cepc | Center for Energy Poverty and Climate

# Protecting Vulnerable Populations from Extreme Heat

**Webinar Series Session 2 – Thursday, June 12, 2024**
**National Cooling Standards Initiative**

# Project Introduction

**The Center for Energy Poverty and Climate** (CEPC) brings together policymakers to brainstorm solutions to difficult problems, and leverage programs to achieve net zero.

CEPC is working with the ClimateWorks Foundation and the National Association of State Energy Officials (NASEO) on the **National Cooling Standards Initiative** to bring together leaders in residential energy efficiency to improve access to cooling for millions of households.

CEPC Website: https://energyprograms.org/
ClimateWorks Clean Cooling Collaborative Website: https://www.cleancoolingcollaborative.org/

# Upcoming Webinars in the Series

**Session 1: Preview of CEPC/NASEO Report: Beating the Heat: Recommendations and Considerations for States to Support Cost-Effective Residential Cooling**
Tuesday, June 4, 1:00 p.m. – 2:30 p.m. EST

**Session 2: Protecting Vulnerable Populations from Extreme Heat**
Thursday, June 13, 1:00 p.m. – 2:30 p.m. EST

**Session 3: State Examples of Comprehensive Affordable Cooling Strategies**
Thursday, June 20, 1:00 p.m. – 2:30 p.m. EST

**Session 4: Funding & Financing the Energy Transition, Braiding Federal & State Funds**
Tuesday, July 2, 1:00 p.m. – 2:30 p.m. EST

# Contact

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# Health Risks of Extreme Heat

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*Developed with* **Peter Kahn, M.D., M.P.H.**

Yale School of Medicine

Section of Pulmonary, Critical Care, and Sleep Medicine

# Plan for today

- Define **what is "extreme heat"** from a medical standpoint
- Explore **what constitutes a "vulnerable patient"** or population of patients
- Learn about the human **body's response to heat** and the ways in which failures of these mechanisms can lead to illness and death and review basic **treatments for heat related illness**
- Review some of the surveillance **data available** on heat related illness
- Hear this doctor's thoughts on **medically-informed interventions** that could reduce heat related illness

# Financial Disclosures/COI

- No financial COIs to report
- Non-financial interests of note
  - Represent the American Thoracic Society at the American Medical Association
  - Represent Suffolk County, MA physicians at the Massachusetts Medical Society
- Income unrelated to this topic (past 36 months)
  - Consulting fees from: Alosa Health, Analysis Group, Atheneum, Bershire Hathaway Home Companies, Chronius, FVC Health, GLG, Guidepoint, NuvoAir, Ogilvy, Philips, Simbo, Tell Health
  - Authorship fees from New York Times and Wall Street Journal
  - *Random Acts of Medicine* book rights (Doubleday) and newsletter (Substack)

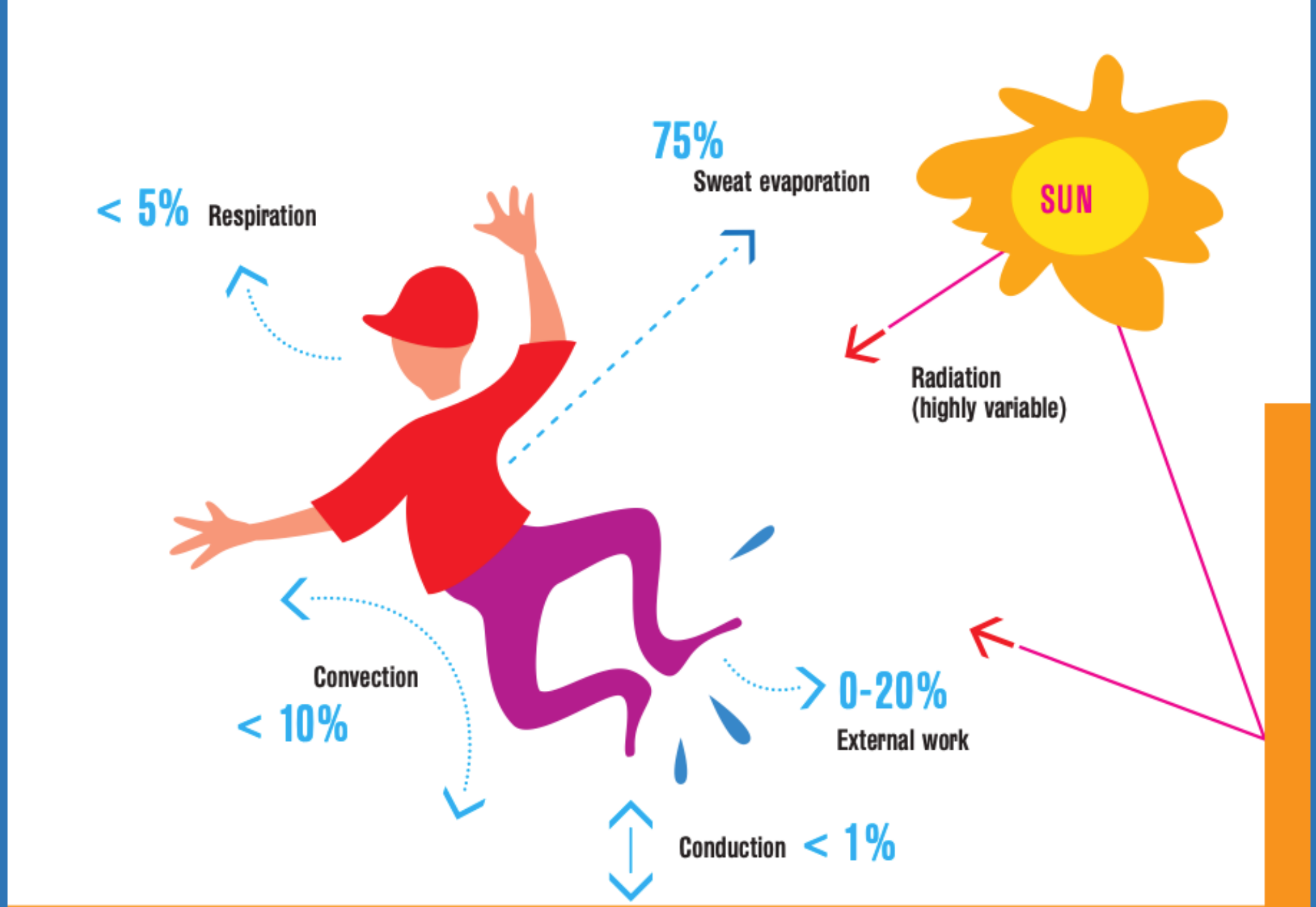
# What temperature is dangerous to health?

- A highly satisfying answer: **IT DEPENDS**
  - It depends on patients' **underlying medical status and medications**
  - It depends on **other atmospheric conditions** like humidity and pollutants
  - It depends on **ability to hydrate**
  - It depends on **ability to rest and cool off**
- Many of these factors will be **highly influenced by the *typical* outdoor temperature** for a given region in a given season
- The best measure of "temperature" as it relates to the human body is the **wet bulb globe temperature**

# Wet-bulb globe temperature

- Better than simple temperature measurements or heat index since it **accounts for all major environmental factors that impact body temperature**
- Combined measure of:
  - **Air temperature**
  - **Humidity**
  - **Radiant heat** (e.g. sun, furnaces, surfaces, etc.)
  - **Air movement** (e.g. wind, ventilation)


USAF




Source: adapted from Havenith (2003).

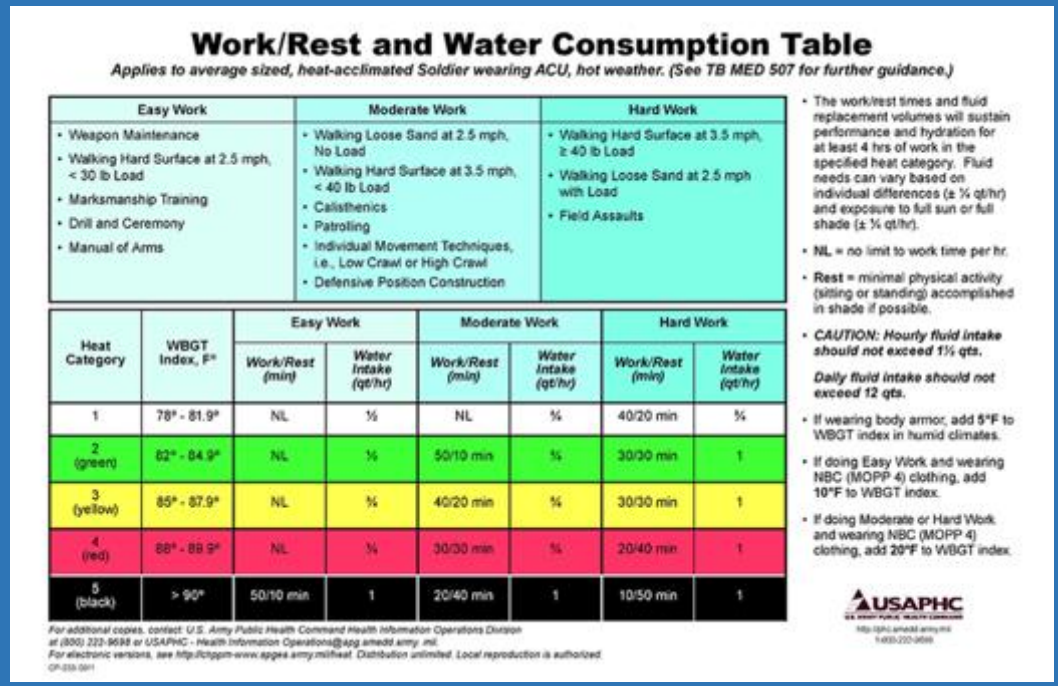
World Health Organization (2004). Heat-waves: risks and responses

# Outdoor activity guidelines

- Multiple different systems
- Consider 4 important factors
  - **Wet bulb globe temperature (WBGT)**
  - **Typical conditions in a region**
  - **Health and fitness of the person**
  - **Nature of outdoor activities**

| WBGT by Region (F) | | | Proposed Activity Guidelines |
|---|---|---|---|
| Cat 1 | Cat 2 | Cat 3 | |
| <72.3 | <75.9 | <78.3 | Normal activities, monitor fluids |
| 72.3-76.1 | 75.9-78.7 | 78.3-82.0 | Normal activities, monitor fluids |
| 76.2-80.1 | 78.8-83.7 | 82.1-86.0 | Plan intense or prolonged exercise with discretion |
| 80.1-84.0 | 83.8-87.6 | 86.1-90.0 | Limit intense exercise and total daily exposure to heat and humidity |
| >84.0 | >87.6 | >90.0 | Cancel exercise |

University of Georgia Guidelines, based on regions. Grundstein, Andrew & Williams, Castle & Phan, Minh & Cooper, Earl. (2015). Regional heat safety thresholds for athletics in the contiguous United States. Applied Geography. 56. 55-60. 10.1016/j.apgeog.2014.10.014.



## Work/Rest and Water Consumption Table

*Applies to average sized, heat-acclimated Soldier wearing ACU, hot weather. (See TB MED 507 for further guidance.)*

| Easy Work | Moderate Work | Hard Work |
|---|---|---|
| • Weapon Maintenance<br>• Walking Hard Surface at 2.5 mph, < 30 lb Load<br>• Marksmanship Training<br>• Drill and Ceremony<br>• Manual of Arms | • Walking Loose Sand at 2.5 mph, No Load<br>• Walking Hard Surface at 3.5 mph, < 40 lb Load<br>• Calisthenics<br>• Patrolling<br>• Individual Movement Techniques, i.e., Low Crawl or High Crawl<br>• Defensive Position Construction | • Walking Hard Surface at 3.5 mph, ≥ 40 lb Load<br>• Walking Loose Sand at 2.5 mph with Load<br>• Field Assaults |

| Heat Category | WBGT Index, F° | Easy Work | | Moderate Work | | Hard Work | |
|---|---|---|---|---|---|---|---|
| | | Work/Rest (min) | Water Intake (qt/hr) | Work/Rest (min) | Water Intake (qt/hr) | Work/Rest (min) | Water Intake (qt/hr) |
| 1 | 78° - 81.9° | NL | ½ | NL | ¾ | 40/20 min | ¾ |
| 2 (green) | 82° - 84.9° | NL | ½ | 50/10 min | ¾ | 30/30 min | 1 |
| 3 (yellow) | 85° - 87.9° | NL | ¾ | 40/20 min | ¾ | 30/30 min | 1 |
| 4 (red) | 88° - 89.9° | NL | ¾ | 30/30 min | ¾ | 20/40 min | 1 |
| 5 (black) | > 90° | 50/10 min | 1 | 20/40 min | 1 | 10/50 min | 1 |

- The work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hrs of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).
- **NL** = no limit to work time per hr.
- **Rest** = minimal physical activity (sitting or standing) accomplished in shade if possible.
- ***CAUTION: Hourly fluid intake should not exceed 1½ qts.***

  ***Daily fluid intake should not exceed 12 qts.***
- If wearing body armor, add **5°F** to WBGT index in humid climates.
- If doing Easy Work and wearing NBC (MOPP 4) clothing, add **10°F** to WBGT index.
- If doing Moderate or Hard Work and wearing NBC (MOPP 4) clothing, add **20°F** to WBGT index.

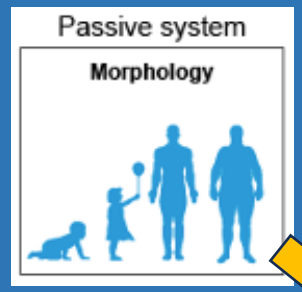
USAPHC

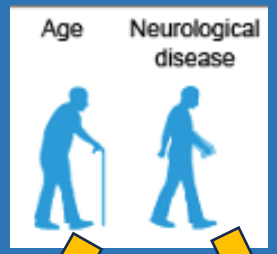
*For additional copies, contact: U.S. Army Public Health Command Health Information Operations Division at (800) 222-9698 or USAPHC - Health Information Operations@apg.amedd.army.mil.*
*For electronic versions, see http://ctqpm-www.apgea.army.mil/heat. Distribution unlimited. Local reproduction is authorized.*

# Who is “vulnerable”?

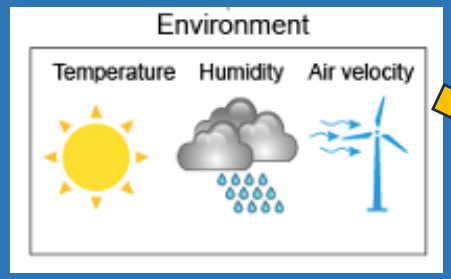
- Everyone
- The real questions:
  - **Who is *most* vulnerable?**
  - **Who needs special preparation?**
  - **Who would benefit from *proactive* interventions?**
  - **Who might struggle with *reactive* interventions?**


WHO:
Children
More males than females are affected
Older adults
Outside workers
People with disablities
CDC

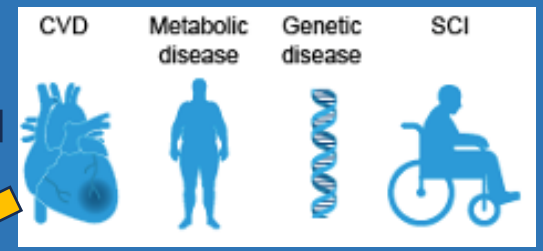



- Cognitive issues
- Age-related changes in sweating

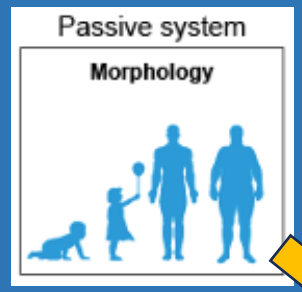



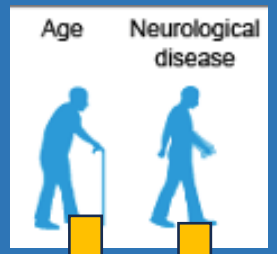





- Heart disease/fluids
- Obesity
- Composition of sweat
- Ability to sweat
- Medications

Cramer, M. N., et al. (2022). "Human temperature regulation under heat stress in health, disease, and injury." Physiol Rev **102**(4): 1907-1989.

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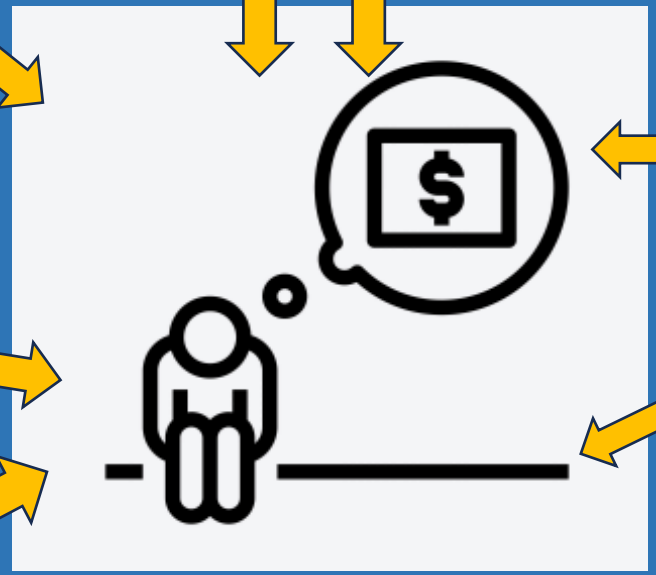

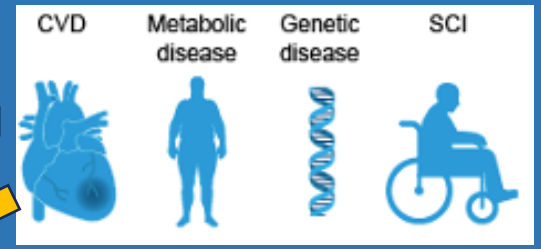


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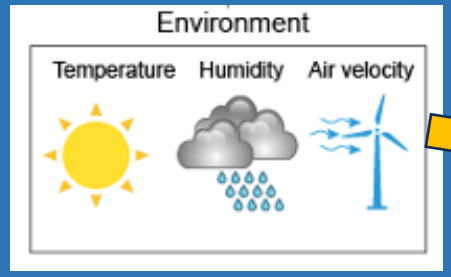
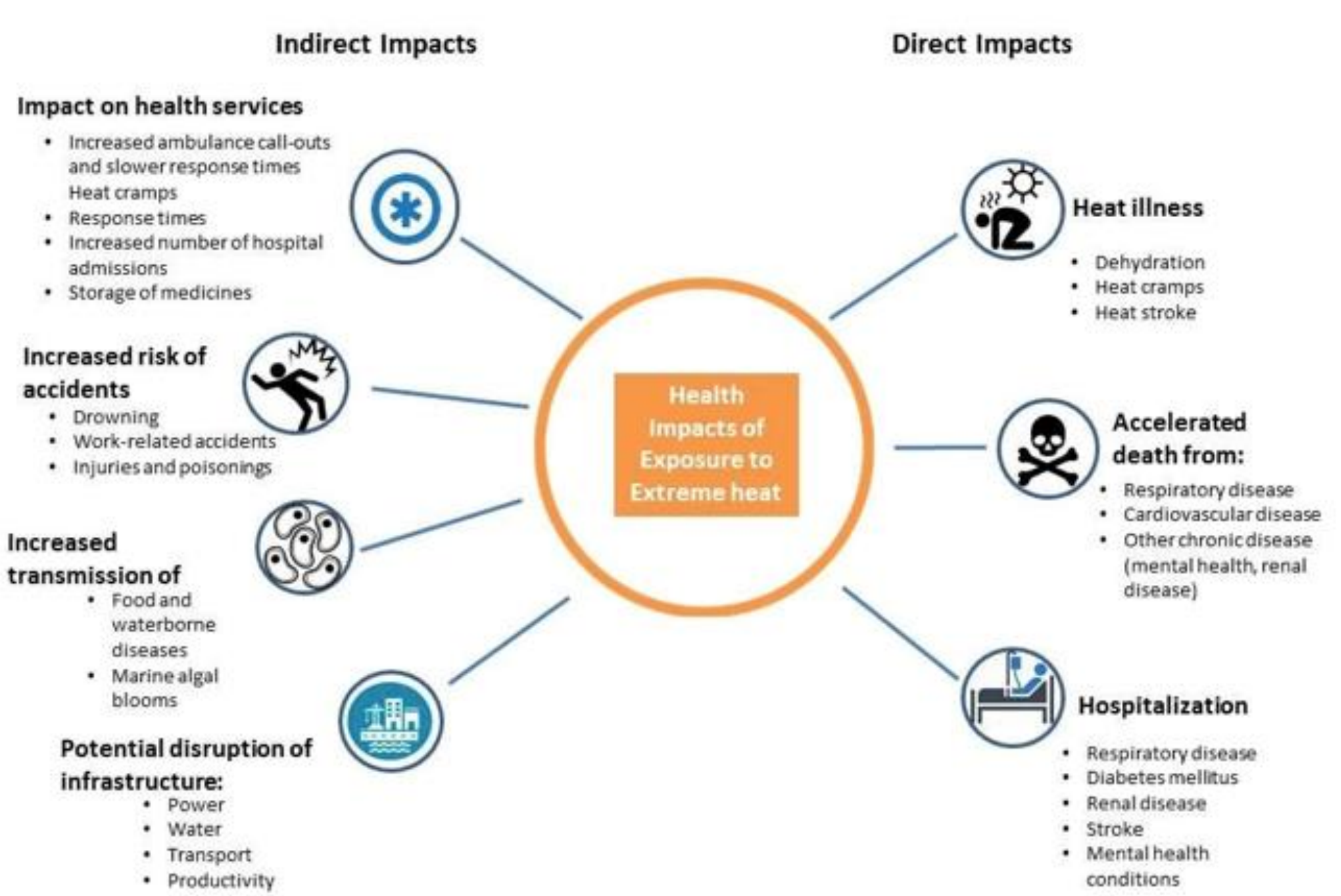
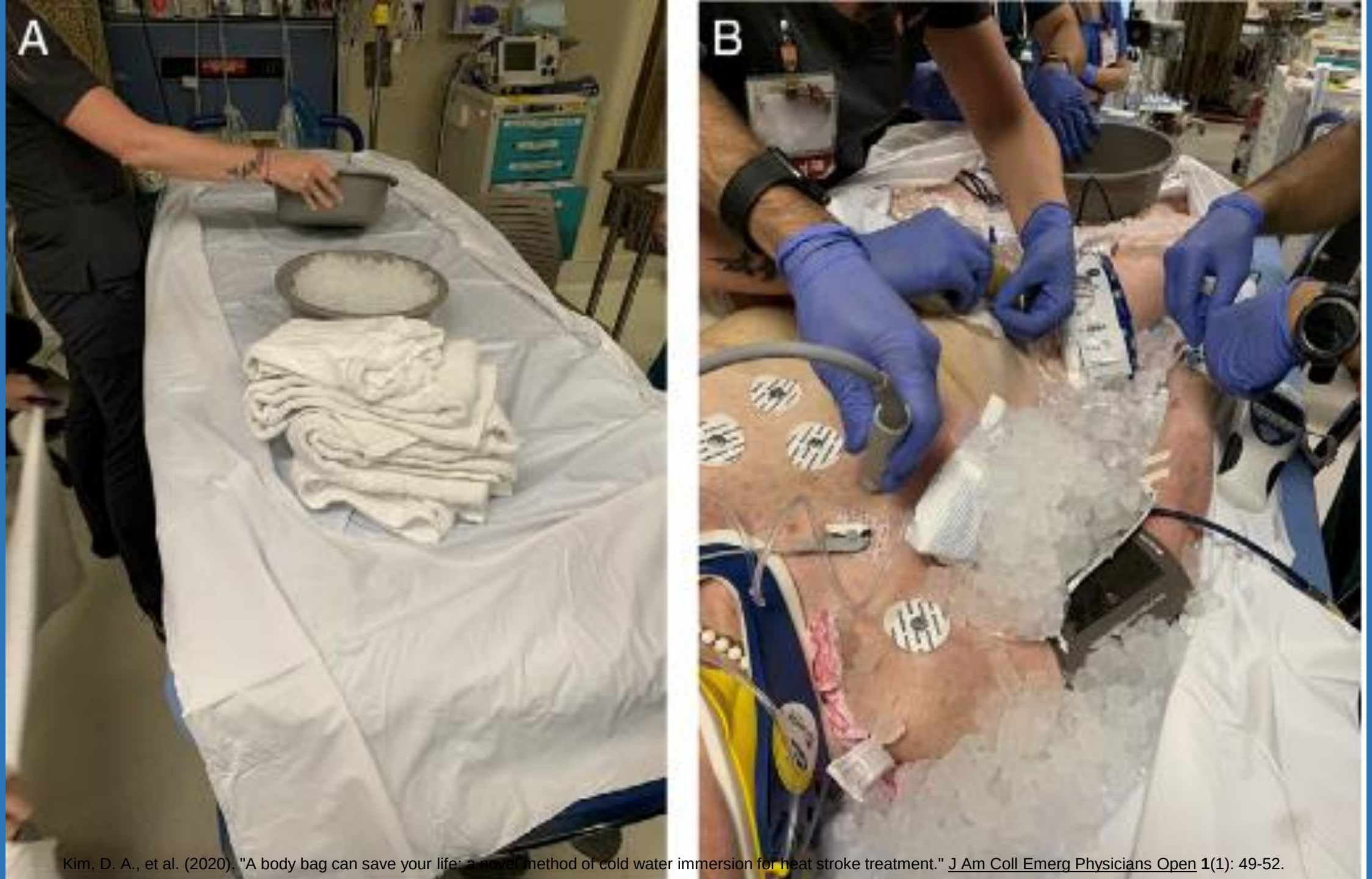



World Health Organization (2018). "Heat and health." from https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health.




Kim, D. A., et al. (2020). "A body bag can save your life: a novel method of cold water immersion for heat stroke treatment." J Am Coll Emerg Physicians Open **1**(1): 49-52.

# Basics of avoiding heat-related health issues

- **Stay away from heat**
  - Go inside; if home/workplace is not cool, spend at least several hours somewhere cool (e.g. air conditioned public building)
  - If outside, avoid mid-day heat/sun
  - Seek shade
  - Careful in cars—especially children
- **Keep living space cool**
  - Air conditioning—one room better than none
  - Window shades
  - Fans may help less than you think
- **Avoid strenuous activity** (YMMV)

# Basics of avoiding heat-related health issues

- **Cool the body**
  - Cool showers, cool baths, sponging, cold packs
  - Light, loose-fitting, clothing and hats
  - Light linens/sheets
- **Stay hydrated**
  - Drink water, yes, but food is also important for electrolytes and energy
  - Avoid alcohol
  - Avoid caffeine
- **Seek necessary support**
  - Vulnerable people may need assistance with tasks they normally don't need
  - Those living alone should have someone to check in with
  - Seek medical advice around medications—**psychiatric medications in particular**
  - Learn signs and symptoms of heat related problems, ideally individualized by their doctor

U.S. CENTERS FOR DISEASE CONTROL AND PREVENTION

Climate & Health Program

- Home
- Heat and Health Index
- About the Data
- Resources
- Search
- Contact Us

# Heat & Health Tracker

## Home

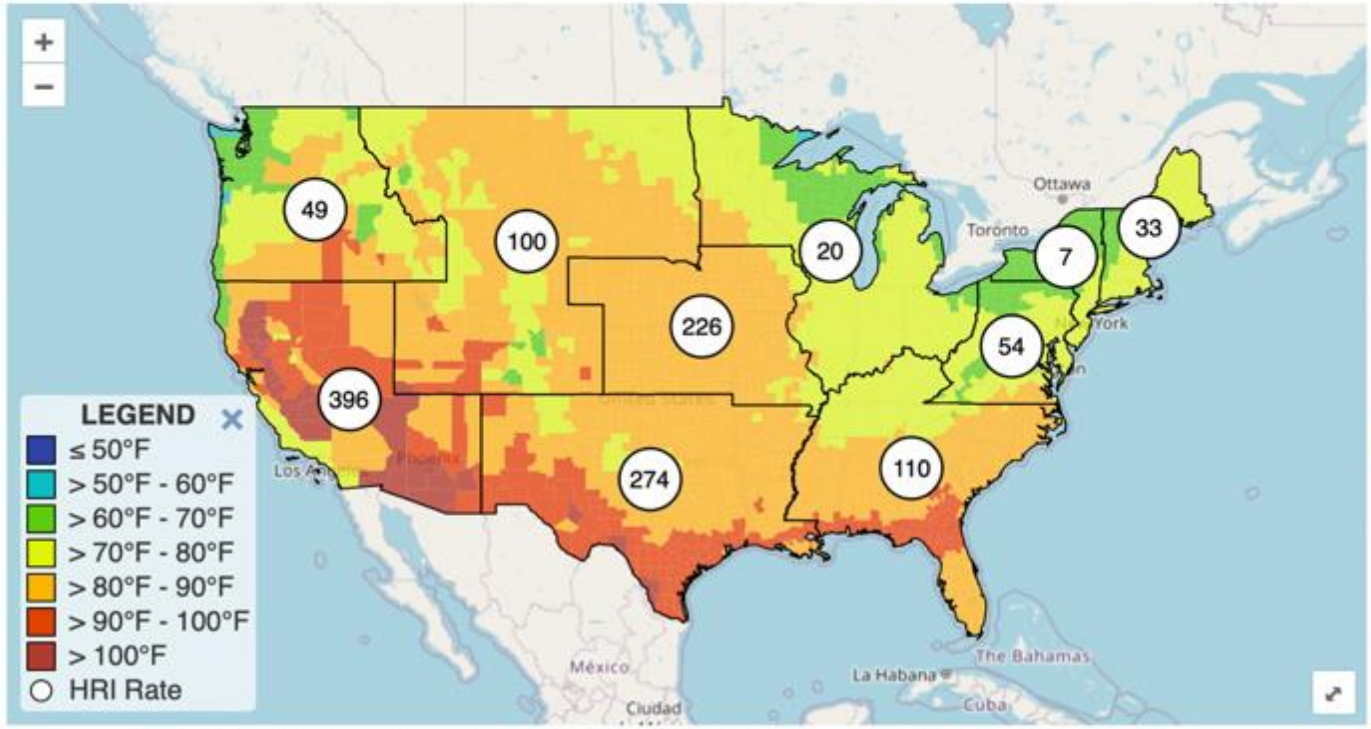
*****NEW HEAT AND HEALTH INDEX***** - Click on the "Heat and Health Index" (HHI) in the left navigation menu to access the HHI and learn more about the intersection of heat and health.

Heat poses significant and increasing risks to public health across the United States. Use this dashboard to explore your community's heat exposure, related health outcomes, and assets that can protect people during heat events.

**Search for location here**

Enter zip or county here

Daily Heat-Related Illness | Weekly Heat-Related Illness | Heat and Worker Health




Choose a date
6/11/2024

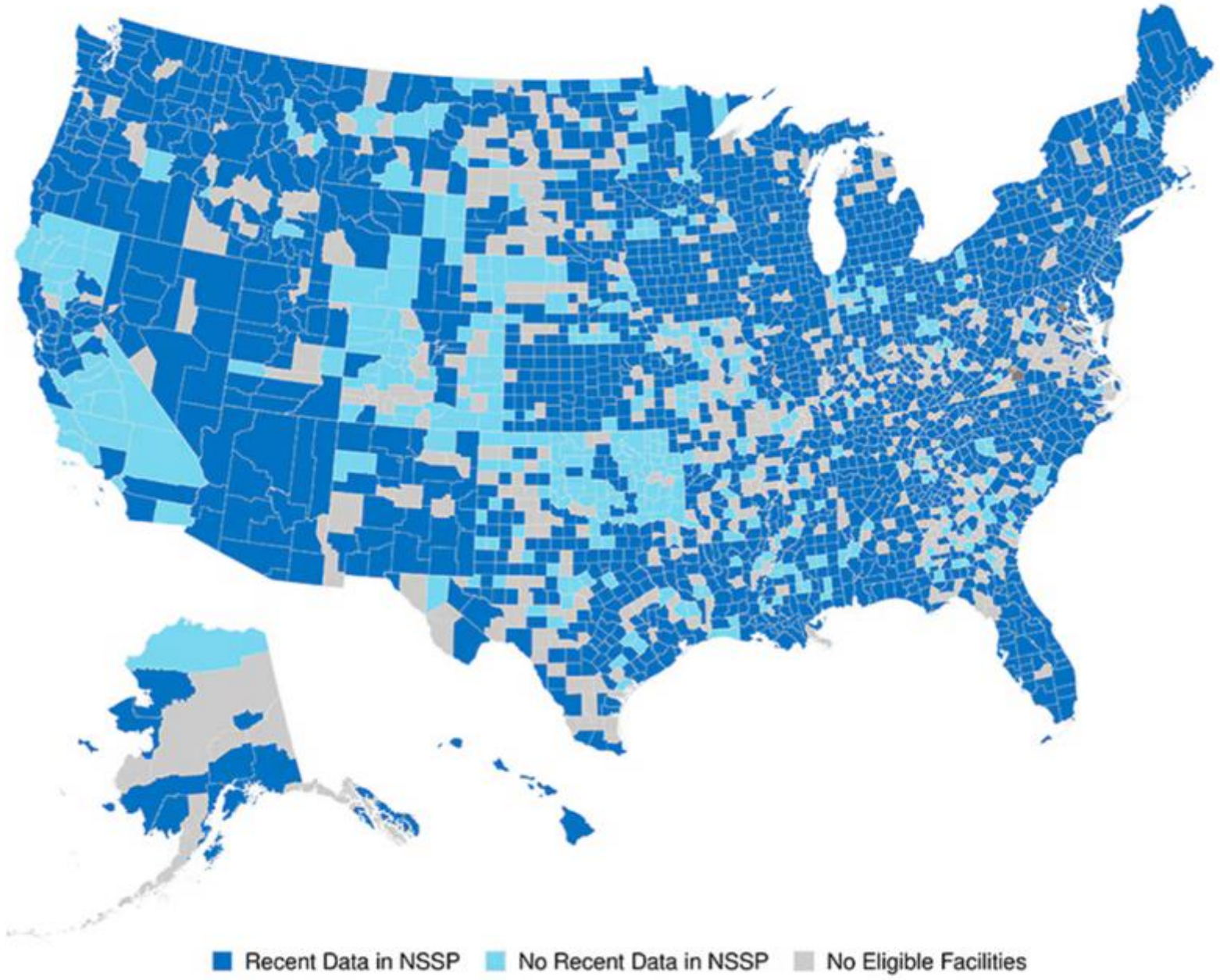
**About the Data**

The Heat-Related Illness and Temperature map shows the rate of emergency department (ED) visits associated with heat-related illness (HRI) per 100,000 ED visits by region (as defined by the U.S. Department of Health and Human Services) for the selected day using data available through the National Syndromic Surveillance Program. The colors on the map show the average maximum temperature by county for the same day and year, using data from the National Center for Environmental Information. Note, the HRI data is updated daily and may adjust to become more accurate as more data comes in.

(more info)

This icon indicates that extremely high rates of heat-related illness were detected in the region. Extremely high rates of heat-related illness are defined as exceeding the 95th percentile based on data from 2018-2023.

Non-federal Emergency Care Participation in the National Syndromic Surveillance Program: January 1, 2023, to April 1, 2024.



# Public Health Heat Related Deaths Dashboard

(Note: All 2024 data are preliminary)

2024

**Total Confirmed**

5

**Heat Caused**

2

**Heat Contributed**

3

**Under Investigation**

67

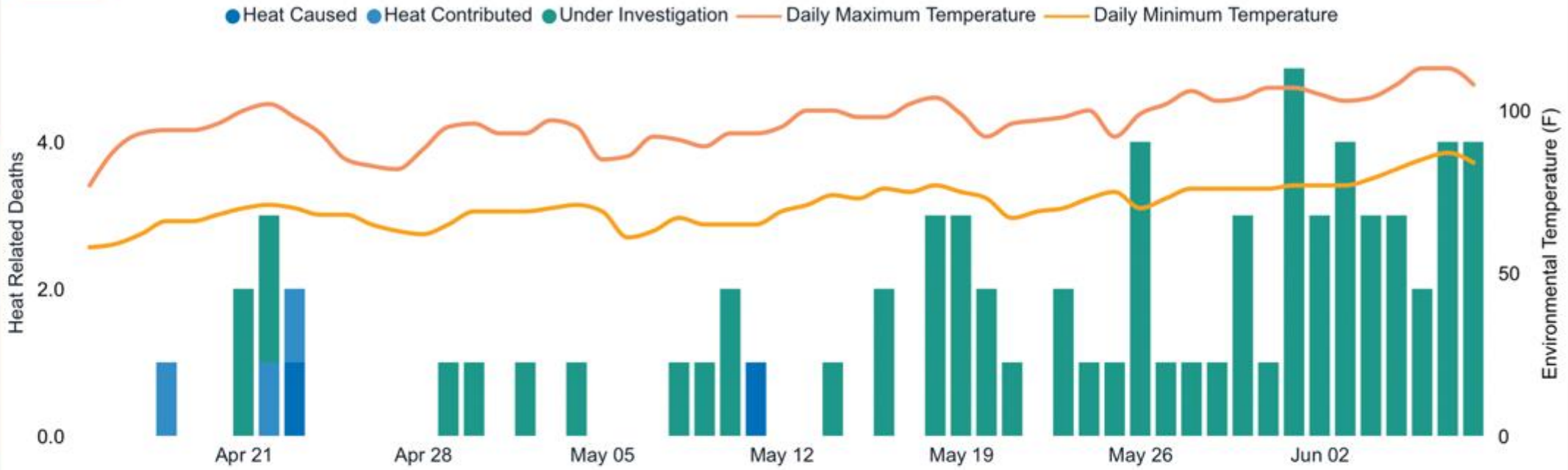
*2023 Heat Related Deaths as of Week Range: (06/02 - 06/08)*

Total Confirmed: 5

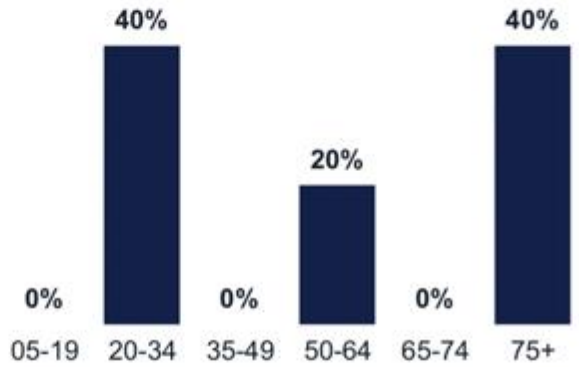
Under Investigation: 56

Day | Week

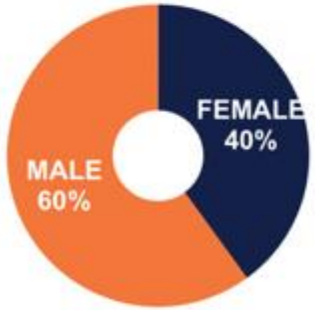
## Heat Related Deaths and Environmental Temperature in Maricopa County



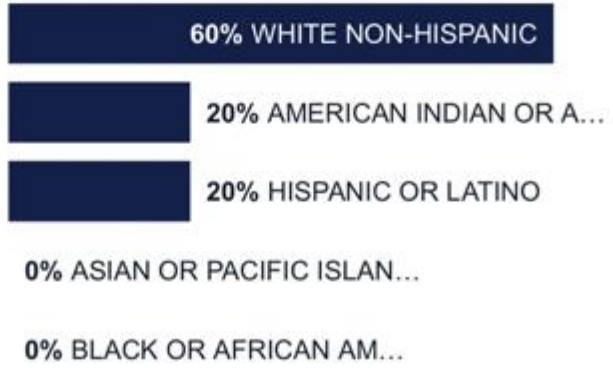

## Maricopa County Heat Related Deaths by Age Group




## Maricopa County Heat Related Deaths by Sex




## Maricopa County Heat Related Deaths by Race and Ethnicity




**Alcohol Use**

20%

**Drug Use**

40%

**Unhoused**

20%

Heat Related Deaths Overview | Heat Related Hospital Visits | Help us improve!

# ★ Real-time heat-related illness

The weather forecast is the best way to predict heat-related health outcomes.

We can also track heat-related illness with near real-time electronic data from emergency departments at hospitals throughout NYC. These data include illnesses directly attributed to heat (including heat exhaustion, muscle cramps, fainting and heat stroke), not the full burden of heat-related health impacts.

We track these outcomes citywide by using a system called **syndromic surveillance** which lets us know how many people who visit the emergency room (ED) are being affected by certain health conditions. About 10,000 patients visit the ED per day in NYC, and reasons for their visits are captured in hospital records. These reasons are de-identified and sent to the Health Department. The Health Department then searches the records for diagnostic codes (when available) and words describing why patients are at the ED to track specific health conditions in near real-time and understand citywide trends.

Below are data on the number of **heat syndrome** visits to emergency departments, and the daily maximum temperature.

**What do we use these data for?**


Extreme heat is dangerous. It can cause illness, make chronic conditions worse, and even kill. Heat-related illnesses - including heat exhaustion, muscle cramps, fainting, and heat stroke (the most serious form) - happen when the body cannot cool down enough. Heat can also worsen chronic conditions, such as cardiovascular diseases or kidney conditions.

In NYC, an **extreme heat event** is two or more days with a heat index reaching 95 °F, or one or more days reaching 100 °F.

To learn more about heat and health, visit Extreme Heat and Health. To stay safe in the heat, visit Beat the Heat.

## Daily data: 2024

2024 2023 2022 2021 2020 2019 2018 2017


# Caveat on heat related illness data

- Patients who present to the ED/require medical care for heat related illness represent the **tip of the iceberg**
- A patient requiring medical care represents **multiple failures of preventive strategies**
- Patients who die from heat related illness may not be in the data

Google Trends Home Explore Trending Now

Air conditioning
Topic

+ Compare

Phoenix AZ | Past 5 years | All categories | Web Search

## Interest over time

TECHNOLOGY

# Your Smart Thermostat Isn't Here to Help You

But that doesn't mean it's useless.

By Ian Bogost

Katie Martin / The Atlantic

# How do we intervene?

- **Address underlying issues**
  - Climate change
  - Infrastructure
  - Social determinants & costs of staying cool
- **Promote awareness *with education***
  - Outreach with trusted members of local communities (e.g. pastors, local online influencers)
  - Weather alerts *with steps people can take*


# This doctor's orders:

- **Plan ahead of the hot season**
  - Know who is most vulnerable *well in advance*
  - Assess community resources *well in advance*
  - Plan for increased need for medical care while taking steps not to need it
- **Make it easy to *stay* cool when it gets hot**
  - Affordable air conditioning for at least one room in the home
  - Avoid electrical service interruptions (disconnections & grid infrastructure)
  - Ensure access to water *and* appropriate food
  - Affordable access to appropriate clothing and bedding

# This doctor's orders:

- **Make it easy to *get* cool when starting to overheat**
  - Cooling centers, splash pads, pools (with caution)
  - Must be accessible to the most vulnerable patients (e.g. consider logistics for wheelchair bound patients)
- **Look out for vulnerable community members**
  - Check ins (friend, family, neighbor, health care workers, idle first responders, others)
  - Take advantage of all available and potentially useful data

# Thank you

# Protecting Vulnerable Populations from Extreme Heat


Katherine Catalano
Deputy Director, Center for Climate, Health and Equity
American Public Health Association
June 12, 2024

Center for CLIMATE, HEALTH AND EQUITY
AN INITIATIVE OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

APHA
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*For science. For action. For health.*

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# Center for Climate, Health and Equity

Promote policies and practices that address climate change, environmental justice and health equity.

Spur climate action among APHA members, partners and members of the public who are motivated by the impacts of climate change on health and equity.

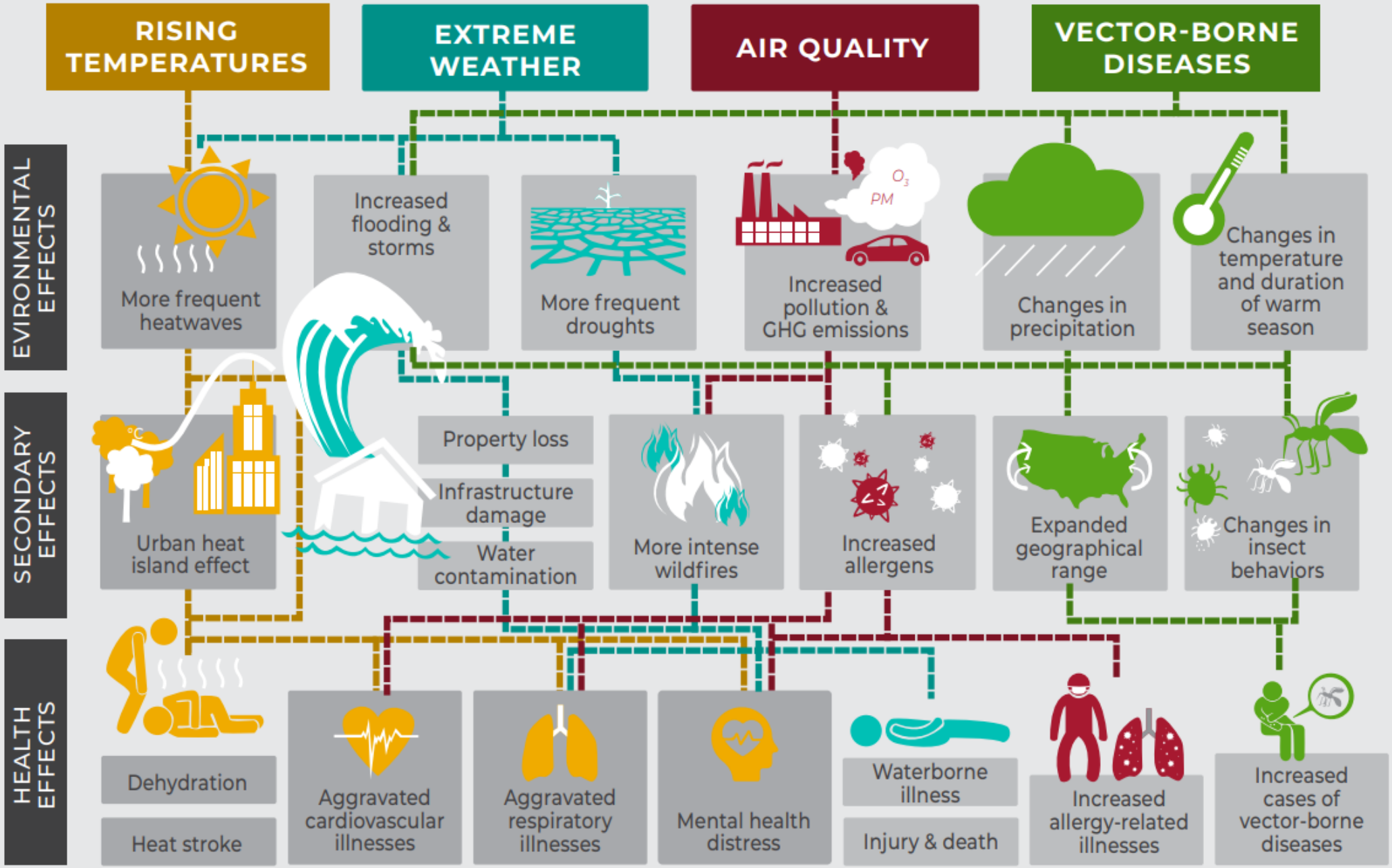
Support science that clarifies the health and equity impacts of climate change.

Translate science and highlight emerging and best practices in addressing the health and equity impacts of climate change.

Raise awareness so everyone in the U.S., beginning with the public health field, recognizes the disproportionate impacts of climate change and the urgency of practices, policies and individual choices that address climate change and improve public health.

APHA

# HOW CLIMATE CHANGE AFFECTS YOUR HEALTH




climatenexus

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# Serious heat wave to scorch the East next week. Maps show areas at risk.

The Washington Post

The heat wave could produce dangerously high temperatures over a large area for an extended period.

BBC

# Life in a heat dome: The American West is figuring out how to keep cool

**America's dirty divide**

# 'It's unbearable': in ever-hotter US cities, air conditioning is no longer enough

The Guardian

Record-breaking temperatures in the last few years shatter the myth that air conditioning alone will keep people safe

CBS NEWS

U.S.

# Woman dies while hiking on Colorado trail, prompting heat warning from officials

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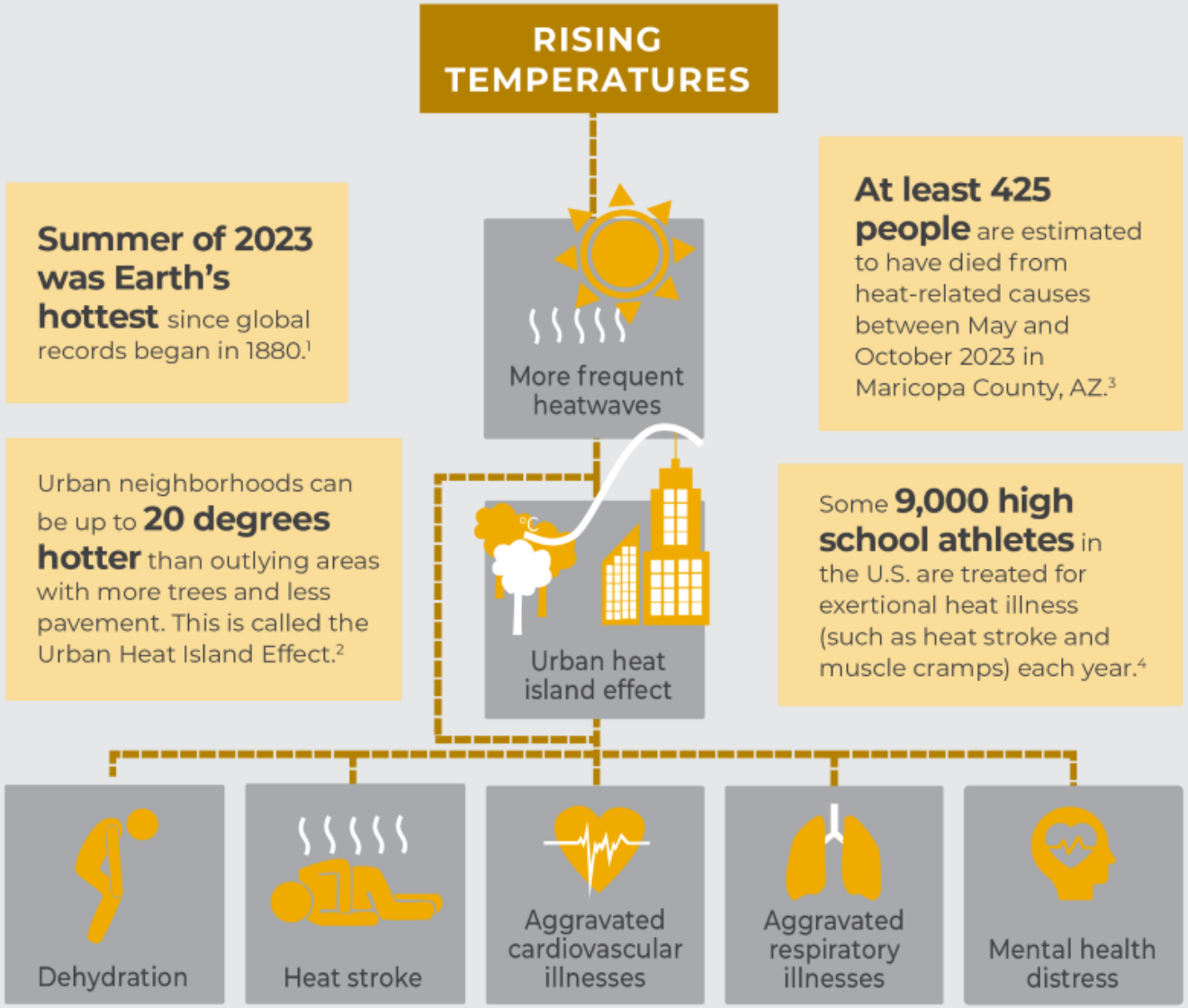
# HOW CLIMATE CHANGE AFFECTS YOUR HEALTH

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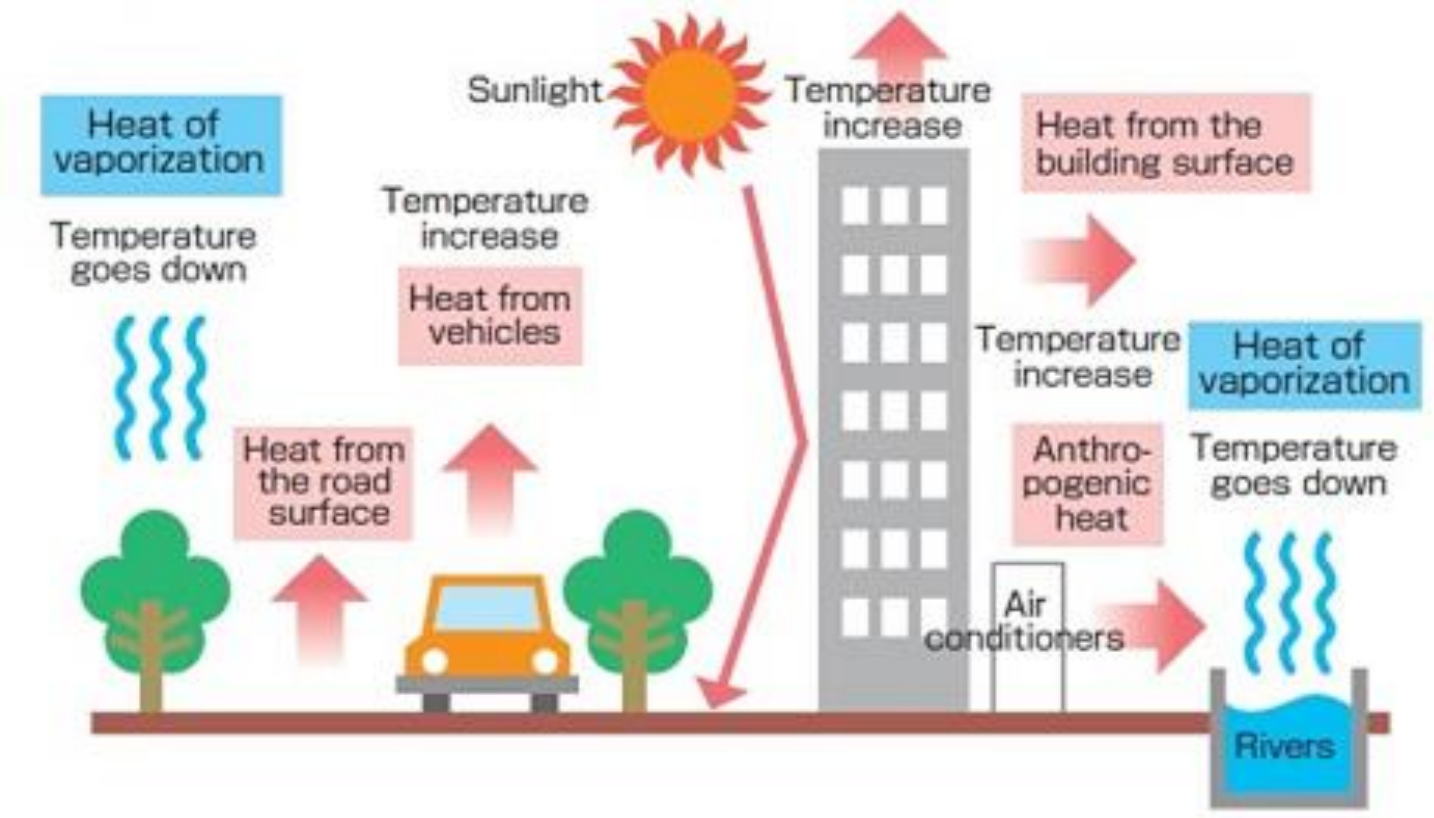
EXTREME HEAT CAN HARM OUR HEALTH

# HEAT ISLAND EFFECT - DISPROPORTIONATE EFFECTS FOR VULNERABLE COMMUNITIES

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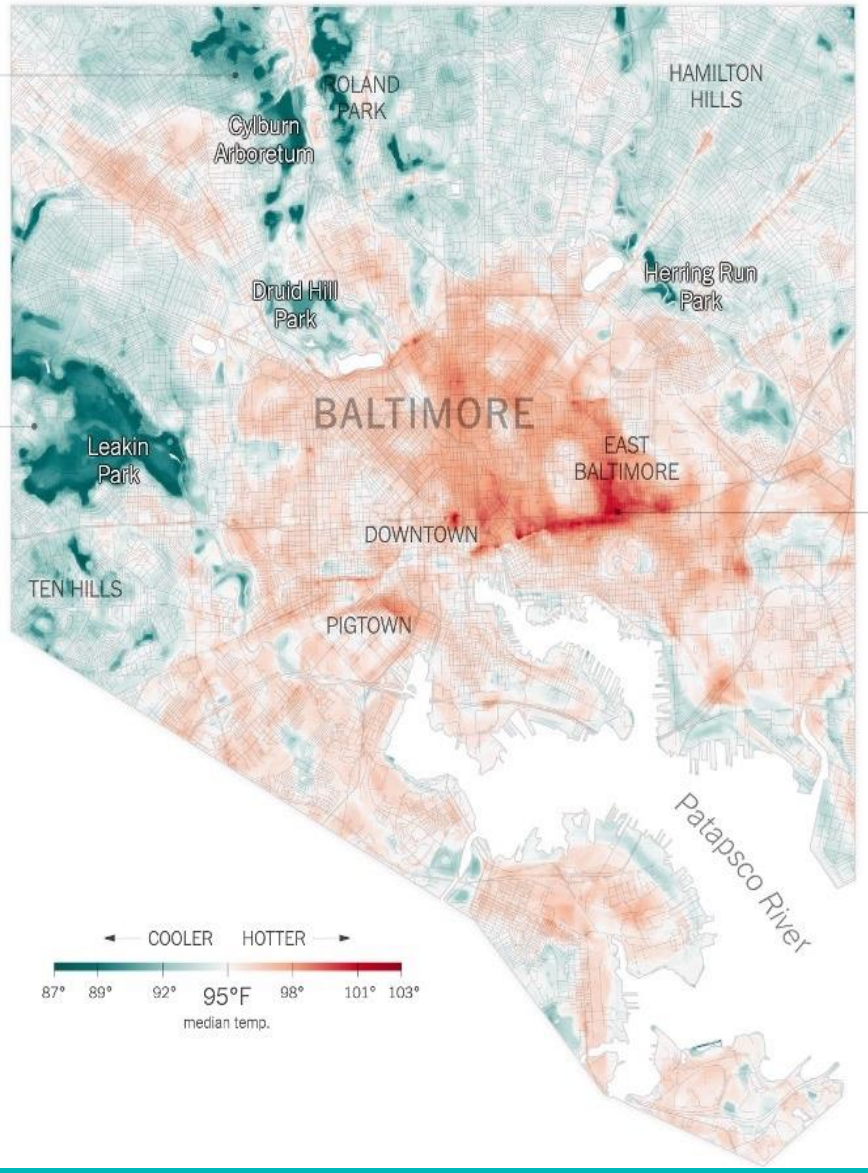
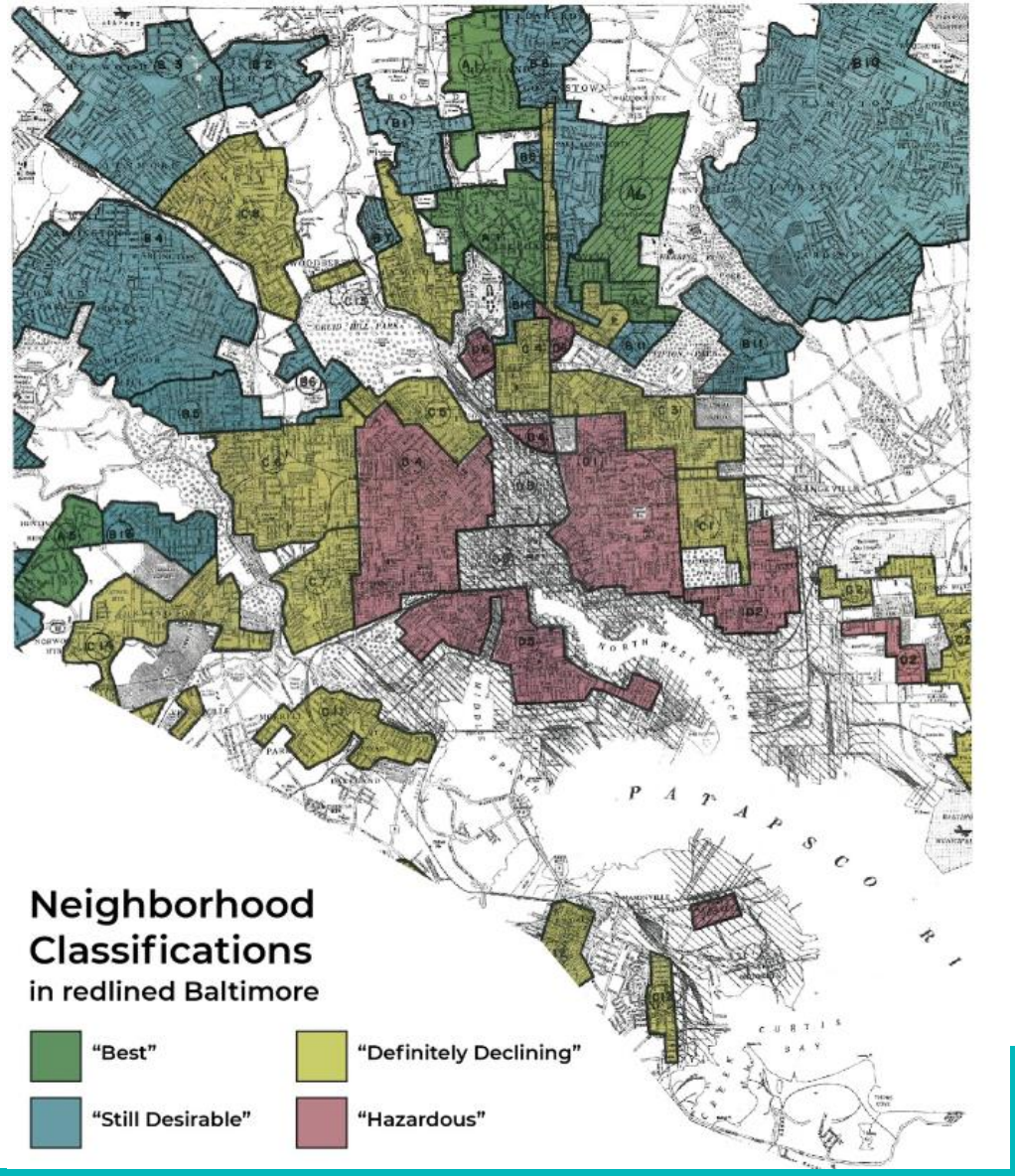
# A Matter of Equity

**Cooler:** Neighborhoods next to parks and those with plenty of tree cover saw significantly cooler temperatures on a hot summer afternoon: **as low as 87°F.**




**Hotter:** On the same day, residential neighborhoods east of downtown saw hotspots reach **over 101°F.**



# A Matter of Equity

**33%**

less tree canopy on average in neighborhoods with a majority of people of color than majority white communities

**41%**

less tree canopy in neighborhoods with 90% or more of residents living in poverty than communities with only 10% or less of the population in poverty

[1]American Forests, 2021

SMART SURFACES COALITION

The Smart Surfaces Coalition is made up of more than 40 leading national and international organizations with a shared commitment to creating **cooler**, **healthier**, and **more resilient** cities by cost-effectively reducing the impacts of extreme urban heat and flooding.

# Funded Partner Organizations

METROPOLITAN African Methodist Episcopal CHURCH

American Lung Association.

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WE ACT FOR ENVIRONMENTAL JUSTICE

ACEEE

TRUST FOR PUBLIC LAND

WORLD RESOURCES INSTITUTE

CITY FOREST CREDITS

COLUMBIA LAW SCHOOL

SABIN CENTER FOR CLIMATE CHANGE LAW

Altostratus Inc.

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH | C-CHANGE CENTER FOR CLIMATE, HEALTH, AND THE GLOBAL ENVIRONMENT

NASEO National Association of State Energy Officials

THE OIKOS INSTITUTE FOR SOCIAL IMPACT

NLC NATIONAL LEAGUE OF CITIES CITIES STRONG TOGETHER

And many more non-funded partners!

# Cities for Smart Surfaces

SSC is partnering with 10 cities across the US to facilitate the adoption of Smart Surfaces at the metropolitan level and working with communities in those regions to support community-led, local Smart Surface implementation projects.


SMART SURFACES COALITION

APHA

# What are Smart Surfaces?

Infrastructure strategies that cost-effectively manage urban heat and stormwater while maximizing health, climate, and equity co-benefits

Cool Roofs

Green Roofs

Porous + Permeable Pavements

Solar Photovoltaics

Cool Pavements

Trees and Rain Gardens

Low- and Zero-Carbon Concrete

Combined Surfaces

Source: Smart Surfaces Coalition & Carnegie Mellon University

e.g., Green Roof + Solar PV

SMART SURFACES COALITION

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# What are Smart Surfaces?


Source: Smart Surfaces Coalition

Cool roofs and pavements are engineered to reflect the most sunlight. The shift from dark to light surfaces can result in a 40°F cooler temperature and 11.85 kg co2/m2/yr carbon savings

**Benefits include:**

- Reduced heating of buildings and neighborhoods
- Lower energy costs
- Global cooling
- Reduced air pollution
- Greater pedestrian and resident comfort

# Before Smart Surfaces...


Source: Smart Surfaces Coalition

SMART SURFACES COALITION

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# After Smart Surfaces...


Source: Smart Surfaces Coalition

SMART SURFACES COALITION

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# City-wide Smart Surfaces can:

- Reduce peak summer temperatures by 5°F or more
- Provide $10 in benefits and cost savings for every $1 spent
- Cut energy bills by reducing summertime energy demands for indoor cooling
- Lower total city global warming impact 10-12%
- Deliver large reductions in flooding and resulting mold
- Improve public health and air quality
- Protect summer tourism and jobs

with the greatest impact in lower income communities and communities of color

# Using Public Health Data to Inform Public Policy

- Public health data is essential for understanding the health impacts of climate change.
- By tracking hospital admissions, emergency room visits, and even mortality rates during heat waves, we can see a clear correlation between extreme heat and negative health outcomes.
- This data can be further analyzed to identify vulnerable populations and develop targeted interventions.
- Data can guide the development of programs such as:
  - Cooling assistance for low-income households
  - Public education campaigns on heat safety (specifically targeted to vulnerable communities)
  - Expansion of public cooling centers
  - Investment in heat-resistant infrastructure

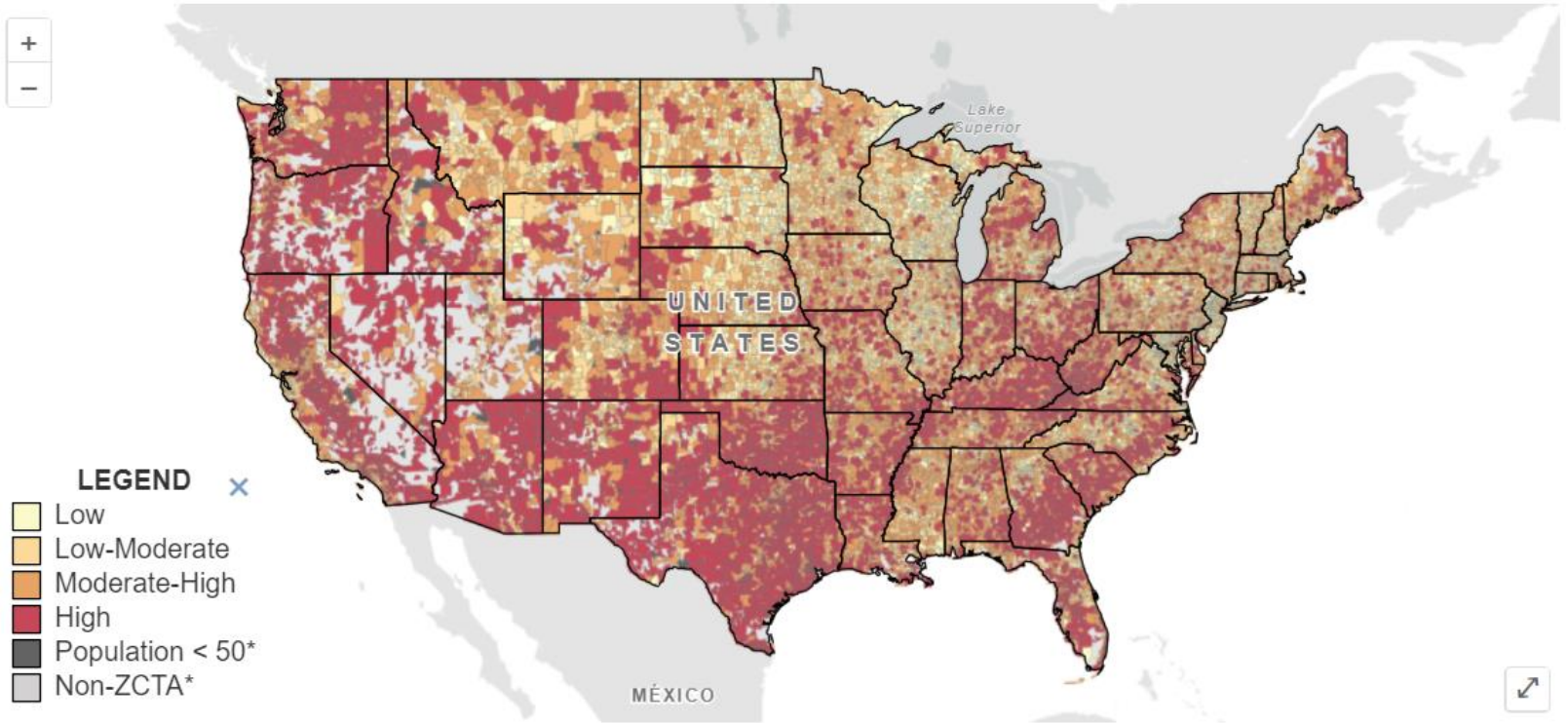
# The CDC's New Heat and Health Index

## Explore the Heat and Health Index

The Heat and Health Index (HHI) helps identify communities where people are most likely to feel the effects of heat on their health, in order to build towards a healthier and more heat-resilient future for all. Enter a ZIP code in the text box on the right or select a ZIP Code Tabulation Area (ZCTA)* in the map below to learn more about how different factors influence the way heat affects your community.

**Search for zip code here**

Enter zip code here

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# The CDC's New Heat and Health Index

## Heat and Health Index
**ZIP Code Tabulation Area: 32304***

This area is in the **top 77.1%** of the country.

**77.1%**

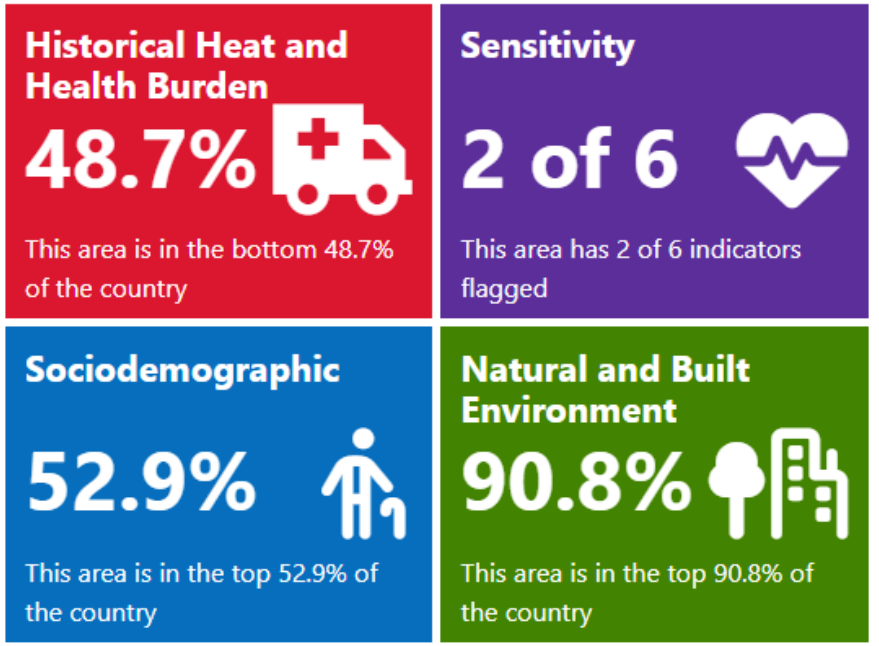
An HHI ranking of **77.1%** signifies that **77.1%** of ZCTAs in the nation are likely **less vulnerable** to the impacts of heat than the ZCTA of interest and that **22.9%** of ZCTAs in the nation are likely **more vulnerable** to the impacts of heat.

The **Historical Heat and Health Burden** module captures measures of previous experience with heat at the local level (ZCTA or ZIP code)

The **Sensitivity** module is comprised of pre-existing health conditions that may increase risk of negative health outcomes when the individual with the condition is exposed to extreme heat

The **Sociodemographic** module encompasses social and demographic characteristics that increase exposure or sensitivity to heat or lessen one's ability to cope with extreme heat

The **Natural and Built Environment** module focuses on characteristics of the natural and built environment that increase exposure or sensitivity to heat or lessen one's ability to cope with extreme heat

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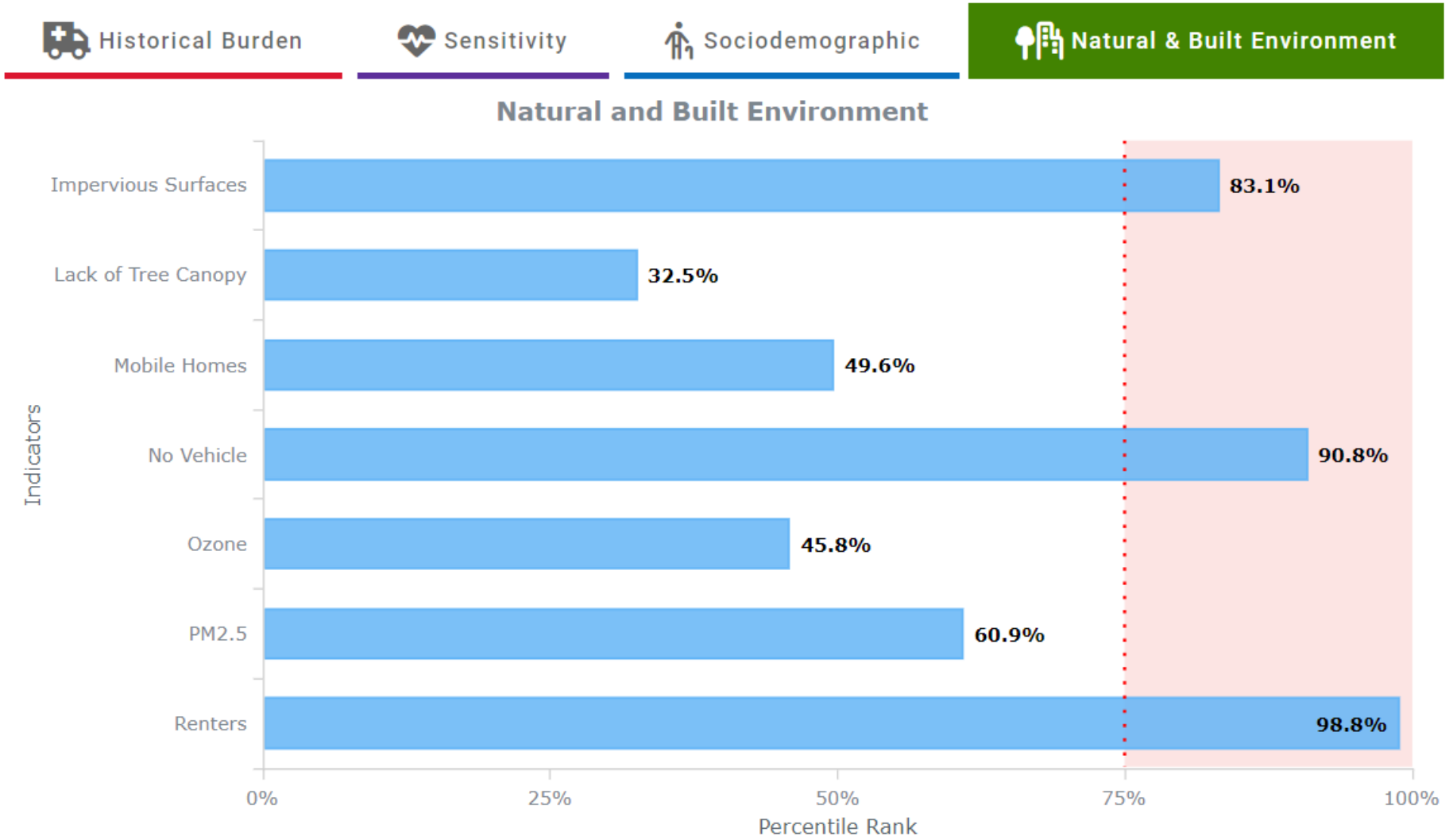
# The CDC's New Heat and Health Index



# Save the Date!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# Some Other Public Health Data Sources:

- U.S. Centers for Disease Control and Prevention (CDC)
  - Climate and Health Program
  - Environmental Public Health Tracking Network
  - Social Vulnerability Index
- Environmental Protection Agency (EPA)
  - Climate Change Indicators
  - Air Quality Index
  - Environmental Justice Screening and Mapping Tool (EJSCREEN)
- National Institute of Environmental Health Sciences (NIEHS)
  - Climate Change and Environmental Health Research
  - Environmental Health Perspectives Journal

# Partner with your State and Local Health Departments

State and local health departments collect data specific to their communities, critical to understanding local vulnerabilities:

- **Climate and Health Assessments**: Many state and local health departments conduct assessments that evaluate the health risks posed by climate change in their specific jurisdictions.
- **Communicable Disease Data**: Tracks the spread of diseases that may be influenced by climate change, such as mosquito-borne illnesses or waterborne outbreaks.
- **Chronic Disease Data**: Provides information on rates of chronic illnesses potentially exacerbated by climate change, such as asthma or heart disease.

Collaborate with health experts to ensure health is included in ALL policies.

# *Thank you!*

https://apha.org/Topics-and-Issues/Climate-Health-and-Equity

Center for CLIMATE, HEALTH AND EQUITY
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