capitalizes on momentum by incorporating climate and health into ongoing efforts that build community resilience and equity in non-health sectors
- Builds the capacity of your agency or partners
- Solves multiple problems at once
- Features nature-based solutions
- Builds on community strengths
- Mainstreams climate across the health department
- Meets feasibility requirements
- Takes advantage of "policy windows." Policy windows are created when three streams converge: the problem stream, the policy (solution) stream, and the politics stream.[21,41] Policy windows may emerge late in the BRACE process so anticipate potential windows during Investigate Options by aligning specific problems and potential solutions.
- Takes advantage of agency and partner assets—such as local networks with community partners, health surveillance assets, interagency partnerships, and academic collaborations—to identify potential topic areas where programs could be developed
- Strikes a balance between innovation and a strong evidence base, which is especially important if a community lacks the resources, time, or capacity to develop approaches de novo

Finalize the list of options you will investigate in Key Tactic 4.2 by considering:

- What is a practical number of strategy options your team can realistically investigate?
- Which items resonate with community members? Which items generate deep concerns or antipathy?
- Which will have the most significant health or equity impacts?
- Does the list include a balance of different types of actions?
- Can you modify items on the list to increase impact through anticipating, designing, and transforming? (Refer back as needed to Figure 4.a.)

CONTEXT MATTERS

In some jurisdictions, mitigation may not be a priority for decision-makers. In these circumstances, look for common ground with other public health initiatives or other STLT health departments. A promising strategy can be to pursue initiatives that have an explicit climate adaptation focus, for example a nature-based solution such as floodplain protection that reduces flooding from extreme weather while also offering a carbon sink. Look to the many strategies that have both public health and climate mitigation benefits. Other paired efforts include Safe Routes to School, electric school buses, planting trees, or weatherizing houses.

KEY TACTIC 4.2

Systematically investigate identified options

Examine your set of potential public health climate strategies. The more thorough and accurate the understanding of each potential strategy, the more informed prioritization and planning processes will be in the next element of BRACE.

Assess the evidence base

Whenever possible, start with the evidence behind a potential strategy. Keep in mind that some strategies lend themselves to emerging practices that do not have an established evidence base.

Return to literature sources located in the previous key tactic. While assessing the evidence, recognize the limitations of traditional formal research design, which often uses a reductionist approach that leaves out nuanced information.[42] Alternatively, a systems approach will center complexity and relationships, but it can be difficult to interpret and apply such findings across contexts.

It may be helpful to assess the strength of available evidence for each strategy. Grading of Recommendations Assessment, Development and Evaluation (GRADE) is one well-vetted system that characterizes the strength of evidence for traditional biomedical research designs.[43] It may be necessary to adapt an existing system to accommodate the characteristics of environmental health evidence, which often require pragmatic or observational designs, rather than randomized controlled trials.[44–47] Recognize differences between researchers and implementers in views of what constitutes evidence.[48] Consider evidence of health outcomes, as well as other benefits (see Vital Conditions Framework in the Introduction).[49]

> **We're sort of building the evidence base as we do the work.** It's not like chronic disease work where they can go to the community health guide and have a slew of evidence-based practices to pick from. We were co-developing it as we were doing the work.
>
> *- State health department staff*

> **I think it's important to be familiar with what research supports and what our evidence-based interventions [are], but then also to think beyond that** because, as we have found ourselves doing, you can end up operating outside of science a little bit and needing to innovate in the moment. Be ready to do that.
>
> *- Local health department staff*

Articulate the potential health and health equity impacts of strategies

For each strategy, clearly and specifically describe the expected potential impacts. Compiling this information ensures every strategy has a clear value and is in line with overarching goals.

To guide this thinking, the following key questions will be helpful:

- Who will benefit from this strategy? In what way specifically and over what time period?
- Does the strategy address several health impacts? If so, which ones and through what pathways?
- How does the strategy improve health equity? How does the strategy address root causes of inequity and potentially span the vital conditions for health? (Review Worksheet 4.a Disaggregating Equity Worksheet to support these answers.)
- Is this strategy reactive, or does it move farther down the metaphorical iceberg highlighted in Key Tactic 4.1?

After answering these questions and reviewing the impact of the strategies, review whether the health impacts match concerns and interests gathered from community members in Listen & Assess.

Incorporate partners' perspectives

Consistently engaging partners is a necessary feature of effective public health climate action. Now is a good time to assess partner perspectives about identified potential strategies.

SOLUTION SPOTLIGHT

Michigan Department of Health and Human Services

An important climate driver of negative health outcomes in Michigan is extreme precipitation. Extreme rainfall overwhelms sewer systems, impacts drinking water, and causes power outages. The Michigan Climate and Health Adaptation Program (MICHAP) identified risks in rural and urban communities and integrated climate adaptations into community planning. By preparing the built environment now, Michigan residents will be better equipped to face their changing environment in the future.[1]

Consider capacity, feasibility, resource requirements, and timeframes

In Get Ready, Stay Ready, users assessed the capacity of their own agency according to staff availability, staff expertise, leadership support, and financial resources. In this activity, map potential actions to this capacity. Chart the expected timeframes for implementation and achievement of outcomes. Loosely sketch out the funding, staff time, expertise, and administrative requirements of each strategy and ensure they align with current organizational capacity.

Other kinds of capacity will also be relevant. Consider:

- Partners' prior experience
- Health department's current engagement and relationship with the population the strategy will most directly affect
- Existing partnerships with community groups and agencies in other sectors that are relevant to the potential strategy

Also assess if the timeframes and requirements are feasible among potential partners.

Take a step back to review your list of options as a whole

Now that the list has gone through another iteration of review and revision, take a step back, refresh your perspective, and look at the options again as a whole before moving to Prioritize & Plan.

Does the list, both overall and in terms of individual strategies, reflect the goals articulated in Get Ready, Stay Ready?

At this stage it may also be helpful to refer to cornerstone public health frameworks. A few are described below:

- **Health Impact Pyramid:** The health impact pyramid depicts the impact of different types of public health interventions from individual to societal and the inverse relationship between resources required and potential impact.[50]
- **Health in All Policies:** Health in All Policies is an approach that seeks to improve health by embedding it as a goal in all policy areas, especially in non-health sectors.[51]

SOLUTION SPOTLIGHT

Village of Wainwright

The Tribal Village of Wainwright identified that the effects of climatic changes on sea ice are of particular concern to community members as it creates unstable and hazardous transportation conditions on previously stable routes used by snowmobiles in the spring. In response, a project was implemented that supported existing accident prevention and rescue programs through the promotion of the use of location technology (inReach devices) and developed new community-based programs that increase knowledge of health risks due to climate change to reduce injury and death resulting from subsistence and travel activities. This project was supported by a 2017 mini-grant from the CDC via the National Indian Health Board (NIHB).[1]

- **Vital Conditions for Wellbeing:** This cross-sector perspective encompasses the vital conditions needed for wellbeing. For more information, see the introduction.[52]
- **Public Health 3.0:** Public Health 3.0 is an approach to public health practice that positions health departments as chief health strategists within their community. Public Health 3.0 envisions health departments working collaboratively with communities and other interest holders to address social and structural drivers of health and promote Vital Conditions for Wellbeing.[53]

Does the list of potential options leverage existing efforts, positive momentum, or existing resources that might support a strategy or policy window to improve climate resilience and health locally? This judgment should consider climate planning efforts such as hazard mitigation plans, capital improvement plans, community master plans, climate action plans, sustainability plans, urban forestry master plans, or transportation plans at the neighborhood, city, county, state, or Tribal level. Answering every component of that question can help facilitate final selection of effective public health climate strategies in Prioritize & Plan.

> **I think it's important to assess what works, but oftentimes, when it comes to the actual interventions that are chosen, it's more opportunistic.** 'This partner's already doing this, and they want the public health end of it.' Because we may be a team of one, and because we may not have grant funding, when it comes to interventions. You can learn from others. There's a lot of resources about what other cities and states have done. We've gleaned a lot of information from that and seen what other jurisdictions are doing related to climate and health.
>
> *- Local health department staff*

Key Reflections

Justice, Equity, and Belonging

- How does the list of strategies address the four types of equity: procedural, distributional, structural, and cultural?
- How are you considering different types of equity (e.g., gender, race, class) during your investigation of strategy options?
- How are partners and collaborators who will implement potential strategies involved in the evaluation of the feasibility of potential strategies?
- How are you ensuring the selected strategies are addressing the strengths and opportunities arising out of Listen and Assess?

Cross-Cutting Activities

COLLABORATE

- How are you engaging partners to generate the range of possible options?
- How are you engaging partners to identify the list of options?
- How are you engaging partners to systematically document factors about the list of options?
- How have you advanced the approach to partnership determined in Partner?

COMMUNICATE

- What are you communicating with partners about how you have Investigated Options and created a list?
- Are you providing opportunities for your community to weigh in on the generation of possible strategies?
- Are you communicating the identified list of options and their documented factors with your community?

EVALUATE

Note: This element does not typically warrant a formal or resource-intensive evaluation. However, it can still be valuable to use evaluative inquiry and reflective practice to gain insight and reflect on both the process and outcomes. This can simply feature regular pulse checks, surveys, or interviews with those involved in this investigation process to understand their perceptions and satisfaction with the process and outputs.

- How thorough, inclusive, and transparent was your process for:
  - generating the range of possible options?
  - identifying the list of options?
  - systematically documenting factors about the list of options?
- What more would you do the next time you undertake this process?
- Who else would you include the next time you are investigating options?
- How might the strategies you have chosen best be evaluated?
- What would be the best way to understand the value of the selected strategy to interest holders?

Priority Principles for Investigate Options

The BRACE Framework is informed by ten key principles intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, three salient principles and examples of their practical relevance are highlighted.

PRINCIPLE 1. **Take timely, evidence-informed action**

Investigate Options moves practitioners from understanding the problem to identifying solutions, which is essential for improving community wellbeing. This principle underscores the importance of using evidence to inform strategy development while also recognizing the limitations of traditional research.

PRINCIPLE 6. **Address the causes of climate change**

This principle calls for systems thinking approaches when investigating options. Instead of reacting to events and addressing symptoms, health departments can identify transformative adaptation and mitigation strategies that address the root causes of climate change.

PRINCIPLE 7. **Prioritize inclusive and sustainable nature-based solutions**

This principle encourages adopting a holistic, systems-based outlook in the identification of potential strategies. Specifically, this can involve integrating nature-based solutions into mitigation and adaptation strategies and ensuring that benefits are equitable and accessible to all communities, especially groups that may be disproportionately affected by climate change.

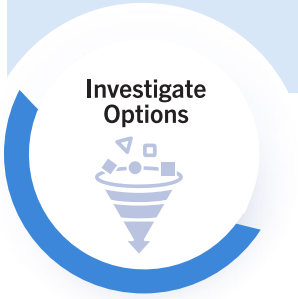
Conclusion

When to move to Prioritize and Plan

After working through this element of BRACE, you should have a list of well-vetted potential public health climate actions. Once that list has been generated and aligned with learnings from the first three elements of BRACE, you are ready to move on to Prioritize & Plan.

When to revisit this element

The process of prioritizing options and taking action may require exploring further options. Revisit this element when new hazards, vulnerabilities, or opportunities are identified, if your prioritization process reveals that you need more options to satisfy one of your prioritization criteria, if you determine more documentation or support for a strategy is needed, or if you determine a need to modify your approach.



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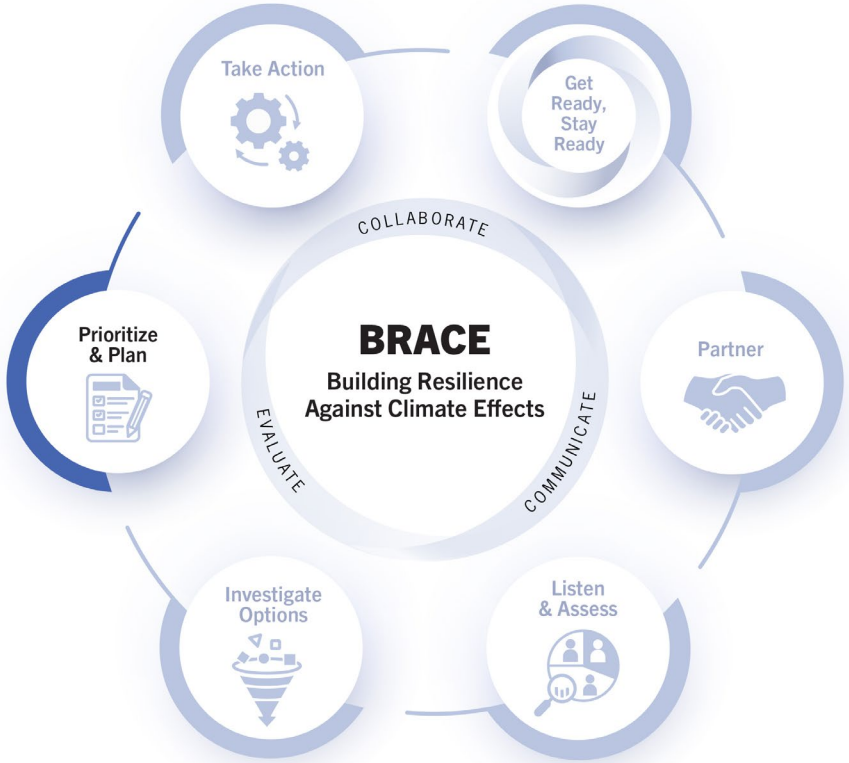
Prioritize & Plan

CHAPTER 5



Collectively setting priorities and developing plans is the last step before implementation. This chapter walks BRACE users through the process of collaboratively developing a prioritization process, selecting public health climate actions, and developing plans for implementation, communication, and evaluation.

Key Tactics

KEY TACTIC 5.1 Determine a prioritization process and criteria

KEY TACTIC 5.2 Prioritize and select public health climate actions

KEY TACTIC 5.3 Develop action plans

KEY TACTIC 5.4 Develop a monitoring and evaluation (M&E) plan

Prioritize & Plan

Outputs

- Prioritization materials (factors, matrix, other tools, and discussion notes)
- Decision about selected climate actions
- Write-up of other options for future use
- Implementation plans
- Communication plans
- M&E plans

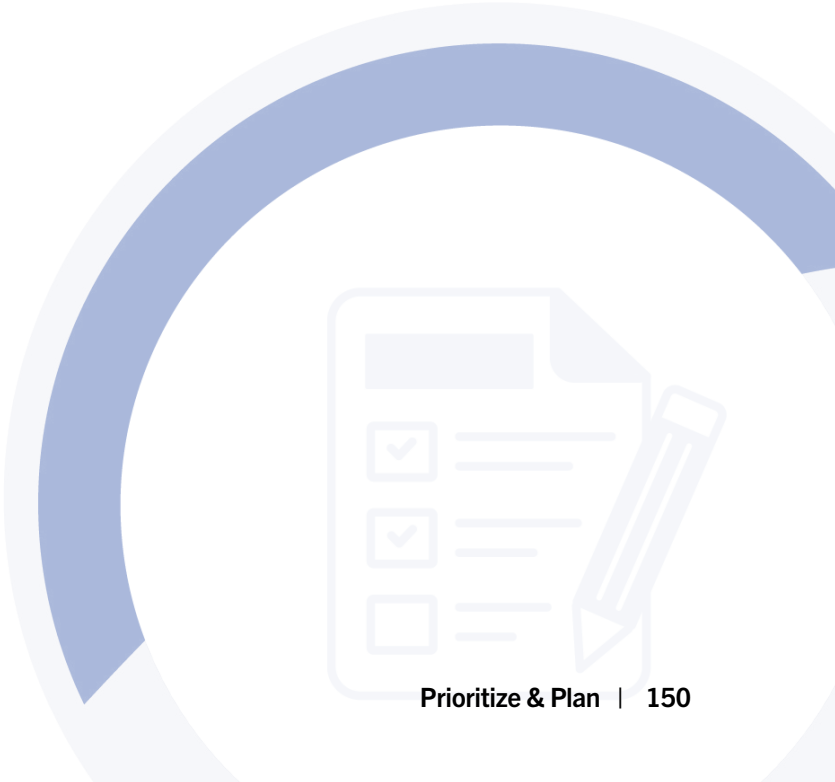
Chapter Resources and Worksheets

WORKSHEET 5.a:
Prioritization Criteria Matrix

WORKSHEET 5.b:
Abbreviated and Full Plan Templates

WORKSHEET 5.c:
Communications Plan Template

WORKSHEET 5.d:
Monitoring and Evaluation Plan Template



Introduction

Why do this after Investigate Options?

Thus far, BRACE has operated somewhat like a funnel. The Guide encouraged users to gather information about context, capacity, partners, climate and health problems, and opportunities in Get Ready, Stay Ready; Partner; and Listen & Assess. Then users were prompted to narrow their focus by identifying potential mitigation and adaptation strategies that respond to surfaced needs in Investigate Options. Now, in Prioritize & Plan, the Guide helps users prioritize options that emerged from the funnel to select and plan for specific public health climate actions. Figure 5.a presents a graphic for this funnel.

Use what was learned in the previous elements to develop a prioritization and planning process that is aligned with organizational capacity, inclusive of community priorities, and reflective of justice, equity, and belonging.

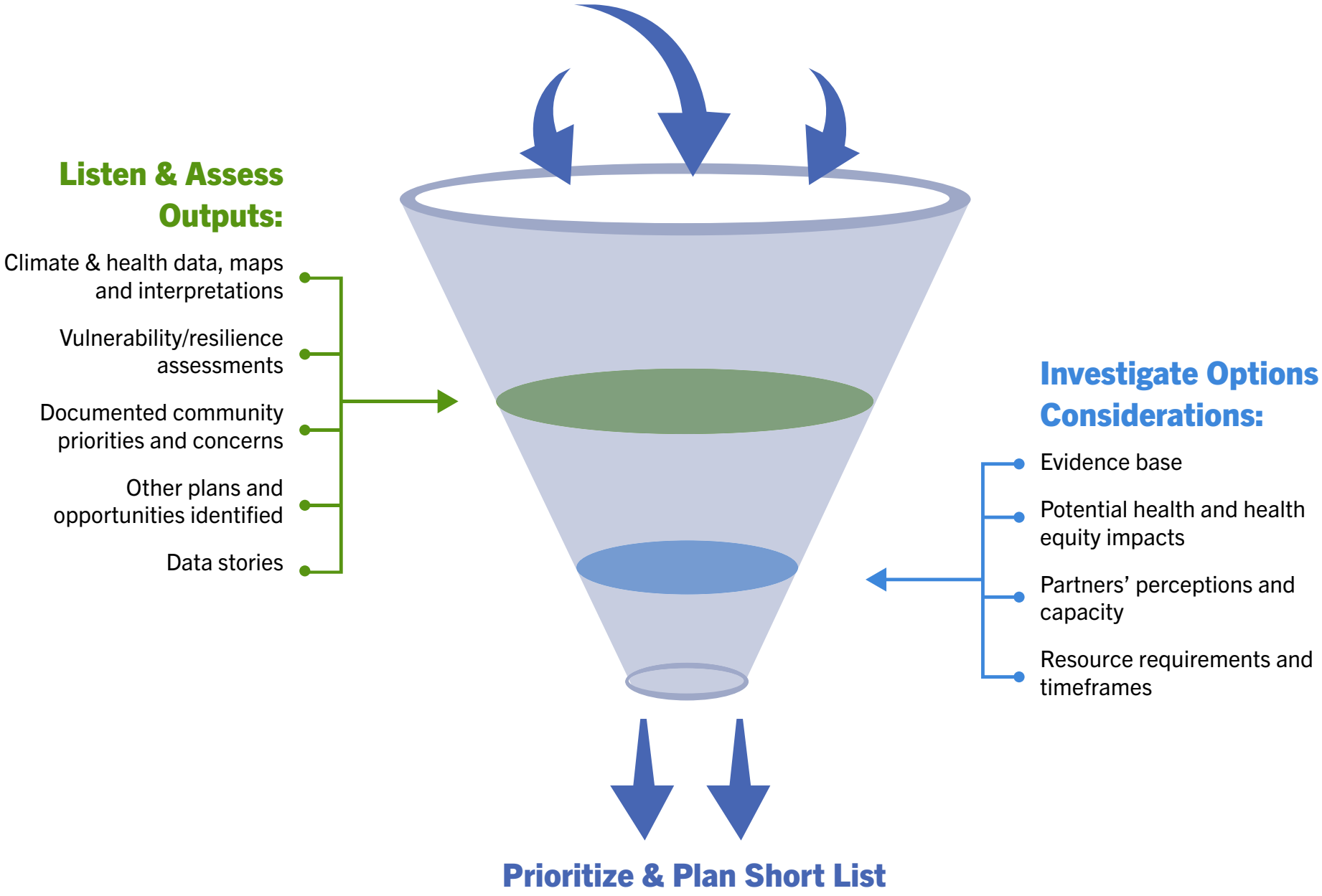
Before you begin

The prioritization and planning process can take a significant amount of time if a team is not careful. However, Prioritize & Plan should be done as efficiently as possible to move to Take Action. Balancing inclusiveness and speed will require thoughtfulness and compromise.

CONTEXT MATTERS

Consider how capacity should factor into the prioritization process. Lower-resourced health departments should work to develop streamlined prioritization processes to ease the burden of planning. Higher-resourced health departments may draft more extensive implementation, communications, and M&E plans to support their selected actions. Understand organizational strengths, limitations, and resources to build a prioritization and planning process that is in tune with organizational constraints.

FIGURE 5.a: Funnel of Public Health Climate Options



KEY TACTIC 5.1

Determine a prioritization process and criteria

Clear processes and selection criteria, agreed upon by partners, are important. The process should reflect community values and goals and drive final decisions. A clear process can also support communication of efforts, increase buy-in, and support future decision-makers, implementers, and evaluators.[1]

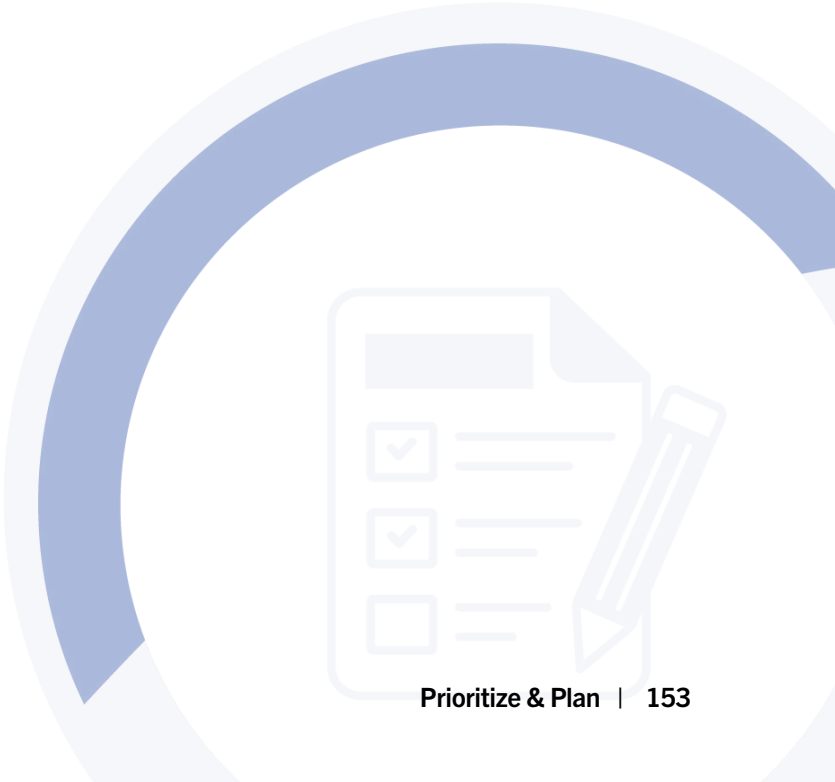
Determine the prioritization process

Determine a structure before moving into prioritization. Think of this step in three phases: partners, facilitators, and prioritization logistics.

PARTNERS

Key question: ***Who will be a part of the prioritization process?***

In the Partner element, initial partnerships were established. Collectively decide which partners will be a part of prioritization and planning, recognizing that the partners that may ultimately implement a selected public health climate action may differ from those participating earlier in the process. That means it may be necessary to re-establish partnerships while establishing a prioritization process. Because this step involves making a decision about actions, change in the world, and resource allocation, inclusion may be particularly important to partners. How partners are involved influences trust, relationship strength, and community buy-in.[2] In contrast, academic partners who helped conduct research in Listen & Assess might have less involved roles during the prioritization and implementation phase of climate action.



FACILITATORS

Key question: ***Who will facilitate the prioritization process?***

Once partners have been selected, consider who will serve what roles. Prioritization processes require strong facilitation skills and the management of competing interests and perspectives.

PRIORITIZATION LOGISTICS

Key question: ***How will prioritization be conducted?***

The process logistics also need to be determined during this step. Consider whether meetings will be held virtually or in-person, whether partners will need to do independent work before attending meetings, and other coordination logistics. Build a process that considers the capacity of each member of the team and plan to compensate members for their work.

Identify the prioritization tool or method

There are several ways to structure prioritization. The number of options to rank, the time available to conduct prioritization, and the number of participants impact which structure to use. BRACE suggests using a prioritization matrix to help map strategy options against selected criteria. An example worksheet is included below. Prioritization matrices are flexible and can be adapted to match local needs.

Select prioritization criteria

Developing prioritization criteria is a crucial step to take before conducting prioritization, because the criteria will drive the final decision. Prioritization criteria should reflect community values and partner goals. Selecting appropriate prioritization criteria to judge the merit of potential focus areas can help avoid selection bias and hidden agendas.[1] Spelling out criteria ensures that everyone understands the rationale behind selections and assists in documenting the process for future decision-makers, implementers, and evaluators. Look to Worksheet 5.a for tools and a process for selecting prioritization criteria. Use outputs from Listen & Assess—

> “There will be sort of cost benefit analysis and political and financial assessments. **But prioritization can be done in a way that centers the actual direct needs of the most vulnerable communities.** How are we making sure that whatever interventions are selected are achieving multiple benefits? Not just health benefits, but some of these other realms too. It could be related to economic equity and just being able to make ends meet. For communities, it could be related to climate mitigation.”
>
> *- Community organization staff*

especially community perspectives and concerns—along with those from the core team and partners to draft criteria. You may have also generated relevant insights from Investigate Options that can be translated into criteria.

WORKSHEET 5.a: Prioritization Criteria and Matrix Worksheet

Share the list of prioritization criteria with the final group of decision-makers. Group similar criteria, assess which are most important, and come to a consensus on a feasible final list (three to seven is suggested). Use Table 2 from Worksheet 5.a to think through additional issues related to selected criteria. Consider:

- ***Scale:*** Determine how each criterion will be measured. A simple three-point scale (e.g., low=1, medium=2, high=3) is generally recommended. Other options are a Likert scale with more points or only qualitative comments.
- ***Weight:*** If all criteria matter equally, no weighting of the criteria is necessary. If some matter more than others, consider how to add more or less weight accordingly. One way to do this is assign each prioritization factor a percentage value with the sum of all factors equaling 100 percent.

Use Table 3 from Worksheet 5.a to develop the matrix. Test the tool and explore weights by using examples. Re-evaluate and adjust before moving to the next key tactic.

OTHER RESOURCES

NACCHO's Guide to Prioritization Techniques provides suggestions of different techniques that could be used for determining which strategy to take.

The Community Tool Box's content on Assessing Community Needs and Resources has a helpful section on Developing and Using Criteria and Processes to Set Priorities.

KEY TACTIC 5.2

Prioritize and select public health climate actions

Next, begin the prioritization process to select a public health climate action.

Implement the agreed upon prioritization process and criteria; make adjustments as needed

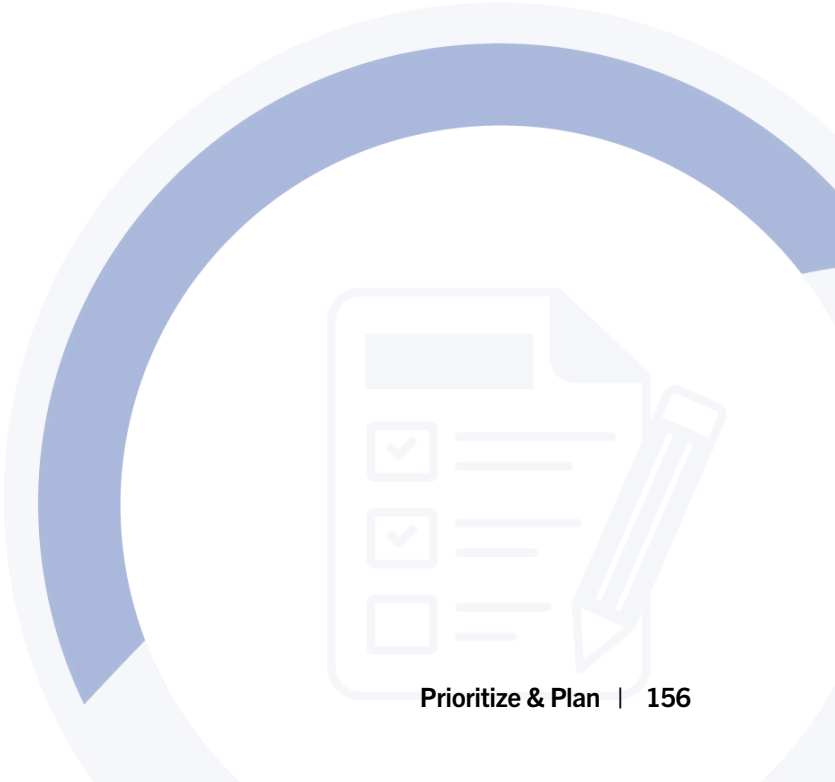
Start with the list of strategy options generated in Investigate Options. Ensure the prioritization team has a clear understanding of each strategy on the list.

Follow the process outlined in the previous Key Tactic to rank each public health climate action. It should have been previously determined whether prioritization will happen individually or collectively via group conversation. In either case, explore participants' perspectives, concerns, and other issues that arise through the process. The tool may not be perfect and may require some adjustment in practice.

Use results to guide final decisions about strategies

Use the prioritization results to further narrow down and rank public health climate actions for implementation. Sometimes two or more options can be combined into a selected approach.

The results of the prioritization tools may not be the definitive answer. Charts and matrices are *tools,* not decision-makers. Group discussions might raise insights that influence the final decisions in ways the prioritization tools could not capture.



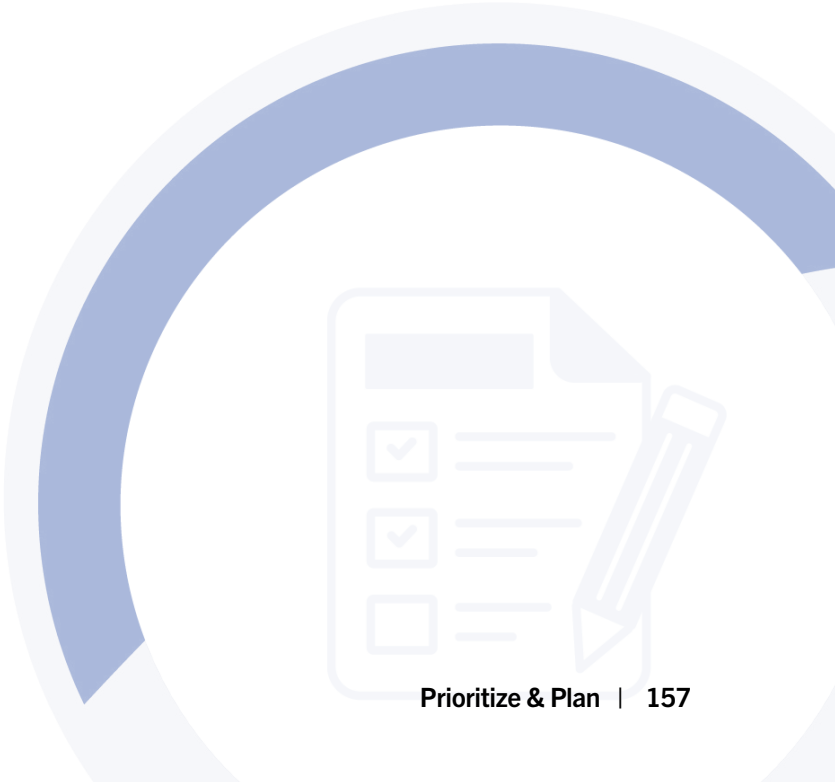
As the group narrows in on a decision, pay particular attention to the equity implications, considering with partners how a strategy might need to be adjusted to maximize equity benefits and minimize inequitable effects. Adjust to address potential problems, unintended consequences, or potential maladaptation (see Maladaptation discussion on page 160).

Now that a final decision has been made, share with partners, community members, other participants, and collaborators who informed the process.

Capture the thinking and work behind the climate actions not prioritized

Debrief on what has been learned thus far. Catalog other favored strategies that were not selected in case they are valuable later. Save notes about other strategies, indicating strengths and weaknesses. If a selected strategy is no longer desired, having good records will help shift gears quickly.

Evaluation support may be valuable here. An informal process to review partners' perceptions of the prioritization process can help improve relationships and buy-in. If an evaluation is conducted, vet and share findings and recommendations, as well as actions taken. In addition, sharing a brief summary of the process, important discussion themes, and the selected and unselected strategies can also enhance buy-in and trust.



KEY TACTIC 5.3

Develop action plans

Now that one or more strategies have been selected, draft a written plan for implementation. Moving too quickly to implementation without having a strong plan risks failure to meet desired goals. Written action plans are not just a formality.

Create action plans that include objectives, timelines, resource deployments, plans for partner and community engagement, and implementation work plans. Some health departments may develop multiple actions plans for one strategy or action plans with multiple components or phases.

Do not overlook the value of developing a theory of change or logic model to supplement action plans. These tools help users to figure out the connections between an action and the desired outcomes. Refining a theory of change or logic model roots action plans in the world and helps ensure positive impacts in people's lives.

THEORY OF CHANGE

A theory of change is an "illustration of how and why a desired change is expected to happen in a particular context."[3] It is focused on the "missing middle" between what a program or change initiative does—its activities or interventions—and its desired goals or outcomes. The theory of change maps out or fills in how the actions will achieve the desired outcomes.

A theory of change helps to avoid a situation in which selected actions are unlikely to actually achieve the desired objectives. Such failures can occur for reasons such as inadequate scale, an incomplete or inaccurate conceptualization of the problem, or ineffective methods. A theory of change can help to identify and correct these flaws.

Use a theory of change to think critically through each outcome objective and ask how, specifically, a public health climate action will lead to that outcome. Public health theories identify evidence-based mechanisms for how change occurs.[4] Avoid making assumptions, and instead rely on evidence and tested theories to make specific connections between activities and outcomes. Document the conclusions in either narrative or visual form.

See Worksheet 5.b for more on developing your theory of change.

Determine what kind of action plan is needed

There are many ways to develop a plan. BRACE provides outlines for two options: a full plan and an abbreviated plan.

A *full plan* is appropriate for medium- and high-capacity health departments and for strategies that have multiple, complex components or are resource intensive.

An *abbreviated plan* may be a better fit for lower capacity health departments, internal capacity building efforts, or more straightforward actions. This plan will have fewer components and may be written more concisely (around one to two pages).

Worksheet 5.b includes Abbreviated and Full Plan Templates to guide creation of both types of plans. Each plan is a starting point and can be built upon by adding other elements that are useful to have all together in the resource.

WORKSHEET 5.b: Abbreviated And Full Plan Templates

Neither template is ideal for jurisdictional-level planning or response planning for a specific climate threat (e.g., a heat response plan). BRACE recommends consulting existing examples of these kinds of plans to use as guides. Many can be found in climate action repositories, such as EcoAdapt's CAKE or NOAA's Climate Resilience Toolkit.

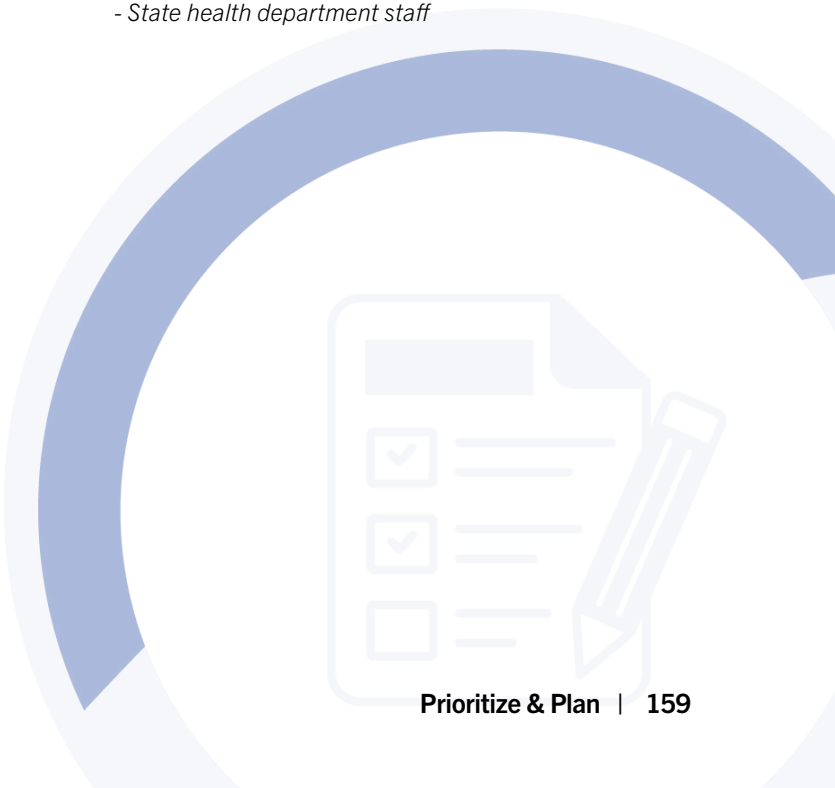
Develop the action plan

The first step to drafting an action plan is reviewing the information collected about the selected strategy in Investigate Options. Establish a process to engage partners and give them a chance to provide input before finalizing the plan. Build engagement opportunities for partners at the outset.

Other steps when drafting a plan include:

- Verify staffing, financial, and other resources needed for an action to assess what resources might be missing.
- Identify existing or emerging barriers that may impede actions. Pay special attention to institutional barriers or barriers resulting from siloes.[5]
- Identify partners who can support specific components of the plan. Clarify roles and contributions. Review outputs from Partner to support this.

> "If our communities aren't a part of developing the plan and actually implementing it, if we're not hearing from them and listening to them and seeking them out, then it's likely we're not going to reach the people that need it the most. **We need to make sure that we're creating a space for them instead of just holding a public meeting and waiting for them to show up.** We need to rely on our local health districts, nonprofits, and our community partners to make sure that they're there and we're capturing their needs."
>
> *- State health department staff*



UNDERSTANDING AND PREVENTING MALADAPTATION

Maladaptation describes unintended consequences of climate action that increase rather than decrease the risk of adverse climate-related outcomes. This can include increased GHG emissions, reinforced existing vulnerability, redistribution of vulnerability, introductions of new risks and sources of vulnerability, more inequitable outcomes, or diminished health or wellbeing, now or in the future.[6–8]

Long, complex bureaucratic processes for pre-disaster mitigation and post-disaster recovery are examples of maladaptation that reinforce existing vulnerabilities and exacerbate inequality.[9,10] Cooling centers in response to a heat wave contributing to spread of a communicable disease are an example of introducing new risks.[11] Infrastructure projects can sometimes redistribute risk. Governments and property owners are increasingly attempting to block sea level rise through seawalls and levees, in some cases worsening flooding and economic damage in unprotected communities.[12]

Maladaptation is a perennial challenge in climate adaptation. It is more likely when critical drivers of vulnerability are poorly understood or not considered. This is often due to incomplete engagement of all interest holders, particularly the residents of affected communities, or a scope that is too narrow, in terms of time and space.[6,13]

Several solutions to minimize maladaptation have been proposed.[6,13] A few key practices are:

- Improving assessments of the root causes of vulnerability to climate change among the intended beneficiaries.
- Expanding participation by a range of groups in the design, planning, and implementation of interventions to promote participatory justice.
- Ensuring that existing partner networks do not exclude the people who are most vulnerable and ensuring that the most powerful people are not put in a position to marginalize the most vulnerable even more.
- Expanding evaluation from measuring only outputs to longer term impacts on the resilience and wellbeing of the intended beneficiary populations or non-beneficiary populations, as well as unintended negative consequences.

Vet and revise the plan

Follow partner agreements to ensure partner and community insight is gathered and shapes the final version. Also consider if there is value in inviting previously unengaged interest holders to review. Potential interest holders include health department leadership, other government departments, government agencies, or other community-based organizations. It may be especially helpful to engage interest holders who may be less supportive or critical of the proposed strategy to gain insight about potential concerns that can be addressed in implementation and evaluation. The review process should include the time and resources needed to respond to the feedback.

> “The environmental justice principle of **‘nothing about us without us’** is really applicable here.”
>
> *- Local health department staff*

Develop a written communications plan to update partners and community on progress

Consistent communication is vital to getting and maintaining buy-in from community interest holders and leaders. Think about ways to frame the value proposition of the initiative and develop strategic and compelling messaging for relevant audiences, specifically a layperson audience and decision-makers.

Strong messaging and communications can:

- Generate broader buy-in.
- Expand untapped support for funding and resources.
- Counter pushback from individuals or departments.
- Promote sustainability.
- Align cross-sector departments and resources toward a common guiding vision to create project efficiencies and mutual benefits.
- Increase accountability.[15]

Use Worksheet 5.c Communications Plan Template to draft a communications plan to support the awareness building of selected strategies. Account for cultural differences, audience preferences discovered throughout the BRACE process, and language needs.

WORKSHEET 5.c: Communications Plan Template

Secure funding

Few health departments have dedicated funding for climate and health initiatives. About 80% of state and territorial health departments report having low capacity in terms of financial capital for climate and health. Only 5% of local health departments have dedicated funding to address the public health effects of climate change. For these agencies, the most common funding sources are the local government or the state health department. Lack of funding was perceived by health directors as the most significant barrier to implementing climate and health activities.[16]

SOLUTION SPOTLIGHT

Arizona Department of Health Services

Arizonans experience more than 100 days over 100°F per year. Yet, some populations are disproportionately impacted by extreme heat including people experiencing homelessness, older adults, and people without access to air conditioning. Maricopa and Pima counties assessed how to improve the visitor experience for cooling centers, developing best practices, and increasing awareness of locations. As a result of their efforts, new cooling center locations were identified using geospatial analysis, with sites chosen by their ability to best meet demand and support populations at higher risk. Additionally, heat alerts reach nearly 29,000 people on extreme heat days.[14]

If planned activities are not fully funded and partnerships have not financially enabled the initiative, seek opportunities for additional resources:

- As of 2024, climate and health-focused federal funding sources relevant for health departments are the CDC, Department of Housing and Urban Development, and the Environmental Protection Agency.
- Other federal agencies such as NOAA, Department of Transportation, and the Federal Emergency Management Administration have more substantial cross-sector funding that may have direct or indirect health implications. See the Office of Climate Change and Health Equity (OCCHE) Quickfinder for Leveraging the Inflation Reduction Act for the Health Sector and funding resources provided by the US Climate Resilience Toolkit.
- In some states, there may be funding available at the state level for particular types of initiatives.
- National-level private funding sources include the Kresge Foundation and Wellcome Trust.
- Health departments can also seek grants from local public health institutes, philanthropic organizations, and universities.

Consider the persuasive power of multi-solving solutions. Bundling projects within an existing agency program can provide a faster path to implementation. Consider which existing programs are already aligned with your objectives and identify new sources for funding or finance opportunities.

Think about how to combine funding and finances from a variety of sources—referred to as *blended finance*—to cover all stages of resilience building from community co-development and project design to execution and longer-term M&E.[15]

SOLUTION SPOTLIGHT

Pala Band of Mission Indians

The Southwest has the largest population of Indigenous peoples in the country, and they are often experiencing the worst effects of climate change due to high exposure, sensitivity, and lower adaptive capacity stemming from historical and social factors. The Pala Band of Mission Indians (located in what is now called Southern California) developed climate and health communication and outreach materials tailored to the specific needs of the Pala community, including a plan highlighting the importance of culture-based psychosocial resilience strategies. By creating culturally competent climate resilience communications, not only will the materials reach more people, but those people are more likely to use the strategies. This work has been supported through several mini-grants from CDC via the National Indian Health Board (NIHB).[14]

KEY TACTIC 5.4

Develop a M&E plan

M&E can support more successful actions, effective partnerships, and greater sustainability. Creating M&E plans during this planning phase allows an initiative to prioritize feasibility and address questions or concerns from partners and interest holders. Well-constructed and transparent M&E plans also foster feelings of buy-in and trust among partners and communities.[17] Note that evaluators often have skills in program design and planning and can be valuable to engage before a formal evaluation stage.

Monitoring is an ongoing process to track implementation progress through periodic data collection or review of existing data. Monitoring can be useful to indicate if changes need to happen during program implementation to support the achievement of implementation objectives (e.g., reach). A typical goal is to provide early indications of progress, or lack thereof.

Evaluation is a scientific activity that uses systematic data collection and analysis of programs, policies, and organizations to assess their effectiveness and efficiency. Questions that evaluation can help answer include strengths and areas for improvement of the program, adequacy of program resources, accuracy of program assumptions, quality or fidelity of program operations, and the intended and unintended effects of a program.[18]

Consult CDC's Framework for Program Evaluation for more information on this topic. CDC provides guidelines, templates, and resources organized around the six steps of evaluation: assess context, describe the program, focus the evaluation design, gather credible evidence, generate and support conclusions, and act on the findings.

Public health climate actions have unique M&E challenges. Interventions often have impacts that stretch over long-time scales, require multiple partners, and are implemented in dynamic and complex systems. Consider these realities and how differences between mitigation and adaptation strategies might require different approaches to M&E.

BENEFITS OF MONITORING & EVALUATION

Monitoring Benefits:

- Establishes accountability and ensures responsible parties are working towards common goals.
- Allows learning about what is and is not working, and making changes accordingly.
- Enhances transparency and builds trust and support for a project or program.

Evaluation Benefits:

- Provides insight into a program and its operations.
- Assesses impact, including the degree to which the strategy benefits the community, or has unintended effects.
- Builds program capacity when evaluation results are used to increase funding, skills, learning, and accountability.

Create an initial concept of the evaluation purpose and uses and users of the findings

After engaging interest holders, begin to conceptualize the purpose of the M&E effort, then determine potential uses of findings, as well as who will use them. These can be finalized later in the process.

When thinking about purpose, consider several different types of evaluation:[18]

- **Formative evaluation:** Assesses the degree to which a program, policy, or organizational approach may be feasible, appropriate, and acceptable before it is implemented.
- **Process/implementation evaluation:** Assesses how the program, intervention, or policy is implemented relative to its intended theory of change; typically includes information on processes, content, quantity, quality, and structure.
- **Outcome evaluation:** Assesses the extent to which a program, policy, or organization has achieved its intended outcomes; this type of evaluation does not attempt to attribute causality.
- **Impact evaluation:** Seeks to establish whether a causal relationship can be established between a program or activity and an outcome by estimating and comparing outcomes with and without the program or activity.
- **Economic evaluation:** Assesses program effects relative to the costs of the program and often includes cost analysis, cost-benefit analysis, cost-effectiveness analysis, and cost-utility analysis; this can overlap with other evaluation types depending on the evaluation questions.

Draft the Monitoring & Evaluation plan

Worksheet 5.d is a M&E plan template adapted from CDC's Framework for Program Evaluation[18] and other CDC resources.[19,20] The most crucial elements of public health evaluation are included in this template, but users can adapt it as needed.

WORKSHEET 5.d: M&E Plan Template

> "How do you evaluate this in a way that makes sense for the communities you're trying to serve with competing priorities and competing budgets and deadlines? **Ask your community 'what do you want to see change, what do you think needs improving.'** You're almost co-creating a vision for what success could look like."
>
> *- National organization staff*

CONTEXT MATTERS

A M&E plan will depend on the capacity of the health department, the expertise and availability of M&E staff, or resources to support an external evaluator.

A first step is to assess context. This can include settings in which evaluation occurs such as location and environment; people and their values or beliefs, politics, economics, cultural, and historical circumstances; evaluation capacity; ways that power and privilege are brought to bear; and whether the program is ready for an evaluation that can produce relevant, useful, and rigorous insights.[18]

Another key aspect of evaluation success is a program description, which identifies the outcomes the program intends to achieve and the key activities that are expected to lead to those outcomes. Often presented as a graphic (e.g., a theory of change or logic model) and a narrative explanation, the description ensures that all interest holders have a shared understanding. The program description is the foundation for all subsequent steps; an effective evaluation without one will be challenging to design and implement.[18]

Next, it is time to focus the evaluation, which includes finalizing the purpose of the evaluation, how the findings are likely to be used, who is likely to learn from or use the findings, the evaluation design, and a list of evaluation questions. Each of these elements should be aligned with each other; for example the design should be suitable to answer the proposed evaluation questions.

Once M&E questions are finalized, decide how you will gather credible evidence to answer them. The following are typical planning activities for this step:

- Identify data sources currently available to answer questions.
- Identify what additional data is needed to answer questions and how feasible it will be to collect data considering capacity, resources, and timeline.
- Decide whether to develop indicators. Use existing resources to guide indicator development.[21,22]
- Determine if the evaluation will set expectations for indicators about what qualifies as "success" or levels of achievement such as "good," "adequate," or "poor."
- Bring justice, equity, and belonging considerations into evaluation questions.
- Strategically use a combination of quantitative and qualitative data that responds to a variety of needs. Consider interest holder needs and perspectives on what types of data are more credible. Some partners may view quantitative data as more accurate and valid, while others may place greater weight on personal stories that emerge from qualitative sources.[19] This underscores the value of mixed methods.

SOLUTION SPOTLIGHT

Rhode Island Department of Health

In Rhode Island, the economy and culture are tied to the ocean, making the effects of climate change particularly acute. Utilizing CDC Climate and Health Program grants, the Rhode Island Department of Health assessed climate change and health vulnerabilities specific to Rhode Island, produced a Social Vulnerability Index Map, a Climate Change and Health Resiliency Report, and developed a Climate Change and Health Adaptation Plan. These projects have not only produced measurable reductions in the health burdens of climate change but have helped to further address and adapt to the many public health effects of climate change in Rhode Island.[14]

NEW AND EMERGING EVALUATION APPROACHES

New and emerging evaluation approaches may be especially valuable for public health climate action. For example, Developmental Evaluation is well suited for complex or uncertain environments, innovative solutions and crises. This method facilitates real-time feedback to implementers feeding a continuous development loop.[23]

Another approach useful for evaluating the complex, human, and ecological systems is Blue Marble Evaluation, which encourages evaluators to adopt a long-term perspective, assessing the resilience and adaptability of interventions in the face of dynamic and uncertain environments.[24]

Appreciative Inquiry is an approach to organizational change that focuses on strengths, rather than on weaknesses, deficits or problems. Also a group process, Appreciative Inquiry identifies and further develops the best of "what is" in organizations in order to strengthen their capacity to create positive change.[25]

Last, Contribution Analysis attempts to assess causal questions, inferring causality for particular outcomes. It is designed to reduce uncertainty about the contribution an intervention is making to the observed results by increasing understanding of why the observed results have occurred through the use of theory of change.[24]

The BRACE M&E template is a general starting point. It does not encompass the full range of evaluation approaches that can be taken for this work. Use the worksheet as applicable and move beyond it as needed.

Finally, add plans to analyze the data, interpret findings, and generate conclusions in a way that features collaboration and dialogue with partners. Ask partners and community members about the best way to share results. Consider using innovative techniques like data stories or multi-media formats, as well as data dashboards, written reports, graphics, or other visual forms of communication to illustrate and share M&E findings with interest holders.

The last step, acting on the findings, is the most crucial; a good evaluation plan begins with the end in mind. When developing the plan, ensure that you have built in mechanisms and processes that align with your finalized purpose(s) and needs of interest holders and will facilitate action in terms of using the findings generated for decision-making and program improvement.

Key Reflections

Justice, Equity, and Belonging

- Are prioritization processes and criteria aligned with recognitional, structural, and distributive equity? How?
- How are communities who are most affected involved in the prioritization and planning processes?
- How are you considering different identities when considering equity (e.g., sex, gender identity, disability, race, intersectional identity) throughout this element as you select a climate action strategy and an associated action plan?
- Are you aligning the action plan and associated goals and outcomes with community goals? Does your theory of change or logic model generate explicit health equity outcomes?
- Do the proposed climate action strategies help build community capacity through expanded knowledge and skill base, funding, or other resources?[26]
- Does the selected climate action strategy support long-term relationships and trust between the health department and local communities?[26]
- How are you considering the potential for maladaptation in the selected climate action strategy and action plan? How is this integrated in your evaluation plan?
- Does the selected climate action strategy include M&E mechanisms or other means to minimize harms and maximize climate equity?[26]
- How are you identifying the most appropriate evaluation methods for the communities you are working with? What kind of burden does the evaluation plan place on the community?

Cross-Cutting Activities

COLLABORATE

- How are you bringing communities that experienced disinvestment into the prioritization and planning processes? How have you included Tribal communities in your planning?
- How is the prioritization and planning process involving non-health sectors?
- How have you followed the approach to partnership determined in Partner?
- If trust was harmed or undermined at any point, how can you rebuild or make amends?

COMMUNICATE

- Did you engage in transparent communication with partners throughout the prioritization and planning process?
- Did you return to the community to convey the selected climate action strategy and action plan?
- How are you formulating the information shared to meet the interests, expectations, and needs of the audience?

EVALUATE

- How has the preparation from the other elements set you up for success in designing the evaluation plan?
- Did you practice reflective thinking while developing the plan?
- Have you consulted with the community or your evaluation team to ensure that the evaluation you have created accurately reflects the knowledge they are hoping to gain?

Priority Principles for Prioritize & Plan

The BRACE Framework is informed by ten key principles, intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, three salient principles and examples of their practical relevance are highlighted.

PRINCIPLE 2. **Take timely, evidence-informed action**

This principle encourages BRACE users to utilize the best available evidence to inform prioritization and planning. Doing so maximizes the likelihood of a positive impact despite uncertain conditions inherent in climate action.

PRINCIPLE 3. **Prioritize community experience**

This principle underscores the importance of inclusive and community-centered approaches to prioritization and planning for public health climate action; engage community members throughout the process to ensure that final outcomes reflect their values and needs.

PRINCIPLE 5. **Minimize harms**

Maladaptation in climate action can lead to unintended consequences that exacerbate vulnerability and introduce new risks. Health departments can minimize harms by ensuring inclusive planning, improved assessments of vulnerability, and participatory approaches in prioritization and planning processes.

Conclusion

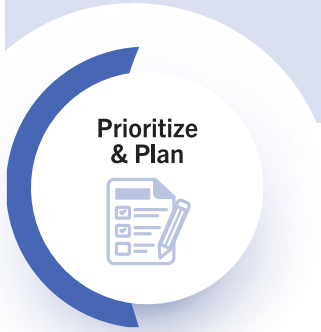
When to move to Take Action

Prioritization and planning can be time consuming, but the goal of the effort is not primarily to create a great plan. Rather, the goal is to facilitate the success of climate action. It is more important to develop a good plan and move to action than to develop a perfect plan that is never implemented.

When to revisit this element

When implementation concludes—because the project has been completed, circumstances changed, or insurmountable barriers arose—it may be the right time to return to Prioritize & Plan.

Revisiting this chapter to select and plan for a new climate action strategy will make the most sense if not too much time has passed—otherwise the underlying conditions, community sentiments, and evidence base may have changed too much and it would be most helpful to return to Listen & Assess.



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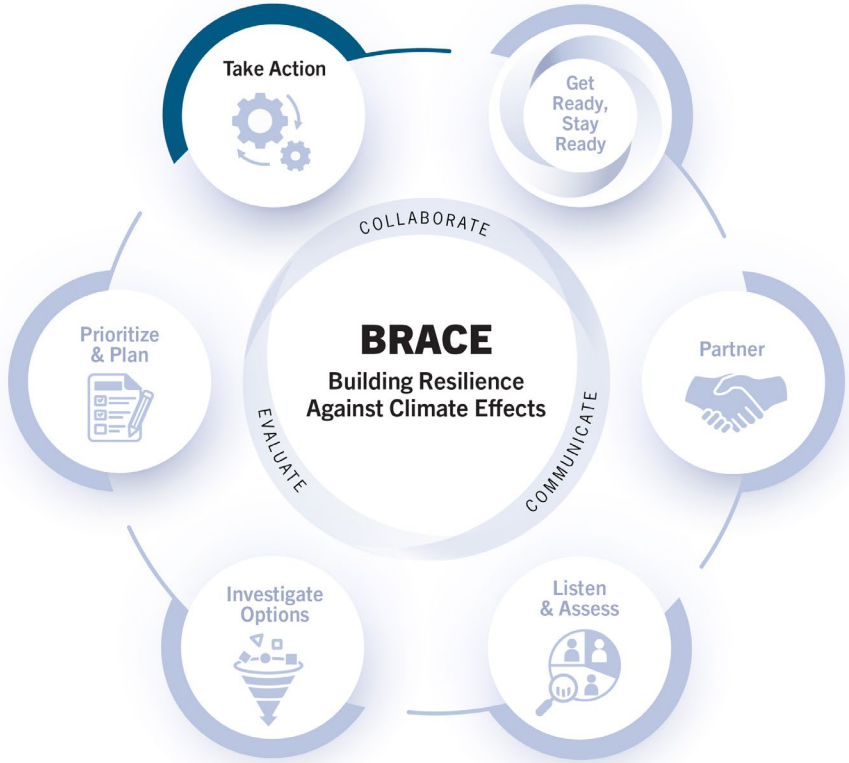
Take Action

CHAPTER 6



After all the planning, it's time to take action. In this element, build on the work done so far to implement, monitor, and communicate about the public health climate action undertaken to promote health; improve resilience; and expand justice, equity, and belonging.

Key Tactics

KEY TACTIC 6.1 Implement selected actions

KEY TACTIC 6.2 Implement monitoring and evaluation

KEY TACTIC 6.3 Modify actions as needed

KEY TACTIC 6.4 Share successes and lessons learned

Take Action

Outputs

- Monitoring and evaluation (M&E) tools, data, and insights used to improve the public health climate action and make decisions
- Evidence about how to improve implementation and demonstrate achievement of objectives and positive health and health equity outcomes
- Communications products

Introduction

Why do this after Prioritize & Plan?

The previous element, Prioritize & Plan, prepared for the implementation stage by selecting a final public health climate action and drafting supporting plans. Preparation is vital to efficient and effective implementation. Preparation also helps BRACE users be flexible and responsive to emerging opportunities and unforeseen barriers. Prioritize & Plan sets up for success by aligning activities with community needs, assessing capacities, setting intentions with community, partners, and decision makers, and developing implementation, M&E and communications plans.

Before you begin

Implementation can be daunting. At times, public health professionals may be hesitant to act unless they have complete understanding of highly technical climate science or complete confidence in the selected strategies based on existing evidence.[1] The best way to overcome this hesitancy is through strong partnerships and alignment with community priorities. Keep the exigency of the problem at the forefront. There is adequate scientific consensus that action is urgently needed.[2,3]

This chapter guides BRACE users into action using the best available evidence and community insights, acknowledging that users will not have an exhaustive accounting of parameters or absolute certainty of outcomes.

CONTEXT MATTERS

State and large city health departments likely have more resources to dedicate to the implementation of climate action. Smaller local and Tribal departments, conversely, may have a more nuanced understanding of community needs and priorities, translating into a more robust understanding of how to successfully implement actions.

In Get Ready, Stay Ready you assessed internal capacity, in terms of staff availability, expertise, financial capital, and leadership support. If more capacity is needed, refer to Key Tactic 6.4. Additionally, strengthen and leverage partnerships with other government agencies, academic institutions, community-based organizations, Tribal organizations, and grassroots coalitions.

KEY TACTIC 6.1

Implement selected actions

Now is the time to switch gears from preparation to implementation. Start by building a team and expanding capacity as needed.

Build a strong implementation team and begin implementation

The necessary skill sets, expertise, and perspectives to implement the selected actions should have been identified in Prioritize & Plan. If an implementation team has not yet been determined, consider those needs, gather more context if required, and build a team that meets needs.

Key aspects to consider in assembling implementation team members:

- Consider diversity across racial, ethnic, gender, lived experience, ability status, class, cultural, and other backgrounds. Try to build a team that reflects the community of focus.
- Recruit team members from partner organizations such as universities, other state, local, or federal agencies, non-profit organizations, philanthropic organizations, or community-based organizations.
- Develop a structure that responds to various participants' time and expertise. Consider questions such as: Do you need sub-teams? Should there be advisory or consultant roles? Who has decision-making authority?
- Identify community members to be a part of the implementation team where possible. As previously described in Partner, compensate community members for their time and effort.

SOLUTION SPOTLIGHT

Sitka Tribe of Alaska

The Sitka Tribe of Alaska relies heavily on shellfish and seafood for nutrition and cultural purposes. Warming water temperatures threaten the safety of shellfish for human consumption. With a 2019 mini-grant from the CDC via the National Indian Health Board (NIHB), the Tribe coordinated a regional project to monitor shellfish contamination. Through this project, they are building capacity to support testing and notification of threats to traditional shellfish and sea dependent diets.[4]

Once a team has been assembled, consider what each member needs to be successful.

- Ensure that team members are familiar with the implementation plan created in Prioritize & Plan.
- If not already established, for each task, establish who should be responsible for leading, who is accountable for making sure it happens, who should be consulted throughout the process, and who should be informed of progress. Individuals assigned to each role should have appropriate skills, time, and resources. Creating a simple table (often called a "responsible-accountable-consulted-informed" or RACI matrix) that details each of these roles according to specific task is one way to plan for and keep track of team member roles.
- Review the partnership approach outlined in Partner to ensure each team member is engaged as expected and understands what roles other partners will play in implementation.

Build capacity, internally and externally

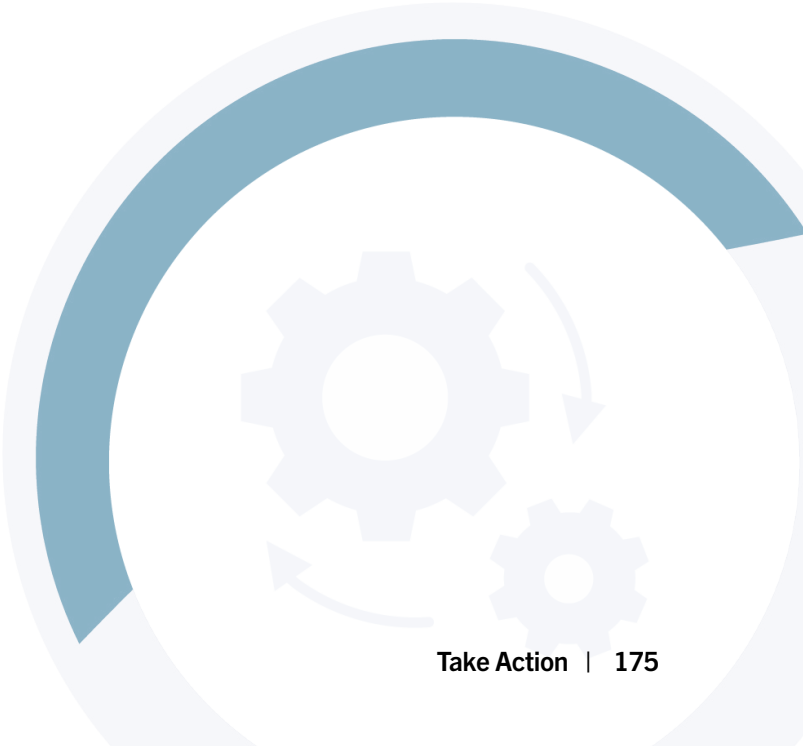
Consistently look for ways to build capacity within the organization and among partners as implementation unfolds. Consider how building capacity through changing knowledge, behaviors, attitudes, and mental models can serve as a deeper systems-based intervention. The process of learning by doing offers an ideal opportunity for gaining perspective and confidence. Capacity can also be expanded through seeking additional funding, hiring or contracting additional staff, attending or facilitating workshops or training, or seeking in-kind support.[5]

Communicate progress

Communicate with all interest holders throughout implementation to keep them informed and engaged. Poor communication can result in lack of commitment, misunderstanding of expectations, misaligned definitions of success, and conflict.[6]

Capture the implementation actions, challenges, successes, and outcomes to share with partners, interest holders, and the community according to the established communications plan. Communication should occur regularly. Convene a small group of interest holders to establish what information could be communicated,

> **"It's a long-term part of the process.** In implementing this, hopefully, there's increased capacity and it's not extractive processes. Hopefully, as a result, there are stronger partnerships and increased funding. All these things that hopefully direct back into the successful implementation in reducing health disparities due to climate change."
>
> *- Community organization staff*

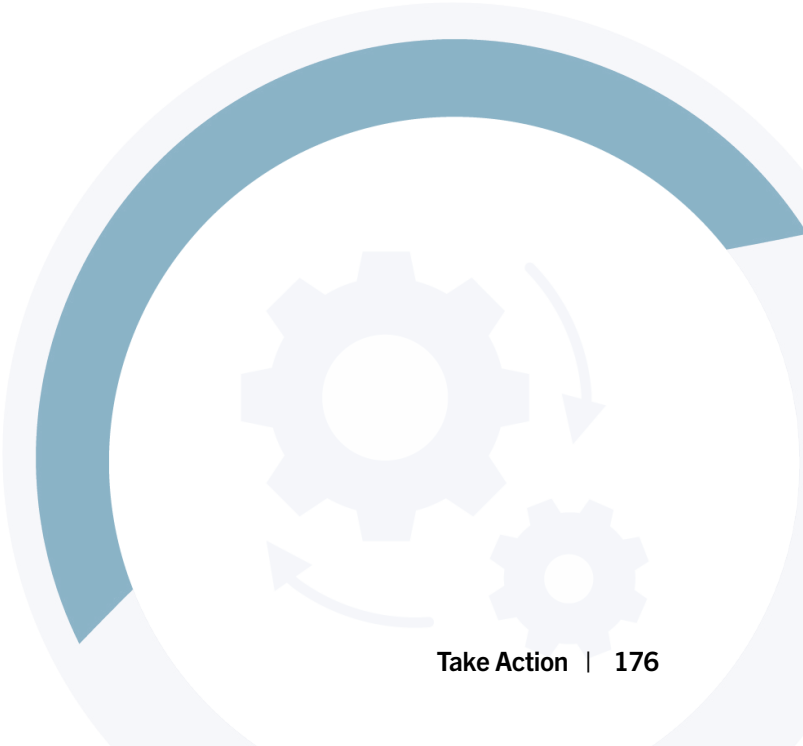


highlighting plans, successes, and lessons learned related to topics such as community engagement, planned actions, and outcomes. Ensure communications are in an audience-appropriate format, literacy level, and language.

No single communications strategy will fit every scenario. Keep in mind several actions to ensure a communications plan is effective:

- Make content accessible to non-subject matter experts with different backgrounds including partners, community members, and other interest holders.[7]
- Use a variety of products including blog posts, brochures, fact sheets, webpages, newsletters, infographics, manuals, social media posts, or short videos.
- Develop after action reports for specific events, such as heat waves, that summarize data and practices in one place to inform future activities. For an example, see Health Impacts from Excessive Heat Events in Multnomah County, Oregon, 2021.
- The voices of communities most impacted by the effects of climate change should shape communications and be amplified through communications outputs.
- Use narrative and data storytelling to deliver compelling key messages, with narrative arcs that tell more engaging stories about initiatives, challenges, and successes.
- Ensure that, where possible, efforts are structured to build community capacity for communications.
- Consider using PhotoVoice—a method described in Listen and Assess—to amplify voices that are often unheard.[8]

As needed, modify the communications plan to ensure that intended audiences are reached.



KEY TACTIC 6.2

Monitor progress and measure effectiveness

As outlined in Prioritize & Plan, M&E actions track the implementation process and assess whether a program is achieving desired outcomes.[9] To track both process and outcomes, M&E efforts can begin before implementation (formative evaluation), happen concurrently with implementation (monitoring or outcome evaluation), and after the conclusion of implementation (outcome and impact evaluation).

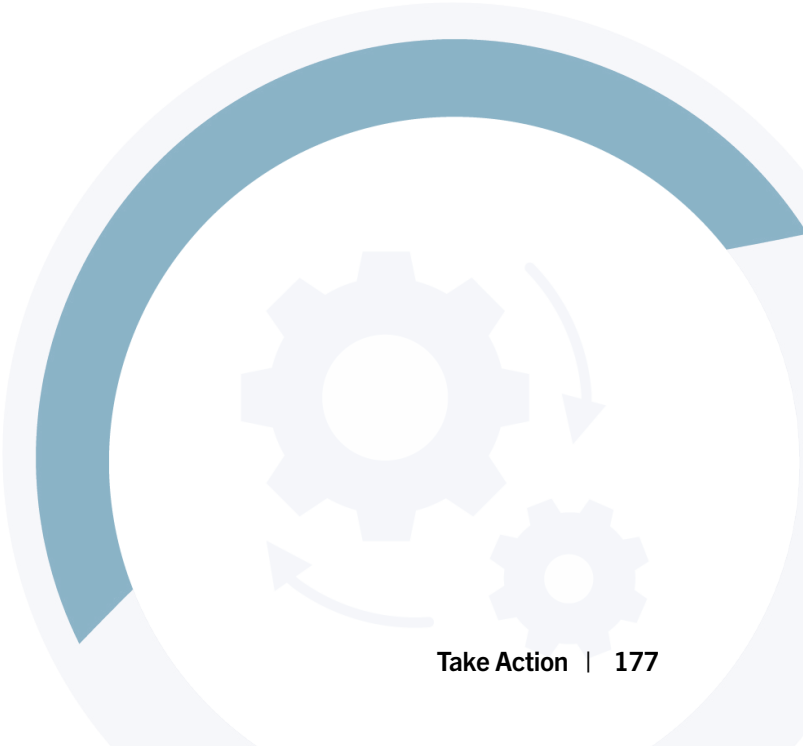
Collaboratively track processes and outcomes

Monitoring and evaluation, much like the rest of BRACE, requires partners. Reconnect with the various entities identified in earlier elements of BRACE and give them an opportunity to provide input on data collection instruments, methods, analysis, interpretation of results, and dissemination plans.[7]

The M&E plan—drafted in the previous element—stems from the theory of change or logic model. Introduced in Prioritize & Plan, a theory of change is a written description or a visual depiction of how and why a desired change is expected to happen. It focuses on the "missing middle" between what a program or change initiative does—or its activities or interventions—and its desired goals and outcomes.[10] Beyond the core metrics suggested by a theory of change or logic model, additional metrics may also be tracked either formally or informally.

Several other M&E activities include:

- Ensure there is an evaluator or evaluation team established if budget and capacity allow. Some health departments may hire a consultant to lead evaluation activities. If operating with fewer resources, aim to identify an M&E lead.



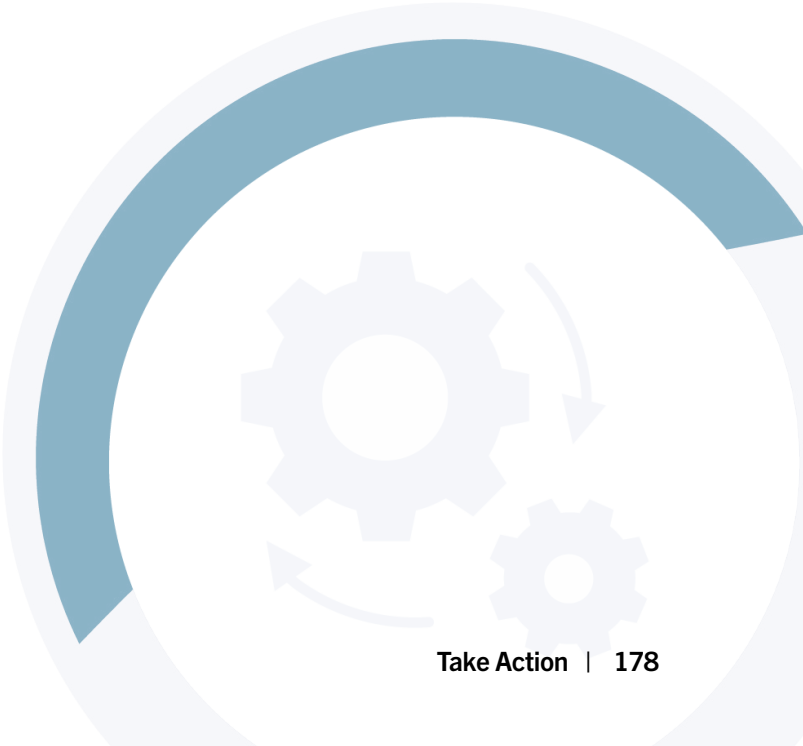
- Compare activities and outputs to:
  1. The anticipated plans
  2. Whether an initiative is on track to achieve stated objectives.
- Revisit the theory of change or logic model often; assess whether findings support original conceptualizations. If not, consider if the implementation plan should be augmented or adjusted.
- Narrow or expand indicators if new opportunities become apparent during implementation.[11]
- Avoid collecting data that will not be used to improve the program, help make decisions, or assess outcomes.

Evaluate justice, equity, and belonging processes and outcomes

The M&E plan should include an assessment of the justice, equity, and belonging implications of the public health climate action. Revisit M&E questions, metrics, data collection, and data analysis plans and make adjustments as needed.

In addition to outcomes, also think about process. When possible, incorporate community members and partners representing communities most impacted by the effects of climate change and who are the intended beneficiaries of the public health climate action into the evaluation team.

> "The evaluation and monitoring is a place, especially when you're working with other partners, and you're not leading implementation, where you could build up resources and knowledge for evaluation. **Public health departments could be a much more valuable partner and could easily demonstrate their value in a project by building out this evaluation piece.**"
>
> *- Local health department staff*



KEY TACTIC 6.3

Modify actions as needed

No plan is perfect. Rapid changes in climate science, intensifying climate impacts, and emerging technologies make this particularly true for climate actions. A successful and effective program or initiative understands this reality by course correcting, reallocating resources to respond to changing circumstances, and iterating with new strategies.

Cycles of action and revision should be expected. It is essential to respond to lessons learned and incorporate emerging information, opportunities, and experiences during implementation.[12] Build a culture of iteration. This does not mean "starting from zero," but rather reflecting and adapting using the latest information, conditions, and resources to inform, refine, and improve plans and processes.[12]

Anticipate and respond to common challenges

When implementing public health climate action, BRACE users are likely to encounter some common challenges, including limited staff capacity, uncertainty in predicting outcomes, and funding constraints.

The strategies listed below can help address these challenges:

1. **Limited Staff Expertise**
    a. **Challenge:** Limited staff expertise is a common challenge for health departments. State health department staff have reported experiencing low self-efficacy, inhibiting them from developing and implementing public health climate actions. Staff also noted limitations in their capacity to communicate climate and health information to constituents due to a lack of training and the complex nature of climate change.[13] Some have expressed concern about their lack of technical skills and expertise in key subject areas, including epidemiology, geographic information systems, and community engagement.[14]

> "**One thing we learned is that the moment you write a plan is the moment you're changing that plan,** because this space is so darn fluid. So, the need to be iterative and not wed to any sort of sacred step in your plan is important."
>
> *- National organization staff*

b. **Response:** BRACE users should expand and leverage partnerships with academic institutions, departments within their agency, community-based organizations, and cross-disciplinary organizations with relevant skills. Such partnerships can offer technical assistance, training opportunities, and subject-matter expertise. Local health officials have reported that the most common area of climate and health capacity development has come through collaboration and knowledge sharing with peers.[14,15] Get Ready, Stay Ready and Partner share more information about how to build capacity and collaborate effectively with partners.

2. **Uncertainty**

   a. **Challenge:** Uncertainty around understanding and predicting the health impacts of climate change can create barriers to action.[16] Health departments have reported a lack of timely, locally relevant data needed to inform climate action, which can lead to hesitancy and, ultimately, inaction.[17]

   b. **Response:** Health departments should recognize that there is adequate scientific consensus that climate action to protect health is urgently needed.[2,3] BRACE users can and should take action despite uncertainty. Refer to Prioritize & Plan for more guidance on developing a theory of change or logic model to strengthen implementation plans. These tools are useful for aligning actions with intended outcomes, improving the likelihood of positive impacts on public health. Read more later in Key Tactic 6.3 about adaptive management, an approach well suited for public health climate action.

3. **Funding Constraints**

   a. **Challenge:** Funding constraints are another leading challenge for public health climate action. It is well-established that climate and health programs are underfunded.[15] This is not a problem limited to the United States; globally, less than 1 percent of funding for climate change adaptation goes to health systems.[14] All health departments are challenged in hiring and retaining personnel and developing and implementing interventions. State health departments are limited in their ability to support local health departments.[14,16]

   b. **Response:** Until funding for public health climate actions increases, health departments will be limited in their ability to respond adequately to climate-related health needs.[18] Health departments and other partners have taken on this challenge by being creative and proactive in their efforts to secure funds. In addition to actively seeking federal, state, and private funding, leveraging partnerships can be an effective way to address challenges with funding constraints. For example, the San Francisco Department of Public Health and the Arizona Department of Health Services have collaborated with other well-funded departments, state agency partners, and universities.[17] Enhancing climate and health communications can help create awareness and generate buy-in from interest holders, potentially leading to more funding opportunities.[15] Highlighting the multiple benefits of climate and health initiatives may also be effective by demonstrating how investments in climate and health contribute to broader goals that touch many sectors. See Prioritize & Plan for more information about funding opportunities.

4. **Political Will and Polarization**

   a. **Challenge:** Lack of political will and polarization are other common challenges faced by health departments.[14] Some health departments report difficulty securing funding or applying for grants related to climate change due to concerns about political divisions. This can stall implementation and result in inaction.[14]

   b. **Response:** Practitioners can focus on highlighting the health impacts of climate change and the many health and other benefits of acting with decision-makers at all levels. Such discussion has been shown to increase public engagement by fostering optimism about society's ability to address climate and health challenges as well as increasing perceptions of per-

sonal risk. These feelings have been shown to strengthen support for climate policy and increase motivation to take climate advocacy actions. Moreover, some of these effects have been observed among people who are political moderates and conservatives.[19]

5. **Lack of Prioritization of Climate and Health**
   a. **Challenge:** The relative lack of priority given to climate and health poses a challenge to health departments. While state and local health officials identify climate change as a public health issue, it is typically not among their priorities.[14] Competing demands for time and resources exacerbate these challenges, especially after the COVID-19 pandemic.[17]
   b. **Response:** BRACE users should increase awareness about the existential threat that climate change poses to public health among their staff and leadership, highlighting the immediate and long-term impacts across a range of health outcomes. BRACE users can also seek to integrate climate considerations into broader health and emergency response efforts outside the agency. Emphasize the many benefits of public health climate action, such as improved air quality and enhanced community resilience, to help garner support. Climate activities may be more effective when woven throughout agency operations instead of siloed as an environmental health problem.

Use adaptive management strategies

Adaptive management is an iterative, learning-based approach to designing, implementing, and evaluating strategies in uncertain, complex, and changing systems.[20,21] Principles of adaptive management inform BRACE because decision making in public health climate action recognizes that the needs of today may differ from the needs of tomorrow. Adaptive management may be less familiar to public health practitioners but has been successfully used in ecosystem management, watershed management, emissions trading, and air quality monitoring.[22]

Adaptive management organizes an action into smaller stepwise pieces to implement strategies rapidly, recognizing practitioners often must work with incomplete knowledge and understanding. Strategies need to be updated alongside learning.[12]

SOLUTION SPOTLIGHT

Wisconsin Division of Public Health

The Wisconsin Climate and Health Program addresses the health effects related to extreme heat, extreme cold, flooding, and vector-borne diseases. One of the adaptation activities that the Wisconsin Heat Health Network is developing is an early warning system in the urban southeastern part of the state and providing heat-health messaging to reduce the health impacts of heat-related illness. The heat health warning system will increase community climate resilience by allowing local decision-makers to implement informed interventions.

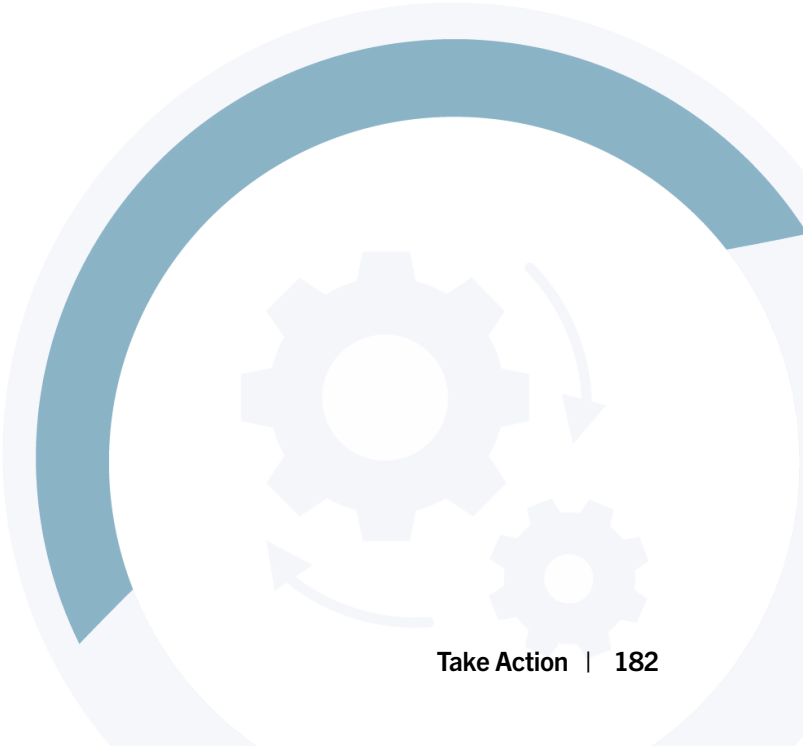
Additionally, Wisconsin developed the Flood Resilience Scorecard to help local officials identify critical infrastructure risks and social vulnerabilities to improve flood-related health outcomes. This scorecard is a comprehensive checklist that assesses social, institutional, and environmental variables so that local municipalities can better assess their risks of flooding events. It also allows local municipalities to better plan for future flooding events by using the tool's recommendations based on their individual scores. Already, sixteen communities have completed scorecards, considered recommendations, and brought together sectors for collaboration and implementation.[4]

The National Research Council recognizes six key features of adaptive management[22]:

1. **Management objectives are regularly revisited and revised.** Different perspectives among interest holders about objectives are likely; recognition and discussion of these are part of the process.
2. **A model of the systems being managed.** A model of the system, which could be quantitative or qualitative such as a theory of change or a logic model, provides a foundation for learning and helps identify gaps, assumptions and knowledge limitations.
3. **A range of management choices.** Sometimes objectives will be agreed upon, but there are alternative strategies to potentially achieve these objectives. A range of choices should be considered and evaluated; multiple strategies can be tested simultaneously when possible.
4. **M&E of outcomes.** A mechanism for comparing outcomes is central to improving knowledge and should show progress towards objectives.
5. **Mechanisms for incorporating learning into future decisions.** There should be mechanisms for feeding information gained back into the management process. Political will to act upon that information must also exist. If these are missing, learning will not result in better management decisions and policies.
6. **A collaborative structure for interest-holder participation and learning.** Meaningful involvement that includes give and take, active learning, and some level of agreement is a challenge, but is essential to adaptive management.

Many of these features have been built into earlier elements of the Guide.

Though there is no widely accepted and clearly defined course of adaptive management, there are several resources that provide recommendations and best practices.[22–25] These may be more useful to follow more formally in certain situations. An approach that is more faithful to formal adaptive management methods may be especially useful when there is a mandate to take action in a context of high uncertainty and when there is institutional commitment and capacity to undertake long term measurement and evaluation of outcomes. It can also be warranted when the management objectives are clear, the value of reducing uncertainty is high, uncer-



tainty can be expressed as a set of competing but testable models, and a monitoring system can be put in place with a reasonable expectation of reducing uncertainty.[24]

Whether adaptive management is followed strictly or not, incorporate feedback into your management and implementation.[20] In some cases, modifying implementation plans may be difficult during a project or initiative because of the fear that making changes will be perceived as failure. However, such a mindset is misaligned with the realities that are inherent in climate and health.

Some ways to regularly incorporate learnings to improve implementation and outcomes include:

- Using the M&E system established in Prioritize & Plan to watch for suboptimal results and address problems as they appear.
- Work with an evaluator or use evaluation approaches that explicitly align with adaptive management strategies.
- Assess the specific categories or areas where challenges are likely to arise and target changes within those areas. This can often include staffing, leadership, prioritization, budget, new competing priorities, implementation contingencies, partner buy-in, and community buy-in.
- Allow certain external events, thresholds, or longer-term trends to trigger iteration and adaptation. Examples of these events include new regulations, new findings, new engagement opportunities, novel hazards, new technologies, changing community needs, or resource changes. If these occur, especially when they directly impact implementation or outcomes, modify the approach; revisit Prioritize & Plan if needed.
- Reflect on the original timeline and deadlines to revise based on a more realistic assessment of anticipated completion dates.
- Closely monitor the budget to ensure that resources are invested wisely and can be responsive to community demands.

In sum, this sub-tactic outlines the importance of reviewing and iterating selected actions. Adaptive management is a vetted practice that can support this process.

SOLUTION SPOTLIGHT

Massachusetts Department of Health

The Massachusetts Climate Change Adaptation Report identified a need for strengthening public health and healthcare infrastructure to promote climate-resilient communities. To help meet this need, the Massachusetts Department of Public Health (MDPH) awarded grants to local health departments and launched a vulnerability mapping tool to support climate adaptation planning. Local public health departments can assess the need for adaptation efforts, operate municipal warming and cooling centers with emergency preparedness partners, and conduct health impact assessments of climate action strategies.[4]

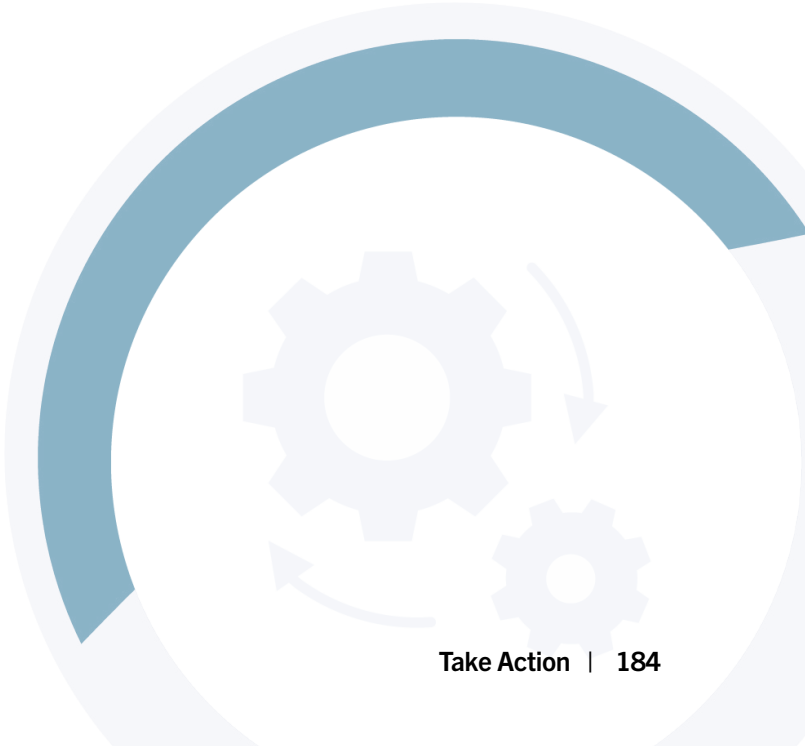
Minimize the risk of maladaptation

Maladaptation is a key concern to consider throughout implementation. Recommended steps to limit or prevent maladaptation were presented in Prioritize & Plan.

If an implementation team developed a rich picture, theory of change, logic model, or other kind of participatory diagram that reflects relevant influencing or contextual factors, refer to the diagram periodically to maintain awareness of potential unintended consequences.

Document risks of maladaptation across spatial and time scales and create a plan for minimizing such risks. Monitoring efforts can be deployed to ensure that implementation is not exacerbating inequity or climate vulnerability for any specific groups.

Maladaptation has a high potential to be "locked in" when policies, procedures, and initiatives do not sufficiently shift course. Monitoring and evaluation plans that emphasize flexibility and course correction can reduce the potential for maladaptation.[26]



KEY TACTIC 6.4

Share successes and lessons learned

Considering the size and diffuse burden of responsibility of climate change, consider work done at a local or regional scale as supporting a global effort to limit the harmful effects of climate change. As such, successes and lessons learned should be shared with local communities as well as broader national and international audiences. Sharing about a project helps build sustained buy-in from the community, partners, and interest holders and improves the collective understanding of best practices for others seeking to do similar work.

Use an array of communication methods and channels

Use the communications plan drafted in Prioritize & Plan. This plan, like others, should be revised and updated as insights emerge throughout implementation.

Successes and lessons learned can be shared during implementation as well as after the conclusion of implementation. As you are sharing successes and lessons, use an array of different communication methods and channels. Consider expanding audiences to state or national levels, particularly if successes are noteworthy or have applicability in other settings. Do not avoid sharing challenges and even failures, as these present especially rich opportunities for learning.

Promote multiple benefits

Beyond sharing findings explicitly connected to the implemented actions, emphasize the many potential benefits of a public health climate action.

These ancillary benefits may occur with public health climate action and include, but are not limited to, improved water quality, improved social cohesion, better

> **It's vitally important to be able to close the loop** and say, 'okay, here's what our plan is, here's how well we're doing and ... we thought we could do this and really, we've realized we can't, but maybe we can do this instead.
>
> *- State health department staff*

air quality, and a cleaner environment.[27–30] This is particularly relevant for nature-based solutions, such as greening gray surfaces and ecosystem restoration, where the other benefits can be experienced directly and are more immediate and tangible to some audiences.[31–33]

Even if your program does not directly measure a range of benefits, find ways to demonstrate how potential benefits might apply to your action. Cite the scientific literature that demonstrates the link between an implemented action and its documented benefits in other settings.

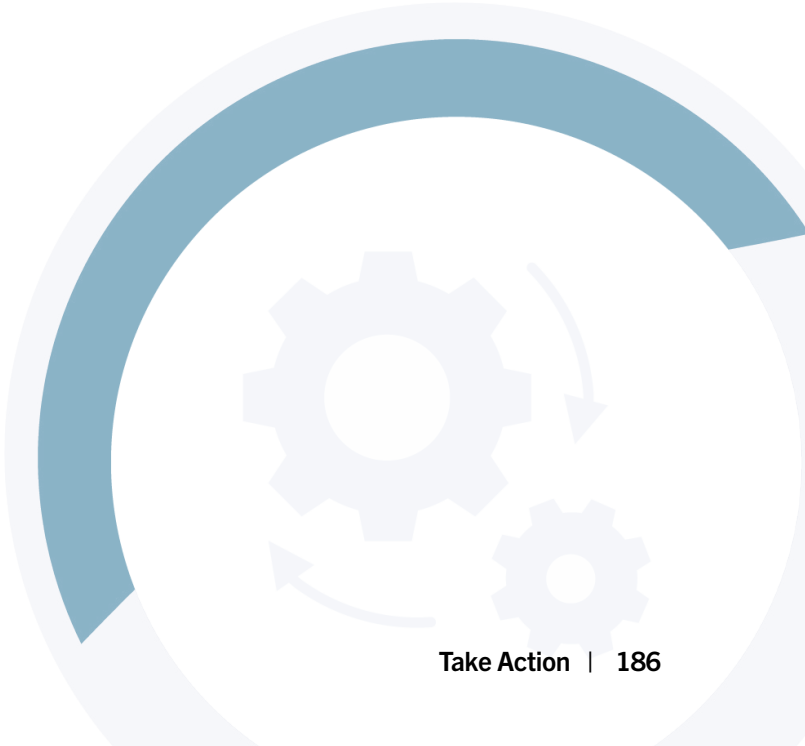
Sharing the multiple benefits of an action helps make the case for the importance of environmental health and aids in securing consistent investment now and, potentially, future reinvestment.

Advance practitioner knowledge

Share lessons learned and best practices with professional peers to build national capacity. Organizations such as the American Society of Adaptation Professionals and the U.S. Sustainability Directors Network support these types of conversations. Many states host regular resilience forums; EcoAdapt's semi-annual National Adaptation Forum is another space for adaptation professionals to connect. Communicate through existing channels to professional societies, regional government working groups, and online tools used for adaptation such as NOAA's Steps to Resilience, EcoAdapt's Climate Adaptation Knowledge Exchange, or Climate XChange's State Climate Policy Network.

It is especially important for health departments to share insight into community and cross-sector partnerships to assist their peers.

> **There are so many examples of us having a lesson learned that basically doesn't leave our team. And that's a problem** for sort of institutional knowledge and continuity if we have staff turnover, right. It also doesn't help other jurisdictions facing the same issues.
>
> *- Local health department staff*



Key Reflections

NOTE: Throughout the BRACE framework, the Key Reflections sections will serve as knowledge checks to ensure that the implementation of each BRACE section consistently calls back to some of the key principles of BRACE.

Justice, Equity, and Belonging

- Is implementation aligned with procedural, distributional, and structural equity? How?
- Are you monitoring whether public health climate actions are maladaptive by unintentionally exacerbating inequality or undermining the resilience of communities and modifying if so?
- How are communities most affected involved in implementation and M&E?
- Are you returning to findings from the climate and health vulnerability and resilience assessments to ensure that those who are most at risk are prioritized?

Cross-Cutting Activities

COLLABORATE

- How is implementation involving non-health sectors?
- Are all the appropriate partners being engaged to help support implementation?
- How is implementation being leveraged to build capacity internal to the agency? External to the agency?
- Are efforts to mainstream the project or initiative being made?
- How have you abided by the approach to partnership determined in Partner?

COMMUNICATE

- Are you ensuring that progress updates and M&E findings are effectively communicated by tailoring the format and content to the needs and preferences of different interest-holders?
- Are you communicating with interest-holders regularly and consistently throughout implementation?
- Are you ensuring that larger lessons are being communicated more broadly to additional audiences?

EVALUATE

- Are M&E findings being utilized to help make decisions and adjust plans as needed, thus enabling adaptive management?
- How are M&E insights being applied to improve the program implementation or service delivery?
- How are M&E insights being leveraged to maintain buy-in and accountability among implementation partners?
- How has evaluation been implemented and how have results been shared?

Priority Principles for Take Action

The BRACE Framework is informed by ten key principles, intended to guide public health climate action. These principles are integrated into each chapter of the Implementation Guide. At the end of each chapter, three salient principles and examples of their practical relevance are highlighted.

PRINCIPLE 3. **Understand injustice and work towards justice**

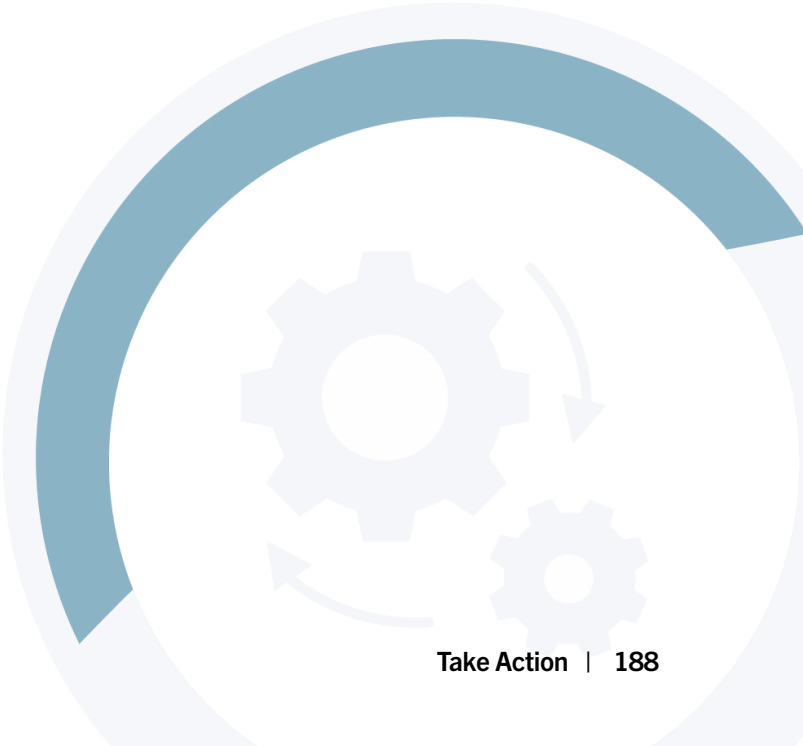
This principle underscores the importance of justice, equity, and belonging considerations in public health climate action. One way to do so is by ensuring that the intended beneficiaries—especially those from communities that are disproportionately affected by climate change—are invited to advise or participate in implementation, evaluation and communications.

PRINCIPLE 9. **Emphasize multiple benefits**

BRACE encourages users to emphasize the many potential benefits of public health climate action when sharing successes and lessons learned; doing so can help secure investment and buy-in from cross-sectoral partners.

PRINCIPLE 10. **Promote a culture of learning**

This principle advocates for adaptive management and iterative approaches to public health climate action. It emphasizes the importance of integrating emerging evidence, community insights, and evaluation results to continuously refine action.

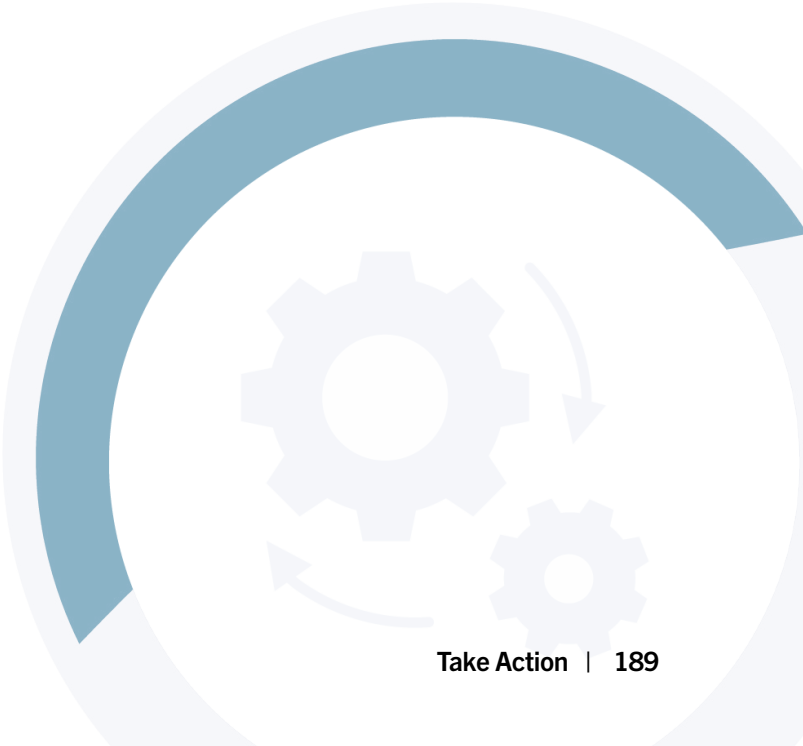


Conclusion

When to return to Get Ready, Stay Ready

Take Action is an ongoing and iterative process, and it marks the end of a BRACE cycle. However, the conclusion of this chapter is an opportunity for public health departments to design, refine, and start new initiatives. The work of minimizing the negative health impacts of climate change is never complete—rather, challenges will constantly evolve and new strategies will continue to emerge.

Public health practitioners should regularly reflect on the evolution of actions, revisit the other stages of BRACE, and adapt to evolving community needs. The capacity of health departments will always be in flux, GRSR will guide you in continuing to assess and build that capacity.



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Continuing Progress

Climate change is a fundamental threat to human health and wellbeing and urgent action is needed. The BRACE framework and Guide were designed to help practitioners either begin to engage on this issue or to expand already established public health climate action. Upon reaching the conclusion of Take Action, you are invited to circle back to the beginning of the Guide to build upon the momentum generated to date.

The six elements of BRACE are a logical, best-practice oriented way of moving health departments and their partners to action. In Get Ready, Stay Ready, practitioners take stock of organizational readiness and local context and identify potential opportunities and partners. In Partner, practitioners establish and build partnerships, especially with communities disproportionately affected by climate change. In Listen & Assess, practitioners learn about community needs and strengths by engaging partners and assessing relevant climate threats, health impacts, and mitigation opportunities. In Investigate Options, practitioners identify potential adaptation and mitigation strategies to promote climate resilience and reduce health threats. In Prioritize & Plan, practitioners select strategies and develop plans for action, communication, and evaluation. And, finally, in Take Action, practitioners implement and evaluate those efforts. In practice the framework is not always linear; health departments may have followed a few detours or loops or progressed through a different ordering of steps. The Guide is designed as a reference that can be consulted for new insights, methods, and approaches to support health departments and their partners as climate leadership expands.

Public health stands at a tremendous opportunity to promote human health and wellbeing in the context of unprecedented environmental change. BRACE aspires to support this work by imagining a transformation of the public health approach to climate action. By acknowledging the complexity of the systems that generate climate inequity, understanding the strengths of the myriad communities that will be vital in addressing climate change, and acting on community-engaged public health climate action, public health professionals can promote effective adaptation to ongoing and expanding impacts of climate change and help mitigate further warming.

Just like practitioners, the Guide will continue growing and adapting to the changing landscape of opportunities and challenges. This may be the conclusion of the Guide, but it is not the end of our collective effort.

Building Resilience Against Climate Effects

Appendix: Glossary

Term	BRACE Definition
Adaptation[1]	**Climate adaptation:** In human systems, the process of adjustment to actual or expected climate and its effects to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects. Human intervention may facilitate adjustment to expected climate and its effects. **Incremental adaptation:** Adaptation that involves minor shifts in usual practices and that maintains the essence and integrity of a system or process at a given scale. **Transformative adaptation:** Adaptation that changes the fundamental attributes of a social–ecological system, often involving persistent, novel, and significant changes to institutions, technology, behaviors, and values across multiple sectors in anticipation of or reaction to climate change and its impacts.
Adaptive capacity[1,2]	The ability of systems, institutions, humans, and other organisms to adjust to potential hazards, to take advantage of opportunities, or to respond to consequences of climate change.
Adaptive management[1,2]	A process of iteratively designing, implementing, and evaluating strategies for managing resources in the face of uncertainty, complexity, and change. Adaptive management involves adjusting management approaches in response to observations of their effect on, and changes in, the system brought on by resulting feedback effects and other variables.
Asset-based approach[3]	An approach that aims to identify and use existing community assets and strengths to enable its members to have more control over their health and wellbeing. This approach aims to appreciate and value connections and potential within a community rather than simply identifying and responding to problems and needs.
Belonging[4]	A fundamental human need—the feeling of deep connection with social groups, physical places, and individual and collective experiences. Belonging is achieved when all people are treated like and feel like full members of the overall community. Belonging builds upon concepts of diversity and inclusion: diversity is getting in the door; inclusion is having a seat at the table; and belonging is having your voice matter in discussions and decision-making.
Climate[1,2]	Climate, in a narrow sense, is usually defined as the average weather or, more rigorously, as the statistical description in terms of the average and variability of defining factors over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate, in a wider sense, is the state, including a statistical description, of the climate system.
Climate change[1,5]	Changes in average weather conditions that persist over multiple decades or longer. Climate change encompasses both increases and decreases in temperature, as well as shifts in precipitation, changes in frequency and location of severe weather events, and changes to other features of the climate system.

Term	BRACE Definition
Climate Equity[6]	Climate equity is the goal of recognizing and addressing the unequal burdens made worse by climate change, while ensuring that all people share the benefits of climate protection efforts.
Climate Mitigation[1,5]	Measures to reduce the amount and rate of future climate change by reducing emissions of heat-trapping gases or removing carbon dioxide from the atmosphere.
Community[7]	A group of people with diverse characteristics who are linked by social ties, share common perspectives, and engage in joint action in geographical locations or settings.
Community engagement[8]	Community engagement builds sustainable relationships through trust and collaboration, strengthening community well-being. The process should be enduring, equitable, and culturally sensitive to all participants, with a shared goal of addressing the concerns of the community.
Ecosystem services[1,2]	Ecological processes or functions that have monetary or nonmonetary value to individuals or society at large. These are frequently classified as supporting services such as productivity or biodiversity maintenance, provisioning services such as food or fiber, regulating services such as climate regulation or carbon sequestration, and cultural services such as tourism or spiritual and aesthetic appreciation.
Equity[1,9]	**Equity:** The consistent and systematic treatment of all individuals and groups in a manner that is fair and just, with particular attention to race, ethnicity, ability status, gender identity, sexual orientation, and income status. Achieving equity involves recognizing that individuals and groups have different circumstances and needs, often due to systems of oppression, and providing resources and opportunities to address those needs. **Health equity:** The attainment of the highest level of health for all people, where everyone has a fair and just opportunity to attain their optimal health regardless of race, ethnicity, disability, sexual orientation, gender identity, socioeconomic status, geography, preferred language, or other factors that affect access to care and health outcomes. **Procedural equity:** Ensures that processes are fair and inclusive in the development and implementation of any program or policy. **Distributional equity:** Ensures the resources or benefits and burdens of a policy or program are distributed fairly. **Structural (intergenerational) equity:** Entails a commitment and action to correct past harms and prevent future negative consequences by institutionalizing accountability and decision-making structures that aim to sustain positive outcomes. **Cultural equity:** Reflects a commitment to undoing racism and other systems of oppression through an intentional deconstruction of White supremacist and other discriminatory assumptions and behaviors and the concurrent construction of equitable multicultural norms.
Exposure[10]	Contact between a person and one or more biological, psychosocial, chemical, or physical stressors, which are exacerbated by climate change. Contact may occur in a single instance or repeatedly over time, and may occur in one location or over a wider geographic area.

Term	BRACE Definition
Indigenous knowledges[1,11]	Bodies of dynamic and experiential knowledges gained over time by Indigenous Peoples, often associated with a specific place. Indigenous Knowledges include observations, oral and written knowledge, innovations, practices, rituals, and beliefs; some Indigenous Knowledges are considered sacred and secret to a group or individuals. Indigenous Knowledges are inherently heterogeneous due to the cultural and geographic contexts from which it is derived.
Interest holder[1,5]	An individual or group that is directly or indirectly affected by or interested in the outcomes of decisions.
Justice[1,9]	**Justice:** The principle of fairness in treatment of people and groups, including a fair distribution of benefits and burdens, fair access to rights, resources, opportunities, and power, and remedy of past harms. Achieving justice involves dismantling systems of oppression and privilege that create systemic disadvantages and barriers for certain individuals and groups. **Environmental Justice:** The just treatment and meaningful involvement of all people regardless of income, race, color, national origin, Tribal affiliation, or disability with respect to the development, implementation, and enforcement of environmental decision-making, laws, regulations, policies, and other related activities.
Maladaptation[1,2]	Occurs when actions are taken that result in unintended consequences that increase rather than decrease the risk of adverse climate-related outcomes, including via increased greenhouse gas emissions, increased or shifted vulnerability to climate change, more inequitable outcomes, or diminished welfare, now or in the future. Most often, maladaptation is an unintended consequence.
Nature-based solutions[12]	Actions that protect, sustainably manage, or restore ecosystems in ways that promote nature, biodiversity, and human wellbeing. Such actions are designed to address a range of environmental challenges, including climate mitigation and adaptation, and provide economic, social, and environmental benefits.
Resilience	The capacity of communities and their interconnected social, economic, and ecological systems to cope with, respond to, and recover from climate disruptions and adverse conditions in ways that yield overall improvements in wellbeing.
Sensitivity[13]	The degree to which people are negatively affected by climate hazards if exposed.
Systems thinking[14]	Approach to problem-solving that views problems as part of a wider dynamic system. It recognizes and prioritizes the understanding of relationships, interactions, and interdependencies among the components of a system that explain its functioning. Systems thinking encourages the recognition of patterns and how changes in one aspect of a system may affect other parts of the system in positive or negative ways.
Vital Conditions[15]	The properties of places and institutions that we all need all the time to reach our full potential. They include physical necessities like food, water, and humane housing, but also include things that are harder to quantify, like a sense of belonging and agency or civic muscle. Investments in these conditions are necessary to create an equitable, thriving future for ourselves and for generations to come.
Vulnerability[1]	The degree to which physical, biological, and socioeconomic systems are susceptible to and unable to cope with adverse impacts of climate change.

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Building Resilience Against Climate Effects

IMPLEMENTATION GUIDE