



REPORT

FEELING THE HEAT:

HOW CALIFORNIA'S WORKPLACE HEAT STANDARDS CAN INFORM STRONGER PROTECTIONS NATIONWIDE



AUTHORS:

Teniopé Adewumi-Gunn

Juanita Constible

ACKNOWLEDGMENTS

The authors are grateful to the following report reviewers for their constructive feedback: Lizbeth Diaz and Kevin Riley (UCLA Labor Occupational Safety and Health Program); Anne Katten (California Rural Legal Assistance Foundation); and Marc Boom, Lena Brook, Kim Knowlton, Jennifer Sass, and Leah Stecher (NRDC).

We would also like to thank the individuals from the following organizations who contributed to our Community Voices narratives by sharing their personal stories: California Rural Legal Assistance, CLEAN Carwash Worker Center, Institute of Popular Education of Southern California, and the International Brotherhood of Electrical Workers.

Finally, thank you to the many professionals who shaped our thinking, pointed out resources that were unknown to us, and shared their personal stories, including those working with Public Citizen's Heat Stress Network, the California Division of Occupational Safety and Health, and Worksafe.

About NRDC

NRDC is an international nonprofit environmental organization with more than 3 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Chicago, Montana, and Beijing. Visit us at nrdc.org.

NRDC Interim Chief Communications Officer: Jenny Powers

NRDC Managing Directors of Communications (Operations and Content): Lisa Goffredi

NRDC Policy Publications Editor: Leah Stecher

Cover image: © Mark Rightmire/MediaNews Group/Orange County Register via Getty Image

Design and Production: www.suerossi.com

© Natural Resources Defense Council 2022

Table of Contents

Executive Summary	4
California’s Heated History: Leading the Way With a Robust Heat Standard	6
Workplace Illnesses and Deaths Lead to an Emergency Heat Standard	6
Creating—and Refining—a Permanent Heat Standard	7
An Indoor Heat Standard Would Fill Important Gaps	8
Cal/OSHA Tackles Education and Awareness of the Heat Standard.....	8
Investigating Heat-Related Illnesses and Fatalities	8
Inspecting a workplace	9
Citations and appeals process	9
Strengthening Heat Standards for Workers in California and Beyond.....	9
Workers Need a Stronger OSHA Heat Standard and More Robust Enforcement: Findings and Recommendations	10
Finding 1: The agriculture industry leads in serious heat incidents and serious heat standard violations	10
Recommendations.....	10
Finding 2: Most heat stress violations are triggered by unprogrammed inspections.....	13
Recommendations.....	13
Finding 3: Indoor workers and outdoor workers across multiple nonfarm industries are also affected by heat-related injuries and illnesses.....	15
Recommendation	16
Finding 4: Hundreds of businesses repeatedly violated the heat stress standard.....	17
Recommendations.....	17
Finding 5: Penalties were reduced for more than half of all citations	20
Recommendations.....	20
Finding 6: Training was the most cited heat standard violation.....	20
Recommendations.....	20
Finding 7: Acclimatization was among the least cited standard provisions	21
Recommendations.....	21
Conclusion	23
Appendix: Research Methodology	24
Catastrophic and Fatal Heat Incidents	24
Heat Standard Citations	24
Community Voices	24

Executive Summary

We are in the midst of a profound public health crisis. Rising temperatures fueled by climate change are contributing to more extreme weather events, spikes in air pollution, more frequent wildfires, and increases in tick- and mosquito-borne disease outbreaks.¹ The resulting health harms fall more heavily on some populations than others, including workers.² Workers face a range of climate-related hazards on the job, but one of the most pressing and well-understood hazards is extreme heat.³

Extreme heat is killing and sickening workers.⁴ Both short stretches of extreme heat and chronic exposure to heat can cause significant effects on their physical, mental, and social well-being.⁵ Heat can cause rash, cramps, exhaustion, and stroke, the most serious heat-related illness. The Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII) estimates that from 1992 to 2019, more than 900 workers died and tens of thousands more were sickened due to extreme heat.⁶

However, these numbers greatly underestimate the scale of the problem due to lack of reporting by negligent employers and by workers afraid of retaliation (e.g., loss of employment or deportation if they are undocumented).⁷ These numbers are further deflated when heat is not identified as a cause of, or contributor to, illness or injury. Negative outcomes from cardiac or respiratory illnesses are often not attributed to heat, even if that is an underlying cause.⁸ Physical and mental effects of heat such as disorientation can also increase the risk of other work-related injuries including falling from heights, being struck by a moving vehicle, or mishandling dangerous machinery.⁹ Research has shown that the number of workers facing health outcomes from extreme heat are higher than those reported by the BLS SOII.¹⁰ In fact, in California alone, a study of workers found more than 15,000 occupational heat-related illness cases from 2000 to 2017.¹¹ The California cases were three to six times higher annually than the numbers reported for California by BLS.

Exposure to extreme heat impacts both indoor and outdoor workers.¹² From agricultural and construction workers, who have the highest incidences of heat-related illnesses, to warehouse and other indoor employees working without adequate cooling or ventilation, heat touches many workplaces.¹³ Workers of color also experience greater rates of heat-related illnesses and fatalities than do white workers.¹⁴ Workers of color are overrepresented in industries with a high risk of heat illness, but racial disparities in heat illness and death also exist among those working the same jobs. Additionally, not all workers

tolerate heat the same way. Those with personal risk factors such as heart disease, medications, and pregnancy are more likely to experience heat stress.¹⁵

Heat-related fatalities, injuries, and illnesses are preventable, but current federal regulations do not support prevention. Responsibility for protecting workers from extreme heat falls on employers and regulatory bodies, most notably the federal Occupational Safety and Health Administration (OSHA). However, the lack of a specific standard limits OSHA's ability to address the dangers of occupational heat stress. Currently, heat-related incidents that occur under OSHA's jurisdiction (most private sector workers and some federal government workers) or in states without a specific heat regulation are cited under the General Duty Clause of the Occupational Safety and Health Act of 1970, which broadly states, "Each employer shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm."¹⁶ The General Duty Clause is not specific enough to address discrete hazards such as heat and is often hard to enforce. In several recent rulings the Occupational Safety and Health Review Commission (OSHRC), which hears cases in which an employer contests penalties resulting from OSHA inspections, has stated that in the absence of a heat standard it is difficult to establish that excessive heat is a recognizable hazard under the General Duty Clause—putting constraints on OSHA's ability to protect workers.¹⁷

Environmental, labor, faith, health, consumer rights, and immigration justice organizations have long advocated for a comprehensive federal standard that protects indoor and outdoor workers from heat.¹⁸ Federally, the United States trails several other countries that have instituted policies for occupational heat stress including China, Costa Rica, Thailand, and the United Arab Emirates.¹⁹ While there have been several congressional attempts to have OSHA develop specific heat safeguards within a defined time frame, corporate lobbying has slowed these legislative efforts.²⁰

In mid 2021, as part of the Biden administration's focus on worker safety, OSHA signaled its intent to start the rulemaking process for a heat standard independent of congressional legislation.²¹ The White House also announced that OSHA would increase its efforts to protect workers from extreme heat by boosting heat-related inspections, improving its response to heat-related complaints, and increasing enforcement.²² These efforts have the potential to help some workers in high-risk industries, but most workers are not likely to feel real relief from heat stress anytime soon. For one thing, the enhanced inspection and enforcement program excludes many high-risk workers, such as those in the Postal Service. It also will still rely on the insufficiently specific General Duty Clause. The other problem is that the formal OSHA rulemaking process is notoriously time-consuming, taking up to 11 years.²³ The average time for federal standards promulgated between 1981 and 2010 exceeded 7 years.²⁴

Without federal safeguards in place for heat, it falls on states to close the gap and develop enforceable heat stress regulations for workers.²⁵ To date only five states have done so: California, Washington, Colorado, Minnesota, and Oregon.²⁶ But a push for state-level protections has gained momentum in recent years. Legislators in Arizona, New York, and Maine have introduced workplace heat safety bills.²⁷ And in Maryland, the state Occupational Safety and Health office is in the process of developing heat stress standards.²⁸ A benefit of state standards is that they are often developed faster than national-level regulations. For example, the California Occupational Safety and Health Administration (Cal/OSHA) developed its heat stress standard in one year following a mandate by the state legislature.²⁹ However, current state standards leave gaps that a federal standard could fill. Currently, none of the state standards protect all workers in the state. California and Washington have safeguards only for outdoor workers, Colorado's standard is specific to agricultural workers, and Minnesota focuses only on indoor workers. A federal standard is needed to protect *all* indoor and outdoor workers, both in states with specific heat stress policies and in states without them.

Reviewing the effectiveness of existing policies can ensure that the most protective standards are developed, whether by OSHA or by individual states. Many states have modeled their safeguards after the California standard, one of the most robust. Yet very little research has been done to understand how employers in California have been adhering to the standard and how workers have been impacted by it. Understanding employer adherence and impact on workers will provide California, other states, and OSHA valuable insights into how such standards can

be improved. This report identifies areas in which the California heat stress standard—and any subsequent state or OSHA standards modeled after it—can be strengthened, using publicly accessible data on occupational heat-related inspections and citations over the last 15 years. This report also includes interviews with worker advocates and workers impacted by these heat policies and uses their experiences to inform recommendations on improving the California standard.

Through our analysis and interviews, we identified several key findings:

- Workers in agriculture are affected by heat-related illness and injury more than workers in any other industry. However, heat affects workers across multiple occupations in outdoor settings and indoor environments without adequate cooling, such as construction, outdoor maintenance (e.g., landscaping), indoor maintenance (e.g., pest control), security and parking services, warehouses, and bus and delivery services.
- Many heat penalties imposed on employers by Cal/OSHA stem from complaint-initiated inspections rather than routine inspections.
- Businesses that violate California's heat illness prevention standard commonly do so more than once.
- Cal/OSHA routinely reduces penalties imposed on employers for violating the heat standard.
- Employers provide inadequate worker training on how to avoid heat-related injuries and illnesses.
- Worker experiences with the California heat standard greatly differ, with vulnerable worker populations such as day laborers and car wash workers bearing the brunt of employer inaction.

Alongside our findings we include key recommendations, such as the following:

- Increase funding and recruitment so Cal/OSHA can hire more staff and bilingual inspectors.
- Include more detail in the standard about how employers should provide potentially life-saving elements such as water, rest, shade, and training.
- Better protect workers who report unsafe conditions from retaliation by employers.
- Revise Cal/OSHA's current citation-reduction policies.

Overall, the California standard is a good model for OSHA and other states to look to when developing their own heat standard but there is still much room for improvement in how the standard is written and enforced.

California's Heated History: Leading The Way with a Robust Heat Standard

California contains the most employed people of any state in the country, and many of those 16.9 million workers need heat protections.³⁰ The state-level government agency tasked with the job is Cal/OSHA, created in 1973 to ensure safe and healthful working conditions for California's workers.³¹ Cal/OSHA sits within the California Department of Industrial Relations, which also houses the Occupational Safety and Health Standards Board (OSHSB).³² The OSHSB promotes, adopts, and maintains reasonable and enforceable workplace safety standards.³³ Cal/OSHA and OSHSB play a pivotal role in developing occupational health and safety standards.³⁴

WORKPLACE ILLNESSES AND DEATHS LEAD TO AN EMERGENCY HEAT STANDARD

Advocates in California began pushing for a workplace heat standard in 1984, when members of the Los Angeles Librarian's Guild brought a petition to Cal/OSHA requesting protections for librarians suffering from heat

illness due to lack of indoor cooling.³⁵ Cal/OSHA finally convened a committee in the late 1990s to draft regulatory language and proposed a standard in 2002 but took no further action.³⁶

In February 2005 then State Assemblymember Judy Chu authored a bill sponsored by the United Farm Workers union (UFW) and the California Rural Legal Assistance

© Irfan Khan / Los Angeles Times via Getty Images



Foundation that directed OSHSB to develop a permanent heat illness prevention standard by the end of 2006. Later that year, Cal/OSHA investigated three potential workplace heat illnesses and five heat deaths, the highest annual number of heat investigations since 1998.³⁷ All the cases occurred in outdoor occupations, specifically agriculture and construction.³⁸ These incidents, passage of the bill in the General Assembly, and pressure from the UFW drove Cal/OSHA to seek emergency regulations to minimize the incidence of heat stress among workers.³⁹ With approval from OSHSB and then-governor Arnold Schwarzenegger, an emergency heat stress standard for outdoor workers took effect in August 2005 and included provisions for water, shade, and heat stress training for employees and supervisors.⁴⁰ The emergency standard had an intended end date of December 2005 but was renewed twice into July 2006.⁴¹

CREATING—AND REFINING—A PERMANENT HEAT STANDARD

With rising temperatures and the repeated need to renew the emergency standard, it became apparent that a permanent standard was necessary. Cal/OSHA and OSHSB moved toward a rulemaking process.

Workers, unions, worker advocates, and employers provided input on the two agencies' proposed additions and amendments to the emergency standard. These amendments included allowing cooling measures in place of shade (such as misting machines) and requiring employers to have written heat stress procedures available at work sites. Many employers questioned the need for such a standard, wanted clarification on what constituted an outdoor worker, and noted that they could not force their

employees to drink water. Although worker advocates were generally supportive of the permanent standard's proposed language, they called for more emphasis on the responsibilities of employers; longer recovery breaks that were scheduled rather than voluntary; and the use of temperature, humidity, and exertion metrics to determine employee exposure. OSHSB took these comments into consideration in formulating the permanent standard, which went into effect July 2006.

In 2009, as the state continued to see heat-related illnesses and deaths, the UFW brought litigation challenging the adequacy of enforcement and pushed for more specificity to the outdoor heat standard.⁴² To ensure that employers were clear on what was required to protect workers, Cal/OSHA drafted additional substantive changes to the standard including new provisions for high-heat conditions, employee and supervisor training prior to the beginning of work, and distribution of information on clothing and personal protective equipment.⁴³ Again workers, unions, advocates, and employers provided public comment on the revisions.⁴⁴ The OSHSB voted to adopt the amendments, which went into effect in November 2010.

The most recent amendments to the heat standard occurred in 2015.⁴⁵ At the urging of worker advocates, OSHSB and Cal/OSHA proposed clarifying language for certain sections of the standard including language on acclimatization and not leaving employees alone or sending them home after a heat illness.⁴⁶ These changes were brought forward after several workers experiencing heat stress died during their first days of work after being sent home or left alone. Other proposed changes to the standard included reducing the temperature at which shade protections were triggered. The final revised standard went into effect in May 2015.⁴⁷ Table 1 outlines the heat standard requirements for all outdoor places of employment.

TABLE 1: REQUIREMENTS OF CALIFORNIA'S HEAT ILLNESS PREVENTION IN OUTDOOR PLACES OF EMPLOYMENT STANDARD⁴⁸

Standard Requirements*	Year Introduced
Training Supervisory and nonsupervisory employee training on elements of heat-related illnesses and injuries.	2005
Provision of Water Employee access to free, drinking water as close as practicable to the areas where they are working.	2005
Access to Shade Mandatory provision of shade when the temperature exceeds 80 ° F, and encouragement of preventative cool-down rests in the shade.	2005
High-heat Procedures Procedures that employers must follow when the temperature equals or exceeds 95 ° F.	2010
Emergency Response Procedures Procedures including close monitoring of employees who are exhibiting signs or symptoms of heat illness.	2015
Acclimatization Close observation of employees during their first 14 days of employment and during heat waves.	2015
Heat Illness Prevention Plan Written safety plan for how employers will address heat stress in the workplace.	2015

*Note: Descriptions of requirements are brief overviews and do not detail mandatory elements of the standard.

AN INDOOR HEAT STANDARD WOULD FILL IMPORTANT GAPS

California's heat standard has a significant flaw: It does not cover indoor workers and may not cover workers whose jobs are not unambiguously outdoor. What is considered an outdoor workplace is determined by Cal/OSHA, the Cal/OSHA Appeals Board, or the appellate courts. For example, in 2014, the California Superior Court ruled that buses were outdoor places of employment and that transit companies had to follow the outdoor heat standard.⁴⁹ There have also been cases in which Cal/OSHA has cited workplaces that could be considered indoor (e.g., auto-body shops) under the outdoor standard. In these instances, employees have typically been working both indoors and outdoors.

In 2016 the lack of specific indoor heat protections led to the passage of California's Senate Bill 1167, co-sponsored by the California Labor Federation, American Federation of Labor and Congress of Industrial Organizations (AFL-CIO) and the Northern California District Council of the International Longshore & Warehouse Union.⁵⁰ The legislation required Cal/OSHA to propose a Heat Illness Prevention in Indoor Places of Employment standard to the Standards Board within two years. In early 2017, Cal/OSHA convened several advisory committee meetings to develop the proposed regulation, and stakeholders and the public were given an opportunity to provide input.⁵¹ Several more advisory committee meetings were held in 2018, and revisions were made to the draft indoor standard. Cal/OSHA made further revisions in 2019 and then began to prepare the rulemaking documents.

In April 2019, the draft standard entered the Standardized Regulatory Impact Assessment (SRIA) process, which includes, among other things, an assessment of all costs and benefits of the proposed regulatory change. In late 2021, Cal/OSHA announced that the SRIA analysis was complete and that the department would be putting the finishing touches on the formal rulemaking documents, but no formal release date has been set.⁵²

As of October 2021, the draft standard designates an indoor trigger temperature that would put the standard into effect. It covers provision of water, access to cool-down areas, emergency response procedures, acclimatization, details for training, and a heat illness prevention plan. As we discuss in our recommendations in Section 3, indoor workers need provisions such as these to protect them from heat-related injuries and illnesses.

CAL/OSHA TACKLES EDUCATION AND AWARENESS OF THE HEAT STANDARD

Following the 2009 UFW lawsuit and continued problems with employer compliance with the heat standard, Cal/

OSHA launched an extensive heat illness prevention campaign in 2010. Featuring print ads, billboards, radio ads, and other means of communication, the campaign seeks to educate workers and employers on the outdoor heat standard, especially those in the construction and agriculture industries.⁵³ The statewide campaign is largely implemented through a partnership with the UCLA Labor Occupational Safety and Health Program; the University of California, Berkeley, Labor Occupational Health Program; and the Western Center for Agricultural Safety and Health at the University of California, Davis.⁵⁴

Cal/OSHA has continued its outreach program in recent years, including by holding collaborative training in English and Spanish to highlight the requirements of the standard. More recently it expanded its materials and fact sheets to include other languages such as Hmong and Punjabi.⁵⁵ Additionally, Cal/OSHA provides consultative services for employers on heat illness prevention.

INVESTIGATING HEAT-RELATED ILLNESSES AND FATALITIES

Cal/OSHA inspectors routinely conduct workplace inspections to ensure that employers are adequately protecting workers from heat and following all requirements of the heat standard. Typically these inspections are conducted without advance notice to the employer.⁵⁶ Inspections can be classified into two categories, programmed and unprogrammed.⁵⁷ Programmed inspections are conducted in high-hazard industries (e.g., construction) that have high rates of workers' compensation losses and preventable injuries and illnesses, such as those caused by excessive heat. Unprogrammed inspections occur in response to unexpected events such as catastrophic incidents and fatalities. (A catastrophe is defined as the hospitalization of three or more employees resulting from a work-related incident or exposure.) For example, if an employee is hospitalized for heatstroke, the employer is required to report the event to Cal/OSHA no more than eight hours after becoming aware of the event. Cal/OSHA then performs an investigation of the incident that led to the worker's hospitalization.

Cal/OSHA also carries out unprogrammed inspections when they receive referrals—accounts of violations originating from media reports—or complaints of workplace hazards.⁵⁸ Complaints investigated by Cal/OSHA fall into two categories: formal and nonformal.⁵⁹ Formal complaints can be filed by an employee, employee representative, or government agency. For example, Cal/OSHA has a memorandum of understanding with the UFW that allows union staff or volunteers to make reports if they observe a heat violation.⁶⁰ As part of the complaint, UFW provides Cal/OSHA with employer contacts, incident locations, photographs, and other evidence of violations. Cal/OSHA investigates by conducting on-site inspections

within three working days for serious complaints (i.e., those claiming that workers face a “realistic possibility” of death or serious harm) and within 14 calendar days for nonserious complaints.

The second type are nonformal complaints, filed anonymously by an employee or anyone else. These complaints are important for employees who may fear retaliation for speaking up about heat violations at their workplace. Although Cal/OSHA normally investigates nonformal complaints for other safety violations via letter, email, or phone contact with the employer, it treats heat differently. Due to the gravity of heat illnesses, heat-related complaints must be investigated in person within 24 hours for imminent danger cases and no later than three working days for all other complaints.⁶¹

Inspecting a workplace

When a Cal/OSHA inspector arrives at a work site to conduct an inspection for compliance with the heat standard, they begin by requesting permission from the employer to do so. Refusal may result in Cal/OSHA obtaining an inspection warrant. Once permission is granted, the inspection begins with a conference in which the inspector gathers preliminary information, discusses the reasons for the inspection, and explains the procedure. Employers are required to ask a worker or union representative to join the process. After the initial conference is the walkaround in which the inspector, joined by the worker representative and employer, inspects the site, documents hazards with photos and measurements, reviews written records, interviews workers without the employer present, and conducts any applicable industrial hygiene or safety monitoring. Finally, an exit conference is held at the site. The inspector provides preliminary findings of violations observed during the walkaround and recommends abatement and corrective action. After an internal Cal/OSHA review of the inspection, a formal closing conference is held with the employer where any necessary citations, notices, or corrective actions are discussed. Depending on the gravity of the findings, a follow-up may occur to ensure that employers have taken appropriate corrective actions.

Citations and appeals process

If Cal/OSHA determines that an employer has violated an occupational health standard, the agency may issue a citation, which typically comes with a financial penalty.⁶² The citation describes the violation, lists the proposed penalties, and gives a deadline for hazard correction. The maximum penalty amount for a given citation is based on the type of violation (e.g., general, serious, willful), the

extent of the violation, and the likelihood and severity of harm to employees. As of January 2022, a “serious” violation could carry a penalty of up to \$25,000, and penalties for repeat violations can go up to \$142,692.⁶³ However, employers can receive penalty reductions based on their business size, their “good faith” efforts to comply with standards, and the business’s history of violations.⁶⁴ Some citations can be reduced to \$0 if employers contest for reduction or dismissal.

An employer may contest a citation in several ways.⁶⁵ The first is through an informal conference with the issuing Cal/OSHA district manager within 10 working days of receiving the citation. During this conference, the employer may discuss extension of abatement dates, evidence that indicates no violation exists, proposed penalty amounts, and violation classifications. At this stage the district manager can amend nonserious citations, including reducing penalty amounts or dismissing the citation altogether. Unfortunately, workers are often left out of this process and are unable to provide their input.

If an employer is not satisfied with the decision at the district manager level, a formal appeal can be filed with the Cal/OSHA Appeals Board.⁶⁶ Some appeals can be resolved during a prehearing telephone conference, while others may require an in-person hearing with the employer and Cal/OSHA representatives. An administrative law judge conducts the hearing and issues a decision. If an employer is not satisfied with the Appeals Board decision, they can appeal to the local superior court and can potentially escalate all the way to the California Court of Appeals.

STRENGTHENING HEAT STANDARDS FOR WORKERS IN CALIFORNIA AND BEYOND

It is of paramount importance that OSHA and states make their own heat policies for workers as protective as possible. The California heat standard can serve as a model for decision makers in other worker-protection agencies due to its longevity, robustness, and continued improvement process. Additionally, California’s awareness and education campaign provides an example of how states and OSHA can provide much-needed information to employers and workers on heat-related illnesses and injuries. While the standard provides many key provisions for workers, there is still much to learn about how employers are adhering to it. We now investigate noncompliance with the California standard to provide Cal/OSHA, OSHA, and other states with valuable insight into strengthening future heat protections for workers.

Workers Need a Stronger OSHA Heat Standard and More Robust Enforcement: Findings and Recommendations

Using publicly accessible data, we analyzed 489 serious heat-related incidents affecting 502 workers and 16,358 heat standard citations in California from 2005 to 2021 in order to identify opportunities to strengthen heat standard language, enforcement, and outreach. Details on our methodology can be found in the appendix to this report.

The following seven findings from our analysis represent a range of lessons to be learned from compliance and noncompliance with the California heat standard. Included with each finding are a series of recommendations that are applicable to Cal/OSHA, OSHA, and other states looking to develop heat stress protections for workers.

We recognize that these recommendations are not enough on their own to tackle the many injustices some workers face. Power dynamics stemming from race, ethnicity, socioeconomic status, immigration status, and other factors can play a major role in the ability of workers to stand up against employers who put them in unsafe working conditions. While we do not address holistic solutions to these issues, it is our aim that our findings and recommendations, together with narratives from workers and advocates interspersed throughout the remainder of this report, will provide solutions to some workplace failings as they pertain to heat stress.

FINDING I: THE AGRICULTURE INDUSTRY LEADS IN SERIOUS HEAT INCIDENTS AND SERIOUS HEAT STANDARD VIOLATIONS.

Heat illness is a serious health and safety concern facing farmworkers nationwide.⁶⁷ When reviewing citation and inspection data from 2005 to 2021, we found that workers in the Agriculture, Forestry, Fishing and Hunting industry classification made up the largest share (32 percent) of 502 fatal and catastrophic heat cases in California; of these cases, farmworkers accounted for 94 percent. Farmworkers also accounted for 36 percent of the 70 overall fatalities.

In overall heat standard violations, Agriculture, Forestry, Fishing and Hunting ranked second behind Construction, accounting for 22.5 percent of more than 16,000 citations issued. Though second in overall violations, Agriculture, Forestry, Fishing and Hunting ranked first in serious and willful violations with 46 percent of 1,629. Cal/OSHA defines serious violations as those creating a workplace hazard that could cause an accident or illness likely to result in death or serious physical harm. Willful violations are those in which the employer purposefully disregards

a legal requirement or acts with indifference to employee safety. The high percentage of serious and willful violations (e.g., lack of shade, training, and water) in Agriculture, Forestry, Fishing and Hunting highlights systemic failures of employers to adequately protect the well-being of workers in these industries.

Recommendations

During high heat periods, production quotas should be reduced and the number of rest breaks for workers should be increased.

Preventative rest breaks are important to allow workers to recover from the heat and avoid overheating during the workday. Current Cal/OSHA procedures require agriculture employers to provide employees with a minimum of only 10 minutes of rest every two hours during “high heat periods” (when the temperature equals or exceeds 95 °F). It is of paramount importance that heat protections include more frequent hourly rest breaks during high heat periods and when workers are acclimating to hot conditions. Additionally, heat standards should specify work rate or quota reductions as ways to reduce employee susceptibility to heat stress. They should also provide compensation for piece-rate workers’ rest time, as required in California Labor Code section 226.2.⁶⁸



© Bob Nichols/USDA

Funding should be increased for state and federal OSHAs for staffing, bilingual inspectors, and translated heat safety materials.

Cal/OSHA already conducts specific outreach, education, and enforcement in agriculture, and several of its resources have been translated into languages commonly used by agriculture workers, such as Spanish. Unfortunately, these materials are not available in variants of Mixtec, Zapotec, or Triqui, indigenous languages spoken by nearly a third of California farmworkers.⁶⁹ Additionally, Cal/OSHA still lacks bilingual staff. Out of 196 field inspectors in April 2022, only 19 spoke Spanish, one spoke Cantonese, and one spoke Vietnamese.⁷⁰ This is not nearly enough Spanish-speakers to serve the nearly 408,000 agriculture workers in California, the majority of whom are most comfortable communicating in Spanish.⁷¹

As OSHA and states educate employers and workers on heat illness, it is critical that the materials used be accessible in several languages including those of vulnerable workers in high-risk industries. Additionally, OSHA has historically been understaffed and underfunded.⁷² Increased funding is needed to allow greater capacity for OSHA and states to conduct enforcement, and the hiring of bilingual staff would improve communication with workers and employers.

The Department of Labor should improve data collection on housing conditions for workers with H-2A visas, including cooling measures available in homes. Heat standard language should address hot conditions in agricultural labor housing.

Certain farmworkers are particularly vulnerable to heat-related illnesses. This includes the nearly 25,000 farmworkers in California with an H-2A visa, which allows them to hold temporary or seasonal agricultural

jobs for which U.S. workers are not available.⁷³ There are H-2A visa holders in almost every state.⁷⁴ H-2A visa holders rely heavily on employers for their food, housing, and transportation. Some employers fail to provide air-conditioning, fans, or adequate cooling in H-2A housing.⁷⁵ The inability to properly cool down at night means that workers may start their day already stressed by heat. Currently, only Oregon has rules in place to address high ambient temperatures in labor housing.⁷⁶

Inspections of H-2A worker housing nationwide, typically done by state housing authorities or foreign labor officers, should be conducted by the Department of Labor to ensure regulatory compliance. Inspections should include questions on accessibility of adequate cooling measures such as air-conditioning and fans to determine what heat protections are offered to workers. This data can aid in strengthening labor housing standard language. Questions about access to emergency services and protection from retaliation should also be included in H-2A housing inspections.

Distance to water, shade, and restrooms should be stipulated in heat standards.

Access to water, shade, and clean restrooms has long been a concern raised by farmworkers and worker advocates.⁷⁷ Currently the California heat standard states that these key provisions should be “located as close as practicable to the areas where employees are working.” The standard language is inadequate and vague, particularly for industries such as agriculture, where employees may work in remote locations or cover a considerable area in the course of a day. Maximum distances to these key provisions should be included in all state and federal heat standards (e.g., shade should be within a 2.5-minute walk).



© Bob Nichols/USDA

California Rural Legal Assistance (CRLA) is a nonprofit law firm that provides free legal services to low-income California residents. Its work includes pushing state regulators to enforce existing laws and filing litigation on behalf of farmworkers whose rights have been violated.

Maximiliano Ochoa and Lilliana Huerta, CRLA community workers⁷⁸

Max and Lilliana are community workers in the Coachella Valley, one of the largest crop-growing regions in California. With summertime highs regularly exceeding 100 °F, Max says heat is a “primary concern” for the farmworkers and community members whom CRLA serves in the region.

Workers often don’t have the training they need to recognize and respond to heat-related symptoms “before it’s too late.” They also may not have access to cool drinking water or hygienic restrooms, even though employers are required to provide both. Lilliana says that a lot of farmworkers bring their own water to work because “they can’t trust that their employer will provide water that is cool enough.”

Lilliana and Max say that most large Coachella-area farm owners comply, at least in spirit, with the Cal/OSHA heat stress rule. However, the quantity and quality of information about heat stress decline as information is passed from the owners, through a chain of independent farm labor contractors and foremen, to the workers themselves.

There are also situations in which CRLA sees “one employer, or one contractor, or one foreman who decides to cut corners, decides to ignore one rule, or decides to do something on their own.” When that happens, Max says, “we do end up finding issues where there’s a farmworker who dies, there’s a farmworker who suffers.”

Max and Lilliana have ideas for improving the current situation. First, Cal/OSHA needs additional funding and staffing so there are personnel ready to act when a complaint is filed.

Second, agencies should support organizations (like CRLA) that can build and maintain relationships with farmworkers, many of whom deeply mistrust anyone outside their immediate community. There’s also the matter of producing culturally appropriate training materials in a language and form that farmworkers can understand. For example, many of the Indigenous languages and dialects spoken by immigrant farmworkers in the Coachella Valley don’t exist in written form, so training needs to be delivered verbally or pictorially.

CRLA’s clients also need training on their workplace rights and how to appropriately document instances of harassment, discrimination, and retaliation as they occur. The organization and its many partners often hear from farmworkers who have experienced repeated abuse over months and years but have no recourse without appropriate documentation.

Lilliana also wants to see Cal/OSHA continuously review how the heat stress rule is implemented in response to changing climate conditions and the lived experience of workers.

For Lilliana, in particular, many of the problems farmworkers face come down to society viewing them as unskilled, uneducated, and therefore somehow unworthy. “If I had to survive on the land,” she says, “I would have no clue how to plant chili or how to harvest grapes. It’s definitely not unskilled labor. It requires a lot of knowledge about the land, production, and machinery.” And so, Lilliana says, “changing the definition and the perception of farmworkers is probably the start of it all.”

Ephraim Camacho and Juanita Perez, community workers

Ephraim and Juanita are community workers in California’s Central Valley, one of the most productive agricultural regions in the world. Like the Coachella Valley, the Central Valley is extremely hot in the summer, and often quite humid. Workers do strenuous work over many hours in the heat for very little pay, too often without the water, shade, and training they are due under state law.

“Some of the real serious violations that we see during the summertime, and even right now [in February], is the lack of drinking water,” says Ephraim. “We went out last Monday and out of maybe 10 sites, 6 had no drinking water.” Juanita and Ephraim have seen a similar problem with shade, particularly during the July garlic harvest and the August raisin harvest.

Unfortunately, according to Ephraim, many employers in the Central Valley are repeat violators. The farm labor contractor system, insufficient enforcement action by Cal/OSHA, egregiously low fines for noncompliant employers, and a vulnerable workforce combine to make it more attractive for some employers to break the law than to follow it.

“Workers are dying as a result of employer negligence and not providing the basics, which is drinking water and shade,” says Ephraim.

Many of the workers served by CRLA are afraid of retaliation by employers—so afraid, Juanita says, that “you can hear them shake as they’re talking.” Farm labor contractors regularly blacklist workers who complain about unsafe conditions, making it difficult or impossible for them to find work with other growers.

And lodging a formal complaint isn’t easy, even for workers ready to take that step. Cal/OSHA offices aren’t open in the evenings or

weekends and have been mostly virtual during the COVID-19 pandemic—a problem for farmworkers without internet access. Ephraim emphasized that Cal/OSHA inspectors need to “go out and talk to the workers and tell them, ‘Look, it’s okay for you to call us. We’re not going to call the grower when you call us.’”

Juanita and Ephraim also want Cal/OSHA to hire more Indigenous-language speakers and inspectors. Juanita, who is herself from an Indigenous family, points out that Indigenous farmworkers without children to translate tend to be especially vulnerable to unsafe employers. “We need staff over at OSHA who see humanity, you know? See humanity, regardless of the body, regardless of the color skin, regardless of the type of work they’re doing.”

For CRLA’s Central Valley team, strengthening California’s heat stress rule all comes down to better enforcement and educating workers, foremen, and employers. “We need more enforcement by Cal/OSHA and these agencies that are supposedly there to protect the workers,” Ephraim says.

In the meantime, he continues, “We’ll call Cal/OSHA 10, 15 times a day if we have to, to get them out there, to make sure the workers have water and shade when it gets over 110 degrees in the fields. We’ll continue to fight for workers.”

FINDING 2: MOST HEAT STRESS VIOLATIONS ARE TRIGGERED BY UNPROGRAMMED INSPECTIONS.

In our analysis, we found that 71 percent of more than 16,000 heat standard violations resulted from unprogrammed inspections. As mentioned earlier in this report, unprogrammed inspections occur in response to unexpected events such as accidents, catastrophic incidents, and fatalities, or when Cal/OSHA receives referrals or complaints of workplace hazards.

Thirty-seven percent of the more than 11,500 violations found during unprogrammed inspections stemmed from complaints.⁷⁹ The Agriculture, Forestry, Fishing and Hunting and the Construction industry classifications accounted for 57 percent of 4,286 violations issued after complaints. This highlights the importance of complaints in the identification of heat hazards. While the data do not specify who made the complaint, Cal/OSHA investigates complaints from a wide range of stakeholders, including employees, former employees, employee representatives, worker advocates, unions, and government agencies.

Recommendations

Nonformal complaints for vulnerable industries should be given high priority and lead to immediate inspections.

In its Heat Illness Prevention Special Emphasis Program, Cal/OSHA has strengthened protections for workers by requiring inspectors to investigate nonformal heat complaints in person rather than by letter, email, or phone contact with the employer. OSHA and other states should follow this model. Having inspectors respond to complaints urgently and in person allows them to respond quickly to heat hazards and ensure that employers have potentially lifesaving measures such as water and shade in place.

Federal and state OSHAs should broaden the definition of who can report a formal complaint on behalf of workers.

As previously mentioned, Cal/OSHA has a memorandum of understanding (MOU) with the United Farm Workers union that allows the organization to report formal complaints of heat-related violations and workplace incidents on behalf of farmworkers. This type of collaboration should be extended to other industries and unions in California and replicated in other states and at the federal level. This would provide a stronger pathway for vulnerable worker groups to report workplace hazards without fear of retaliation.

Worker protection agencies should increase worker education and awareness around anti-retaliation and whistleblower protections.

Workers, particularly those who are especially vulnerable (e.g., undocumented workers), may be reluctant to report workplace noncompliance with the heat standard. They may fear deportation or fear jeopardizing future employment opportunities and being blacklisted.⁸⁰ Additionally, workers may not know how to file an OSHA complaint. For example, smaller workplaces may lack formal employment and human resource policies. This leads to workers being unaware of their rights and less likely to file formal grievances.

Heat stress standards should include strong anti-retaliation language and mandatory training. This training should include how to file an OSHA complaint and what specific protections are in place for employees who refuse to work due to safety concerns.

The Institute of Popular Education of Southern California (IDEPSCA) is a multi-issue, community-based organization advocating for immigrant and low-wage workers and their families. IDEPSCA operates five day laborer job centers and has three main programs focused on worker health and specific concerns faced by day laborers and domestic workers.

IDEPSCA works closely with day laborers and domestic workers to provide education and build awareness around several issues including heat. Both groups are particularly vulnerable to heat illness as they often work in isolated locations. Moreover, Cal/OSHA protections currently exclude household domestic workers and day laborers. IDEPSCA and other organizations are advocating for that to change.

Domestic workers work primarily indoors in homes and don't have much control over the temperatures they experience. Many of the domestic workers whom IDEPSCA works with take public transportation to and from their jobs and are often exposed to hot temperatures en route. And as wildfires proliferate, domestic workers have been tasked with additional outdoor work. During the 2018 Woolsey Fire in Los Angeles and Ventura Counties, domestic workers were asked to help their employers evacuate and later clean up wildfire debris—not typical domestic work tasks—often with no personal protective equipment or training on how to do so safely. Workers have shared stories with IDEPSCA of becoming ill due to lack of acclimatization from having to rapidly transition between working in air-conditioned homes and hot backyards cleaning wildfire debris.

Day laborers are typically exposed to outdoor heat while doing physically demanding manual labor. Nancy Zuniga, IDEPSCA's worker health program manager, has heard of workers falling ill or fainting in the heat due to underlying conditions. IDEPSCA has found that many day laborers are not provided with basic workplace heat protections such as breaks, shade, or access to clean water. They are sometimes told to drink from garden hoses or questionable water sources.⁸¹ "Often workers rightly won't drink from the hoses, so that leaves them pretty much without access to water," adds Nancy.

IDEPSCA encourages workers to protect their health by bringing their own water, sun hats, and other heat protections. Day laborers are also encouraged to share information on any chronic illness they may have with their fellow workers or with job center staff. IDEPSCA provides heat stress materials to workers in Spanish and English so they are aware of the rights they have. Additionally, IDEPSCA has been working with day laborers impacted by exposure to wildfire during the course of their manual tasks for homeowners. Nancy would like to see increased collaboration between Cal/OSHA and worker centers so the agency can better understand and address the needs of vulnerable workers.

Pedro, Day Laborer*

As a day laborer, Pedro does a little bit of everything, including gardening and painting. He experienced a lot more heat while working in 2021 than in previous years, leaving him feeling faint. Often the employers he works for do not provide water and other basic workplace necessities. "We have to get some from the water hose outside," he says.

Mario, Day Laborer*

With preexisting medical conditions such as high blood pressure and high cholesterol, Mario tries not to work in very hot temperatures. However, "I also need money for my bills, so I can't always avoid it," he adds. Mario does not disclose his conditions to his employers for fear of losing the work.

When temperatures rise, he's had some employers who have reduced his hours and given him 30-minute breaks. While these basic provisions are much needed, they also create their own problems. The reduction of working hours means that Mario and his fellow day laborers must work faster to finish their work on time and beat the heat, which can lead to dangerous overexertion.⁸² Additionally, some employers do not provide enough water to keep all of the workers on site hydrated during the hours they spend in the sun. Mario wishes employers would provide more water and shade. He adds, "Usually shade isn't something certain for us. For example, when we are doing excavations, there isn't any shade. Sometimes all we can really do is splash water on our face and our hats."



© IDEPSCA

* These workers' names have been changed to preserve confidentiality.



FINDING 3: INDOOR WORKERS AND OUTDOOR WORKERS ACROSS MULTIPLE NONFARM INDUSTRIES ARE ALSO AFFECTED BY HEAT-RELATED INJURIES AND ILLNESSES.

Nationwide, heat-related education, outreach, and enforcement measures have overwhelmingly been focused on outdoor workers, particularly in the agriculture and construction industries. While workers in these industries may be highly vulnerable to heat, other industries and worker groups are also impacted by high temperatures.⁸³

Heat-related illness and injuries can occur in almost any workplace. We identified heat-related cases in 463 different industries outside of agriculture and construction, including:

- car washes;
- janitorial services;
- motion picture and video industries;
- elementary and secondary schools;
- material recovery facilities;
- amusement and theme parks; and
- postal services.

There were also several surprising industries with heat-related cases, including:

- home health care services;
- nursing care facilities;
- offices of real estate agents and brokers;
- museums;
- portrait photography studios;
- newspaper publishers; and
- veterinary services.

We found that the 463 non-agriculture and non-construction industries accounted for 36 percent of more than 11,500 citations from unprogrammed inspections. In addition, 43 percent of the non-agriculture and non-construction citations stemmed from complaints. This large number of complaints illustrates the prevalence of heat stress in industries that are typically not considered vulnerable to heat.

Looking specifically at fatal and catastrophic heat events in California, we found that indoor and indoor/outdoor workers accounted for 11 percent of 502 incidents. An additional 25 indoor workers were hospitalized, including:

- security guards and parking lot attendants in booths;
- cooks;

- correctional officers;
- grocery store workers;
- warehouse workers; and
- heating, ventilation, and air-conditioning (HVAC) mechanics.

Two important themes emerged when we reviewed fatal and catastrophic heat cases involving indoor workers. First, indoor workers who are employed in industrial processes that include hot works (e.g., welding) or working next to hot machines are at risk of heat-related illnesses. This stems, no doubt, from the nature of their work, coupled with the use of heat-trapping personal protective equipment. In one case an employee suffered heat exhaustion when unloading an oven in a manufacturing setting. The employee was wearing a powered air-purifying respirator at the time, which in hot environments increases the risk of heat stress.

Second, indoor workers are vulnerable to heat-related illness while performing duties in the homes of their clients. In one case, a plumber installing a water heater began to experience heat cramps. The worker was admitted to a hospital where they were found to be dehydrated and have an acute kidney injury. Another worker collapsed from heat exhaustion while engaged in pest control services at a client's home.

Recommendation

Indoor workers should be given specific protections from heat exposure.

An indoor heat standard is needed to ensure that workers in indoor environments have the specific protection they need. This is especially true for indoor workplaces that were designed for the cooler climates of the past. A perfect illustration of why an indoor standard is needed comes from the 2021 summer heat wave in the Pacific Northwest, during which food service and manufacturing workers suffered from heat-related illnesses in buildings without air-conditioning.⁸⁴ Additionally, agencies should consider protective measures for workers who are sent out by their employers to perform duties in residences where they cannot control the indoor temperature.

While OSHA does not have an indoor heat standard, it does recommend thermostat control in the range of 68 to 76 °F and humidity control in the range of 20 to 60 percent.⁸⁵ This alone is not enough to protect indoor workers from heat. State and federal indoor heat standards should be modeled after the National Institute for Occupational Safety and Health (NIOSH) *Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments*.⁸⁶ The NIOSH recommendations include specific trigger temperatures for implementing heat procedures, specific designs for indoor cooling systems, and provisions for workers who work alone and those who wear personal protective equipment.

COMMUNITY VOICES

ELISA, THEME PARK ATTENDANT*

When she began working at a Southern California theme park, Elisa was placed in the food services department. She stayed there for more than six years, working in various roles and eventually landing in a supervisory position. As temperatures rose over the years, heat was something she and her other coworkers found progressively concerning. "It was not a rare occurrence that we were in the triple digits during the summer," she says, commenting on the increasing temperatures.

In her supervisory capacity, she was even more mindful of the heat as it was her job to protect the health and safety of the staff she oversaw. Nonetheless, Elisa experienced the negative effects of heat firsthand. While working in a non-air-conditioned indoor food venue, Elisa and a coworker began experiencing symptoms of heat stress. They were able to get some relief by finding some shade outside, but unfortunately the outdoor environment was not cool enough. The coworker continued to feel unwell and was taken to the theme park's first aid office, where she was able to rest further.

This was not Elisa's only experience with the negative impacts of heat. She saw both guests and employees suffer from the heat, including an incident in which an ambulance had to transport a heat-exhausted guest to a hospital. She described the experience as scary—and more common than she would like it to be.

Elisa is grateful that her employer always had water accessible for employees, provided some shaded outdoor areas, and encouraged workers to take frequent breaks as well as to tell supervisors when they were feeling unwell. "But there is more they could have done," she adds. This includes providing heat stress training during the summer months, making frequent in-person checks on park employees, rotating staff in and out of high heat locations (especially food service workers in high-traffic areas and places with additional sources of heat, such as ovens), and updating outdated facilities with more fans and cooling options.

* This worker's name has been changed to preserve confidentiality.



FINDING 4: HUNDREDS OF BUSINESSES REPEATEDLY VIOLATED THE HEAT STRESS STANDARD.

In California, employers receive higher penalties for repeatedly violating health and safety standards (upwards of \$5,000 per repeat incident, up to a maximum of \$142,692), but only if citations are formally classified as “repeat violations.”⁸⁷

Prior to 2017, Cal/OSHA defined repeat violations as substantially similar violations that occurred at a single work site and within a three-year period.⁸⁸ In 2017 Cal/OSHA expanded the time frame to five years. Additionally, for employers with multiple sites, the agency increased the geographic scope of a repeat violation to any site in the state. This meant employers could receive repeat violation citations—and the associated increased penalties—for infringements that occurred in different facilities.⁸⁹

However, we found that many businesses that had violated the heat stress standard multiple times were not given citations classified as repeat violations. In fact, 13 of the 15 establishments with the most heat-related citations received no more than one citation for a repeat violation,

despite receiving 7 to 41 citations in all (Table 2). Most of these businesses were in the agriculture industry, but the list also includes transportation and health care establishments. In one egregious case, we found that Cal/OSHA issued the United Parcel Service (UPS) 41 citations for violating the heat standard, but classified only one of the citations as a repeat violation. Because UPS contested all the citations and many of the cases are still open, it is likely that subsequent citations issued to UPS also will not be classified as repeat violations. Overall, in the period we analyzed, Cal/OSHA issued only 142 citations for repeat violations out of a total of more than 16,000. Eighty-three percent of those citations were issued after Cal/OSHA broadened its definition of repeat violations.

Recommendations

Repeat citations should be given even when a similar citation is under contest.

Repeat violators should be held accountable for their repeated indifference to the health, safety, and well-being of workers. States and OSHA should assess how

they define and identify repeat violators. Currently, Cal/OSHA cannot issue a repeat citation if an original citation is under contest.⁹⁰ Because contesting a citation can take several years, repeat citations should still be issued and subsequently reduced to a regular citation if the contestation is upheld.

The maximum penalty for repeat violators should be increased.

California, other states, and the U.S. Congress should also increase the minimum and maximum limits on occupational safety and health penalties for repeat violators. The minimum federal penalty in 2022 was as low as \$414 for a first repeat violation and as high as

\$145,027.⁹¹ For context, the maximum amount is equivalent to about 6 percent of the civil penalty for financial crimes such as insider trading.⁹² As noted in a study of nearly 4,500 violations issued by OSHA from 2000 to 2014: “From an economic perspective, if the expected penalties are smaller than the investment required to explore potential hazards, the deterrent effect of violation would be insufficient to motivate proactive improvement.”⁹³ In fact, David Michaels, who ran OSHA from 2009 to 2017, has been “told by chemical manufacturers that they see OSHA fines and penalties as inexpensive industrial hygiene consultations”—rather than as deterrents for bad behavior.⁹⁴

TABLE 2: CALIFORNIA ESTABLISHMENTS WITH THE MOST UNIQUE INSPECTIONS LEADING TO HEAT STANDARD CITATIONS, JANUARY 2005 TO MAY 2021

Rank	Establishment Name*	Unique Heat Inspections	Total Heat Citations	Repeat Heat Citations
1	United Parcel Service	18	41	1
2	Esparza Enterprises	14	17	1
3	Securitas Security Services USA Inc.	13	25	9
4	Giumarra Vineyards	13	21	1
5	Security Paving Company Inc.	11	14	1
6	Universal Protection Service	10	28	6
7	CBC Framing Inc.	10	12	1
8	Dan and Lori Avila DBA Dan Avila & Sons	9	18	0
9	Cream of the Crop	7	15	1
10	Stamoules Produce Company	7	10	0
11	Brightview Landscape Services Inc.	7	9	1
12	Kaiser Permanente Group	6	13	0
13	Armstrong Garden Center	6	11	0
14	Ovidio G. Garza Farm Labor Contractor	6	9	0
15	AG Force LLC	6	7	0

* Several establishments received citations at more than one location attributed to their business name. As described above, Cal/OSHA did not define heat citations at multiple locations as “repeat violations” prior to 2017.

CLEAN CARWASH WORKER CENTER—CAR WASH WORKERS

With over 1,500 members, CLEAN Carwash Worker Center is a grassroots organization that works to improve the lives and communities of car wash workers in Los Angeles and surrounding areas.

CLEAN staff and community partners routinely conduct outreach to car wash workers on workplace safety and rights issues including heat. In the 15 years since its founding, CLEAN has seen the effects of extreme heat on workers, such as skin irritation and discoloration due to the combination of extreme heat and chemical exposures. CLEAN provides training and community space where workers can feel empowered. Additionally, CLEAN provides education on existing worker rights, how to exercise them, and how to deal with retaliation by employers. While some car wash workers have been able to push management to make changes, such as creating rest areas with shade and drinkable water, there is still much to be done.

For example, CLEAN's Executive Director Flor Rodriguez described a visit to an indoor parking structure where a car wash was located three floors underground. The visit was initiated after a group of workers contacted CLEAN about conditions there. Their lunch breaks were being cut short, they had limited access to restroom facilities, and they were being forced to arrive at work early without receiving compensation. While visiting the site, CLEAN staff and community leaders began to feel dizzy and short of breath due to the intense heat. "After this visit, I connected with workers, and they mentioned they too took some time to get used to that extreme heat when they started working there. They mentioned they have to clean their nose at the end of the day because of all the fumes and chemicals because there is no ventilation, and the heat of the motors of the cars makes it worse," Flor adds.

"We continue to struggle with enforcement, especially now with COVID. Many of the onsite visits are only addressing masks and other related regulations and not necessarily other issues workers might be facing at the workplace," Flor says, commenting on what else needs to be done. "We truly believe the workers have to be front and center, leading and making those changes."

Joaquín, Car Wash Worker*

Working nearly 15 years at car washes in Los Angeles, Joaquín has experienced his fair share of the negative effects of heat. At his current job, the sun heats up the plastic logo on his required uniform, leaving marks of the logo on his body. He often feels tired due to the heat, particularly in July and August. His main task is drying cars, a position without shade that has him standing under

the sun for long periods. The lunch area provided by his employer is situated next to the drying area, where warm air from the blowers engulfs him and his coworkers. Joaquín has taken to eating lunch in his car for some respite from the heat.

Joaquín says that working at a car wash is a high-stress environment, with managers constantly pressuring employees to work quickly. His employers have taken no time to train or educate workers on heat and do not provide any necessities for heat protection. Joaquín now wears a long-sleeved shirt and sun hat to protect himself. What Joaquín does know about heat comes from the CLEAN Carwash Worker Center, and he shares his knowledge with his coworkers in hopes that they can all stand up to their employers and push for workplace safety improvements. He says that many, if not all, car wash workers fear retaliation in the form of cut hours or loss of their job entirely.

Apart from more education for workers on their rights, he hopes to see more enforcement by Cal/OSHA, with inspectors coming to car washes and checking that the laws are being followed. He notes that having a heat law is important, but there should be more focus on enforcement and looking to see what real-life conditions workers are facing.



© CLEAN Carwash Worker Center

* This worker's name has been changed to preserve confidentiality.

FINDING 5: PENALTIES WERE REDUCED FOR MORE THAN HALF OF ALL CITATIONS.

As described above, penalty amounts are initially based on the type and extent of the violation and the likelihood and severity of harm to employees. However, federal and state OSHAs routinely reduce penalties as part of informal and formal settlement agreements. Discounts are typically given for size (e.g., employers with less than 10 employees can receive a 40 percent reduction), good faith (to employers who demonstrate a desire to comply with standards), and abatement credits.⁹⁵

Cal/OSHA heavily discounted heat penalties across all types of violations. Reviewing heat citations with final judgments (e.g., with citation contests concluded), we found that initial penalties totaled \$14.4 million and final penalties totaled \$7.5 million—a reduction of nearly 48 percent. Much of the initial reduction on these penalties occurred at the district level. Federal and state OSHA district managers have discretion over penalty amounts and often reduce them in exchange for employers agreeing to correct violations immediately.⁹⁶ It is likely that heavily discounting citations can lead to employers repeatedly disregarding the safety of their employees, knowing that they can reduce their citations to \$0 in some cases.

Recommendations

Federal and state OSHAs should revise their current citation reduction policies.

Federal and state OSHAs need to change the way they settle citations. There should be clear guidelines for district officials to move away from granting reductions and citation reclassifications.

Discounts should not be provided to employers who:

- Repeatedly violate components of heat standards.
- Do not give workers basic lifesaving heat protections such as water or shade.

Federal and state OSHAs should also move beyond just having employers abate hazards to focus on the development of formal injury and illness prevention plans or implementation of comprehensive third-party safety audits. For example, employers who violate the training component of the heat standard should not be given any discounts but should be required to provide proof of how the training components will be adhered to and records of compliance.

FINDING 6: TRAINING WAS THE MOST CITED HEAT STANDARD VIOLATION.

California's heat stress standard requires both employee training and supervisor training. The employee training section includes topics such as the responsibility of employers to provide certain protections including water and shade, procedures for responding to possible heat illness, and procedures for contacting emergency response personnel. The supervisor training section includes the components of employee training and also how to monitor weather reports and respond to hot weather advisories.

In our analysis of citations issued for fatal and catastrophic events, we found that the training provision ranked first in the number of overall citations (55 percent of 557), in serious citations issued (60 percent of 267), and in citations for fatalities (56 percent of 110). Across all enforcement citations (not just fatal and catastrophic events), training accounted for more than half of the citations issued (57 percent of more than 16,000).

It's true that training violations can be easier for OSHA inspectors to identify, simply because failing to keep satisfactory training records is a violation. However, the failure of employers to provide training and keep such records speaks volumes and reflects deeper issues with employers failing to take adequate responsibility for worker health and safety.

Recommendations

Heat standards should include specific language on training content, timing, and frequency.

Currently the California heat standard states, "Effective training in the following topics shall be provided to each supervisory and non-supervisory employee before the employee begins work." That standard does not require regular training or refresher courses. Language on how often regular training should occur is needed, such as during extreme heat events, when employees return from leave, and when employees change work sites. Additionally, there should be language that requires employers to regularly reinforce the elements of training and evaluate worker understanding of the content.⁹⁷

Heat stress training materials should be developed with language, education level, and resource availability of trainees in mind.

Cal/OSHA and other OSHAs should routinely assess training materials for their efficacy, including by considering the language and education levels of trainees. Additionally, federal and state OSHAs should increase outreach efforts, primarily targeting vulnerable worker groups, small employers, and other businesses that may lack human resources departments or internal processes that normally facilitate worker trainings.

FINDING 7: ACCLIMATIZATION WAS AMONG THE LEAST CITED STANDARD PROVISIONS.

Heat acclimatization is the increase in a person's heat tolerance that comes from gradually increasing the intensity or duration of work performed in a hot setting. Lack of acclimatization is a known factor in heat-related injuries and worker deaths.⁹⁸ The California standard did not include acclimatization until 2015; before then, lack of acclimatization was frequently mentioned in investigations of heat-related deaths. In one case an untrained and unacclimatized warehouse employee suffered from heatstroke and was hospitalized. Cal/OSHA later discovered that another employee at the same facility had also had a heat illness just days prior. While the least cited provision, the process for acclimatizing workers in the California standard is vague, mentioning only that employees should be closely monitored. Both NIOSH and the U.S. military provide more detailed breakdowns of acclimatization procedures that should be incorporated into heat stress standards.⁹⁹

Recommendations

Heat acclimatization procedures should be more detailed and include a recordkeeping component.

Heat standards should provide employers a framework on how to acclimatize their workers to heat. Additionally, the Cal/OSHA standard does not include details on acclimatization recordkeeping. Having detailed records on how and when an employee was acclimatized would facilitate OSHA heat inspections, provide proof of employer accountability, and help inform future acclimatization efforts.

© Allen J. Schaben / Los Angeles Times via Getty Images



The International Brotherhood of Electrical Workers (IBEW) represents approximately 775,000 active members and retirees who work (or worked) in a wide variety of fields, including utilities, construction, telecommunications, broadcasting, manufacturing, railroads, and government.

Mike Costigan, Safety Officer, IBEW Local 11

As IBEW Local 11's safety director, Mike Costigan works to protect union members from various health and safety hazards. This includes frequent information sharing on safety issues during general meetings, via email, and by other communication methods. He makes sure that members have the tools and resources they need to prevent heat-related illness, and over time he's seen an increase in awareness around heat and heat protections.

Maria Cruz, Solar/Antelope Valley

In 2018, the contractors whom Maria worked with did not provide heat protections such as ice, but now they do. This change came about due to Cal/OSHA implementing more stringent heat-related protocols with the increasing number of solar projects in the area. Maria typically brings lemonade to keep herself hydrated and avoids alcohol consumption, which can contribute to heat illness. She has been at sites in the desert where air-conditioned trailers have been provided, among other cooling measures such as tent canopies, cool towels, and plenty of water.

Dion Jenson, Solar/Construction Supervisor/Bakersfield

Dion suffered from a heat-related illness at work 20 years ago, before he was a union member. While working in an attic he began to feel nauseous, and at that time his only option was to drive himself home and go to bed. Now as a union member and supervisor, Dion makes sure his fellow union members have provisions to protect themselves from heat. This includes shade trailers, swamp coolers, ice bags, hydration packs, and more. In addition, members are encouraged to take extra breaks when they need them and to take breaks out of the sun. To reduce the occurrence of heat-related illnesses, he also gives orientations on heat illness, uses buddy systems, and adjusts work schedules when necessary. Dion works to empower members to call out unsafe heat situations.

Dan Bellows, Superintendent

Working indoors at a glass manufacturing plant, Dan spends most of his time near hot furnaces. His site has a full-time safety officer dedicated to heat-related illness. Employees at the site are provided water, air-conditioned offices indoors, and shaded areas outdoors. Additionally, any work near the furnace area is limited to 30- to 45-minute shifts. Dan previously worked at a site in the desert where temperatures nearly reached 120 °F. At that site employees were regularly educated about heat stress, received cooling packs and water, and were given adjusted work hours and acclimatization days.

Leo Black, Project Superintendent

Leo works as a project superintendent overseeing a contracting job in Blythe, California. "We have had days over 120 degrees working 10-hour days, six days a week," he says. Due to concerns about the heat, the company he works for has established extra heat stress policies and procedures. Having suffered heatstroke from outdoor racing when he was younger, Leo understands the health risks of heat exposure. He stresses the importance of having a plan: "When planning your work, put your safety program first and make sure that everyone is properly trained with safety and heat stress training."

All employees at the contracting company are IBEW members, including Leo. He makes sure to keep an eye on everyone, saying, "We're our brothers' keepers; we have to watch out for our brothers." Every employee is given heat stress training, and a job hazard analysis* is completed to identify all potential heat exposures. Leo also encourages employees at his site to listen to their bodies and utilize the heat protections provided on site. "I try to preach to them, 'Don't be a hero.' The hero to me is the guy that realizes he needs a break, he needs a little more hydration," he adds. Employees on site are supplied with heat protections including umbrellas, pop-up shade canopies, portable swamp coolers, plenty of water, and rest periods for cool-down time.

Leo feels fortunate that the contracting company he works for puts safety first. He hopes that all contractors take safety as seriously. "I have a son and a daughter in the construction field, and I worry about them every day. I have worked for contractors where all that mattered was to get-er-done."

* A job hazard analysis is a standard industry procedure used to identify how to perform a task step by step, any hazards associated with the task, and controls to mitigate the hazards.

Conclusion

While workers have long faced heat hazards in the workplace, the impacts of climate change have increased these risks over time. To avoid even worse health outcomes from rising temperatures, workers need strong, comprehensive heat protections. Federal and state heat stress standards are an important accountability measure to ensure that employers are meeting their legal obligations to keep workers healthy and safe. The more far-reaching and detailed the standards are, the better protections they offer for workers who suffer in the heat.

As illustrated in our Community Voices narratives, employees have direct knowledge of the heat hazards they face and the impacts of heat on their health. Heat standard development needs to start with worker voices; they should have a seat at the table to determine the best solutions for them. While our recommendations outline ways in which current and future heat standards can be strengthened, this

must be done alongside workers. This is particularly true for vulnerable groups that are often left out of the decision-making process but bear the brunt of heat hazards, such as those in the agriculture industry.

As we learn from old standards and develop new ones, it is important to remember that one death or illness from heat is one too many. We have the tools to prevent them.

Appendix: Research Methodology

CATASTROPHIC AND FATAL HEAT INCIDENTS

To analyze workplace heat-related injuries, illnesses, and deaths in California, we used the Occupational Safety and Health Administration's Fatality and Catastrophe Investigation Summaries (FAT/CAT). The summaries are part of OSHA's Integrated Management Information System, a publicly accessible database that provides information on workplace injuries, illnesses, and fatalities investigated by federal and state OSHAs, including heat stress-related incidents like heatstroke and heat death.¹⁰⁰ The summaries provide details on date, location, employer, employee demographics, nature of injury, description of incident, causal factors, and penalty and citation details.

To identify heat-related summaries, we used search terms specific to heat illness in the description, abstract, and keyword sections of the database. These terms included heat, heat stress, heat exhaustion, heat-related illness, heatstroke, and heat syncope. We included heat-related incidents in California from 2005 to 2019 that were determined or suspected to be caused by environmental heat exposure. Cases in which burns, explosions, or fires were the primary means of injury or death were excluded. Our query identified 489 serious heat-related incidents impacting 502 workers, for which 557 citations were issued. We calculated descriptive statistics such as frequency, percentage, mean, and standard deviations for our variables of interest using R version 4.0.5.¹⁰¹

Limitations

Our dataset includes cases that we defined as suspected or potential heat events, such as incidents in which employees suffered from cardiac arrest or presented symptoms of heat stress such as vomiting, elevated body temperature, and heavy sweating. However, not all cases in the FAT/CAT database resulted in a heat standard citation issued by the California Occupational Safety and Health Administration (Cal/OSHA). For this reason, our dataset may contain more cases of heat-related incidents than reported by Cal/OSHA.

HEAT STANDARD CITATIONS

We used the publicly available OSHA Enforcement Database (EDB) to analyze heat-related workplace citations and inspections. The EDB contains several datasets that house information on more than three million inspections conducted by OSHA enforcement at a federal and state level since 1972. To create our heat standard citations dataset, we identified cases (across several EDB datasets) from 2005 to 2021 where the California heat standard was

cited as basis of violation.* Using Python Version 3.8, we created a novel dataset by merging several inspection and violation datasets in the EDB database that matched our search criteria.¹⁰² Our final dataset included information on inspection type, industry, initial and current penalties, violation type, violation gravity, and union representation. From January 2005 to May 2021, we identified 12,599 inspections that resulted in 16,358 heat standard citations. Again, we calculated descriptive statistics such as frequency, percentage, mean, and standard deviations for our variables of interest using R version 4.0.5.

Limitations

While the EDB database has information on more than three million OSHA inspections, it does not include every inspection and citation. There may be citations issued by Cal/OSHA under the heat standard that were not captured in this study. Additionally, we chose to include all issued citations in our analysis, except for our examination of penalty reductions, where we focused only on closed cases. These may include citations that were rescinded after the fact. Still, these inspections and citations provide valuable insight into workplace heat standard compliance.

COMMUNITY VOICES

Our Community Voices are direct narratives from advocates, workers, and union members about their experiences with occupational heat stress and the California outdoor heat standard. These narratives detail impacts of heat stress, employer adherence and nonadherence, and recommendations for changes to the current heat standard.

Advocates were identified from organizations in California that actively engage in advocacy around stronger heat stress protections for workers. These organizations include the Institute of Popular Education of Southern California (IDEPSCA), CLEAN Carwash Worker Center, and California Rural Legal Assistance. Advocates provided contacts to specific workers who were interested in sharing their personal experiences of working in the heat. Union members were identified through the International Brotherhood of Electrical Workers.

The narratives were collected through online and written interviews. The interviews included questions on experiences with heat and heat stress at work, heat protections provided by employers (if any), and recommendations for stronger heat protections.

* We used EDB datasets `osha_inspection`, `osha_violation`, and `osha_violation_event`.

ENDNOTES

- 1 Donald De Alwis and Vijay S. Limaye, “The Costs of Inaction: The Economic Burden of Fossil Fuels and Climate Change on Health in the United States,” Medical Society Consortium on Climate & Health, NRDC, and Wisconsin Health Professionals for Climate Action, May 2021, <https://www.nrdc.org/sites/default/files/costs-inaction-burden-health-report.pdf>.
- 2 Andy Haines and Jonathan A. Patz, “Health Effects of Climate Change,” *JAMA* 291, no. 1 (2004): 99–103, <http://doi.org/10.1001/jama.291.1.99>. Kristie Ebi et al., “Human Health,” chapter 14 in *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II*, David R. Reidmiller et al., eds., U.S. Global Change Research Program, 2018, <http://doi.org/10.7930/NCA4.2018.CH14>. Katie M. Applebaum et al., “An Overview of Occupational Risks From Climate Change,” *Current Environmental Health Reports* 3, no. 1 (2016): 13–22, <http://doi.org/10.1007/s40572-016-0081-4>.
- 3 Juanita Constible et al., *On the Frontlines: Climate Change Threatens the Health of America’s Workers*, NRDC, June 2020, <https://www.nrdc.org/sites/default/files/front-lines-climate-change-threatens-workers-report.pdf>. Max Kiefer, “Worker Health and Safety and Climate Change in the Americas: Issues and Research Needs,” *Revista Panamericana de Salud Pública* 40 (2016): 192–97, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5176103/>. Barry S. Levy and Cora Roelofs, “Impacts of Climate Change on Workers’ Health and Safety,” in *Oxford Research Encyclopedia of Global Public Health*, 2019, <https://doi.org/10.1093/acrefore/9780190632366.013.39>. Tord Kjellstrom, Ingvar Holmer, and Bruno Lemke, “Workplace Heat Stress, Health and Productivity—An Increasing Challenge for Low and Middle-Income Countries During Climate Change,” *Global Health Action* 2, no. 1 (2009): 2047, <https://doi.org/10.3402/gha.v2i0.2047>. Tord Kjellstrom et al., “Climate Change and Occupational Heat Problems,” *Industrial Health* 51, no. 1 (2013): 1–2, <https://doi.org/10.2486/indhealth.MS5101ED>.
- 4 Diane M. Gubernot et al., “Characterizing Occupational Heat-Related Mortality in the United States, 2000–2010: An Analysis Using the Census of Fatal Occupational Injuries Database,” *American Journal of Industrial Medicine* 58, no. 2 (2015): 203–11, <https://doi.org/10.1002/ajim.22381>. Sheila Arbury et al., “Heat Illness and Death Among Workers—United States, 2012–2013,” *Morbidity and Mortality Weekly Report* 63, no. 31 (2014): 661–65, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4584656/>. Cora Roelofs, “Without Warning: Worker Deaths From Heat 2014–2016,” *New Solutions: A Journal of Environmental and Occupational Health Policy* 28, no. 2 (2018): 344–57, <https://doi.org/10.1177/104829111877874>.
- 5 Elspeth Oppermann et al., “Establishing Intensifying Chronic Exposure to Extreme Heat as a Slow Onset Event With Implications for Health, Wellbeing, Productivity, Society and Economy,” *Current Opinion in Environmental Sustainability* 50 (2021): 225–35, <https://doi.org/10.1016/j.coesust.2021.04.006>.
- 6 U.S. Bureau of Labor Statistics (hereinafter BLS), “Nonfatal Cases Involving Days Away From Work: Selected Characteristics (2011 Forward),” 2021, <https://www.bls.gov/iif/data.htm>. BLS, “Census of Fatal Occupational Injuries (2011 Forward),” 2021, <https://www.bls.gov/iif/data.htm>. BLS, “Fatal Cross-Tabulation of Event Exposure to Environmental Heat by State, All Ownership (1992–2017),” 2019, <https://www.bls.gov/iif/sqt/fatal-heat-exposure.xlsx>.
- 7 Kathleen M. Fagan and Michael J. Hodgson, “Under-Recording of Work-Related Injuries and Illnesses: An OSHA Priority,” *Journal of Safety Research* 60 (2017): 79–83, <https://doi.org/10.1016/j.jsr.2016.12.002>. AFL-CIO, *Death on the Job—The Toll of Neglect: A National and State-by-State Profile of Worker Safety and Health in the United States*, 28th Edition, 2019, https://aflcio.org/sites/default/files/2019-05/DOTJ2019Fnb_1.pdf, 103–104.
- 8 Oyebo A. Taiwo et al., “Recognizing Occupational Illnesses and Injuries,” *American Family Physician* 82, no. 2 (2010): 169–74, <https://www.aafp.org/afp/2010/0715/pl69.html>. Kenneth D. Rosenman et al., “How Much Work-Related Injury and Illness Is Missed by the Current National Surveillance System?” *Journal of Occupational and Environmental Medicine* 48, no. 4 (2006): 357–65, <https://doi.org/10.1097/01.jom.0000205864.81970.63>. Sean R. Notley et al., “Occupational Heat Stress Management: Does One Size Fit All?” *American Journal of Industrial Medicine* 62, no. 12 (2019): 1017–23, <https://doi.org/10.1002/ajim.22961>.
- 9 Jisung Park et al., “Temperature, Workplace Safety, and Labor Market Inequality,” IZA Institute of Labor Economics, July 2021, <https://ftp.iza.org/dp14560.pdf>.
- 10 Martell Hesketh et al., “Heat Related Illness Among Workers in Washington State: A Descriptive Study Using Workers’ Compensation Claims, 2006–2017,” *American Journal of Industrial Medicine* 63, no. 4 (2020): 300–11, <https://doi.org/10.1002/ajim.23092>.
- 11 Amy Heinzerling et al., “Risk Factors for Occupational Heat-Related Illness Among California Workers, 2000–2017,” *American Journal of Industrial Medicine* 63, no. 12 (2020): 1145–54, <https://doi.org/10.1002/ajim.23191>.
- 12 Diane M. Gubernot et al., “The Epidemiology of Occupational Heat-Related Morbidity and Mortality in the United States: A Review of the Literature and Assessment of Research Needs in a Changing Climate,” *International Journal of Biometeorology* 58, no. 8 (2014): 1779–88, <https://dx.doi.org/10.1007%2F00484-013-0752-x>. L. Harduar Morano et al., “Occupational Heat-Related Illness Emergency Department Visits and Inpatient Hospitalizations in the Southeast Region, 2007–2011,” *American Journal of Industrial Medicine* 58, no. 10 (2015): 1114–25, <https://doi.org/10.1002/ajim.22504>.
- 13 Blessom M. Varghese et al., “Are Workers at Risk of Occupational Injuries Due to Heat Exposure? A Comprehensive Literature Review,” *Safety Science* 110 (2018): 380–92, <https://doi.org/10.1016/j.ssci.2018.04.027>. June Spector et al., “A Case-Crossover Study of Heat Exposure and Injury Risk in Outdoor Agricultural Workers,” *PLoS One* 11, no. 10 (2016): e0164498, <https://doi.org/10.1371/journal.pone.0164498>. Payal Acharya, Bethany Boggess, and Kai Zhang, “Assessing Heat Stress and Health Among Construction Workers in a Changing Climate: A Review,” *International Journal of Environmental Research and Public Health* 15, no. 2 (2018): 247, <https://doi.org/10.3390/ijerph15020247>.
- 14 Gubernot et al., “Characterizing Occupational Heat-Related Mortality.”
- 15 Karin Lundgren et al., “Effects of Heat Stress on Working Populations When Facing Climate Change,” *Industrial Health* 51, no. 1 (2013): 3–15, <https://doi.org/10.2486/indhealth.2012-0089>. Glen A. Selkirk and Tom M. McLellan, “Influence of Aerobic Fitness and Body Fatness on Tolerance to Uncompensable Heat Stress,” *Journal of Applied Physiology* 91, no. 5 (2001): 2055–63, <https://doi.org/10.1152/jappl.2001.91.5.2055>. James L. Glazer, “Management of Heatstroke and Heat Exhaustion,” *American Family Physician* 71, no. 11 (2005): 2133–40, <https://www.aafp.org/afp/2005/0601/p2133.html>.
- 16 The Occupational Safety and Health Administration (hereinafter OSHA) does not cover state and local government workers unless they work in states with an OSHA-approved state program, self-employed workers, immediate family members of farm employers, and workers whose hazards are regulated by another federal agency (e.g., the Coast Guard). U.S. Department of Labor, “Frequently Asked Questions,” accessed June 26, 2022, [https://webapps.dol.gov/dolfaq/go-dol-faq.asp?faqid=253#:~:text=Those%20not%20covered%20by%20the,Administration%2C%20or%20Coast%20Guard\)](https://webapps.dol.gov/dolfaq/go-dol-faq.asp?faqid=253#:~:text=Those%20not%20covered%20by%20the,Administration%2C%20or%20Coast%20Guard).). OSHA, “Standard Interpretations: Acceptable Methods to Reduce Heat Stress Hazards in the Workplace,” accessed August 5, 2021, <https://www.osha.gov/laws-regs/standardinterpretations/2001-10-17-0>. Richard S. Morey, “The General Duty Clause of the Occupational Safety and Health Act of 1970,” *Harvard Law Review* 86 (1972): 988–1005, <https://doi.org/10.2307/1340085>.
- 17 Bruce Rolfsen, “Judge Rejects 5 OSHA Heat Danger Cases Against Postal Service,” *Bloomberg Law*, July 20, 2020, <https://news.bloomberglaw.com/safety/judge-rejects-5-osha-heat-danger-cases-against-postal-service>. Gabrielle Sigel, “OSHRC Rules No General Duty Clause Hazard or Feasible Abatement for Heat Exposure,” Jenner & Block, March 2019, https://environblog.jenner.com/corporate_environmental_1/2019/03/oshrc-rules-no-general-duty-clause-hazard-or-feasible-abatement-for-heat-exposure.html.
- 18 Teniope Adewumi-Gunn, “Stressed by Heat, Farmworkers Deserve Federal Protections,” NRDC Expert Blog, March 26, 2021, <https://www.nrdc.org/experts/teniope-adewumi-gunn/stressed-heat-farmworkers-deserve-federal-protections>. Teniope Adewumi-Gunn, “Commonsense Solutions: Protecting Workers From Extreme Heat,” NRDC Expert Blog, August 7, 2020, <https://www.nrdc.org/experts/teniope-adewumi-gunn/commonsense-solutions-protecting-workers-extreme-heat>.

- 19 Teniope Adewumi-Gunn, “Workplace Heat Protections Across the Globe,” NRDC Expert Blog, September 15, 2021, <https://www.nrdc.org/experts/teniope-adewumi-gunn/workplace-heat-protections-across-globe>.
- 20 Associated General Contractors of America, “National Heat Standard,” September 2019, <https://nclc.agc.org/wp-content/uploads/sites/15/2019/09/National-Heat-Standard.pdf>. House Education and Labor Committee, “House, Senate Democrats Introduce Heat Stress Legislation to Protect Farm Workers,” press release, March 26, 2021, <https://edlabor.house.gov/media/press-releases/house-senate-leaders-introduce-heat-stress-legislation-to-protect-farm-workers>.
- 21 Office of Information and Regulatory Affairs, Office of Management and Budget, “Heat Illness Prevention in Outdoor and Indoor Work Settings,” accessed September 2, 2021, <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=1218-AD39>.
- 22 Juanita Constible, “OSHA Moves to Protect Workers From Climate-Fueled Heat Waves,” NRDC Expert Blog, September 20, 2021, <https://www.nrdc.org/experts/juanita-constible/osha-moves-protect-workers-climate-fueled-heat-waves>. The White House, “Fact Sheet: Biden Administration Mobilizes to Protect Workers and Communities From Extreme Heat,” press release, September 20, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/20/fact-sheet-biden-administration-mobilizes-to-protect-workers-and-communities-from-extreme-heat/>.
- 23 OSHA, “The OSHA Rulemaking Process,” October 15, 2012, https://www.osha.gov/sites/default/files/OSHA_FlowChart.pdf.
- 24 U.S. Government Accountability Office, “Workplace Safety and Health: Multiple Challenges Lengthen OSHA’s Standard Setting,” April 2012, <https://www.gao.gov/assets/gao-12-330.pdf>.
- 25 OSHA, “State Plans,” accessed August 5, 2021, <https://www.osha.gov/stateplans>. Lisa Nagele-Piazza, “State Workplace Safety Standards May Exceed OSHA’s Rules,” Society for Human Resource Management, October 6, 2017, <https://www.shrm.org/resourcesandtools/legal-and-compliance/employment-law/pages/state-workplace-safety-standards-may-differ-from-osha.aspx>.
- 26 Minnesota Administrative Rules, “Indoor Ventilation and Temperature in Places of Employment,” Office of the Revisor of Statutes, 2014, <https://www.revisor.mn.gov/rules/5205.0110>. California Department of Industrial Relations (hereinafter DIR), “California Code of Regulations, Title 8, Section 3395: Heat Illness Prevention,” last amended 2020, www.dir.ca.gov/title8/3395.html. Lora Shinn, “Washington State Adds Emergency Rules to Protect Workers From Heat and Wildfire Smoke,” NRDC, August 2021, <https://www.nrdc.org/stories/washington-state-adds-emergency-rules-protect-workers-heat-and-wildfire-smoke>. U.S. Department of Labor and Employment, Division of Labor Standards and Statistics, “Agricultural Labor Conditions Rules, 7 CCR 1103-15,” October 29, 2021, <https://cdle.colorado.gov/sites/cdle/files/7%20CCR%201103-15%20%20Agricultural%20Labor%20Conditions%20Rules.pdf>. Oregon Occupational Safety & Health Division, “Oregon OSHA’s Adoption of Rules to Address Employee and Labor Housing Occupant Exposure to High Ambient Temperatures,” May 9, 2022, <https://osha.oregon.gov/OSHArules/adopted/2022/ao3-2022-letter-ah-heat.pdf>.
- 27 Working Conditions; Heat Illness; Prevention, State of Arizona, H.B. 2686 (2021) <https://apps.azleg.gov/BillStatus/BillOverview/75349>. Assembly Bill A5361, “Relates to Regulating Employers to Keep Their Employees Safe From Exposure to Extreme Heat,” State of New York, A.B. A5361 (2021) <https://www.nysenate.gov/legislation/bills/2021/A5361>. “An Act Relating to Heat Illness Prevention,” State of Maine, H.P. 1077 (2021), http://legislature.maine.gov/legis/bills/display_ps.asp?LD=1461&snum=130.
- 28 Labor and Employment—Occupational Safety and Health—Heat Stress Standards, State of Maryland, H.B. 0722 (2020), <http://mgaleg.maryland.gov/mgawebsite/Legislation/Details/hb0722?ys=2020RS>.
- 29 Robert Salladay and Nancy Vogel, “Gov. Orders Shade, Water for Workers Sickened by Heat,” *Los Angeles Times*, August 3, 2005, <https://www.latimes.com/archives/la-xpm-2005-aug-03-me-farmworkers3-story.html>.
- 30 BLS, “Economy at a Glance—California,” accessed August 5, 2021, <https://www.bls.gov/eag/eag.ca.htm>.
- 31 Susan Ann Myers, “The California Occupational Safety and Health Act of 1973,” *Loyola of Los Angeles Law Review* 9 (1975): 905–60, <https://digitalcommons.lmu.edu/llr/vol9/iss4/6>.
- 32 DIR, “Divisions, Boards and Commissions at DIR,” accessed September 7, 2021, https://www.dir.ca.gov/divisions_and_programs.html.
- 33 Ibid.
- 34 DIR, “Cal/OSHA,” accessed September 7, 2021, <https://www.dir.ca.gov/dosh/>.
- 35 Kevin Riley et al., “From Agricultural Fields to Urban Asphalt: The Role of Worker Education to Promote California’s Heat Illness Prevention Standard,” *New Solutions: A Journal of Environmental and Occupational Health Policy* 22, no. 3 (2012): 297–323, <https://doi.org/10.2190/ns.22.3.e>.
- 36 Ibid.
- 37 Josh Cable, “California: Worker Deaths Prompt Emergency Heat Stress Rule Proposal,” *EHS Today*, August 4, 2005, <https://www.ehstoday.com/archive/article/21907188/california-worker-deaths-prompt-emergency-heat-stress-rule-proposal>.
- 38 Dan Glaister, “Death in the Sun,” *The Guardian*, August 5, 2005, <https://www.theguardian.com/world/2005/aug/05/worlddispatch.usa>. “Battling the Heat,” *Los Angeles Times*, August 4, 2005, <https://www.latimes.com/archives/la-xpm-2005-aug-04-ed-heat4-story.html>. Shellie Branco, “Settlement Made in Death,” *Bakersfield Californian*, October 7, 2006, https://www.bakersfield.com/archives/settlement-made-in-death/article_4e57333b-3113-5df5-a767-ee76511e363.html.
- 39 Josh Cable, “California: Worker Deaths Prompt Emergency Heat Stress Rule Proposal.” “Worker Deaths Prompt Action on Heat Illness Emergency Regulation,” *Cal-OSHA Reporter*, July 29, 2005, <https://www.cal-osha.com/article/worker-deaths-prompt-action-on-heat-illness-emergency-regulation/>.
- 40 DIR, “California Code of Regulations, Title 8, Section 3395.”
- 41 Salladay and Vogel, “Gov. Orders Shade, Water.” “Standards Board to Vote Aug. 12 on Emergency Heat Illness Regulation,” *Cal-OSHA Reporter*, August 5, 2005, <https://www.cal-osha.com/article/standards-board-to-vote-aug-12-on-emergency-heat-illness-regulation/>. Kevin Thompson, “Board Readopts Heat Illness Emergency Reg, Revisits Shade Issue,” *Cal-OSHA Reporter*, January 6, 2006, <https://www.cal-osha.com/article/board-readopts-heat-illness-emergency-reg-revisits-shade-issue/>. Kevin Thompson, “Standards Board Readopts Heat Illness Emergency Rule, Approves Avalanche Safety Advisory Committee,” *Cal-OSHA Reporter*, March 24, 2006, *Cal-OSHA Reporter*, <https://www.cal-osha.com/article/standards-board-readopts-heat-illness-emergency-rule-approves-avalanche-safety-advisory-committee/>.
- 42 United Farm Workers, “Landmark Lawsuit Accuses State of Failing to Protect Farm Workers From Heat-Related Death and Illness,” July 30, 2009, <https://ufw.org/Landmark-Lawsuit-Accuses-State-of-Failing-to-Protect-Farm-Workers-from-Heat-Related-Death-and-Illness/>.
- 43 Kevin Thompson, “New Heat Proposal Airst Oct. 15,” *Cal-OSHA Reporter*, September 4, 2009, <https://www.cal-osha.com/article/new-heat-proposal-airst-oct-15/>. Kevin Thompson, “A Problem of Enforcement?” *Cal-OSHA Reporter*, October 23, 2009, <https://www.cal-osha.com/article/a-problem-of-enforcement/>.

- 44 Anna Gorman, “California Steps Up Efforts to Prevent Heat-Related Deaths Among Farmworkers,” *Los Angeles Times*, August 3, 2009, <https://www.latimes.com/archives/la-xpm-2009-aug-03-me-heat3-story.html>. Sasha Khokha, “Teen Farmworker’s Heat Death Sparks Outcry,” *Los Angeles Times*, June 6, 2008, <https://www.npr.org/templates/story/story.php?storyId=91240378>. Summary: Public Meeting of the Occupational Safety and Health Standards Board, State of California, Department of Industrial Relations, June 18, 2009 (unpublished transcript). Summary: Public Meeting of the Occupational Safety and Health Standards Board, State of California, Department of Industrial Relations, October 15, 2009 (unpublished transcript).
- 45 Peter H. Weiner and Ira J. Klein, “Revisions to California’s Heat Illness Prevention Standard to Take Effect on May 1, 2015,” Paul Hastings LLP, April 15, 2015, <https://www.paulhastings.com/insights/client-alerts/revisions-to-californias-heat-illness-prevention-standard-to-take-effect-on-may-1-2015>. “Calif. Strengthens Heat Illness Prevention Standard,” *Industrial Safety & Hygiene News*, March 2, 2015, <https://www.ishn.com/articles/100797-calif-strengthens-heat-illness-prevention-standard>. “The Amendments to the Heat Illness Prevention Plan,” Jackson Lewis, February 26, 2015, <https://www.californiaworkplacelawblog.com/2015/02/articles/workplace-safety/the-amendments-to-the-heat-illness-prevention-plan>. Summary: Public Meeting of the Occupational Safety and Health Standards Board, State of California, Department of Industrial Relations, July 8, 2013 (unpublished transcript). Summary: Public Meeting of the Occupational Safety and Health Standards Board, State of California, Department of Industrial Relations, September 25, 2014 (unpublished transcript).
- 46 Roy Maurer, “Calif. Employers Should Prepare Now for Summer Heat Amended Heat Illness Prevention Standard Goes Into Effect May 1,” *Society for Human Resource Management*, April 8, 2015, <https://www.shrm.org/resourcesandtools/hr-topics/risk-management/pages/california-employers-summer-heat.aspx>. Worksafe, *Dying at Work in California: The Hidden Stories Behind the Numbers*, 2014, https://worksafe.org/file_download/inline/769dab3c-3c0f-47c4-8748-8fa1a2615541.
- 47 Mauricio Peña, “Death in the Fields,” *Desert Sun*, November 19, 2015, <https://www.desertsun.com/story/news/2015/11/19/death-fields/74058984/>.
- 48 DIR, “California Code of Regulations, Title 8, Section 3395.”
- 49 Kevin Thompson, “Judge: Heat Illness Prevention Standard Could Apply to Buses,” *Cal-OSHA Reporter*, August 15, 2014, <https://www.cal-osh.com/article/judge-heat-illness-prevention-standard-could-apply-to-buses/>.
- 50 Senate Committee on Labor and Industrial Relations Analysis of Employment Safety: Indoor Workers: Heat Regulations, State of California, S.B 1167 (2016), February 18, 2016, https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1167.
- 51 DIR, “Heat Illness Prevention in Indoor Places of Employment,” accessed September 5, 2021, <https://www.dir.ca.gov/dosh/doshreg/heat-illness-prevention-indoors/>.
- 52 “Indoor Heat Illness Standard Status,” *Cal-OSHA Reporter*, August 27, 2021, <https://www.cal-osh.com/article/indoor-heat-illness-standard-status/>.
- 53 DIR, *California Heat Illness Prevention Campaign Summer 2012, Final Performance and Evaluation Report*, January 2013, <https://www.dir.ca.gov/dosh/HeatIllnessCampaign/Heat-Illness-Campaign.Evaluation-Report.Summer-2012.pdf>. Division of Occupational Safety and Health (hereinafter DOSH), *Heat Illness Prevention Special Emphasis Program*, April 2020, <https://www.dir.ca.gov/DOSHPol/Heat-SEP.pdf>.
- 54 Riley et al., “From Agricultural Fields to Urban Asphalt.”
- 55 DIR, “Heat Illness Prevention,” accessed September 7, 2021, <https://www.dir.ca.gov/dosh/heatillnessinfo.html>.
- 56 DOSH, *Policies and Procedure Manual: Inspection Procedures*, revised February 21, 2019, <https://www.dir.ca.gov/DOSHPol/P&pc-1A.pdf>.
- 57 Ibid. University of California, Labor Occupational Health Programs, “Basics of Cal/OSHA,” accessed August 5, 2021, https://lohp.berkeley.edu/wp-content/uploads/2016/07/9.-SB_Factsheet_BasicsOSHA_final.pdf.
- 58 DIR, “Cal/OSHA Safety and Health Complaint Handling Simplified Process,” accessed September 7, 2021, <https://www.dir.ca.gov/dosh/caloshacomplaintflowchart.html>. DOSH, *Policies and Procedure Manual: Referral*, revised January 1, 2000, <https://www.dir.ca.gov/DOSHPol/P&PC-90.pdf>.
- 59 DIR, “File a Workplace Safety Complaint,” accessed September 7, 2021, <https://www.dir.ca.gov/dosh/complaint.htm>. University of California, Labor Occupational Health Programs, “Basics of Cal/OSHA.”
- 60 United Farm Workers, “Exhibit 2: Memorandum of Understanding,” accessed April 5, 2022, <https://www.ufw.org/pdf/BautistaMOUFinal.pdf>. Geoffrey Mohan, “Cal-OSHA Settles Farmworker Suits Over Heat-Related Deaths,” *Los Angeles Times*, June 11, 2015, <https://www.latimes.com/business/la-fi-cal-osh-farm-workers-20150612-story.html>.
- 61 DOSH, *Heat Illness Prevention Special Emphasis Program*.
- 62 DOSH, *Policies and Procedure Manual: Citation and Notification of Penalty and Verification of Abatement*, revised June 2, 2008, <https://www.dir.ca.gov/DOSHPol/P&PC-2.pdf>.
- 63 DIR, “California Code of Regulations, Title 8, Section 336: Assessment of Civil Penalties,” accessed June 26, 2022, <https://www.dir.ca.gov/title8/336.html>.
- 64 DIR, “California Code of Regulations, Title 8, Section 335: Factors Considered in Assessing Civil Penalties,” accessed August 5, 2021, <https://www.dir.ca.gov/title8/335.html>.
- 65 DIR, “Citation and Notification of Penalty,” accessed August 5, 2021, <https://www.dir.ca.gov/DOSHPol/forms/CalOSHA2.pdf>.
- 66 DOSH, *Policies and Procedure Manual: Appeals and Hearings*, revised September 15, 2021, <https://www.dir.ca.gov/DOSHPol/P&PC-23.pdf>.
- 67 Jeffrey W. Bethel and Renee Harger, “Heat-Related Illness Among Oregon Farmworkers,” *International Journal of Environmental Research and Public Health* 11, no. 9 (2014): 9273–85, <https://dx.doi.org/10.3390%2Fijerph110909273>. Thomas A. Arcury et al., “Heat Illness Among North Carolina Latino Farmworkers,” *Journal of Occupational and Environmental Medicine* 57, no. 12 (2015): 1299–1304, <https://dx.doi.org/10.1097%2FJOM.0000000000000552>. Abby D. Mutic et al., “Classification of Heat-Related Illness Symptoms Among Florida Farmworkers,” *Journal of Nursing Scholarship* 50, no. 1 (2018): 74–82, <https://doi.org/10.1111/jnu.12355>.
- 68 DIR, “Frequently Asked Questions: Piece-Rate Compensation—Labor Code §226.2 (AB 1513),” https://www.dir.ca.gov/pieceratebackpayelection/AB_1513_FAQs.htm.
- 69 Alena Uliasz, “Not Everyone Speaks Spanish! The Need for Indigenous Language Interpreters in California’s Agricultural Workforce,” U.C. Davis Western Center for Agricultural Health and Safety, July 19, 2018, <https://aghealth.ucdavis.edu/news/not-everyone-speaks-spanish-need-indigenous-language-interpreters-californias-agricultural>.
- 70 Garrett Brown, “Latest Cal/OSHA staffing data -- as of April 1st -- vacancies continue as hiring does not match retirements [sic] and turn-over,” PWA email list serve, July 11, 2022.

- 71 California Employment Development Department, "Agricultural Employment in California," accessed July 12, 2022, <https://www.labormarketinfo.edd.ca.gov/data/ca-agriculture.html>. Izaac Ornelas et al., *California Findings From the National Agricultural Workers Survey (NAWS) 2015–2019: A Demographic and Employment Profile of California Farmworkers*, JBS International for the U.S. Department of Labor, January 2022, https://wdr.doleta.gov/research/FullText_Documents/ETAOP2022-15_NAWS_Research_Report_15_508c.pdf.
- 72 Alexandra Berzon, Shalini Ramachandran, and Coulter Jones, "OSHA's Job Is Workplace Safety. In the Covid-19 Pandemic, It Often Struggled," *Wall Street Journal*, March 4, 2021, <https://www.wsj.com/articles/oshas-job-is-workplace-safety-in-the-covid-19-pandemic-it-often-struggled-11614875112>.
- 73 U.S. Citizenship and Immigration Services, "H-2A Temporary Agricultural Workers," November 2011, <https://www.uscis.gov/working-in-the-united-states/temporary-workers/h-2a-temporary-agricultural-workers>.
- 74 Philip Martin, "A Look at H-2A Growth and Reform in 2021 and 2022," Wilson Center, January 3, 2022, <https://www.wilsoncenter.org/article/look-h-2a-growth-and-reform-2021-and-2022>.
- 75 Adam Wagner and Aaron Sanchez-Guerra, "'They're Literally Hot All the Time.' How a Heat Standard Would Help NC Farmworkers," *News & Observer*, September 30, 2021, <https://www.newsobserver.com/living/article246280395.html>. Sara A. Quandt et al., "Heat Index in Migrant Farmworker Housing: Implications for Rest and Recovery From Work-Related Heat Stress," *American Journal of Public Health* 103, no. 8 (2013): e24–e26, <https://dx.doi.org/10.2105%2FAJPH.2012.301135>.
- 76 Oregon Occupational Safety & Health Division, "Oregon OSHA's Adoption of Rules."
- 77 Robert B. Gravano, "Farm Worker Health and Hygiene," Produce Safety Project, 2009, <https://www.pewtrusts.org/~media/assets/2009/pspworker1pdf.pdf>. Caius Z. Willingham and Silva Mathema, "Protecting Farmworkers From Coronavirus and Securing the Food Supply," Center for American Progress, April 23, 2020, <https://www.americanprogress.org/issues/economy/reports/2020/04/23/483488/protecting-farmworkers-coronavirus-securing-food-supply/>. Brian Osgood, "What Choice Do We Have? US Farm Workers Battle Deadly Heatwave," *Al Jazeera*, July 15, 2021, <https://www.aljazeera.com/economy/2021/7/15/what-choice-do-we-have-us-farm-workers-battle-deadly-heat-wave>.
- 78 CRLA community workers conduct significant education and outreach regarding employment rights, including health and safety, sexual harassment, and wage and hour rights, to agricultural workers in all California counties.
- 79 The inspection data did not distinguish between formal and informal complaints.
- 80 Daisy Contreras, "Farmworkers Who Face Extreme Heat Fear Retaliation or Deportation if They Complain, Says Nurse," *The World*, July 21, 2021, <https://www.pri.org/stories/2021-07-21/farmworkers-who-face-extreme-heat-fear-retaliation-or-deportation-if-they>.
- 81 Garden hoses are not manufactured to deliver safe drinking water. They can contain bacteria, mold, and toxic chemicals such as lead. Additionally, when garden hoses are exposed to direct sunlight, the water inside can be heated, potentially causing burns.
- 82 Overexertion leads to an increase of heat production in the body, which can increase the risk of heat-related illness.
- 83 Amy Heinzerling et al., "Risk Factors for Occupational Heat-related Illness Among California Workers, 2000-2007," *American Journal of Industrial Medicine* 63 no. 12 (2020): 1145–54, <https://onlinelibrary.wiley.com/doi/abs/10.1002/ajim.23191>.
- 84 Scott Neuman, "The Pacific Northwest Has Limited A/C, Making the Heat Wave More Dangerous," NPR, June 28, 2021, <https://www.npr.org/2021/06/28/1010923130/the-pacific-northwest-has-limited-a-c-making-the-heat-wave-more-dangerous>. David Fitzgerald, "Workers Forced to Stay on the Job as Heat Wave Continues to Sweep Pacific Northwest," World Socialist Web Site, July 1, 2021, <https://www.wsws.org/en/articles/2021/07/02/paci-j02.html>.
- 85 OSHA, "Reiteration of Existing OSHA Policy on Indoor Air Quality: Office Temperature/Humidity and Environmental Tobacco Smoke," accessed August 5, 2021, <https://www.osha.gov/laws-regs/standardinterpretations/2003-02-24>.
- 86 Brenda Jacklitsch, Kristin Musolin, and Jung-Hyun Kim, *Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments. Revised Criteria 2016*, National Institute of Occupational Safety and Health (hereinafter NIOSH), February 2016, <https://www.cdc.gov/niosh/docs/2016-106/default.html>.
- 87 DIR, "California Code of Regulations, Title 8, Section 336: Assessment of Civil Penalties," accessed June 26, 2022, <https://www.dir.ca.gov/title8/336.html>.
- 88 Jennifer Mora, Thomas Benjamin Huggett, and Christina Cila, "Cal/OSHA Amendment Significantly Expands Its Definition of 'Repeat' Violations," Littler, December 12, 2016, <https://www.littler.com/publication-press/publication/calosha-amendment-significantly-expands-its-definition-%E2%80%9CRepeat%E2%80%9D>.
- 89 DIR, "California Code of Regulations, Title 8, Section 336: Assessment of Civil Penalties."
- 90 DIR, "Classification of Violations and Definitions," accessed September 7, 2021, <https://www.dir.ca.gov/title8/334.html>.
- 91 Kimberly A. Stille and Scott C. Ketcham, "2022 Annual Adjustments to OSHA Civil Penalties," memorandum to OSHA regional administrators, January 13, 2022, <https://www.osha.gov/memos/2022-01-13/2022-annual-adjustments-osh-civil-penalties>.
- 92 Celine McNicholas et al., "Civil Monetary Penalties for Labor Violations Are Woefully Insufficient to Protect Workers," Economic Policy Institute, July 15, 2021, <https://www.epi.org/blog/civil-monetary-penalties-for-labor-violations-are-woefully-insufficient-to-protect-workers/>.
- 93 Di Fan et al., "Safety Regulation Enforcement and Production Safety: The Role of Penalties and Voluntary Safety Management Systems," *International Journal of Production Economics* 248 (2022): 108481, <https://www.sciencedirect.com/science/article/abs/pii/S0925527322000743?via%3Dihub>.
- 94 Jeff Johnson, "Former OSHA Head David Michaels Calls for Regulatory Overhaul," *ACS Chemical Health & Safety* 28, no. 3 (2021): 148–9, <https://pubs.acs.org/doi/full/10.1021/acs.chas.1c00038>.
- 95 Discounts are given to employers when they abate or eliminate a recognized hazard identified by OSHA during an inspection.
- 96 Martha T. McCluskey et al., "OSHA's Discount on Danger," Center for Progressive Reform, June 2016, https://cpr-assets.s3.amazonaws.com/documents/OSHA_Discount_on_Danger_Report.pdf.
- 97 Chelsea Eastman Langer et al., "Are Cal/OSHA Regulations Protecting Farmworkers in California From Heat-Related Illness?" *Journal of Occupational and Environmental Medicine* 63, no. 6 (2021): 532–9, doi.org/10.1097/JOM.0000000000002189.
- 98 OSHA, "Heat Exposure: Protecting New Workers," accessed April 11, 2022, <https://www.osha.gov/heat-exposure/protecting-new-workers>.
- 99 NIOSH, "Acclimatization," accessed April 11, 2022, <https://www.cdc.gov/niosh/topics/heatstress/acclima.html>. U.S. Army Public Health Center, "Heat Acclimatization Guide," 2003, <https://www.usariem.army.mil/assets/docs/partnering/HeatAcclimatizationGuide.pdf>.
- 100 OSHA, "Fatality and Catastrophe Investigation Summaries," accessed March 5, 2021, <https://www.osha.gov/pls/imis/accidentsearch.html>.
- 101 R Core Team, "R: A Language and Environment for Statistical Computing," R Foundation for Statistical Computing, 2020, <https://www.R-project.org/>.
- 102 Python Software Foundation, "Python Language Reference, Version 3.8," October 15, 2020, <http://www.python.org>.