cepc | Center for Energy Poverty and Climate

National Cooling Standards Initiative

Webinar Series Session 4 – Tuesday, March 12, 2024
Protecting Vulnerable Populations from Extreme Heat

Federal-State Policy Landscape for Extreme Heat


EXTREME HEAT
ONLY TRAVEL IF
ESSENTIAL

As Extreme Temperatures Become More Frequent, Where is the Federal Government?

True Costs of Heat

Without federal action on extreme heat, Americans can expect billions of dollars in lost productivity, increased healthcare costs, and growing food insecurity – every year.

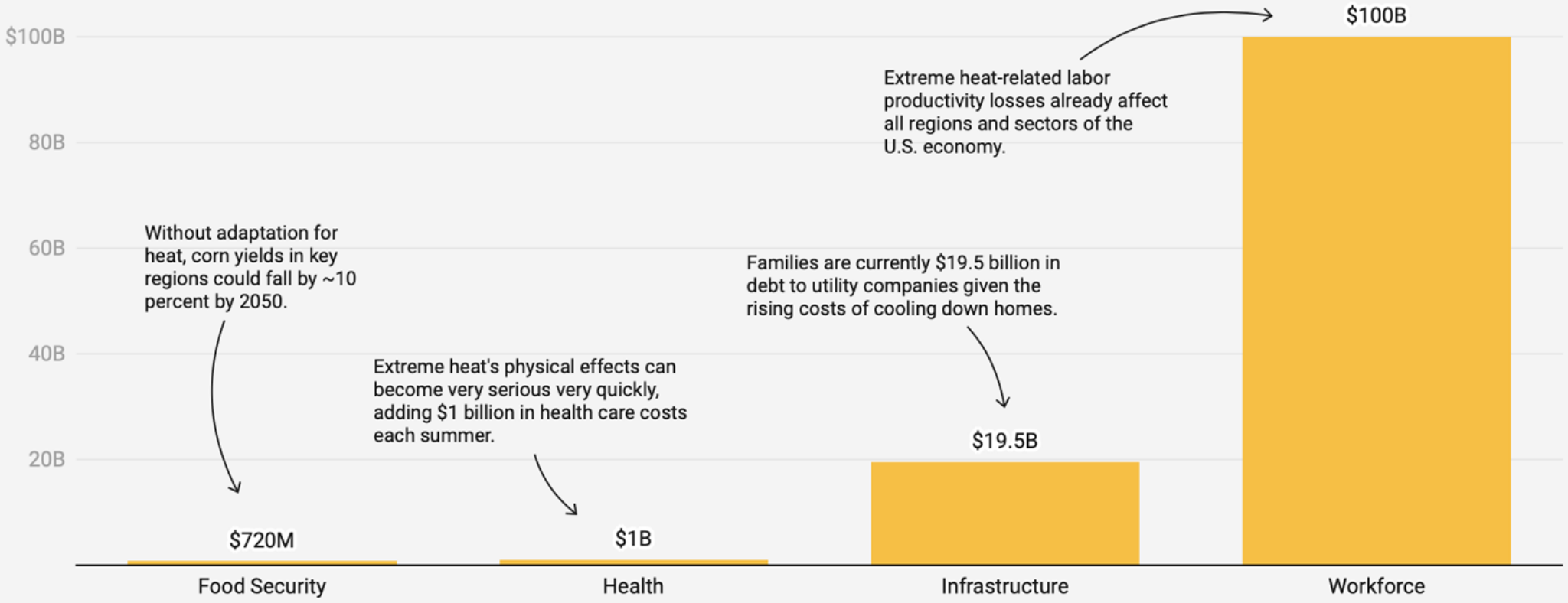


Chart: Federation of American Scientists • Created with Datawrapper

As Extreme Temperatures Become More Frequent, Where is the Federal Government?

FAS has mapped the federal landscape over the last year to locate and inventory all ongoing activities, here's what we found…

Infrastructure and the Built Environment

Concerns:

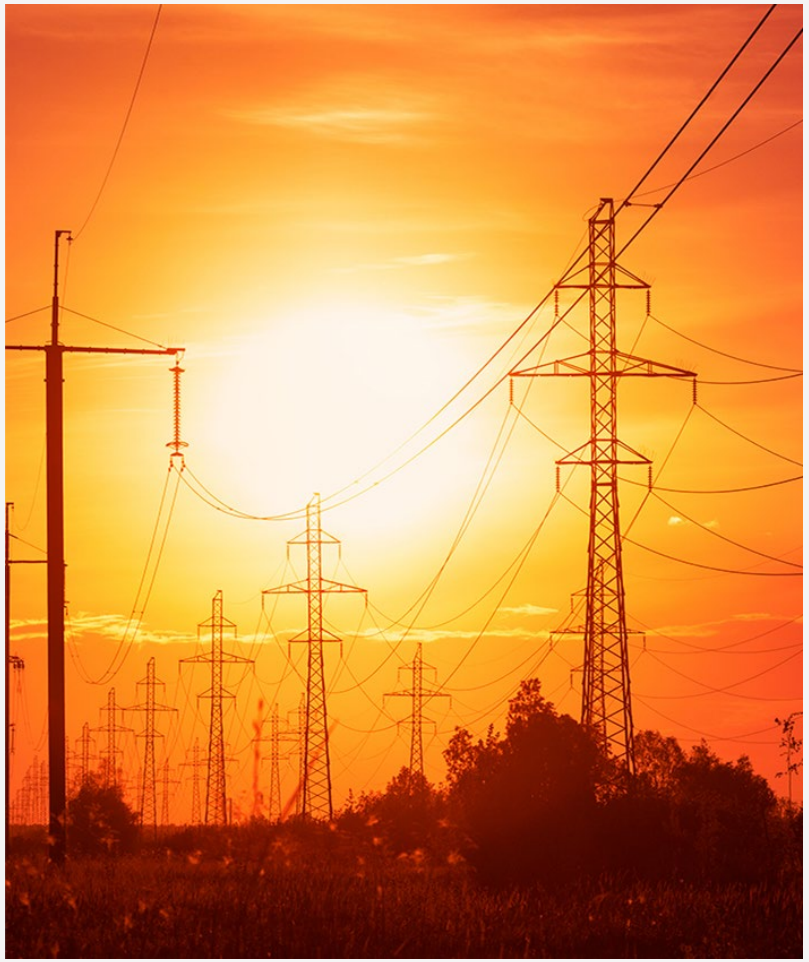
- Grid and transportation resilience
- AC vs. passive cooling technologies
- Building codes for thermal comfort and resilience
- Urban planning and design - Urban Heat Islands

Some Current Federal Programs:

- DOE - Grid Resilience Program; Weatherization Assistance Program
- DOT - PROTECT (surface transportation resilience)
- USDA - Urban and Community Forestry Program (~$1 billion)
- FEMA - BRIC program
- HHS ACF - LIHEAP Program for energy assistance
- IRA Tax Credits - weatherization activities, energy-efficiency

Gaps:

- Integration of extreme heat resilience into funding eligibility criteria
- Benefit-cost analysis not up-to-date on heat



Public Health

Concerns:

- Growing numbers of heat-related illness and death
  - Lack of access to shade, AC, medical transportation
  - Indoor deaths on the rise
- Healthcare response and coordination
- Infectious disease transmission

Current Programs:

- OCCHE - Climate and Health Outlook
- CDC - Climate Ready States and Cities Initiative
- CMS - 1115 Waivers to support AC distribution in Oregon, support broader needs for housing

Gaps:

- Funding - CDC's program underfunded by 1100%
- Lack of training for health professionals
- Lack of proactive response plans

Workforce

Concerns:

- Outdoor workers at a higher risk for developing heat-related illnesses
- Loss in workplace productivity - $100 billion
- High-exposure during day followed by lack of cooling at night - more heat illness

Current Programs:

- OSHA - Heat Hazard Alert and National Emphasis Program
- OSHA - Increased inspections and enforcement

Gaps:

- No national heat standard
- State-level standards and capacities differ
- Need for more protective cooling strategies
- Costs to small businesses to develop cooling interventions

Food and Resource Security

Concerns:

- Exacerbates other natural hazards (ex. droughts, wildfires) - increasing the level of risk
- Reduction in crop growth and productivity
- Livestock impacts
- Transportation and storage
- Increasing food prices for consumers

Current Programs:

- USDA - Climate Hubs
- USDA - Partnerships for Climate Smart Commodities

Gaps:

- Funding (again!)
- No explicit focus on extreme heat

Planning and Management

Concerns:

- No trigger for federal emergency declaration under Stafford Act
- Lack of responsibility among federal agencies
- Local and state governments are experimenting with different organizational structures
- Households have few avenues to prepare themselves

Current Programs:

- CDC, EPA, FEMA - Guidance Documents

Gaps:

- No insurance products on the market to cover losses
- No best practices for how to plan and respond to an extreme heat disaster and poor understanding of the costs
- No incentive to create heat management personnel

Data and Indices

Concerns:

- Inadequate data collection, especially in urban environments
- Different heat indices communicate different levels of severity

Current Programs:

- NOAA and CDC - NIHHIS
- EPA - Urban Heat Island Mapping Campaign
- HHS - EMS Tracker for Heat Illness

Gaps:

- Underestimating the severity of heat
- Lack of application of data to specific localities
- Lack of data on which strategies are most effective at mitigating extreme heat

Cities, Local Governments, and States Out Ahead

State Actions

- Extreme Heat Preparedness Plans in New Jersey and Maryland in development. Plans finalized in Arizona and California
- California's $200 million for building resilience to extreme heat - Extreme Heat and Community Resilience Program
- Minnesota, Colorado, Oregon, Washington, California - workplace protections

Local Government Actions

- Miami-Dade County - workplace heat rules (failed)
- Pima County - has one of the most sophisticated deaths tracking system in the country

City Actions

- New York City and Los Angeles - cool roof mandates
- Phoenix - cooling requirements for renters

THANK YOU

Health Risks of Extreme Heat

Christopher Worsham, M.D., M.P.H.

MGH Pulmonary & Critical Care Unit

Instructor in Medicine, Harvard Medical School

Teaching Associate, HMS Department of Health Care Policy

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

Yale School of Medicine

Section of Pulmonary, Critical Care, and Sleep Medicine

@ChrisWorsham

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
- Review **treatments for heat related illness**

Financial Disclosures/COI

- No financial or non-financial COIs to report
- 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)

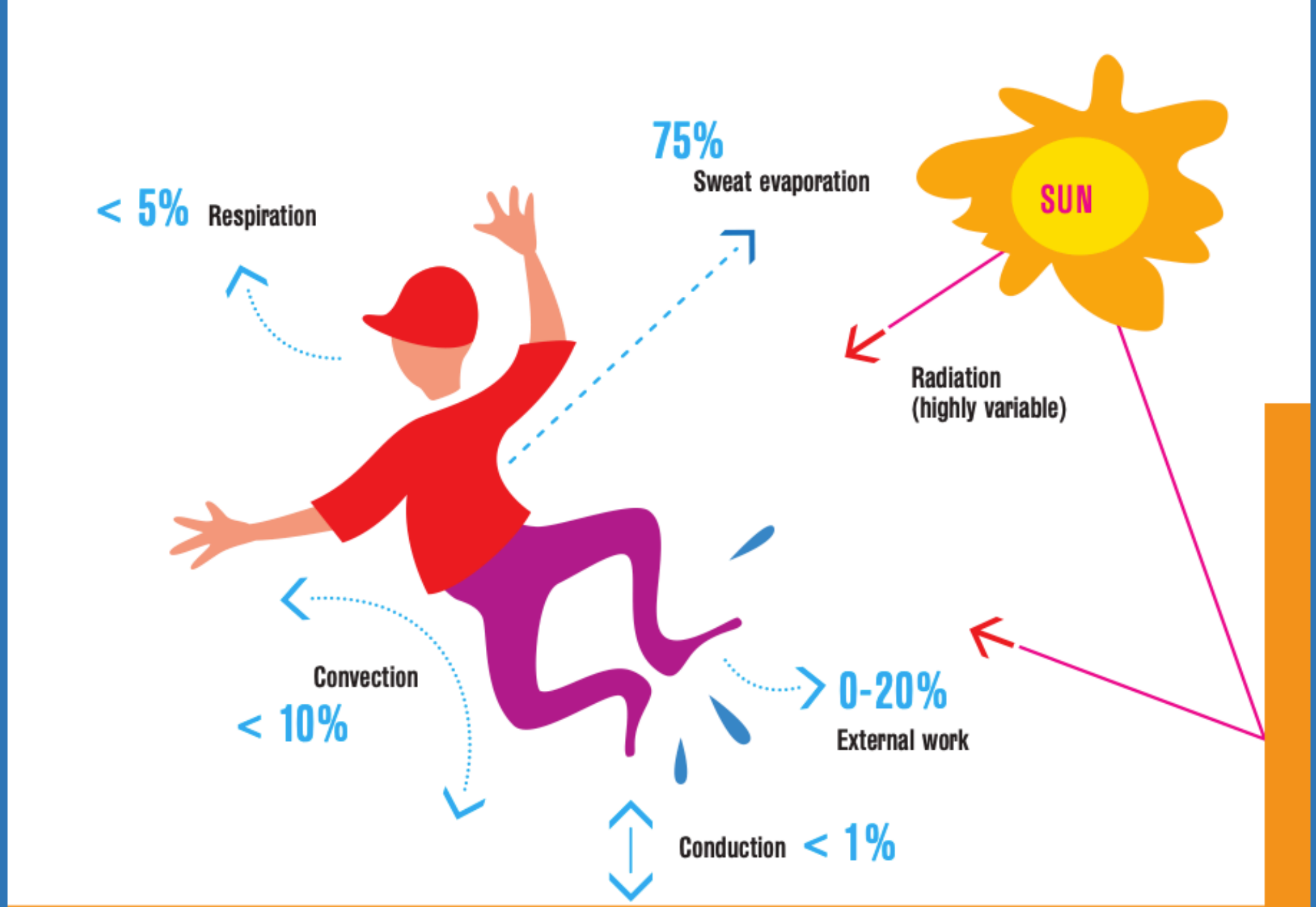
What temperature is dangerous to health?

- A highly satisfying answer: **IT DEPENDS**
  - It depends on patients' **underlying medical status**
  - 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

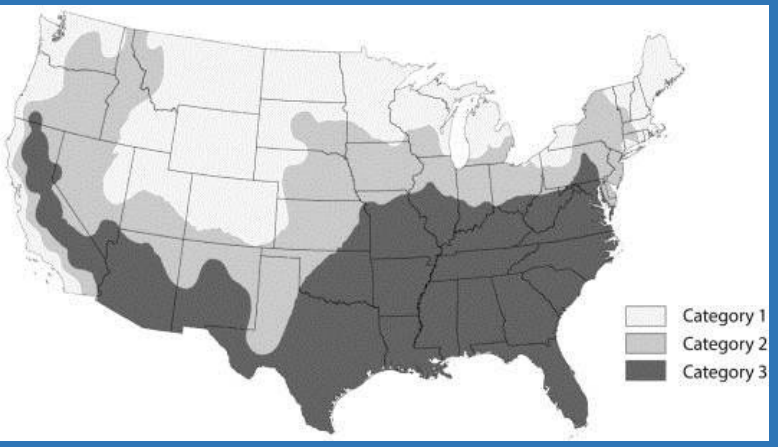
- Better than simple temperature measurements or heat index since it **accounts for all major environmental factors that impact body temperature**
- Combined measure of:
  - **Air temperature**
  - **Humidity**
  - **Radiant heat** (e.g. sun, furnaces, surfaces, etc.)
  - **Air movement** (e.g. wind,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

USAF



Source: adapted from Havenith (2003).

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



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 • Walking Hard Surface at 2.5 mph, < 30 lb Load • Marksmanship Training • Drill and Ceremony • Manual of Arms	• Walking Loose Sand at 2.5 mph, No Load • Walking Hard Surface at 3.5 mph, < 40 lb Load • Calisthenics • Patrolling • Individual Movement Techniques, i.e., Low Crawl or High Crawl • Defensive Position Construction	• Walking Hard Surface at 3.5 mph, ≥ 40 lb Load • Walking Loose Sand at 2.5 mph with Load • 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.

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://chppm-www.apgea.army.mil/heat. Distribution unlimited. Local reproduction is authorized.
CP-033-0811

USAPHC
U.S. ARMY PUBLIC HEALTH COMMAND
http://phc.amedd.army.mil
1-800-222-9698

DoD
OSHA

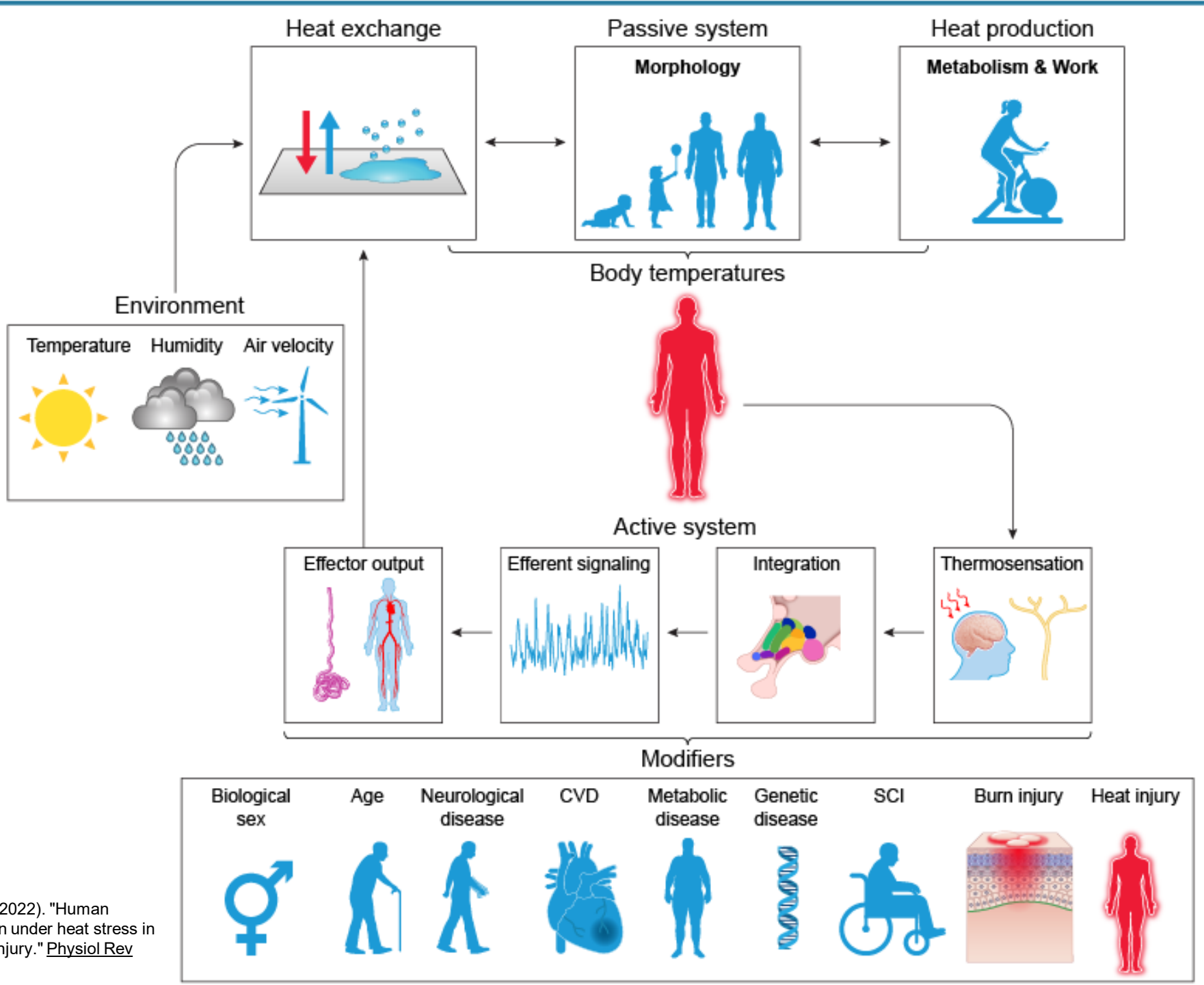
WBGT	Non-acclimatized, unfit or high risk individuals	Acclimatized, fit, low-risk individuals
65.1-72.0	Increase the rest:work ratio. Monitor fluid intake	Normal activity
72.1-78.0	Increase the rest:work ratio. Decrease total duration of activity	Monitor fluid intake
78.1-82.0	Decrease intensity and total duration of activity	Monitor fluid intake
82.1-86.0	Increase the rest:work ratio to 1:1. Limit intense exercise. Watch at-risk individuals carefully	Plan intense for prolonged activity with discretion. Watch at-risk individuals carefully
86.1-90.0	Cancel or stop practice and competition	Limit intense exercise and total exposure to heat and humidity. Watch for early signs/symptoms of heat stress
>90.0	Cancel exercise	Cancel exercise. Heat stress exists for all athletes

American College of Sports Medicine (ACSM) guidelines for training or non-continuous activities.

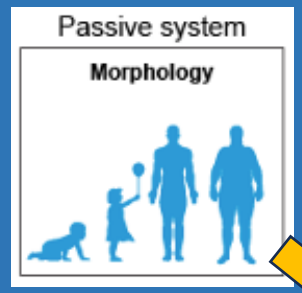
Who is “vulnerable”?

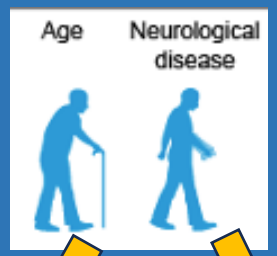
- Everyone
- The real questions:
  - **Who is *most* vulnerable?**
  - **Who needs special preparation?**
  - **Who would benefit from *proactive* interventions?**
  - **Who might struggle with *reactive* interventions?**

CDC

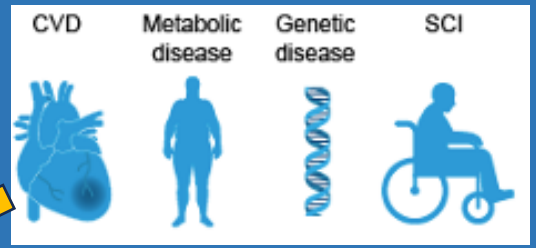


Cramer, M. N., et al. (2022). "Human temperature regulation under heat stress in health, disease, and injury." Physiol Rev **102**(4): 1907-1989.

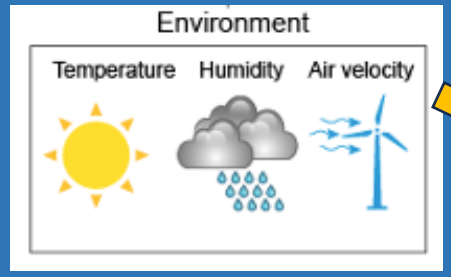


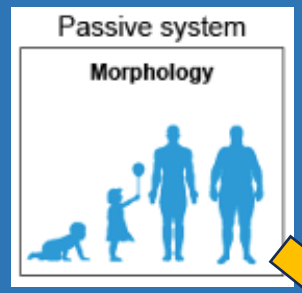


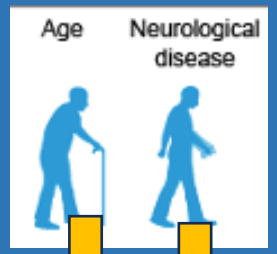
- Cognitive issues
- Age-related changes in sweating



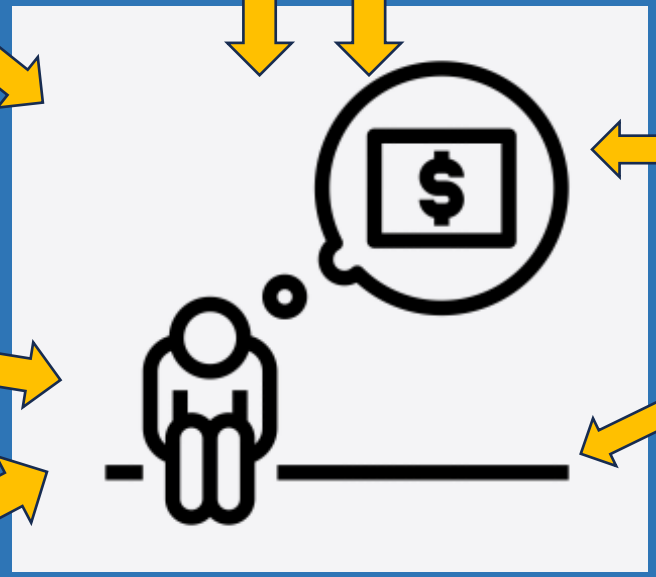
- Heart disease/fluids
- Obesity
- Composition of sweat
- Ability to sweat

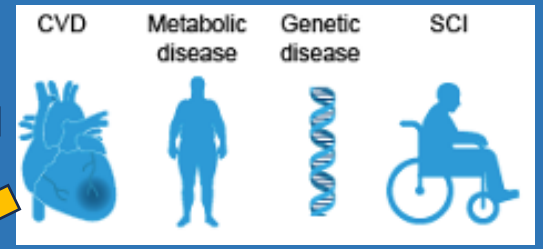




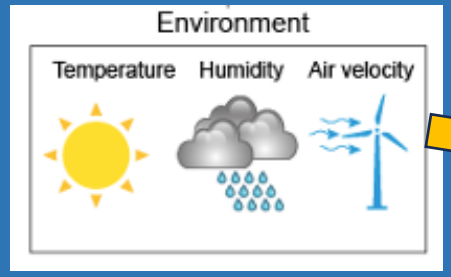


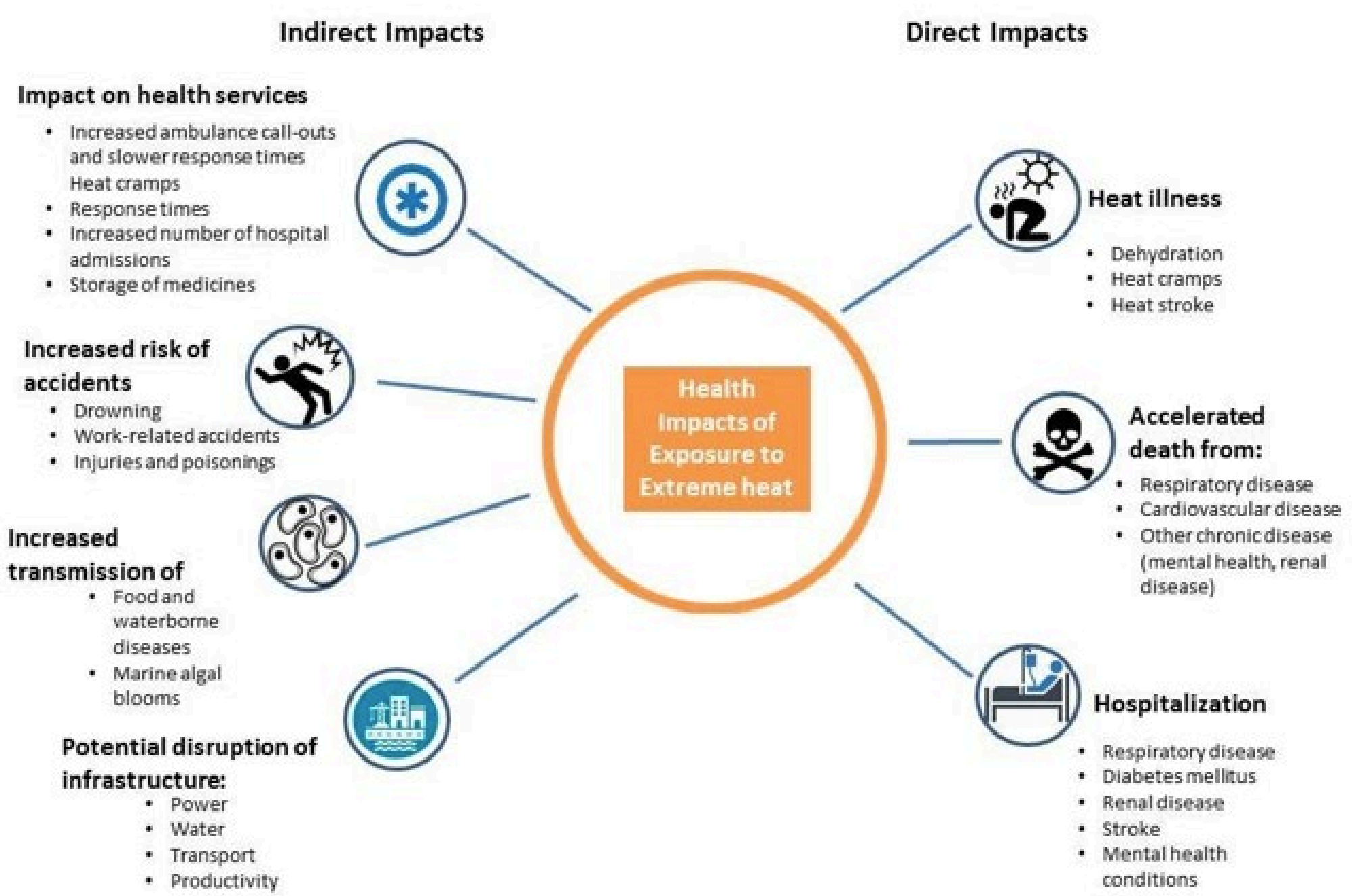
- Cognitive issues
- Age-related changes in sweating



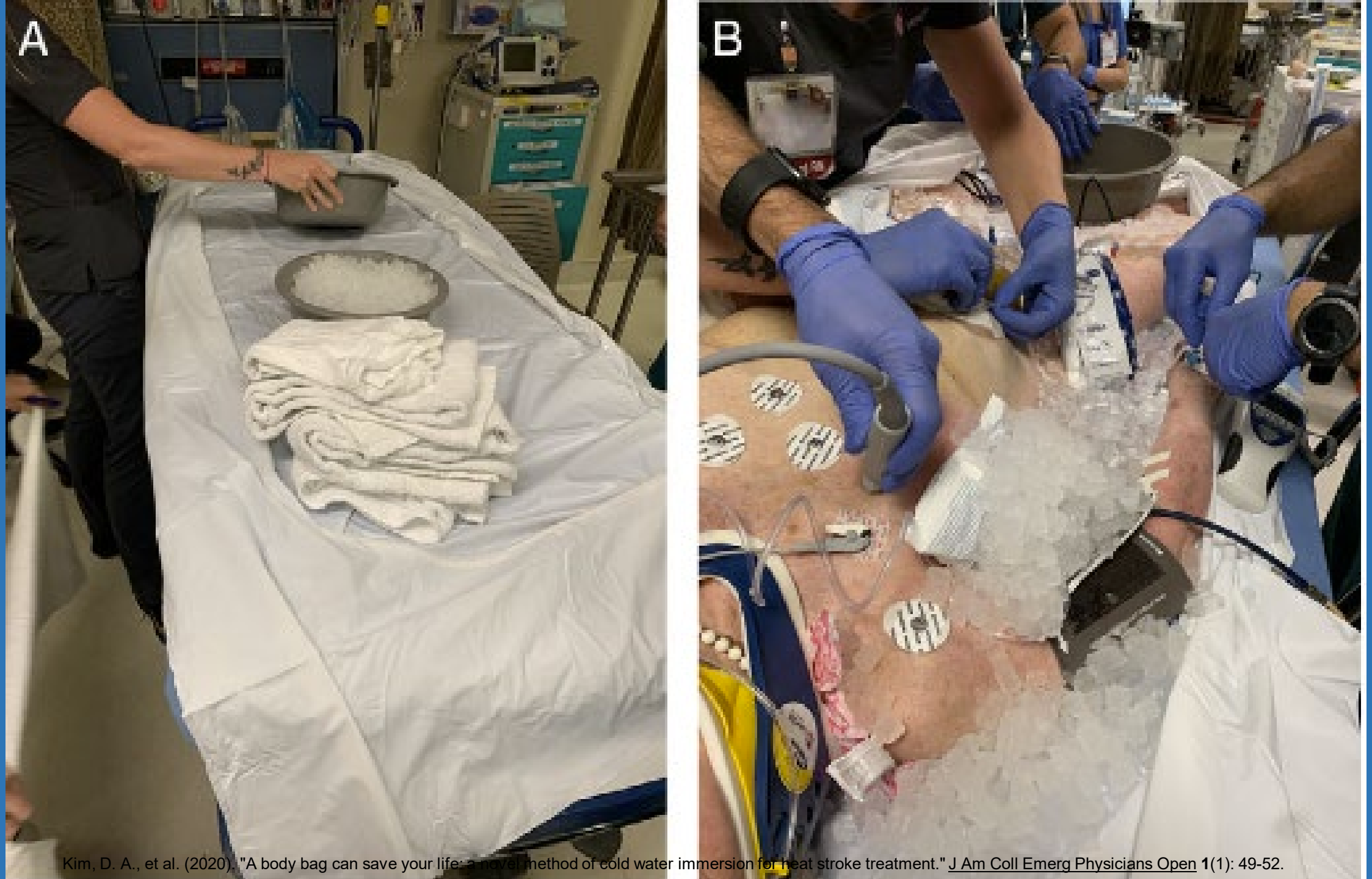


- Heart disease/fluids
- Obesity
- Composition of sweat
- Ability to sweat





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
  - Learn signs and symptoms of heat related problems, ideally individualized by their doctor

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

CDC

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

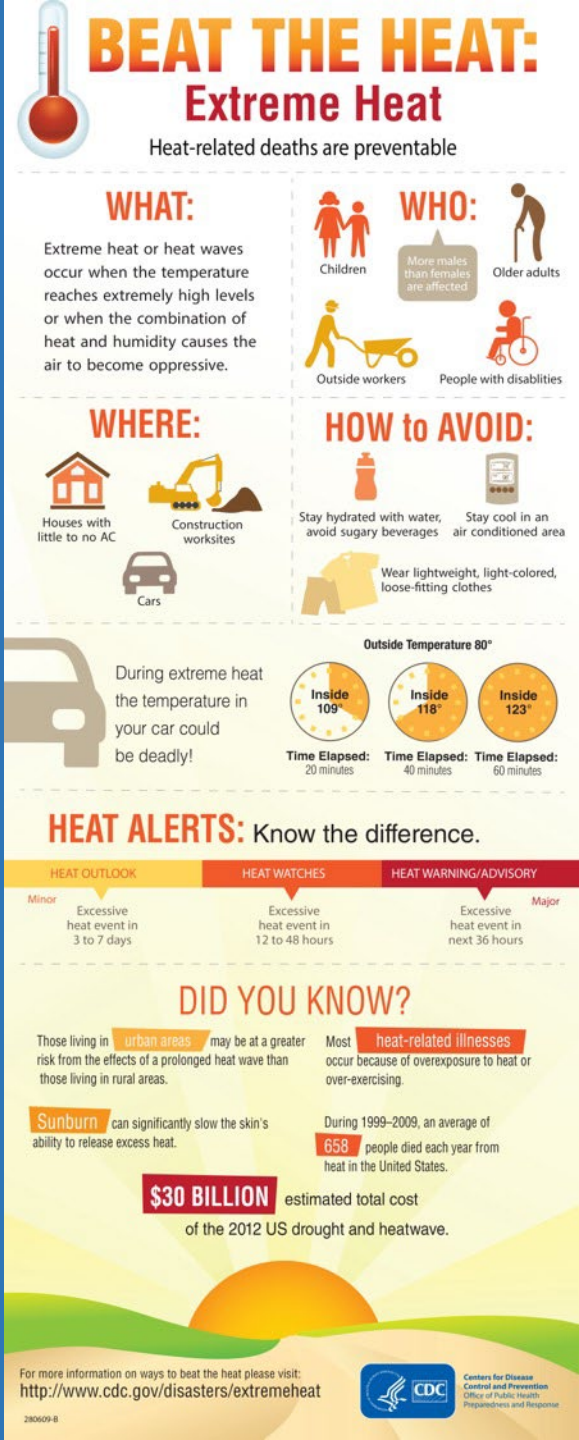
- Red clusters of small blisters that look like pimples on the skin (usually on the neck, chest, groin, or in elbow creases)

- Stay in a cool, dry place
- Keep the rash dry
- Use powder (like baby powder) to soothe the rash

CS280226

How do we intervene?

- **Address underlying issues**
  - Climate change
  - Infrastructure
  - Social determinants & costs of staying cool
- **Promote awareness *with education***
- **Make it easy to stay cool when needed**
  - Bring food and water to those who need it
  - Help cool the home
  - Cooling centers, splash pads, pools (with caution)
  - Clothing
  - Check ins (friend, family, neighbor, health care workers, others)



Questions/Comments/Discussion