Developing a Heat Illness Prevention Program in Construction

June 26, 2024

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Panelists:

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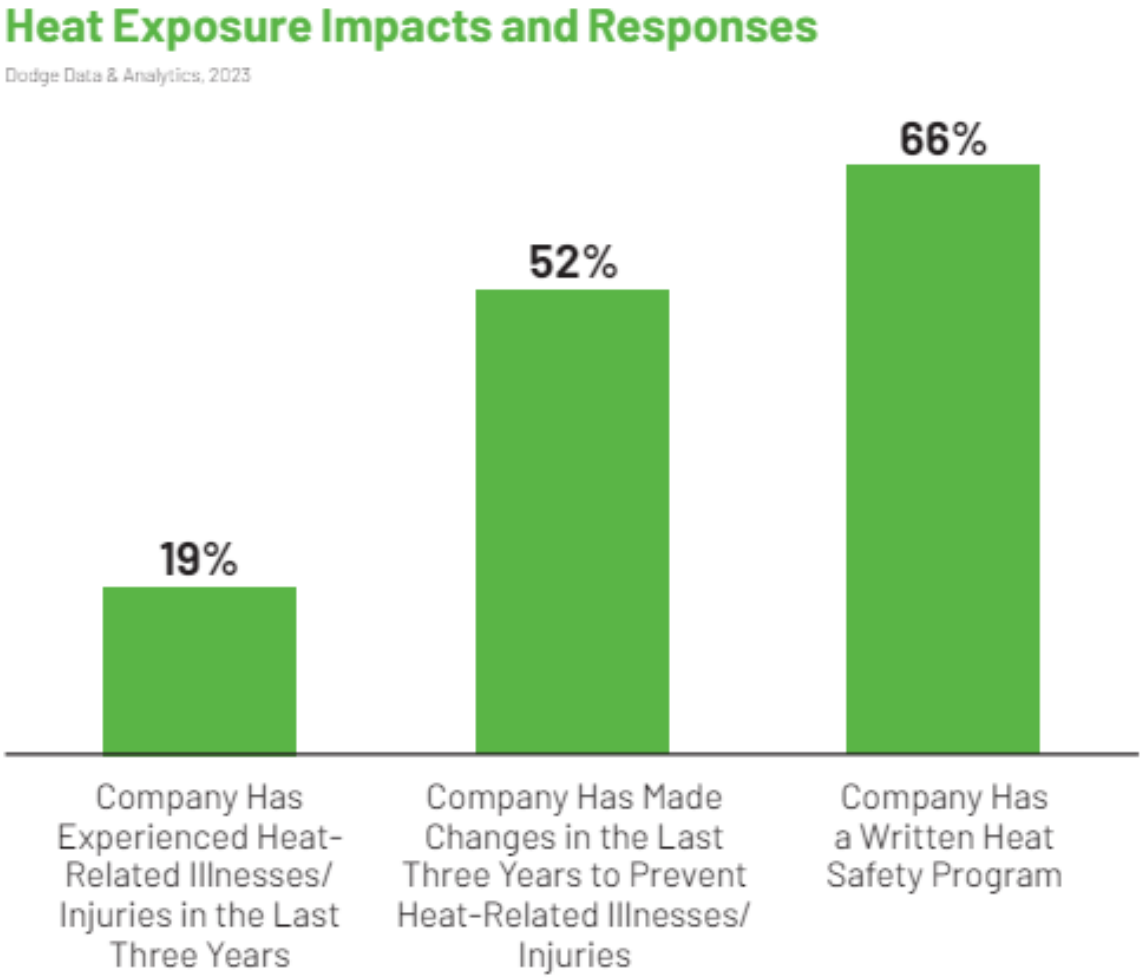
Dodge Construction Network Report



Room for Improvement:

- Methods outside of Water, Rest, and Shade – such as scheduling work for cooler times of day, using PPE, or having an emergency response plan – were used by less than half of contractors surveyed.
- Only 10% said they conduct physical monitoring to identify workers in distress.

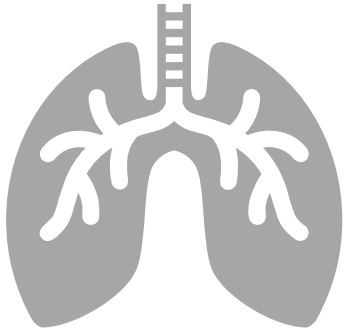
https://www.cpwr.com/wp-content/uploads/RR-Dodge_Safety_Management_SmartMarket_2023.pdf

The Problem

- Sustained high temperatures can significantly affect workers' health
- It's costing everyone $$$ (increased incidents, decreased production)
- Signs and symptoms are often overlooked/undervalued
- Millions of workers are exposed to heat at work
- Although preventable, thousands of workers become sick
- Worker exposure to excessive heat has only increased in the last decade

Fast Facts

Heat is the leading weather-related killer, more than hurricanes, floods, tornadoes and lightning **combined**



Extreme hot weather strains the heart and lungs, causing heart attacks, strokes and respiratory diseases

EPA estimates that heat-related deaths could increase by 3,500 to 27,000 deaths per year by mid-century

Types of Heat Illnesses

Heat Rash

Heat Cramps

Heat Syncope

Heat Exhaustion

Heat Stroke

Mild Medical Condition

Dangerous

Medical Emergency

Summary

- **IT'S HOT!**
- **Intense working conditions**
  - Increase in heat-related illnesses
- **Best practices to protect workers**
  - Water, rest, shade
  - Acclimatization plan
  - Written plan
  - Buddy system
  - Training (workers & supervisors)
  - Hazard assessment & prevention
  - Emergency response plan

Existing Heat Stress Standards/Guidance

- **Active State standards:**
  - California, Oregon and Washington State
    - Most protective heat standards in the nation
    - Water/rest/shade, acclimatization and written plan requirements
  - Minnesota (indoor only)
  - Colorado (agr. workers)
  - Maryland, Nevada (proposed)

- **Consensus standard**
  - ANSI/ASSP A10.50, Heat Stress Management

- **Federal OSHA actions:**
  - Rulemaking
  - General Duty Clause
  - NEP
  - Hazard Alert
  - NACOSH
  - ACCSH

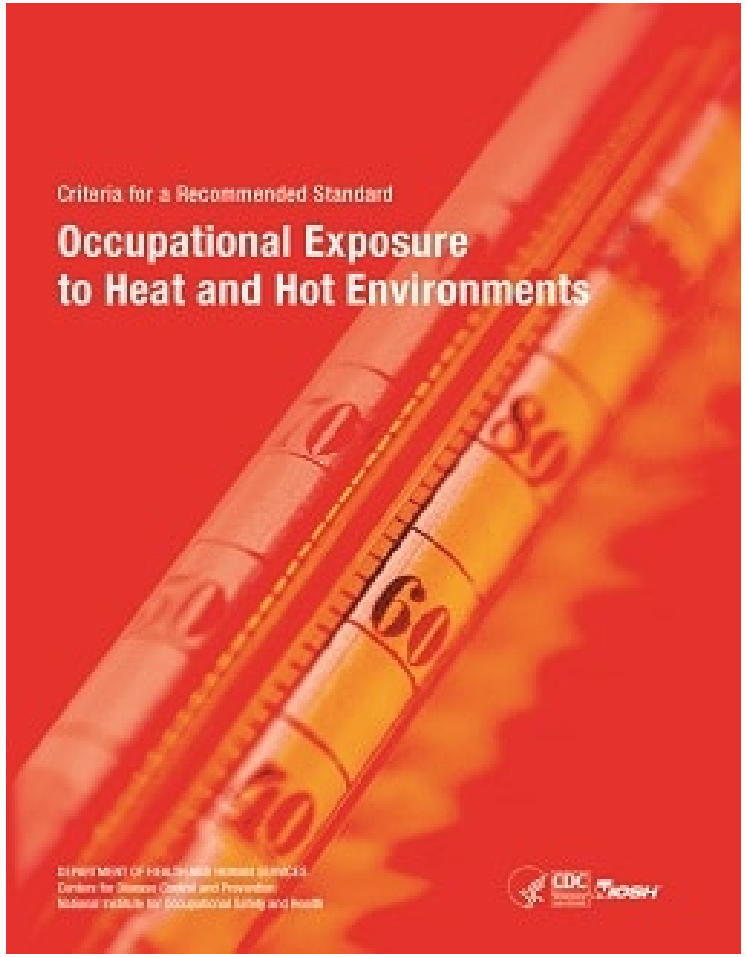
Let’s cover a bit more background info before we begin the Q&A

1. Key terminology
2. Adverse effects of heat stress
3. CPWR resources

Two key definitions in the NIOSH Criteria Document:

- **Heat Stress: The net heat load to which a worker is exposed** from the combined contributions of metabolic heat, environmental factors, and clothing worn which results in an increase in heat storage in the body.

- **Heat Strain: The physiological response to the heat load (external or internal)** experienced by a person, in which the body attempts to increase heat loss to the environment in order to maintain a stable body temperature.

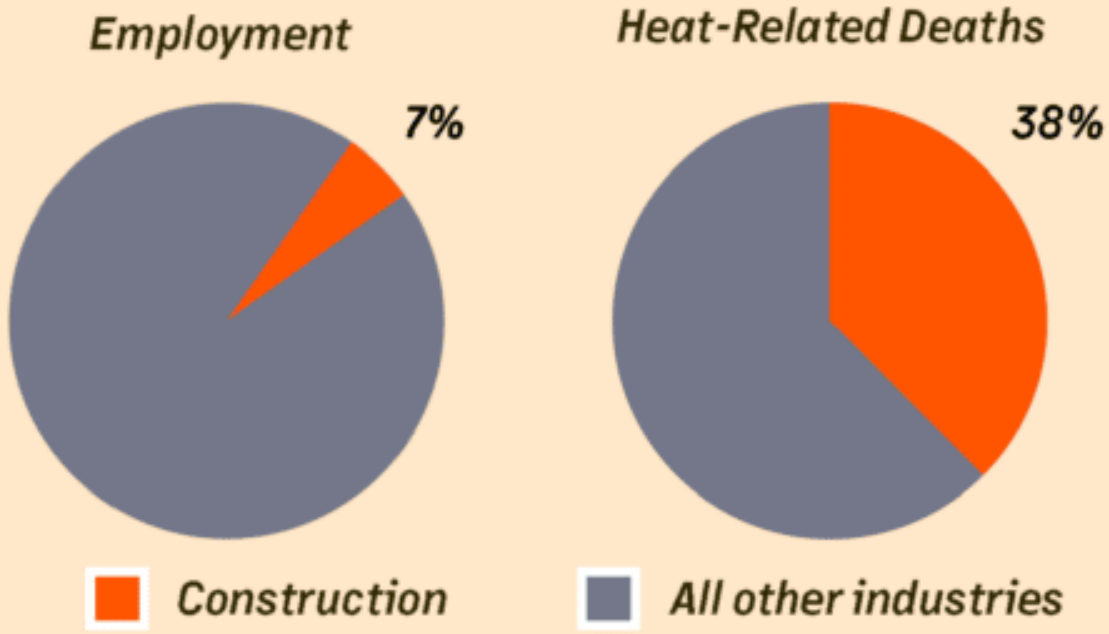


Heat stroke is a medical emergency

1. Results in death or permanent disability without rapid recognition and treatment
2. Sweating differs for classic vs. exertional heat stroke
3. Change in mental status (e.g., confusion, delirium) is best way to differentiate heat stroke from milder forms of heat-related illness

HEAT-RELATED DEATHS IN CONSTRUCTION

Construction workers accounted for **only 7%** of the U.S. workforce, but experienced **38% of all heat- related deaths at work in 2020.**[1,2,3]



[1] CPWR- The Center for Construction Research and Training. [2022]. Fatal and Nonfatal Injuries in the Construction Industry. https://www.cpwr.com/wp-content/uploads/DataBulletin-May2022.pdf
[2] U.S. Bureau of Labor Statistics. [2022]. Census of Fatal Occupational Injuries (2011 forward) One Screen Tool. https://www.bls.gov/iif/data.htm
[3] U.S. Bureau of Labor Statistics. [2022]. Household Data Annual Averages 18b. Employed persons by detailed industry and age. https://www.bls.gov/cps/cpsaat18b.htm

NPR aired a story this week about two brothers who worked as roofers in Florida

Extreme heat contributed to his brother's death. He worries he could be next

JUNE 23, 2024 · 6:00 AM ET

HEARD ON ALL THINGS CONSIDERED

Rebecca Hersher

npr

WAMU 88.5
AMERICAN UNIVERSITY RADIO

"People don't understand how hot it is. Because when they work, it's in the air conditioning… They don't understand when you feel it for 10 to 12 hours a day, how much your body has to work."

Research shows that heat exposure can exacerbate or trigger a wide range of health conditions:

- ischemic heart disease
- cardiac dysrhythmias
- ischemic stroke
- asthma
- chronic obstructive pulmonary disease
- respiratory tract infections
- hyperglycemia
- kidney failure
- neuropsychiatric disorders (e.g., psychosis, suicides, homicides, anxiety, and depression),
- adverse birth outcomes

Sorensen C, Hess J. Treatment and Prevention of Heat-Related Illness. N Engl J Med. 2022 Oct 13;387(15):1404-1413.

Studies are also investigating heat exposure as a potential contributor to chronic kidney disease of unknown etiology (CKDu)

Gibb K, Beckman S, Vergara XP, Heinzerling A, Harrison R. Extreme Heat and Occupational Health Risks. Annu Rev Public Health. 2024 May;45(1):315-335.

Hotter temperatures are associated with a increased likelihood of workplace injuries

California workers' comp study

- Hotter temps cause 20,000 injuries per year (e.g., falls)
- A day above 100 °F leads to a 10-15 % increase in same-day injury risk

https://equitablegrowth.org/working-papers/temperature-workplace-safety-and-labor-market-inequality/

Productivity losses due to heat stress cost the US economy an estimated $98 billion annually

Luke A Parsons *et al* 2022 *Environ. Res. Lett.* 17 014050 DOI 10.1088/1748-9326/ac3dae

CPWR has a collection of resources for heat illness prevention including two checklists

June 2023

HEAT ILLNESS PREVENTION PROGRAM CHECKLIST

According to OSHA, employers are responsible for providing workplaces free of known safety and health hazards, including heat-related hazards. Use this checklist to make sure your Heat Illness Prevention (HIP) program is up to date and follows best practices, aligning with heat abatement recommendations made by OSHA and promoted through their 2022 National Emphasis Program on Outdoor and Indoor Heat-Related Hazards. To help execute the measures identified in this list on the job, see CPWR's Daily HIP Checklist.

Place a check next to each measure you plan to implement as part of your HIP program on **this** specific jobsite:

- ☐ Identification of a competent person to ensure a HIP program is in place and operational.
- ☐ Procedures for pre-task heat stress hazard analyses for tasks that could cause heat-related illness
- ☐ A site-specific, written HIP plan, shared with all employees, that incorporates methods to reduce exposure, including unlimited access to water, scheduled rest breaks, access to shade and cooling solutions, scheduling adjustments (e.g., earlier start), buddy systems, and other best practices
- ☐ An acclimatization plan included in the written HIP program to closely supervise and adjust work schedules and work practices for workers newly exposed to heat, temporary or contract workers, pregnant workers, those new to the region or returning from extended leave, and during periods of significantly higher heat conditions. The plan should include specific monitoring of workers who are acclimatizing. Special attention should be given to regional heat waves, physical demands of the work, and changing PPE that may increase heat effects.
- ☐ Established trigger conditions for implementation of HIP plan (e.g., local or national heat index alerts)
- ☐ Employee training on risk factors, protection against heat-related illness, the importance of hydration, recognizing and reporting signs and symptoms, administering first aid, and contacting emergency personnel
- ☐ A method to monitor temperature and relative humidity whenever workers are exposed to heat, both outdoors and indoors, as well as a method to monitor and factor in levels of work exertion
- ☐ A response and rescue plan in the event of heat-related illness

If you left boxes unchecked or think there may be room to improve on a checked box, visit CPWR's Working in Hot Weather webpage for additional information and guidance or consult OSHA's generic template for a Model Heat Illness Prevention Plan at https://bit.ly/3ZIXl0G.

CPWR: Working in Hot Weather www.cpwr.com/heat

OSHA National Emphasis Program: Outdoor & Indoor Heat-Related Hazards https://bit.ly/3Hm1WPt

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DAILY HEAT ILLNESS PREVENTION CHECKLIST

Before beginning work, ask yourself whether your crew will be exposed to heat or hot weather. Are you working outside in the heat or direct sunlight? Are you working indoors in a hot environment or in a space with heat-generating machinery? If you and your crew might be at risk for heat-related illness or death, make sure you have a heat-illness prevention (HIP) program in place. A HIP program should include plans for training workers, monitoring heat conditions, ensuring controls and solutions are available when needed, acclimatizing workers, and more. The plan should be updated at the worksite for each job site with clear guidance on when and how it will be implemented at the worksite for (new and experienced) workers. Use CPWR's Heat Illness Prevention Program Checklist before continuing to the checklist below if you do not have an established program in place.

Once you have a HIP plan set up, use the following checklist to identify daily risks and preventive and protective measures that will be implemented accordingly. If you have questions about the items on the checklist visit cpwr.com/heat for more information

Date: _____

Jobsite: _____

Heat Illness Prevention (HIP) Competent Person: _____

1. Are any of these risk factors for heat exposure present on your job site today? (check all that apply)

- ☐ Outdoor work in warm/hot weather or direct sun
- ☐ Radiant heat sources such as hot asphalt, power tools, machinery, furnaces, boilers, steam piping, or other radiant heat sources
- ☐ Low wind speed and/or physical elements of the construction site that block wind
- ☐ Work in confined spaces - for example, attics, crawl spaces, and/or the interior of tanks
- ☐ Moderate to strenuous physical activity performed in warm/hot indoor or outdoor environments
- ☐ Heavy or non-breathable work clothes and/or personal protective equipment worn in warm/hot indoor or outdoor environments
- ☐ High relative humidity combined with a warm/hot indoor or outdoor environment (heat index)
- ☐ Mobile worksites with the potential for variable levels of heat exposure
- ☐ Workers that have not yet been trained on heat exposure and heat-related illness

Continued →

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www.cpwr.com/heat

One is programmatic

- [ ] Identification of a competent person to ensure a HIP program is in place and operational.
- [ ] Procedures for pre-task heat stress hazard analyses for tasks that could cause heat-related illness
- [ ] A site-specific, written HIP plan, shared with all employees, that incorporates methods to reduce exposure, including unlimited access to water, scheduled rest breaks, access to shade and cooling solutions, scheduling adjustments (e.g., earlier start), buddy systems, and other best practices
- [ ] An acclimatization plan included in the written HIP program to closely supervise and adjust work schedules and work practices for workers newly exposed to heat, temporary or contract workers, pregnant workers, those new to the region or returning from extended leave, and during periods of significantly higher heat conditions. The plan should include specific monitoring of workers who are acclimatizing. Special attention should be given to regional heat waves, physical demands of the work, and changing PPE that may increase heat effects.
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- [ ] A method to monitor temperature and relative humidity whenever workers are exposed to heat, both outdoors and indoors, as well as a method to monitor and factor in levels of work exertion
- [ ] A response and rescue plan in the event of heat-related illness

The other is a daily checklist that considers the hierarchy of controls and emergency response after assessing risks

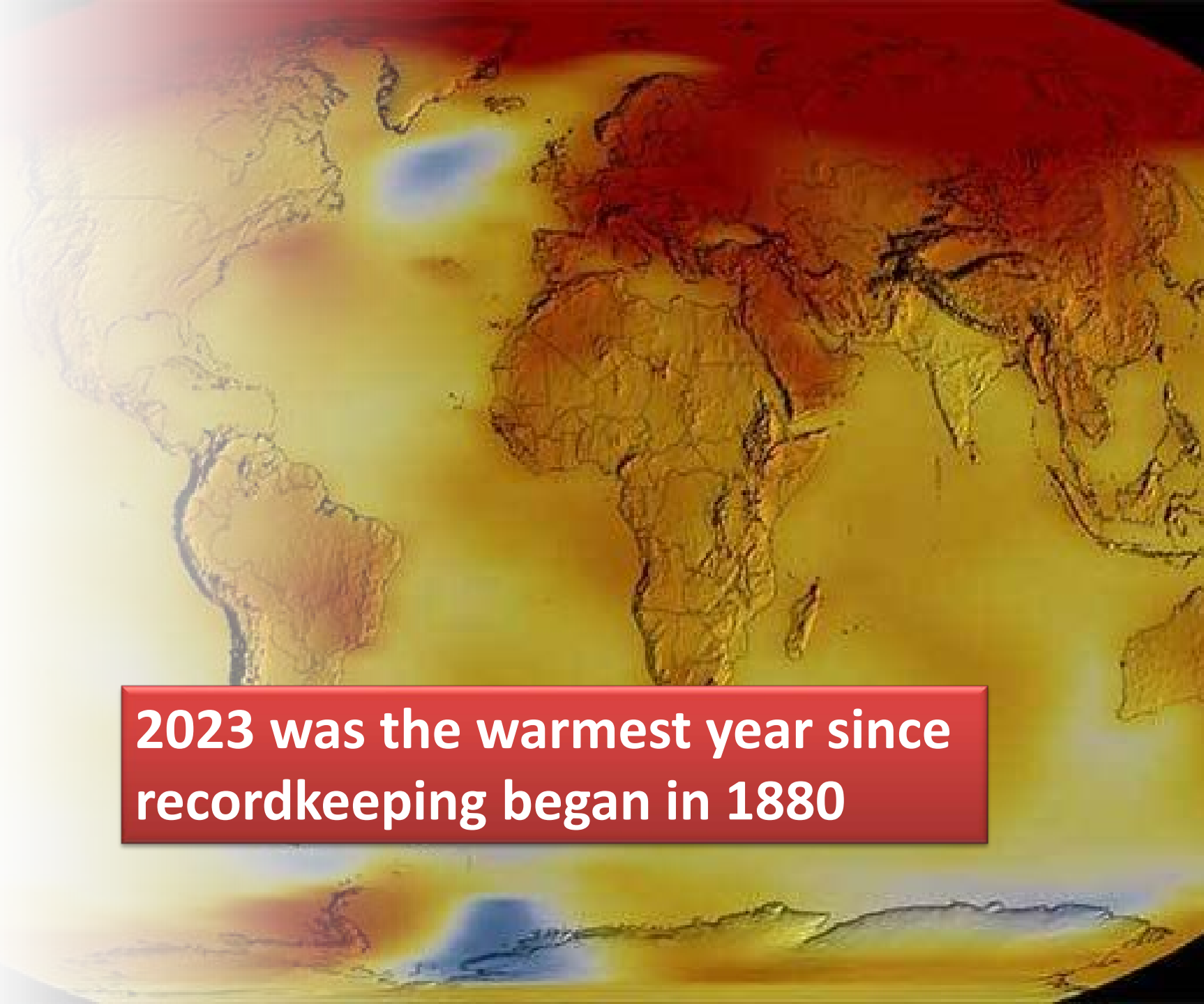
1. Are any of these risk factors for heat exposure present on your job site today? (check all that apply)

☐	Outdoor work in warm/hot weather or direct sun
☐	Radiant heat sources such as hot asphalt, power tools, machinery, furnaces, boilers, steam piping, or other radiant heat sources
☐	Low wind speed and/or physical elements of the construction site that block wind
☐	Work in confined spaces - for example, attics, crawl spaces, and/or the interior of tanks
☐	Moderate to strenuous physical activity performed in warm/hot indoor or outdoor environments
☐	Heavy or non-breathable work clothes and/or personal protective equipment worn in warm/hot indoor or outdoor environments
☐	High relative humidity combined with a warm/hot indoor or outdoor environment (heat index)
☐	Mobile worksites with the potential for variable levels of heat exposure
☐	Workers that have not yet been trained on heat exposure and heat-related illness

- Engineering controls
- Administrative controls
- PPE
- Are you prepared for a heat-related medical emergency?

ADDITIONAL SLIDES
(Discussion & Follow-up Resources)

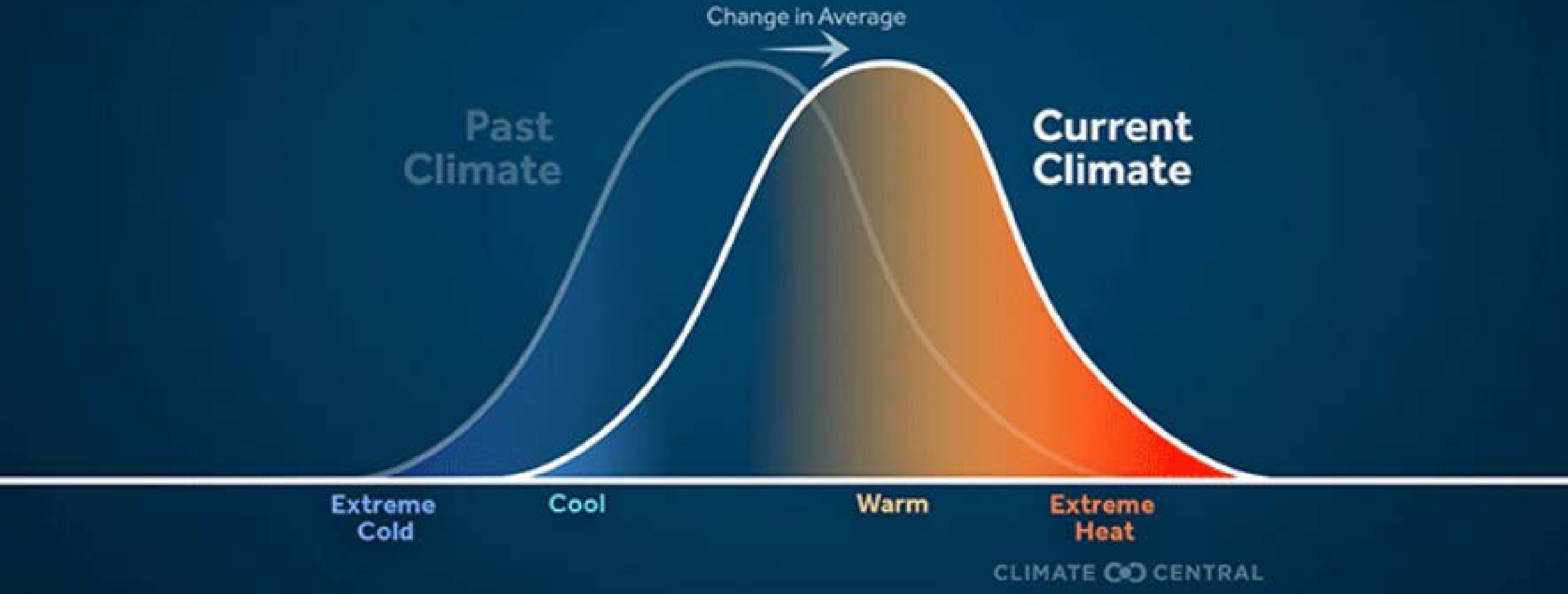
The past 10 years were the warmest on record



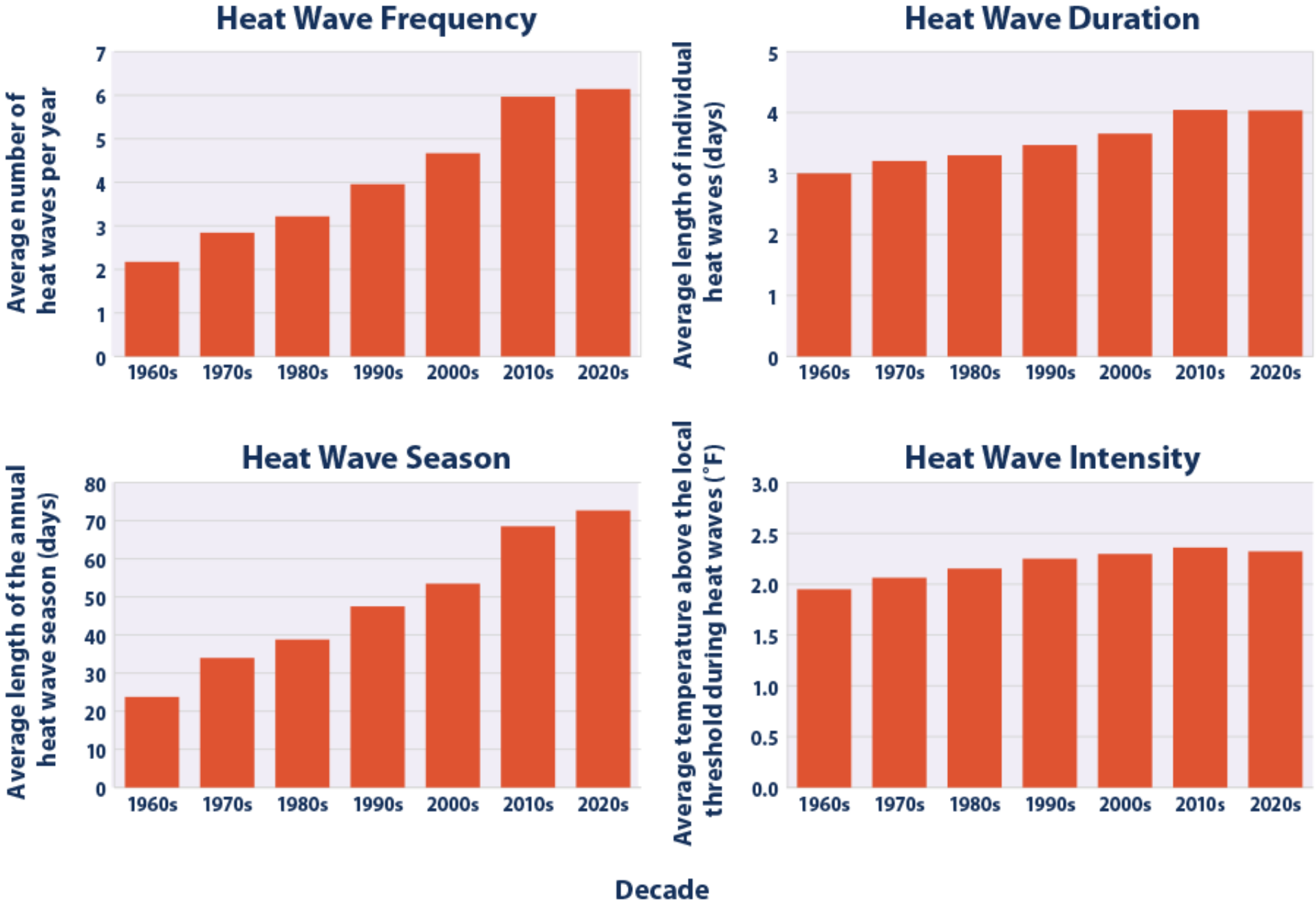
2023 was the warmest year since recordkeeping began in 1880

Source: NASA/GISS
https://climate.nasa.gov/vital-signs/global-temperature/

SMALL CHANGE IN AVERAGE
BIG CHANGE IN EXTREMES



Heat waves in the US are getting worse



Data Source: NOAA 2021.

For more info: https://www.epa.gov/climate-indicators/climate-change-indicators-heat-waves

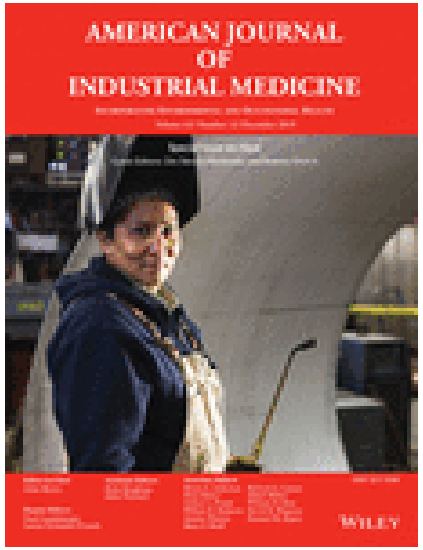
CPWR researchers studied heat-related construction deaths from 1992 to 2016

CPWR KEY FINDINGS FROM RESEARCH

Heat-related deaths among construction workers

Heat-related deaths among construction workers in the United States

Xiuwen Sue Dong, Gavin H. West, Alfreda Holloway-Beth, Xuanwen Wang, and Rosemary K. Sokas. American Journal of Industrial Medicine, 2019.



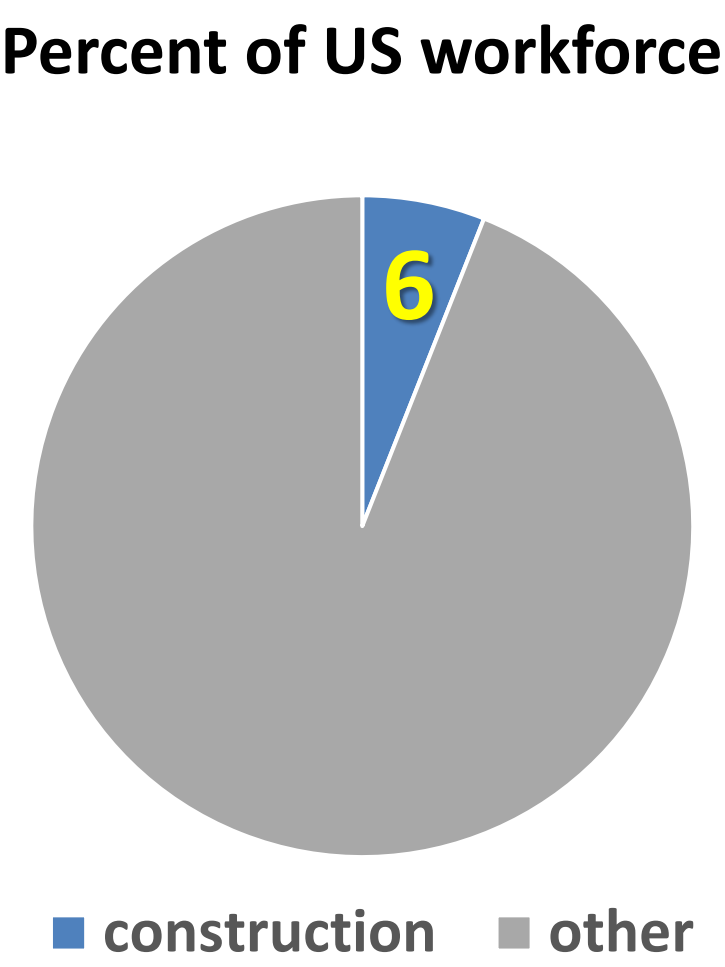
Source: Fatal injury data were generated by the CPWR Data Center with restricted access to BLS CFOI micro data. The views expressed here do not necessarily reflect the views of the BLS. Employment data were from the Current Population Survey. Calculations by the authors.

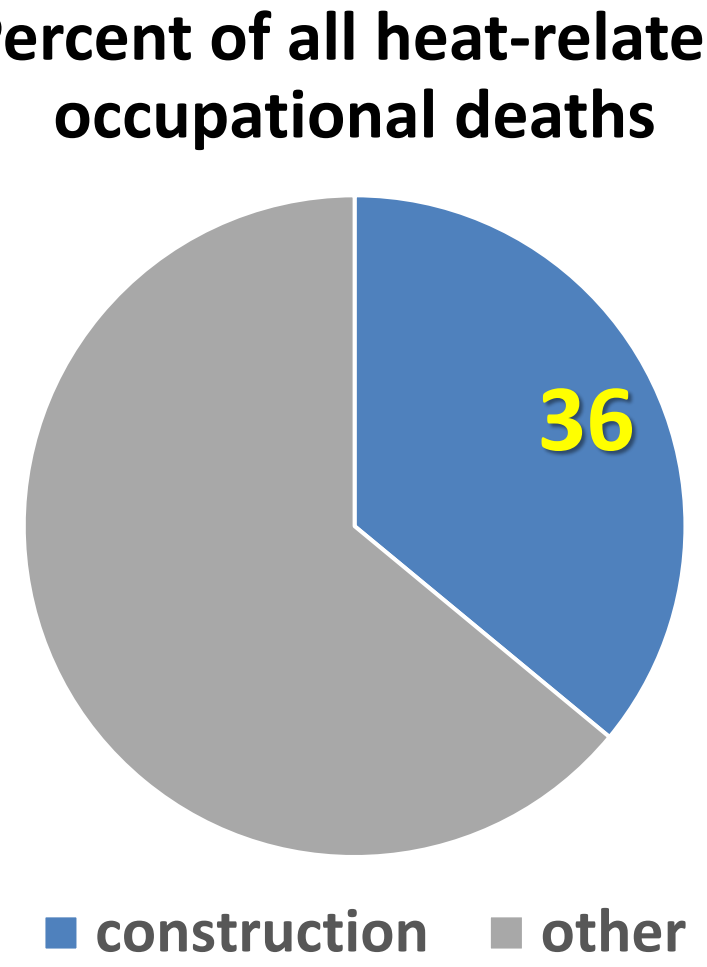
The study identified subgroups with a higher risk of heat-related death compared to all construction workers

- Masons
- Roofers
- Helpers
- Immigrant workers
- Workers of color

Photo courtesy: International Union of Bricklayers and Allied Craftworkers

285 construction workers suffered heat-related deaths from 1992 to 2016





Resources for Heat Illness & Injury Prevention

- www.osha.gov/heat
- OSHA Publications By Search | Occupational Safety and Health Administration
- United States Department of Labor - Sign-up for our Heat Source Newsletter (govdelivery.com)
- National Emphasis Program - Outdoor and Indoor Heat-Related Hazards (osha.gov)
- Report of the Small Business Advocacy Review Panel on OSHA's Potential Standard for Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings
- Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments

From OSHA Compliance Directive (2022)

During heat-related inspections, CSHOs should;

- Review OSHA 300 Logs for any entries indicating heat-related illness(es),
- Review injury and illness reports and obtain any records of emergency room visits and/or ambulance transport, even if hospitalizations did not occur,
- Interview workers for reports of headache, dizziness, fainting, dehydration, or other symptoms that may indicate heat-related illnesses,
- Review employer's plan to address heat exposure, including acclimatization procedures (especially for new and returning workers), work-rest schedules, access to shade and water (with electrolytes when needed), and any training records associated with implementing a heat illness prevention program,
- Document, where possible, the heat index on the OSHA-NIOSH Heat App, using the screen save feature on a mobile phone or tablet,
- Identify conditions and activities relevant to heat-related hazards. These can include, but are not limited to:
    - Potential sources of heat-related illnesses (e.g., working in direct sunlight, a hot vehicle, or areas with hot air, near a gas engine, furnace, boiler or steam lines),
    - WBGT calculations and/or other temperature measurements,
    - Heat advisories, warnings or alerts,
    - The use of heavy or bulky clothing or equipment,
    - The types of activities performed by the employees and whether those activities can be categorized as moderate, heavy or very heavy work,
    - The length of time in which a worker is continuously or repeatedly performing moderate to strenuous activities,
    - Heat-related illnesses among new workers,
    - The presence of any recent vacation time or breaks in employment prior to complaints of heat-related symptoms, and
    - The availability of rest breaks, water and shade on site.

...continued

Consider the following:

1. Is there a written program?
2. How did the employer monitor ambient temperature(s) and levels of work exertion at the worksite?
3. Was there unlimited cool water that was easily accessible to the employees?
4. Did the employer require additional breaks for hydration?
5. Were there scheduled rest breaks?
6. Was there access to a shaded area?
7. Did the employer provide time for acclimatization of new and returning workers?
8. Was a “buddy” system in place on hot days?
9. Were administrative controls used (earlier start times, and employee/job rotation) to limit heat exposures?
10. Did the employer provide training on heat illness signs, how to report signs and symptoms, first aid, how to contact emergency personnel, prevention, and the importance of hydration?