

Heat Injuries and Illnesses among Construction Workers

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OVERVIEW

Construction workers are disproportionately affected by heat stress. Their jobs often require prolonged physical exertion in hot or humid environments, both indoors and out, where heat sources (e.g., high temperature and humidity, sun exposure, indoor heat sources) and personal protective equipment (PPE) can increase the risk of heat-related illnesses and injuries (HRI). Although construction workers are only [7% of the overall workforce](#), they account for [more than one-third](#) of occupational heat-related deaths. Heat—the [leading cause](#) of weather-related deaths globally—also increases the risk of injuries [from safety hazards](#) such as working at heights, and it can trigger or [worsen existing health conditions](#) like asthma, diabetes, or cardiovascular disease. Heat’s impact is likely even higher given the well documented [underreporting and undercounting](#) of HRI’s. New research also suggests that [chronic underhydration](#) contributes to the development of chronic diseases and premature mortality. With each of the past [10 years being the warmest ever recorded](#), HRI prevention remains critical for construction workers and other occupations impacted by heat.

This issue examines heat-related illnesses and injuries among construction workers using multiple data sources. Fatal injury data comes from the U.S. Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) and [CPWR’s Fatality Map](#). Nonfatal injury data come from the BLS Survey of Occupational Injuries and Illnesses (SOII) and OSHA’s *Severe Injury* database. SOII data shows nonfatal injuries that resulted in *days away from work (DAFW)* among private industry workers and are shown in two-year periods due to the data changing to biennial estimates in 2021. Rates per 100,000 *full-time equivalents (FTEs)* were calculated using Current Population Survey (CPS) estimates in chart 1, chart 4, chart 5, chart 6, and chart 10.



THIS ISSUE

This issue examines heat-related injuries and illnesses among construction workers.

KEY FINDINGS

In 2023, the construction industry accounted for over one-third of heat-related fatal injuries in the U.S.

Chart 2

Heat-related fatalities occur throughout the year, with the majority of deaths (71.4%) taking place during the summer.

Chart 3

Construction had the highest number of fatal heat-related injuries and the fifth-highest number of nonfatal heat-related injuries resulting in days away from work.

Charts 2 and 6

Specialty Trade Contractors (NAICS 238) made up the largest share of heat-related severe construction injuries reported to federal OSHA (55.2%) from 2015 to 2023.

Chart 11

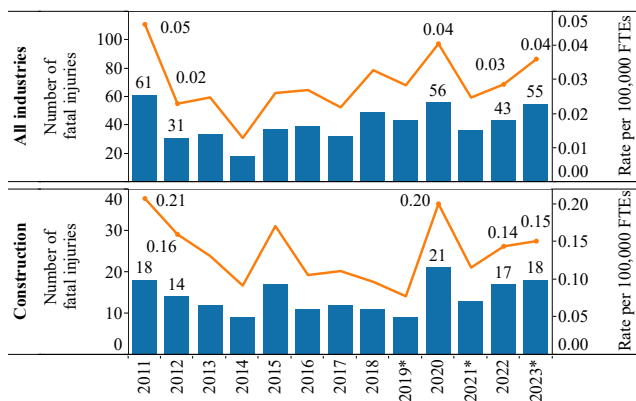
NEXT DATA BULLETIN

Medical Expenditures among Construction Workers

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The number of heat-related fatal injuries among all workers increased 77.4% between 2012 to 2023 (31 to 55; chart 1). The highest number of these fatalities—61—occurred in 2011, likely due in part to extreme heat waves experienced [that year](#). Fatal heat-related injuries reached a second peak in 2020 (n=56), before dropping in 2021 and rising again. Construction had decreases from 2011 to 2018 (18 to 11), before seeing a peak in 2020 (n=21) and similarly high numbers in 2022 and 2023 (n=17 and n=18). The rate of fatal heat-related injuries in construction ranged from 0.09 to 0.21 per 100,000 FTEs in 2014 and 2011. Most recently, the rate in construction was nearly four times higher than all other industries (0.15 versus 0.04 per 100,000 FTEs).

1. Fatal heat injuries, construction versus all industries (2011-2023)

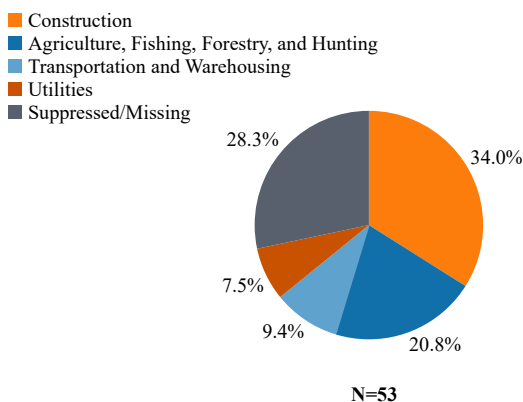


Source: U.S. Bureau of Labor Statistics, 2011-2023 Census of Fatal Occupational Injuries and Illnesses and 2011-2023 IPUMS Current Population Survey.

*Construction in 2019, 2021, and 2023 is missing data by event/exposure so primary source is used to estimate fatal heat injuries.

By industry, construction reported the most fatal heat-related injuries, accounting for over one-third (34.0%; n=18) of all fatalities in 2023 (chart 2). Agriculture, fishing, forestry, and hunting followed at 20.8%, then transportation and warehousing at 9.4%. Industry classification was suppressed or missing in the BLS data for more than one in four heat-related deaths in 2023.

2. Share of fatal heat injuries*, by industry (2023)

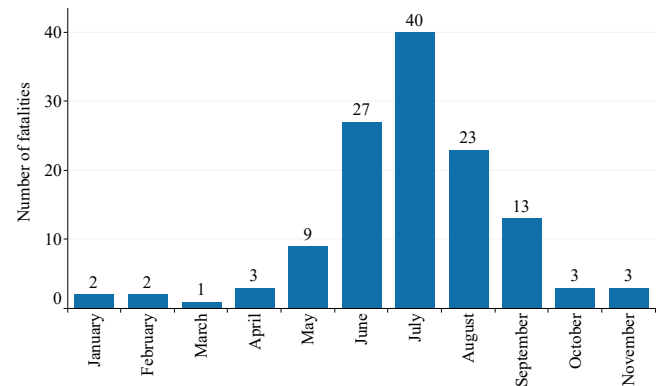


Source: U.S. Bureau of Labor Statistics, 2023 Census of Fatal Occupational Injuries and Illnesses.

*Chart uses primary source to estimate heat injuries by industry due to data availability issues.

CPWR Fatality Map data were also examined for heat-related deaths from 2011 to 2023 (n=126, chart 3). The summer months of June (n=27), July (n=40), and August (n=23) accounted for over two-thirds (71.4%) of observed heat-related fatalities. This aligns with when construction [hits operational peaks](#) and when temperatures are the highest.

3. Heat-related fatalities in construction, by month* (2011-2023)

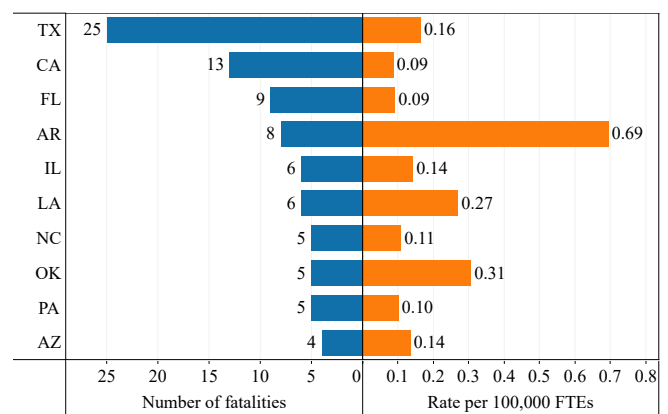


Source: CPWR, 2011-2023 Fatality Map.

*December is not shown due to no observed fatalities.

Heat-related fatalities were also analyzed by state (chart 4). The highest numbers of heat-related fatal injuries or illnesses occurred in Texas (n=25; Rate: 0.16 per 100,000 FTEs), California (n=13; Rate: 0.09), and Florida (n=9; Rate: 0.09). These three states also have the [highest construction employment](#) and the [largest populations](#). They are followed by other states such as Arkansas (n=8; Rate: 0.69), Louisiana (n=6; Rate: 0.27), North Carolina (n=5; Rate: 0.11), and Arizona (n=4; Rate: 0.14).

4. Heat-related fatalities in construction, by state* (2011-2023)

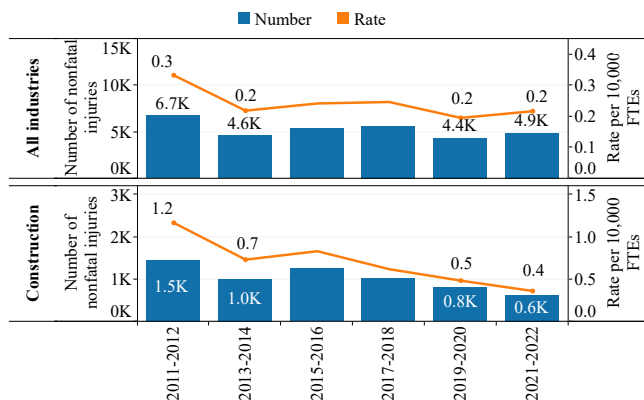


Source: CPWR, 2011-2023 Fatality Map and 2011-2023 IPUMS Current Population Survey.

*Fatality map data is restricted to OSHA fatality investigations and states covered in identified media reports. This data source accounts for approximately 70% of all construction at-work fatalities.

Next, construction was compared with all industries for nonfatal heat injuries resulting in days away from work (chart 5). From the 2011-2012 period to the 2021-2022 period, the number of nonfatal heat-related injuries in construction fell by more than half (-57.2%; 1.5K to 620), double the 26.9% (6.7K to 4.9K) decline across all industries. Meanwhile, the nonfatal heat injury rate in construction declined 66.7% (1.2 to 0.4 per 10,000 FTEs), while the rate across all industries fell 33.3% (0.3 to 0.2 per 10,000 FTEs).

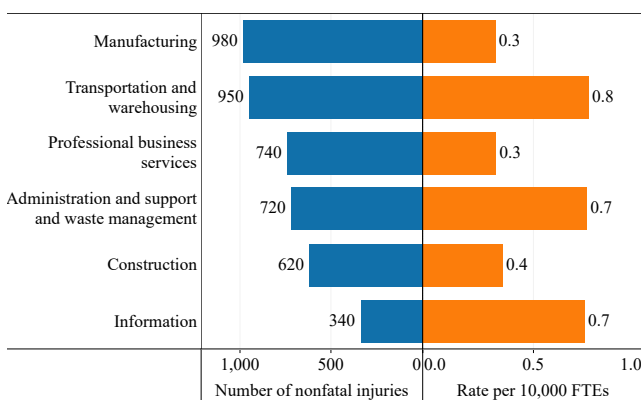
5. Nonfatal heat injuries resulting in days away from work, construction versus all industries (Private industry; 2011-2022)



Source: U.S. Bureau of Labor Statistics, 2011-2022 Survey of Occupational Injuries and Illnesses and 2011-2022 IPUMS Current Population Survey.

The six industries with the highest number of nonfatal heat injuries were then examined (chart 6). During the 2021-2022 period, construction reported 620 nonfatal injuries, with an injury rate of 0.4 per 10,000 FTEs. Among these six industries, manufacturing had the most heat-related injuries (n=980), followed by transportation and warehousing (n=950). Transportation and warehousing reported the highest rate (0.8 per 10,000 FTEs) among observed industries.

6. Nonfatal heat injuries, by top 6* industries (Private industry; 2021-2022)

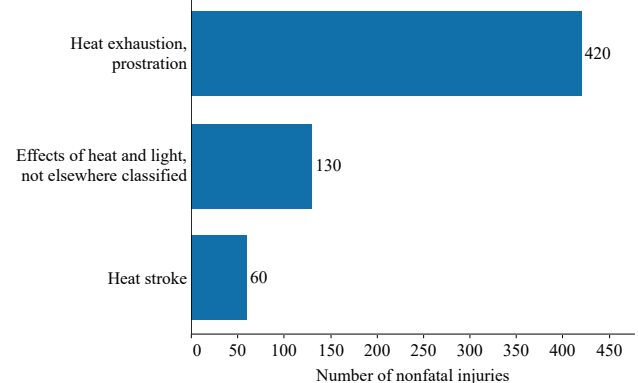


Source: U.S. Bureau of Labor Statistics, 2021-2022 Survey of Occupational Injuries and Illnesses and 2021-2022 IPUMS Current Population Survey.

*By count of injuries, excluding "Other Services".

Nonfatal heat-related injuries in construction were also analyzed by their *nature* (e.g., the physical characteristic of the injury; chart 7). During the 2021-2022 period, the most common nature of [heat-related injuries](#) was heat exhaustion, accounting for over two-thirds (n=420; 67.7%) of the total. The second most common was effects of heat and light not elsewhere classified (n.e.c.), which includes heat edema and dehydration; n=130) followed by heat stroke (n=60).

7. Nonfatal heat injuries in construction, by nature* (Private industry; 2021-2022)

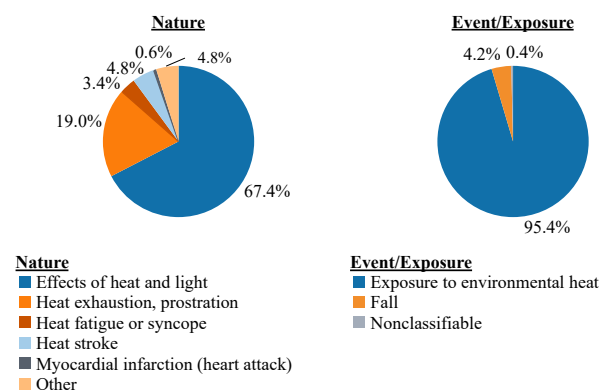


Source: U.S. Bureau of Labor Statistics, 2021-2022 Survey of Occupational Injuries and Illnesses.

*Due to rounding, nature codes do not sum to the total for 2021-2022 shown in charts 5 and 6.

Next, OSHA severe injuries were identified by *event/exposure*, *primary source*, or narratives related to heat. Without reviewing narratives, identification of additional severe traumatic injuries (e.g., from falls) for which heat was a contributing factor would have been missed. Of these additional injuries, 91.6% of those identified using a key word search were classified as traumatic injuries resulting from falls (data not shown). The reported nature and event/exposure codes were then examined for heat-related severe injuries (chart 8). By nature, more than two out of three (67.4%) of these severe injuries resulted from effects of heat and light, while the next largest category was heat exhaustion (19.0%). Almost all event/exposures were exposure to environmental heat; however, 4.2% were due to falls.

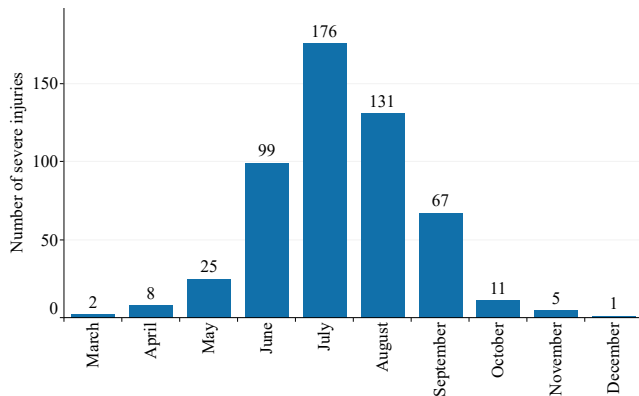
8. Heat-related severe injuries in construction, by nature and event/exposure (2015-2023)



Source: Occupational Safety and Health Administration, 2015-2023 Severe Injury Reports.

Next, 525 *heat-related injuries and illnesses* in OSHA severe injury data were examined (chart 9). By month, more than half of heat-related injuries occurred in July and August (58.5%), while approximately 5% of injuries occurred from October through April.

9. Number of heat-related severe injuries in construction reported to OSHA, by month* (2015-2023)

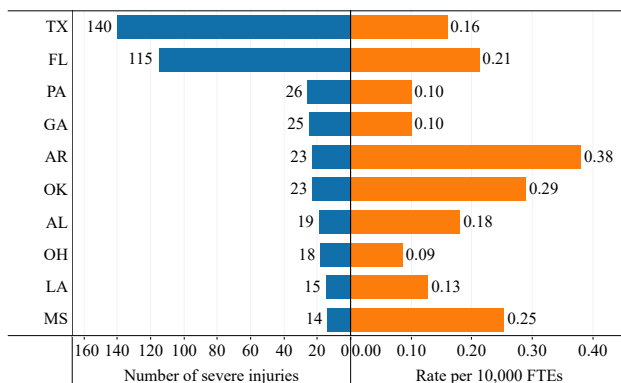


Source: Occupational Safety and Health Administration, 2015-2023 Severe Injury Reports.

*January/February are not shown due to no observed fatalities.

Heat-related OSHA severe injuries were then analyzed by state (chart 10). It is important to note that OSHA only includes incidents under federal OSHA jurisdiction; incidents in OSHA State Plans are not included. The top three states with the most heat-related injuries were Texas (n=140; Rate 0.16 per 10,000 FTEs), Florida (n=115; Rate: 0.21) and Pennsylvania (n=26; Rate 0.10).

10. Heat-related severe injuries in construction, by state* (2015-2023)

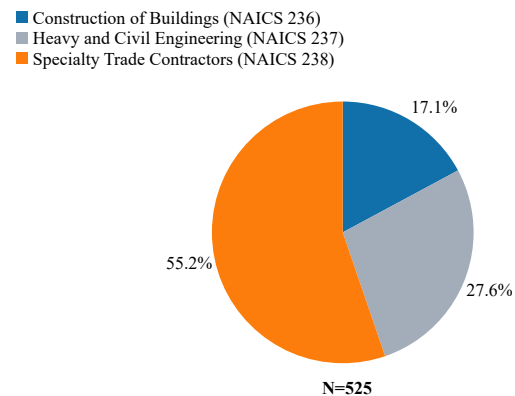


Source: Occupational Safety and Health Administration, 2015-2023 Severe Injury Reports and 2015-2023 IPUMS Current Population Survey.

*Data only available for federal OSHA states.

By major subsector, more than half of heat-related OSHA severe injuries were among workers employed by Specialty Trade Contractors (NAICS 238; 55.2%; chart 11). Heavy and Civil Engineering (NAICS 237) accounted for 27.6% of injuries, and Construction of Buildings (NAICS 236) accounted for 17.1% of injuries.

11. Heat-related severe injuries in construction, by major subsector (2015-2023)



Source: Occupational Safety and Health Administration, 2015-2023 Severe Injury Reports.

Construction had the highest number of fatal heat-related injuries and the third highest nonfatal heat-related injuries resulting in days away from work (charts 2 and 6 above). Heat's impact on worker health is even more significant than is shown in these statistics, as current data sources [underrepresent the number of HRI's](#). Overall, 5% of heat-related severe injuries (charts 8-11) would not have been identified using traditional event/exposure, source, or nature codes, as the information indicating they were heat-related was in their narratives. Heat has been demonstrated to contribute to other injury types, such as falling from a scaffold after becoming dizzy from heat exposure. It is also important to note that not all HRI's will result in days away from work or severe injury (e.g., hospitalization).

As the United States [continues to experience hotter summer temperatures](#), it is important for employers and employees to take [steps to reduce the adverse health effects of working in the heat](#), such as by conducting pre-task heat stress hazard analyses, developing and implementing heat injury and illness prevention plans, putting heat stress controls in place, and training workers to recognize and respond to the signs and symptoms of heat illness.

Many resources are available to help employers prevent HRI's, such as the [OSHA-NIOSH Heat Safety Tool App](#) and the [AIHA Heat Stress Mobile App](#). [Seven states](#) now have regulatory requirements for the protection of workers from heat, including [Maryland's Heat Stress Standard](#), and many other states have [bills under consideration](#). ANSI/ASSP's recent [A10.50-2024 Standard for Heat Stress Management In Construction and Demolition Operations](#) provides construction-specific guidance on heat as does [CPWR's heat safety](#) posters, handouts, program

templates, checklists, webinars, and trainings. North America's Building Trades Unions (NABTU) prioritizes heat safety across all trades and has developed a [new webpage](#) with posters, checklists, and other resources. [OSHA's Heat Safety](#) page also contains English and Spanish-language tools that are relevant to construction employers.

ACCESS THE CHARTS & MORE

View the [charts](#) in PowerPoint and the [data](#) underlying the charts in Excel. Downloading will start when you click on each link. These files can also be found under the Data Bulletin at: <https://www.cpwr.com/research/data-center/data-reports/>.

DEFINITIONS

- **Days away from work (DAFW)** – nonfatal injury cases resulting in at least one day away from work beyond the day of injury or illness onset.
- **Event or exposure** – the manner in which the injury or illness was produced or inflicted, such as fall, heat-related illness, etc. Definitions and examples can be found in the [Occupational Injury and Illness Classification Manual](#).
- **Full-time equivalent worker (FTEs)** – determined by the hours worked per employee on a full-time basis, defined as working 2,000 hours (40 hours x 50 weeks) per year.
- **Heat-related illness or injury** – an illness or injury resulting from exposure to heat. Illnesses included things like heat stroke, heat exhaustion, while injuries refer to traumatic injuries where heat was a contributing factor.
 - **CFOI/SOII** – injuries with event/exposure defined as “Exposure to Environmental Heat.” Includes the following conditions: Heat exhaustion, heat stroke, hyperthermia, or fatigue from high temperatures in any work environment; working around furnaces, kilns or other heat producing equipment without direct contact with hot objects.
 - **CPWR's Fatality Map** – narratives were coded as heat-related if they included a heat-related word such as heat exhaustion, overheated, dizzy. These were not manually reviewed for accuracy. Email datacenter@cpwr.com for more information.
 - **OSHA Severe Injury** – injuries were manually reviewed and classified as heat-related based on the presence of a heat-related word (e.g., heat exhaustion, overheated, temperature) or a heat-related event/exposure, primary source, or nature code. Email datacenter@cpwr.com for more information.
- **Major subsector** – 3-digit NAICS codes within construction.
- **Nature** – describes the physical characteristics of the injury or exposure. For more details see: [Occupational Injury and Illness Classification Manual](#).

- **Primary source** – the objects, substances, equipment, and other factors that were responsible for the injury or illness incurred by the worker. For example, a worker who was climbing up a ladder when they slipped and fell would have a reported primary source of, “Ladders.” For more details, see: [Occupational Injury and Illness Classification Manual](#).
- **Severe injury** – reports for amputations, in-patient hospitalizations, or loss of an eye for states that fall under Federal OSHA jurisdiction.

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ABOUT THE CPWR DATA CENTER

The CPWR Data Center is part of CPWR—The Center for Construction Research and Training. CPWR is a 501(c)(3) nonprofit research and training institution created by NABTU, and serves as its research arm. CPWR has focused on construction safety and health research since 1990. The Data Bulletin, a series of publications analyzing construction-related data, is part of our ongoing surveillance project funded by the National Institute for Occupational Safety and Health (NIOSH).

Besides cpwr.com, visit CPWR's other online resources to help reduce construction safety and health hazards:

- Choose Hand Safety
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- Construction Solutions
<https://www.cpwrconstructionsolutions.org/>
- COVID-19 Construction Clearinghouse
<https://covid.elcosh.org/index.php>
- Electronic Library of Construction Occupational Safety and Health
<https://www.elcosh.org/index.php>
- eLCOSH Nano
<https://nano.elcosh.org/>
- Exposure Control Database
<https://ecd.cpwrconstructionsolutions.org/>
- Nano Safety Data Sheet Improvement Tool
<https://nanosds.elcosh.org/>
- Safety Climate—Safety Management Information System (SC-SMIS)
www.scsmis.com
- Stop Construction Falls
<https://stopconstructionfalls.com/>
- Work Safely with Silica
<https://www.silica-safe.org/>