

Welcome to today's webinar:

**Testing a New Virtual Tool:
Planning and Implementing Extreme
Heat Interventions**

July 1, 2025 | 1:00 PM ET

Questions may be submitted/upvoted in the Q&A box.

This webinar is being recorded.

About the National Association of County and City Health Officials (NACCHO)

NACCHO is the **only** organization dedicated to **servicing every local health department (LHD)** in the nation. NACCHO serves the country's 3,300 local health departments and also supports the over 180,000 staff who work within them. NACCHO is the leader in providing cutting-edge, **skill-building**, professional **resources and programs**, seeking **health equity**, and supporting **effective** local public health **practice and systems**.

-  Advocacy
-  Partnerships
-  Funding
-  Training and Education
-  Networking
-  Resources, Tools, & Technical Assistance

Local Health Departments Impact Lives Every Day



NACCHO's Programmatic Impact



- Chronic Disease Prevention
- Maternal and Child Health
- Adolescent Health
- Infectious Diseases
- Overdose, Injury, and Violence Prevention
- Tobacco Prevention
- Healthy Aging and Disability
- Immunization



- Wastewater Surveillance
- Water Safety
- Health in All Policies
- Food Safety
- Vector-borne Illness
- Climate and Health



- Accreditation Preparation
- Quality Improvement
- Assessment and Planning
- Health Equity and Social Justice
- Public Health Transformation
- Workforce Development
- Data and Informatics
- Public Health Law and Policy



- Pandemic Preparedness and Catastrophic Response
- Public Health Preparedness
- Medical Reserve Corps
- Bio-surveillance

CHanGE

Center for Health and the Global Environment
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

W

Testing a New Virtual Tool: Planning and Implementing Extreme Heat Interventions



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UNIVERSITY of WASHINGTON
SCHOOL OF PUBLIC HEALTH

NACCHO
National Association of County & City Health Officials



UW Medicine

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Overview

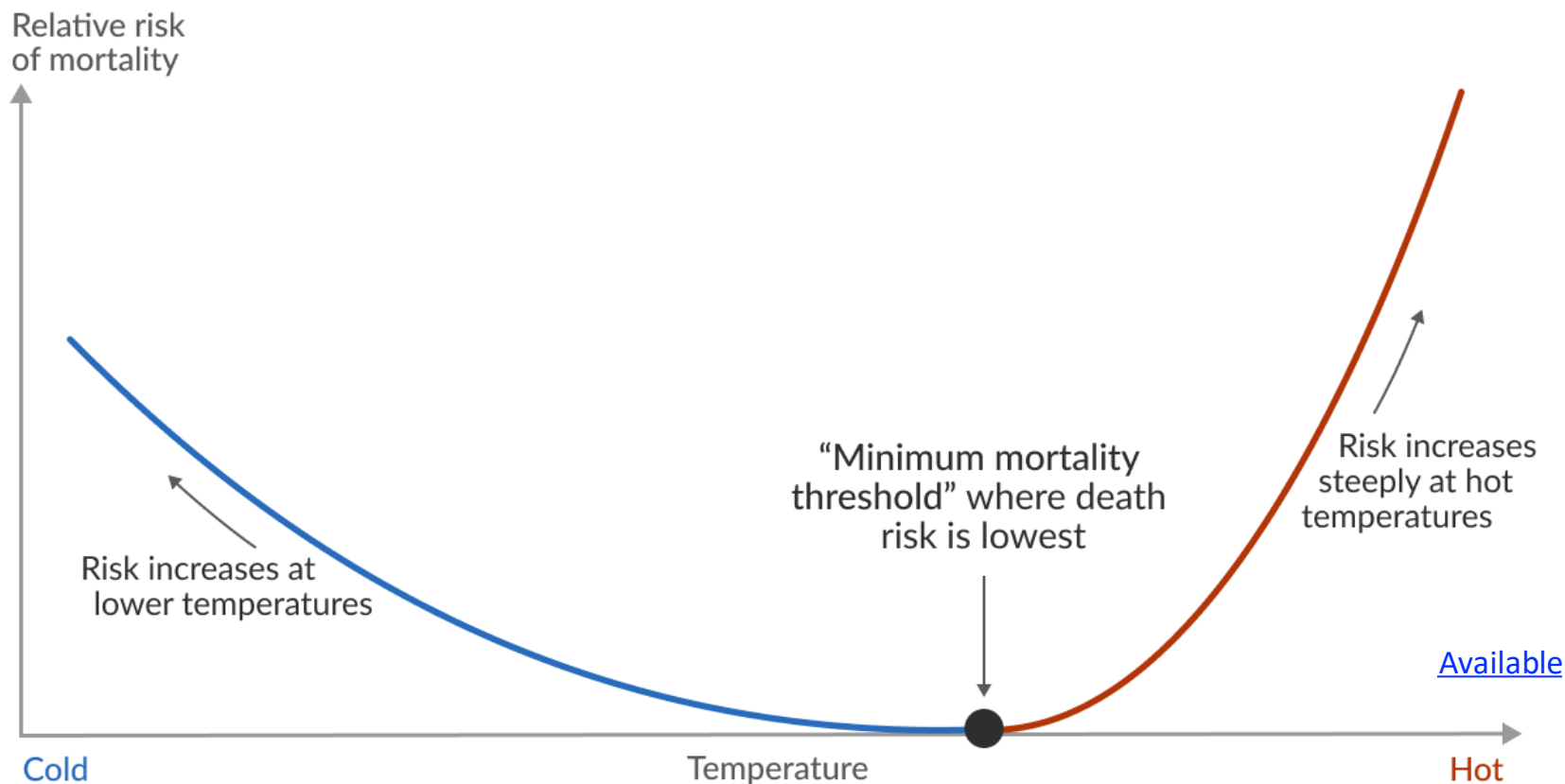
- > Extreme heat events
- > Implementation challenges
- > Decision support
- > CHaRT platform
- > Experience from King County
- > CHaRT pilot randomized controlled trial
- > Questions and answers

Extreme Heat Events

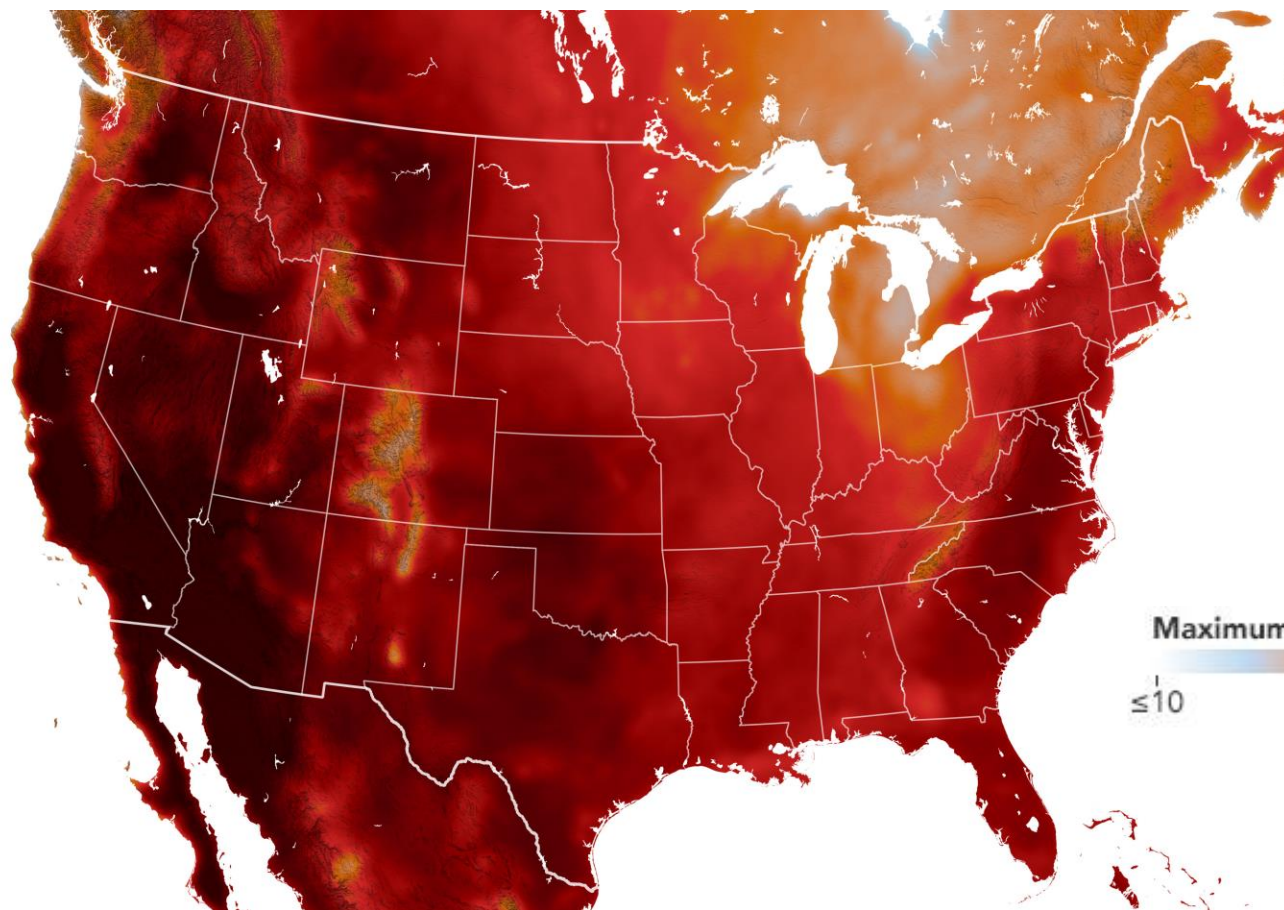


Taylor
Callery,
Scientific
American

Heat is a Dangerous Hazard



Extremes Most Dangerous

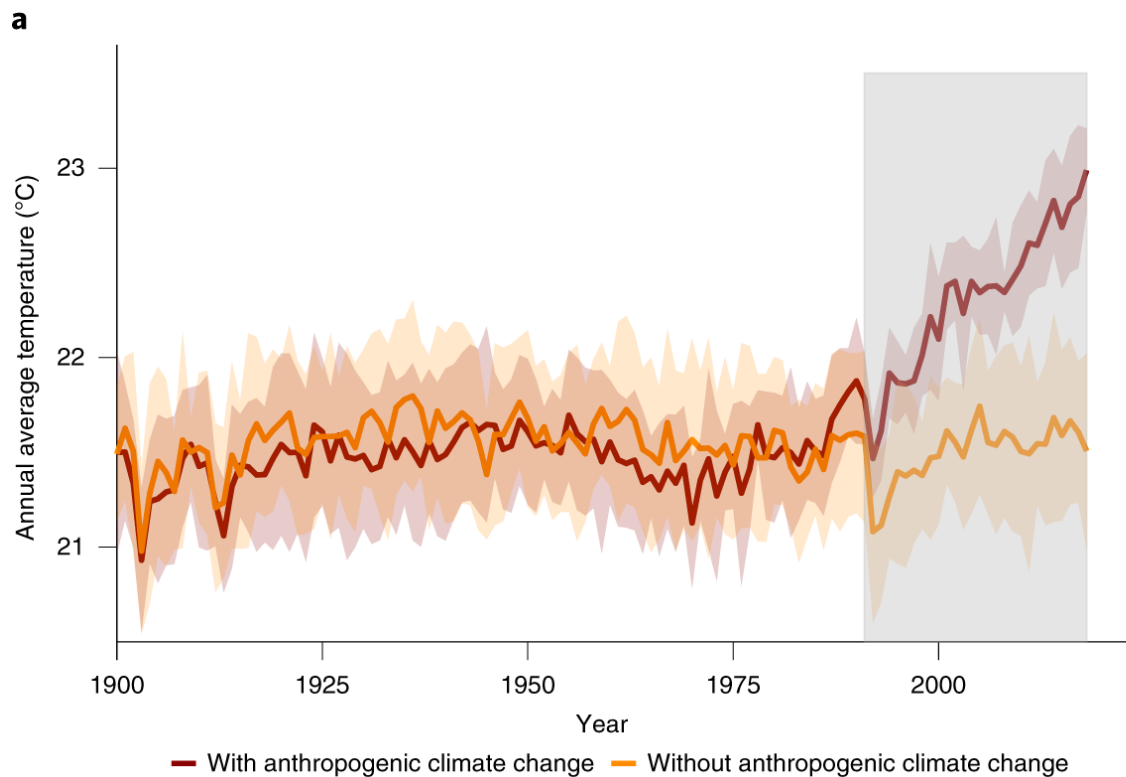


Maximum temperature across the CONUS, July 10, 2024

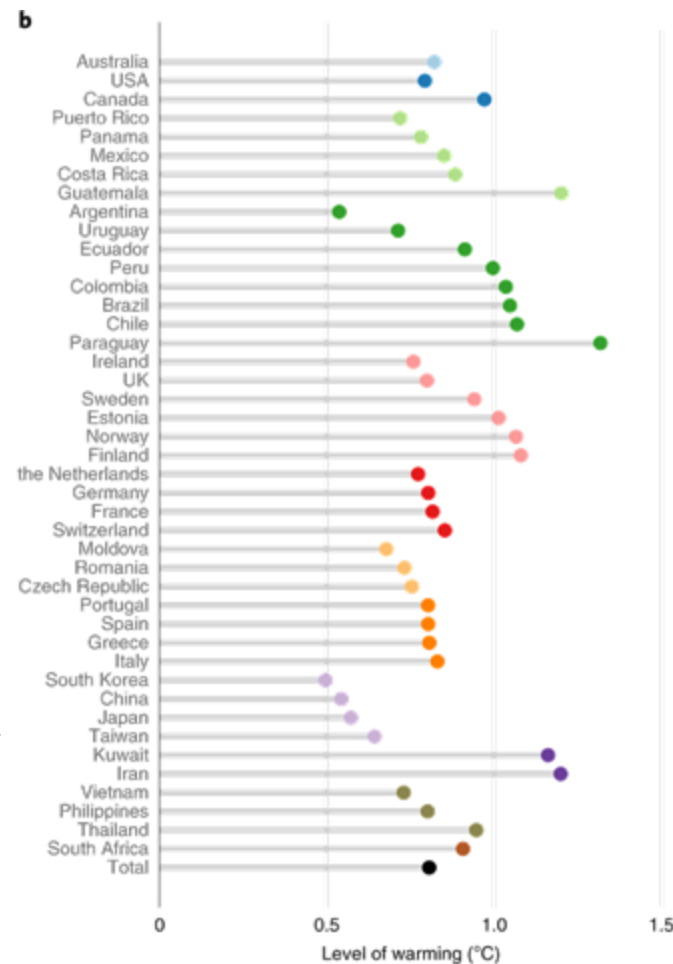


[NASA, Available](#)

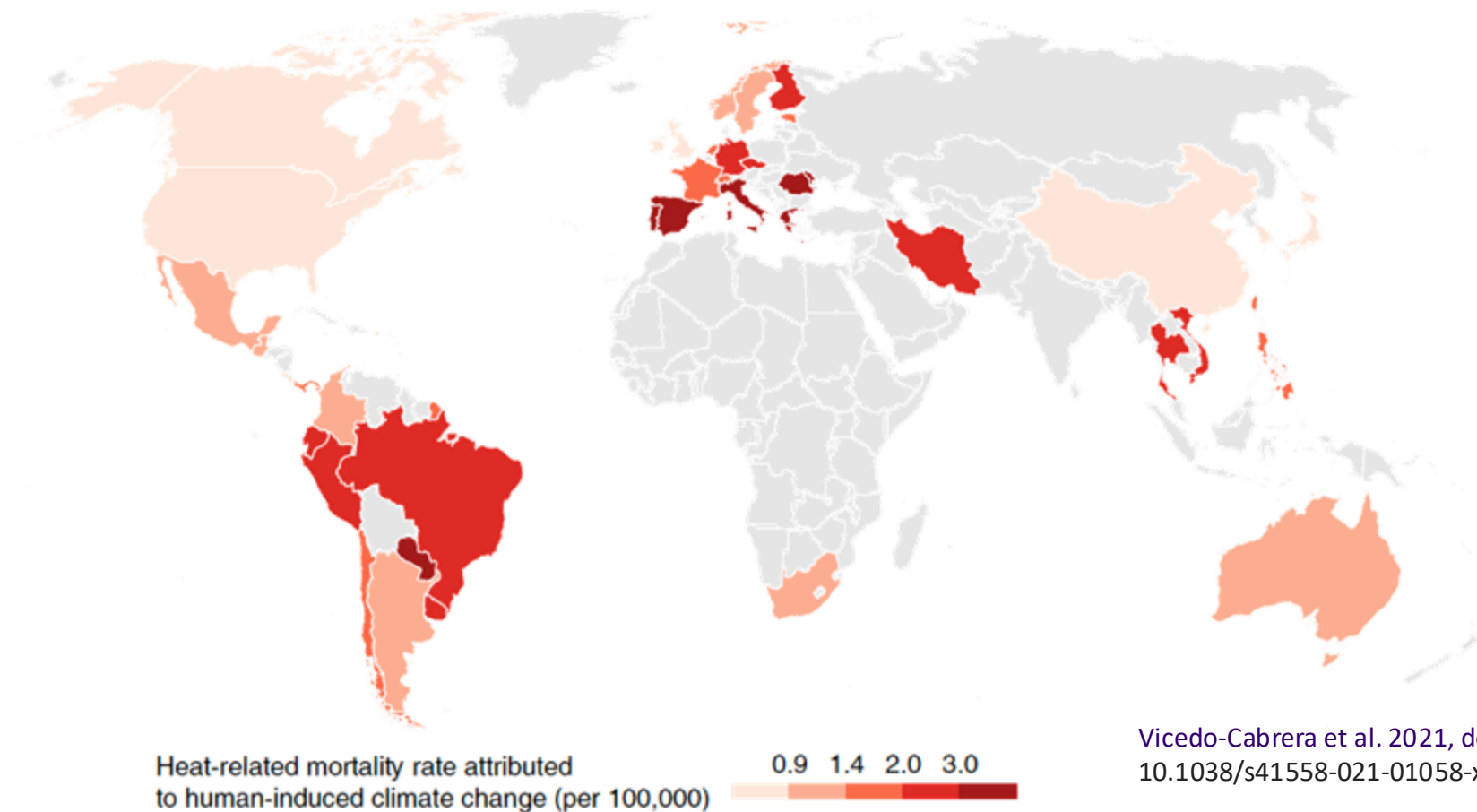
Climate Change and Heat



Vicedo-Cabrera et al. 2021, doi: 10.1038/s41558-021-01058-x

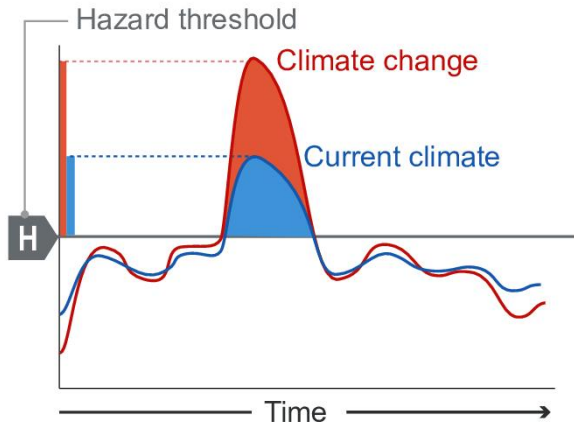


CC-Attributable Heat Mortality

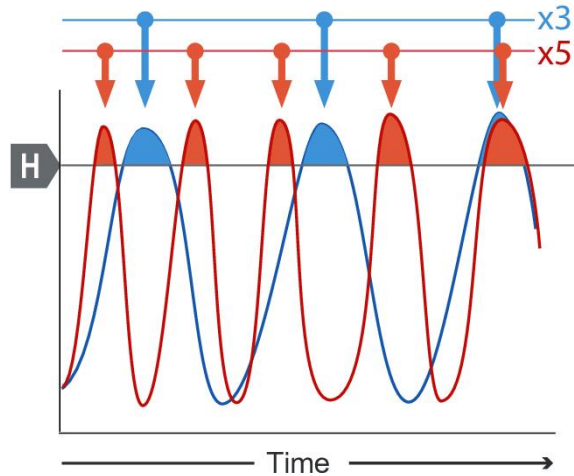


Vicedo-Cabrera et al. 2021, doi:
10.1038/s41558-021-01058-x

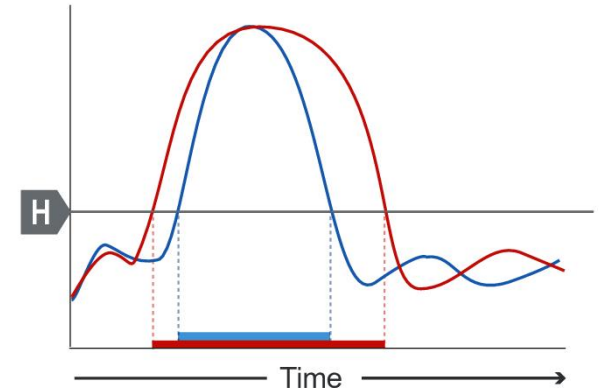
Intensity and Magnitude



Frequency

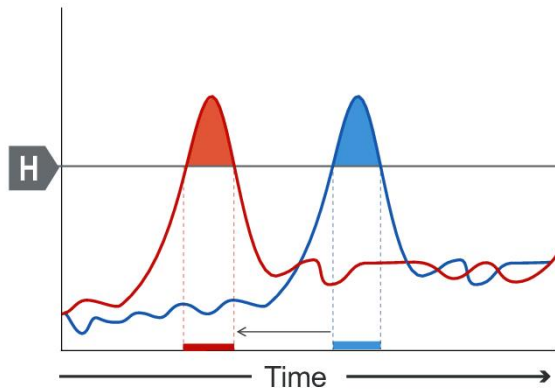


Duration

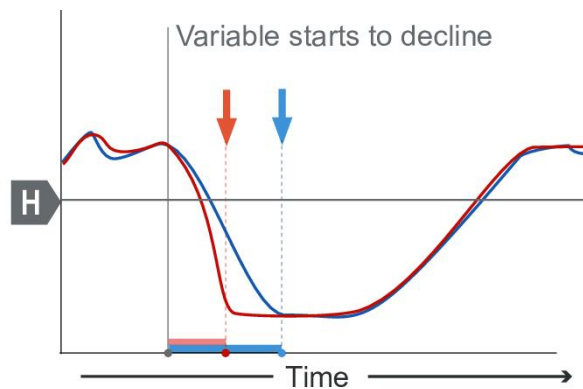


Timing

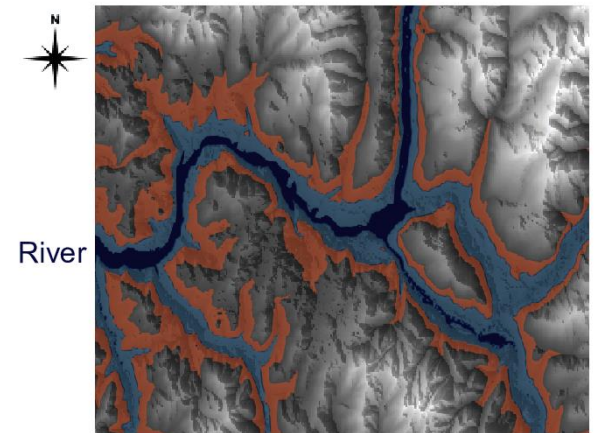
Seasonal shift



Shift in speed of onset



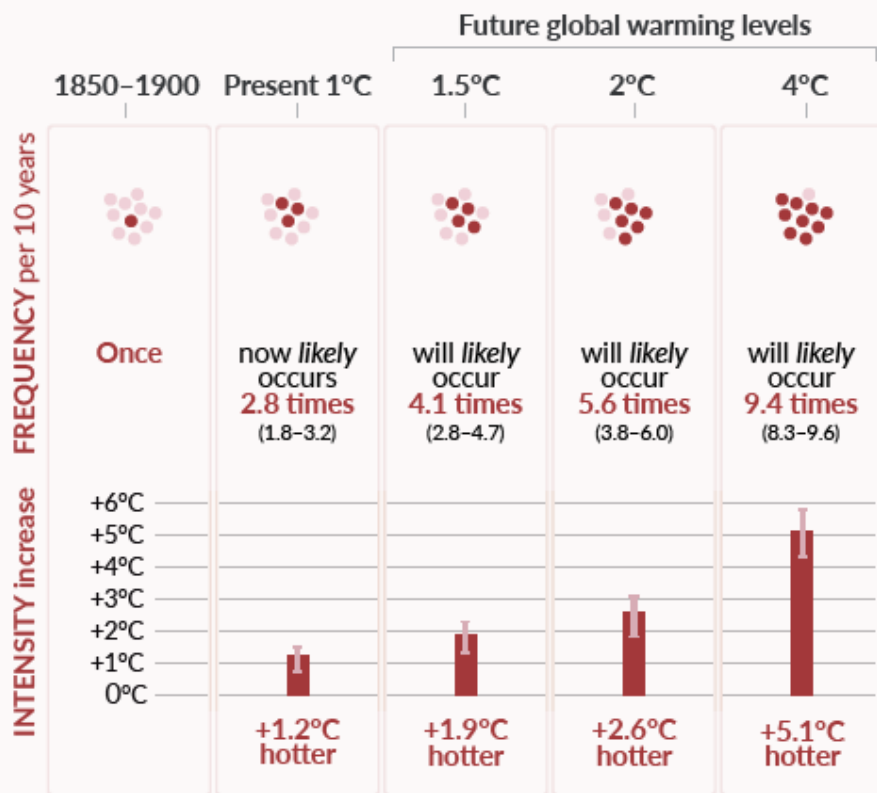
Spatial extent



Hot temperature extremes over land

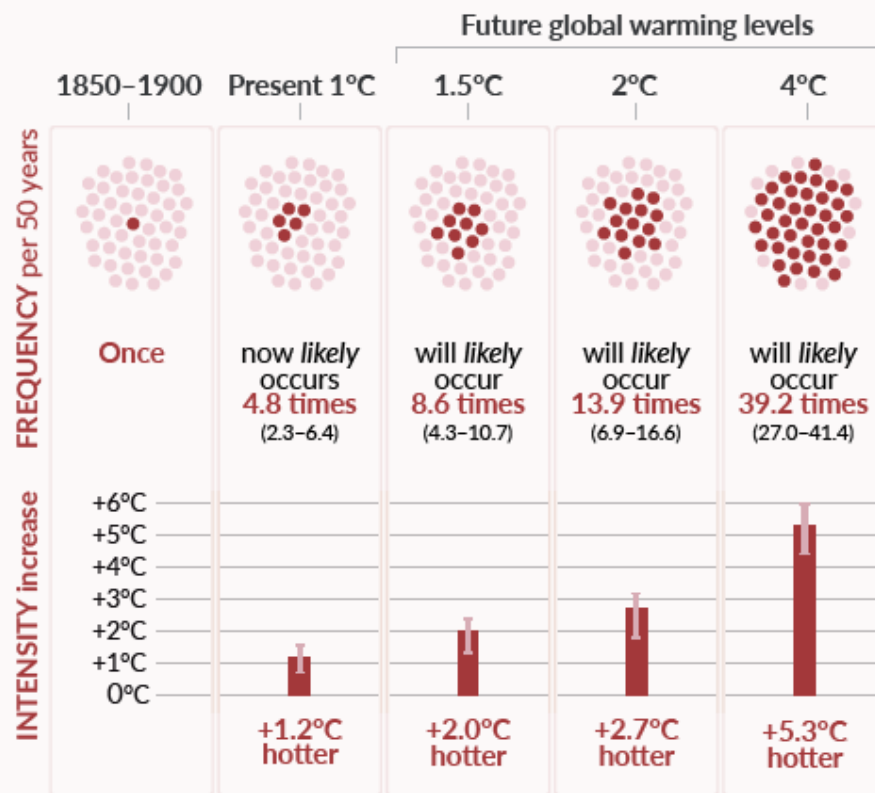
10-year event

Frequency and increase in intensity of extreme temperature event that occurred once in 10 years on average in a climate without human influence

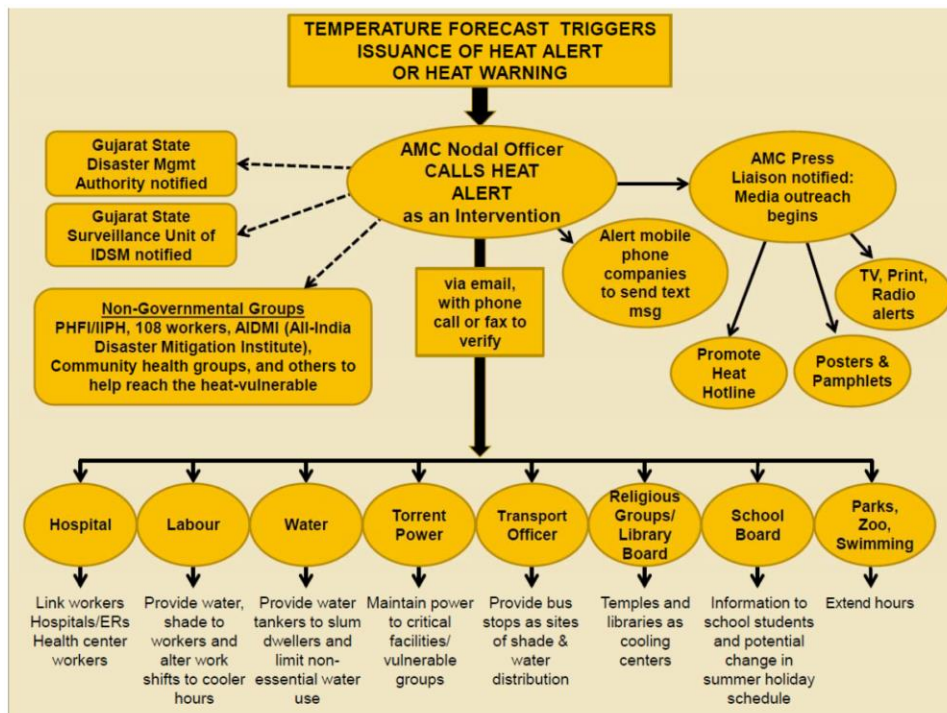


50-year event

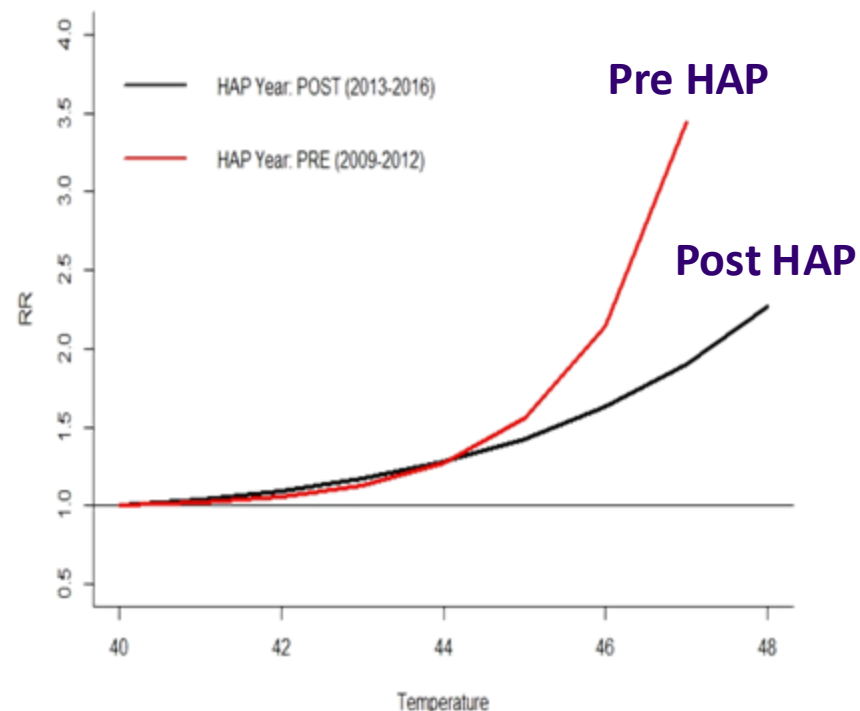
Frequency and increase in intensity of extreme temperature event that occurred once in 50 years on average in a climate without human influence



Potential for Mortality Reduction



Knowlton et al. 2014

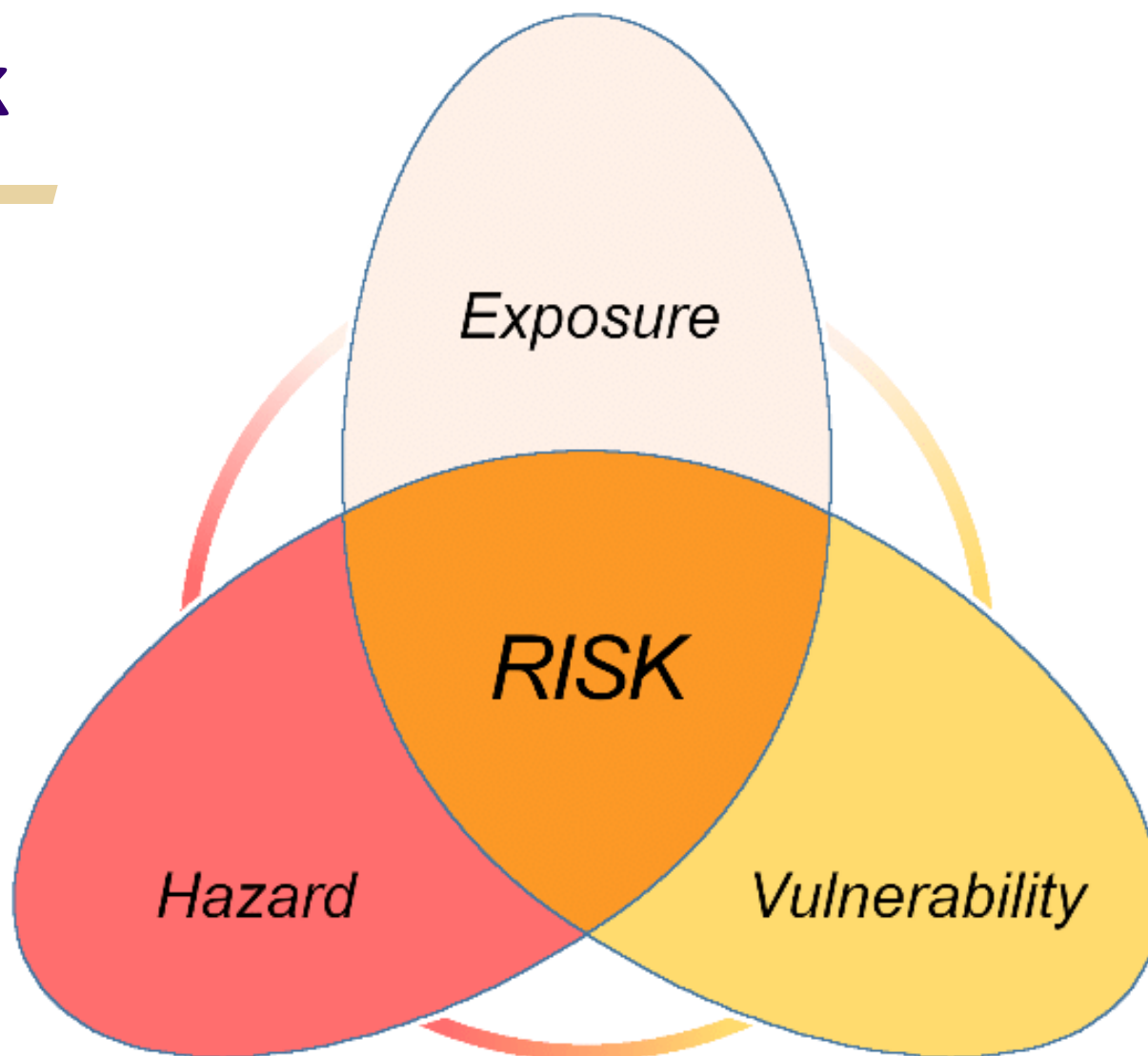


Hess et al. 2018

Implementation Challenges



Risk



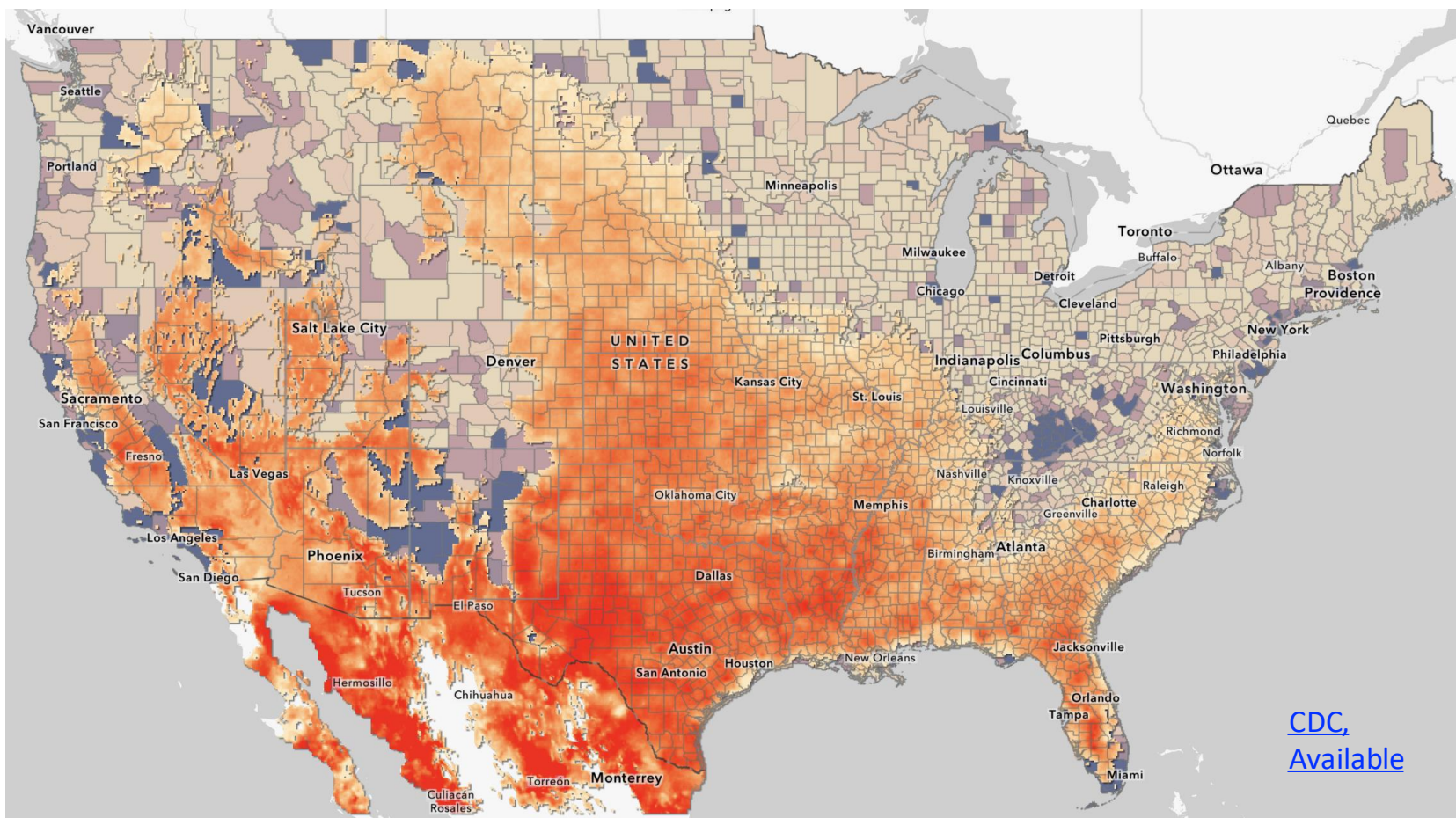
[Adapted from IPCC; Available](#)

Vulnerability



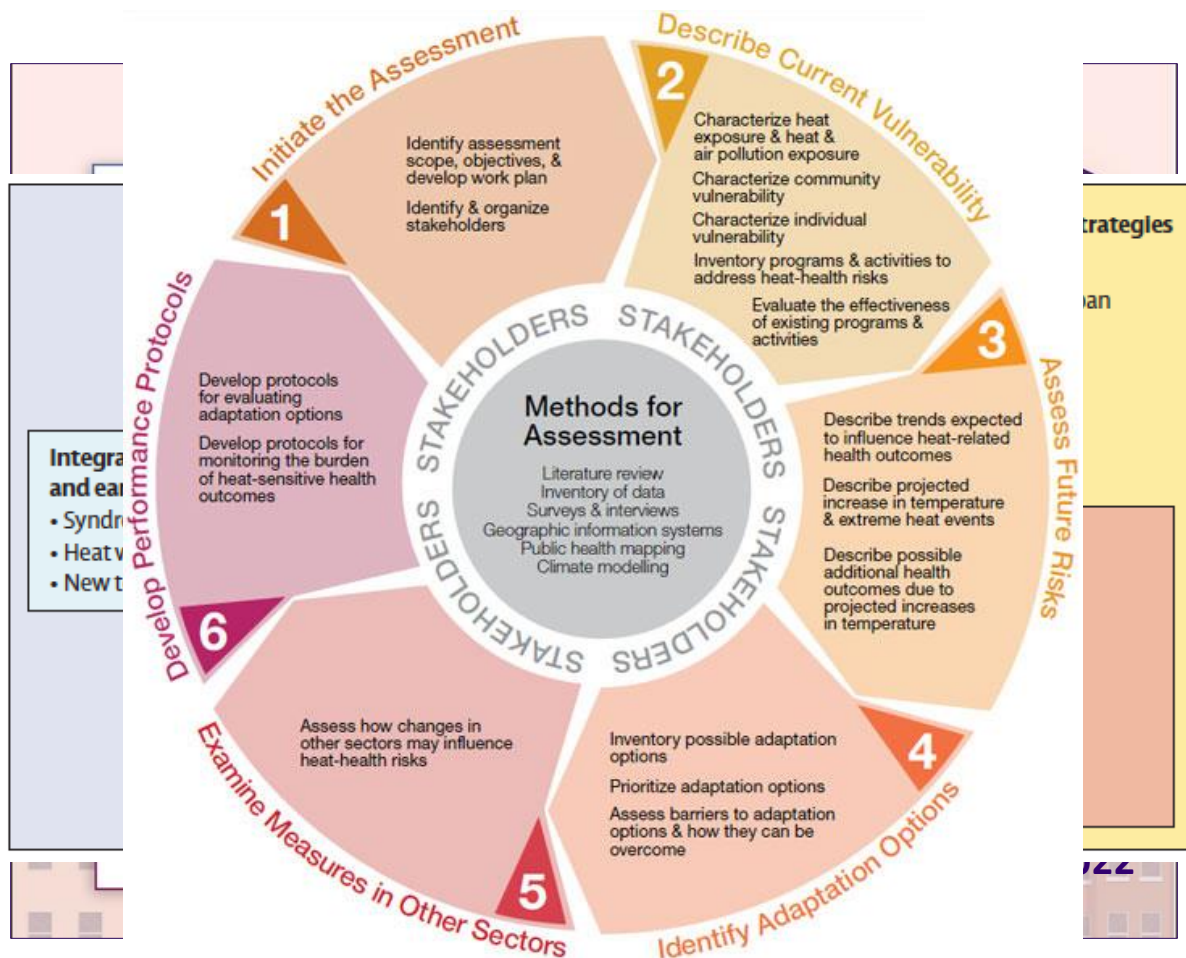
[Health Canada, Available](#)

Hazard & Vulnerability



The Challenge

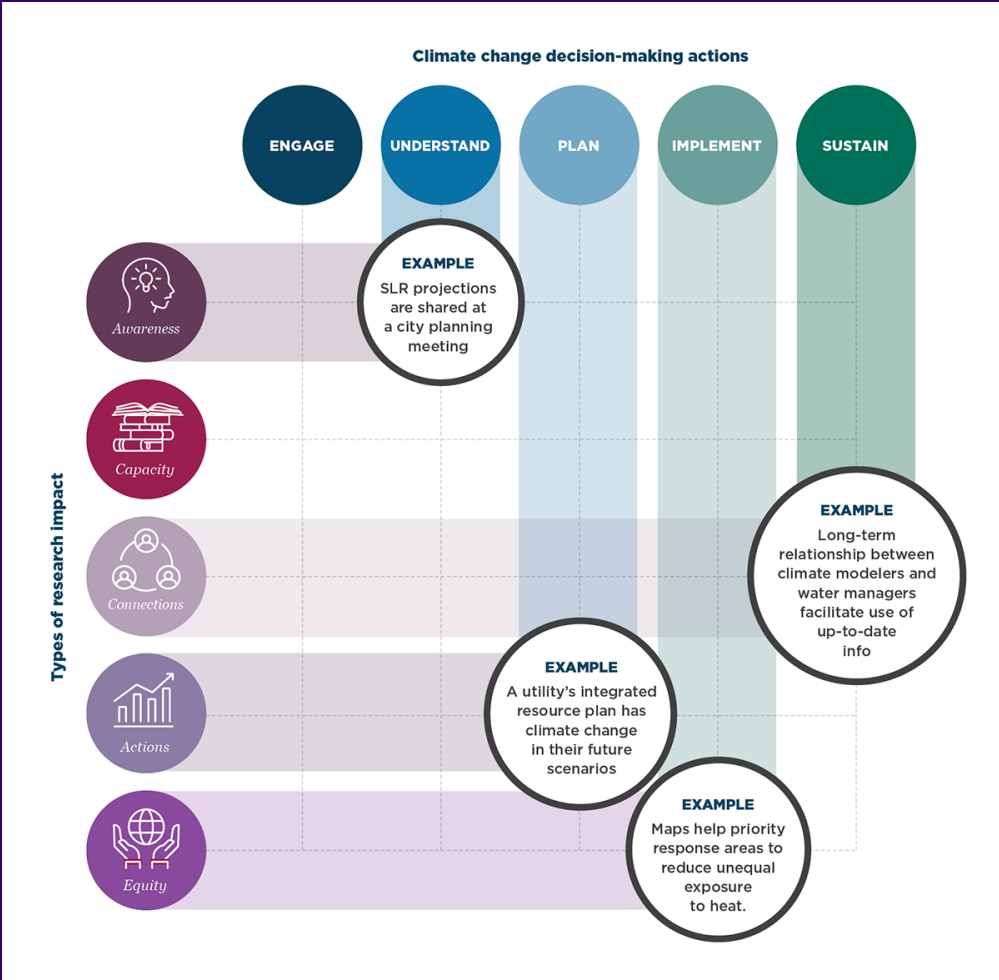
- > We know what, in general, drives risk, and...
- > We know what, in general, protects health, but...
- > Communities have specific risk profiles, priorities, and needs



Health Canada 2011

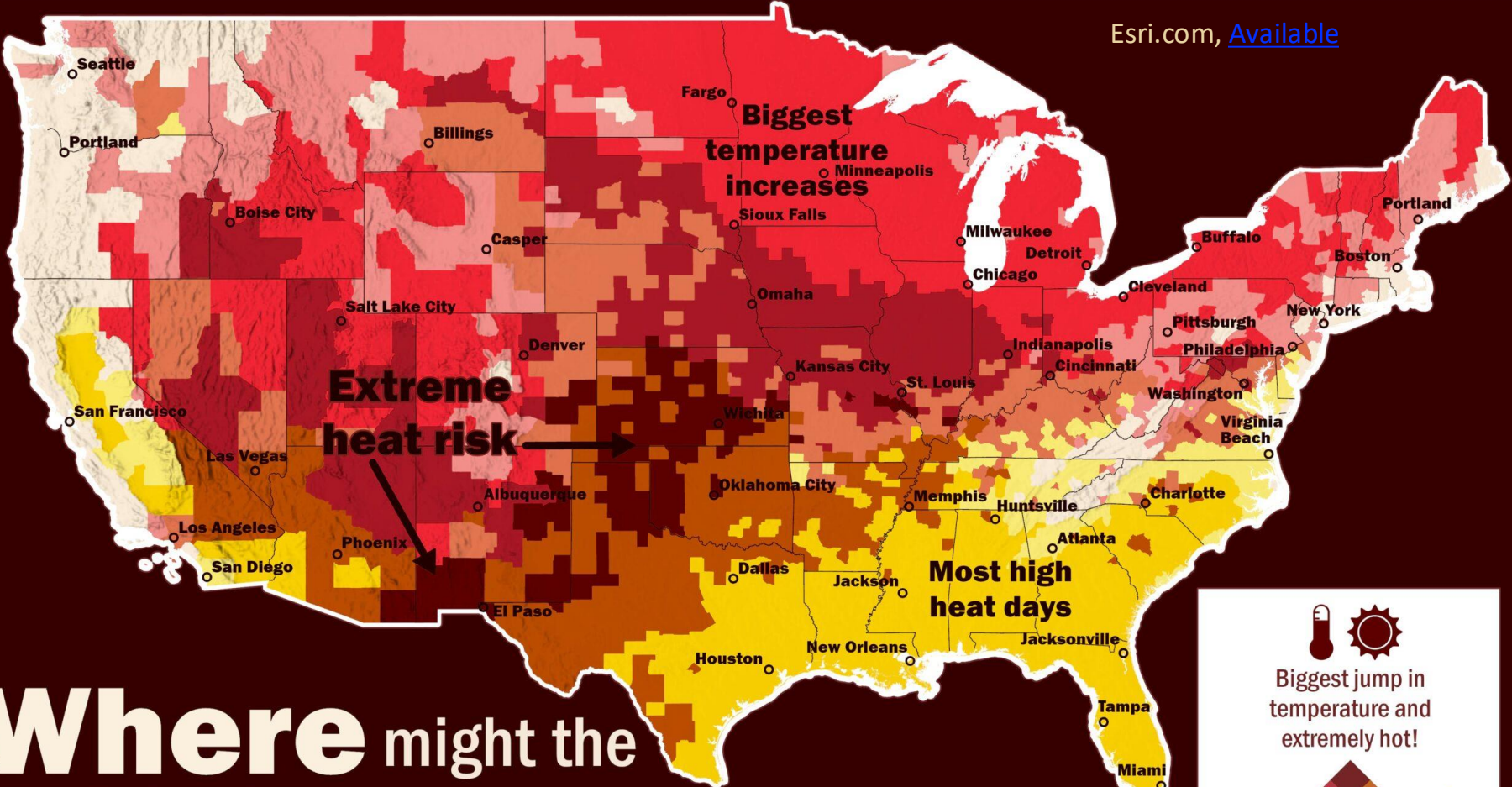
Interventions	Temperature			Area		Object			Duration			
	Low	High	Future (extreme)	Developed	Developing	Environment	Adult	The elderly	Children	Immediate	Short-term	Long-term
Proactive intervention												
Urban canyon	☆	★	☆	★	☆	★	★	☆	☆		☆	★
Green space	☆	★	☆	★	☆	★	★	★	★		☆	★
Blue space	☆	★	☆	☆	☆	★	★	★	★		☆	★
Albedo	☆	★	☆	★	☆	★	★	☆	☆	★	★	☆
Street trees/Landscape		★	☆	☆	☆	★	★	☆	★	☆	★	★
Housing Facilities	★	★	★	★	☆	☆	★	★	★	★	★	★
Water mist		★	☆	☆	☆	☆	★	★	★	★	☆	
Indirect intervention												
Early warning system	★	★	★	★	☆		★	☆	☆	★	★	★
Heat action plan	☆	★	★	★	☆		☆	★	☆	☆	★	★
Publicity/education	★	★	★	★	☆		★	★	☆	☆	★	★
Behavior intervention	★	★	★	★	☆		★	★	☆	☆	★	★
Direct intervention												
Cooling		★	☆	☆	☆		★	☆	☆	★	☆	
Heating	★		☆	☆	☆		★	☆	☆	★	☆	
Thermal exposure	☆	☆	★	☆	☆	☆	★	★	★	★	★	☆
Drug intervention		☆	☆	☆	☆		☆	★	☆	★	★	
Clothing	★	★	★	☆	☆		★	★	★	☆	★	
Personal comfort system	★	★	★	★	☆		★	★	☆	★	★	☆
Behavior adaptation	★	★	★	★	☆		★	★	☆	☆	★	★

Decision Support



Aspen
Global
Change
Institute

Esri.com, [Available](#)





Extreme heat risk →

Biggest temperature increases

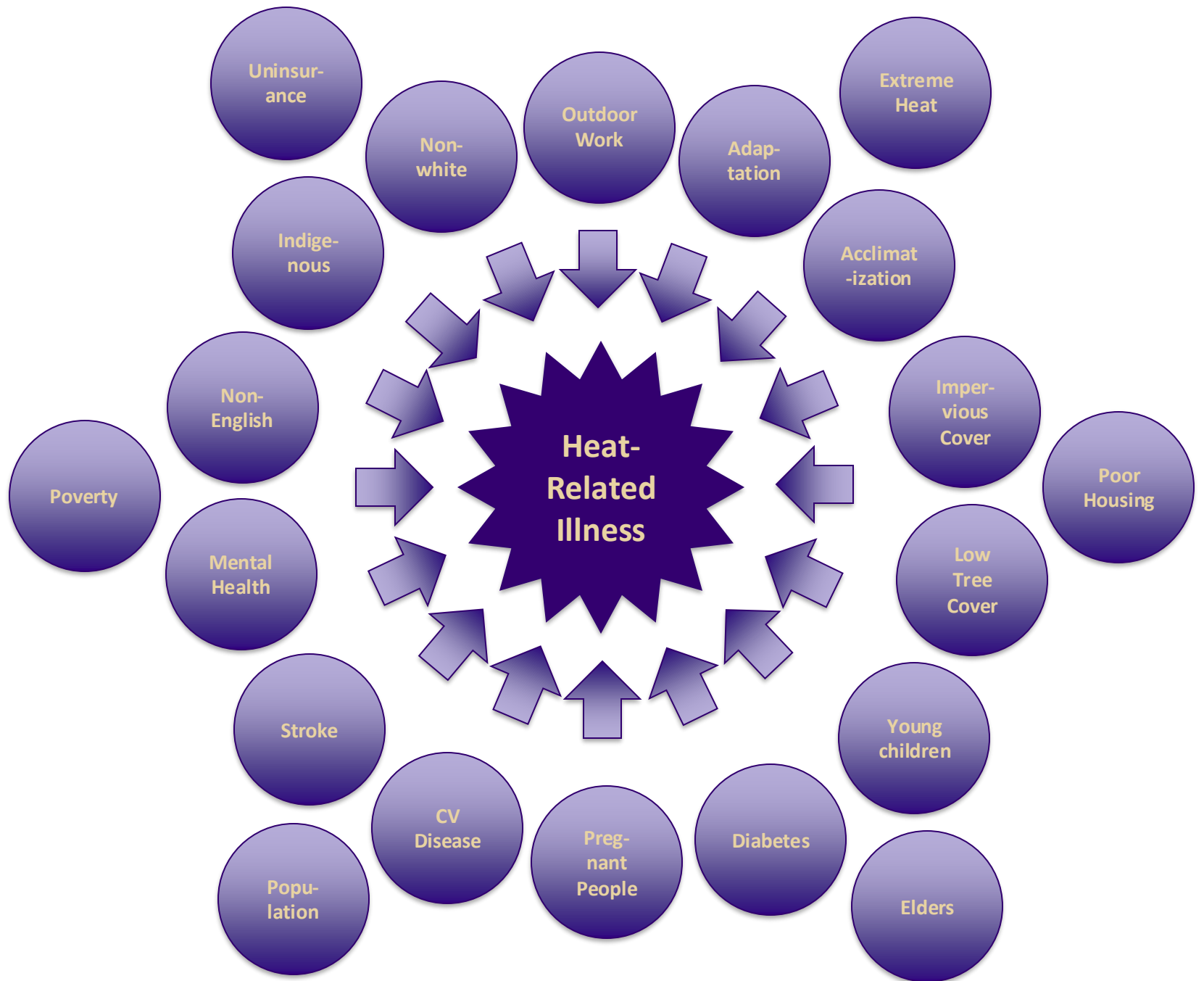
Most high heat days

Where might the **BIGGEST** temperature increases & **MOST** days over 90° be in 2050?

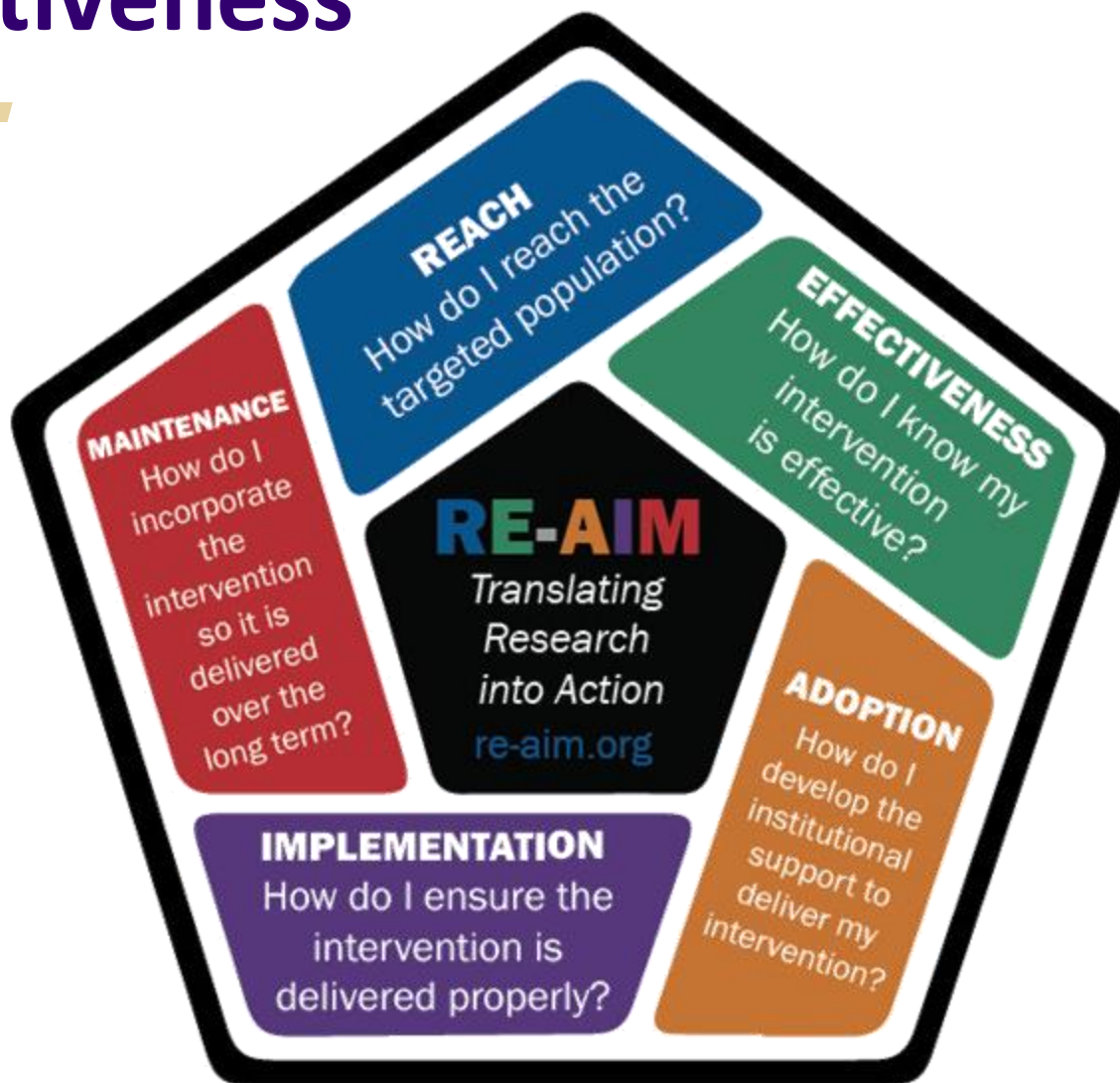
 Biggest jump in temperature and extremely hot!

 Temperature Increases

 Most days over 90°F



Effectiveness



Arizona
Health
Information
Network,
[Available](#)

Local Assessment and Advice



WORKER PROTECTIONS

by Alan Wang, BA, Jeremy J. Hess, MD, MPH
Published: 06/20/2023

With rising global temperatures, workers may be increasingly required to work in high-temperature environments, making them more susceptible to heat stress, occupational injuries, and potentially decreased productivity. Heat stress for workers derives from both external sources of heat in the environment and internal heat generated by metabolic activity, which is increased during physical activity. Heat stress can be mitigated by wearing protective equipment that reduces evaporative cooling through sweating. Workers in high-temperature environments are at risk of occupational injuries, absenteeism, and chronic kidney injury, as well as decreased wages. Individuals working in industries that require strenuous physical activity and are exposed to high-temperature environments are the most vulnerable. Workers in these environments need in place to protect workers from heat exposure and heat stress, and generally



Place-based Risk & Drivers

- High resolution
- Transparent
- Comprehensive
- Multiple hazard scenarios

Risk Reduction Opportunities

- Strategies
- Effectiveness
- Cost
- Timing

Synthesis

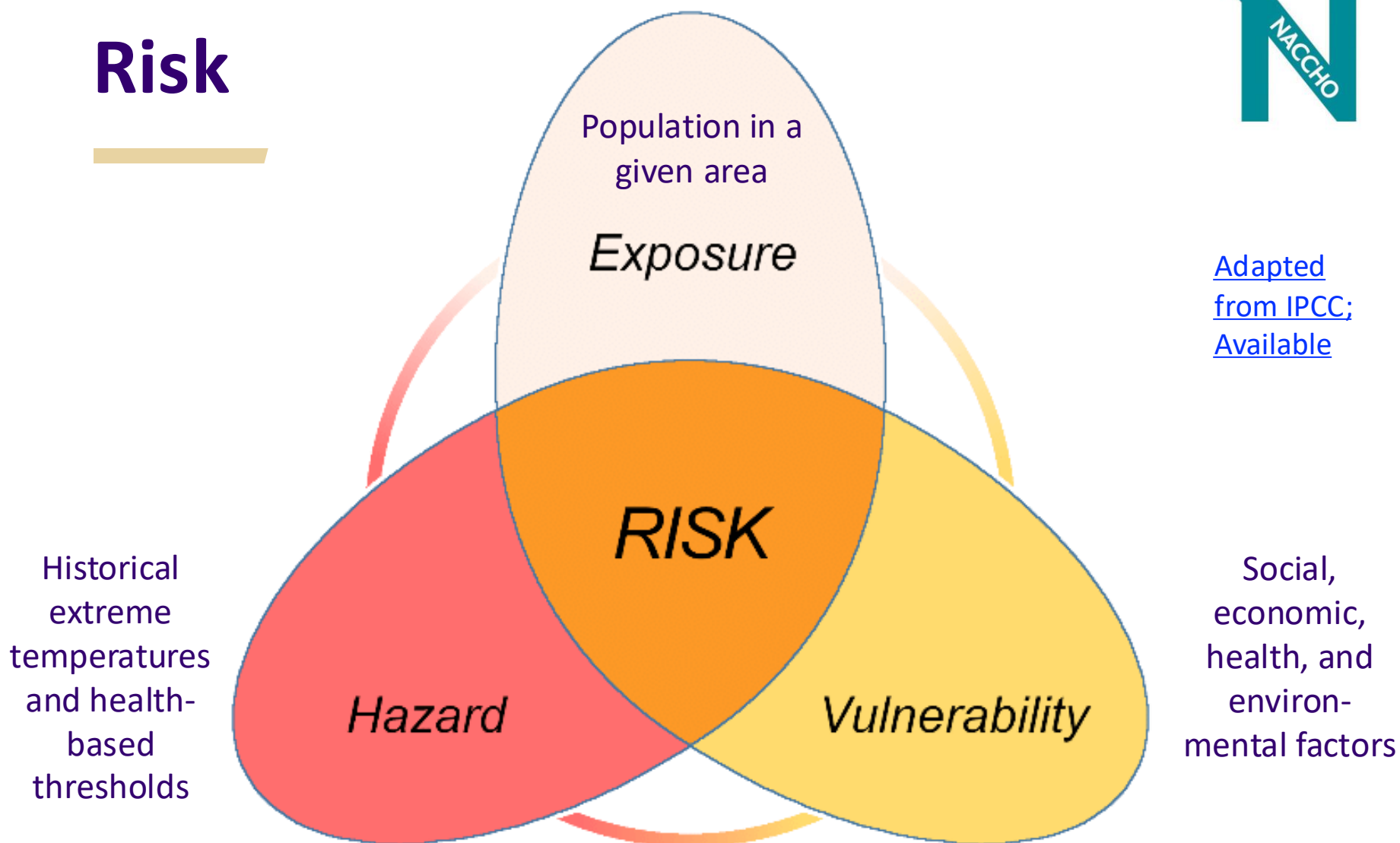
- Many points of entry
- Insights to advance discussions

W

CHaRT Platform



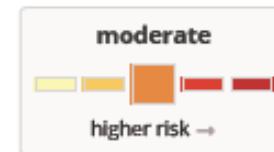
Risk



[Adapted from IPCC; Available](#)

HEAT HEALTH RISK (HISTORIC)

HOTTEST 3 DAYS OF EACH YEAR (1991-2020)



Report created 4/25/2025

http://localhost:8000/report/county/53033/models/heat_1991_2020_3days/

King County, Washington

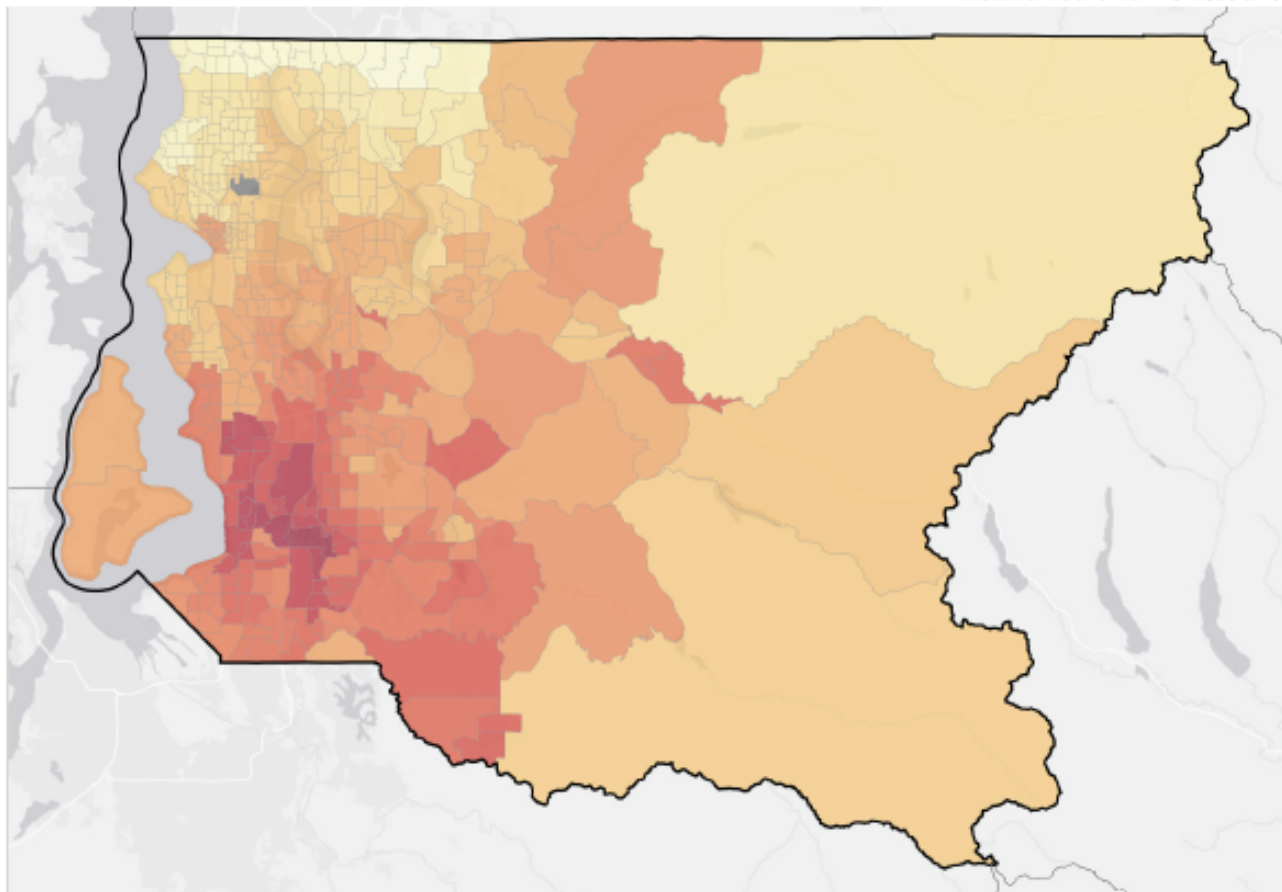
population: 2,254,371 people

total area: 2,116 sq miles

reporting units: 494* Census tracts

analysis based on 2020 Census data

* insufficient data for 4 Census tracts



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the
GTS user community

insufficient data

low risk



high risk

SEATTLE, WASHINGTON

HEAT HEALTH RISK (HISTORIC)

HOTTEST 3 DAYS OF EACH YEAR (1991-2020)



Report created 4/29/2025

http://localhost:8000/report/places/5363000/models/heat_1991_2020_3days/

population: 734,471 people

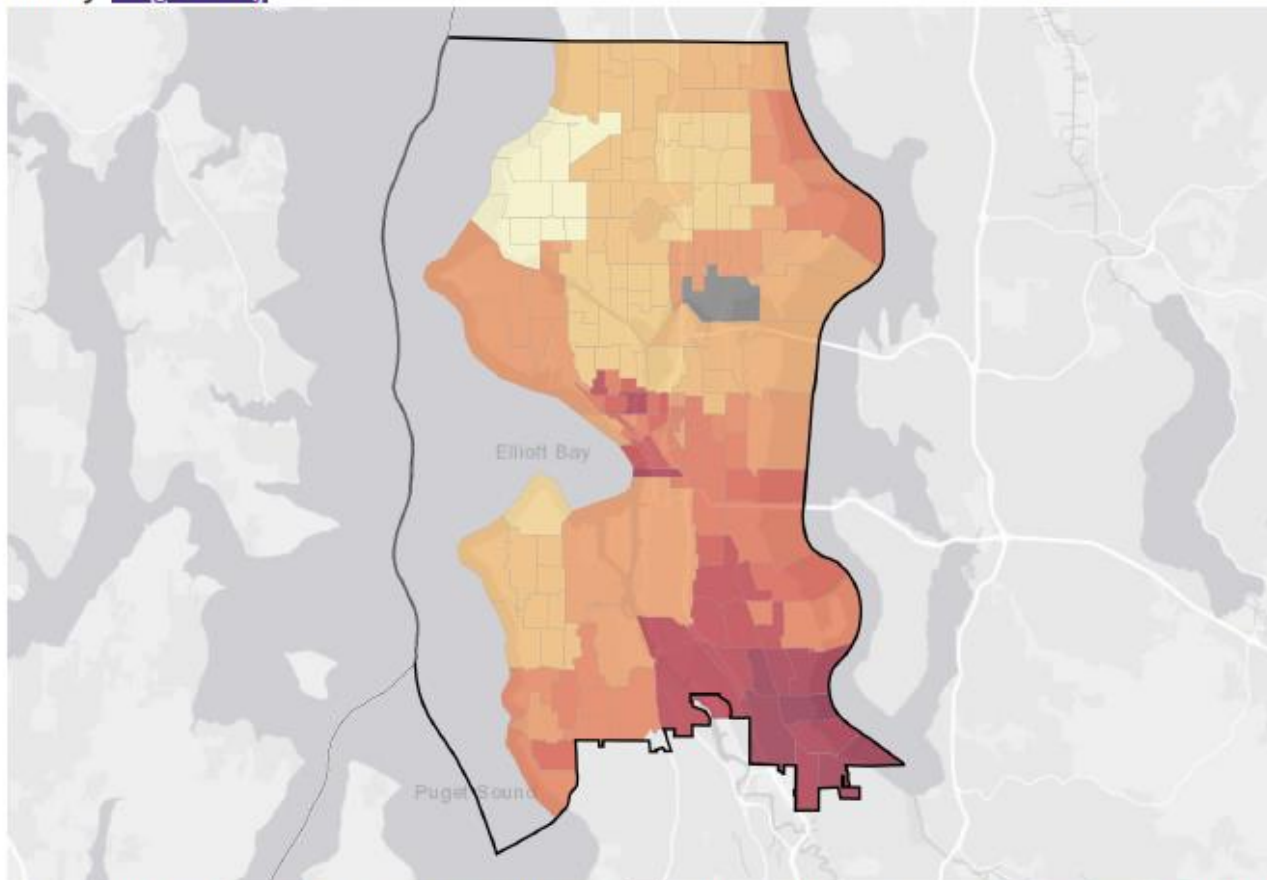
total area: 84.1 sq miles

county: [King County](#)

reporting units: 177* Census tracts

analysis based on 2020 Census data

* Insufficient data for 4 Census tracts



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

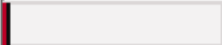
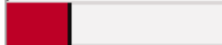
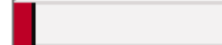
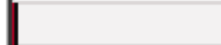
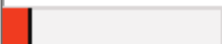
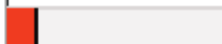

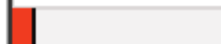




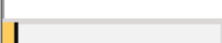

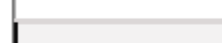

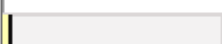
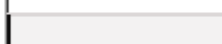
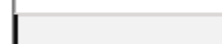
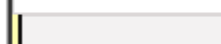




insufficient data

low risk










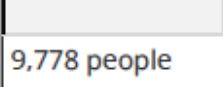






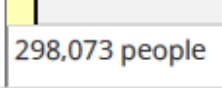
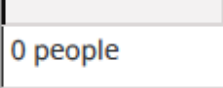
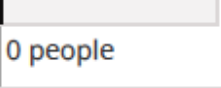
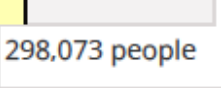






high risk

Contributing factors to risk by area

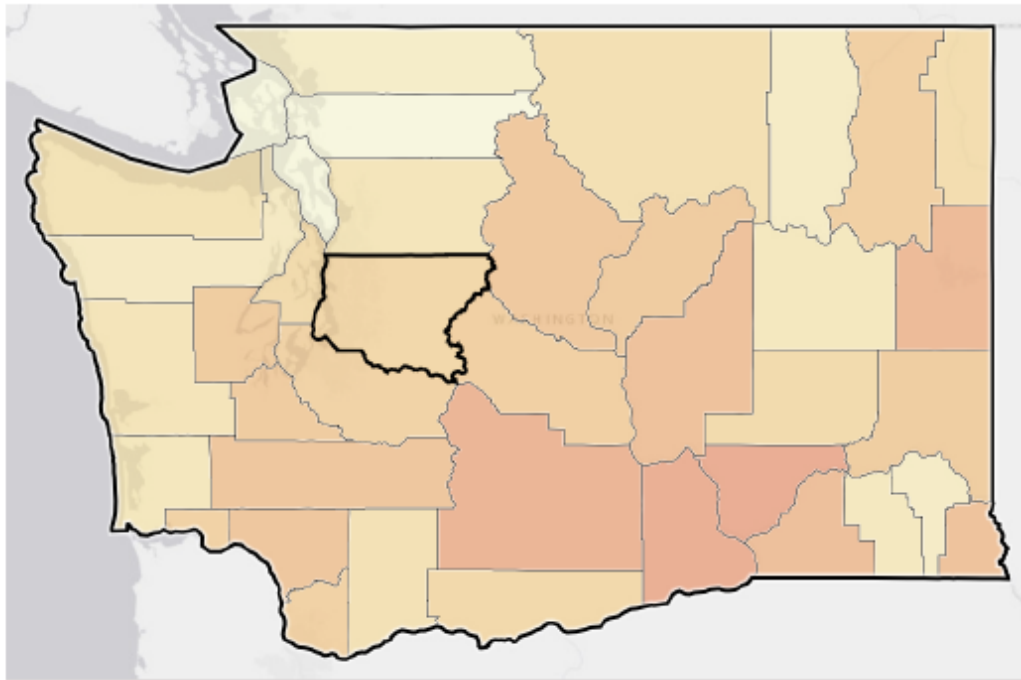
	Hazard (temperature)	Exposure (population density)	Vulnerability (multiple factors)	Risk
High	 3% 54.8 sq miles	 28% 591.1 sq miles	 9% 200.4 sq miles	 2% 37.7 sq miles
Moderate-high	 12% 245.9 sq miles	 13% 268.4 sq miles	 59% 1,243 sq miles	 10% 222 sq miles
Moderate	 75% 1,597 sq miles	 7% 144.9 sq miles	 31% 650.4 sq miles	 24% 517.1 sq miles
Moderate-low	 6% 132.2 sq miles	 52% 1,110 sq miles	 < 1% 20.5 sq miles	 59% 1,253 sq miles
Low	 4% 84.7 sq miles	 0% 0 sq miles	 0% 0 sq miles	 4% 84.7 sq miles
Insufficient data	 < 1% 1.12 sq miles	 < 1% 1.12 sq miles	 < 1% 1.12 sq miles	 < 1% 1.12 sq miles

Contributing factors to risk by population

	Hazard (temperature)	Exposure (population density)	Vulnerability (multiple factors)	Risk
High	 8% 178,324 people	 96% 2,163,232 people	 24% 549,527 people	 5% 119,966 people
Moderate-high	 22% 492,011 people	 3% 57,380 people	 33% 742,011 people	 21% 467,978 people
Moderate	 26% 582,368 people	 < 1% 9,778 people	 40% 892,259 people	 28% 636,425 people
Moderate-low	 31% 689,933 people	 < 1% 10,319 people	 3% 56,912 people	 32% 718,267 people
Low	 13% 298,073 people	 0% 0 people	 0% 0 people	 13% 298,073 people
Insufficient data	 < 1% 13,662 people	 < 1% 13,662 people	 < 1% 13,662 people	 < 1% 13,662 people

COMPARED TO OTHER COUNTIES

On average, King County has a higher risk than 50% of other counties in Washington and 91% of other counties in the contiguous U.S.

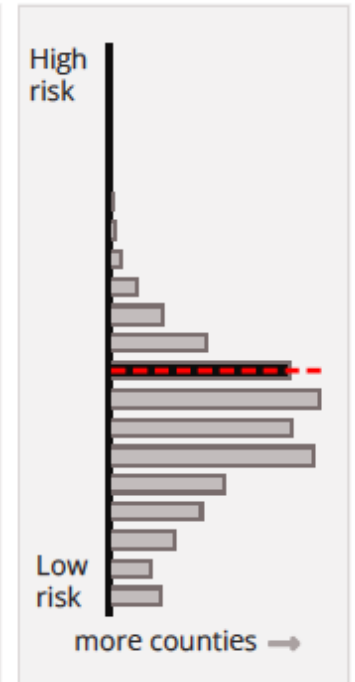


Basemap: Esri, HERE, Garmin, (c)
OpenStreetMap contributors, and the
GIS user community

low risk  high risk



Compared to other
counties in
Washington

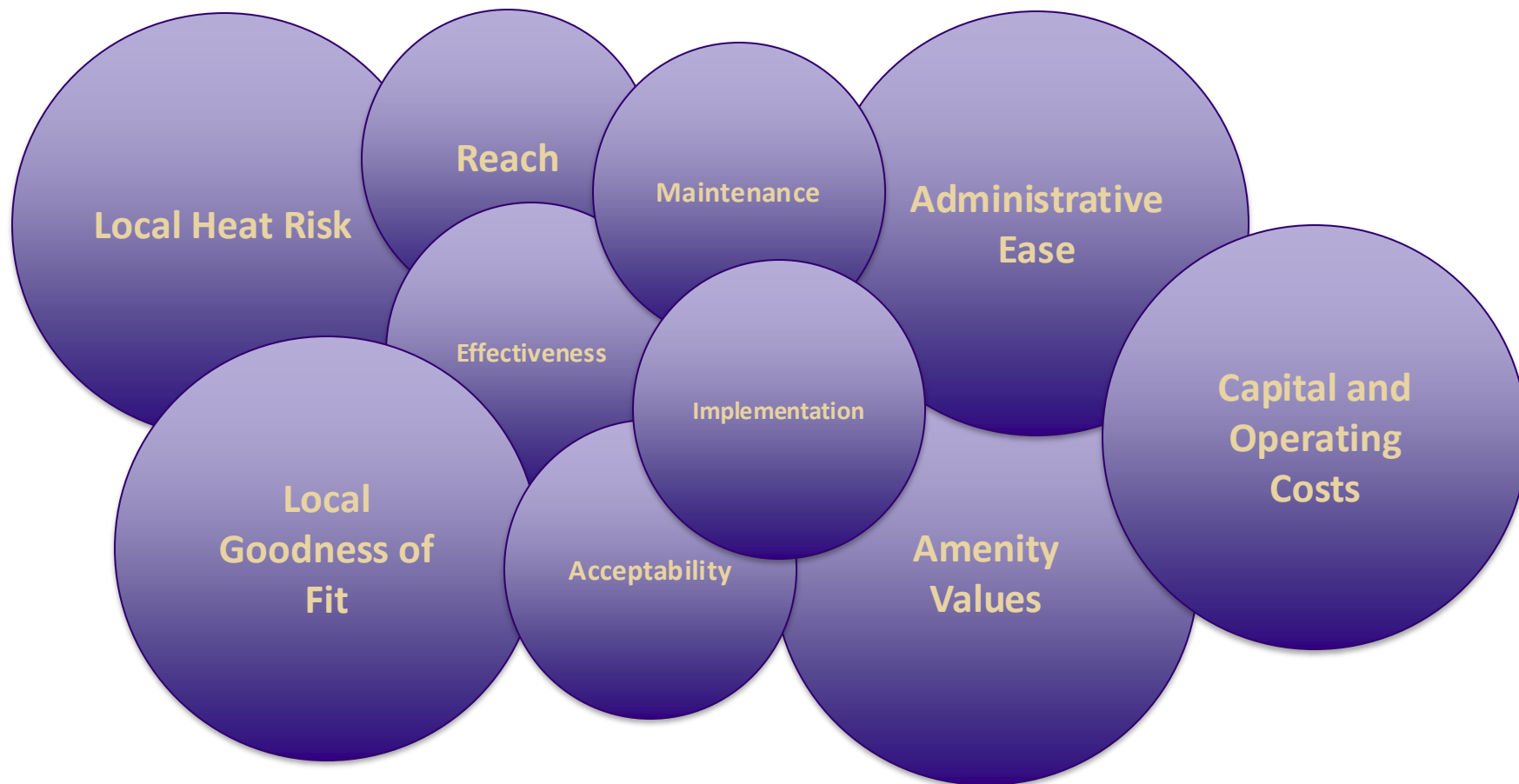


Compared to other
counties in the
contiguous U.S.

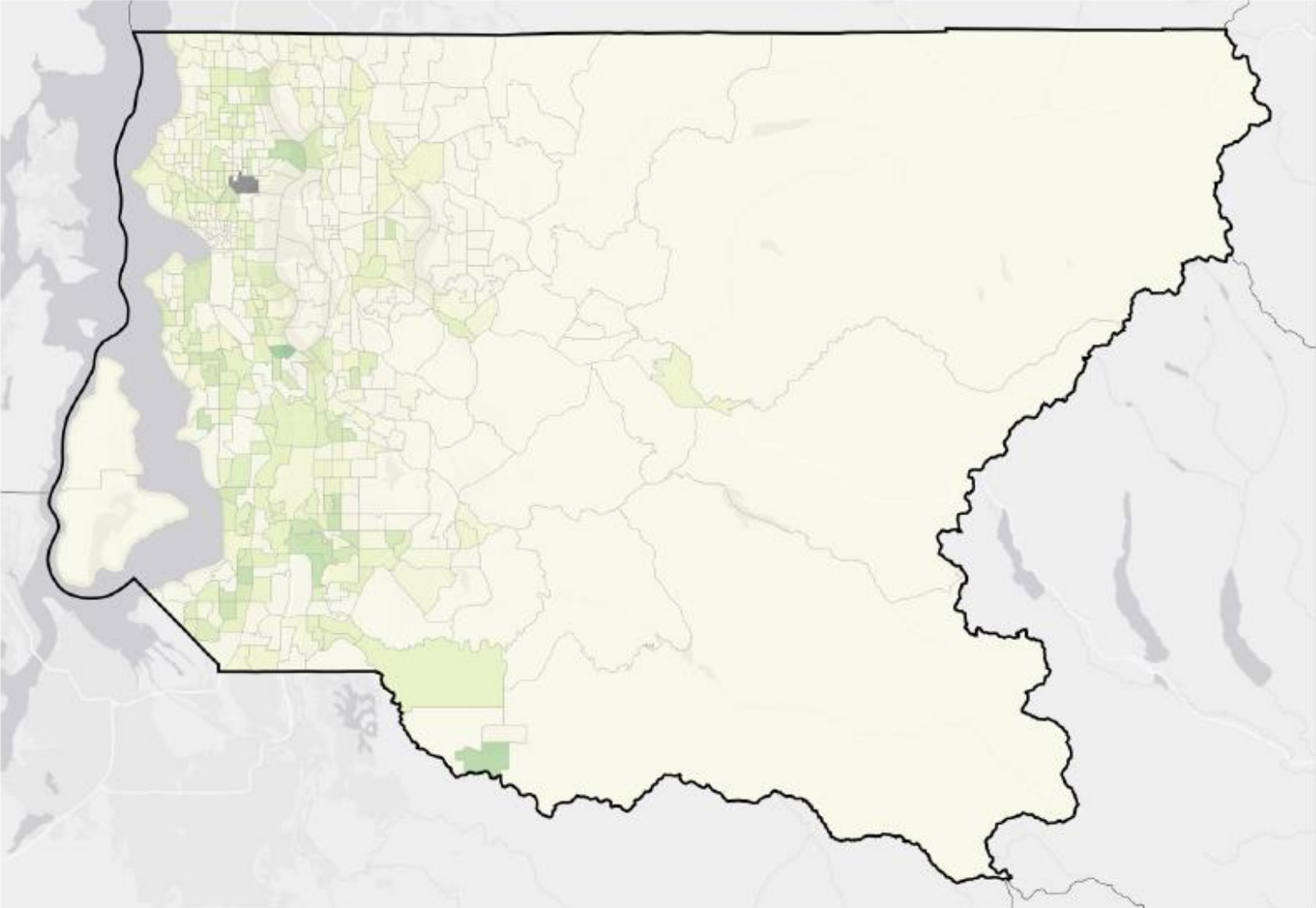
Intervention Families



Intervention Recommendations



TREE PLANTING



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

insufficient data

Not recommended



Highly recommended

This intervention is recommended based on:

Alignment to risk:

Estimate of the degree to which this intervention matches with the drivers of heat health risks in the reporting unit.



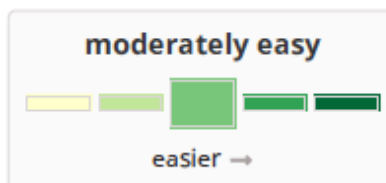
Effectiveness:

Estimate of this intervention's effectiveness at protecting population health from extreme heat based on assessment of the intervention's risk reduction, acceptability, and ease of implementation.



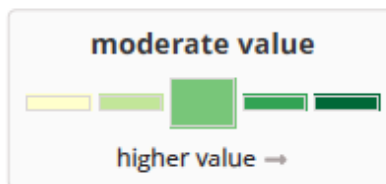
Ease of implementation:

Estimate of the relative ease or difficulty of implementing this intervention in the reporting unit's jurisdiction based on administrative, regulatory, and ownership concerns.



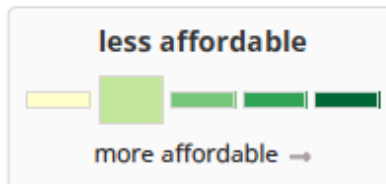
Amenity value:

Estimate of the associated values of amenities that the intervention would support, including leisure, community gathering, and property values.



Cost:

Estimate of the net-present value of the intervention's implementation over a five-year period in the reporting unit's jurisdiction.



HEAT HEALTH RISK (HISTORIC) FOR BLOUNT COUNTY, ALABAMA

HOTTEST 3 DAYS OF EACH YEAR (1991-2020)

Report created 4/24/2025

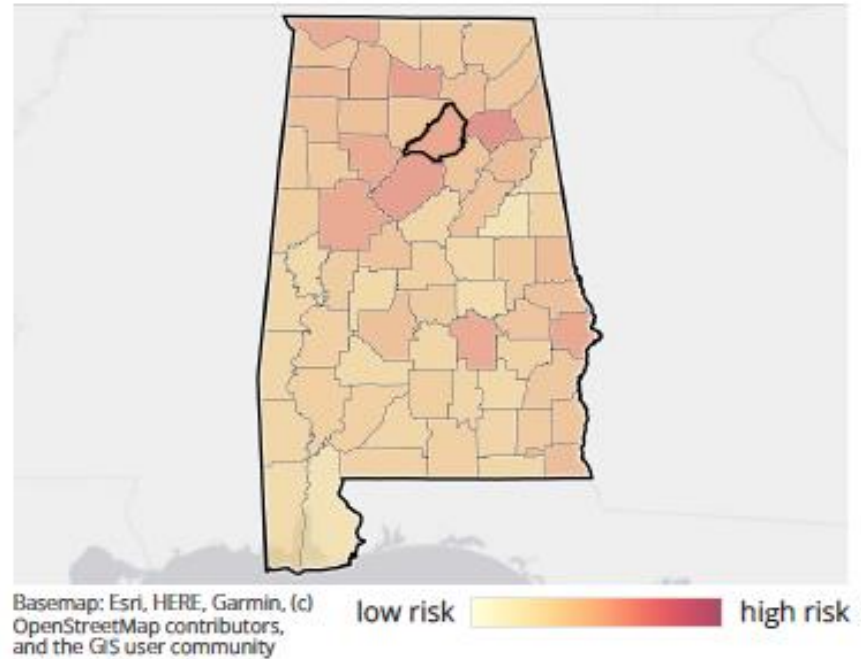
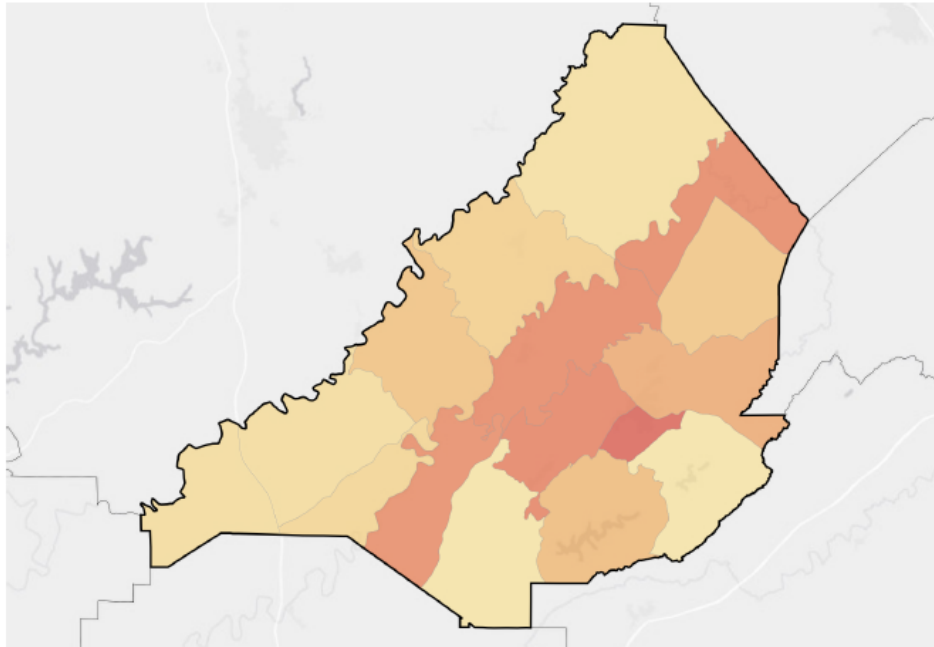
http://localhost:8000/report/county/01009/models/heat_1991_2020_3days/#TODO

population: 59,077 people

total area: 644.9 sq miles

analysis units: 16 Census tracts

analysis based on 2020 Census data



HEAT HEALTH RISK (HISTORIC) FOR RIVERSIDE COUNTY, CALIFORNIA

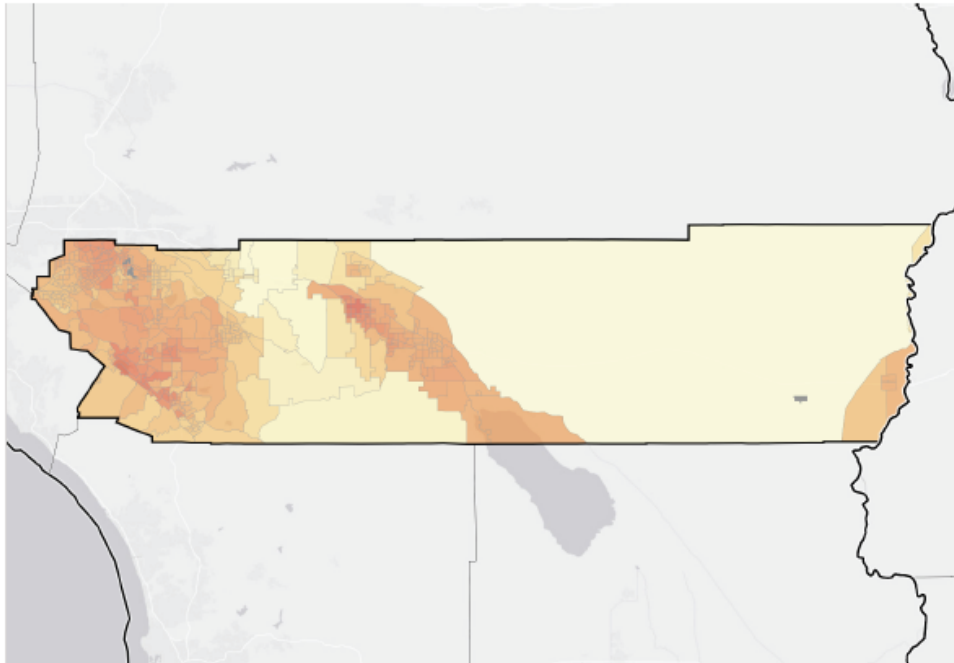
HOTTEST 3 DAYS OF EACH YEAR (1991-2020)

Report created 4/24/2025

http://localhost:8000/report/county/06065/models/heat_1991_2020_3days/#TODO

population: 2,429,487 people
total area: 7,209 sq miles

analysis units: 518* Census tracts
analysis based on 2020 Census data
* insufficient data for 3 Census tracts



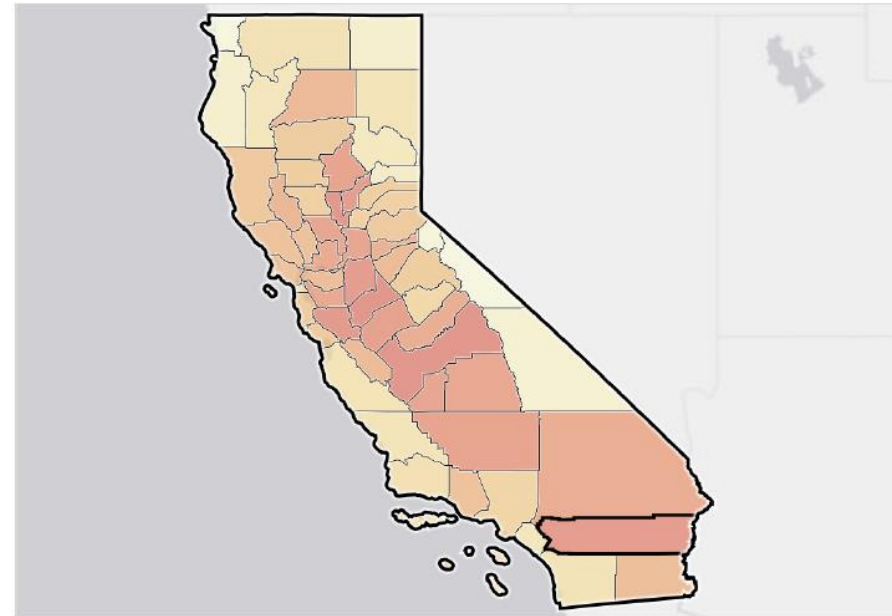
Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

insufficient data

low risk



high risk



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

low risk



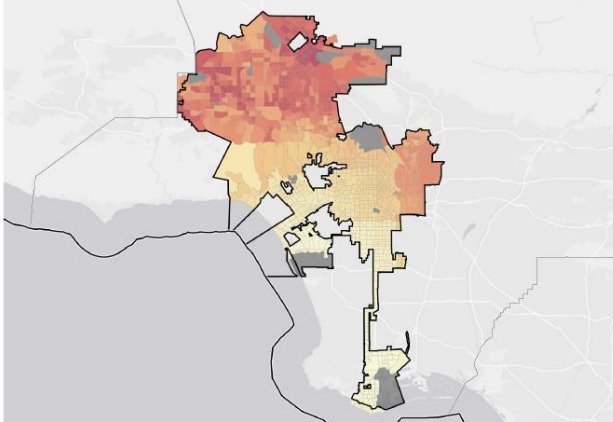
high risk

LOS ANGELES, CALIFORNIA
HEAT HEALTH RISK (HISTORIC)
 HOTTEST 3 DAYS OF EACH YEAR (1991-2020)



Report created 4/29/2025
http://localhost:8000/report/places/0644000/models/heat_1991_2020_3days/

population: 3,883,524 people
 total area: 473.6 sq miles
 county: [Los Angeles County](#)
 reporting units: 1,114* Census tracts
 analysis based on 2020 Census data
 * insufficient data for 15 Census tracts



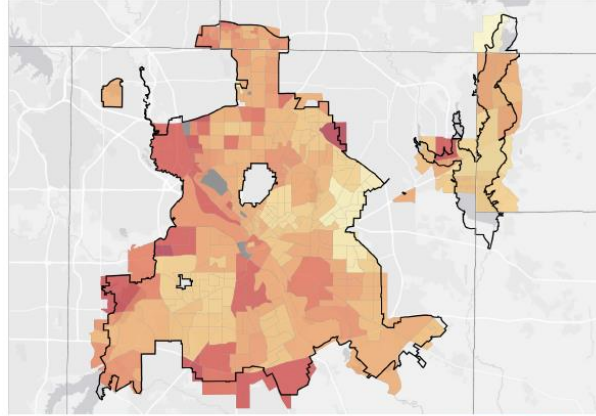
Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 insufficient data low risk high risk

DALLAS, TEXAS
HEAT HEALTH RISK (HISTORIC)
 HOTTEST 3 DAYS OF EACH YEAR (1991-2020)



Report created 4/29/2025
http://localhost:8000/report/places/4819000/models/heat_1991_2020_3days/

population: 1,569,943 people
 total area: 455.8 sq miles
 counties: [Collin County](#), [Dallas County](#), [Denton County](#), [Rockwall County](#)
 reporting units: 403* Census tracts
 analysis based on 2020 Census data
 * insufficient data for 5 Census tracts



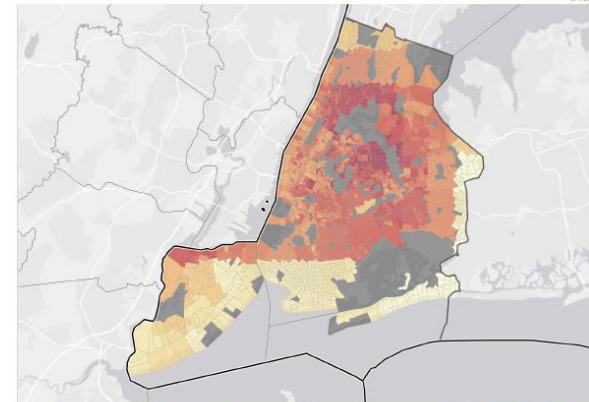
Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 insufficient data low risk high risk

NEW YORK, NEW YORK
HEAT HEALTH RISK (HISTORIC)
 HOTTEST 3 DAYS OF EACH YEAR (1991-2020)



Report created 4/29/2025
http://localhost:8000/report/places/3651000/models/heat_1991_2020_3days/

population: 8,622,467 people
 total area: 300.5 sq miles
 counties: [Bronx County](#), [Kings County](#), [New York County](#), [Queens County](#), [Richmond County](#)
 reporting units: 2,324* Census tracts
 analysis based on 2020 Census data
 * insufficient data for 110 Census tracts



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
 insufficient data low risk high risk

Performance

- > Novel tool designed to improve on multiple fronts
- > Many questions about validity and utility
- > Piloted with multiple stakeholders in W, feedback gathered for second version now being finalized
- > Validity
 - Face validity evaluated with residents of Auburn, WA
 - Risk model validity evaluated for WA counties
- > Utility
 - Being evaluated by NIH-funded randomized controlled trial
 - Ease of implementation being evaluated by post-trial qualitative study of users



Experience from King County



UNIVERSITY *of* WASHINGTON
SCHOOL OF PUBLIC HEALTH

NACCHO
National Association of County & City Health Officials
The National Connection for Local Public Health

W **CHAnGE**
Center for Health and the Global Environment
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

King County

Public Health Seattle & King County



- > Pop 2.34m
- > Diverse
 - 54% White
 - 20% Asian
 - 7% Black
 - 11% Hispanic or Latino
- > Prosperous (and expensive)
 - Median HH income \$120K, per capita \$71K, poverty 8.8%
- > Mix of urban, sub-urban, rural, varied terrain
- > Temperate climate, but warming quickly

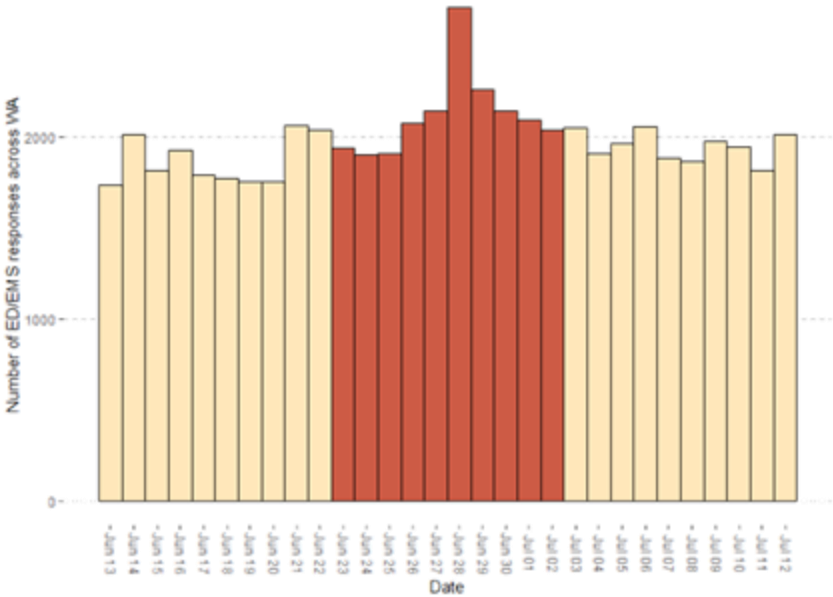


2021 Heat Dome

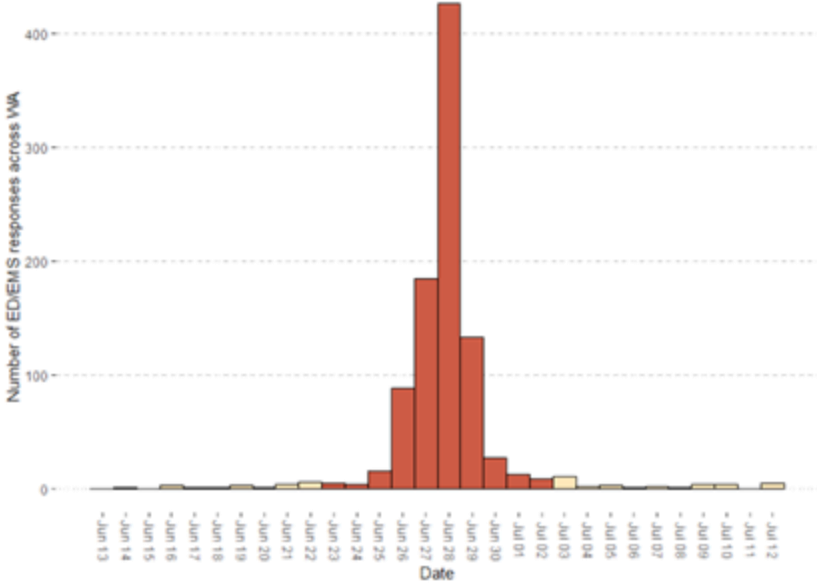


[CBS](#)

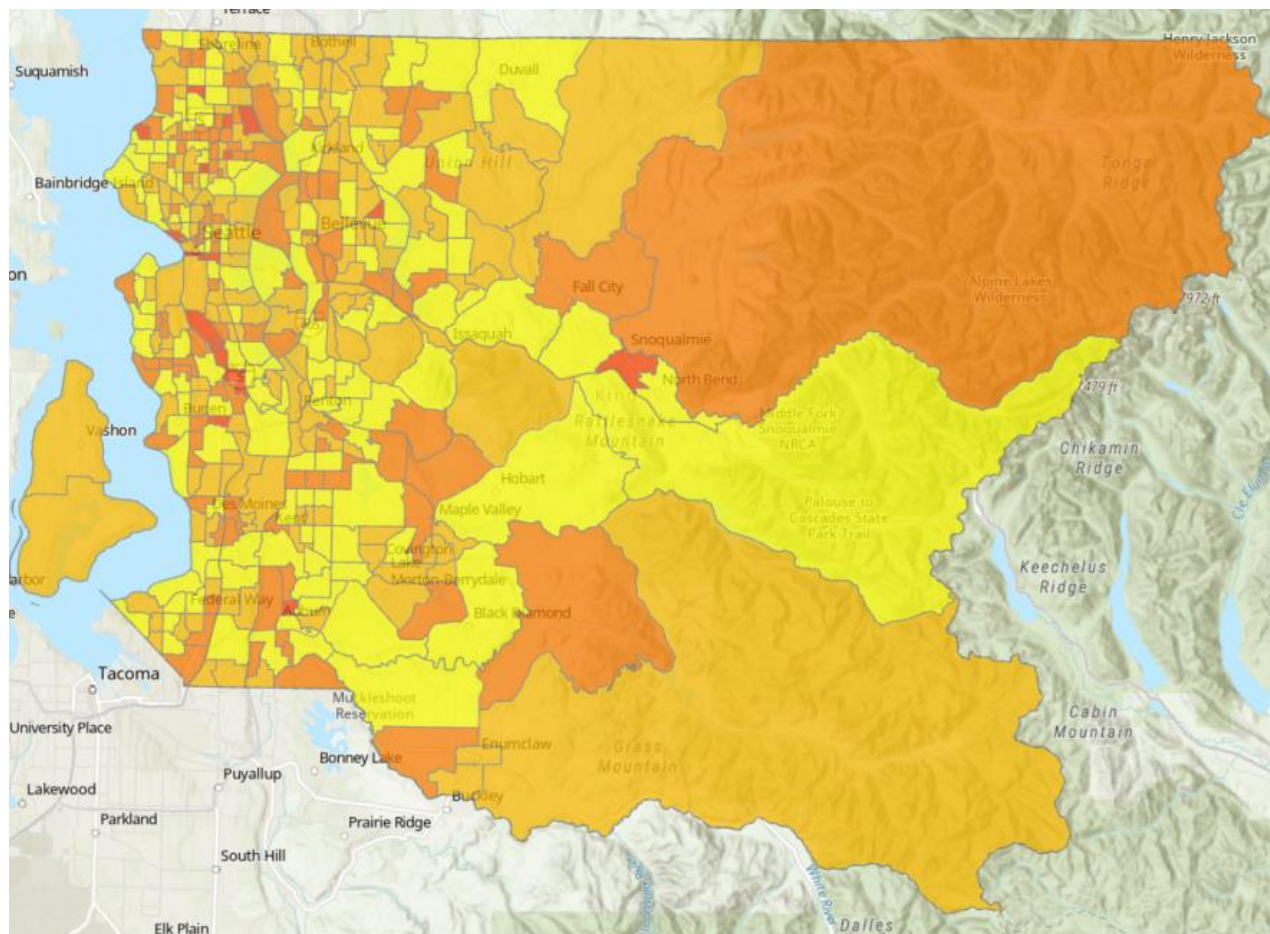
All-cause EMS Calls



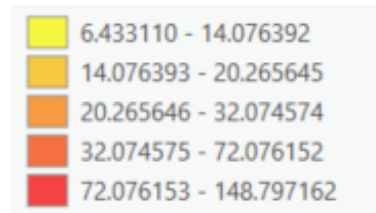
Heat-related EMS Calls



King County 911 Calls

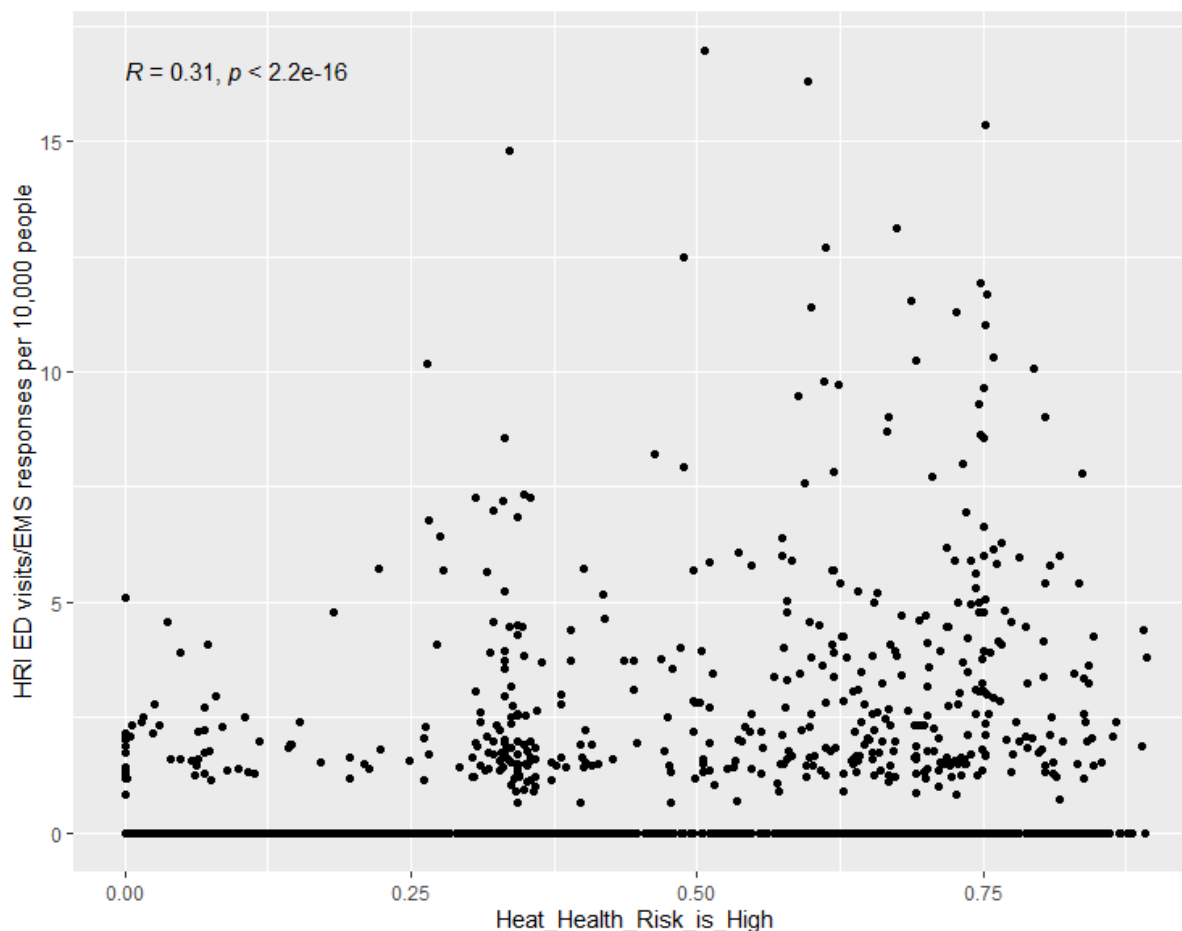


HRI ED/EMS
events per
10,000
people,
6/23-7/2



Thanks to
Dr. Randy
Stalter at
WA DOH for
this analysis

King County 911 Calls



Moderate correlation, but better than any other available hazard vulnerability metric

Face Validation

- > Validated CHaRT risk scores, risk drivers with Auburn residents trained in heat and health
- > Endorsed scoring and distribution
- > Resolution adequate for heat action planning

AUBURN, WASHINGTON HEAT HEALTH RISK (HISTORIC) HOTTEST 3 DAYS OF EACH YEAR (1991-2020)

Report created 4/29/2025

http://localhost:8000/report/places/5303180/models/heat_1991_2020_3days/

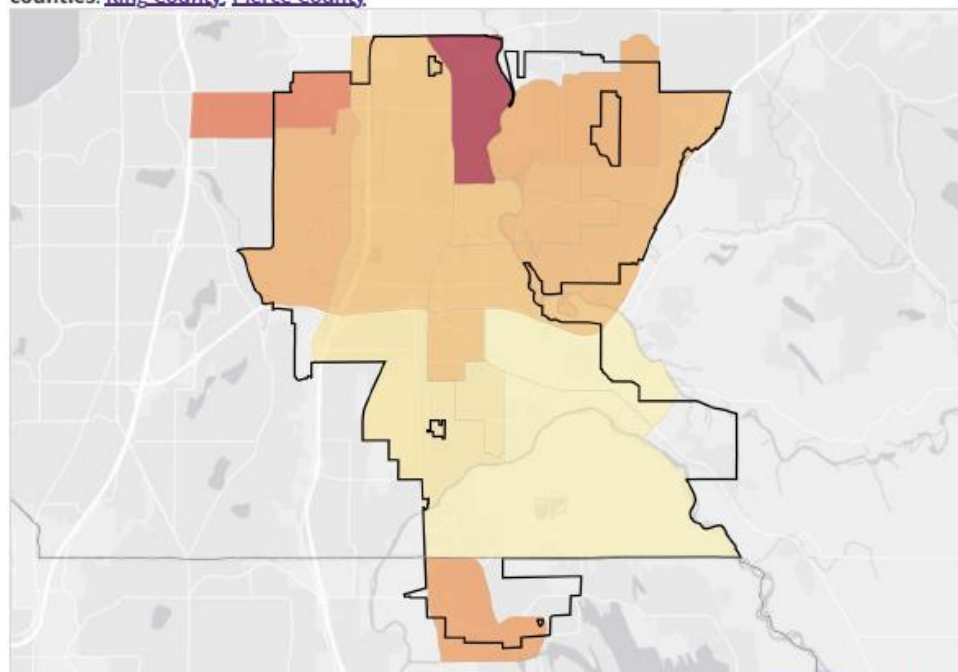
population: 98,438 people

total area: 34.1 sq miles

counties: [King County](#), [Pierce County](#)

reporting units: 19 Census tracts

analysis based on 2020 Census data



Basemap: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

low risk high risk

Randomized Controlled Trial



General Information

- > In partnership with NACCHO
- > Local Health Departments
- > All participants paid
- > Participants randomized
- > Baseline survey
- > Intervention or control
- > Follow-up Survey
- > 1 year trial
- > Key Informant Interviews
intervention group



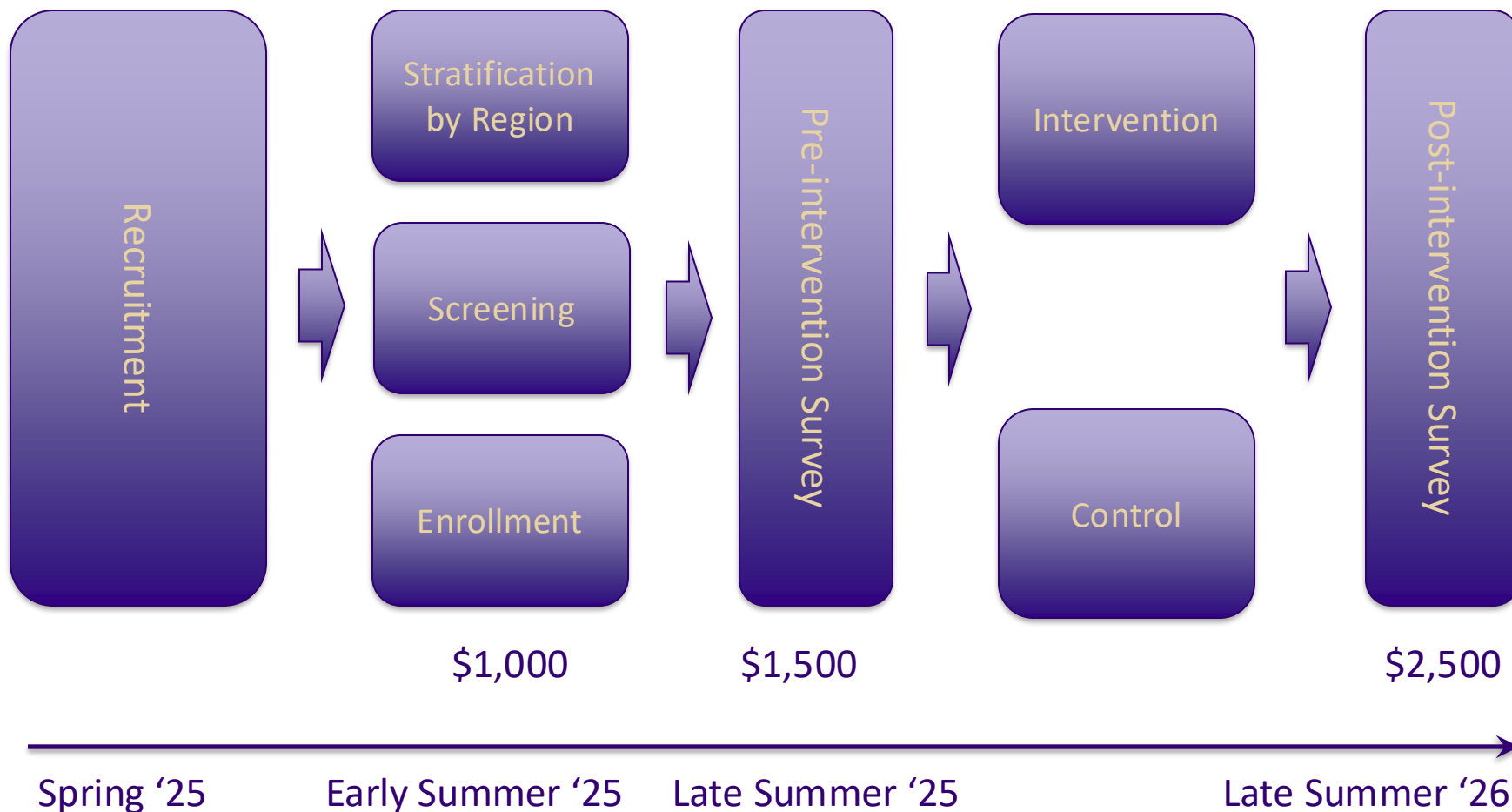
NIH award **P20ES036748**

Specific Aims

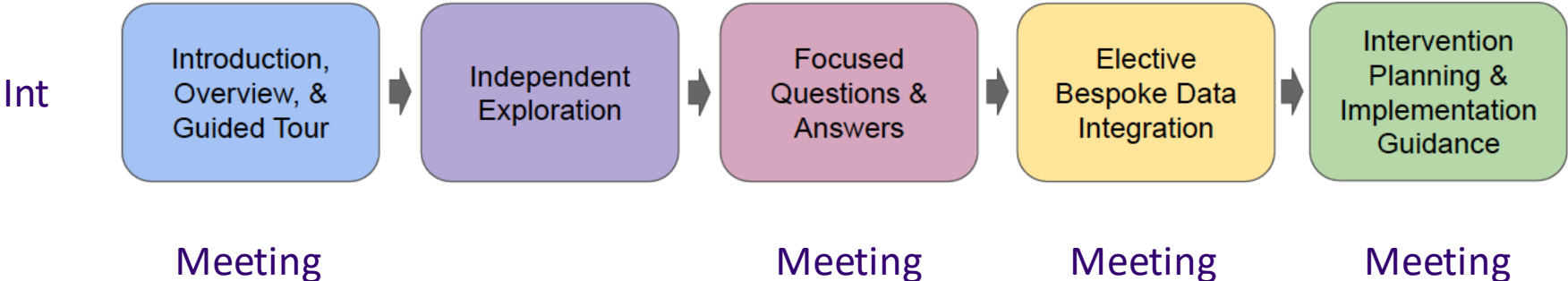
1. To assess the public health impact of a facilitated engagement with the CHaRT decision support tool on the breadth and depth of city and county health departments' heat-health activity by comparing the reach, effectiveness, adoption, implementation, and maintenance of the intervention and the organization's heat-health activities compared with an information-only control.
2. To assess barriers and facilitators of CHaRT's implementation by identifying study participants' perspectives on its alignment with constructs from the Consolidated Framework for Implementation Research.



Study Timeline



Intervention and Control



Con

Information Packet: Vulnerability & Risk Assessment, Interventions, Planning

Why to Express Interest

- > Learning opportunity for you and your organization
- > Learning opportunity for public health
 - Randomized trials are relatively rare in our specialty
 - Connected with RE-AIM and CFIR frameworks
- > Opportunity to support NACCHO's role in research
- > Opportunity to advance heat action planning
- > Opportunity to support platform that allows for standardized risk assessment, community engagement, and intervention planning, at scale

Questions & Answers

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aalsadi@naccho.org



NIH award **P20ES036748**