A Guide to Building a Climate-Ready Rural Workforce

July 2024

NACCHO
National Association of County & City Health Officials

Introduction

Local health departments (LHD) are on the frontlines of climate change. A resilient and climate-ready rural workforce can help curb potential risks to public health, including risks to food and water safety, air quality, and mental health disorders caused by a changing climate and extreme weather. However, rural LHDs may face unique challenges when developing or scaling up their climate activities, including less baseline capacity for applying to funding and grant opportunities, hiring and retaining specialized staff, and dedicating resources to climate activities due to political constraints.

Robust data on climate vulnerabilities in rural areas and adaptation opportunities for rural LHDs are also limited in comparison to urban LHDs (Houghton et al., 2017). These challenges make it difficult for rural LHDs to immediately

20% of the U.S. population lives in a rural area. Rural areas are typically more sparse and less dense compared to urban areas (U.S. Census Bureau).

62% of local health departments serve rural communities, which NACCHO defines as communities under 50,000 residents (NACCHO, 2024).

build up capacity, implement climate and health activities, and respond to extreme weather impacts (Vo et al., 2022). A common solution for LHDs to engage in climate adaptation is to use increased funding from state and federal levels. This solution is not always practical or equitable for rural LHDs since funding opportunities are typically directed towards state-level agencies and larger LHDs. Funding may also not be easily or immediately obtainable for rural LHDs because they may not be able to compete at the same level as larger LHDs based on smaller jurisdiction size and lack of data to support grant applications.

Given the constraints experienced by rural LHDs, their climate and health activities must be free or low-cost, creative, and sustainable. The activities in this guide emphasize leveraging local strengths and partnerships, engaging with communities, and bridging gaps for LHDs with competing priorities and non-specialized staff.

Although this guide is tailored to assist rural LHDs, the activities may be adaptable to LHDs of varying capacities. Guides for other LHDs may differ with activities being more complex in response to larger staff, existing climate activities, more funding, increased political support, and established partnerships.

How to Use This Guide

This guide supports rural LHDs in their efforts to build a climate-ready workforce. Rural LHDs can refer to this guide when building a climate and health program for the first time, or when scaling up their programs to increase their climate response and adaptation capacity. This document provides tiers of program development and staffing activities, from baseline to advanced, for staffing, training, and climate and health program development tailored to rural LHDs.

- Baseline activities are the minimum steps that can be taken toward assessing community and workforce needs in response to climate change.
- Enhanced activities may be incorporated as appropriate according to time, workforce capacity, and ease of implementation.
- Advanced activities may be undertaken as adaptation capacity increases, and LHDs have developed increased capacity to establish a full climate and health program.

The program activities and resources in this guide cover community outreach and education, collaboration with partners, workforce development, and mental health and well-being of communities and public health and emergency response workforce.

Within this guide, the sun symbol denotes examples from the field featuring rural LHDs.

Methodology

In 2023-2024, the National Association of County and City Health Officials (NACCHO) engaged in a review process to identify and synthesize literature describing climate adaptation activities, rural resilience, and adaptive capacity. The literature review revealed a lack of resources addressing how rural LHDs can prepare their workforce for the impacts of climate change. Additionally, NACCHO consulted with subject matter experts (SMEs) from rural LHDs to understand ongoing climate activities and the current capacity of rural LHDs, and to assess the levels of program development and staffing activities required to support a climate-ready rural workforce. The SMEs reported challenges such as lack of flexible funding and lack of expertise amongst department staff for dedicated climate change related activities. SMEs also discussed that much of their climate work is related to response and mitigation of impacts of extreme events, and less focused on resilience activities.

Surveillance

Surveillance helps LHDs identify the risks of climate change in their communities, specifically its impacts on local people and places. A Climate, Health, and Equity Vulnerability Assessment (CHEVA), combined with local knowledge of community resources, can guide LHD action to mitigate impacts of climate change in their communities.

Baseline Activities

Know climate risks in your region and associated health hazards and impacts.

- Refer to this document from the Centers for Disease Control and Prevention (CDC): Preparing for the Regional Health Impacts of Climate Change in the United States (https://www.cdc.gov/climate-health/media/pdfs/health_impacts_climate_change-508_final_1.pdf).
- Refer to CDC's website to learn more about regional climate effects on health (https://www.cdc.gov/climate-health/php/effects/).

Enhanced Activities

Conduct Climate, Health, and Equity Vulnerability Assessments.

- Refer to this document from CDC: Assessing Health Vulnerability to Climate Change: A Guide for Health Departments (https://www.cdc.gov/climate-health/media/pdfs/AssessingHealthVulnerabilitytoClimateChange_1.pdf).
- Refer to this document from the American Public Health Association (APHA): Climate Change, Health, and Equity: A Guide for Local Health Departments (https://climatehealthconnect.org/wp-content/uploads/2018/10/APHA_ClimateGuide18_pp10web_FINAL.pdf).

Through collaboration with emergency management and planning partners, identify populations disproportionately affected by climate change in your jurisdiction.

Disproportionately affected populations include:

- Children
- Geographically or socially isolated individuals and communities
- Immigrant groups (including undocumented groups)
- Indigenous communities
- Low-income communities
- Minority communities
- Older adults
- Outdoor workers, including agricultural, forestry, hunting, and fishing sectors
- People experiencing homelessness
- People with chronic conditions and disabilities
- People without access to broadband
- Pregnant women and newborns

Refer to chapter 9: *Populations of Concern. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* by the U.S. Global Change Research Program (https://doi.org/10.7930/J0Q81B0T).

Identify community needs and map risk.

- Identify community assets to support adaptation efforts such as local partners' capabilities for responding to disasters, financial resources, colleges, local schools, national, state, and local agencies, and non-governmental organizations (Ebi & Semenza, 2008).
- Map high-risk locations. For example, know of nearby facilities that use hazardous chemicals, which may raise the risk of exposure to chemicals during an extreme weather event.
- LHDs can use existing tools with preloaded data to assist with mapping:
    - ☐ Resilience Analysis and Planning Tool (RAPT) is a free GIS tool offered by Federal Emergency Management Agency (FEMA). It includes information about community resilience indicators. Refer to: https://www.fema.gov/about/reports-and-data/resilience-analysis-planning-tool.
- Use community-based participatory research (CBPR) to effectively engage community members to identify community impacts, needs, and solutions. CBPR ensures that community members have a voice in the adaptation process and that adaptation plans are relevant and useful to the community (Ebi & Semenza, 2008).

Integrate CASPERs into Emergency Planning and Response Activities.

- Community Assessments for Public Health Emergency Response (CASPERs) are an epidemiological survey technique used to gather information throughout disaster cycles. They are typically low-cost and a useful method to understand the public health needs of the community.
- The CDC has a CASPER Toolkit that can be used to inform planning for disasters, conduct community health assessments, assess community needs, and collect data during emergency or non-emergency situations. Refer to this document: Community Assessment for Public Health Emergency Response (CASPER) Toolkit: Third edition (https://www.cdc.gov/casper/media/pdfs/CASPER-toolkit-3_508.pdf).

Advanced Activities

Use a Geographic Information System (GIS) for geospatial analysis.

GIS methods and data are tools for measuring, modelling, and analyzing climate impacts on communities. GIS can be used to:

- Map areas in which disproportionately affected populations live and work.
- Monitor the dangers of changing temperatures, rising sea levels, and shifts in land cover.
- Monitor factors that may affect agriculture, the environment, and human well-being (Kamel Boulos and Wilson, 2023).
- Some examples of open-source tools to create your own models include:
    - ☐ QGIS: https://www.qgis.org/en/site/
    - ☐ GRASS GIS: https://grass.osgeo.org/

Partnerships

Partnerships with internal and external stakeholders help increase capacity for LHDs with fewer resources and help integrate climate programs into the broader public health infrastructure.

Baseline Activities

Leverage existing partnerships to develop programming and activities related to climate change.

- Initiate conversations with established partners about climate and health and assess if there are any untapped opportunities among these partnerships.

Initiate relationships with new internal and external partners.

- Talk to partners before creating plans to assess community impacts and needs. These partners may include:
  - ☐ Other LHDs in your region.
  - ☐ Local agencies such as first responders, schools, and faith-based organizations.
  - ☐ Non-governmental and non-profit organizations.
  - ☐ Community-based organizations (CBOs).
  - ☐ Partnering with state departments of health may be beneficial for determining if state level tools and resources are replicable at the local level.
  - ☐ Rural LHDs can engage with and provide data to other local government officials who may help secure more funding for rural climate and health programs and activities.

Enhanced Activities

Develop a collaborative model for exchanging information and building capacity with partners. Focus on sharing best practices, resources, and expertise on responding and adapting to climate events.

- Establish regular channels of communication with partners.
- Foster an environment to maintain relationships.
- Collaborate on climate-related initiatives.
- Continually assess community needs.

The San Luis Valley Public Health Partnership (SLVPHP) is a collaborative model for exchanging information, building public health capacity, and expanding access and quality of services.

- San Luis Valley Public Health Partnership (https://www.slvphp.com/)

	Advanced Activities
	Engage in cross-jurisdictional collaboration and combine public health functions.
	▪ LHDs with limited capacity may partner with neighboring LHDs to share resources and personnel.
	▪ LHDs can engage in joint initiatives for climate-related activities, developing preparedness and response plans, and communicating with the public.
	☐ Genesee County and Orleans County in New York implemented Genesee and Orleans County Cross Jurisdictional Sharing Project (GO Health) in 2012 to combine their public health functions by sharing personnel to collaborate and save financial resources.
	▪ GO Health - Genesee & Orleans Public Health Departments (https://gohealthny.org/)
	▪ Genesee and Orleans County Cross Jurisdictional Sharing Project (GO Health) (https://www.ruralhealthinfo.org/project-examples/997)
	▪ Sharing personnel is one solution for LHDs that are facing challenges of funding, staffing shortages, and expertise.
	☐ Refer to this document with case studies by the Center for Sharing Public Health Services and Center for State and Local Government Excellence: Staff Sharing Arrangements for Local Public Health (https://research.missionsq.org/content/media/document/2018/02/2017-Public-Health-Shared-Staffing-Approaches.pdf).
	☐ Refer to this resource on Cross-Jurisdictonal Sharing by NACCHO: https://www.naccho.org/uploads/downloadable-resources/Programs/Public-Health-Infrastructure/Innovation-Snapshot-Cross-juris-sharing_updated.pdf.

Communication	Baseline Activities
LHDs can engage in communication, education, and outreach activities around climate and health with their communities. Community involvement improves climate resilience activities by building awareness and trust in public health programs.	**Develop communication strategies for outreach and education on the health impacts of climate change.** • Frame messages to resonate with the community and focus on issues that directly impact them. • Listen to community members and respect values and beliefs. Be open to ambivalence and understand that everyone has varying levels of concerns regarding climate change. • Highlight personal solutions and benefits for supporting climate activities. • Give meaningful and feasible ideas. □ Refer to this document by ecoAmerica: 5 Steps to Effective Climate Communication (https://ecoamerica.org/wp-content/uploads/2022/03/5-steps-fact-sheet-mar2022.pdf). **Communicate with decisionmakers such as policy and lawmakers, and state, county, and local elected officials.** • Some jurisdictions may not receive dedicated support for climate change activities due to political polarization. Use creative and alternative language to communicate about climate change and to increase support and buy-in for building climate and health programs. **Ensure that information about your LHD and ongoing climate activities is available to the community.** • Make information available on your LHD website. • Use social media, local TV, radio, etc., to disseminate information. • Prepare messaging to share with leaders in your jurisdictions such as county boards of supervisors, town councils, and the mayor.
	Enhanced Activities
	Provide accessible resources, including materials in commonly spoken languages in the community, options for individuals with hearing and visual impairments, and printed materials for those with limited technology access. • Refer to this guide by APHA: Climate and Health Playbook (https://www.apha.org/Topics-and-Issues/Climate-Health-and-Equity/JEDI). **Community members should participate and remain involved in the implementation of climate activities.** • Interact with the public regularly, listen to their concerns, and keep them updated on resources and programmatic activities.

	Advanced Activities

	Hire a communication and outreach coordinator.
	
	■ A communication and outreach coordinator specializes in building a connection with your community and developing outreach activities.
	
	Host regular outreach activities for communication.
	
	■ Hosting regular community outreach activities and including communities in adaptation processes are forms of resilience building.
	■ Tell stories through storylines or story mapping to illustrate the risks of climate change in a way that resonates with your community.
	   □ Creating storylines can help communicate risks and identify adaptive capacity. Refer to this journal article: Community-Based Adaptation to the Health Impacts of Climate Change (https://www.ajpmonline.org/article/S0749-3797(08)00684-3/fulltext).
	   □ Refer to this example of a story map and action plan for an extreme heat event developed through collaboration with the community in Lake County, California: CHARM - Lake County, California (https://storymaps.arcgis.com/stories/855b677d73f9452997458e6a97bd9378).
	■ Partner with schools to develop a curriculum and educational events or workshops with children and youth to teach them about climate change.

Workforce Development	Baseline Activities

LHD staff can engage in training, recruitment, and development activities for building climate health programs.	**Have staff with expertise in climate change and health.**
	
	■ Identify positions that can include job specifications for climate change activities.
	■ Have dedicated and skilled staff with environmental/climate expertise. Staff dedicated to leading climate activities can be either full-time or part-time.
	   □ Identify existing staff who may already be interested in environmental and climate health before hiring a new staff member.
	■ Recruit interns from local schools and colleges.
	■ Engage in education and resource sharing among all staff to increase awareness of the health impacts of climate change.
	■ Complete free trainings to build expertise:
	   □ Climate and Health: A Training for Health Department Staff (https://www.train.org/cdctrain/course/1117398/details)
	   □ Climate for Health Ambassador Training (https://virtualcommunities.naccho.org/climateactiontoolkit/home)
	   □ Resilient Rural America Project (RRAP) Training Modules (https://resilientruralamerica.org/)

Enhanced Activities

Utilize existing staff from different programs.

- Preparedness – Preparedness and emergency response coordinators can help design plans for responding to extreme events.
- Epidemiology – Coordinate with local or state epidemiologists to help with vulnerability and community needs assessments.
- Behavioral Health and Chronic Disease – Behavioral and chronic disease staff can address increases in chronic diseases and mental health impacts associated with climate change.
- Policy and Planning – Policy and planning staff can help develop policy documents to establish climate change as a departmental priority, create plans to address health equity, and integrate climate education in health promotion and disease prevention programs.
- Clinical Services – Clinical staff can assist in standardizing tracking and reporting of climate-related health impacts, and they can encourage patients with pre-existing health conditions to prepare for extreme weather events.

Checklists for building organizational capacity:

- 12 Steps to Operationalize Climate Change in a Local Health Department | NACCHO (https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps_Corrected.pdf)
- Assess Organizational Capacity Checklist | Oregon Health Authority (https://www.oregon.gov/oha/ph/HealthyEnvironments/climatechange/Toolkit/Documents/1-Build-Capacity/Assess-Organizational-Capacity.pdf)

Advanced Activities

Establish technical capacity to continue climate activities.

These roles may be either a full-time or part-time employee.

- Hire a program manager of environmental health or a climate and health program coordinator to lead sustainable climate activities.
- Hire an equity lead to bridge gaps between climate activities and public health programs. An equity lead works with the entire LHD to incorporate health equity strategies into all public health plans, programs, and activities.

Formulate response plans and develop a full climate health program.

- Based on the findings of assessments, LHDs may develop response plans that describe specific actions for addressing identified vulnerabilities.
- Refer to this toolkit: Rural Emergency Preparedness and Response Toolkit | Rural Health Information Hub (https://www.ruralhealthinfo.org/toolkits/emergency-preparedness).

Mental Health and Well-Being

Climate events may have significant mental health impacts in your community. There are several activities LHD staff can engage in to strengthen individual and community resilience and well-being in the face of climate change.

Refer to: Mental Health and our Changing Climate, 2021 Edition (https://ecoamerica.org/mental-health-and-our-changing-climate-2021-edition/).

Baseline Activities

Build climate literacy.

Understand how extreme climate events can affect not only community members, but also LHD staff and first responders.

Know mental health effects of extreme climate events:

- Post-Traumatic Stress Disorder (PTSD)
- Anxiety
- Insomnia
- Depression
- Substance Use
- Violence
- Aggression
- Suicide and suicidal ideation
    - ☐ Refer to pages 26-39 of Mental Health and our Changing Climate, 2021 Edition (https://ecoamerica.org/mental-health-and-our-changing-climate-2021-edition/) for more information on acute and incremental impacts of climate change on humans and communities.

	Enhanced Activity

	Provide support to the community.
	
	- Provide information to the community about:
	  - ☐ Mental health impacts of extreme weather events and disasters
	  - ☐ Warning signs of mental health effects
	  - ☐ Where to seek care
	- Design strategies based on vulnerability assessments to reduce sources of exposure to extreme weather impacts and meet the needs of vulnerable populations.
	- Provide mental health services to the community if your LHD has a mental health provider on staff.
	- Build partnerships with local service providers and add mental health support activities to disaster response plans.
	- Train first responders and rescue workers to provide sensitive, interactive, and calm services to people experiencing the immediate impacts and aftermath or a disaster to promote safety, hope, and connectedness (Hobfoll, 2009).
	
	Provide support to the public health and emergency response workforce.
	
	- Design strategies to support LHD staff and strengthen workforce resilience in response to climate stressors.
	  - ☐ CDC offers a training for public health workers: Understanding and Preventing Burnout among Public Health Workers (https://www.cdc.gov/niosh/learning/publichealthburnoutprevention/default.html).
	  - ☐ The Association of State and Territorial Health Officials (ASTHO) has a collection of resources for public health leaders and strengthening resilience: PH-HERO Workforce Resource Center (https://www.astho.org/ph-workforce-resources).
	  - ☐ Substance Abuse and Mental Health Service Administration (SAMHSA) provides several trainings and tools to support practitioners and the public:
	    - Practitioner Training (https://www.samhsa.gov/practitioner-training)
	    - Public Messages (https://www.samhsa.gov/public-messages)
	    - Climate Change and Health Equity (https://www.samhsa.gov/climate-change-health-equity)

Examples of Program Activities by Health Hazard

Climate-related programmatic activities may already be occurring in your jurisdiction. Some examples are listed in this table. To learn about more detailed program activities and examples, refer to pages 21-76 in this guide by APHA: https://climatehealthconnect.org/wp-content/uploads/2018/10/APHA_ClimateGuide18_pp10web_FINAL.pdf.

Extreme Heat
- Warning systems   - Cooling centers   - Public drinking fountains and swimming pools   - Wildfire watch / alert systems   ☐ Refer to this document by CDC: Extreme Heat Can Impact Our Health in Many Ways (https://www.cdc.gov/climate-health/media/pdfs/EXTREME-HEAT-Final_508.pdf).   ☐ Refer to the National Integrated Heat Health Information System (https://www.heat.gov/).

Drought
- Groundwater and surface water quality monitoring   - Drinking water delivery planning   - Education for safe water conservation efforts   - Surveillance of vector-borne diseases   - Establishing mosquito control programs   ☐ Refer to this document by CDC: Preparing for the Health Effects of Drought: A Resource Guide for Public Health Professionals (https://www.cdc.gov/drought-health/media/pdfs/CDC_Drought_Resource_Guide-508.pdf).   ☐ Refer to the National Integrated Drought Information System (https://www.drought.gov/).   ☐ Refer to this guide by NACCHO: Practical Guide to Building Local Mosquito Control Capacity (https://www.naccho.org/blog/articles/nacchos-practical-guide-to-building-local-mosquito-control-capacity).

Wildfires and Poor Air Quality
- Forestry management (e.g., controlled burns, managing overcrowded forests)   - Evacuation plans   - Alert systems   - Air quality assessments   - Surveillance and data collection on chronic diseases, especially in populations vulnerable to respiratory illnesses   - Provide HEPA filters to the community   ☐ Refer to this webpage by EPA: Smoke-Ready Toolbox for Wildfires (https://www.epa.gov/air-research/smoke-ready-toolbox-wildfires).

Sea Level Rise, Storms, Flooding
- Identify areas prone to flooding   - Watershed management   - Evacuation and shelter plans   - Monitoring and testing drinking water and recreational water for contamination   - Monitoring agricultural waste for food-borne illnesses   ☐ Refer to this checklist by EPA: Flood Resilience Checklist (https://www.epa.gov/sites/default/files/2014-07/documents/flood-resilience-checklist.pdf).

Additional Resources

NACCHO has compiled a list of resources from our partners and members to assist rural LHDs in building a climate-ready workforce.

1. Increasing Rural Resilience to Climate Change: A Resource Roundup for Health Departments | NACCHO. (https://www.naccho.org/blog/articles/increasing-rural-resilience-to-climate-change-a-primer-for-health-departments-2)

2. Are We Ready? Report 2: Preparing for the Public Health Challenges of Climate Change: Perspectives from Local Public Health | NACCHO. (https://www.naccho.org/uploads/downloadable-resources/NA609PDF-AreWeReady2.pdf)

3. 12 Steps to Operationalize Climate Change in a Local Health Department | NACCHO. (https://www.naccho.org/uploads/downloadable-resources/NA634PDF-12Steps.pdf)

4. Preparing for the Regional Health Impacts of Climate Change in the United States | CDC. (https://www.cdc.gov/climate-health/media/pdfs/health_impacts_climate_change-508_final_1.pdf)

5. Justice, Equity, Diversity, and Inclusion in Climate Adaptation Planning | CDC. (https://www.cdc.gov/climate-health/php/brace/jedi.html)

6. Community Assessment for Public Health Emergency Response (CASPER) Toolkit: Third Edition | CDC. (https://www.cdc.gov/casper/media/pdfs/CASPER-toolkit-3_508.pdf)

7. Resources for a Climate Ready Workforce | U.S. Climate Resilience Toolkit. (https://toolkit.climate.gov/content/resources-climate-ready-workforce)

8. Adaptation Capability Advancement Toolkit | Adapt-CA. (https://arccacalifornia.org/adapt-ca/)

9. Climate Change, Health, and Equity: A Guide for Local Health Departments | APHA (https://climatehealthconnect.org/wp-content/uploads/2018/10/APHA_ClimateGuide18_pp10web_FINAL.pdf)

10. Adaptation in Action | APHA. (https://www.apha.org/-/media/Files/PDF/topics/climate/Adaptation_In_Action_2022.ashx)

11. Climate and Health Playbook | APHA. (https://www.apha.org/Topics-and-Issues/Climate-Health-and-Equity/JEDI)

12. Mental Health and our Changing Climate 2021 Edition | ecoAmerica. (https://ecoamerica.org/mental-health-and-our-changing-climate-2021-edition/)

13. 5 Steps to Effective Climate Communication | ecoAmerica. (https://ecoamerica.org/wp-content/uploads/2022/03/5-steps-fact-sheet-mar2022.pdf)

14. Climate and Economic Justice Screening Tool | Council on Environmental Quality. (https://screeningtool.geoplatform.gov/en/#5.56/38.473/-88.74)

15. Rural Emergency Preparedness and Response Toolkit | Rural Health Information Hub. (https://www.ruralhealthinfo.org/toolkits/emergency-preparedness)

Citations

- Crimmins, A. R., Avery, C. W., Easterling, D. R., Kunkel, K. E., & Stewart, B. C. (2023). Fifth National Climate Assessment (pp. 1–470). U.S. Global Change Research Program. https://doi.org/10.7930/NCA5.2023

- Cunningham, M., Patel, K., McCall, T., et al. (2024). 2022 National Profile of Local Health Departments. National Association of County and City Health Officials. Washington, DC. https://www.naccho.org/resources/lhd-research/national-profile-of-local-health-departments

- Ebi, K. L., & Semenza, J. C. (2008). Community-Based Adaptation to the Health Impacts of Climate Change. American Journal of Preventive Medicine, 35(5), 501–507. https://doi.org/10.1016/j.amepre.2008.08.018

- Gamble, J. L., Balbus, J., Berger, M., Bouye, K., Campbell, V., Chief, K., Conlon, K., Crimmins, A., Flanagan, B., Gonzalez-Maddux, C., Hallisey, E., Hutchins, S., Jantarasami, L., Khoury, S., Kiefer, M., Kolling, J., Lynn, K., Manangan, A., McDonald, M., … Wolkin, A. F. (2016). Ch. 9: Populations of Concern. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program. https://doi.org/10.7930/J0Q81B0T

- Hobfoll, S. E., Watson, P., Bell, C. C., Bryant, R. A., Brymer, M. J., Friedman, M. J., Friedman, M., Gersons, B. P. R., Jong, J. T. V. M. de, Layne, C. M., Maguen, S., Neria, Y., Norwood, A. E., Pynoos, R. S., Reissman, D., Ruzek, J. I., Shalev, A. Y., Solomon, Z., Steinberg, A. M., & Ursano, R. J. (2009). Five Essential Elements of Immediate and Mid-Term Mass Trauma Intervention: Empirical Evidence. FOCUS, 7(2), 221–242. https://doi.org/10.1176/foc.7.2.foc221

- Houghton, A., Austin, J., Beerman, A., & Horton, C. (2017). An Approach to Developing Local Climate Change Environmental Public Health Indicators in a Rural District. Journal of Environmental and Public Health, 2017, 3407325. https://doi.org/10.1155/2017/3407325

- Kamel Boulos, M. N., & Wilson, J. P. (2023). Geospatial techniques for monitoring and mitigating climate change and its effects on human health. International Journal of Health Geographics, 22(1), 2, s12942-023-00324–00329. https://doi.org/10.1186/s12942-023-00324-9

- National Association of County and City Health Officials. (2023). Increasing Rural Resilience to Climate Change: A Resource Roundup for Health Departments. The Essential Elements of Local Public Health. https://www.naccho.org/blog/articles/increasing-rural-resilience-to-climate-change-a-primer-for-health-departments-2

- U.S. Census Bureau. (2023). Urban and Rural. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

- Vo, M. V., Ebi, K. L., Busch Isaksen, T. M., Hess, J. J., & Errett, N. A. (2022). Addressing Capacity Constraints of Rural Local Health Departments to Support Climate Change Adaptation: Action Is Needed Now. International Journal of Environmental Research and Public Health, 19(20), 13651. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9602968/

Learn More

For more information, please contact the Environmental Health team: environmentalhealth@naccho.org

To learn more about NACCHO's climate change programs and resources, visit https://www.naccho.org/climate-change.

NACCHO
National Association of County & City Health Officials

www.naccho.org

Public Health

The mission of the National Association of County and City Health Officials (NACCHO) is to improve the health of communities by strengthening and advocating for local health departments.

1201 Eye Street, NW, Fourth Floor • Washington, DC 20005

Phone: 202-783-5550 • Fax: 202-783-1583