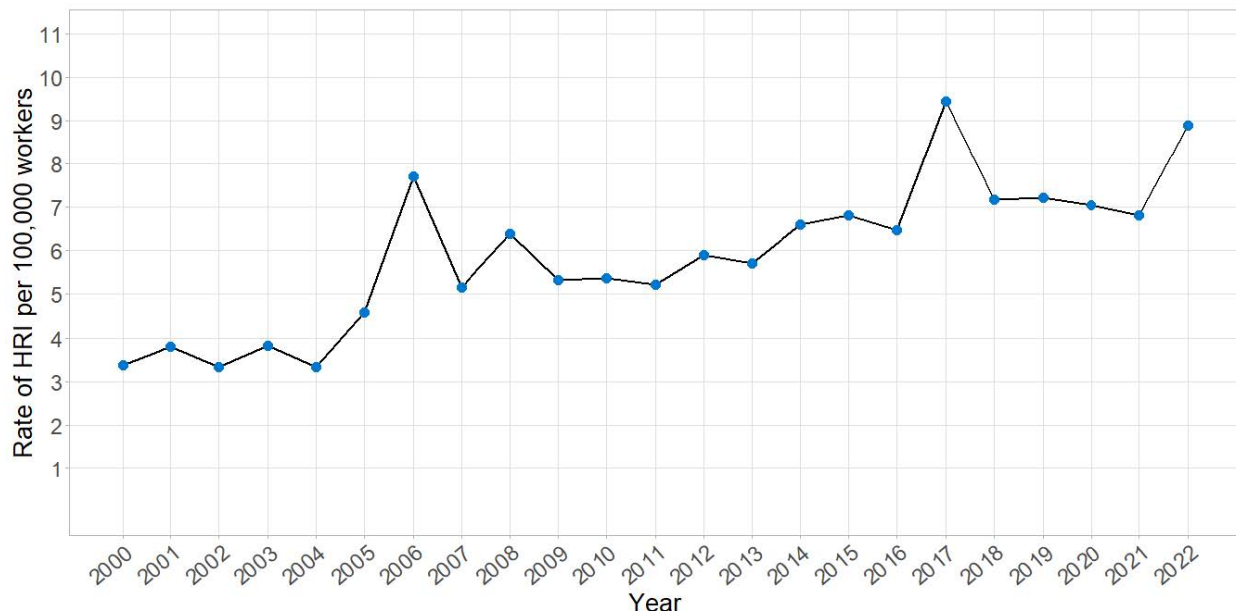


5.2 Occupational Heat-Related Illnesses

Californians are increasingly exposed to extreme heat due to climate change. In 2024, California experienced its hottest July on record. Workers are uniquely vulnerable to extreme heat due to occupational conditions and sustained exposure during work activities. Although heat-related illnesses are preventable, they remain a significant source of occupational (work-related) illness and death. In California, workers' compensation insurance claims for heat-related illnesses more than doubled from 2000 to 2022, underscoring the growing health burden of heat on the workforce.

Figure 5.2.1. Occupational Heat-related Illnesses in California.



Rates of heat-related illnesses are based on workers' compensation insurance claims from January 1, 2000, to December 31, 2022. HRI, heat-related illnesses. Source: CDPH (2025a)

What does the indicator show?

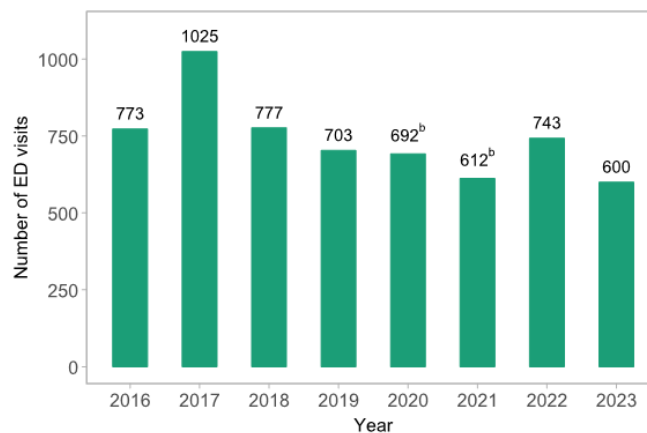
The yearly rate of occupational heat-related illness workers' compensation insurance claims more than doubled between 2000 and 2022. **Figure 5.2.1** presents annual rates of occupational heat-related illness claims per 100,000 California workers from 2000 to 2022 based on an analysis of workers' compensation claims data. Between 2000 and 2022, a total of 20,564 heat-related illness claims were reported in California. This



represents an average annual rate of 5.9 heat-related illness claims per 100,000 workers. Most heat-related illness cases reported in California occurred during the summer: July had the highest number of cases, followed by August, then June (not shown). Heat-related illnesses were relatively high in 2006, 2017, and 2022 when summertime temperatures were exceptionally warm.

Figure 5.2.2 shows the annual number of emergency department (ED) visits for occupational heat-related illness from 2016 to 2023. Over this period, occupational exposures accounted for 5,925 (12.5%) of the 47,223 ED visits with a heat-related illness diagnosis among people 16-84 years old. ED utilization declined during 2020 and 2021 due to the COVID-19 pandemic, suggesting that the reported visit counts during those years may underestimate the true burden of occupational heat-related illness.

Figure 5.2.2. ED visits for Occupational Heat-Related Illness, 2016–2023^a.



^a2016–2021 counts may differ from the previous version of this data brief due to an error in identifying severe HRI cases that has been corrected.

^b2020–2021 data subject to bias caused by reduced emergency department utilization during the COVID-19 pandemic.

Source: CDPH (2025b)

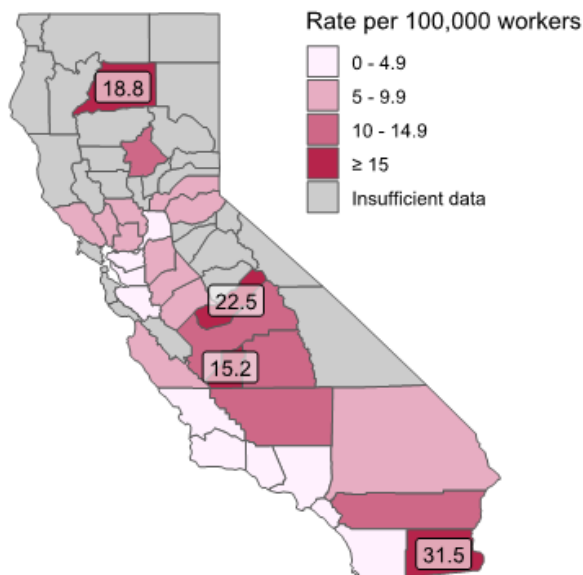
The highest rate of occupational heat-related illness ED visits is seen in Imperial County, with Kings, Madera and Shasta Counties also having high rates (**Figure 5.2.3**).

Figure 5.2.3 shows the rate of occupational heat-related illness visits per 100,000



workers by patient's county of residence, averaged over the eight years of data. Imperial County experiences the hottest temperatures in California (for daytime and nighttime/overnight) and agriculture is one of its major industries – potentially explaining the high rate of workers' ED visits for heat-related illness. It is possible that the high rate in Shasta County was caused by overlapping wildfire and heat events. Counties shown in gray reported relatively few total ED visits, so reliable rate estimates could not be determined.

Figure 5.2.3. ED Visit Rates per 100,000 Workers for Occupational Heat-Related Illness, 2016–2023.



Source: CDPH (2025b)

Why is this indicator important?

Heat-related illness among workers has been well-documented for several decades. Tracking these illnesses among workers is an integral part of public health planning, to mitigate and prevent the effects of extreme heat on the most vulnerable populations. As the climate warms, Californians are increasingly exposed to extreme heat. Workers are particularly vulnerable to heat exposure because they typically have little control over



working conditions and environments, with limited ability to adapt when faced with extreme heat conditions (Gibb et al., 2024).

“I worked in a skilled nursing facility without air conditioning, standing the entire shift. I experienced heat-related illnesses, including fainting, not knowing it was heat-related illnesses. My employer did not tell us about the importance of taking breaks, drinking water, and resting when working in hot conditions. Even if I knew about my right to file a workers’ compensation claim for my illnesses, I would have been afraid to.”

-Alyssa, former skilled nursing facility worker*

**Name changed to protect privacy*

CDPH 2025(a)

As climate change intensifies, average daily temperatures and the frequency and intensity of extreme heat events, as well as occupational heat-related illnesses and deaths, are projected to increase (ILO, 2019). A study of U.S. crop workers estimates that, at the current pace of climate change, occupational heat-related illnesses could double by the middle of the 21st century (Tigchelaar et al., 2020). As more workers are placed at risk, additional strategies and interventions will be needed to protect workers from heat-related illnesses. Such strategies include adjusted work schedules and more frequent and longer breaks with access to water and shade. OEHHA’s [CalHeatScore](#), released in 2025, helps employers track local heat events and identify cooling centers to support preparedness when extreme heat events arise.

Rising workplace temperatures also have broader economic implications. Borg et al. (2021) reviewed 20 studies to estimate the past and potential future global economic burden of workplace heat exposure. They estimated substantial heat stress-related expenses from lost productivity, decreased work efficiency, and healthcare costs, and highlighted the need for workplace heat management policies to minimize future economic burden. A study of workers’ compensation claims for heat exposure in California estimated financial costs for heat-related injuries at between \$525 and \$875 million per year, considering health care expenditures, lost wages and productivity, and disability claims (Park et al., 2021). A study of heat-related workers’



compensation insurance claims in weather-exposed industries during seven extreme heat events from 2013 to 2022 estimated approximately \$527 million in work-time losses (CDI, 2024).

Exposure to elevated workplace temperatures may also exacerbate trends in labor market inequality. Park et al. (2021) report that lower-wage workers are more likely to live and work in places with greater heat exposure and experience larger increases in heat-related risk on hotter days. People in the state's lowest household income tier are approximately five times more likely to be affected by heat-related illnesses or injuries on the job than those in the top income tier. These injuries among low-income workers can lead to high healthcare costs and long-term wage losses, potentially affecting future earnings.

What factors influence this indicator?

Warmer temperatures and more frequent extreme heat events such as those seen during the summers of 2006, 2017, and 2022 are becoming the new normal (see *Air Temperature* and *Extreme Heat Events* chapters). These warming trends coincide with an increase in reported cases of worker heat-related illnesses, as shown in **Figure 5.2.1**. Exposure to heat can lead to heat-related illnesses, including heat exhaustion, heat cramps, and heat stroke (a life-threatening medical emergency that can lead to death if not treated promptly).

Heat exposure during work restricts a worker's physical functions and leads to loss of productivity (ILO, 2019). When workers are exposed to heat, they are more likely to experience heat-related illnesses, make mistakes, become irritable, and sustain injuries due to impaired cognitive and physical performance. Extreme heat can also exacerbate chronic or underlying illnesses and injuries (Gibb et al., 2024). On average, workplace temperatures above 75-79 degrees Fahrenheit (°F) (24-26 degrees Celsius (°C)) are associated with reduced labor productivity. At 91-93°F (33-34°C), a worker operating at moderate work intensity loses approximately 50% of their work capacity. These temperature thresholds are even lower for workers who wear personal protective equipment (PPE), such as for pesticide applications. In California, a comparison of workers' compensation claims with local weather data from 2001 to 2018 showed that



on days with a high temperature above 90°F (32°C), workers have a 6 to 9% greater risk of any injuries than on days with high temperatures of 50 to 60°F (10 to 16 °C) (Park et al., 2021). When temperatures top 100°F (38°C), the risk of injuries increases by 10 to 15%. However, the temperature at which heat exposure adversely affects a worker's health varies widely and is influenced by multiple interacting factors. Individual characteristics, working conditions, and broader environmental or living conditions can all lower the temperature threshold at which occupational heat exposure becomes harmful. In particular, workers who are not heat-acclimatized - such as those newly exposed to hot conditions or returning after time away - are at increased risk of heat-related illness. **Figure 5.2.4** presents some examples of individual, occupational, and environmental factors that influence susceptibility to heat-related illness and helps explain variability in health outcomes among workers exposed to similar ambient temperatures. Further information is discussed below.



Figure 5.2.4. Examples of Individual, Occupational, and Environmental Factors that Affect Heat-Related Illness.



 Gibb K, et al. 2024
Annu. Rev. Public Health 45:315–35

Source: Gibb et al. (2024)

Individual worker factors

Certain demographic groups have higher rates of occupational heat-related illnesses than others, as shown in [Tables 5.2.1-5.2.3](#). In California, occupational heat-related illnesses are more common among Hispanic individuals, younger workers, and men (CDPH, 2025b). Workers who are socially isolated or economically disadvantaged, have chronic illnesses, or lack health insurance are especially vulnerable to heat-related illness; these workers are often from communities of color (OEHHA, 2026; US Global Change Research Program, 2023). Additional factors are shown in [Figure 5.2.4](#).



Table 5.2.1. Total Number and Average Yearly Rates of Occupational Heat-Related Illness Claims by Age in California, 2000–2022.

Age (years)*	Number and percent of total worker claims	Claims per 100,000 workers per year
16-24	3,830 (18.7%)	7.7
25-34	5,761 (28.1%)	6.3
35-44	4,462 (21.7%)	4.8
45-54	3,924 (19.1%)	4.5
55-64	2,080 (10.1%)	3.8
65+	475 (2.3%)	2.7

*Age was missing for 32 claims

Source: CDPH (2025a)

Table 5.2.2. Total Number and Average Yearly Rates of Occupational Heat-Related Illness Claims by Sex in California, 2000–2022.

Sex**	Number and percent of total worker claims	Claims per 100,000 workers per year
Male	14,715 (72.2%)	6.8
Female	5,672 (27.8%)	3.2

Source: CDPH (2025a)



Table 5.2.3. Race and Ethnicity of Occupational Heat-Related Illness Emergency Department Patients, California, 2016–2023.

Race and ethnicity	Number and percent of emergency department visits
Hispanic, any race	2,661 (45%)
White, non-Hispanic	2,313 (39%)
Black, non-Hispanic	365 (6.2%)
Other or multiracial, non-Hispanic	295 (5.0%)
Asian or Pacific Islander, non-Hispanic	179 (3.0%)
Race/ethnicity unknown	112 (1.9%)

Source: CDPH (2025b)

Younger workers may be more likely to work in industries or occupations with a higher risk of heat exposure, undertake more physically demanding work, and/or lack work experience and adequate acclimatization to hotter temperatures. New workers are considered those who are new to or returning to a job and lack acclimatization to the heat. New workers are at risk for occupational heat illness because they may not be accustomed to the physical demands and environmental conditions of their job (Gibb et al., 2024).

Working conditions

Workers who perform physically demanding or strenuous tasks and/or work outdoors are particularly vulnerable to heat-related illnesses (Heinzerling et al., 2020; Gibb et al., 2024). Occupations posing the highest risk of heat illness include those working outdoors in hot climates, such as agriculture, construction, mining, and landscaping, as well as those in non-climate-controlled indoor settings, including production work (machine operators and food packers). Workers in these occupations are typically at



risk due to their exposure to hot environments, labor-intensive tasks, and lack of access to cooling resources, such as shade, air conditioning, and fans (Gibb et al., 2024). Outdoor workers are often exposed to the sun, and many farmworkers require extra clothing to protect themselves against pesticides and abrasive vegetation such as thorns or rough foliage. Research on heat-related illnesses among indoor workers remains limited. Indoor workers who use heat-generating equipment, particularly in poorly ventilated settings or non-climate-controlled environments, such as warehouses and food production facilities, may be at risk of heat-related illnesses (CDPH, 2023; Gibb et al., 2024).

The occupational group with both the highest number and rate of heat-related illnesses is “protective services”, which includes police and firefighters ([Table 5.2.4](#); CDPH, 2025a). Heat-related illness was also commonly reported among workers in farming, fishing, and forestry; construction; and transportation and material moving occupations, though at lower rates than in protective services.

High ambient temperatures challenge the body’s ability to regulate internal temperature through evaporative cooling. Anything that limits sweat from evaporating, such as PPE or clothing, impairs the body’s ability to cool down (Gubernot et al., 2014), which in turn increases the risk of heat-related illness. Firefighting presents significant challenges for heat illness prevention, given the high heat exposure and exertion involved, as well as the heavy PPE required (West et al., 2020, [Figure 5.2.4](#)). Heat-related illnesses among firefighters have risen from 2001 to 2020 (Murray et al., 2024; [Figure 5.2.5](#)). The risk of heat-related illnesses in this group, especially among wildland firefighters, is expected to continue increasing as wildfires grow larger and more severe, and as fire seasons lengthen (see *Wildfires* chapter). Other occupations that may require heat-restrictive equipment or clothing include farmwork for pesticide applications (see *Farmwork Exposure to Pesticides* chapter) and construction, further increasing heat-related illness risk during periods of extreme heat.



Table 5.2.4. Total Number and Average Yearly Rates of Heat-Related Illness Claims for the 10 Highest Occupation Groups, California, 2000-2022.

Occupation Group	Number and percent of total claims*	Claims per 100,000 workers per year
Protective service occupations**	3,776 (22.4%)	50.2
Farming, fishing, and forestry occupations	1,928 (11.5%)	37.0
Construction occupations	2,114 (12.6%)	12.4
Transportation and material moving occupations***	2,115 (12.6%)	8.7
Building and grounds cleaning and maintenance occupations	1,028 (6.1%)	7.6
Installation, maintenance, and repair occupations	802 (4.8%)	7.5
Production occupations****	711 (4.2%)	4.1
Arts, design, entertainment, sports, and media occupations	226 (1.3%)	3.5
Architecture and engineering occupations	250 (1.5%)	3.1
Personal care and service occupations	189 (1.1%)	2.7

* Total number of claims = 20,564

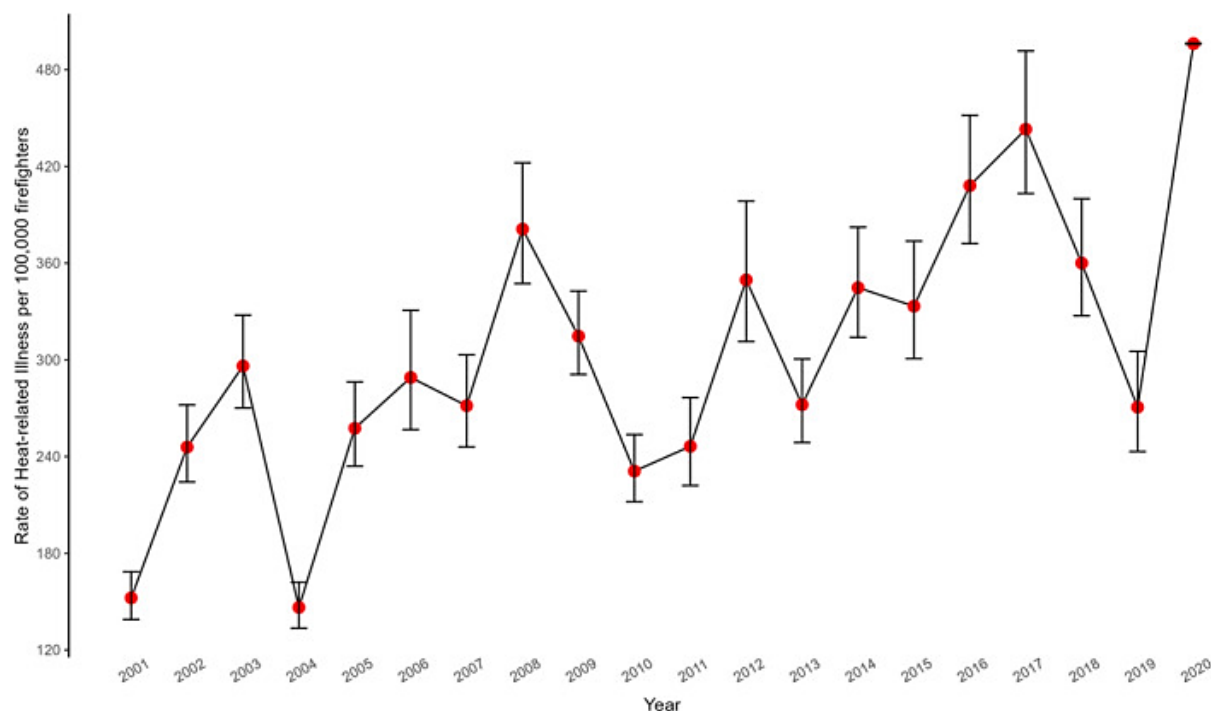
** Includes firefighters, police officers, and correctional officers

*** Includes transportation workers, refuse collectors, and hand packers

**** Includes machine operators, assemblers, welders, and food packers Source: CDPH (2025a)



Figure 5.2.5. Rates of Heat-Related Illnesses in California Firefighters, 2001-2020.



The graph shows estimates of heat-related illnesses (red points) and 90% confidence intervals. Source: Murray et al. (2024).

Heat-related illnesses are also common among farmworkers ([Table 5.2.4](#); CDPH, 2025a). The majority of farmworkers in California are immigrants who work long days during the summer season and have limited control over their work schedule and job tasks (ILO, 2019). Immigrant and migrant workers have high overall rates of occupational injuries; they often have extended work hours, poor working conditions, and limited safety training in comparison to their non-migrant counterparts. Language barriers can also interfere with health and safety training (Gibb et al., 2024). A study of heat strain in California farmworkers found an increased risk of acute kidney injury after a day of work, particularly among female workers who were paid by the amount they picked or harvested (Moyce et al., 2017).

In a California Heat Illness Prevention Study, core body temperature and work rate (monitored using a personal accelerometer) over a work shift were used to monitor



heat-related illness risk in 587 farmworkers (Langer et al., 2021). About 58,000 workers were at risk of elevated core body temperatures greater than or equal to 101.4°F, (38.6°C). Despite consuming more water compared to less active workers, many of those at risk still became dehydrated (15.7% of men and 3.3% of women). The study concluded that the risk of heat-related illness was exacerbated by both work rate and environmental temperature, despite farms adhering to Cal/OSHA heat-related illness regulations.

Incarcerated workers are also vulnerable to heat stress and often do not receive the same level of protection as many other workers. They perform various indoor and outdoor jobs, including firefighting, construction, cooking, cleaning, laundry, and manufacturing, many of which are at high risk for heat-related illnesses. The extent of the impact of heat exposure on incarcerated workers is unknown, as they are typically excluded from data sources that characterize occupational heat illness, which are limited to noninstitutionalized populations (Gibb et al., 2024).

Worker living conditions

The hazards created by extreme heat in the workplace are affected by the context in which workers live. Cities are often warmer than surrounding rural areas due to heat-absorbing materials such as concrete used for roads and buildings, without adequate shade. This phenomenon is called the urban heat island effect. Urban heat islands, combined with substandard worker housing, can prevent overnight cooling periods, which are crucial for reducing the risk of heat-related illnesses (Gibb et al., 2024).

Prevention

Heat-related illnesses are preventable, with well-established strategies to protect workers (Heinzerling et al., 2020). Two regulations enforced by the California Division of Occupational Safety and Health (Cal/OSHA) protect workers from heat-related illnesses. Since 2006, all employers with outdoor workers have been required to comply with the regulation for heat illness prevention in outdoor work, Title 8 CCR Section 3395. This requires employers to implement protections, including adequate shade, water, and rest breaks, as well as training, recordkeeping, and additional procedures for exposure to extreme heat. Beginning in fall 2024, employers with indoor workers have been required to comply with Title 8 CCR Section 3396, which mandates similar



protections for these workers. The California Department of Industrial Relations maintains information about both standards on their website: [Cal/OSHA Heat Illness Prevention Guidance and Resources](#). Evidence suggests that these heat-safety regulations help mitigate some of the risk that outdoor workers face (Alahmad et al., 2025; Fomenko et al., 2025). After implementing Title 8 CCR Section 3395 in 2005, the rate of heat-related work injuries in California declined by approximately 30%, and heat-related deaths may have been reduced by as much as 43% after Cal/OSHA updated and strengthened the requirements in 2015 (Dean and McCallum, 2025).

Technical considerations

Data characteristics

When workers are injured or become ill on the job, a workers' compensation claim may be filed with their employer's workers' compensation insurance carrier. This occupational heat-related illnesses indicator is based on analyses by CDPH, which uses workers' compensation claims and ED visits to estimate the burden of heat-related illnesses in California. Findings of the workers' compensation analysis are presented in **Figure 5.2.1** and **Tables 5.2.1** through **5.2.3** (CDPH, 2025a). Findings of the emergency department analysis are presented in **Figure 5.2.2** and **Table 5.2.4** (CDPH, 2025b).

The Workers' Compensation Information System (WCIS), managed by the California Department of Industrial Relations, collects information on work-related illnesses and injuries that result in more than one day of lost work time or require treatment beyond first aid. Most, but not all workers are eligible for workers' compensation and workers may decline to file a claim for various reasons (CDPH, 2025a). Claims were identified as heat-related if the nature or cause of injury was heat-related, or if heat-related illness keywords were included in the injury description. Employment data from the US Bureau of Labor Statistics Current Population Survey was used to calculate rates of heat-related illnesses per 100,000 workers by sex, age, and occupation (CDPH, 2025a).

Each claim contains a description of the worker's occupation at the time of the claim. The National Institute for Occupational Safety and Health (NIOSH) Industry and Occupation Computerized Coding System was used to assign standard occupation



codes to individual occupations. To compare occupations with many versus few workers, average yearly rates of heat-related illnesses were calculated per occupation group, using the same classification system as NIOSH. Occupations employing fewer than 1,000 workers annually in California are excluded. WCIS data does not include information on the worker's race or ethnicity (CDPH, 2025a).

All state licensed emergency departments in California are required to submit summary information for each visit to the Department of Health Care Access and Information. These data include codes for the diagnoses received by the patient, as well as information about the patient, including age, race and ethnicity, and county of residence. CDPH searched these data for the years 2016–2023 for ED visits with heat-related illness diagnostic codes that were accompanied by either a code indicating a work-related event or that the medical bill was expected to be paid by Workers' Compensation Insurance. The diagnostic codes included heat-related illness included heat exhaustion, heat stroke, heat fatigue, heat syncope (fainting), heat cramps, and heat edema (swelling of extremities). The Occupational Health Branch followed CDPH guidelines on data de-identification and did not include identifying information in any results presented in this chapter (CDPH, 2025b).

Strengths and limitations of the data

Rates of reporting may also differ by industry and occupation. Some occupations, such as those with barriers to obtaining healthcare or struggle to file workers' compensation claims, are likely to be underrepresented. Other barriers to filing a workers' compensation claim include fear of retaliation (for example, getting hours reduced or being fired); vulnerability due to immigration status (for example, migrant farmworkers); and a lack of accessible information about rights when injured at work. Conversely, individuals who work in occupations with a high level of organized labor may face fewer barriers to filing a workers' compensation claim. Analyses of heat-related illness rates among incarcerated individuals were not included in this analysis due to the lack of available data on the total number of incarcerated people working in the state (CDPH, 2025a).



Additionally, the COVID-19 pandemic is likely to have affected workers' ability to seek care and may have resulted in lower rates of heat-related illnesses; therefore, caution must be used when comparing data from 2000–2019 to later years (CDPH, 2025a).

Milder heat-related cases, such as those treated at home, in the workplace, or in non-medical settings, would not be included in the data. In addition, there are likely to be occupational heat-related cases that were missed because any hospital records that did not include a work-related diagnostic code or list Workers' Compensation insurance as the payer would be excluded (CDPH, 2025b).

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