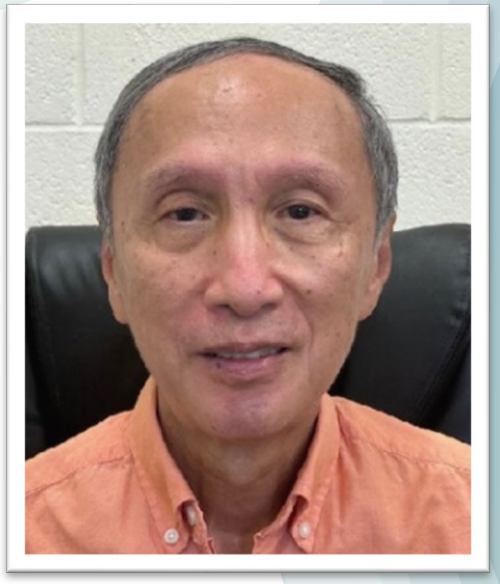
Extreme Heat: The Physical Effects on Vulnerable Populations



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Trends in surface temperature, humidity, and trade wind in the Hawaiian Islands

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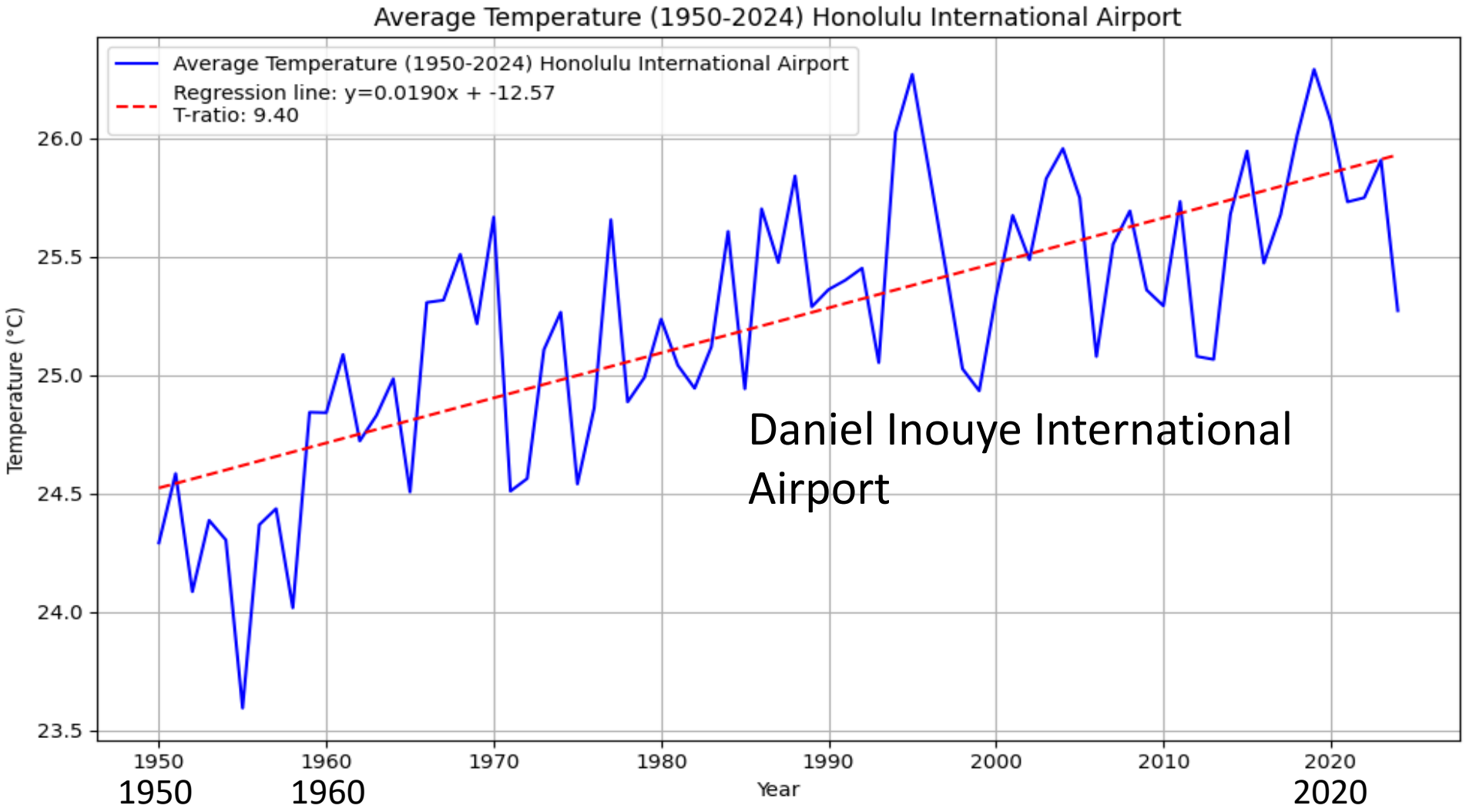
Department of Health - Climate Change and Health Conference
October 23-24, 2024

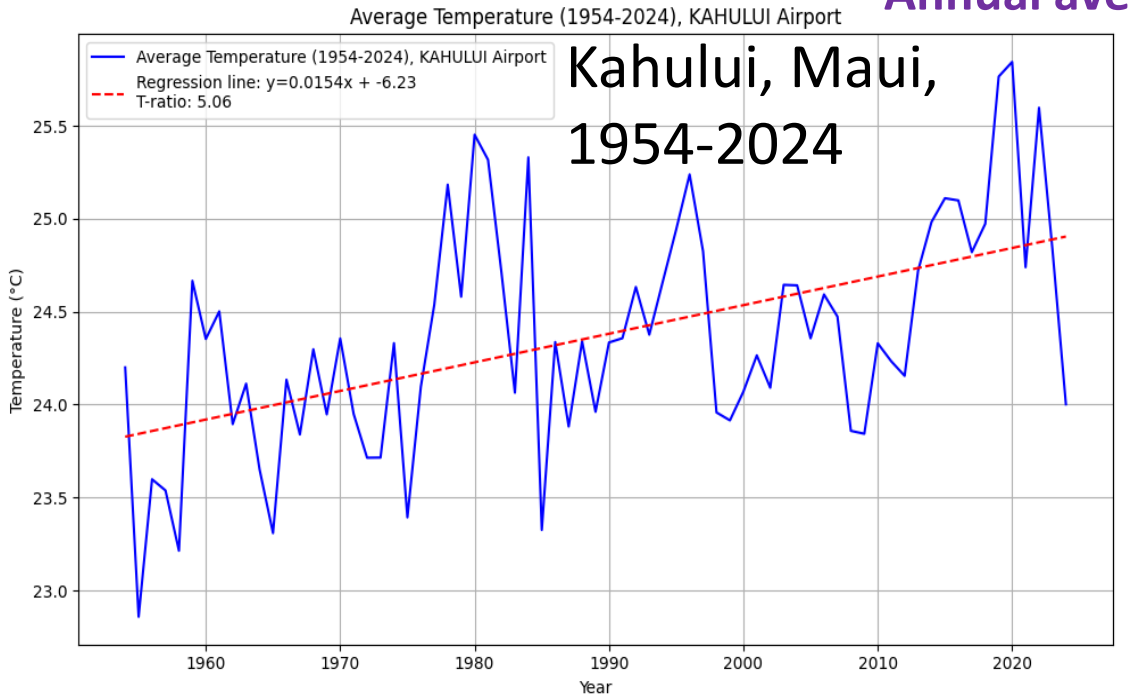
Heat can cause dehydration, exhaustion, skin rashes, fainting and stroke.

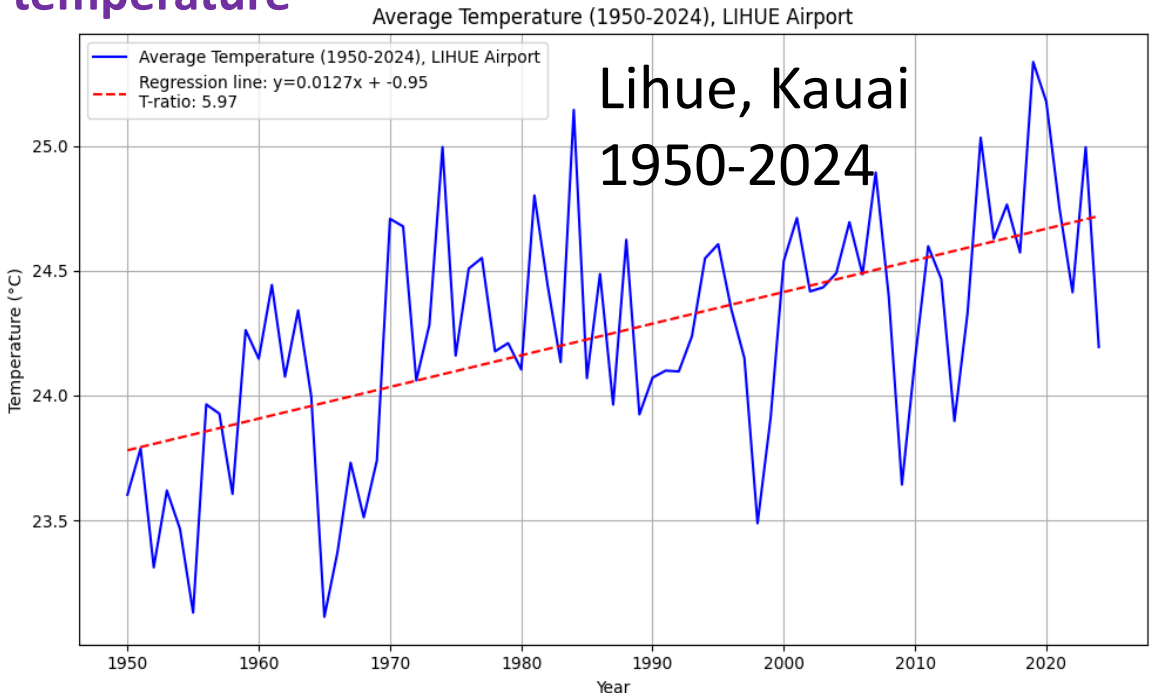
Annual Average Temperature (°C, 1950-2024)

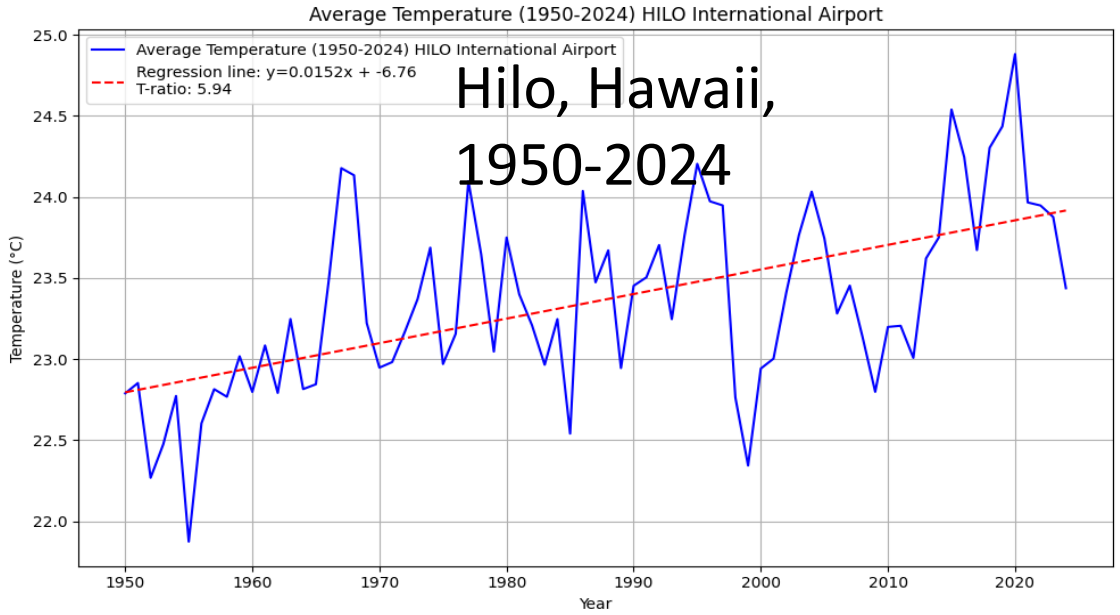


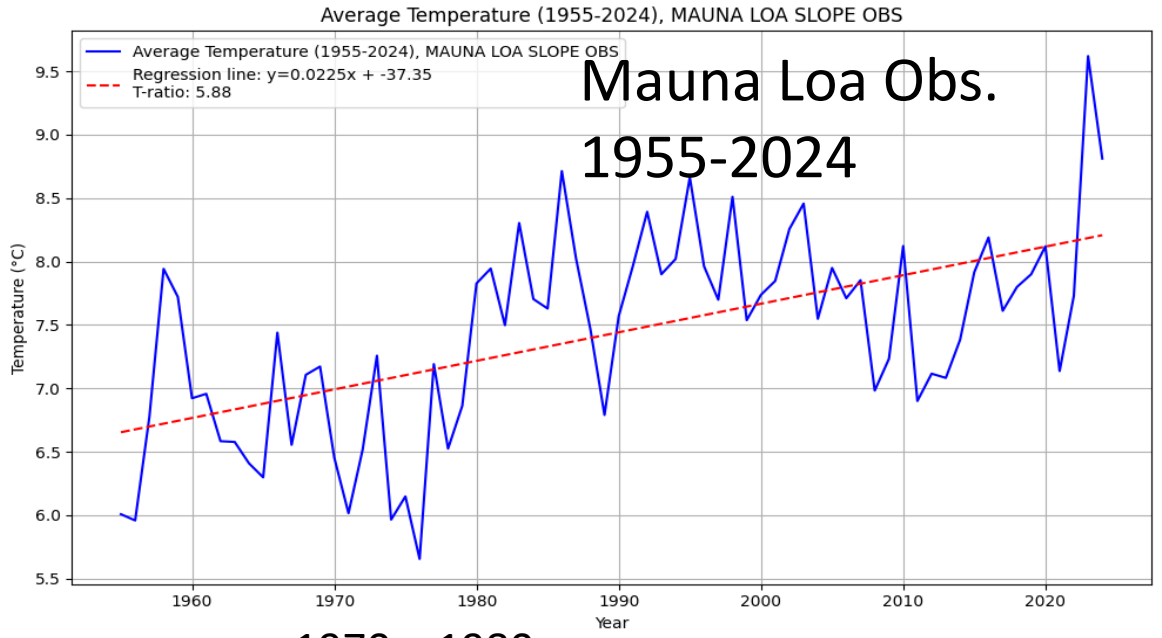
The overall increase is statistically significant and approximately 1.33°C over the last 75 years.

Annual average temperature



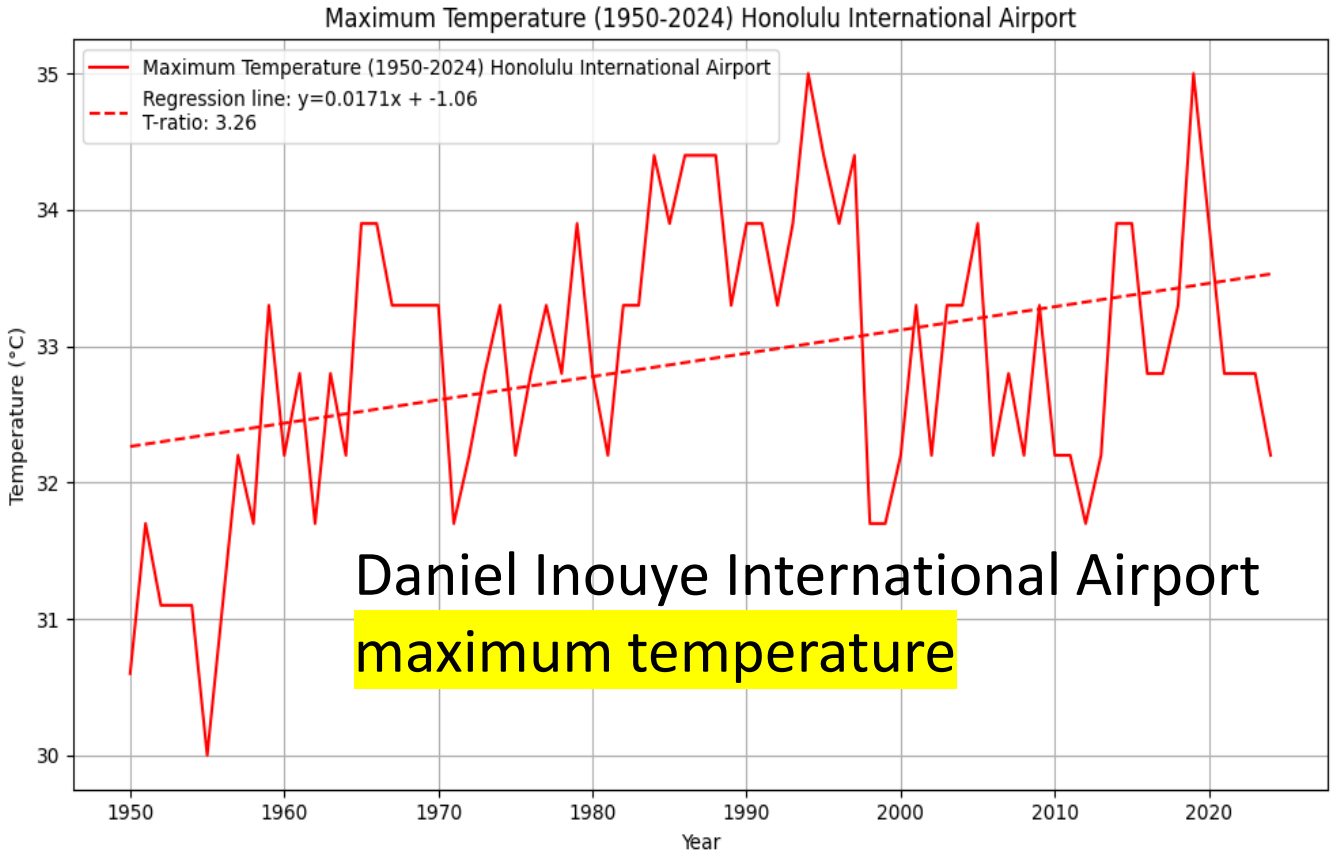


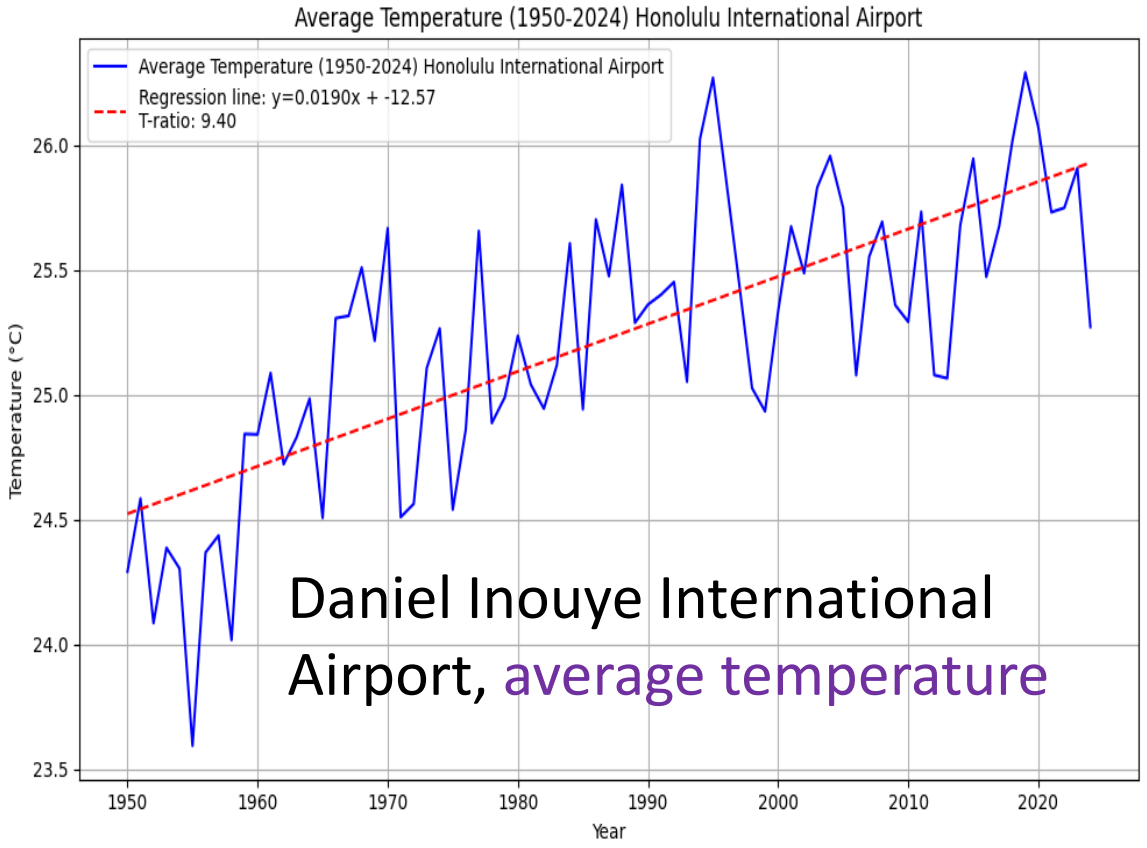




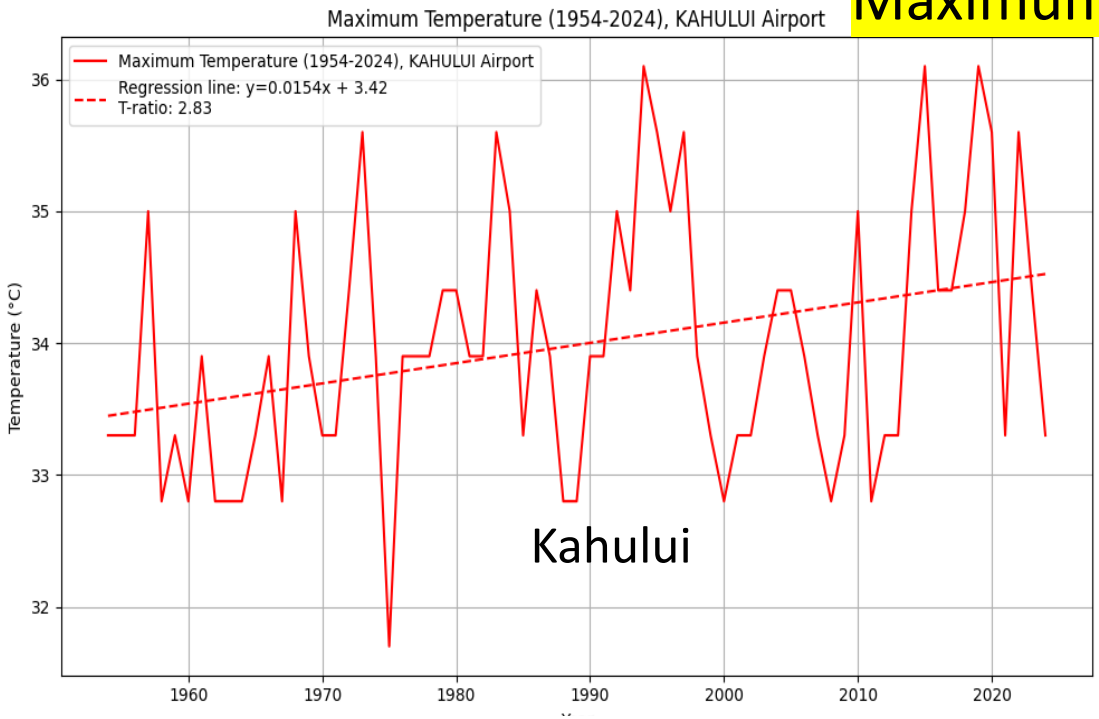
1970 1980

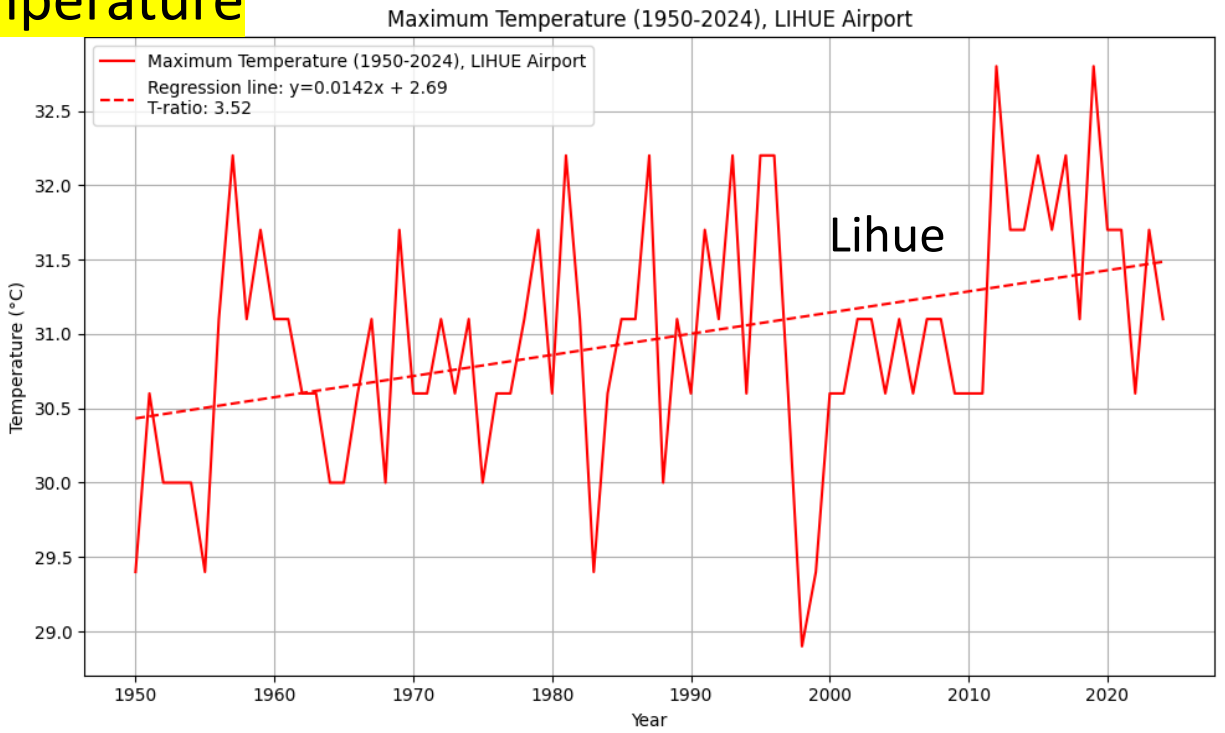
The World Meteorological Organization defines a **heat wave** as 5 or more consecutive days of prolonged heat in which the daily maximum temperature is higher than the average maximum temperature by 5°C or more.

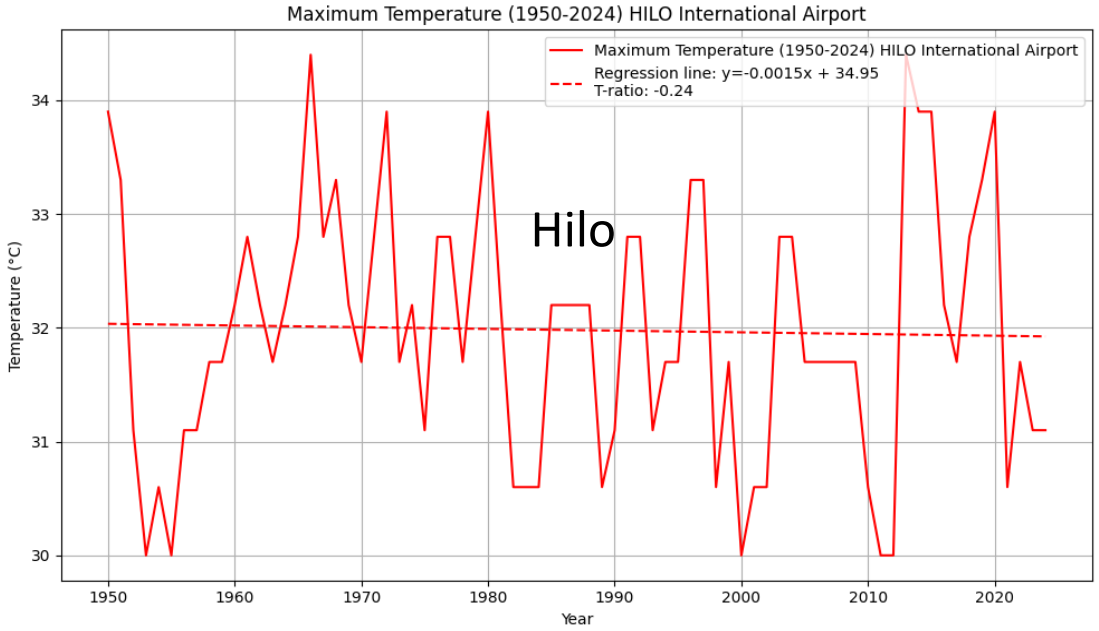


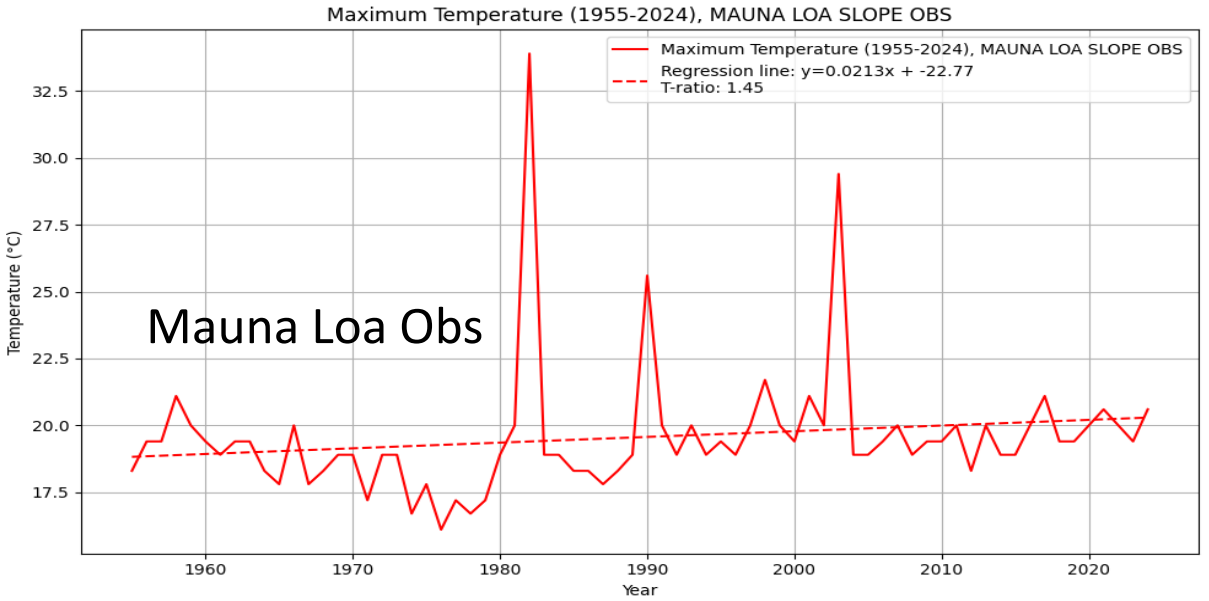


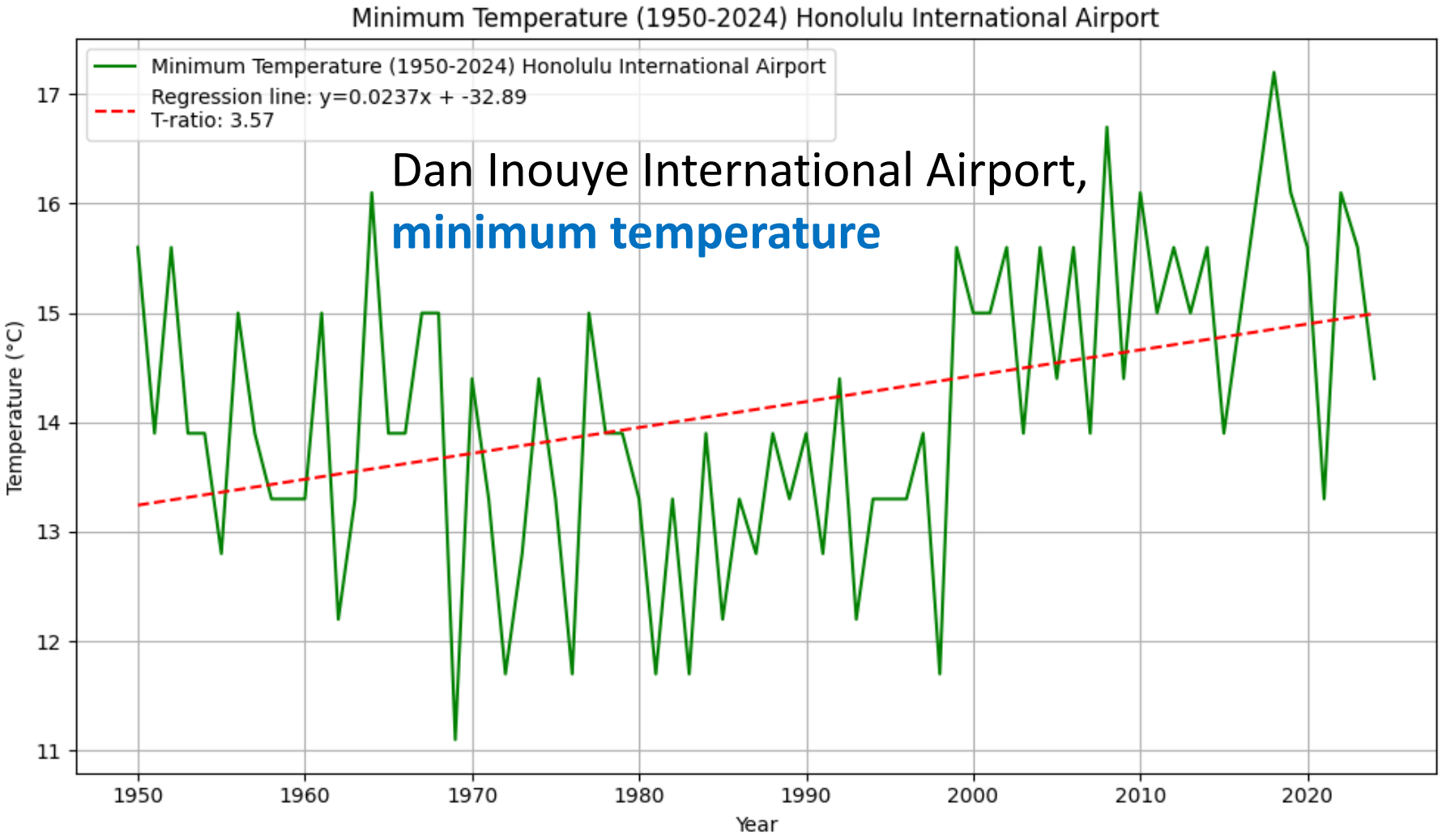
Maximum temperature





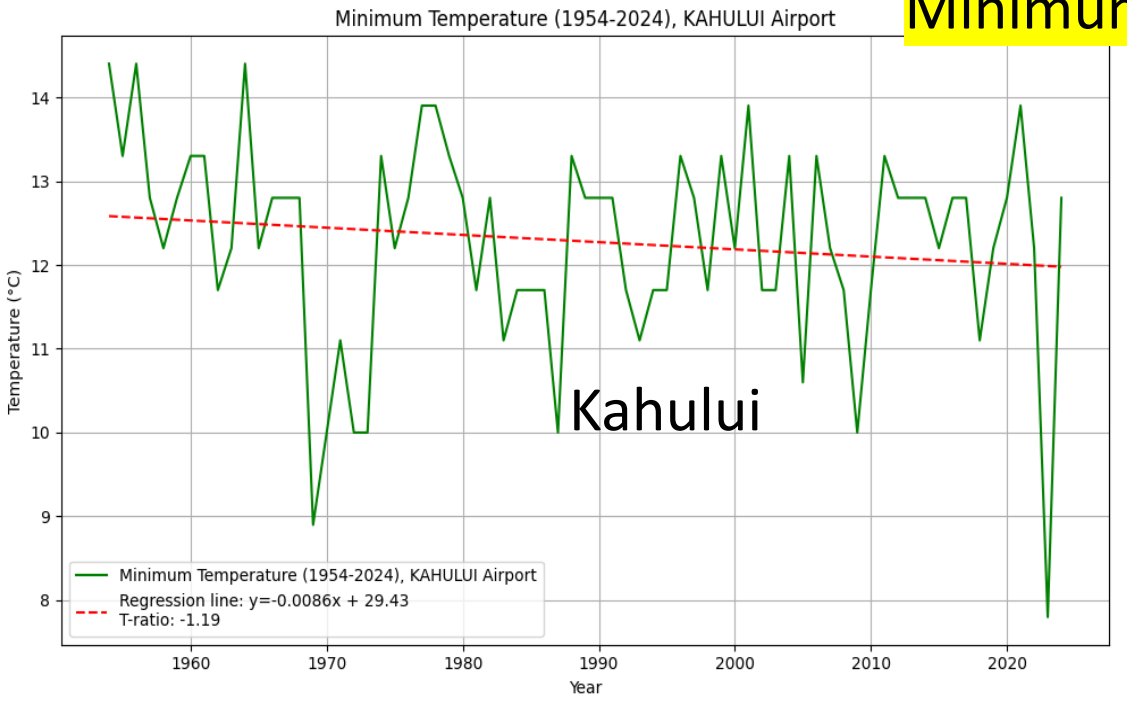


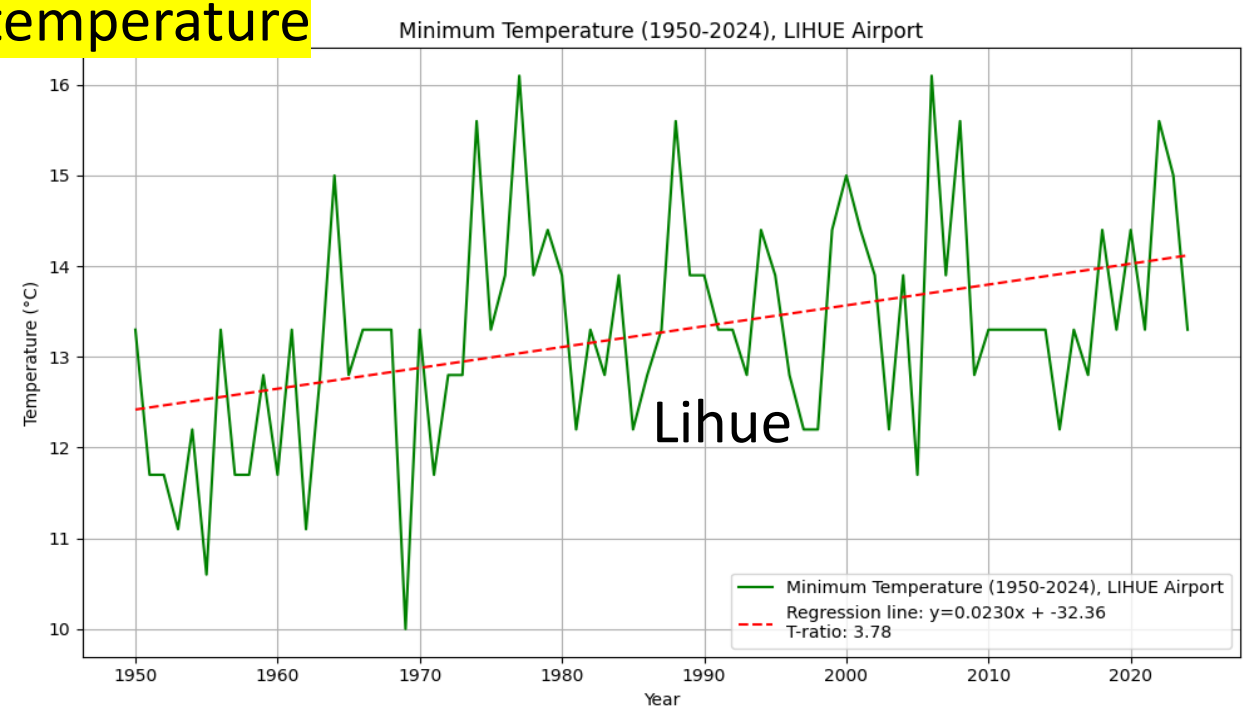


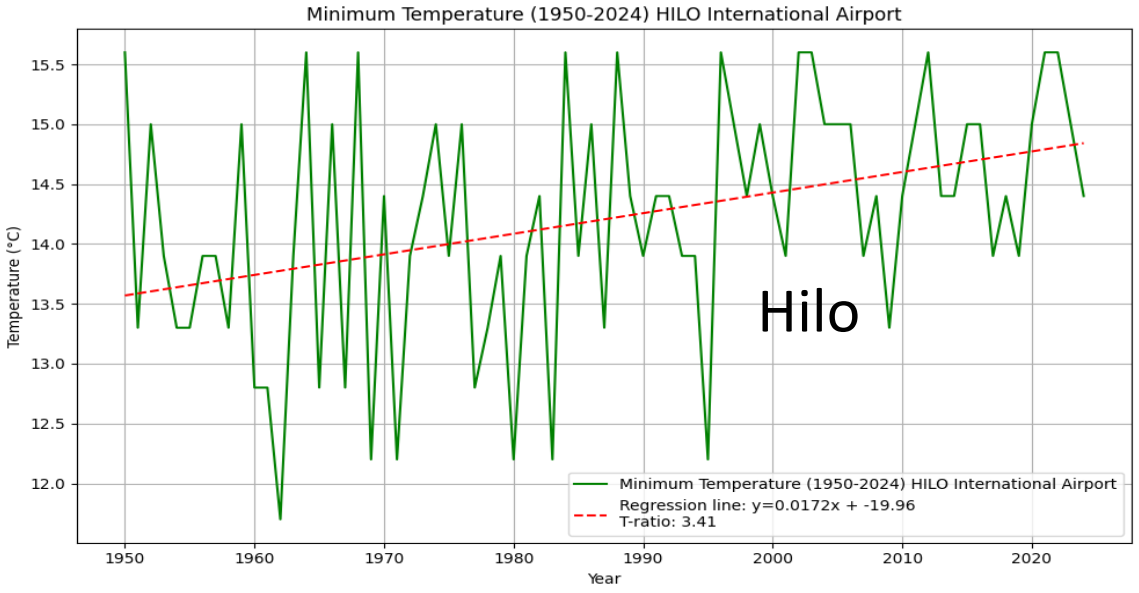


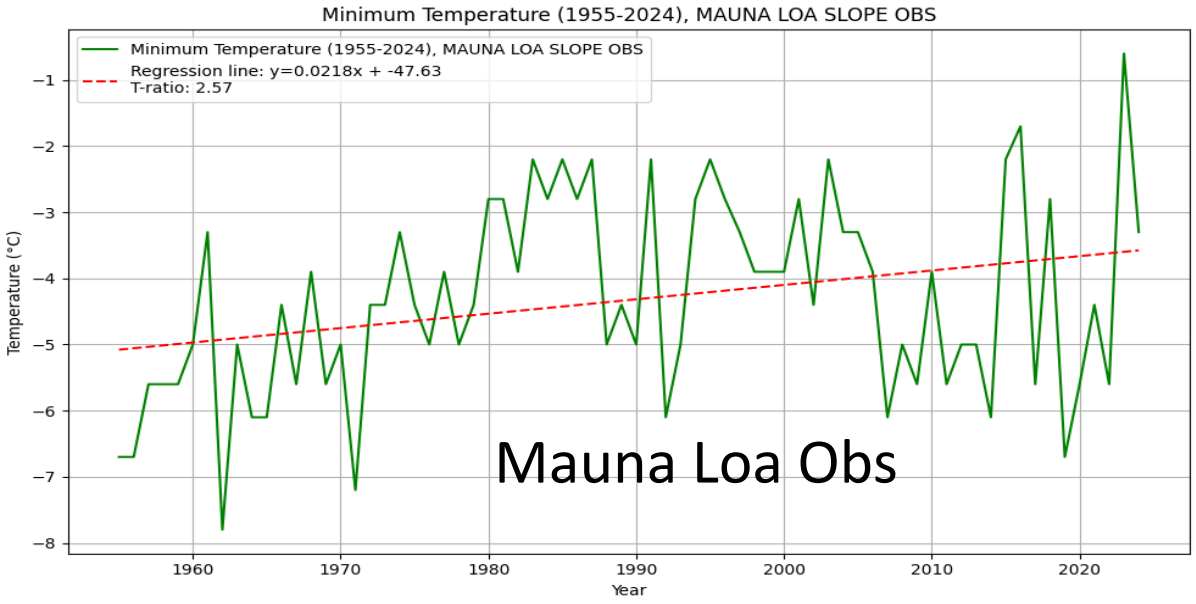
Trend in minimum temperature is stronger than that in maximum temperature

Minimum temperature

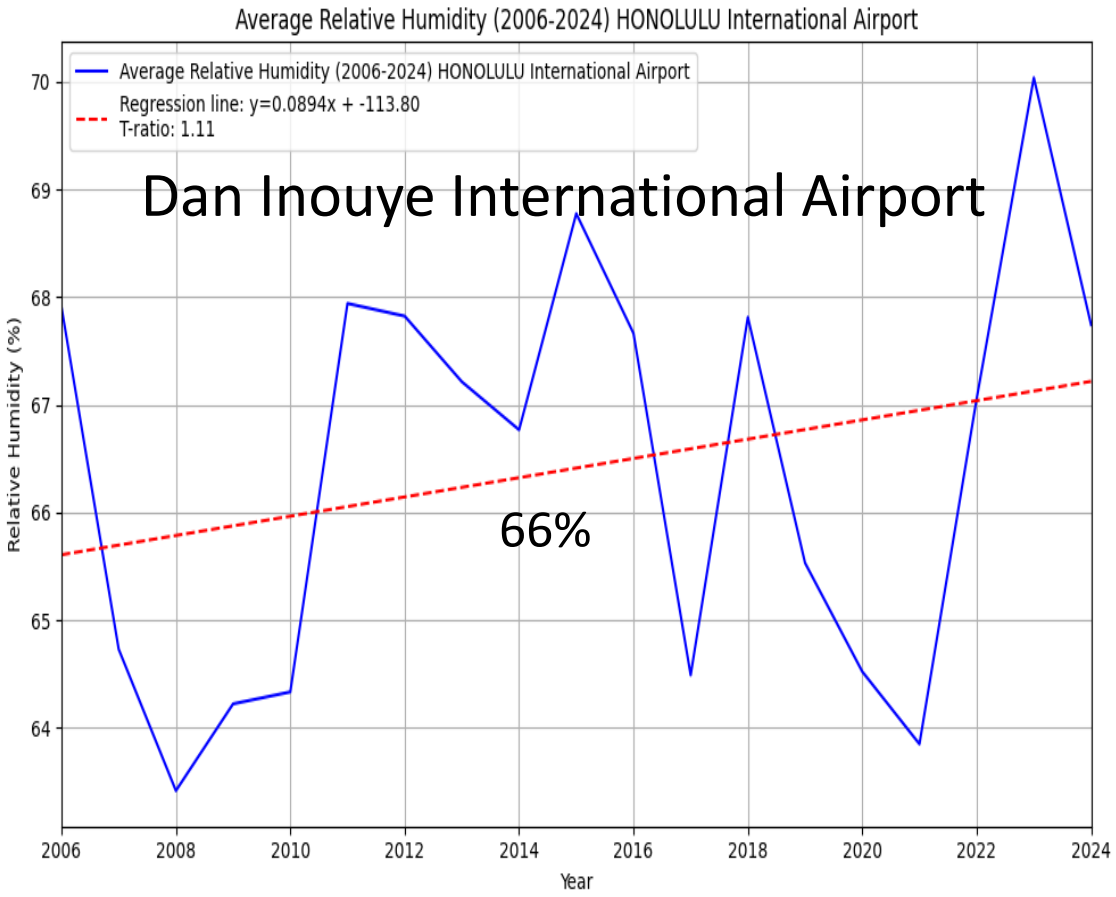






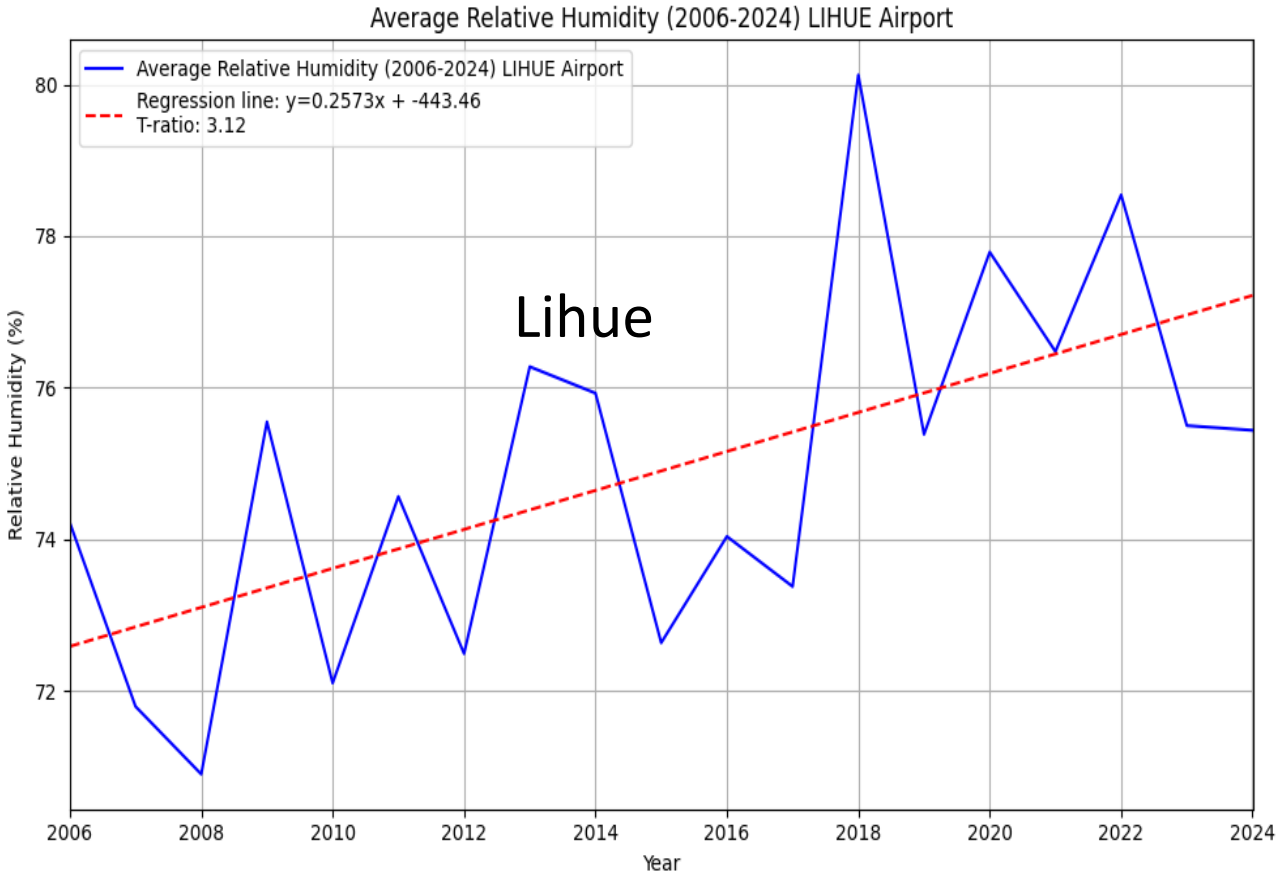


Relative Humidity (%), 2006-2024



Dan Inouye International Airport

66%

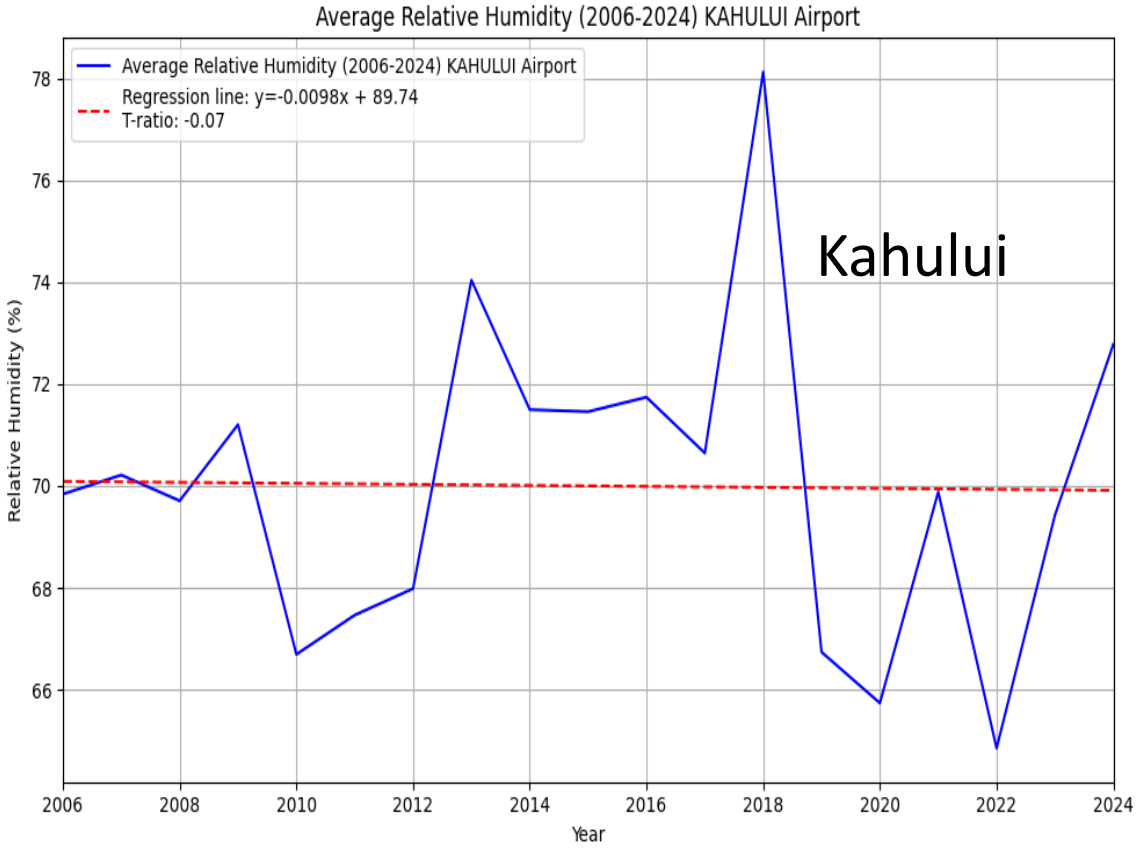


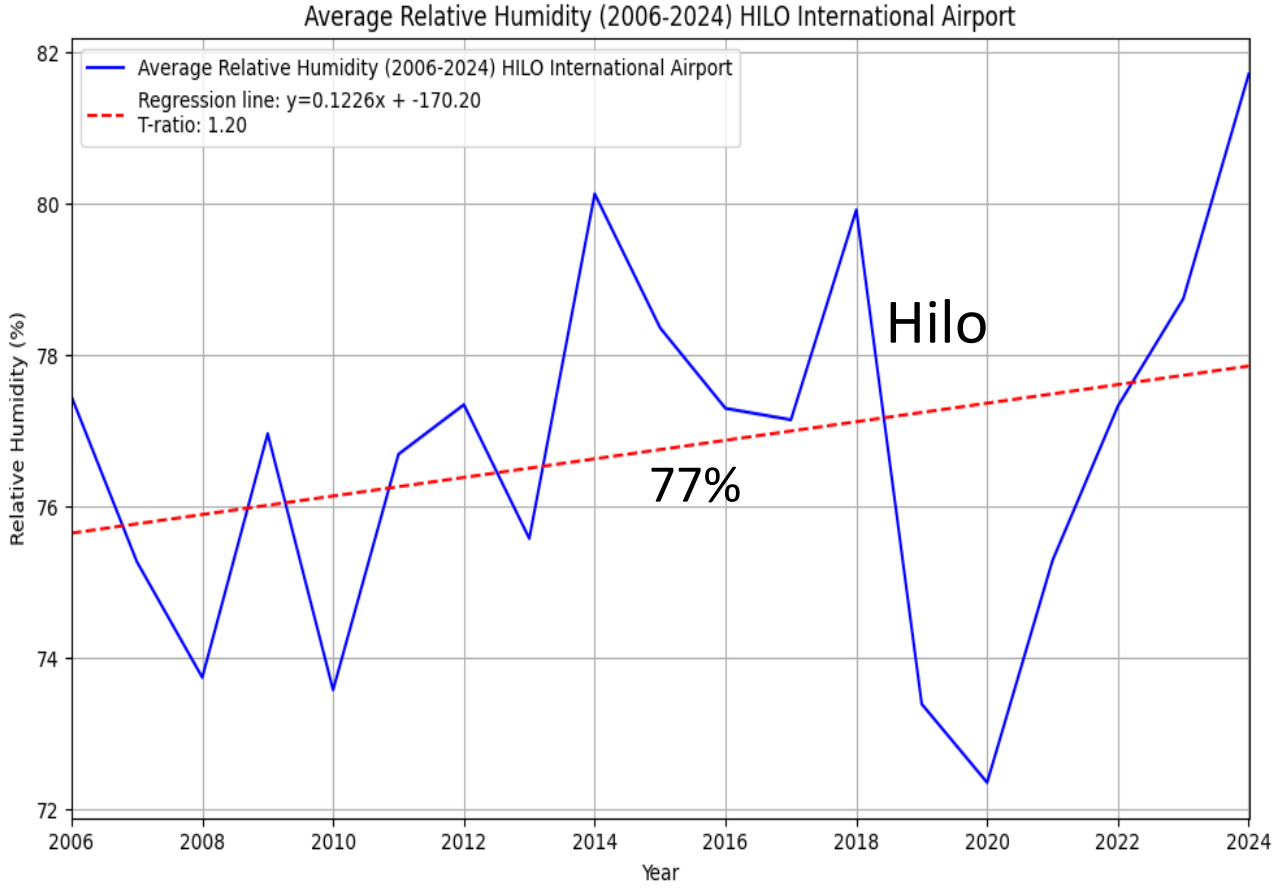
Lihue

72.5%

77%

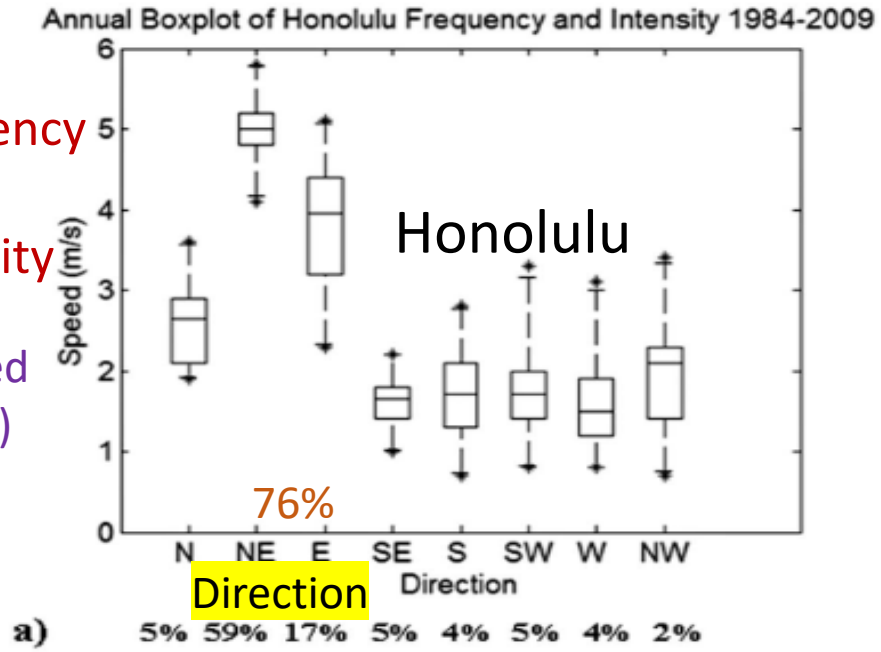
Relative Humidity

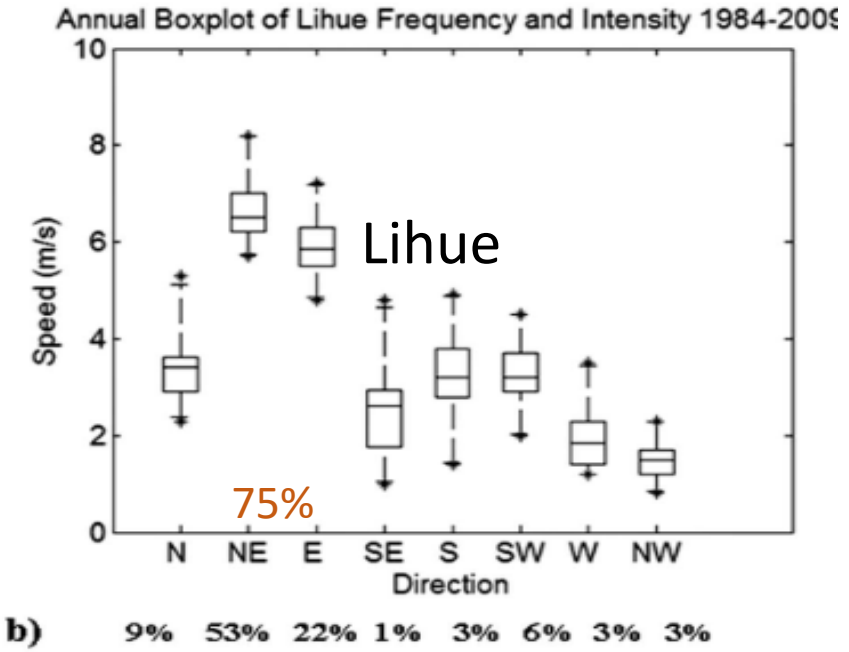


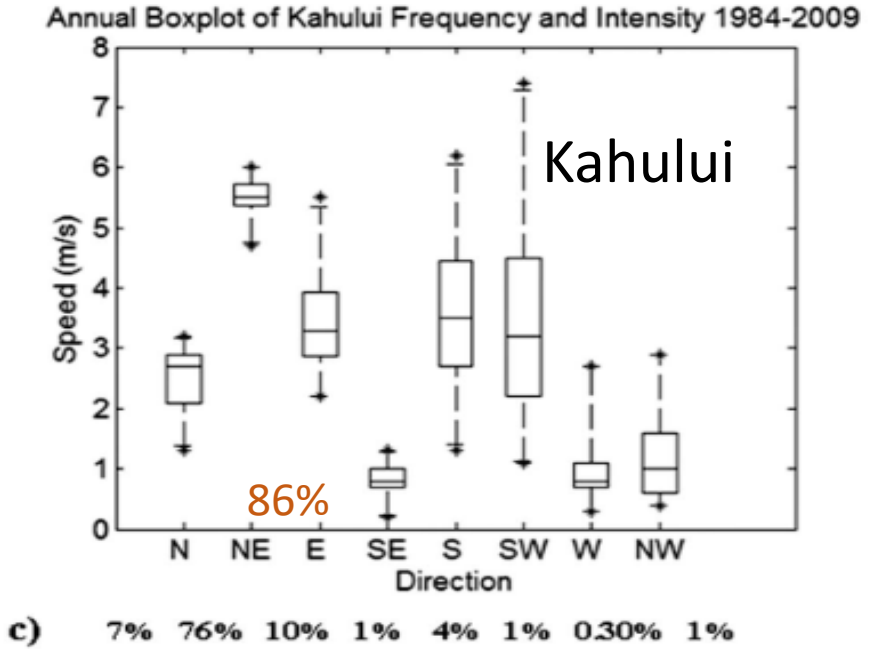


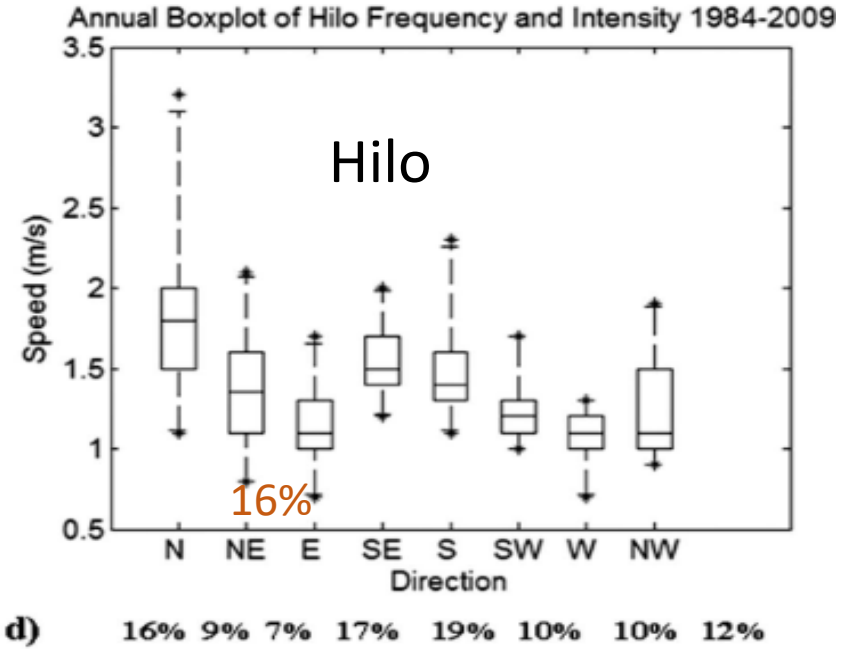
Wind frequency and intensity

Speed (m/s)









Wind data: 1984-2009

Garza, Chu, North, and Schroeder, 2012: **Changes of the prevailing trade winds over the Islands of Hawaii**. Journal of Geophysical Research (Atmosphere).

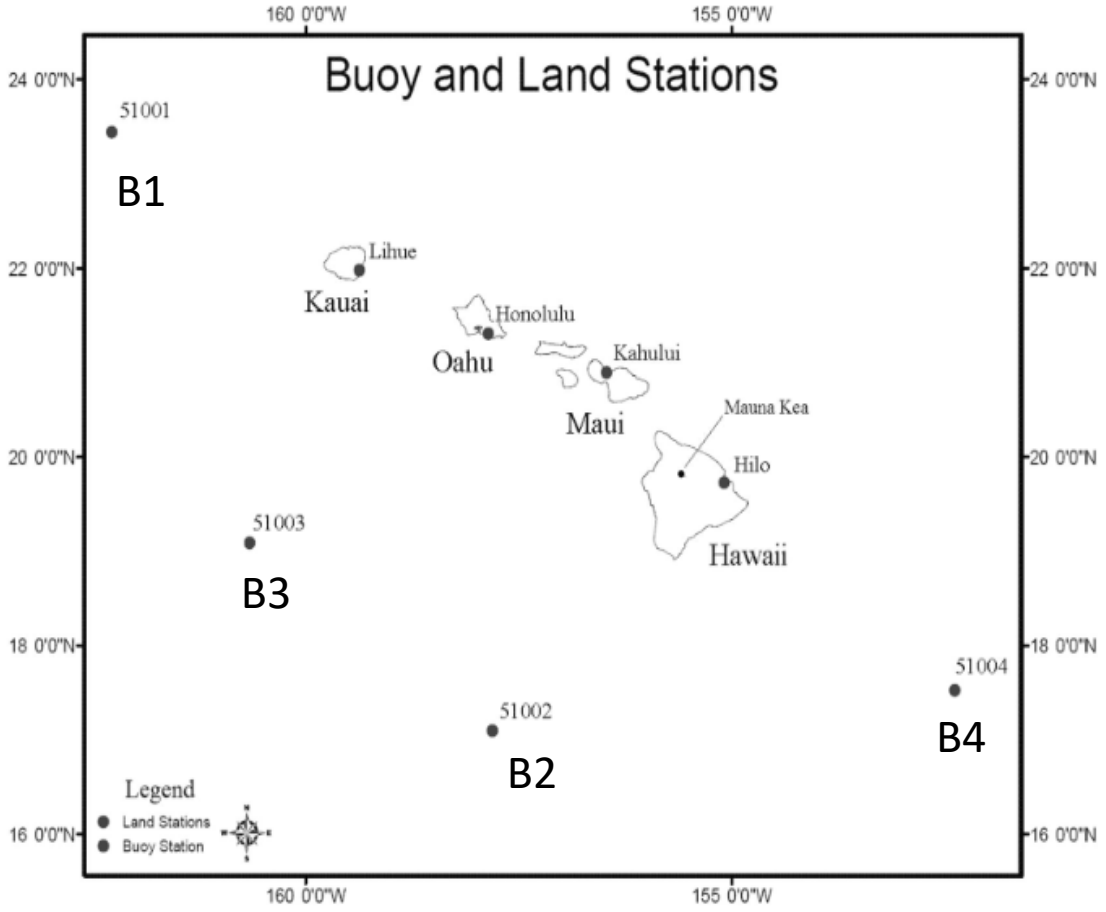


Figure 1. Orientation map of land and buoy stations.

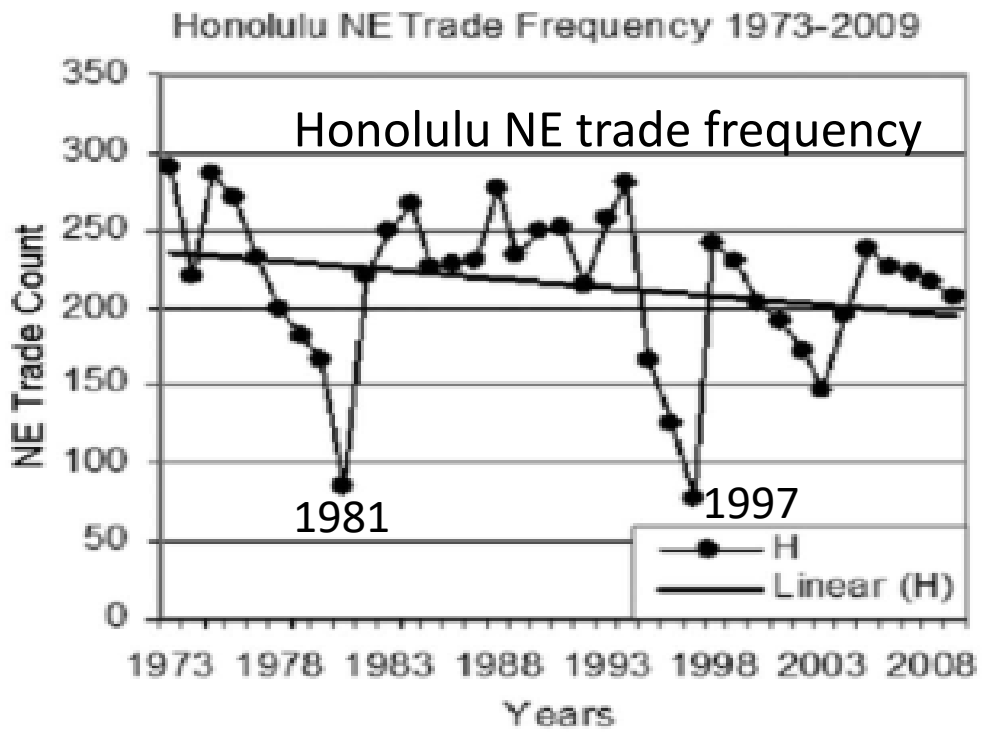
Table 2. Buoy Station Frequency of Winds for the Period of 1984–2009 for Each Cardinal Direction[a]

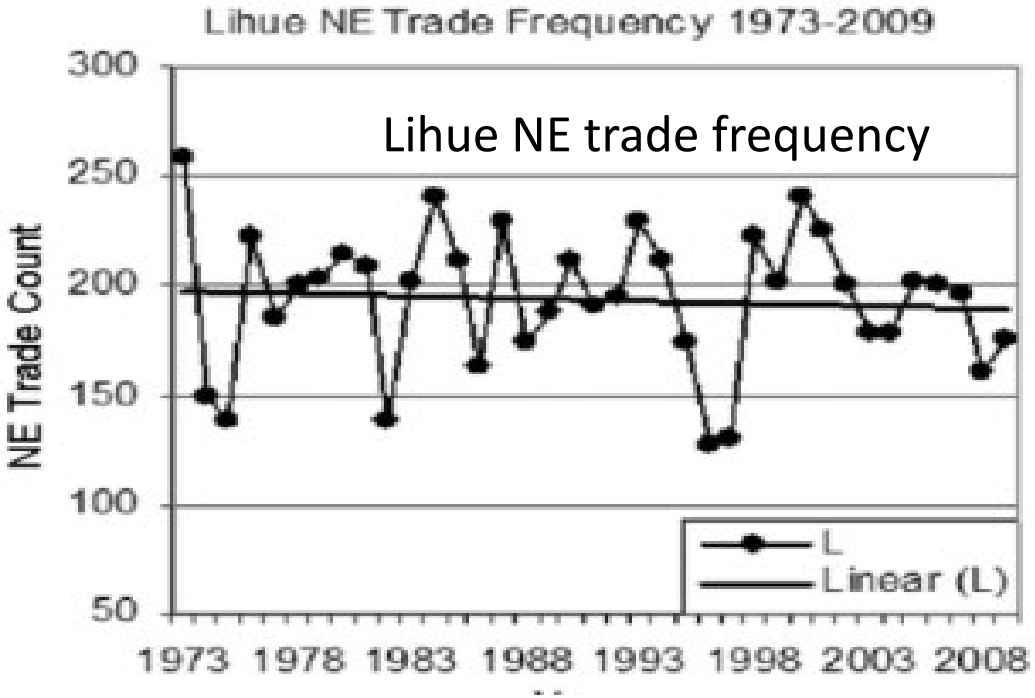
	Frequency of Winds			
	B1	B2	B3	B4
N	5%	3%	3%	2%
NE	**24%**	**31%**	**34%**	**39%**
E	**51%**	**61%**	**48%**	**53%**
SE	7%	3%	9%	4%
S	4%	1%	2%	1%
SW	4%	1%	1%	1%
W	3%	0.47%	1%	0.50%
NW	3%	1%	1%	0.38%

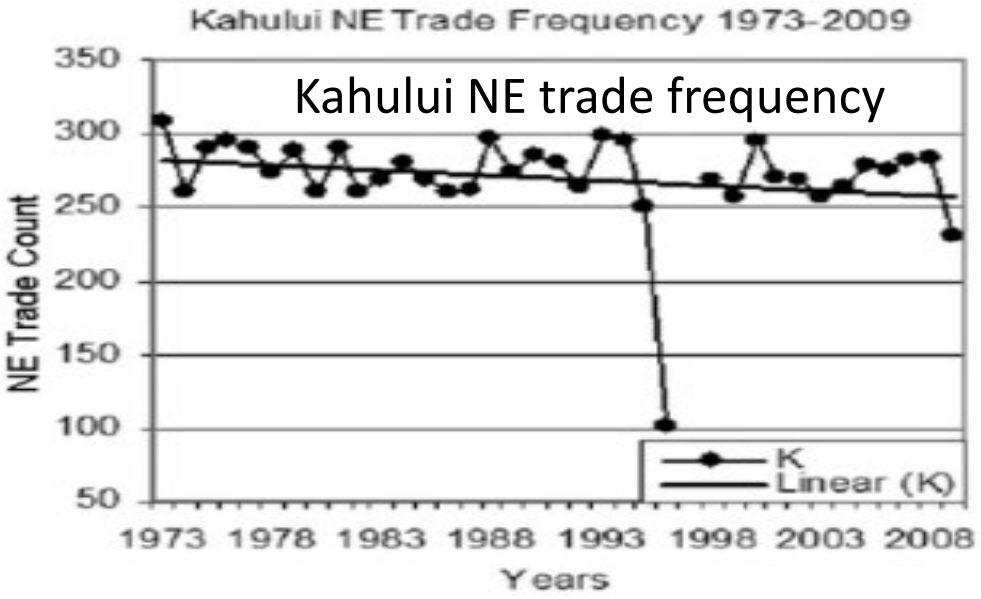
75%

92%

[a]NE and E directions are in bold and represent the highest frequencies.







Time Series	Northeast Q
Honolulu	−2.00*
Lihue	−0.833
Kahului	−0.172
Buoy 51001	−0.162
Buoy 51002	−3.125
Buoy 51003	−3.087
Buoy 51004	−3.36*

NE trade frequency, 1984-2009

- Annual mean temperature at four major airports (Daniel Inouye International Airport, Lihue, Kahului, Hilo) in Hawaii shows a statistically significant **increasing trend** over the last 75 years (1950-2024). For Honolulu, the overall warming is about 1.33°C.
- At high elevation (Mauna Loa Observatory), the warming trend is also significant.
- Annual mean maximum temperature at airport stations (except for Hilo) shows an increasing trend and annual mean minimum temperature also shows an upward trend (except Kahului).
- Consistent with temperature trends, humidity also sees an increasing trend for three major airports (except for Kahului) during 2006-2024.
- Northeast trade wind prevails in the Hawaiian Islands and its frequency in Honolulu, Maui, and Kauai (as well as the adjacent ocean buoy stations) shows a pronounced decline during 1984-2009.

Extreme Heat:
Physical Effects on Vulnerable Populations

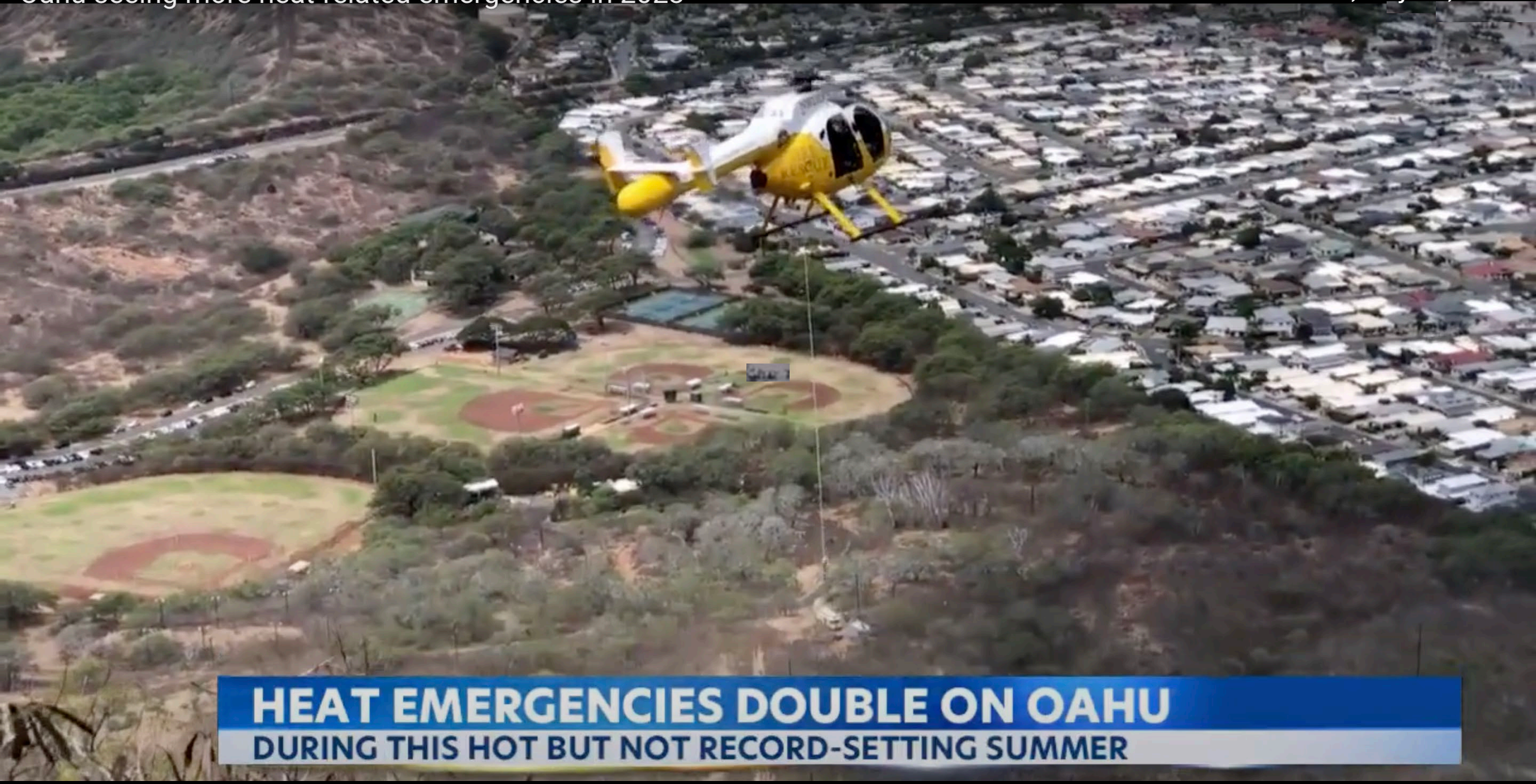
Elizabeth Kiefer, MD MPH

Assistant Clinical Professor of Medicine, JABSOM

(NO DISCLOSURES)

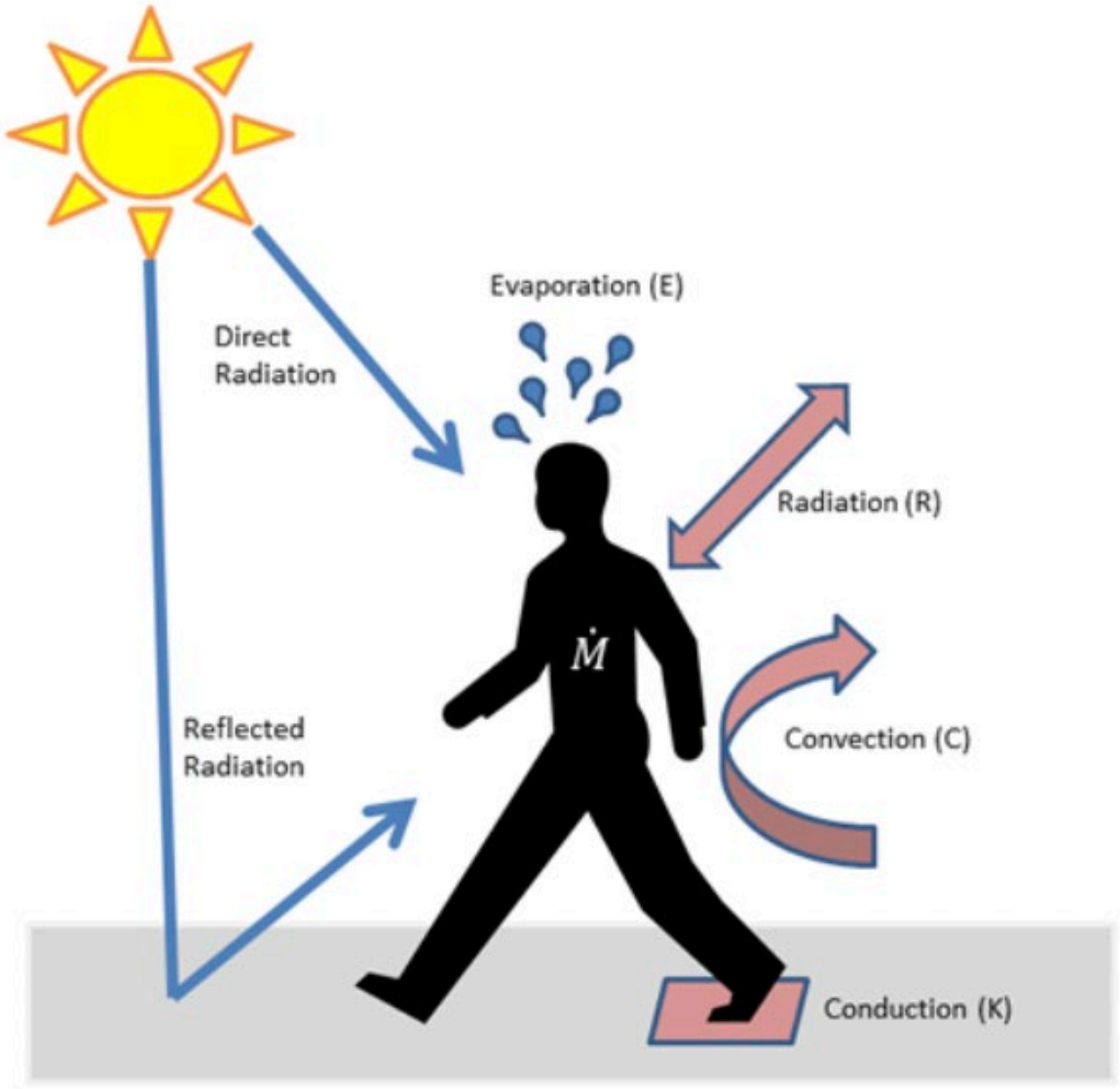
Oahu seeing more heat-related emergencies in 2023

Hawaii News Now, July 31, 2023



Heat Related Illness

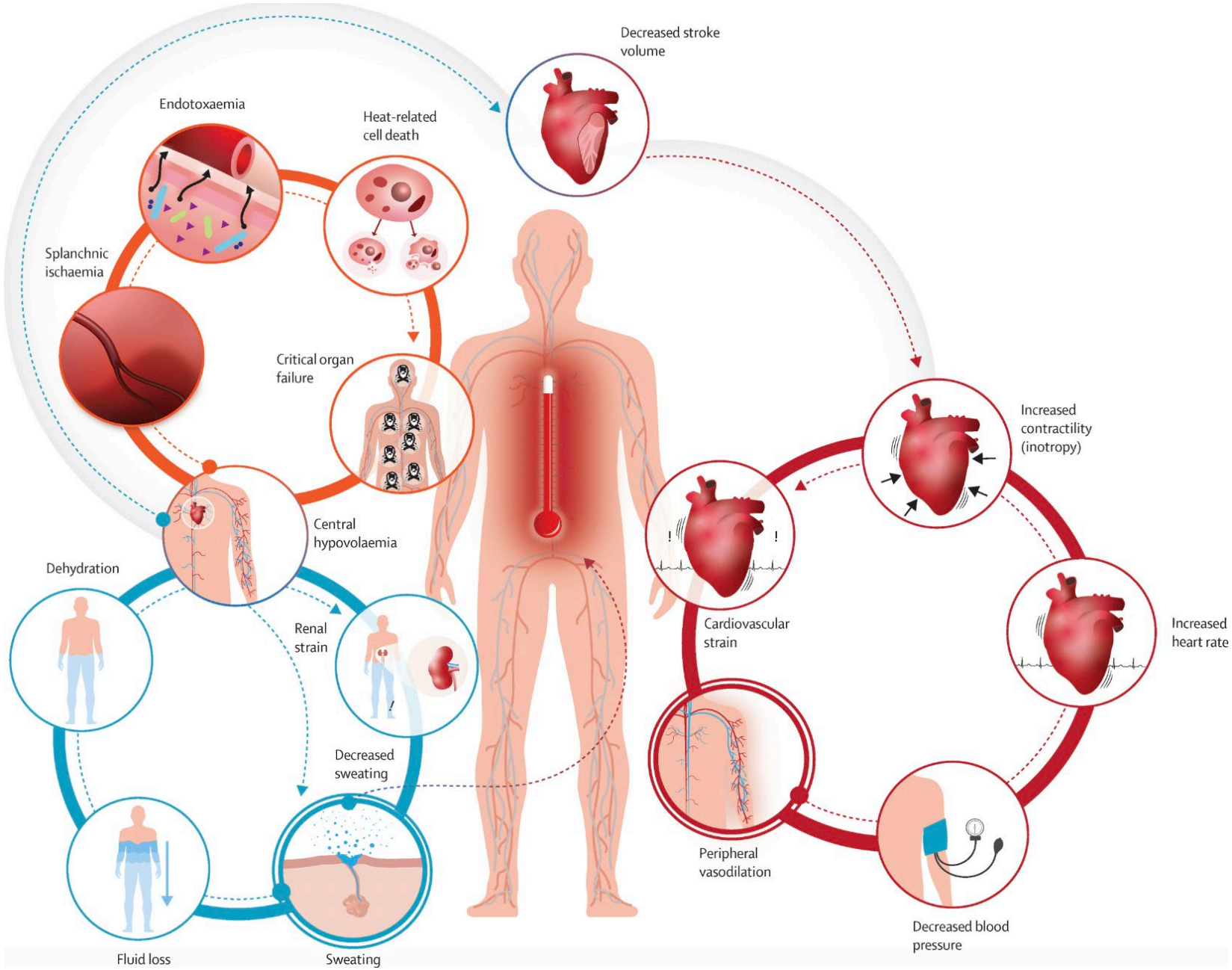
- heat index: heat + humidity
- heat index > 95°F: mortality ↑ with temp + duration
- wet bulb: measures temp on thermometer covered in a wet cloth soaked in ambient temp



www.usariem.army.mil/index.cfm/modeling/scenario

Physiologic Responses to Heat Strain

- Vasodilation/heat exchange
- Sweating/evaporation
- Conduction



Ebi, Kristie L et al.2021

Vasodilation

↑ cardiac demand

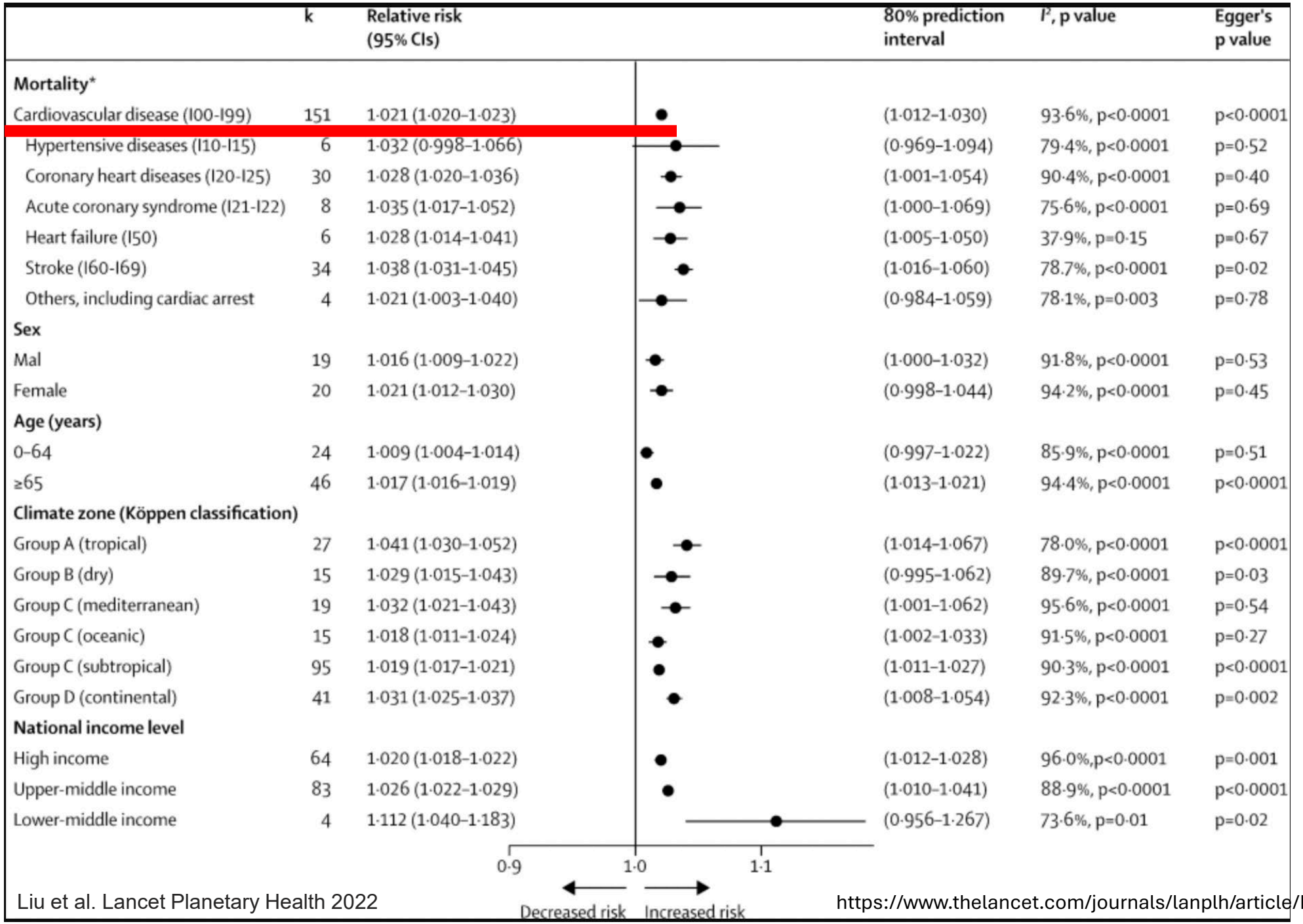
+

↓ cardiac filling pressure

leading to

↑ contractility and HR

↑ coronary O2 demand

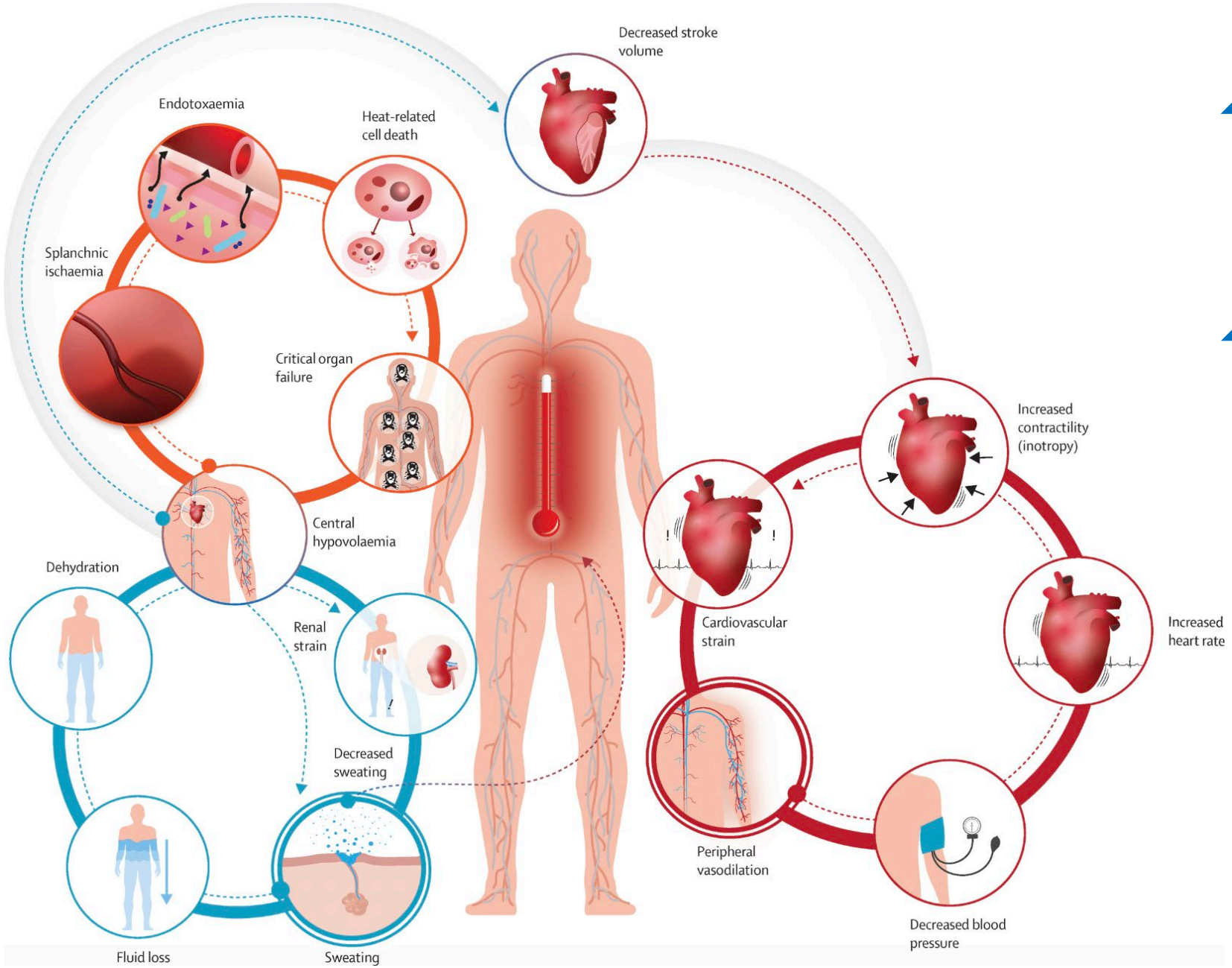


A 1°C temp increase associated with CVD mortality increase of 21%

(RR 1·021 [95%CI 1·020–1·023])

Liu et al. Lancet Planetary Health 2022

https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(22)00117-6/fulltext



Ebi, Kristie L et al.2021

Sweating

↑ Fluid losses

+

↑ Electrolyte losses

leading to

Dehydration
Hyperosmolality
Hypovolemia
RAS activation
Vasopressin release

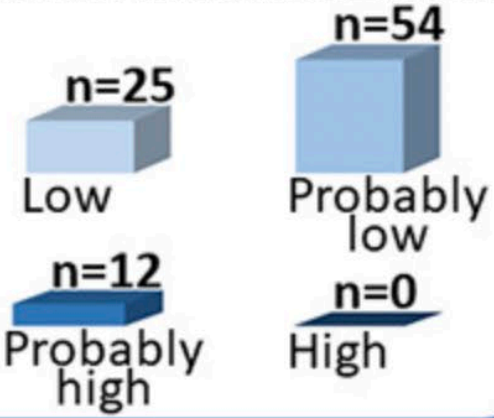
Systematic search of the literature

Published from Jan 1990 to Nov 2020

2,739 manuscripts in initial search

91 studies included in review

Risk of bias assessment



82 studies included in meta-analysis

Relative risks per 1 °C increase in temperature for kidney disease *(ICD-10 N00-N39)*

	High temperature
Morbidity	1.010 (1.009-1.011)
Mortality	1.031 (1.018-1.045)

Relative risks compare Heatwaves versus Non-heatwaves

	Heatwave
Morbidity	1.059 (1.044-1.073)
Mortality	1.188 (1.081-1.296)

Percentage changes per 1 °C increase in temperature for kidney disease morbidity

Urolithiasis *(ICD-10 N20-N23)*	2.2%
Acute kidney injury *(ICD-10 N17)*	1.2%
Urinary tract infections *(ICD-10 N10-N12, N30, N39)*	0.8%

Morbidity rates were higher in:

Male

People living in temperate climate zones

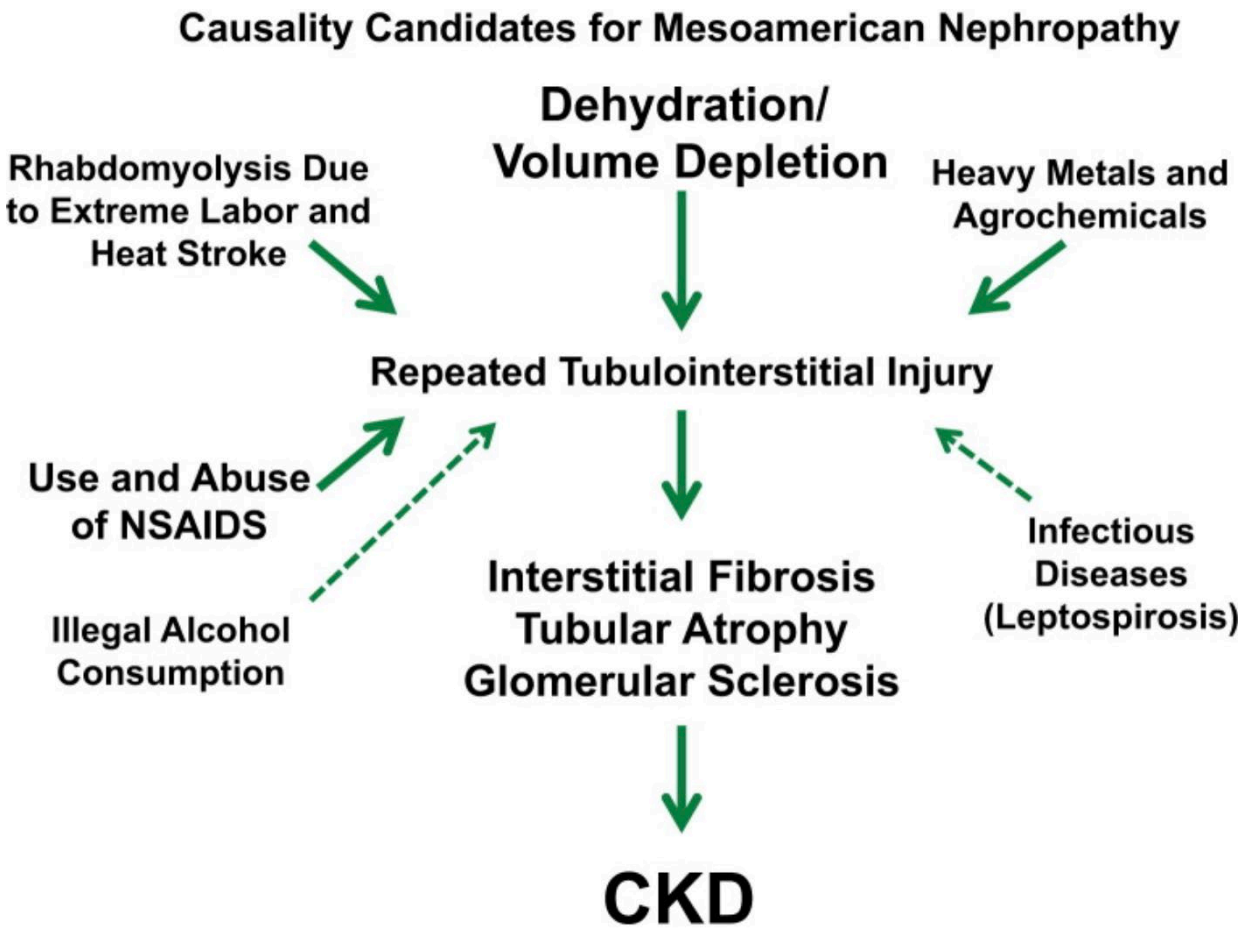
Liu et al.2021

https://www.sciencedirect.com/science/article/pii/S0048969721048816

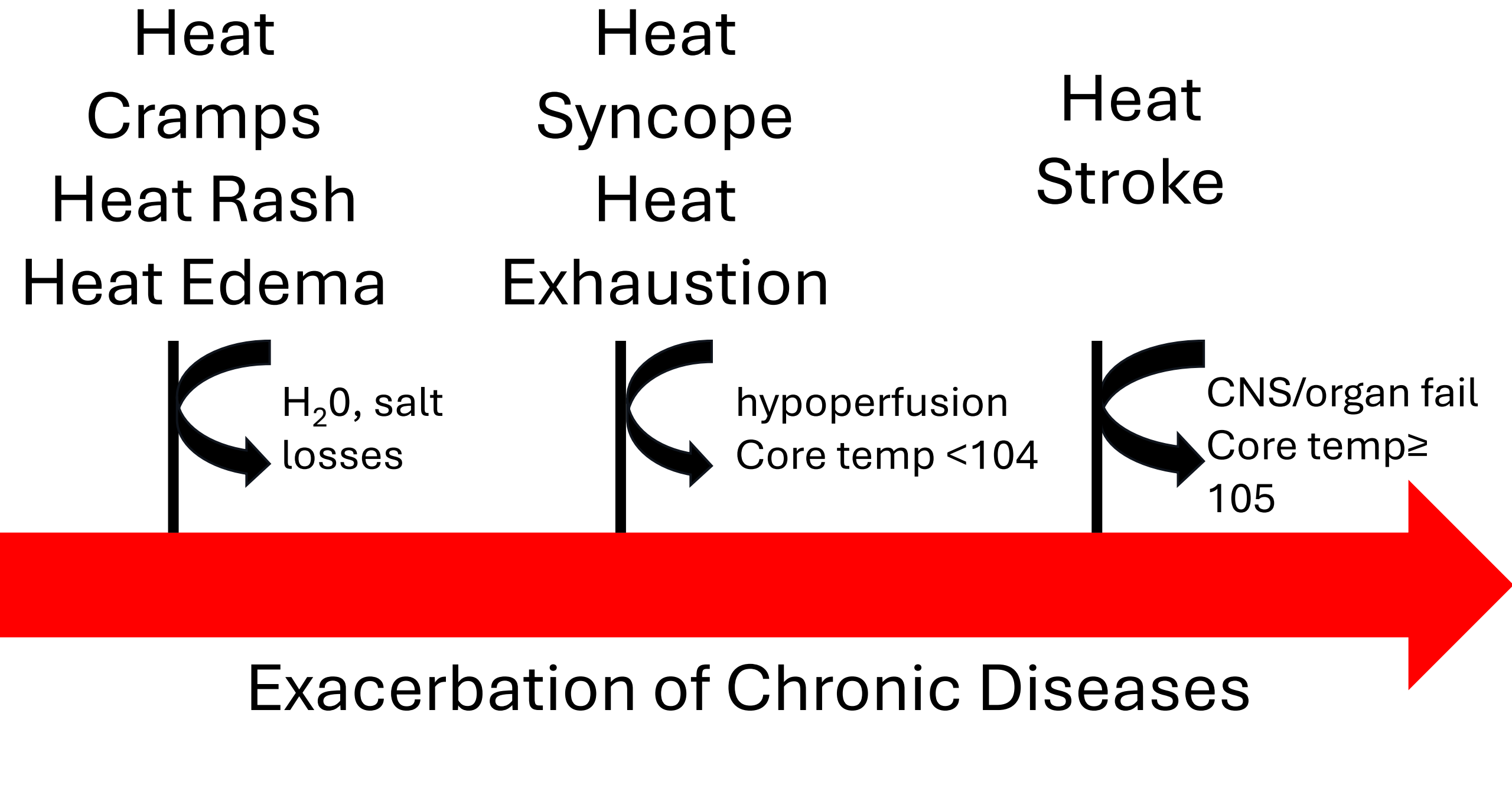
Sugar Cane worker, Chichigalpa, Nicaragua

https://www.cnn.com/2014/06/11/health/kidney-disease-ckdu/index.html

CKD of Unknown Origin in Central America: The Case for a Mesoamerican Nephropathy



Correa-Rotter R et al. Am J Kidney Dis 2014;63:506-20


Heat
Cramps
Heat Rash
Heat Edema
Heat
Syncope
Heat
Exhaustion
Heat
Stroke
H_20, salt losses
hypoperfusion
Core temp <104
CNS/organ fail
Core temp≥ 105
Exacerbation of Chronic Diseases

Heat Related Illness

Most fatalities are preventable!

Early recognition is key!

Heat Exhaustion

Heat Stroke

ACT FAST

- Move to a cooler area
- Loosen clothing
- Sip cool water
- **Seek medical help if symptoms don't improve**

Dizziness

Thirst

Heavy Sweating

Nausea

Weakness

Confusion

Dizziness

Becomes Unconscious

ACT FAST

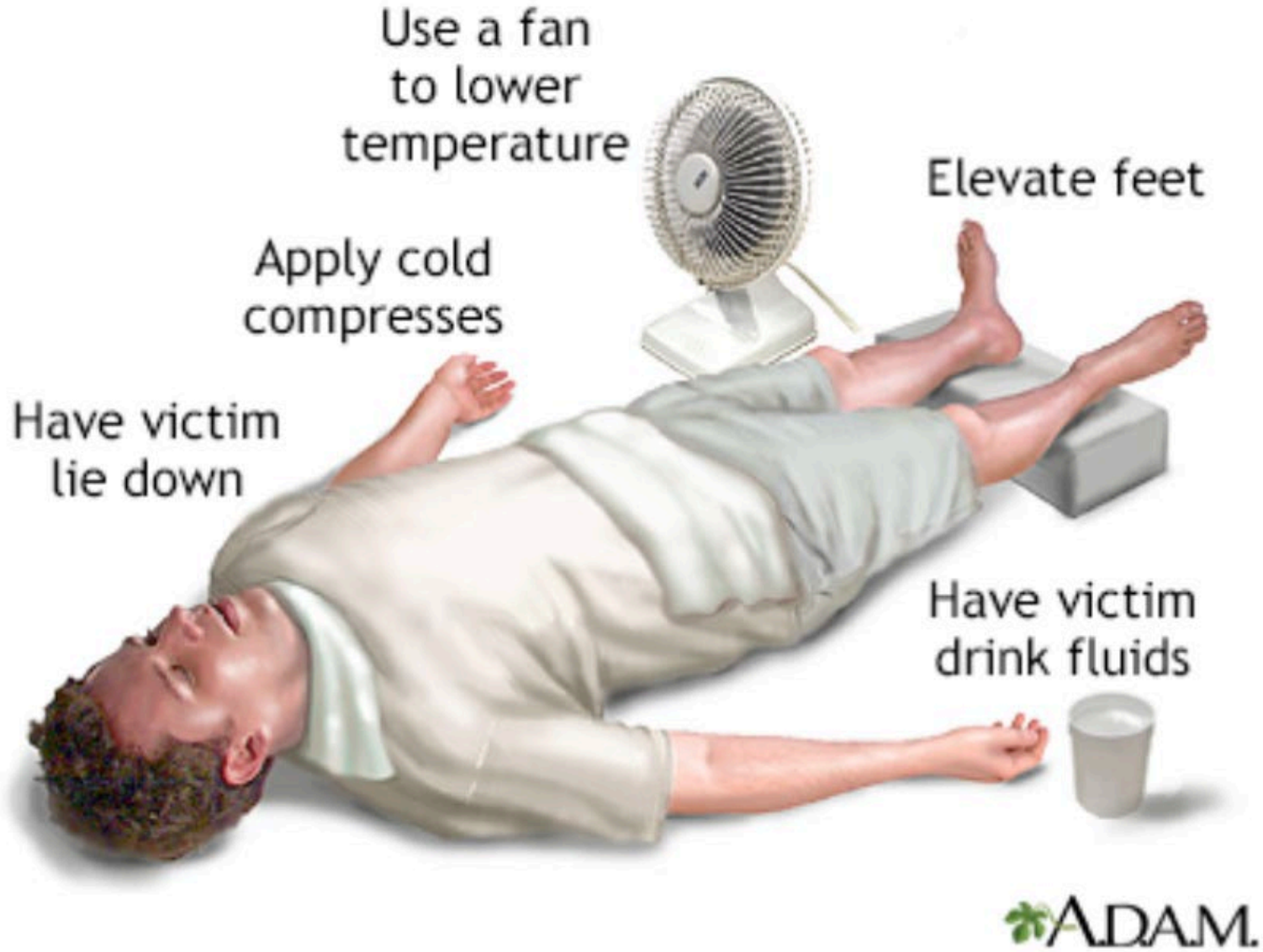
CALL 911

- Move person to a cooler area
- Loosen clothing and remove extra layers
- Cool with water or ice

***Heat exhaustion** can lead to heat stroke.*

***Heat stroke** can cause death or permanent disability if emergency treatment is not given.*

Stay Cool, Stay Hydrated, Stay Informed!

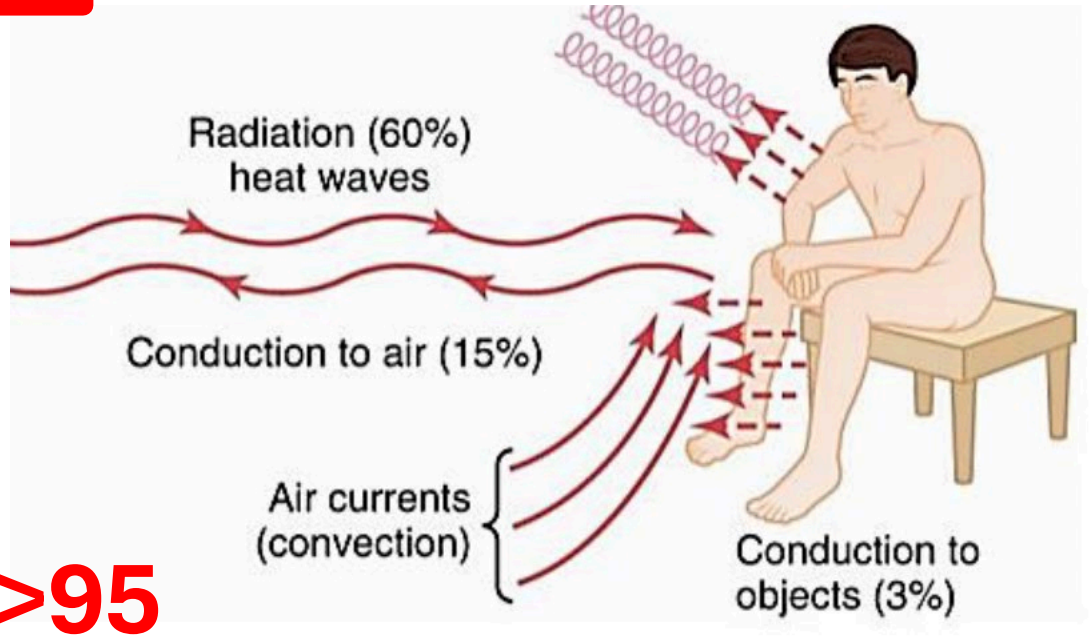

Use a fan
to lower
temperature
Elevate feet
Apply cold
compresses
Have victim
lie down
Have victim
drink fluids
A.D.A.M.

A critical review of the effectiveness of electric fans as a personal cooling intervention in hot weather and heatwaves

Robert D Meade, Sean R Notley, Nathalie V Kirby, Glen P Kenny

DRY Heat (Low Humidity) =
Low Heat Index

FANS NOT EFFECTIVE
FANS HARMFUL
DO NOT PREVENT HRI
at Extreme temperatures >95



https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(24)00030-5/fulltext

A critical review of the effectiveness of electric fans as a personal cooling intervention in hot weather and heatwaves

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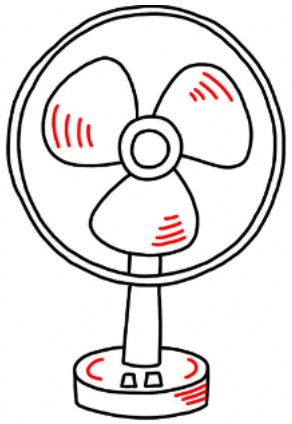
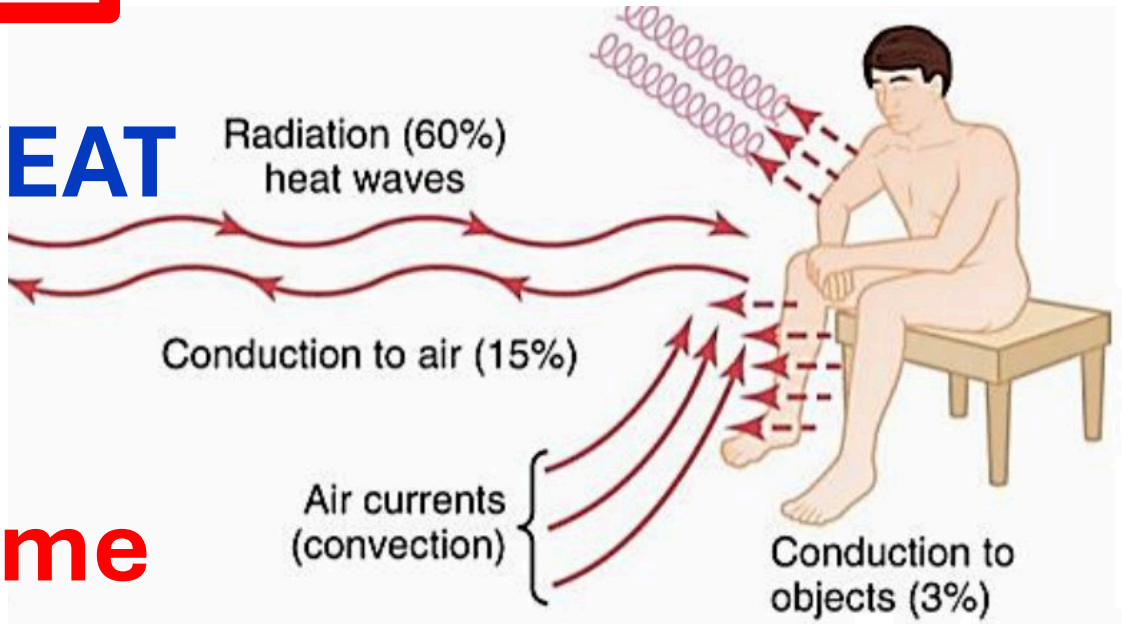
HUMID Heat =
High Heat Index



FANS PROMOTE SWEAT EVAPORATION

BUT

Not helpful at extreme temps (still blows hot air)



https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(24)00030-5/fulltext

FEMA | Preparedness Community

Extreme Heat | Special Conditions/Locations (No Air Conditioning: Use a Fan)

Phase: During

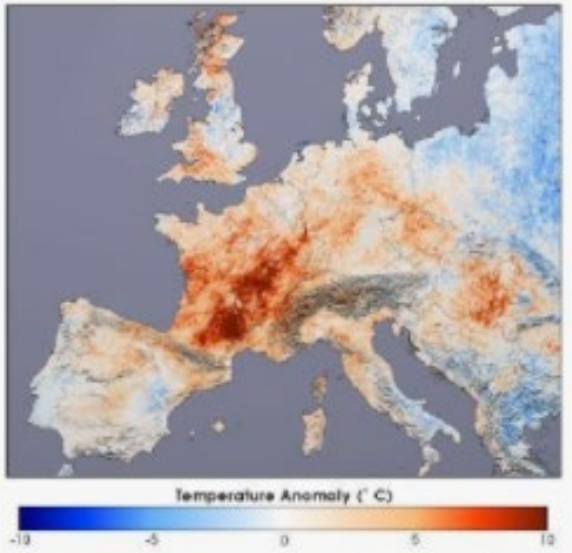
Validity Rating: Insufficient Assessing Validity of the Action

- While electric fans may provide comfort, they do not prevent heat-related illness when the temperature is in the high 90s. [1]
- “While many cities distribute fans among at-risk populations to prevent heat-related deaths, fans are inadequate at extremes of heat and humidity; in the absence of temperature and humidity gradients, evaporative and convective cooling with a fan is ineffective.” [7]
- Note: There is no validation to prove fans reduce risk of death (if no AC). Other than making you “feel” cooler, the studies are mixed as to the results.

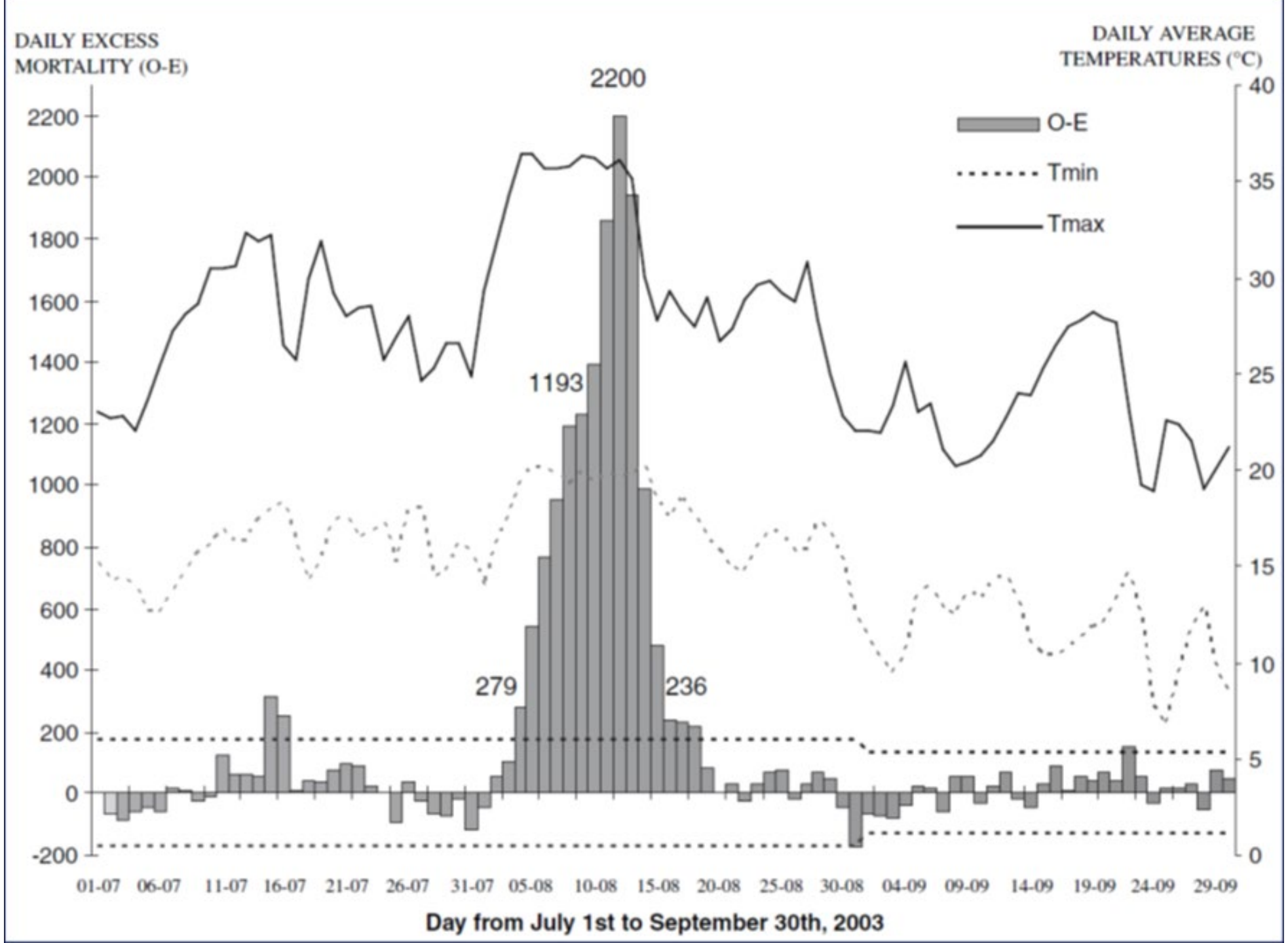
2003 Heat Wave Europe

Photo Credit: AFP/Getty Images

Climate-
The European Heat Wave of 2003



Excess deaths	
France	14,802
Germany	7,000
Spain	4,230
Italy	4,175
UK	2,045
Netherlands	1,400
Portugal	1,316
Belgium	150
TOTAL	35,118



Delayed Health Effects

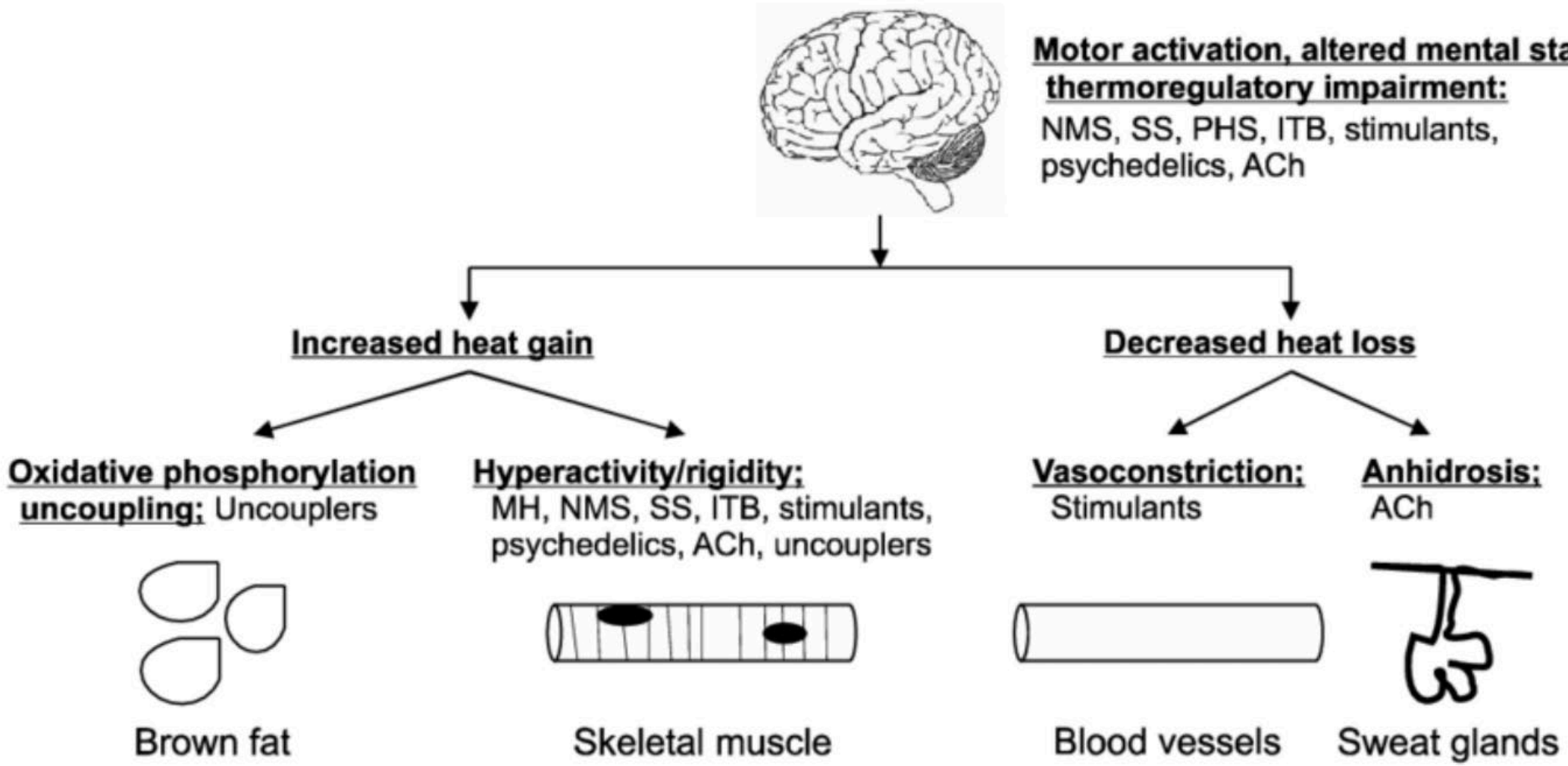
Fouillet A et al. 2006

Heat Related Vulnerability

- Chronic dx: DM, CVD, renal, lung, psych
- Age extremes
- Exposure to seasonality
- SES
- Geography/residence urban heat island
- Occupation
- Athletes

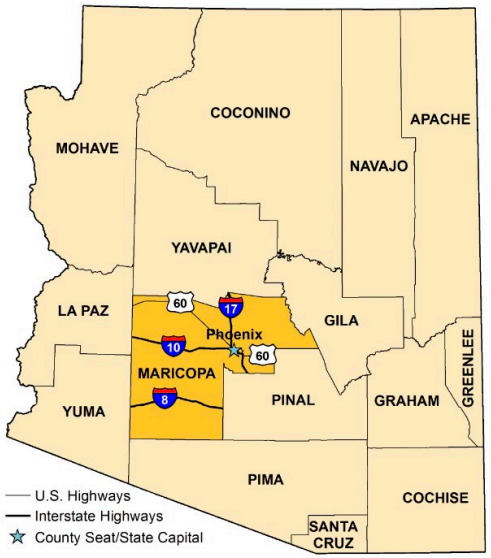
Heat Related Vulnerability: Meds and Drugs

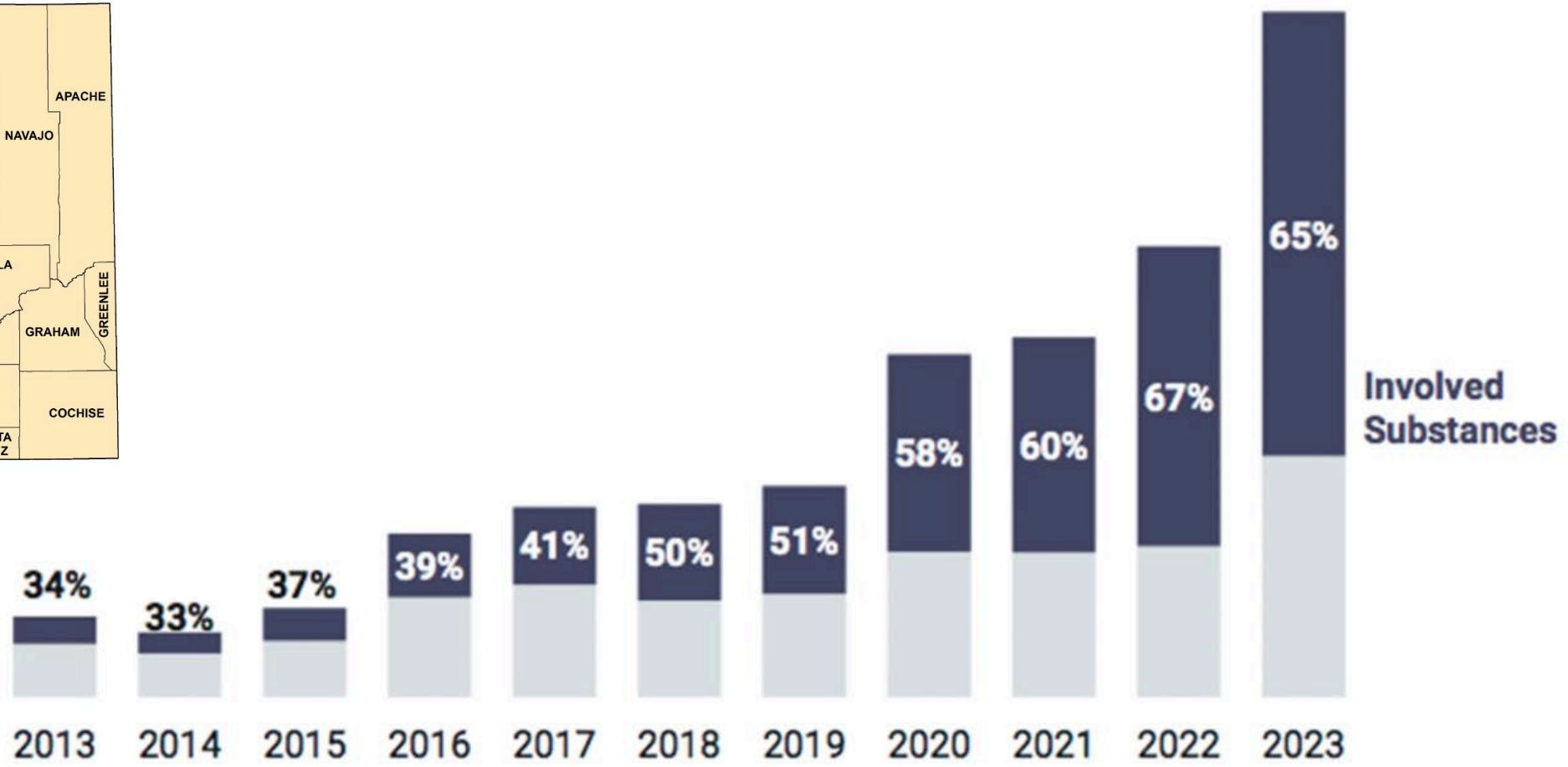
Diuretics, ACE	Dehydration
NSAIDS, ACE	Reduced renal function
Anti-psychotic	Decreased sweat, thermoregulation
Anti-Parkinsonian	“
Anti-Emetic	“
Anti-Histamines	Vasoconstriction
Laxatives	Electrolyte imbalance
Stimulant Drugs	Hyperthermia



Pathophysiology underlying drug-induced hyperthermic syndromes. MH, malignant hyperthermia; NMS, neuroleptic malignant syndrome; SS, serotonin syndrome; PHS, parkinsonism-hyperpyrexia syndrome; ITB, intrathecal baclofen withdrawal syndrome; ACh, anticholinergic syndrome; Uncouplers, drugs that uncouple oxidative phosphorylation.

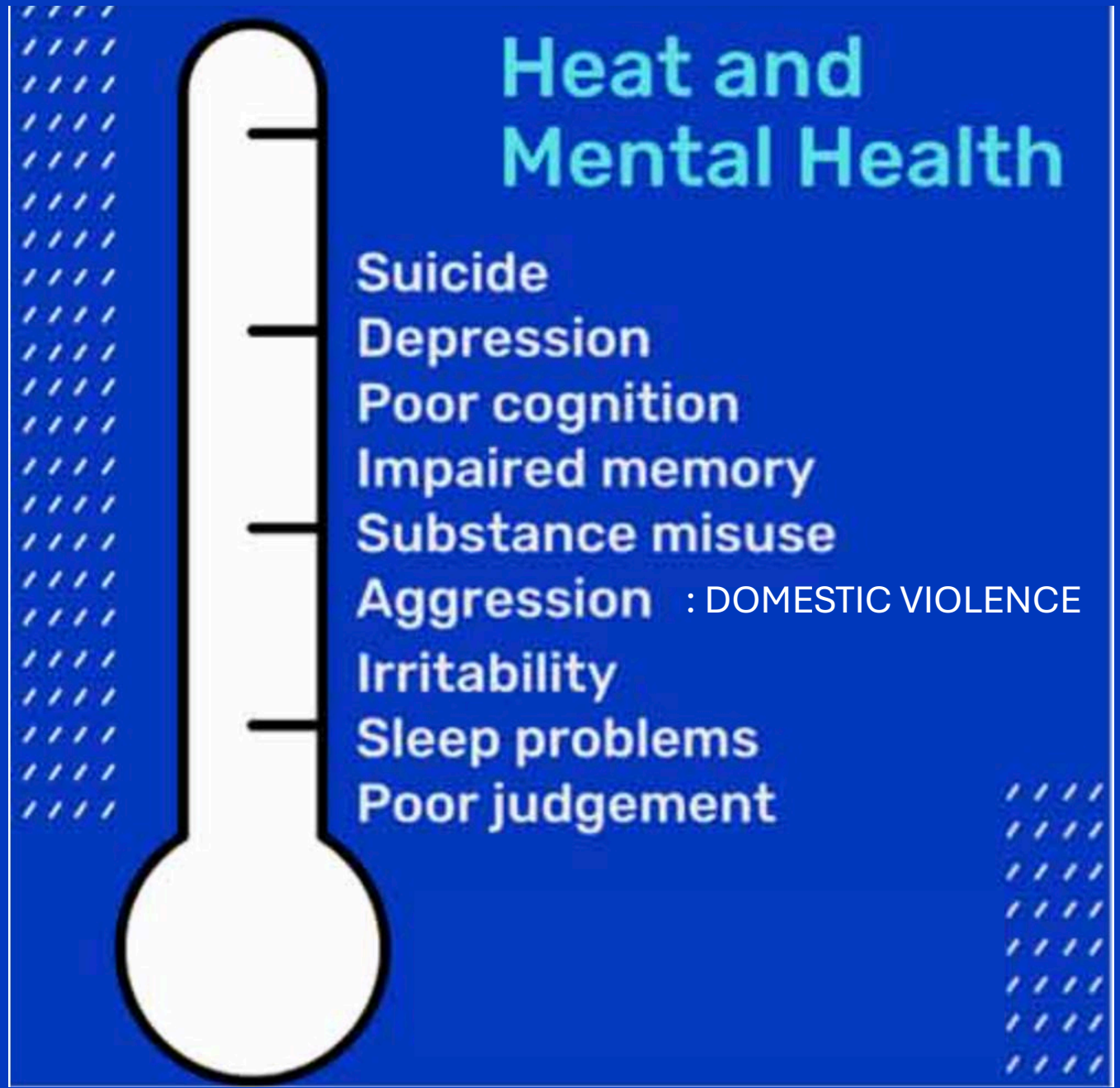
Carof et al. Nov 2020; Clinical Psychopharmacology and Neuroscience in press





Maricopa County Department Of Public Health

A graph shows the percentage of heat-related deaths in Maricopa County each year that involved drugs, alcohol, or both. As the number of heat-related deaths has risen, so has the percentage of heat deaths involving substance use. 65% of all heat deaths involved substances last year. 51% of all heat deaths involved methamphetamine last year.



Who is at risk? People with

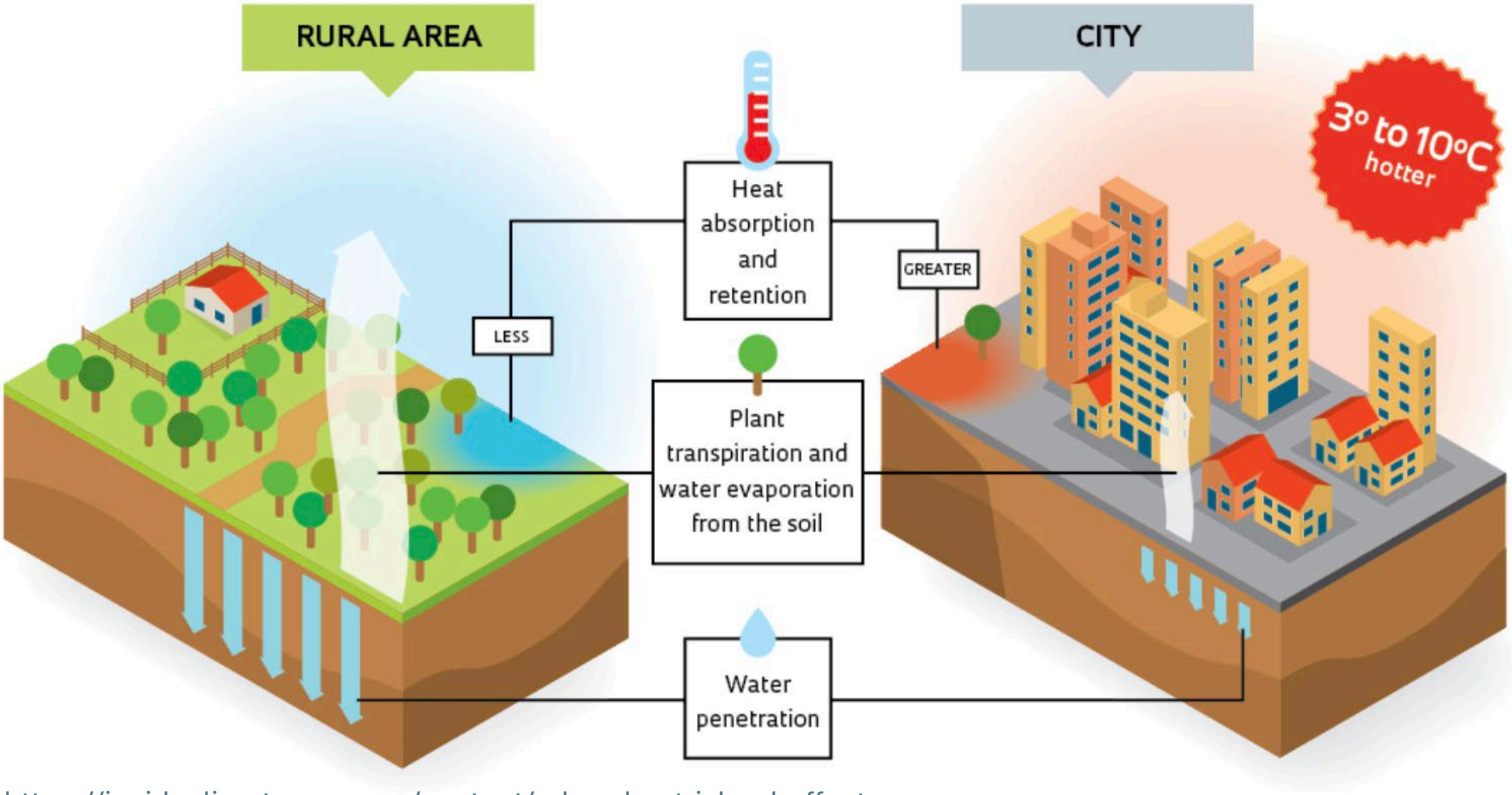
- Pre-existing mental health conditions
- Dementia
- Psychiatric meds

Worsened by:

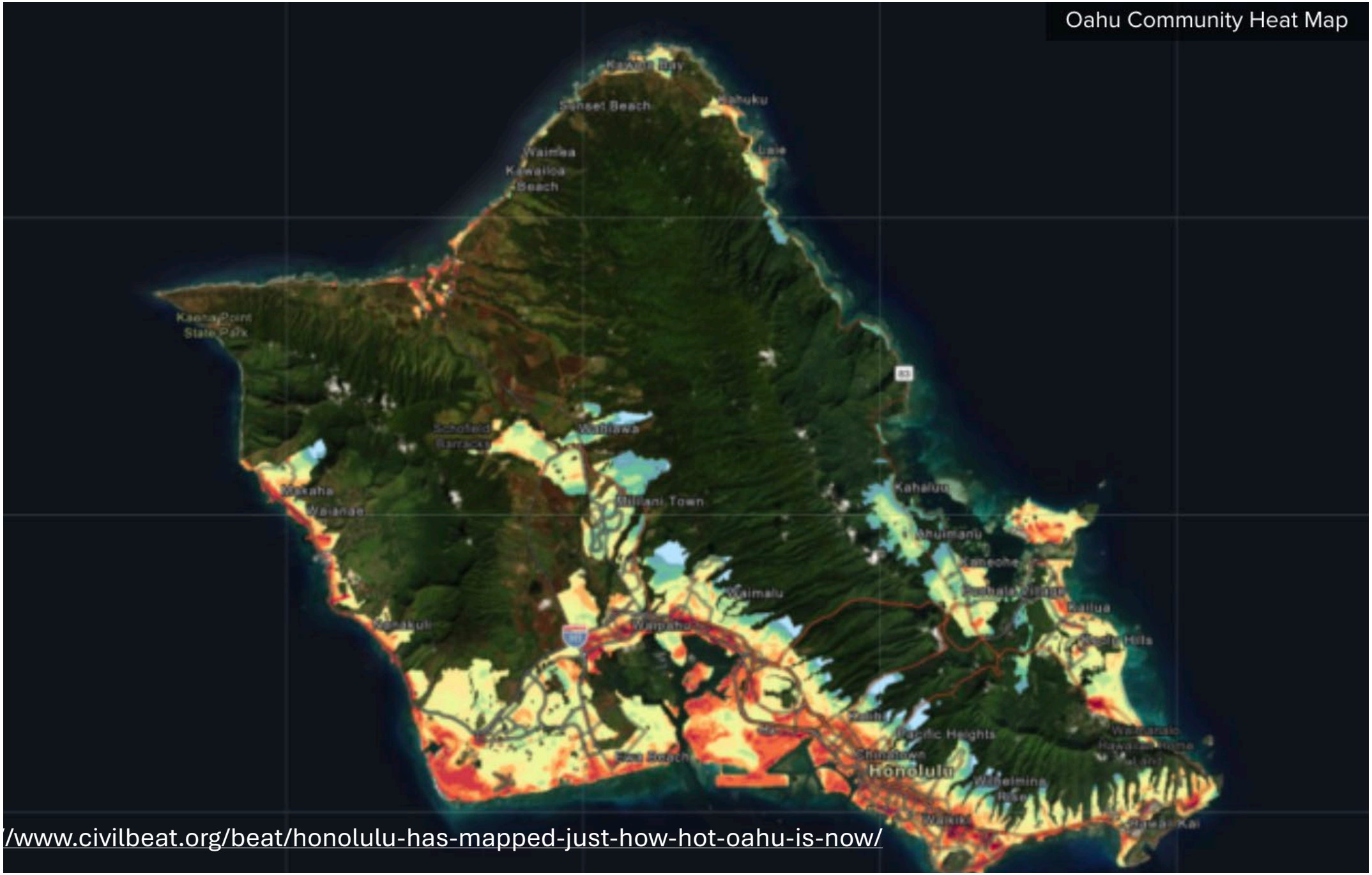
- Poverty, substance abuse

https://jaxtherapynetwork.com/hot-weather-affects-mental-health/

URBAN HEAT ISLAND

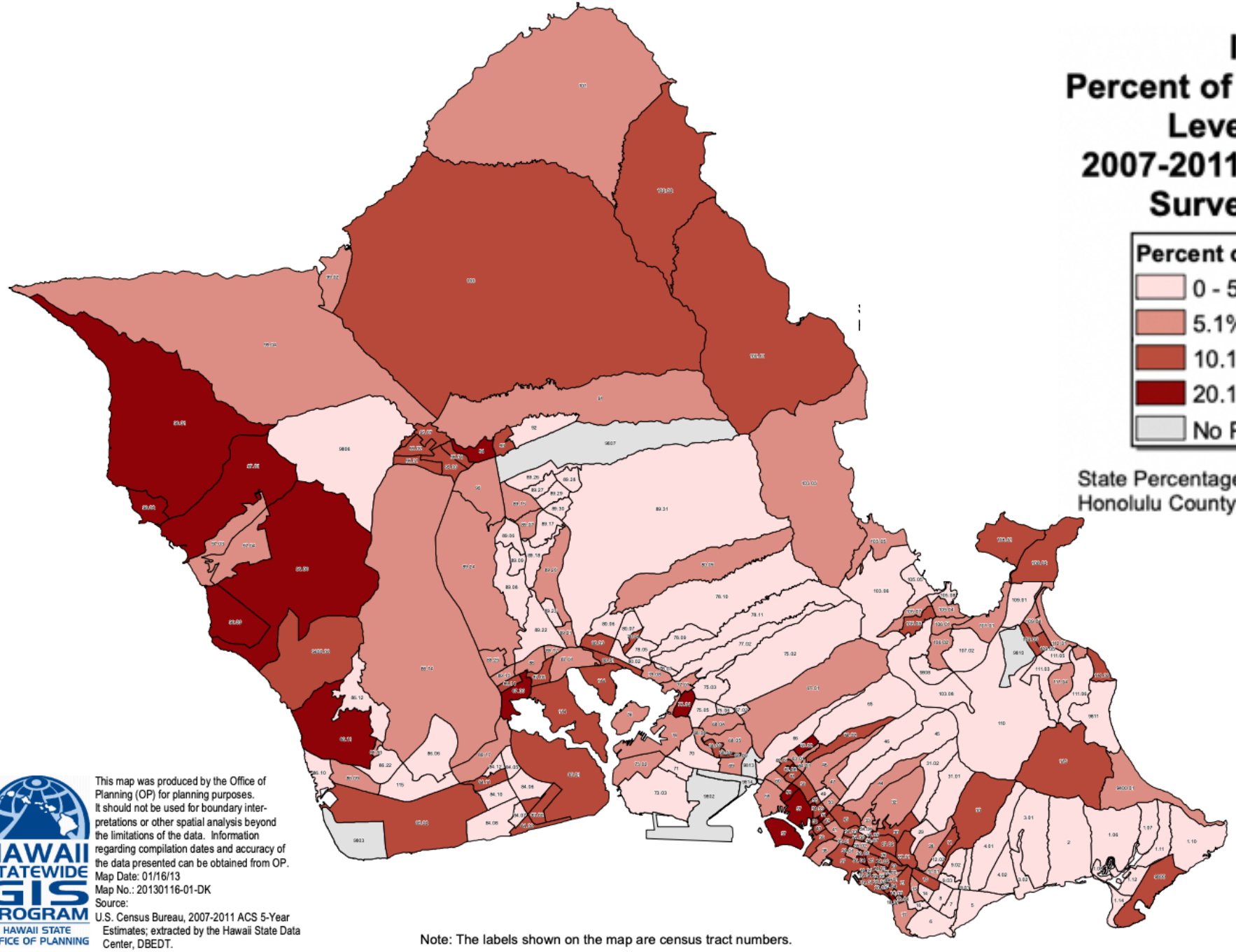


https://insideclimatenews.org/content/urban-heat-island-effect



https://www.civilbeat.org/beat/honolulu-has-mapped-just-how-hot-oahu-is-now/

Island of Oahu
Percent of Persons Below Poverty Level by Census Tract 2007-2011 American Community Survey 5-Year Estimates



Percent of Persons Below Poverty

- 0 - 5.0%
- 5.1% - 10.0%
- 10.1% - 20.0%
- 20.1% - 65.4%
- No Population / No Data Available

State Percentage Below Poverty Level: 10.2%
Honolulu County Percentage Below Poverty Level: 9.3%

HAWAII STATEWIDE GIS PROGRAM
HAWAII STATE OFFICE OF PLANNING

This map was produced by the Office of Planning (OP) for planning purposes. It should not be used for boundary interpretations or other spatial analysis beyond the limitations of the data. Information regarding compilation dates and accuracy of the data presented can be obtained from OP.
Map Date: 01/16/13
Map No.: 20130116-01-DK
Source:
U.S. Census Bureau, 2007-2011 ACS 5-Year Estimates; extracted by the Hawaii State Data Center, DBEDT.

Note: The labels shown on the map are census tract numbers.

N

0 2.5 5 10

Miles

Athletes / Children

Youth and High School Kids are vulnerable!

- Highest level of participation, least resources
- Child/Coach dynamic: fear, retribution
- Not wanting any reason to be taken off the roster
- Not wanting to let the team/coaches/families down
- Game schedule dictated by school schedule

USA FOOTBALL

Nancy Lane/MediaNews Group/Boston Herald via Getty Images

FACTSHEET

Heat guidelines

Please use these guidelines provided by the Hawaii State Department of Education and Hawaii State Department of Health in identifying and addressing heat-related illness.

ILLNESS	DESCRIPTION	SIGNS/SYMPTOMS	FIRST AID / WHAT TO DO
Early Heat Stress	Occurs during prolonged exposure to high ambient temperatures and humidity, direct sun, and without sufficient rest and fluids. When children feel thirsty, they may already be dehydrated. A child may lose greater than 2% of their body weight as sweat before they feel thirsty.	• Tired • Headache • Confusion/anxiety • Normal body temperature • Sweating, may be excessive • Nosebleeds • Dry lips, tongue • Nausea • Heat rash	• Monitor and assist as necessary. • Send to a cooler location. • Have them sit or lie down and rest, keep calm. • Encourage drinking generous amounts of water. • Loosen or remove excess clothing. • Apply cool compresses, or cool water. *Monitor for cessation of sweating:* • **If symptoms persist, escort student to health room.** • **School health aide (SHA) will monitor temperature and notify parent or guardian in accordance with the SHA manual.**
Heat Cramps	Occurs during or after intense exercise. Athlete will experience acute, painful, involuntary muscle contractions typically in the arms, legs, or abdomen.	• Muscle cramps along with the symptoms listed above *May include:* • Thirst • Dehydration • Fatigue • Sweating	• Stop all activity and sit quietly in a cool place. • Drink water or a sports drink. • Do not engage in exercise/strenuous activity for a few hours after cramps subside. • Muscle massage may assist the cramping muscles. • **If symptoms persist, escort student to health room.**

BEAT THE HEAT

Summer's high temperatures put student athletes at increased risk of heat illness. There are several types of heat illness. They range in severity, from heat cramps and heat exhaustion, which are common but not severe, to heat stroke, which can be deadly. Although heat illnesses can be fatal, death is preventable if they're quickly recognized and properly treated.

DEHYDRATION AND HEAT ILLNESSES

As a rule-of-thumb, most athletes should consume 200 to 300 milliliters of fluid every **15 MINUTES OF EXERCISE.**

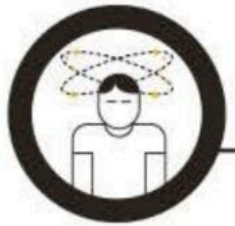
It takes only **30 MINUTES** for cell damage to occur with a core body temperature of 105 degrees.

Currently, 13 states have heat-acclimatization policies, for secondary school athletics with New Jersey being the first.

Exertional heat stroke is one of the top three killers of athletes and soldiers in training.

- From 2010-15, 20 athletic heat stroke fatalities were reported.
- It takes seven to 14 days for a body to adapt to exercising in the heat.

SIGNS OF MINOR HEAT ILLNESS



Dizziness

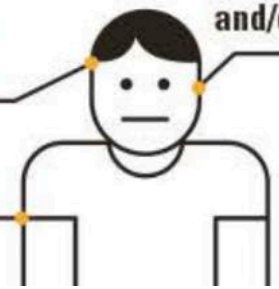
Cramps, muscular tightening and spasms

Lightheadedness, when not associated with other symptoms

EARLY WARNING SIGNS OF EXERTIONAL HEAT STROKE

Headache, dizziness, confusion and disorientation

Excessive sweating and/or flushing



Fatigue

Nausea and/

It's policy!

Football:
Acclimatization
Re-acclimitazation

Wet Bulb Temp
Guidelines

2.67 **Practice Policy for Heat and Humidity**:

(a) Schools must follow the statewide policy for conducting practices and voluntary conditioning workouts (this policy is year-round, including during the summer) in all sports during times of extremely high heat and/or humidity that will be signed by each head coach at the beginning of each season and distributed to all players and their parents or guardians. The policy shall follow modified guidelines of the American College of Sports Medicine in regard to:

(1) The scheduling of practices at various heat/humidity levels.

(2) The ratio of workout time to time allotted for rest and hydration at various heat/humidity levels.

(3) The heat/humidity levels that will result in practice being terminated.

(b) **Football Only**: Acclimatization and Re-Acclimatization (prior to October 1st)

(1) Acclimatization

a. Football practice may begin five consecutive weekdays prior to the start date for football.
1. In the first five days of practice for any student, the practice may not last longer than two (2) hours, and the student may wear no other protective football equipment except helmet and mouthpieces. NOTE:
(a) The time for a session shall be measured from the time the players report to the practice or workout area until they leave that area.
(b) During acclimatization practices, teams may hold a walk-through as long as there is at least a three-hour break between the two activities.

(2) Re-Acclimatization – Required for any athlete who misses five (5) consecutive days of practice for any reason.

a. Day 1 (Only COVID related quarantine can begin on last day of quarantine): 1.5 hours conditioning - helmets only
b. Day 2: 2 hours practice - helmets only
c. Day 3: 2.5 hours practice with helmets and shoulder pads
d. Day 4: 2.5 hours practice with full pads
e. Day 5: 2.5 hours practice with full pads or play a game

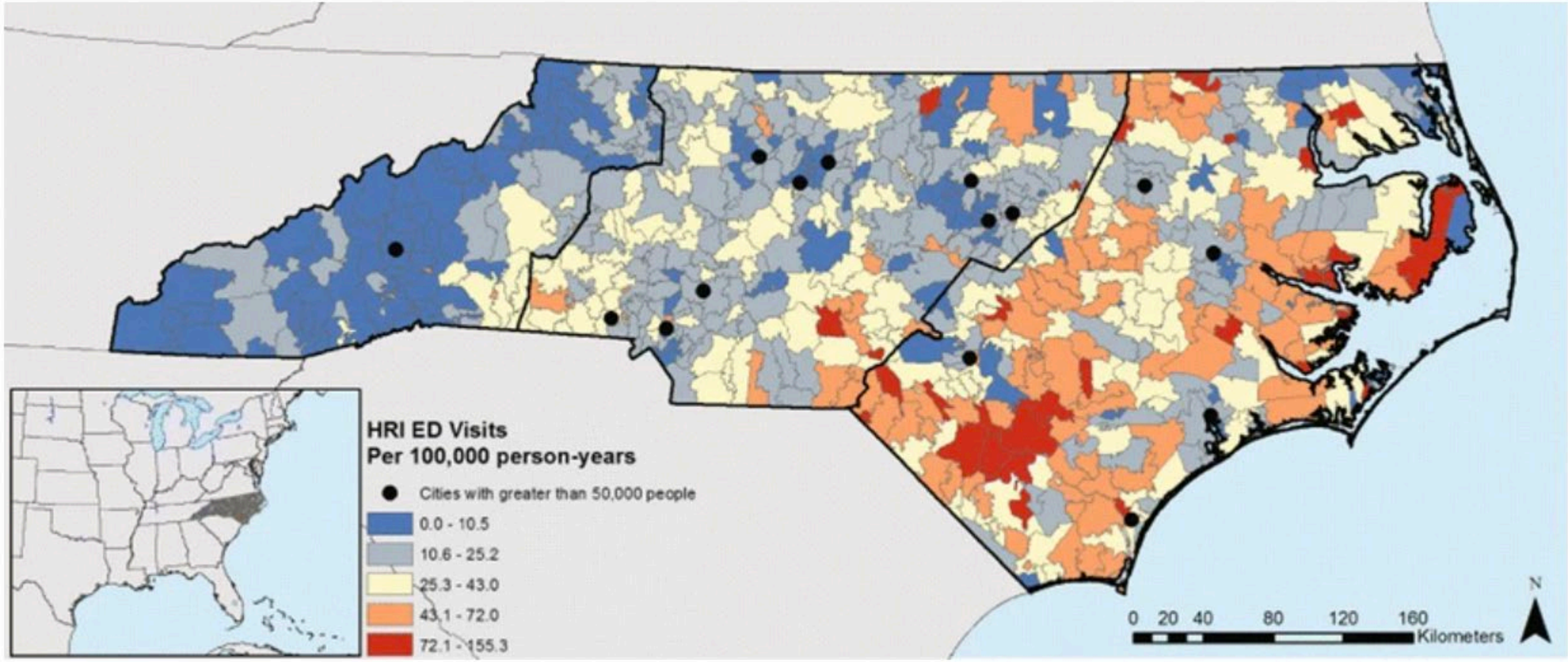
(c) A scientifically-approved instrument that measures the Wet Bulb Globe Temperature must be utilized at each practice (prior to October 1) to ensure that the written policy is being followed properly. WBGT readings should be taken at a minimum of every 30 minutes, beginning 30 minutes prior to the start of practice. All WBGT monitors shall be calibrated, at a minimum, every two (2) years or earlier if recommended by the manufacturer.

WBGT	ACTIVITY GUIDELINES AND REST BREAK GUIDELINES
Under 82.0	Normal Activities - Provide at least three separate rest breaks each hour with a minimum duration of 3 minutes each during the workout.
82.0 - 86.9	Use discretion for intense or prolonged exercise; watch at-risk players carefully. Provide at least three separate rest breaks each hour with a minimum duration of 4 minutes each.
87.0 - 89.9	Maximum practice time is 2 hours. For Football: players are restricted to helmet, shoulder pads, and shorts during practice, and all protective equipment must be removed during conditioning activities. If the WBGT rises to this level **during** practice, players may continue to work out wearing football pants without changing to shorts. For All Sports: Provide at least four separate rest breaks each hour with a minimum duration of 4 minutes each.
90.0 - 92.0	Maximum practice time is 1 hour. For Football: no protective equipment may be worn during practice, and there may be no conditioning activities. For All Sports: There must be 20 minutes of rest breaks distributed throughout the hour of practice.
Over 92.0	No outdoor workouts. Delay practice until a cooler WBGT level is reached.

(d) Practices are defined as: the period of time that a participant engages in a coach-supervised, school-approved sport or conditioning-related activity. Practices are timed from the time the players report to the practice or workout area until players leave that area. If a practice is interrupted for a weather-related reason, the “clock” on that practice will stop and will begin again when the practice resumes.

(e) Conditioning activities include such things as weight training, wind-sprints, timed runs for distance, etc., and may be a part of the practice time or included in “voluntary workouts.” Conditioning activities are not permitted to be used as punishment.

(f) A walk-through is not a part of the practice time regulation, and may last no longer than one hour. This activity may not include conditioning activities or contact drills. No protective equipment may be worn during a walk-through, and no full-speed drills may be held.

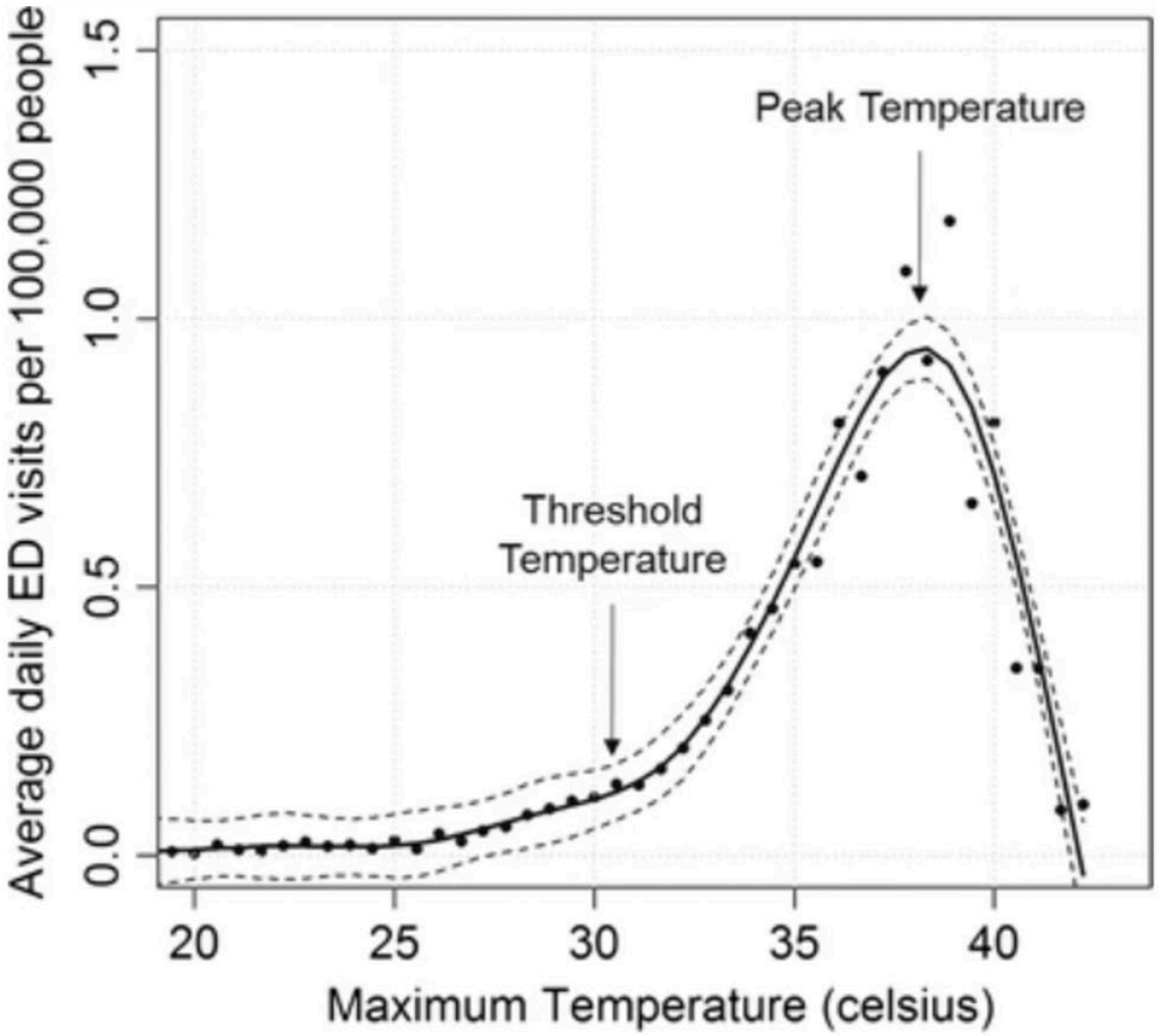


Sugg et al. : [Relationships between maximum temperature and heat-related illness across North Carolina, USA]

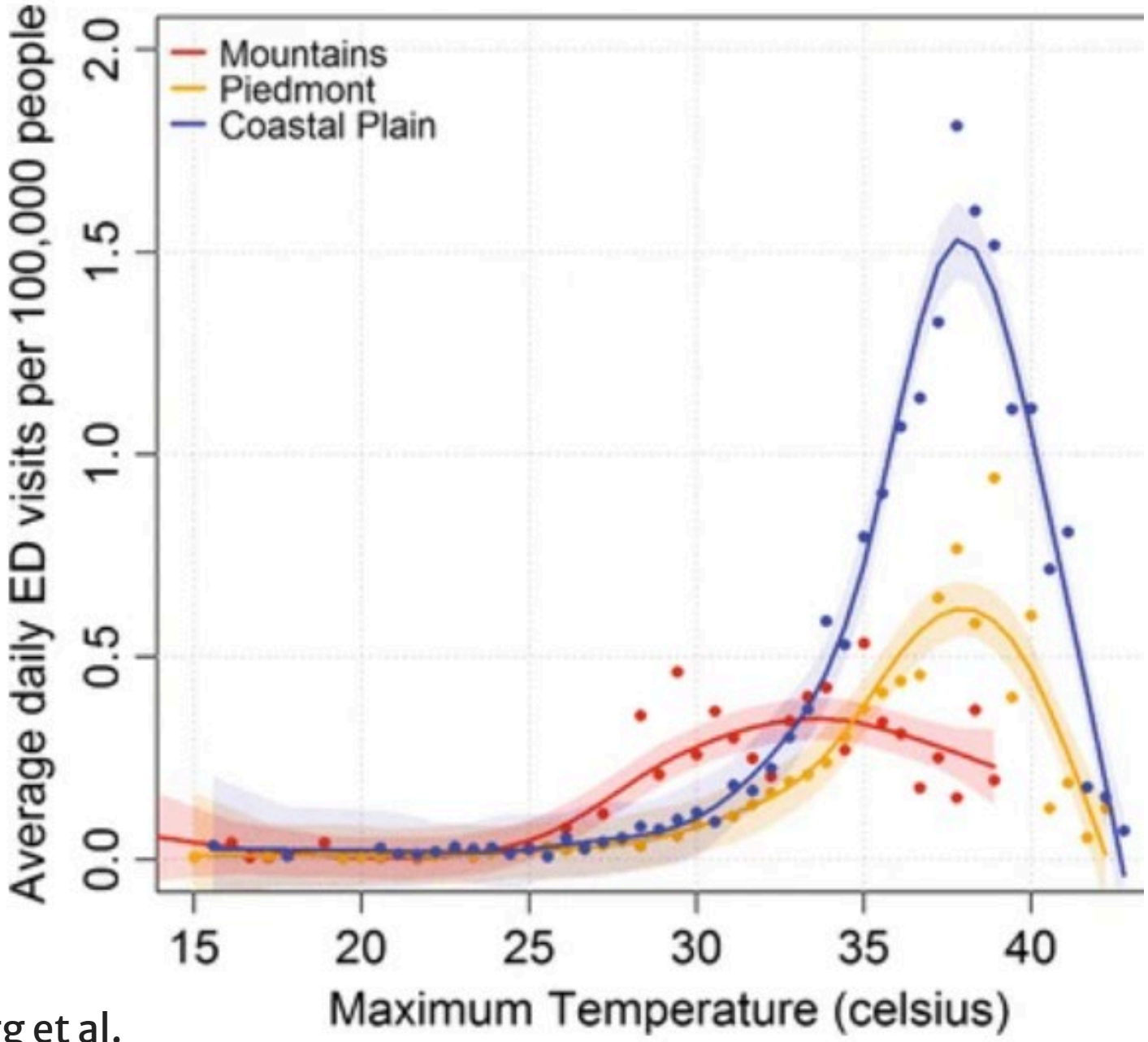
2007 – 2012

HRI per 100,000 person years

Daily HRI ED visits per 100,000 people with respect to maximum temperature for the state level including the threshold temperature location and peak temperature location

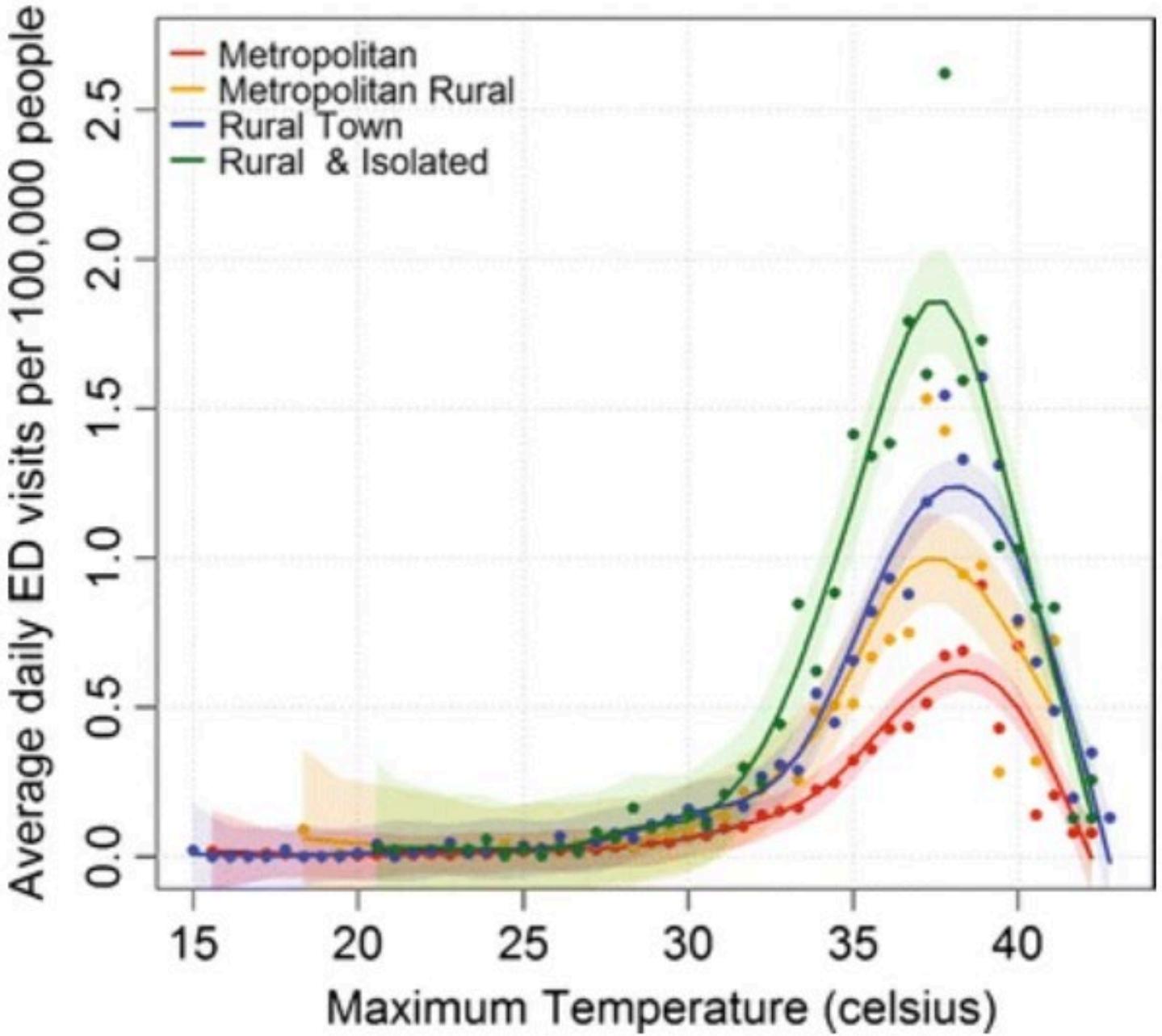


Sugg et al.

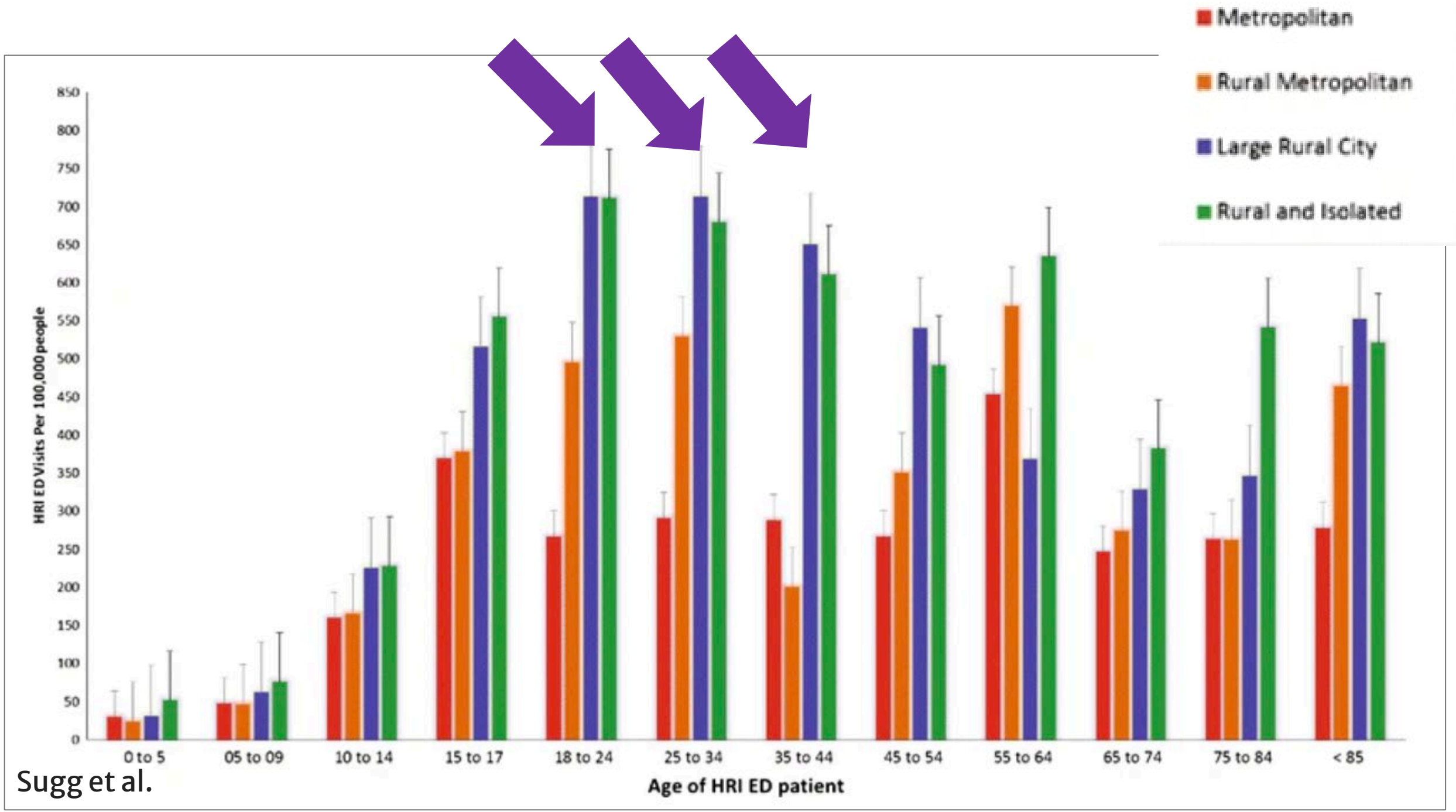


Sugg et al.

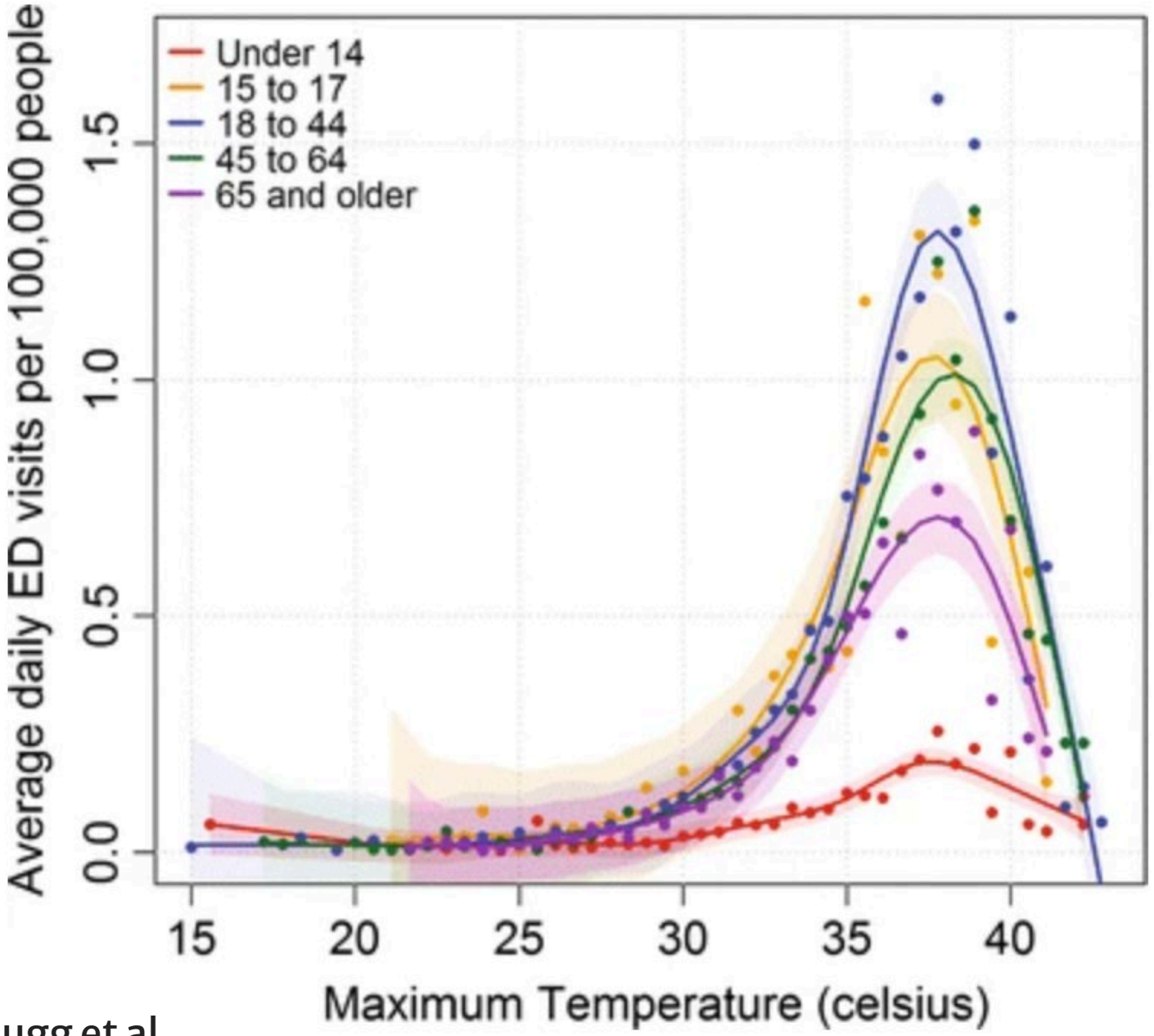
	Temp C (F)
Coastal Threshold: (88)	31.1
Coastal Peak: (100)	37.8
Piedmont Threshold: (89)	31.7
Piedmont Peak: (100)	37.8
Mountain Threshold:	26.7 (80)
Mountain Peak:	33.3 (92)


Metropolitan
Metropolitan Rural
Rural Town
Rural & Isolated
Average daily ED visits per 100,000 people
0.0
0.5
1.0
1.5
2.0
2.5
15
20
25
30
35
40
Maximum Temperature (celsius)

Sugg et al.


Metropolitan
Rural Metropolitan
Large Rural City
Rural and Isolated
HRI ED Visits Per 100,000 people
850
800
750
700
650
600
550
500
450
400
350
300
250
200
150
100
50
0
0 to 5
05 to 09
10 to 14
15 to 17
18 to 24
25 to 34
35 to 44
45 to 54
55 to 64
65 to 74
75 to 84
< 85
Age of HRI ED patient

Sugg et al.



Sugg et al.

HRI Incidence Rates per 100,000

Age	Female	Male
18-24	16.6	49.7
25-34	13.5	55.9
35-44	12.9	47.8
45-54	13.5	45
55-64	23.5	55.2
65-74	13	34.7
75-84	16.6	36.3
>85	23.8	39.2

Conclusions

- HRI peaked 88 – 100 °F
  NOT the hottest days
- Coastal plain:
  more HRI
- Isolated and rural locations:
  3X in HRI at 37.8 °C (100 °F)
  compared to urban
- Rural HRI: 18 - 44 men

Awareness Targets:

Temps below current warning thresholds

Rural working age adults

Men (18-14)

Participating in at risk activities (agriculture, outdoor labor, athletics)

Taking Action

- General Education and Policy

- Targeted populations
  - School education
  - Elderly patient education, outreach
  - Homelessness, substance abuse education about heat

- Wish List
  - Detailed surveillance data:
    Year round; Home zip, age, gender, detailed info

Continuing the Conversation: Physical Effects of Heat

Daintry Bartoldus
Hawaii State Council on Developmental Disabilities
Hawaii Department of Health

Dr. Gloria Fernandez
Hawaii Department of Health
Public Health Nursing Branch

Dr. Elizabeth Kiefer
JABSOM, University of Hawaii

James McCallen
Hawaii Department of Health
Hazard Evaluation and Emergency Response (HEER) Office

IMPACT OF CLIMATE CHANGE ON INDIVIDUALS WITH INTELLECTUAL AND DEVELOPMENTAL DISABILITIES (IDD)

Daintry Bartoldus

OVERVIEW

Introduction

Public Health Challenges

Practical Solutions

Policy Recommendations

Community Engagement and Collaboration

Case Studies and Local Initiatives

Conclusion

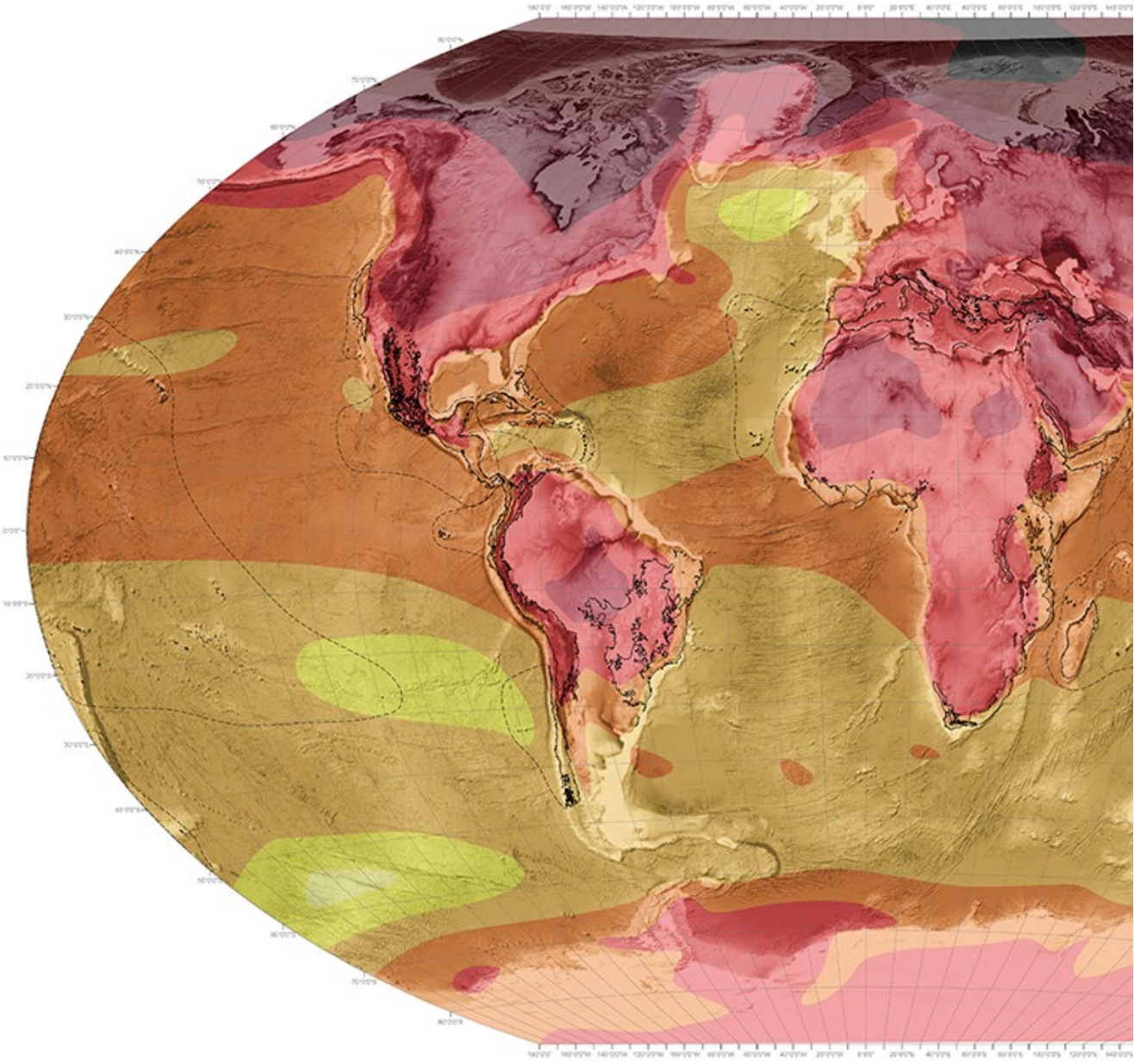
INTRODUCTION

Impact of Heat on Vulnerable Populations

Extreme heat disproportionately affects individuals with developmental disabilities (DD).

Hawaii's Climate

Warm climate + rising temperatures = higher risks for vulnerable groups.



PUBLIC HEALTH CHALLENGES

Inability to Self-Regulate

Difficulty recognizing signs of heat stress

Medications and Heat

Medications may increase susceptibility to heat-related illnesses

Lack of Access to Cool Environments

IMPACT OF CLIMATE CHANGE ON INDIVIDUALS WITH IDD

PRACTICAL SOLUTIONS

BUDDY SYSTEM

Pair individuals with a trusted person.

CAREGIVER TRAINING

Recognize heat stress signs for both themselves and others.

EDUCATION

Teach importance of hydration, rest, and cooling.

ALERT SYSTEMS

Accessible warnings for caregivers during heat events

POLICY RECOMMENDATION

INFRASTRUCTURE	HEAT PROTOCOLS	CLIMATE RESILIENCE
Access to cooling centers; shade in public spaces.	Include safety checks in care programs.	Invest in housing and services for long-term handling.

COMMUNITY ENGAGEMENT

Self-Advocates

Include in designing heat-related solutions.

Collaboration

Partner with health officials, service providers, and leaders.

CASE STUDIES AND LOCAL INITIATIVES

ARIZONA

Effective programs for heat risk.

A strong example of a state addressing heat impact on vulnerable populations is Arizona, especially in Maricopa County (Phoenix area), where extreme heat is a major concern.

FEELING SAFE BEING SAFE

Feeling Safe Being Safe

The State Council on Developmental Disabilities has a "Feeling Safe Being Safe" program that provides safety training by self-advocates for self-advocates and the public. This program can be expanded to include heat safety education.

CONCLUSION

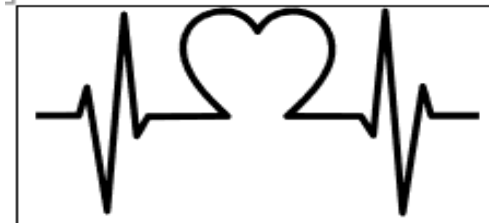
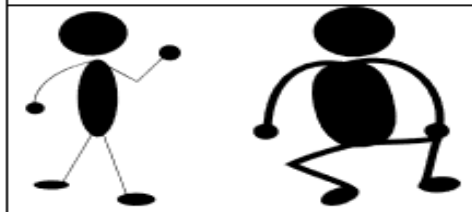
Urge protection for at-risk groups and caregivers.

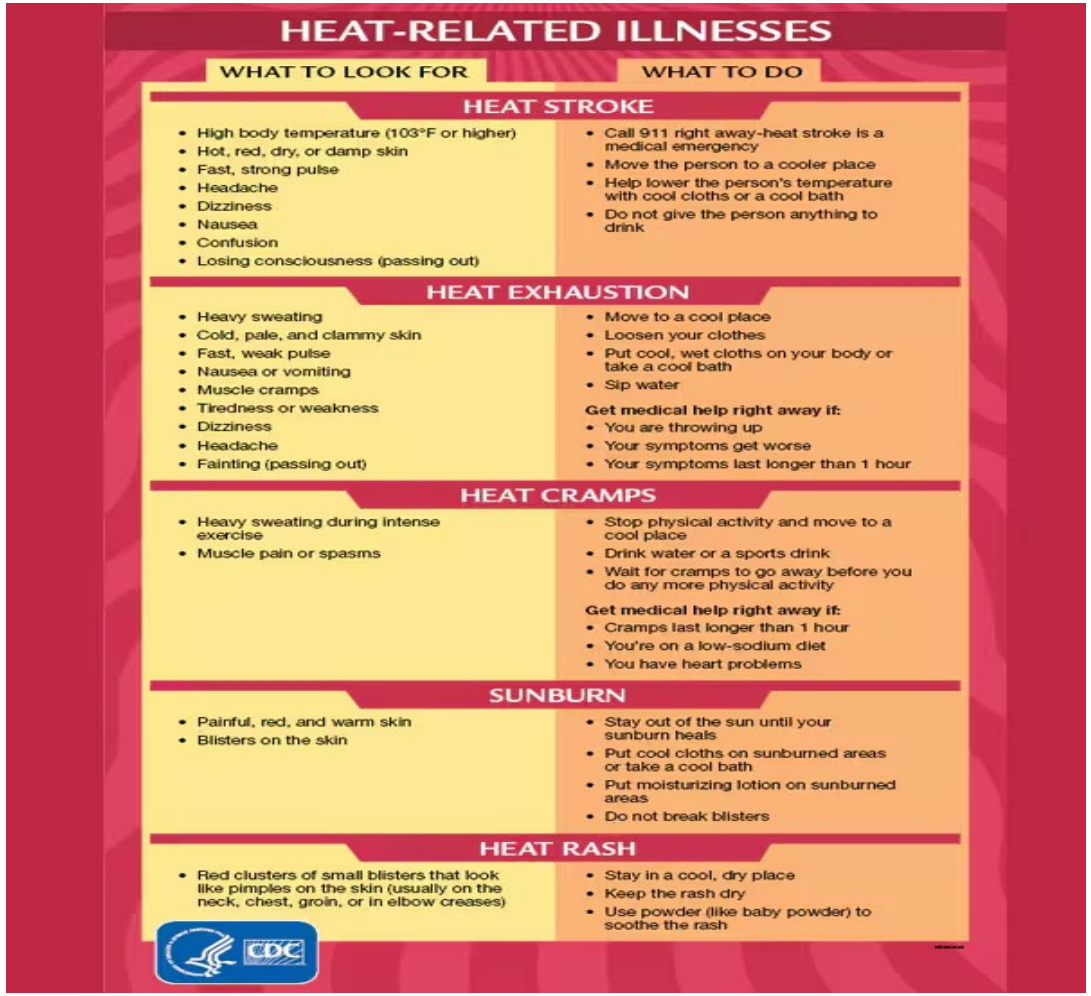
Encourage audience involvement through advocacy and support.

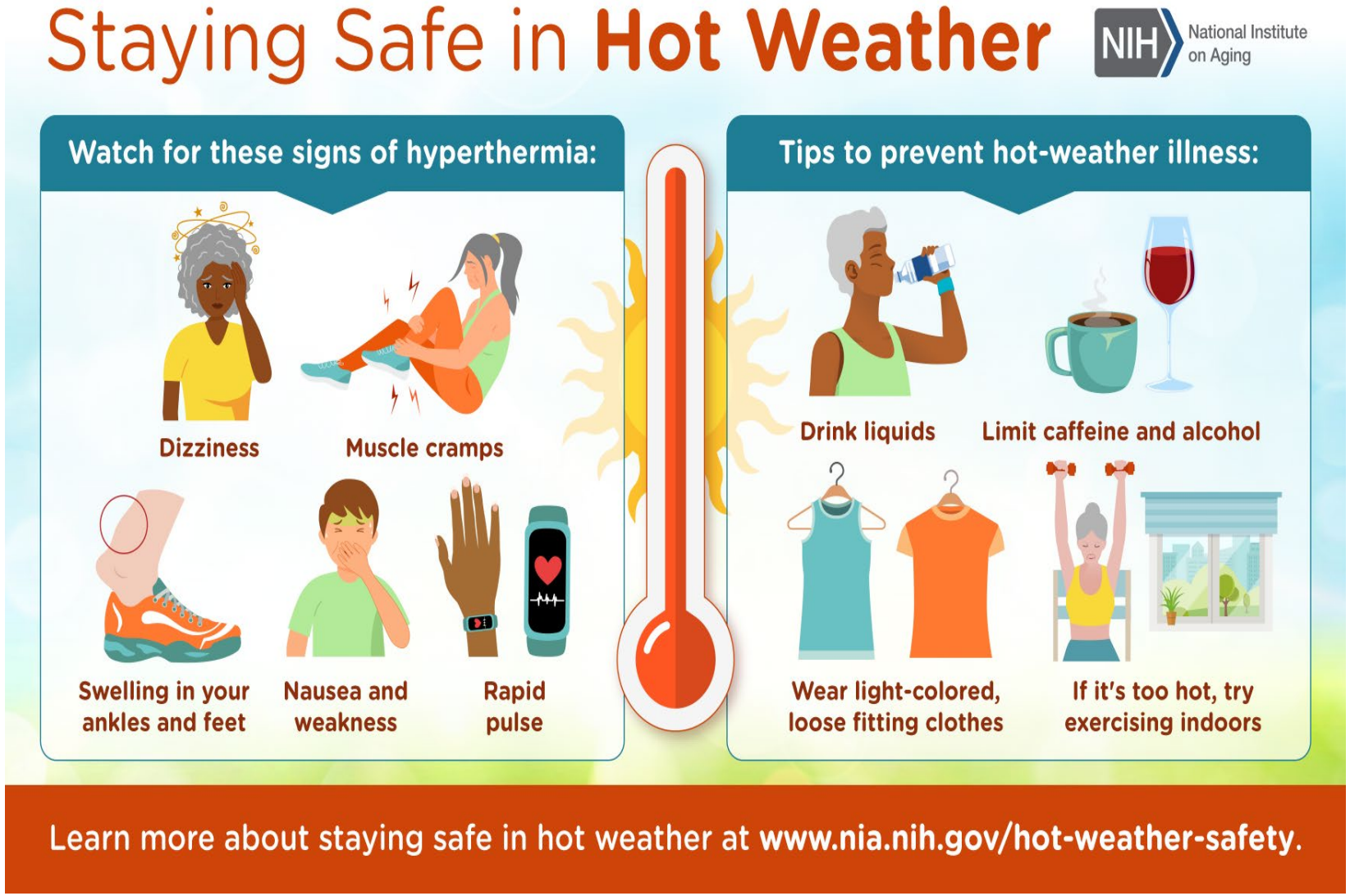
Climate Change Health Conference: Continuing the Conversation

Physical Effects of Heat

Our Kupuna

 Health Problems	 Medications	 Skin
 Weight	**INCREASES RISK FOR HEAT RELATED ILLNESSES**	 Fever
 Dehydration	 Alcohol	 Fan/Air conditioner


HEAT-RELATED ILLNESSES
WHAT TO LOOK FOR
WHAT TO DO
HEAT STROKE
High body temperature (103°F or higher)
Hot, red, dry, or damp skin
Fast, strong pulse
Headache
Dizziness
Nausea
Confusion
Losing consciousness (passing out)
Call 911 right away-heat stroke is a medical emergency
Move the person to a cooler place
Help lower the person's temperature with cool cloths or a cool bath
Do not give the person anything to drink
HEAT EXHAUSTION
Heavy sweating
Cold, pale, and clammy skin
Fast, weak pulse
Nausea or vomiting
Muscle cramps
Tiredness or weakness
Dizziness
Headache
Fainting (passing out)
Move to a cool place
Loosen your clothes
Put cool, wet cloths on your body or take a cool bath
Sip water
Get medical help right away if:
You are throwing up
Your symptoms get worse
Your symptoms last longer than 1 hour
HEAT CRAMPS
Heavy sweating during intense exercise
Muscle pain or spasms
Stop physical activity and move to a cool place
Drink water or a sports drink
Wait for cramps to go away before you do any more physical activity
Get medical help right away if:
Cramps last longer than 1 hour
You're on a low-sodium diet
You have heart problems
SUNBURN
Painful, red, and warm skin
Blisters on the skin
Stay out of the sun until your sunburn heals
Put cool cloths on sunburned areas or take a cool bath
Put moisturizing lotion on sunburned areas
Do not break blisters
HEAT RASH
Red clusters of small blisters that look like pimples on the skin (usually on the neck, chest, groin, or in elbow creases)
Stay in a cool, dry place
Keep the rash dry
Use powder (like baby powder) to soothe the rash
CDC


Staying Safe in Hot Weather
NIH National Institute on Aging
Watch for these signs of hyperthermia:
Dizziness
Muscle cramps
Swelling in your ankles and feet
Nausea and weakness
Rapid pulse
Tips to prevent hot-weather illness:
Drink liquids
Limit caffeine and alcohol
Wear light-colored, loose fitting clothes
If it's too hot, try exercising indoors
Learn more about staying safe in hot weather at www.nia.nih.gov/hot-weather-safety.

Resources

National

- Low Income Home Energy Assistance Program (LIHEAP)
- National Institute on Aging
- Federal Emergency Management Agency Ready.gov

State

- Low Income Home Energy Assistance Program (LIHEAP)
- Hawai'i Home Energy Assistance Program (H-HEAP)
- Office of Community Services – Weatherization Assistance Program

References

Center for Disease Control and Prevention. (n.d.). *Extreme heat*. Retrieved October 12, 2024, from Symptoms of heat related illness: chrome extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.cdc.gov/extreme-heat/media/pdf/Heat_Related_Illness.pdf

Federal Emergency Management Agency. (2024). *Ready.gov*. Retrieved October 12, 2024, from Extreme Heat: https://www.ready.gov/heat#prepare

Layton, J. L. (2020). Heatwaves, medications, and heat-related hospitalization in older Medicare beneficiaries with chronic conditions. *PLOS ONE*, 15. Retrieved 10 9, 2024, from https://doi.org/10.137/journal.pone.0243665

Naitonal Institute on Aging. (2022). *Hot Weather Safety for Older Adults*. Retrieved October 12, 2024, from https://www.nia.nih.gov/health/safety/hot-weather-safety-older-adults