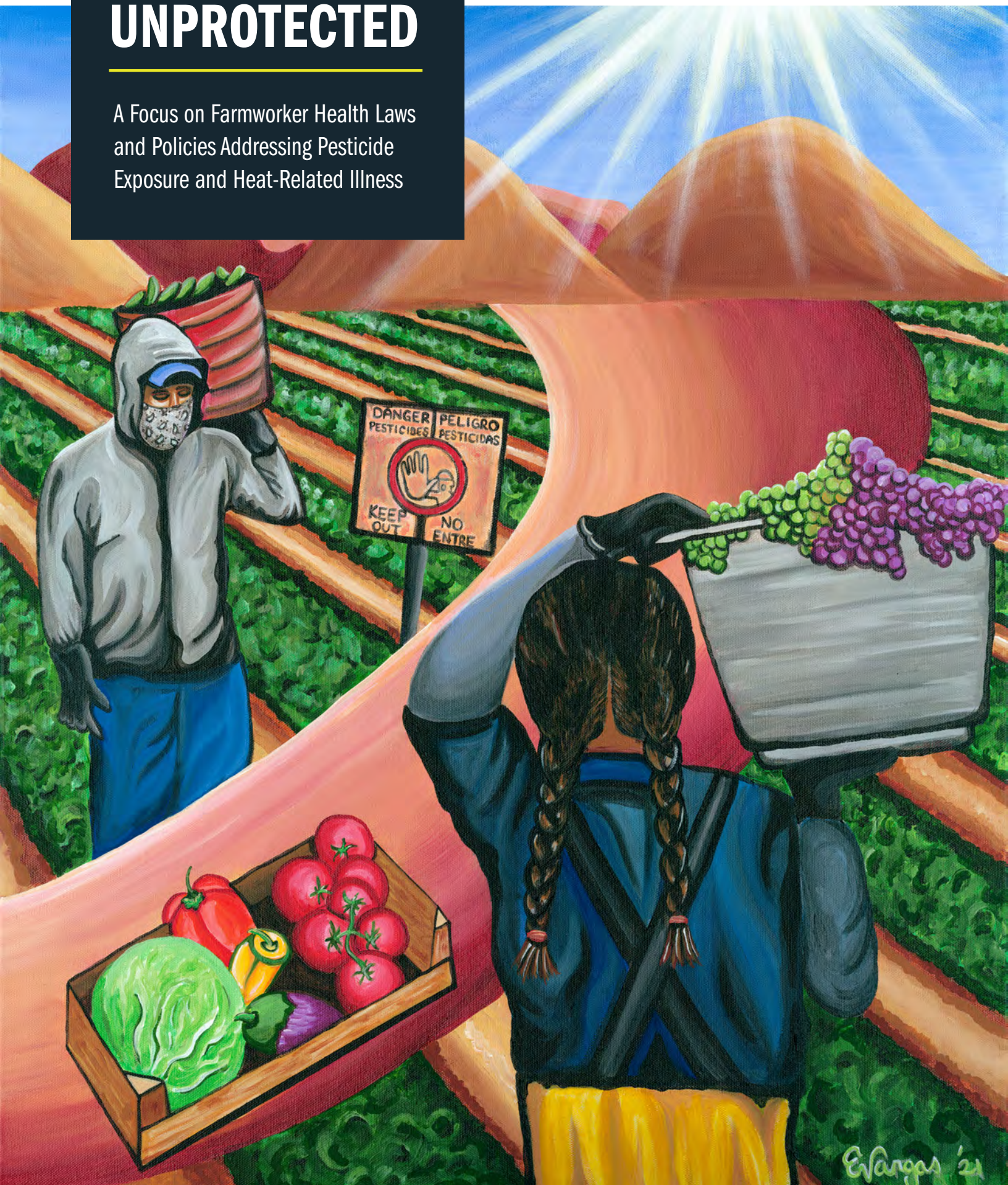
ESSENTIALLY UNPROTECTED

A Focus on Farmworker Health Laws and Policies Addressing Pesticide Exposure and Heat-Related Illness

VERMONT LAW SCHOOL | CENTER FOR AGRICULTURE & FOOD SYSTEMS

JOHNS HOPKINS CENTER for A LIVABLE FUTURE



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AUTHORS & ACKNOWLEDGMENTS

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About CAFS

Vermont Law School's Center for Agriculture and Food Systems (CAFS) uses law and policy to build a more sustainable and just food system. In partnership with local, regional, national, and international partners, CAFS addresses food system challenges related to food justice, food security, farmland access, animal welfare, worker protections, the environment, and public health, among others. CAFS works closely with its partners to provide legal services that respond to their needs and develop resources that empower the communities they serve. Through CAFS' Food and Agriculture Clinic and Research Assistant program, students work directly on projects alongside partners nationwide, engaging in innovative work that spans the food system. Please visit www.vermontlaw.edu/cafs to learn more.

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As an interdisciplinary academic center based within the Johns Hopkins Bloomberg School of Public Health, The Center for a Livable Future (CLF) applies a public health lens to questions of food system reform. Since 1996, CLF has been addressing—and proposing solutions to—some of the most pressing issues in the food system. CLF is a leader in public health research, education, policy and advocacy, dedicated to building a healthier, more equitable and resilient food system. Since its founding, a primary focus of the Center has been understanding and addressing the public health and environmental problems caused by large food animal production operations, often referred to as industrial animal agriculture facilities or CAFOs (concentrated animal feeding operations). Please visit www.clf.jhsph.edu to learn more.

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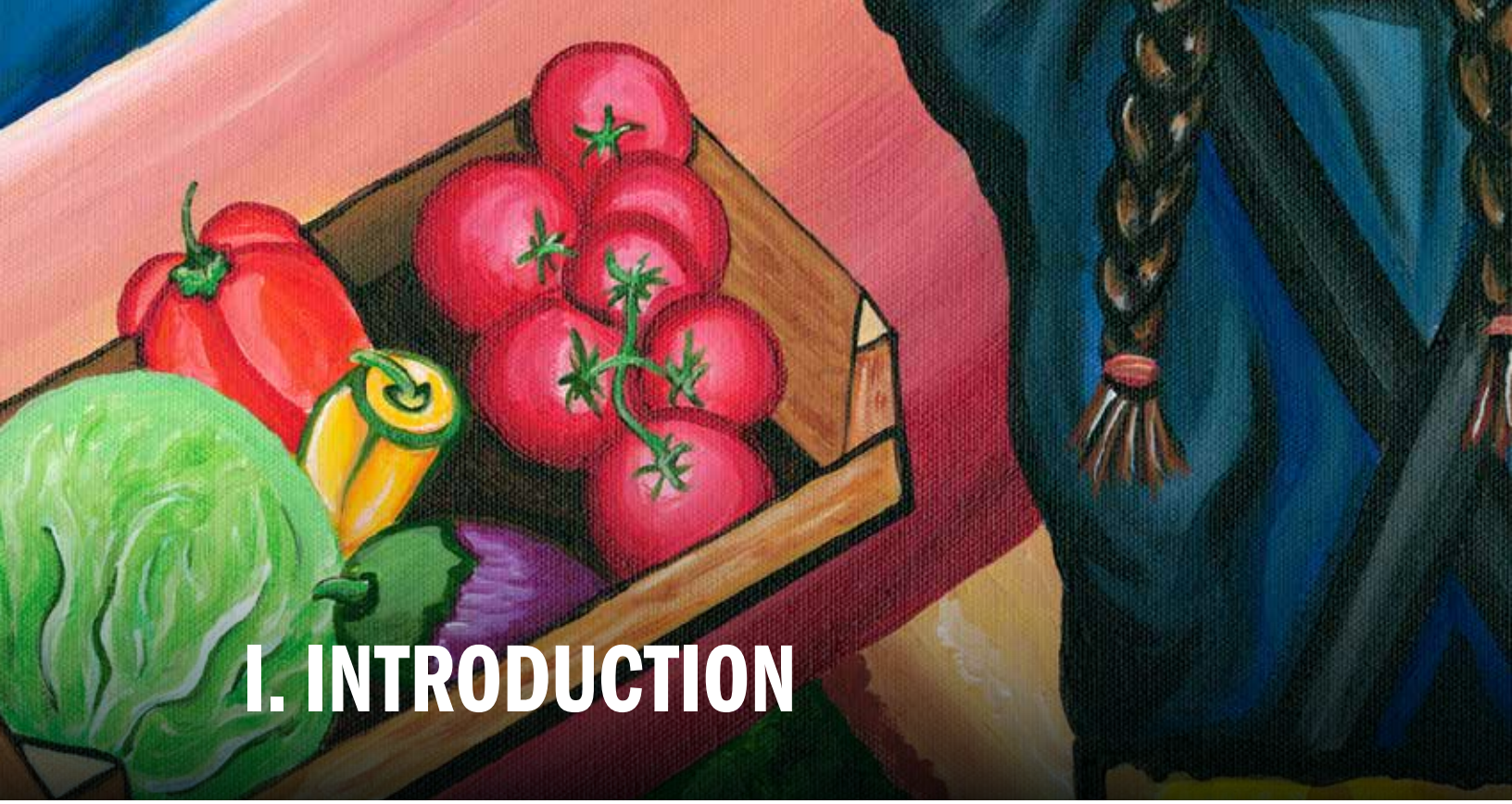


I. INTRODUCTION

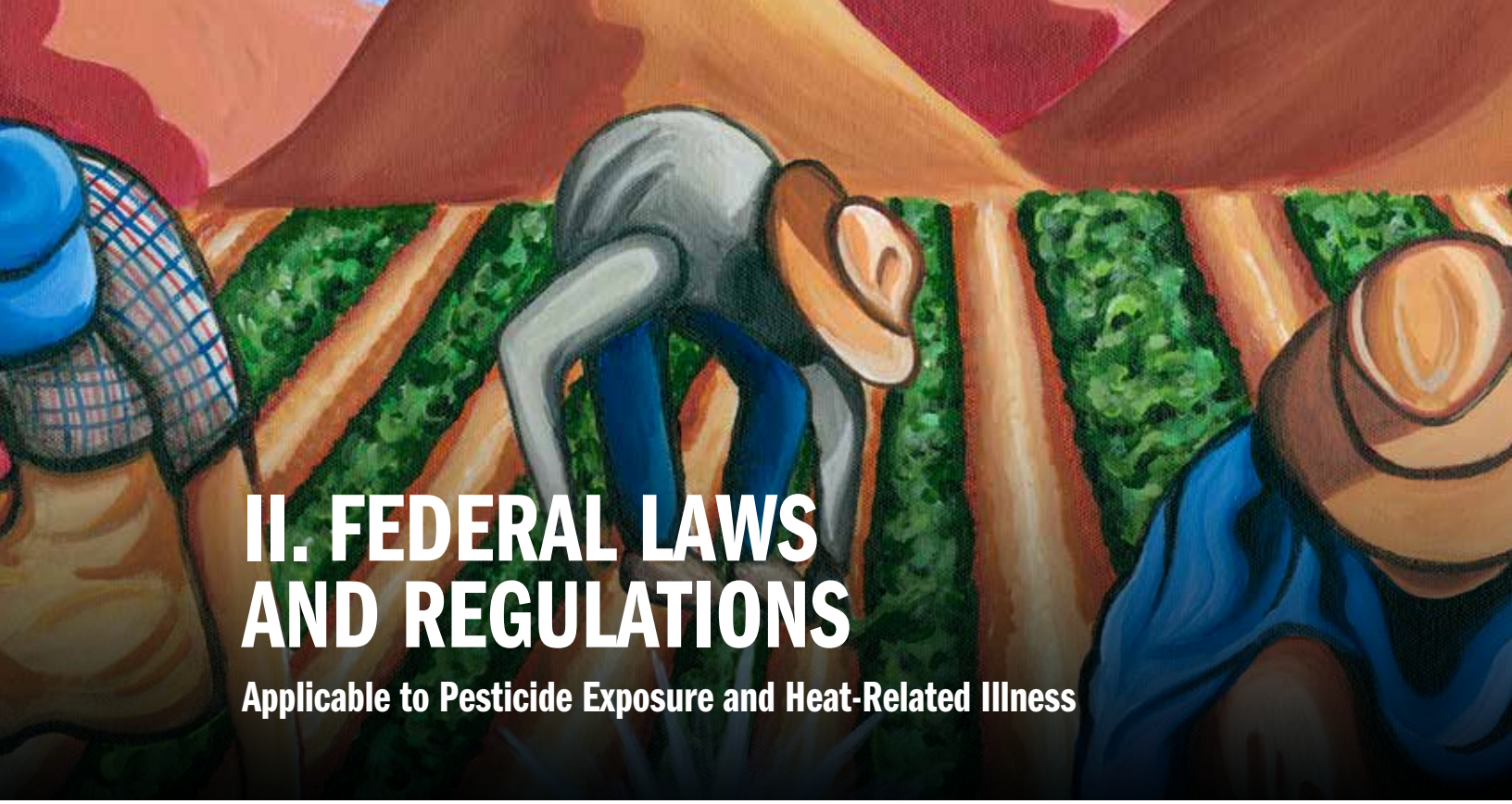
FARMWORKERS ARE THE FOUNDATION of a trillion-dollar industry in the United States[1] yet face a level of occupational risk unrivaled by most workers.[2] Despite their prominence within the nation's food system, farmworkers are largely invisible to most Americans, as are their sacrifices and challenges.[3] To some degree, the COVID-19 pandemic forced the country to reckon with the inhumane realities of food production; farmworkers were quickly deemed essential. At the same time, farmworkers contracted the coronavirus at high rates due to the lack of enforceable COVID safety standards, crowded and unsafe working and housing conditions, and delayed federal assistance.[4] As our nation begins to reckon with its long history of pervasive and systemic racism, law- and policymakers must confront the fact that the vast majority of farmworkers are foreign born, identify as Hispanic or Latino/a[5], are not native English speakers,[6] earn low wages,[7] and have long worked under extraordinarily hazardous conditions. A smaller percentage of farmworkers identify as Indigenous with some identifying an Indigenous language as the one in which they are most comfortable speaking[8] while some may speak a language without a consistent written form, which makes reading and writing in any language impossible.[9] Over half of farmworkers are either undocumented or migrant workers thereby limiting their labor rights,[10] as well as their willingness to exercise the limited rights they possess to report health and safety violations for fear of retaliation through immigration enforcement. Estimates suggest approximately 524,000 farmworkers are under the age of 18.[11]

Farmworkers face many different workplace hazards including injury from heavy machinery and repetitive motion, and illness from exposure to zoonotic disease, pesticides, and heat.[12] For migrant farmworker women, significant reproductive health issues are common.[13] Children working in agriculture amount to less than 5.5 percent of working children in the country yet suffered 52 percent of work-related fatalities.[14] Additionally, farmworkers often lack access to or

cannot afford healthcare both because they earn extraordinarily low wages and due to rampant wage theft.[15] Understandably, they may be reluctant to raise workplace concerns with their employers due to fear of retaliation. Climate change has exacerbated some of these conditions due to extreme heat and increased pesticide usage to combat the rising spread of pests.[16]

Despite the significant risks associated with their work, farmworkers and other agricultural employees are excluded from many labor protections due to our nation's long history of a food and agricultural system rooted in enslavement.[17] While one of the concerns often cited in response to calls for farmworker occupational protections is the potential cost and burden placed on struggling farms and businesses, taxpayers already shoulder a portion of the costs associated with significant work-related injuries.[18] Consequently, many have recommended preventive measures provide the most effective solutions.[19]

Based on conversations with farmworkers and the advocates that work with them, this report considers federal and state law and policy measures addressing two critical workplace hazards—pesticide exposure and heat-related illness. While the federal government has developed a national scheme regulating pesticides in the United States, significant gaps remain. Specifically, many U.S. pesticide protections are focused on protecting consumers, the environment, and wildlife, but not individuals who are not the ones most often exposed to pesticides at dangerous levels—farmworkers and their families. Unlike pesticides, heat-related stress and illness in the workplace has not been addressed in any meaningful way at the federal level short of recommended guidance for employers. To provide law and policymakers with tools by which to consider a broader set of measures to address these critical work-related hazards, this report considers state laws and regulations that may fill gaps left by federal law and identifies opportunities and provides recommendations for additional protective measures.



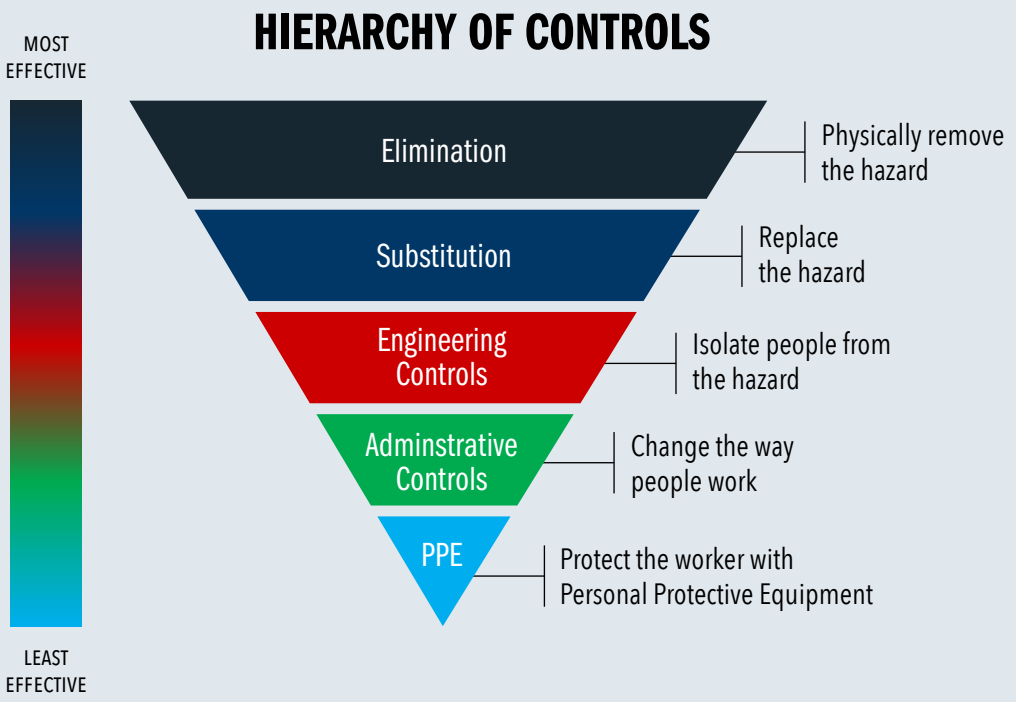
II. FEDERAL LAWS AND REGULATIONS

Applicable to Pesticide Exposure and Heat-Related Illness

IN THE U.S., the Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) administer and enforce most federal farmworker protections related to preventing pesticide exposure and heat-related illness. EPA implements a regulatory framework that sets minimum standards for safe pesticide use and OSHA regulates general safety in the workplace. States must incorporate the federal standards into their worker protection laws and regulations at a minimum, while some include higher standards than those set at the federal level. In many instances, due to concerns that federal safeguards may fail to protect farmworkers coupled with the lack of enforcement in many instances, states have enacted laws and regulations intended to address continued farmworker health issues related to pesticide exposure and heat-related illness. The descriptions below provide a general overview of the major federal laws and regulations that affect farmworker health related to pesticide exposure and heat-related illness.

A. Occupational Safety and Health Act

The Occupational Safety and Health Administration (OSHA) is housed within the U.S. Department of Labor and is the designated agency responsible for enforcing the Occupational Safety and Health Act of 1970 (OSH Act),[20] although the law is also enforced by state agencies in states with OSHA-approved state plans.[21] The stated purpose of the OSH Act is to "assure so far as possible every working man and woman in the Nation safe and healthful working conditions."[22] The OSH Act applies to nearly all privately employed workers,[23] regardless of immigration status.[24] While most states have OSHA-approved plans covering both public and private sector workers, some state plans cover only public sector workers.[25] In these states, private sector workers are under the jurisdiction of the federal act.[26] The OSH Act prohibits employers from retaliating against employees that invoke their rights under the act by either filing a safety or



Source: *Hierarchy of Controls*, CTRS. FOR DISEASE CONTROL AND PREVENTION (Jan. 13, 2015), https://www.cdc.gov/niosh/topics/hierarchy/default.html.

> The National Institute for Occupational Safety and Health recommends controlling exposures to hazards as the "fundamental method of protecting workers."

health complaint, raising concerns with their employer, complying with an OSHA inspection, or reporting an injury or illness related to work.[27] Importantly, however, OSHA has interpreted the OSH Act not to provide any right to employees to walk off the job due to potentially unsafe workplace conditions, meaning an employer can discipline an employee for failing to perform their job functions even when the employee has safety or health concerns.[28]

Congress intended the OSH Act to support states in administering and enforcing their own occupational health and safety laws through grants and approved state plans that provide at least as much protection as federal law.[29] State laws and regulations addressing occupational health and safety are not displaced or preempted by the OSH Act when: (1) they have been developed as part of an OSHA-approved state plan; (2) there is no OSHA standard in effect addressing the specific workplace hazard covered by the law or regulation; and (3) the law or regulation protects the general public, and the specific protection of workers is ancillary to the purpose.[30] However, if an OSHA standard exists for a specific activity or workplace hazard and a state wants to be responsible for implementation and enforcement, they must submit a state plan detailing how they intend to address that standard.[31]

The OSH Act is enforced through occupational safety and health standards (specific duty standards) and the general duty clause. Both standards are legally enforceable, and employers that violate the standards are subject to Occupational Safety and Health Review Commission jurisdiction—an independent adjudicatory body.[32] OSHA standards require employers to adopt specific practices to ensure employee safety and safe workplaces and fall into six categories—recordkeeping, general industry, maritime, construction, agriculture, and state plans. However, the agency is not permitted to enforce "any standard, rule, regulation, or order under the OSH Act which is applicable to any person who is engaged in a farming operation which employs 10 or fewer employees and does not maintain a temporary labor camp."[33] According to the 2017 U.S. Census of Agriculture, 93 percent of farms collectively employing 1.2 million workers meet these criteria, meaning they are completely exempt from OSHA enforcement and investigation.[34] States with OSHA-approved plans can enforce standards, rules, and regulations and provide trainings and consultations on exempted small farms but are prohibited from using any federal funding for these activities.[35] Small farms are not exempted from enforcement by state OSHA plans in California, Oregon, and Washington where agricultural injury rates are lower than other states.[36]

1. Heat-Related Illness

OSHA has developed few standards applying to agricultural employers, meaning the Act's general duty clause largely operates as a stopgap for this sector.[37] Additionally, OSHA has not developed any specific standards that protect workers in any sector from heat hazards.[38] However, OSHA has developed nonbinding guidance suggesting specific protective measures for outdoor workers depending on the heat index (see Table 1).[39] Therefore, for farmworkers at high risk of heat-related illness, the general duty clause is one of the only means for enforcing

TABLE 1: HEAT INDEX AND PROTECTIVE MEASURES AT EACH RISK LEVEL

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

Source: *Protective Measures to Take at Each Risk Level*, Occupational Health & Safety Admin., U.S. Dep't. of Labor, https://www.osha.gov/heat/heat-index/protective-measures.

OSH Act protections. Extreme heat, "heavy physical activity, warm or hot environmental conditions, lack of acclimatization, and wearing clothing that holds in body heat" are recognized hazards, which obligates employers to mitigate risk to employees.[40]

The general duty clause is applicable in the absence of an OSHA standard making it a regulatory safety net of sorts. The general duty clause states, "[e]ach 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 to his employees."[41] In other words, every employer is required to ensure the workplace is free from recognized hazards that are causing, or likely to cause serious injury or death to employees. A recognized hazard is a condition or practice that an employer knows, or should know, will cause serious injury.[42] A hazard can be recognized through employer, industry, or common-sense recognition of the hazard.[43] However, common-sense recognition must be "so obvious that any reasonable person would have recognized it."[44] In theory, an employer can violate the general duty clause even when no employee has been injured if there is a recognized hazard that the employer could feasibly mitigate, but has not.[45]

Pursuant to agency policy most recently cited in 2018, the burden is on OSHA to prove four elements before issuing a citation for a violation of the general duty clause: "(1) [t]he employer failed to keep the workplace free of a hazard to which employees of that employer were exposed; (2) [t]he hazard was recognized; (3) [t]he hazard was causing or was likely to cause death or serious physical harm; and (3) [t]here was a feasible and useful method

to correct the hazard."[46] Advocates suggest that general duty clause citations are the ones most often challenged in court due to the legal ambiguities created when hazards have not been defined by regulations.[47] This may explain OSHA's data on the use of the general duty clause demonstrating that these citations are rarely issued and make up just 1.5 percent of the agency's citations issued in 2018.[48]

By way of example, in 2015, the Occupational Safety and Health Review Commission issued the Sturgill decision vacating two OSHA citations issued under the general duty clause[49] after an employee working on a roofing project collapsed on the job, was subsequently diagnosed with heat stroke, and died three weeks later due to complications arising from heat stroke.[50] OSHA's citation alleged that all workers on the job site in question "were exposed to the hazard of 'excessive heat from working on a commercial roof in the direct sun during the performance of their duties....'"[51]

On review, the OSHRC determined the Secretary failed to prove the existence of a hazard because excessive heat was not present at the worksite.[52] Notably, the Commission determined that the National Weather Service's (NWS) heat index chart did not prove the existence of a hazard.[53] As referenced above, the NWS chart measures relative humidity and temperature to show the "likelihood of heat disorders with prolonged exposure or strenuous activity" and includes four categories—caution, extreme caution, danger, and extreme danger. The Commission found that the heat index values on the day of the incident were in the caution range for approximately two to five hours "at most," which it could not determine amounted to "prolonged exposure" because the Secretary had not defined this phrase, provided evidence of how the National Oceanic and Atmospheric Administration (NOAA), the agency of which the National Weather Service is a part, defined this phrase, or developed a record of evidence to support the finding.[54] Moreover, the Commission found that the record failed to establish the work being performed that day was "strenuous."[55]

In an additional footnote, the Commission noted its understanding of the general duty clause as a tool for the agency to identify workplace hazards, but one that should be used only to fill gaps during the pendency of a rulemaking to adopt formal standards addressing the hazard.[56] From the Commission's perspective, OSHA has relied too heavily on the general duty clause "in lieu of setting standards," creating uncertainty and confusion for employers.[57] The Commission's decision and its strong language regarding OSHA's misuse of the general duty clause suggest the Sturgill decision may serve as a warning from the Commission that it will overturn future citations where OSHA has failed to set standards addressing specific hazards identified in other cases.[58]

Ideally, this decision will urge OSHA to enact a set of enforceable national standards informed by stakeholder feedback to address heat-related hazards providing protection for employees and clarity for employers. However, because OSHA has not yet developed standards to address heat-related illness, states can do so either through their OSHA-approved state plans or otherwise. To date, few states have opted to develop laws and regulations addressing the issue. Only three states—Washington, Minnesota, and California—have state provisions governing occupational heat exposure[59] in their OSHA-approved state plans.

2. Pesticide Exposure and Related Illness

In the 1970s, OSHA promulgated an emergency temporary standard focused on the safety of 21 different pesticides, as well as reentry intervals (periods of time during which it is illegal to access an area treated by pesticides) to protect farmworkers but withdrew it before it became effective due to lawsuits brought by several growers' organizations.[60] Following OSHA's withdrawal of the emergency standard, farmworker advocates sued the federal government to require OSHA to reinstate it, but during this period EPA developed the first Worker Protection Standard, effectively asserting jurisdiction over the issue.

The OSH Act prevents OSHA from exercising jurisdiction over workplaces and hazards already covered by other federal agencies.[61] Accordingly, because the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) addresses farmworker pesticide safety and EPA has exercised that authority through the Worker Protection Standard, OSHA has not developed standards addressing these issues.[62] While FIFRA preempts states from creating labeling requirements that differ from those provided in the law, states are permitted to regulate both the sale and use of federally registered pesticides leaving them free to develop their own standards to address workplace hazards related to pesticide use.[63]

B. Federal Insecticide, Fungicide, and Rodenticide Act

Congress originally enacted the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) to give farmers information on pesticides through labeling requirements.[64] FIFRA is considered a co-regulatory law in the sense that it lays out a set of uniform standards for the nation but gives states the authority to regulate the use of pesticides.[65] The current act and accompanying regulations require that, prior to distribution or sale, all pesticides must be registered with EPA.[66] FIFRA requires applicants to demonstrate that the pesticide "will not generally cause unreasonable adverse effects on the environment."[67] In determining whether an adverse effect is unreasonable, EPA is required to consider the pesticide's economic, social, and environmental risks and benefits to people.[68] EPA interprets this to mean it is not required to "balance the risks and benefits for each exposed group individually," noting that a pesticide may present a high risk to workers, but those risks must be balanced against the economic benefits to society.[69] However, EPA does not consider chronic exposure for certain industries, risks specific to pregnant women and children, or the interactions between multiple pesticides when engaged in risk assessment.[70] After registration, pesticides may still be subject to labeling,[71] packaging,[72] storage, disposal, and transportation requirements.[73]

Additionally, FIFRA requires the development of agricultural workplaces practice standards "to reduce the risks of illness or injury resulting from workers' and handlers' occupational exposure" to pesticides.[74] FIFRA also includes specific interpretations of label claims, such as provision of PPE,[75] application notification, and warning signs.[76] Finally, FIFRA prohibits agricultural employers from preventing or discouraging employees' compliance with the law or retaliating against them when they do so.[77]

The Pesticide Registration Improvement Extension Act (PRIEA) is a series of appropriations acts that amend FIFRA and set the fee schedules for registering pesticides.[78] Part of PRIEA allocates funding from registration fees for farmworker protection activities, including illness oversight and monitoring, training programs and materials, and surveys collecting data on "farm worker employment, health, living conditions, [and] demographics."[79]

C. FIFRA's Worker Protection Standard

EPA developed the Agricultural Worker Protection Standard (WPS) in 1974 and has amended it several times since, most recently in 2015.[80] The WPS is the main federal law intended to address the risks associated with pesticide-related illness and injury among farmworkers.[81] According to EPA, this standard applies to "more than 2 million farmworkers at more than 600,000 farms."[82] States have primary authority for enforcing the WPS with the exception of Wyoming, but EPA is required to ensure the states are adequately monitoring compliance with the standard.[83]

Generally, the standard sets out specific obligations agricultural employers must meet when their employees come into contact with pesticides. It addresses most agricultural workers and employers,[84] but does not cover situations where pesticides are applied "on livestock or other animals, or in or about animal premises."[85] The standard requires agricultural employers to assure that pesticides are applied in a manner consistent with the pesticides' labeling and to provide employees with information regarding the protections provided to them under the standard.[86]

The WPS further requires that agricultural employers provide pesticide safety training to employees and provide pesticide safety information in a manner that workers understand.[87] Specifically, employers are required to provide employees with an annual pesticide safety training and information about pesticide application and hazards.[88] Additionally, employers are to provide decontamination supplies at the worksite and emergency assistance to workers injured by pesticides.[89] The standard also sets out more specific requirements for employers of pesticide handlers such as providing training in pesticide use precautions, providing PPE, providing access to pesticide labeling information, and for those who regularly handle certain pesticides, medical evaluations.[90] Importantly, the WPS prohibits employers from retaliating against employees or pesticide handlers for refusing to engage in work they think violates the standard, filing complaints related to noncompliance with the standard, or assisting EPA or the relevant state agency with investigations and compliance.[91]

EPA most recently revised the WPS in 2015 to include some important new requirements including annual full safety training for workers and handlers, a minimum age of 18 for pesticide handlers and early entry workers, enhanced hazard communication and safety information, prohibitions on entry for certain outdoor areas during outdoor pesticide application, and the designated representative provision. The designated representative provision allows farmworkers to identify a person who can request specific pesticide information, including what pesticides are applied and the hazards associated with those pesticides, from their employer on the worker's behalf.[92] This can be useful in situations where there is a language barrier, a worker has moved to a different site and no longer has access to information, or a caseworker needs information about an employee.[93] The request must be presented to the employer in writing and allows the designated representative to access the following information: "(1) a copy of the safety data sheet; (2) the name, EPA registration number, and active ingredient(s) of the pesticide product; (3) the crop or site treated and the location and description of the treated area; (4) the date(s) and times the application started and ended; and (5) the duration of the applicable labeling-specified restricted-entry interval for that application."[94] EPA and the states enforce the WPS primarily through on-farm inspections.[95]

WORKER PROTECTION STANDARD REQUIREMENTS

Under the Worker Protection Standard (WPS), all employers are required to do the following:

- Do not retaliate against a worker or handler.
- Provide annual pesticide safety training.
- Provide access to specific information for workers and handlers at a central location during normal work hours, including (agricultural employers only):
  - Pesticide applications on the establishment;
  - Safety Data Sheets for pesticides applied on the establishment; and
  - Pesticide safety information that includes emergency information.
- Provide decontamination supplies.
- Exchange information (between a commercial handler employer and an operator of an agricultural establishment).
- Provide WPS-required safety, pesticide application, and hazard information to workers and handlers or their designated representative, or to treating medical personnel, if requested. For additional details, see the Designated Representative section of this webpage or Chapter 2 of the WPS How to Comply Manual. See full requirements at 40 CFR 170.311(b).
- Provide emergency assistance by making transportation available to a medical care facility in case of a pesticide injury or poisoning and providing information about the pesticide(s) to which the person may have been exposed.

In addition to the duties listed above for all employers, employers of workers are required to:

- Implement restrictions during applications by keeping workers and other people out of the treated field and application exclusion zones.
- Notify workers about applications and pesticide-treated areas and not to enter during the REI by:
  - Providing oral warnings; or
  - Posting warning signs.
- Implement protections for early entry by workers, including:
  - Providing access to labeling information;
  - Specific information on early entry tasks; and
  - Required early entry Personal Protective Equipment.
- Implement restricted-entry intervals (REIs).

In addition to the duties listed above for all employers, employers of pesticide handlers are required to:

- Implement restrictions during applications by ensuring that pesticides applied do not contact workers or other people. Also, handlers must suspend an application if workers or other people are in the application exclusion zone.
- Monitor handlers working with toxic pesticides.
- Provide specific instructions for handlers.
- Provide access to labeling information for handlers.
- Provide a medical evaluation, fit test and respirator training to handlers required to wear a respirator by the pesticide label.
- Take steps to ensure equipment safety.
- Personal Protective Equipment (PPE):
  - Provide required PPE in clean and good operating condition.
  - Ensure PPE is worn correctly.
  - Provide a clean place for storing personal clothing and removing PPE.
  - Care for, maintain and replace damaged or worn PPE.
  - Replace respirator purifying elements.
  - Dispose of contaminated PPE.
  - Provide instructions for people who clean PPE.

Source: *Designated Representative in* U.S. Env't Prot. Agency (EPA), Pesticide Worker Safety: Agricultural Worker Protection Standard (WPS) https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps#designated (last visited Apr. 8, 2021).

While some states gather data and information provided to EPA through cooperative agreements, the Government Accountability Office (GAO) found that EPA does not collect information regarding the use of the designated representative provision nor does it coordinate with the states to do so. However, EPA previously determined that access to information that could address "even a small number of pesticide-exposure related illnesses" would be useful given the substantial costs associated with treatment for pesticide exposure-related chronic illness.[96] Relatedly, in 2017, the Office of the Inspector General found that EPA's implementation management controls for the WPS were insufficient, in large part due to the agency's inability to gather data regarding agricultural pesticide exposure incidents.[97]

Given EPA's perspective that risks must be balanced against economic benefits, federal laws have the potential to fall short when it comes to protecting farmworker health. To address these issues, some states have developed their own pesticide use standards and pesticide illness reporting requirements that could serve as models for other states or as amendments to federal law.

Market-Based Measures

As an additional means of protection to secure farmworkers' rights, some have pursued market-based, private governance programs that rely on the payment of a premium for agricultural goods in exchange for a set of commitments focused on farmworker wages, health, and safety. There are two different models for these types of programs. The Coalition of Immokalee Workers is known for having developed the Worker-driven Social Responsibility model, which enables workers to drive human rights standards in the supply chain that can be privately enforced through the market.[i] Their Fair Food Program is a partnership between farmworkers, growers, and retail buyers that is monitored by a third party Fair Food Council.[ii] Because compliance is privately enforced through contract provisions, farmworkers do not need to rely on the government to enforce their rights. Standard setting Multi-Stakeholder Initiatives (MSIs) represent another model relying on civil society organizations working with industry to develop standards for corporate social responsibility. One well known example is the Equitable Food Initiative (EFI) which works to bring growers, farmworkers, retailers, and consumers together.[iii]

Oxfam America aided in the creation and development of EFI until it became an independent nonprofit.[iv] However, a decade long study of MSIs has shown they often fail to hold corporations accountable for and provide protection against worker abuse and human rights violations while also denying workers access to remedies.[v] Specifically, it was determined that MSIs should be used alongside enforceable laws and regulations not as an alternative and they should "center workers and affected communities" in standard setting and decision making processes.[vi]

Milk with Dignity Program

The Milk with Dignity Program is a market-based program based in Vermont that seeks to "secure dignified working conditions in dairy supply chains." The Program works with food industry leaders to secure legally binding commitments ensuring the protection of workers' rights.[vii] Developed by Vermont farmworkers, the Milk with Dignity Program brings together workers, farmers, and industry leaders to address rampant violations of labor rights in the dairy industry.[viii]

The Milk with Dignity Program uses the "Worker-driven Social Responsibility" model,[ix] which is rooted in a set of core elements–labor standards created by and for workers, worker-to-worker education, independent monitoring and complaint resolution, premiums paid by corporations, and legally binding agreements to govern buyers' commitments.[x] The Milk with Dignity Program is implemented, monitored, and enforced by the Milk with Dignity Standards Council (MDSC), an independent, nonprofit, third-party auditor that objectively monitors participating farms' compliance with the Code's standards.[xi]

The Milk with Dignity Program is rooted in the Milk with Dignity Code of Conduct (MD Code of Conduct).[xii] Buyers, such as companies like Ben & Jerry's, pay a premium to farms that comply with the standards articulated in →

→ the MD Code of Conduct. [xiii] The MD Code of Conduct sets standards for wages, health and safety, breaks, housing, nondiscrimination, and other labor conditions. [xiv] The day Ben & Jerry's became a part of the Milk with Dignity Program in 2017, farmworker leader Enrique "Kike" Balcazar proclaimed it was "a new day in dairy, a new day for human rights." [xv]

The Council works hard to rigorously enforce and monitor the MD Code of Conduct. [xvi] If a participating farm is unwilling to comply with the MD Code of Conduct, the farm loses the Milk with Dignity premium and faces market consequences by losing its place in participating buyers' supply chains. [xvii] Consequently, failure to comply can result in stiff financial consequences.

During its first two years from 2017 to 2019, the Milk with Dignity Program expanded to protect the rights of 262 workers on 64 participating farms, initiated agreements with 20 percent of the total dairy production in Vermont, resolved 155 complaints of MD Code of Conduct violations, and completed 105 farm audits, among other achievements. [xviii]

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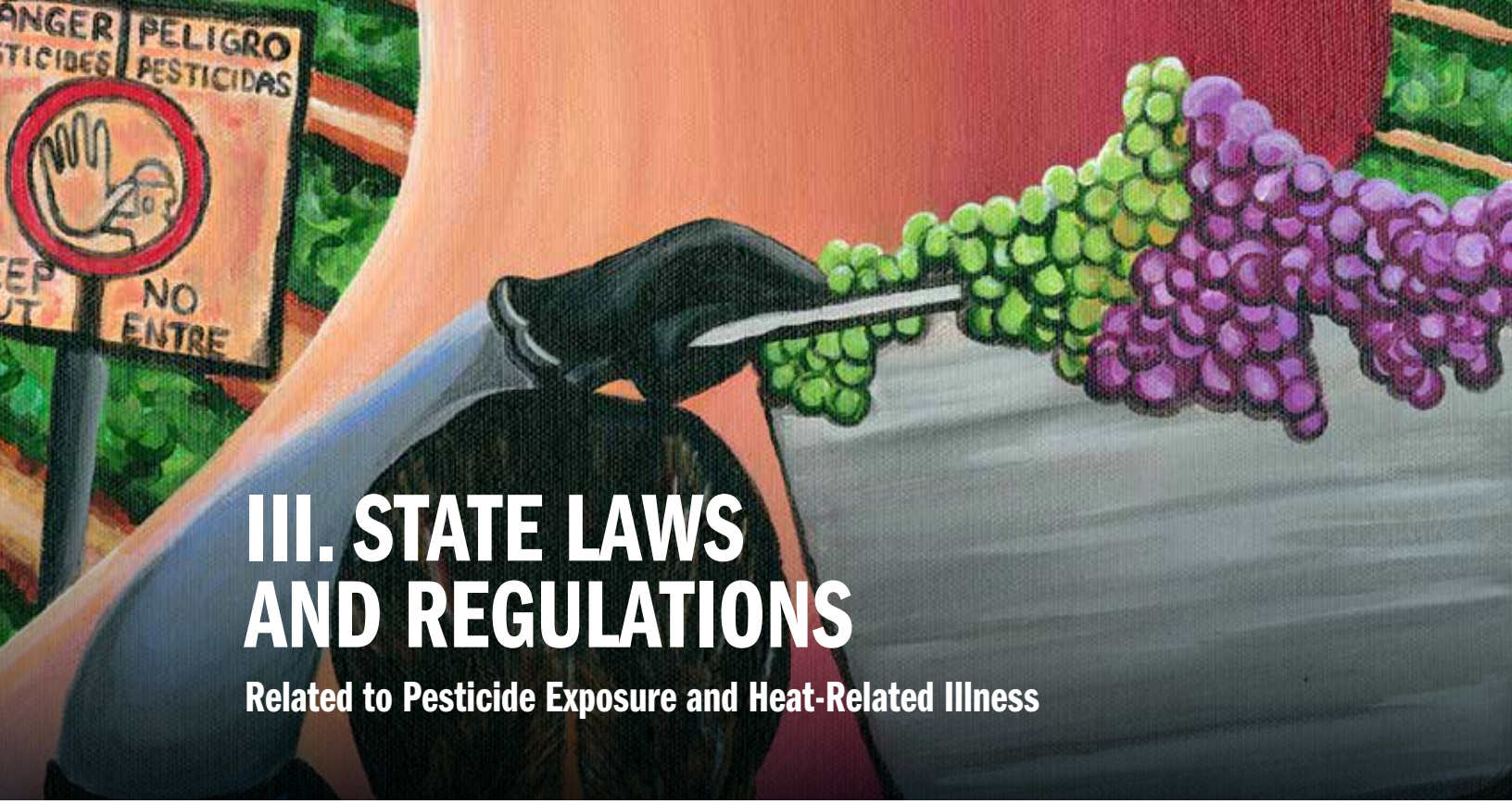
i *About CIA,* Coalition of Imokalee Workers, https://ciw-online.org/about/.
ii *Id.*
iii *About EFI,* Equitable Food Initiative, https://equitablefood.org/about-efi/.
iv *Equitable Food Initiative,* OXFAM, https://policy-practice.oxfamamerica.org/work/in-action/equitable-food-initiative/.
v The Institute for Multi-stakeholder Initiative Integrity, Not Fit for Purpose: The Grand Experiment of Multi-stakeholder Initiatives in Corporate Accountability, Human Rights and Global Governance 5 (2021), https://www.msi-integrity.org/wp-content/uploads/2020/07/MSI_Not_Fit_For_Purpose_FORWEBSITE.FINAL_.pdf.
vi *Id.* at 7.
vii *About*, Milk with Dignity Standards Council, https://milkwithdignity.org/about.
viii Migrant Justice & Milk with Dignity Standards Council, Milk with Dignity First Biennial Report: 2018-2019 7 (2020), https://milkwithdignity.org/sites/default/files/2020MDReport.pdf.
ix *Id.*
x *Id.* at 14.
xi *Id.* at 33.
xii *Id.* at 7.
xiii Milk with Dignity Standards Council, *supra* note 98.
xiv Migrant Justice & Milke with Dignity Standards Council, *supra* note 99, at 28.
xv *Id.* at 7.
xvi *Id.* at 56.
xvii *Id.*
xviii *Id.* at 8.



III. STATE LAWS AND REGULATIONS

Related to Pesticide Exposure and Heat-Related Illness

THE GOAL OF THIS RESEARCH was to identify state laws and regulations related to public health protections for farmworkers, looking specifically at measures related to heat-stress, pesticide exposure, and illness reporting. At the outset, it should be noted that the project team did not conduct field research but did engage in conversations and interviews with individuals supporting farmworkers. Rather than providing a 50-state survey of laws and regulations addressing pesticide exposure and reporting, the project team narrowed the scope and selected 13 states representing the different USDA National Agricultural Statistics Service (NASS) regions in the U.S. with large populations of farmworkers: California, Florida, Illinois, Louisiana, Michigan, Nebraska, New York, North Carolina, Oregon, Texas, Washington, Colorado, and Wisconsin. Since so few states have adopted pesticide bans, the project team expanded the scope of the research to all 50 states. Finally, since only three states have heat-related illness standards, the report includes all three.

The project team focused its research on state laws and regulations due to the interplay between them. Some state laws may have very specific mandates to a designated agency to implement whereas others may be less prescriptive and leave authority to the state agency to work out the details through regulations. Laws and regulations included in the research addressed both implementation and enforcement. The existence of implementation and enforcement language in a law or regulation does not mean that it is fully implemented and enforced. Without sufficient funding and depending on the state's political climate, agencies may be unable to implement certain provisions due to budget shortfalls or unwilling to assess penalties due to pressure from their political administration.

Some laws contain civil or monetary penalties such as fines for failure to comply, others contain criminal penalties, and some laws contain both. Enforcement of a law is sometimes viewed as discretionary depending on how the law has been written. In other words, even if a law or regulation includes penalties associated with violations, it is within the discretion of

Research Methodology Overview

To conduct research on the thirteen selected states, the project team used Westlaw and input a specific set of identified search terms (see full research methodology in Appendix A) for each state in the study. Through referrals and conversations with individuals at organizations working with and representing farmworkers, additional laws and regulations were identified. The project team focused on laws and regulations directly related to pesticide exposure or heat exposure protections for farmworkers. To see the categorization, please see Table 5 in Appendix A. The final dataset is displayed in an Airtable database and includes 216 state laws, 155 state regulations, 15 pieces of proposed or enacted legislation, and three other state-level guidance documents, which do not have the force and effect of law but provide details about how the state regulators interpret the law.

Implementation: Implementation includes the rollout or launch of a law, and the development of regulations that fill in the details of the law. In other words, the regulations create the action steps for how a law is to be administered. For the analysis included in this report, the project team identified whether provisions included required steps or instructions for the designated governmental entity, including whether a responsible agency or official was listed. Of primary interest was any language addressing implementation of the law that specifically addressed the goals of protecting farmworkers from pesticide and heat exposure.

Enforcement: This section addresses how a law is enforced–e.g., clear, defined consequences for failing to comply with the law. Enforcement is different from implementation. For example, a law that creates a program with voluntary participation is unlikely to need or have enforcement provisions, but it may have implementation provisions to enable its administration. In addition, some laws may reference another piece of the code or a law not within the same chapter/title/article/etc. that has the relevant enforcement language.

the responsible agency or department to determine when and how to hold people responsible for compliance. This provides a limit to the research in the sense that the project team was unable to determine how many of these provisions are being enforced, and if so, to what extent. Finally, the research identified which state laws and regulations go above and beyond federal protections and noted when the state provisions contained identical requirements to federal law.

As discussed above, federal laws and regulations addressing pesticide exposure and heat-related illness to protect farmworker health are limited both in application and effect. Because states

generally can develop their own protections, advocates have actively pursued policy measures at the state level to fill in the gaps and provide higher standards to protect farmworkers. These measures fall into two broad categories—prevention and response. Within each of these categories, states have enacted a set of more specific and targeted laws and regulations, which will be discussed in further detail below.

While the creation of laws and regulations is an important first step, they are only effective when actively implemented and enforced. Because implementation and enforcement are largely discretionary for the responsible agencies depending on budgets, staffing, and priorities, it is difficult to assess the impacts of implementation and enforcement. However, based on accounts from farmworker support and advocacy organizations, there are numerous reports of state agencies failing to enforce these laws, leading to little or no consequences for employers who violate the law leading to severe health impacts for farmworkers and their families.

A. Pesticide Exposure and Illness Prevention

When addressing prevention, states have developed a few different types of laws and regulations intended to prevent or reduce pesticide exposure for farmworkers. These measures include: (1) restricting the use of certain pesticides found to present an unacceptable level of risk; (2) controls on pesticide drift to prevent unexpected or unknown exposure; and (3) enhanced labeling, education, and outreach regarding risks associated with pesticide use.

1. Bans on Certain Pesticides

One of the strongest measures a state or local government can enact is to ban or restrict the sale and use of specific pesticides they have determined to present significant health and safety risks. While FIFRA does not prohibit states or localities from enacting stricter pesticide measures or controls than those provided at the federal level,[98] many states have developed legislation prohibiting localities from doing so.[99] Hawaii was the first state to enact a ban on a specific pesticide.[100] Hawaii's ban on pesticides containing chlorpyrifos went into effect in January 2019. Since then, other states have enacted similar bans, which are discussed in more detail in the box below.

Chlorpyriphos is a pesticide primarily used to treat food, fruit trees, wood fences, and utility poles. More specifically, chlorpyriphos is an organophosphate insecticide that prevents insects from damaging crops and wood. Acute chlorpyrifos poisoning can cause convulsions and respiratory paralysis. Chronic exposure to chlorpyrifos has been linked to, "attention deficit hyperactivity disorder (ADHD), anxiety, depression, Parkinson's disease, Alzheimer's and ALS" and detrimental impact on "visual motor speed, nerve function, postural balance, mental development memory and attention." Farmworkers face direct exposure, and their families live in communities that may be exposed to high levels of pesticides, including chlorpyriphos. Children are more sensitive to pesticide exposure and are especially susceptible to severe health impacts from chlorpyriphos.

Source: Goldman, Aspenson, Bhatnagar & Martin, *supra* note 70.

Following enactment of the Food Quality Protection Act of 1996, which requires EPA to develop tolerances (maximum permissible levels) for pesticide residues on food,[101] the agency identified the need to revisit the safety standards for chlorpyrifos given the requirement of "reasonable certainty that no harm will result from aggregate exposure" taking infants and children into consideration.[102] In 2001, many residential pesticide products containing chlorpyrifos were voluntarily phased out or subject to cancellation.[103] In 2002, the EPA added more stringent label and application standards to protect workers, water quality, and aquatic wildlife.[104] Since 2007, advocates have pressed EPA to revoke all tolerances for chlorpyrifos given scientific studies demonstrating significant harm to infants and children.[105]

EPA has reviewed chlorpyrifos registration at least three times since 2011 through Human Health Risk Assessments.[106] In 2012, EPA developed mitigation measures for spray drift and reduced application to further protect individuals near schools and other types of recreational areas.[107] In 2016, EPA issued its Revised Human Health Risk Assessment finding the following: (1) expected food crop residues exceeded the safety standard set under the Federal Food, Drug, and Cosmetic Act; (2) estimated drinking water exposure continued to exceed safe levels; and (3) health risks to workers that mix, load, and apply pesticides with chlorpyrifos even with maximum protective personal equipment and engineering controls.[108] This assessment found that children aged 1–2 are exposed to chlorpyrifos at levels 140 times what had been deemed safe.[109]

Chlorpyrifos Ban in the European Union

In August of 2019, The European Food Safety Authority found that, based on current scientific evidence, they could not determine a safe level of chlorpyrifos.[1] Accordingly, chlorpyrifos did not "meet the criteria required by legislation for the renewal of its approval in the European Union."[2] On December 6, 2019, representatives from countries in the European Union voted to discontinue the sale and use of chlorpyrifos.[3] The European Commission cited concerns about human health, specifically "possible genotoxicity and developmental neurotoxicity" in finalizing the vote.[4] Prior to this, eight EU countries already banned the pesticide.[5] On January 31, 2020, the pesticide's manufacturer's registration expired, and the EU did not approve a renewal application, thus prohibiting the use or sale of chlorpyrifos in EU countries.[6] Although, countries may institute a three-month grace period to facilitate disposal.[7]

1 News release, European Food Safety Authority, Chlorpyrifos: assessment identifies human health effects (Aug. 02, 2019), https://www.efsa.europa.eu/en/press/news/chlorpyrifos-assessment-identifies-human-health-effects.

2 News release, European Food Safety Authority, Chlorpyrifos: assessment identifies human health effects (Aug. 02, 2019), https://www.efsa.europa.eu/en/press/news/chlorpyrifos-assessment-identifies-human-health-effects

3 Timothy D. Backstrom & Kelly N. Garson, *European Union to Ban Chlorpyrifos after January 31, 2020*, NAT'L L. R. (Jan. 04, 2020), https://www.natlawreview.com/article/european-union-to-ban-chlorpyrifos-after-january-31-2020

4 *Chlorpyrifos & Chlorpyrifos-methyl*, EUROPEAN COMMISSION (2020), https://ec.europa.eu/food/plant/pesticides/approval_active_substances/chlorpyrifos_chlorpyrifos-methyl_en.

5 Timothy D. Backstrom & Kelly N. Garson, *European Union to Ban Chlorpyrifos after January 31, 2020*, NAT'L L. R. (Jan. 04, 2020), https://www.natlawreview.com/article/european-union-to-ban-chlorpyrifos-after-january-31-2020

6 *Chlorpyrifos & Chlorpyrifos-methyl*, EUROPEAN COMMISSION (2020), https://ec.europa.eu/food/plant/pesticides/approval_active_substances/chlorpyrifos_chlorpyrifos-methyl_en.

7 *Chlorpyrifos & Chlorpyrifos-methyl*, EUROPEAN COMMISSION (2020), https://ec.europa.eu/food/plant/pesticides/approval_active_substances/chlorpyrifos_chlorpyrifos-methyl_en.

Timeline of EPA Actions and Regulatory History of Chlorpyrifos

1965 ..... Chlorpyrifos first registered with the EPA.

1997 ..... Dow AgroSciences (registrant of chlorpyrifos) voluntarily agreed to cancel chlorpyrifos registrations for indoor broadcast use and direct pet treatments (except pet collars).

2000 ..... EPA modified certain uses to meet the revised standard of safety under the Food Quality Protection Act; registrants of chlorpyrifos voluntarily entered into an agreement with EPA to eliminate, phase out, and modify certain uses.

2001 ..... Majority of remaining chlorpyrifos residential products were subject to voluntary phase out and cancellation.

2002 ..... EPA changed required safety measures to improve safety for the environment and of those applying the pesticide, including using buffer zones for protecting water quality, fish, and wildlife; increasing the amount of PPE required; and reducing applications rates per season on certain crops including citrus and corn.

2007 ..... Pesticide Action Network North America and Natural Resources Defense Council filed a petition requesting that EPA revoke all tolerances for chlorpyrifos and cancel all registrations under FIFRA.

2011 ..... EPA completed a preliminary human health risk assessment for all chlorpyrifos uses.

2012 ..... EPA lowered aerial pesticide application rates and created "no-spray" buffer zones around public spaces to protect children and other bystanders.

2014 ..... EPA completed a revised human health risk assessment for all chlorpyrifos uses, and incorporated information from a 2012 assessment of spray drift exposure.

2016 ..... EPA revised its human health risk assessment for chlorpyrifos based on feedback from the FIFRA Scientific Advisory Panel and public comments.

2017 ..... EPA denied a petition that asked the agency to revoke all pesticide tolerances for chlorpyrifos and cancel chlorpyrifos registrations.

2018-19..... The U.S. Ninth Circuit Court of Appeals ordered the EPA to ban chlorpyrifos within 60 days but upon rehearing, that decision was vacated, leaving U.S. chlorpyrifos registrations still active.

2020 ..... EPA drafted Ecological Risk Assessment and Revised Human Health Risk Assessment. In December 2020, EPA released a proposed interim decision on chlorpyrifos.

Source: Chlorpyrifos: Proposed Interim Registration Review Decision, *supra* note 123, at 6-8.

Despite these findings, in 2017, EPA denied the 2007 petition calling for a cancellation of all chlorpyrifos registrations which would have prohibited any legal use of the pesticide in the U.S.[110] In its denial, EPA concluded that the science "remains unresolved" and "further evaluation of the science" is needed to justify cancelling the registration.[111] After additional challenges and a court order requiring EPA to take final action on the issue,[112] EPA issued a final order in 2019 denying a "2007 petition to revoke all tolerances and cancel all registrations for chlorpyrifos."[113] In December 2020, EPA released its Proposed Interim Decision for Chlorpyrifos for public comment, which reiterates the agency's position that the science continues to evolve and proposes measures to mitigate risks including limiting use to certain regions of the U.S., additional PPE, application restrictions and rate reductions, and spray drift management.[114]

Notably, the attorneys general of several states submitted comments in response to EPA's proposed interim decision calling on EPA to revoke all food tolerances and cancel the registration for all continued use of chlorpyrifos to sufficiently protect the citizens of their states.[115] In their comments, the State Attorneys General note that because EPA has consistently refused to revoke tolerances and cancel the registration of chlorpyrifos to "adequately protect workers from acute exposure and children from [] reducing their lifelong potential,"[116] some states have developed or proposed legislation banning or restricting the use of pesticides containing it.

While these laws are similar, they reflect some differences in approach with some fully banning pesticides containing chlorpyrifos and others allowing for partial continued use. Many chlorpyrifos restrictions cite three main policy considerations: protecting human health, preserving aquatic life, and promoting environmental health generally. **Washington**, for example, specifically cited the effects chlorpyrifos can have on child development and future educational achievement.[117] **California** Governor Gavin Newsom stated that the state's chlorpyrifos ban was "a big win for children, workers and public health in California."[118] **Washington** and **Maryland** both included statements about the pesticide's negative effect on aquatic wildlife, which is an important environmental and economic concern for coastal states.[119] These policy statements are important to include in the laws restricting chlorpyrifos because they detail the legislature's intent in the case that the laws are challenged in court.

All states restricting chlorpyrifos appear to have imposed a ban by actively cancelling the pesticide's registration.[120] Some states, like **California**, imposed an immediate cancellation[121] whereas states like **Oregon** set a future date for cancellation.[122] Internationally, the European Union took a different approach, employing a passive strategy by allowing current chlorpyrifos registrations to expire with no renewal.[123] **Hawaii's** chlorpyrifos ban was more of a hybrid approach; the state amended the existing pesticide law to immediately prohibit chlorpyrifos application but allow for individuals to apply for a temporary chlorpyrifos license.[124] Upon the new licenses' expiration, the state will prohibit all chlorpyrifos applications as of January 2023.[125] However, when banning or phasing out certain pesticides, it is critical to ensure the prohibited pesticide is not replaced with one that presents a similar risk of harm.[126]

When banning or phasing out certain pesticides, it is critical to ensure the prohibited pesticide is not replaced with one that presents a similar or increased risk of harm.

TABLE 2: STATE POLICIES ENACTED SINCE 2018 REGARDING CHLORPYRIFOS

State	State Action On Chlorpyrifos
Hawaii	**Act 45 (2018)** requires that, beginning January 1, 2019, all uses and application of pesticides containing chlorpyrifos as an active ingredient be permitted upon the applicant's request by Hawaii's Department of Agriculture, Pesticides Branch. All uses and application of chlorpyrifos are prohibited as of January 1, 2023.
California	**Cancellation proceedings (2019)** by CDPR led to the phase-out of virtually all chlorpyrifos agricultural use by the end of 2020. Registrants were first prohibited from distributing or selling chlorpyrifos; then, the sale and distribution of chlorpyrifos-containing products by dealers was prohibited. Finally, users of chlorpyrifos were given until the end of 2020 to use their chlorpyrifos subject to strict interim permit conditions. To support the transition away from chlorpyrifos, CDPR and the California Department of Food and Agriculture created a Chlorpyrifos Alternatives Work Group with stakeholders; in May of 2020, the Group published a report with recommendations to support healthy, sustainable, and effective pest control measures.
New York	**Executive Order (2019)** ordered the Department of Environmental Conservation (NYSDEC) to "take immediate action" to ban aerial use of chlorpyrifos in New York. The NYSDEC filed a notice of proposed rulemaking on January 27, 2021 to amend the state's existing pesticide registration regulations and add chlorpyrifos to the list of active ingredients that are no longer allowed to be distributed, sold, purchased, possessed or used for any purpose. The ban will come into effect July 31, 2021.
Maryland	With **Emergency Regulations (2020)**, the Maryland Department of Agriculture placed immediate restrictions on chlorpyrifos use to prohibit all aerial applications and phase out others. Most other applications will be prohibited after December 31, 2020. Limited use on snap beans and fruit trees may be allowed through June 30, 2021.
Oregon	**Oregon Administrative Rule 603-057-0545 (2020)** became effective on December 15, 2020, banning aerial application of chlorpyrifos for all crops (except for a narrow time period - 2 1/2 months per year – on Christmas trees), in addition to banning application for mosquito vector control and on turfgrass on golf courses. By December 1, 2023, any sale, use, or distribution of chlorpyrifos will be prohibited except for commercial pre- plant seed treatments, granular formulations and cattle ear tags.

Source: Attorneys General of New York, California, Hawaii, Maryland, Massachusetts, Oregon, Vermont, Washington, and Washington, D.C., Comments on Notice of Availability for Comment on EPA's Proposed Interim Registration Review Decision, Revised Draft Human Health Risk Assessment, and Ecological Risk Assessment for Chlorpyrifos (EPA–HQ–OPP–2008-0850), at 21, 25 (Mar. 5, 2021), https://ago.vermont.gov/wp-content/uploads/2021/03/2021-03-05-multistate-comments-to-chlorpyrifos-FINAL.pdf.

TABLE 3: EXAMPLES OF INTERNATIONAL LEGISLATION REGARDING CHLORPYRIFOS

Country	International Action On Chlorpyrifos
Australia	**Regulatory decisions (2019-2020)** were made by the Australian Pesticides and Veterinary Medicines Authority to suspend labels of chlorpyrifos-containing products for home gardens and domestic use in July of 2019, followed by cancellation of registrations for these products in September of 2019. In July 2020, label registrations for the remaining chlorpyrifos-containing products for agricultural use were cancelled.
Canada	**Re-evaluation Decision RVD2020-14 (2020)** was issued by the Canadian Pest Management Regulatory Agency to ban all outdoor uses of chlorpyrifos with limited exceptions, such as mosquito control, non-residential use on buildings, and use on ornamental plants. Agricultural use on garlic and canola will be phased out, allowing growers to establish effective alternatives to chlorpyrifos- containing pesticides.
European Union 27 member countries *Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden*	**Commission Implementing Regulation (EU) 2020/17 (2020)** required European Union (EU) member countries to rapidly withdraw all authorization for chlorpyrifos use in plant protection applications after the European Food Safety Authority (EFSA) found that human health approval criteria could not be met for chlorpyrifos. EFSA's primary concerns included potential developmental neurotoxicity "where effects were observed at the lowest dose tested in rats," epidemiological evidence of adverse neurological outcomes in children, and unresolved concerns regarding potential genotoxicity. EFSA also concluded that toxicological reference values could not be established, thereby making a valid risk assessment for consumers, operators, workers, bystanders, and residents impossible to conduct. EFSA characterized this as "a critical area of concern for chlorpyrifos."
United Kingdom	**A regulatory update (2016)** issued by the United Kingdom's Health and Safety Executive banned all uses of chlorpyrifos beginning April 1, 2016, with the sole exception of its use in a protected brassica seedling drench treatment.

Table 3 continued on page 28

TABLE 3: *CONTINUED*

Country	International Action On Chlorpyrifos
European Economic Area – 3 Member Countries *Iceland, Norway, Liechtenstein*	**Commission Implementing Regulation (EU) 2020/17 (2020)** was incorporated into the European Economic Area (EEA) Agreement by a Joint Committee Decision in September of 2020. As such, the EEA member countries were required to rapidly withdraw all authorization for chlorpyrifos use in agricultural applications.
Thailand	**A notification from the Ministry of Industry (2020)** recategorized chlorpyrifos as a substance that cannot be produced, possessed, imported or exported, in accordance with a decision made by the National Hazardous Substances Committee to ban the pesticide. These restrictions went into effect on June 1, 2020. Of particular note, Thailand's proposed "zero-tolerance" on the import of agricultural commodities with residues of chlorpyrifos or the herbicide paraquat is projected to result in the loss of $0.9-1.1 billion in annual agricultural exports for the United States.

Source: Attorneys General of New York, California, Hawaii, Maryland, Massachusetts, Oregon, Vermont, Washington, and Washington, D.C., Comments on Notice of Availability for Comment on EPA's Proposed Interim Registration Review Decision, Revised Draft Human Health Risk Assessment, and Ecological Risk Assessment for Chlorpyrifos (EPA–HQ–OPP–2008-0850), at 21, 25 (Mar. 5, 2021), https://ago.vermont.gov/wp-content/uploads/2021/03/2021-03-05-multistate-comments-to-chlorpyrifos-FINAL.pdf.

2. Pesticide Drift Prevention

Each year, farmworkers suffer "up to 300,000 acute illnesses and injuries from exposure to pesticides," according to EPA.[127] Farmworkers are exposed to residues in the field and drift while in fields and in housing near fields. A report from California's Pesticide Illness Surveillance Program shows that of the pesticide illnesses reported in farmworkers, 64 percent were exposed through drift.[128] In Washington, 56 percent of drift exposures documented from 2005 to 2012 impacted workers on another farm.[129] However, these figures likely underestimate the number of farmworkers exposed to pesticides through drift due to inadequate surveillance systems at the state and federal levels.[130] Pesticide or spray drift occurs when airborne particles, such as droplets or dust, of pesticides move from the target area to any unintended site, or when pesticide chemicals become vapors that then can travel off site.[131] Farmworkers, as well as other bystanders, including children playing outside at school, often experience health impacts such as acute or chronic illness from pesticide drift.[132] In Washington, between 2012-2014 high-pressure ground (air-blast) applications were responsible for the greatest number of drift cases and events followed by aerial applications.[133] In California and Florida, soil fumigation used before planting strawberries and some orchard crops is an additional major source of pesticide drift episodes.[134]

In the United States, the issue of aerial pesticide drift has typically been addressed in lawsuits alleging that a landowner who either aerially applies pesticides or hires someone else to do so may be liable for damage caused to another landowner's crops. Of the courts considering the issue, 16 jurisdictions have found that aerial application of pesticides is an "inherently dangerous activity" meaning the court will not take into account whether the landowner or their contractor acted reasonably.[135] Additionally, eight jurisdictions have determined that aerial application of pesticides is an "ultrahazardous activity" subjecting the landowner and their contractors to strict liability.[136] However, these cases generally have not considered harm to farmworkers associated with pesticide drift. In December 2019, several advocacy organizations filed a lawsuit in Illinois on behalf of farmworkers who had been repeatedly sprayed by a crop duster while they were plainly visible in bright-colored clothing working in a cornfield.[137]

At the federal level, EPA assesses the potential for drift to some extent through its risk assessment process when registering individual pesticides.[138] Recently, the agency launched a voluntary Drift Reduction Technology (DRT) Program that uses a rating system to demonstrate a product's potential to reduce drift and permits manufacturers to include the ratings on their product labels and informational materials.[139] Additionally, the Worker Protection Standard mandated employers to keep workers and others out of an area 25 to 100 feet wide designated as the "application exclusion zone" (AEZ) during outdoor pesticide application, including aerial applications.[140] This requirement was revised in October 2020 to significantly restrict the AEZ to include only areas on an agricultural employer's property.[141] However, a coalition of advocates[142] and attorneys general[143] challenged EPA's rollbacks, resulting in a stay of implementation until April 19, 2021, which may be extended.[144] The Worker Protection Standard also mandates employers to include training on the hazards associated with pesticide drift as part of their required pesticide safety trainings, [145] and provide prompt access to emergency medical assistance for drift-related injuries.[146]

Several states including **Florida** and **California** have enacted laws and regulations addressing pesticide drift that generally require pesticides be used in a manner that prevents substantial drift to nontarget areas.[147] **California** law specifies that not all drift is illegal, and that a certain amount of drift may occur through no fault of the applicator, but it does attempt to prevent substantial drift. The state's drift regulations require pesticide applicators to consider potential harm prior to application by considering the weather, equipment, property type, and surrounding properties.[148] If a reasonable chance of drift is likely, applicators are prohibited from applying pesticides.[149] Similarly, **Washington** developed regulations prohibiting the application of pesticides if weather conditions may cause drift that could injure land, humans, animals, and certain plants.[150] **Oregon** enacted a regulation requiring employers to clean up labor housing areas located within the AEZ that have come into contact with pesticide drift.[151] Even with laws in place, according to some reports in California, in a large percentage of both drift and residue exposure investigations, inspectors documented no violations.[152] Additionally, fines for documented violations are often very low, even though counties have the authority to consider the exposure of each person made ill in one incident a separate violation.[153] Consequently, compliance with some of the relevant laws and regulations does not adequately protect workers.

3. Pesticide Use and Application

Preventing exposure to dangerous pesticides through restrictions on use and laws directed at reducing or preventing pesticide drift provide the strongest protections for farmworkers. As a next level of protection, some states have also adopted measures related to pesticide use and application to provide additional protective measures. It should be noted that the discussion below does not address the use of personal protective equipment (PPE) as a means of protecting farmworkers. This is not meant to suggest PPE should not be required or provided but acknowledges that PPE and other self-protective behaviors, considered by many to be the last line of defense,[154] often fail to adequately protect farmworkers and, in some instances, may contribute to or exacerbate heat-related illness.[155]

a. Worker Pesticide Safety Education and Training

To implement the requirements related to pesticide safety and training under the Worker Protection Standard, most states have training programs related to worker safety and penalty structures if the policies are not implemented. Some of the more notable programs include strong outreach to stakeholder groups and their inclusion in developing policy recommendations.

In **California**, the Department of Pesticide Regulation must create an outreach and education program for worker safety, environmental safety, school safety, and pesticide handling use that addresses all communities and all pesticide exposure opportunities and is conducted in accordance with the state's Department of

California has the largest agricultural sector in the country[1] employing over 400,000 people, many of whom are undocumented.[2]

1 Cal. Dep't of Food & Agric., California Agricultural Statistics Review, 2018-2019 8 (2020), https://www.cdfa.ca.gov/statistics/PDFs/2018-2019AgReportnass.pdf.
2 Philip L. Martin et. al., *How many workers are employed in California agriculture*, 71 Cal. Agric. 30 (2016), http://calag.ucanr.edu/archive/?article=ca.2016a0011.

Environmental Justice guidelines.[156] Additionally, under California's law, the state must appoint an advisory committee of interested stakeholders to provide input on program development and implementation, including workers' rights and procedures for filing confidential complaints.[157] In 2017, the Department of Pesticide Regulation hired a full-time bilingual and bicultural Environmental Justice Liaison to build trust with farmworkers, as well as partnerships with the County Agricultural Commissioners.[158] However, advocacy groups working in areas of the state with high levels of pesticide usage report that farmworkers often do not know the County Agricultural Commissioners but want to work with them to prioritize education and outreach related to pesticide safety and exposure.[159]

In **Washington**, the legislature established the Pesticide Application Safety Committee (PASCO), which is chaired jointly by the state's Department of Health and Department of Agriculture. PASCO works to address health risks associated with pesticide application and exposure and make policy recommendations.[160] However, according to conversations with advocates in Washington, PASCO has met only once since its creation while the advisory committee has never been called to order.

Washington's Pesticide Application Safety Committee's Areas of Focus

- Improve pesticide application safety
- Establish baseline data on types and quantity of pesticide applications
- Improve pesticide application communication
- Compile industry best practices
- Explore why some workers do not report pesticide exposure
- Explore new ways of reporting an exposure without fear of retaliation
- Explore training opportunities for when and how to report workplace exposures
- Explore incentives for using new spray technology and phase out old technology
- Consider developing an effective community health education plan
- Work with community partners to enhance educational initiatives
- Improve non-English pesticide labels
- Work with researchers to develop pesticide label translation apps
- Evaluate prevention techniques to reduce pesticide exposures
- Develop Spanish and other language communication products
- Explore development of an agricultural workforce education safety program
- Work with the agricultural industry and workforce to protocols and best practices

Source: *Pesticide Application Committee*, Wash. State Dep't of Health, https://www.doh.wa.gov/DataandStatisticalReports/EnvironmentalHealth/Pesticides/ApplicationSafetyCommittee.

b. Labels and Language Accessibility

The federal government has long relied on pesticide labeling as a means of managing and preventing risks associated with pesticide use and application. However, reliance on labeling as an effective risk management tool to prevent farmworker pesticide-related illness and injury presents issues as most farmworkers are native Spanish speakers with some speaking Indigenous languages while pesticide product labels are only required to be printed in English.[161] The significance of this cannot be understated as EPA has previously acknowledged that "[e]ven minor errors in pesticide application may lead to chronic exposure to pesticides, which is associated with long term health issues."[162] While EPA has developed a *Spanish Translation Guide for Pesticide Labeling*, this is a supplementary, voluntary guide that translates common pesticide label warnings into Spanish but does not appear on the product label and employers are not required to distribute it.[163] As noted above, while many farmworkers are Spanish speaking, there are some who speak Indigenous languages. Consequently, farmworkers may lack accessible information about the dangers, risks, and symptoms associated with particular pesticides.[164]

Because FIFRA expressly preempts state-level pesticide-labeling requirements that are different or in addition to those mandated by federal law, states lack flexibility to develop stronger requirements.[165] **California's** regulations addressing language accessibility are stronger than those of other states because they require that information about pesticides and potential hazards the worker may encounter be provided in "a manner the employee understands."[166] Additionally, employers are required to display a copy of the *Hazard Communication Information for Employees Working in Fields* (Pesticide Safety Information Series leaflet A-9) or *Hazard Communication Information for Employees Handling Pesticides in Agricultural Settings* (Pesticide Safety Information Series leaflet A-8) as applicable, which are written in English and Spanish and available upon request in a language understood by the worker.[167] Other protections in California are dependent on information requests. For example, if an employee requests information about a pesticide, the employer is required to read the Pesticide Safety leaflet to the employee in an accessible language.[168] The law also requires the property's operator to maintain copies of pesticide use records and safety data sheets and must inform employees of their rights to access all records, as well as provide records to employees, employee representatives, or employees' physicians on request.[169]

Relatedly, some states have developed laws and regulations focused on hazard communication as a means of providing additional information or information in a different format beyond that included on the product label. For example, in **Florida**, licensed applicators are required to ensure that the person directly supervising farmworkers provides an oral statement in a language accessible to the workers informing them of the warnings on any labels of pesticides applied over the prior 48 hours.[170]

c. Permits and Licensing

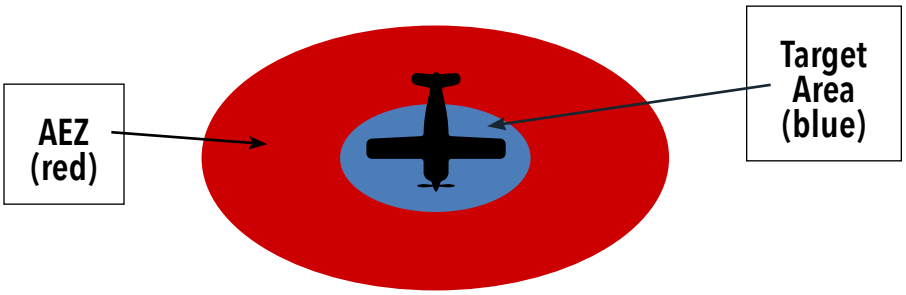
Pursuant to FIFRA, the EPA is required to classify pesticides as either restricted use pesticides (RUP) or general use pesticides, which are considered unclassified, meaning users are not limited unless the labeling restricts use in some manner.[171] Restricted use pesticides have been

determined by the EPA to potentially cause "unreasonable adverse effects" to pesticide applicators, bystanders, or the environment without additional restrictions on use.[172] Consequently, EPA only permits certified applicators or someone under their direct supervision to use RUPs.[173] As mentioned above, under FIFRA, states are permitted to restrict use of pesticides even if they have been approved by EPA.

In **California**, there is a separate listing of state-restricted pesticides and the County Agricultural Commissioners are responsible for issuing permits for the use of California-restricted materials,[174] and are required to consider feasible alternatives or mitigation measures in the event the use may result in a "substantial adverse environmental event."[175] According to materials from the California Department of Pesticide Regulation, substantial adverse environmental events include substantial harm to people.[176] However, despite these regulations that could prevent harmful exposure to workers, a recent study indicated that county agricultural commissioners seldom examine alternatives nor do they have guidance in effect regarding how to evaluate alternatives.[177]

d. Field Entry Interval Requirements

At the federal level, EPA promulgated regulations addressing field Restricted Entry Intervals (REIs) following the application of any pesticides at agricultural establishments.[178] These restrictions prohibit the agricultural employer from allowing or ordering a worker to enter or stay in a treated or targeted area before the expiration of the restricted entry interval stated on the pesticide label, with some exceptions.[179] These differ from Application Exclusion Zones (AEZs) in the sense that REIs pertain to the targeted area where a pesticide has been applied, whereas the AEZ creates a buffer around that targeted area to provide additional protection from exposure.[180]



Source: U.S. ENTVL. PROTECTION AGENCY, *supra* note 200, at 2.

EPA bases the restricted entry intervals on the toxicity of only the active ingredients included in the pesticides—the higher the toxicity, the longer the restricted entry interval.[181] However, some pesticides have different restricted entry intervals depending on the particular use or crop, meaning a pesticide label may have multiple REIs contributing to potential confusion.[182] Moreover, depending on the pesticide, employers may be required to provide notifications to workers, either orally, by posting bilingual warning signs around the treated field, or both.[183] With certain exceptions, warning signs do not have to list the name of the pesticide application, date of application, or when field reentry is allowed.[184] Consequently, there are often signs in

the fields that are rarely removed meaning farmworkers are unsure when it is safe to reenter the field and end up ignoring the signage. Advocates have expressed concern that in some states the law does not even specify that the posted signs restricting entry should be removed after the interval has passed.

California regulations require that notices, whether oral or written, must be presented in "a manner the person can understand."[185] Additionally, the operators of the property must make Hazard Communication Information available to all workers entering a treated field, as well as maintain their pesticide use records in a central location accessible to workers.[186] However, advocates have expressed concern that many workers are unaware they are entitled to view pesticide use information, and fines for noncompliance are rare and modest. Only 11 fines, averaging $232 each, were assessed for violations from 2017 to 2019.[187]

e. Recordkeeping and Pesticide Use Reporting

The 1990 Farm Bill required certified private pesticide applicators to maintain records of federally restricted use pesticides, or those that are restricted to use by certified pesticide applicators or those under their direct supervision.[188] These records require information about the pesticide used, the registration number, quantity applied, date of application (including month, day, and year), location, what has been treated, size of the area treated, and the name and certification number of the applicator or supervisor.[189] If USDA has determined a state has a comparable program, applicators are permitted to comply with their state's laws and regulations.[190] These records can be accessed by licensed health care professionals when treating someone who has been exposed to a restricted use pesticide, among other individuals.[191]

While these records may be subject to random inspection by federal or state regulators, there are no requirements mandating that this information be recorded or collected by the federal government and inspections remain confidential. Rigorous requirements to collect this information coupled with mandatory illness reporting could enable health researchers and regulators to better understand the connections between pesticide exposure and related illness and injury.[192] Most state regulations mirror the federal requirements.

California requires anyone subject to records maintenance to provide the commissioner of the relevant county with a monthly summary of the pesticides used.[193] California has the most comprehensive pesticide use reporting program, requiring any farm applying agricultural pesticide to report use on a monthly basis to county agricultural commissioners, and commercial application companies must report applications made to farms weekly. The data is then sent from the agricultural commissioners to the Department of Pesticide Regulation and can be accessed from their website after review, which takes several years.[194] California also compiles annual pesticide sales summaries.[195] In **New York**, the Department of Environmental Conservation maintains a database with information about pesticide sales and uses the data to create an annual report summarizing the quantity of pesticides used and sold, the type of applicator, and the region where the application occurred.[196] In **Washington**, employers must maintain records that include information about the wind's direction and estimated velocity at the time of application[197] and make the records accessible to employees or their designated representatives.[198]

B. Pesticide Exposure and Illness Response

The Centers for Disease Control and Prevention's (CDC) National Institute for Occupational Safety and Health (NIOSH) gathers data and information on acute pesticide-related illness and injury from 13 states.[199] This process began in 1987 when NIOSH established the Sentinel Event Notification System for Occupational Risks (SENSOR) Pesticides program as a means of tracking occupational pesticide-related illness and injury.[200] However, SENSOR now appears inactive, as the latest data from states is from 2011. In the participating states, physicians were required to report both confirmed and suspected incidents of pesticide-related illness and injury to state health authorities.[201] Since California and Washington participated in this program, it is not surprising they have more rigorous monitoring and surveillance of pesticide-related injury and illness. The California Department of Pesticide Regulation also maintains a separate database drawing from pesticide incident investigations, poison control, and workers' compensation reports.[202]

Based on the collected data, between 2006 and 2011, 2,606 cases of acute occupational pesticide-related illness and injury were identified across the participating states; however, these are likely underestimates for a few reasons. Affected workers may lack access to medical professionals and services or decide not to contact the appropriate authorities for fear of retaliation, while healthcare professionals may not be familiar with the signs and symptoms or how to evaluate pesticide exposure and so fail to diagnose and report or may be unfamiliar with reporting processes. Consequently, many physicians and states fail to report despite reporting mandates.[203] Medical monitoring and illness reporting are invaluable response tools to identify pesticide hazards and treat pesticide exposure while reducing the risk for overexposure.

1. Pesticide Exposure Medical Monitoring

Currently, there are no federal requirements to monitor pesticide exposure levels for workers who typically handle commonly used pesticides such as organophosphates or carbamates, which are known neurotoxins that can cause chronic health conditions.[204] **Washington** has some of the most extensive requirements related to medical monitoring. Under Washington law, any agricultural operation with one or more employees is required to comply with the state's Safety Standards for Agriculture.[205] Those standards require employers to implement a medical monitoring program for employees that handle certain types of organophosphate or carbamate pesticides that include the words "danger" or "warning" on the labels.[206] Employers whose employees receive medical monitoring are required to submit records to the state's Department of Labor and Industries each month with the names of each worker tested and number of hours each worker handled covered pesticides both during the 30 days prior to testing and during the current calendar year.[207] The Department of Labor and Industries is then required to coordinate with the Department of Health to correlate that data with each employee's medical monitoring test results.[208] Additionally, employers are required to report this data to state-approved laboratories at the time of testing and to those employees who are receiving medical monitoring.[209]

Why monitor cholinesterase?

Organophosphate and carbamate pesticides, both of which are widely used throughout the U.S., act as cholinesterase inhibitors.

Medical monitoring and supervision such as cholinesterase testing is one way to protect and prevent farmworkers from dangerous levels of pesticide exposure. Cholinesterase (ChE) is an enzyme that is important for normal functioning of the nervous system. Certain pesticides can inhibit ChE, which can be detected through a blood test. Cholinesterase testing, as required in Washington and California, can detect and diagnose organophosphate and N-methyl carbamate pesticide exposure and poisoning. By providing baseline testing and following up at appropriate intervals for subsequent tests, medical professionals can identify when farmworkers are being overexposed to pesticides even before they become ill, and take action to remove them from pesticide exposure until the levels return to normal.

Sources:

1. Ouahiba Laribi et al., *A Statewide Evaluation of the California Medical Supervision Program Using Cholinesterase Electronic Laboratory Reporting Data*, 52 INQUIRY 1 (2017), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5798718/.
2. Cal. Dep't of Pesticide Reg., Medical Supervision for Organophosphate and Carbamate Pesticide Handlers (2018), https://agcomm.co.tulare.ca.us/ag/assets/File/Medical%20Supervision%20for%20Organophosphate%20and%20Carbamate%20Pesticide%20Handlers%20Fact%20Sheet%20(1-2018).pdf

To implement the medical monitoring program, **Washington's** state regulations require the employer to identify a physician or other licensed health care professional to provide baseline and periodic cholinesterase testing, interpret the test results, and provide recommendations to the employer.[210] Employers must also make cholinesterase testing available at no cost to employees at a reasonable time and place,[211] respond to depressed cholinesterase levels by following a set of required actions,[212] provide protection benefits to address medical removal due to depressed cholinesterase levels,[213] maintain records,[214] and provide training on health hazards and symptoms associated with overexposure to cholinesterase-inhibiting pesticides and the purpose and requirements for medical monitoring.[215]

Similarly, under **California** law, when workers are mixing, loading, or applying pesticides that contain organophosphates or carbamates whose label includes "DANGER" or "WARNING," the employer is required to keep use records, and to provide medical supervision for employees who regularly handle these pesticides.[216] Medical supervision includes a baseline red cell and plasma cholinesterase determination, which are to be verified every two years, and subsequent follow-up tests within three days of the end of a 30-day period during which an employee has regularly handled organophosphate or carbamate pesticides.[217] After three such follow-up tests, the medical supervisor is authorized to determine the appropriate timing for further periodic monitoring.[218] Employers are required to retain and follow the occupational health recommendations of the medical supervisor.[219] Additionally, if an employee's cholinesterase level falls below 80 percent of the baseline levels, the employer must commence an investigation to review safety and work practices and maintain records of the findings, as well as any recommendations made to the employee or responsive changes instituted.[220] Depending on how far the employee's cholinesterase levels fall from their baseline, the employer may be required to remove them from exposure to organophosphate or carbamate pesticide exposure until their levels have returned to 80 percent or more of their baseline.[221] In addition, physicians retained as medical supervisors must register with the Office of Environmental Health Hazard Assessment, which provides training and written guidance,[222] and are required to inform workers of their cholinesterase test results within 14 days of the test. Commercial laboratories performing the cholinesterase tests are required to forward test results to the state for program oversight.[223]

Finally, while not specifically limited to pesticides, **New York's** legislature authorized a state Center for Agricultural Medicine and Health[224] "to address the special health and safety needs of the state's farming community" and "facilitate a focus on agricultural medicine and health."[225] New York's state legislature determined that agriculture is a "dangerous occupation," yet the "health and safety of New York's farming community continues to be an unmet need" because medical professionals lack the requisite skills to treat farm-related illness.[226] The Center for Agricultural Medicine and Health's purpose is to "develop strategies for the provision of comprehensive occupational health services for New York farmers and agricultural workers, including but not limited to migrant workers" through research, evaluation, education and outreach.[227]

2. Pesticide Illness Reporting Requirements

In the U.S., many states have pesticide illness reporting laws with timeframes for reporting ranging from 24 hours to several days.[228] Since 1971, **California** law has required physicians who know or have reasonable cause to suspect to report a patient with pesticide poisoning or any disease or condition caused by a pesticide within 24 hours to the relevant local health official.[229] Once the local health officer receives a report of known or suspected pesticide-related illness, they are required to notify the relevant county agricultural commissioner, as well as submit a pesticide illness report to the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Pesticide Regulation, and the Department of Industrial Relations (if the pesticide illness is work related).[230] California maintains a Pesticide Illness Surveillance Program that collects and evaluates the pesticide illness reports.[231] This data is then used to evaluate the effectiveness of the state's pesticide regulations, as well as provide recommendations.[232] California is the only state to assess a civil penalty for physicians who fail to comply with the directive.[233] **California** also requires physicians who treat cases of pesticide poisoning to file a report with the local health officer within 24 hours of the examination and prohibits compensation unless the health report is filed with the employer (or employer's insurer) and the Division of Workers' Compensation and includes an affidavit that it was filed with the local health officer.[234] However, even with these requirements that carry penalties, illnesses are largely unreported or underreported because workers fear retaliation, lost income, and may lack access to affordable medical care, and there is a notable lack of county-level worker protection law enforcement.[235]

Tracking, recordkeeping, and reporting for pesticide exposure incidents specifically for farmworkers varies widely by state. Without a federal agency or department solely responsible for collecting this data at a national level, and with the large variation between states, there is no national level dataset showing the number of acute pesticide poisonings or injuries specifically for farmworkers in the U.S. The National Poison Control Center has a hotline for reporting of any poisonings but the data collected is not specific to agricultural workers. Every state has a pesticide regulatory agency that has a responsibility to investigate pesticide incidents, including looking into misuse of pesticides and drift. However, those agencies may track pesticide exposure incidents at different levels of specificity. Furthermore, pesticide incidents are largely underreported because farmworkers are not always able to file a complaint or report acute pesticide exposure or injury anonymously and may fear reprisal.

Source:
Amy Mayer, *Across Midwest Farm Fields, Pesticide Exposure Is Tracked Unevenly Or Not At All*, Harvest Pub. Media (May 13, 2019), https://www.harvestpublicmedia.org/post/across-midwest-farm-fields-pesticide-exposure-tracked-unevenly-or-not-all.

Similarly, **Washington** requires healthcare providers or attending physicians to report known or suspected cases of pesticide poisoning to the Department of Health either immediately or within seven days of seeing a patient.[236] To ensure healthcare providers recognize the symptoms associated with pesticide poisoning, Washington law required the creation of a medical education program[237] and tasked the state's department of health with providing technical assistance, consultation, and service to prevent pesticide-related illness.[238] **Louisiana** requires physicians who diagnose any health complaint caused by pesticide poisoning to provide notice within 24 hours to the responsible agency[239] and this data is used for the state's Pesticide Surveillance Program, which investigates, tracks, and evaluates pesticide exposure throughout the state.[240] Notably, Louisiana's tracking specifically accounts for work-related pesticide exposures, which is not common among pesticide surveillance systems.

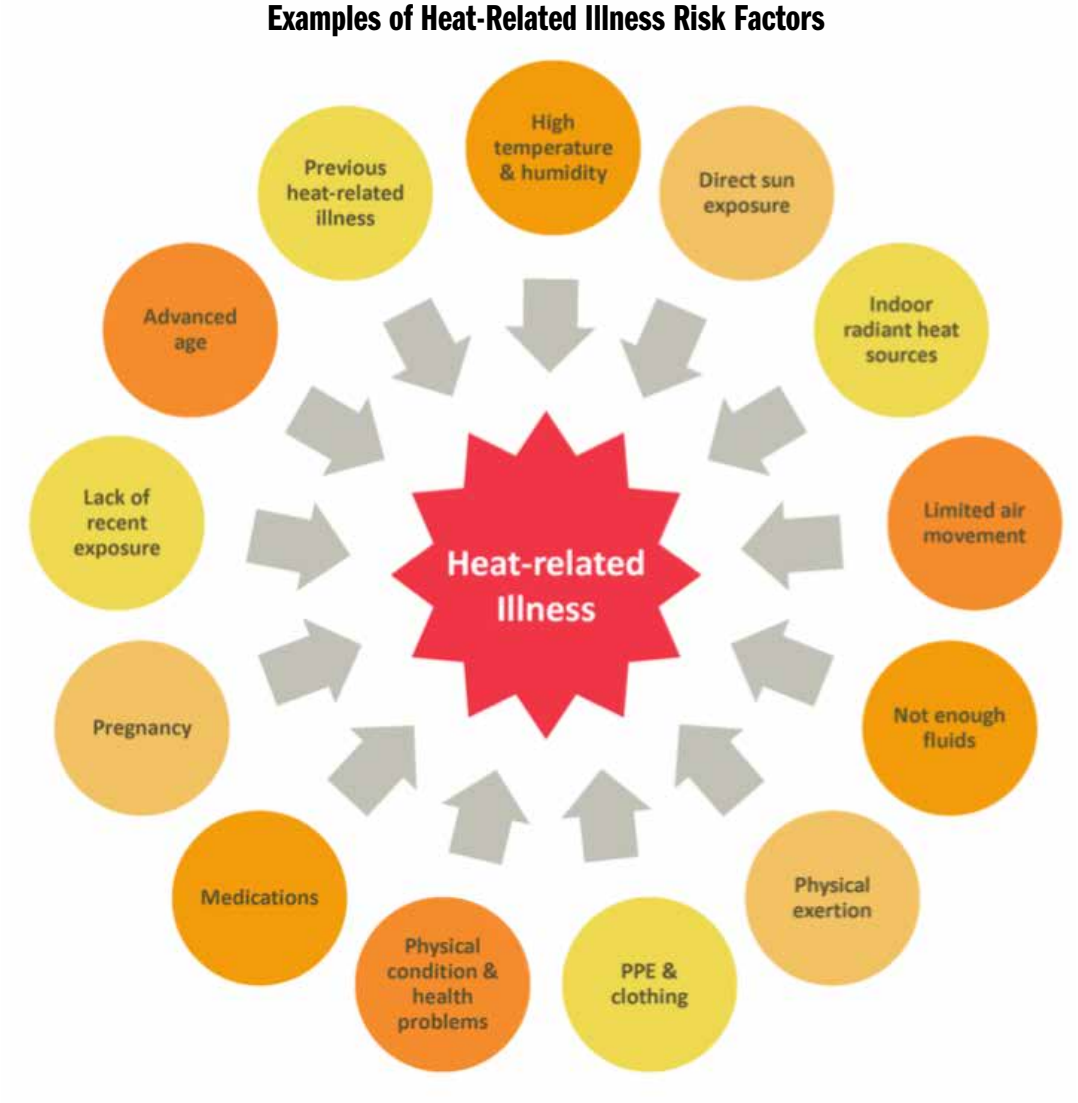
C. Heat-Related Illness Prevention and Response

More extreme temperatures caused by global warming have created a growing public health crisis for people who work in outdoor environments, as well as certain indoor environments.[241] Rising temperatures due to the climate crisis exacerbate the risk for heat-related illness, but also intensify the possibility of wildfires, which increase temperatures and cause poor air quality.[242] Additionally, higher temperatures increase the movement of pesticide fumes, thereby increasing pesticide concentration in the air.[243] Heat and drought stress on plants also leads to increased pesticide application.[244]

In the summer of 2020, striking images emerged of farmworkers picking crops during a global pandemic in front of a backdrop of wildfires—one indication of the growing impacts of climate change on agriculture and public health.[245] However, unlike occupational pesticide exposure, the issue of occupational heat-related illness has not been addressed through enforceable standards at the federal level. As stated above, the only relevant federal law governing heat-related illness for farmworkers and others who work outdoors is the general duty clause contained in the Occupational Safety and Health Act (OSH Act). This clause requires that employers ensure

their workplaces do not present recognized hazards likely to cause serious injury or death.[246] OSHA, the agency charged with implementing the OSH Act, has also developed nonbinding guidance suggesting specific protective measures for outdoor workers depending on the heat index.[247] Additionally, the National Institute for Occupational Safety and Health (NIOSH) developed criteria for a standard to address work-related exposure to heat, including, among many measures, a recommendation for employers to develop medical monitoring programs for early detection.[248] Because OSHA has not developed standards to address heat-related illness, states have the ability to do so either through their OSHA-approved state plans or by other means. However, few states have opted to develop laws and regulations addressing the issue. Washington, Minnesota, and California each have state regulations governing occupational heat exposure[249] enforced through their OSHA-approved state plans.

Examples of Heat-Related Illness Risk Factors



Source: JACKLITSCH, *supra* note 268, at 35.

In 2005, California became the first state to adopt an outdoor heat illness standard, now entitled the Maria Isabel Vasquez Jimenez heat illness standard. The standard has been strengthened in subsequent revisions, most recently in 2015.[250] Advocates suggest that while California has a fairly robust heat illness standard for outdoor employment, it is insufficient to protect farmworkers from the negative health impacts of rising temperatures and heat-related illness.[251] The average annual temperature in the Central Valley of California is predicted to increase by 5 to 6 degrees this century.[252] Since 2008—three years after the heat illness standard was enacted—heat-related illness has killed at least 24 farmworkers.[253]

In May 2008, a teenager named Maria Isabel Vasquez Jimenez collapsed from heat exhaustion in a California grape field.[1] Prior to her collapse, Maria had labored in the field for more than nine hours without sufficient access to water or shade.[2] The foreman on site prevented Maria and her fellow workers from taking a sufficient break in the 95 degree weather to access the water cooler, which was located a ten minute walk away from the field.[3] When Vasquez Jimenez arrived at the hospital, her body temperature exceeded 108°F and she had fallen into a coma.[4] At the hospital, her fiancé learned she was two months pregnant. https://www.npr.org/templates/story/story.php?storyId=91240378 She died two days later. Later that month, Governor Schwarzenegger attended her funeral and declared his commitment to protect farmworkers from heat-related death and illnesses.[5] Despite his vow to protect farmworkers from heat exposure, five additional farmworkers died from heat illness in California in the same summer.[6]

1 Sasha Khokha, *Teen Farmworker's Heath Death Sparks Outcry*, NPR (June 6, 2018), https://www.npr.org/templates/story/story.php?storyId=91240378.
2 Chronology on heat death of Maria Isabel Vasquez Jimenez, United Farm Workers (Mar. 07, 2011), https://www.npr.org/templates/story/story.php?storyId=91240378.
3 Khokha, *supra* note 1.
4 *Id.*
5 United Farm Workers, supra note 2.
6 *Id.*

Under the **California** requirements for outdoor workers, employers must provide one quart of potable drinking water per worker each hour, when the temperature exceeds 80°F provide enough shade for all employees who take breaks at the same time, provide recovery breaks for employees if requested, and train new employees and supervisors on the symptoms of heat-related illness and means to prevent it.[254] Employers must also provide access to emergency medical services if an individual appears to have a severe heat illness and must develop a heat illness prevention plan and have it available at the worksite.[255] When the temperature reaches 95°F, there are additional high heat provisions for agriculture and certain other industries and employers must ensure that agricultural employees take at least 10 minutes to rest every two hours.[256] Relatedly, employers are now required to compensate piece-rate workers during mandated rest and recovery periods and if they fail to provide recovery or cooldown periods to prevent heat-related illness, are required to pay employees for an additional hour of work.[257] Piece rate employees must be compensated separately for rest and recovery periods with these amounts reflected in their pay, however, employees must file a legal claim to force

compliance.[258] The heat illness regulation does not require hourly heat recovery breaks at high temperatures or include added protections for high humidity or heavy workload.

The California Division of Occupational Safety and Health (Cal/OSHA) is the designated agency responsible for enforcing the heat illness standard. To implement the standard, Cal/OSHA engages in varied outreach activities, including presentations, multimedia educational campaigns, trainings, and shared materials on the Cal/OSHA website, all of which are also available in Spanish; however, this does not account for farmworkers speaking languages other than English or Spanish.[259] Cal/OSHA is required to address all heat-related complaints through on-site inspection within three working days.[260]

To improve enforcement capacity, Cal/OSHA entered into memoranda of understanding (MOUs) with United Farm Workers, California Rural Legal Assistance, Inc., and the California Rural Legal Foundation.[261] The MOU with UFW resulted from the Bautista Settlement, a settlement of two lawsuits alleging that Cal/OSHA failed to protect farm workers from heat illness and heat-related death.[262] These MOUs provide a novel approach to address concerns that workplace violations may go unreported due to farmworkers' unwillingness to report for fear of retaliation as advocacy organizations may have the ability to obtain more information due to their connections with farmworkers.

As of 2014, Cal/OSHA was so under-resourced that inspection of all state work sites would have taken 189 years.[1] Between 2013 and 2017, Cal/OSHA completed 7,082 inspections that resulted in heat standard citations or violations.[2] However, many violations remain unreported, and implementation of the new regulations can be inconsistent depending on the geographic area.[3] Currently, Cal/OSHA has seventeen regional offices with varying degrees of ability to enforce the regulation.[4]

1 Katherine L. Pankow, *An Equitable Proposal for Injunctive Relief to End Casualties in Cultivation*, 23 San Joaquin Agric. L. Rev. (2014), http://www.sjcl.edu/images/stories/sjalr/volumes/V23N1C5.pdf.
2 Petition for Rulemaking from Public Citizen to Lauren Sweatt, Acting Assistant Sec. of Labor for Occupational Safety and Health, U.S. Dep't of Labor (July 17, 2018), https://www.citizen.org/wp-content/uploads/2439.pdf.
3 Interview with Anne Katten, Director, Pesticide & Labor Safety Project, California Rural Legal Assistance Foundation (Aug. 08, 2020).
4 Cal/OSHA District Offices, Cal. Dep't of Industrial Relations (2021), https://www.dir.ca.gov/dosh/ca_map_counties2.pdf

Similarly, **Washington** created several regulations addressing outdoor heat exposure that requires employers of workers in outdoor environments to ensure a sufficient amount of drinking water and the opportunity to drink at least one quart per hour,[263] respond to signs and symptoms of heat-related illness through breaks and monitoring,[264] provide information and training on heat-related illness prevention and response to workers and supervisors in a language both can understand,[265] and take appropriate measures to ensure personal protective equipment does not contribute to heat-related illness.[266]

Minnesota enacted regulation addressing indoor environmental heat conditions requiring training for employees and restricting work under certain conditions taking into account temperature and the intensity of the work. California also developed a draft regulation entitled Heat Illness Prevention in Indoor Places of Employment, which would apply to all workplaces exceeding 82 degrees Fahrenheit and generally requires access to water, access to cool down areas, control measures when temperatures exceed certain thresholds, emergency response procedures, training, and creation of a heat illness prevention plan.

Sources:

- Minn. R. 5205.0110, https://www.revisor.mn.gov/rules/5205.0110/
- *Heat Illness Prevention Draft Text-draft revisions 4/19/19 compared to 1/29/19*, Cal. Dep't of Indus. Rel. (2019), https://www.dir.ca.gov/dosh/doshreg/Heat-Illness-Prevention-Indoors/Draft-revisions-Apr-22-2019.pdf

Background on California's Heat Illness Prevention Standard

In 2006, the California Occupational Safety and Health Standards Board replaced an existing temporary regulation with a permanent heat illness prevention regulation.[267] Tragically, three farmworkers in California died the year the regulation was updated.[268] Advocates suggest the 2006 heat illness prevention standard failed to effectively protect farmworkers due to flaws in the policy's response measures, enforcement mechanisms, and penalty structure. Rather than addressing the factors that lead to heat illness, the 2006 standard's shade requirement was triggered only when employees already began experiencing symptoms of heat exposure.[269] The regulation did not include any proactive measures to require an employer to monitor environmental conditions and encourage acclimatization, and rather put the onus on the employee to speak out if they were feeling ill.[270] Many employees were unlikely to come forward with complaints because they feared retaliation.[271] Additionally, Cal/OSHA lacked adequate enforcement capacity.[272] According to a UFW complaint, in 2008, Cal/OSHA employed only 187 safety and health compliance inspectors to investigate over one million work sites throughout the state.[273]

Additionally, many growers lacked incentives to comply with the standard since many farmworkers are employed by farm labor contractors and not by the growers themselves.[274] This employment and enforcement system lacked deterrence measures because growers directly benefited from farmworkers' labor and had control over farmworkers' employment, but were not ultimately responsible for penalties associated with violations.[275] In sum, the employers stood to gain for failing to comply with the heat illness protection standard.[276] In 2015, the regulation was updated to include improved requirements for the amount of shade required and planning for emergency response.

IV. RECOMMENDATIONS

DESPITE THE WORKPLACE PROTECTIONS provided at the federal and state level, farmworkers continue to face extremely hazardous working conditions and are left essentially unprotected from some of the most serious workplace hazards. Of the measures cited above, those targeted at prevention are the best means to address threats to farmworkers presented by pesticide exposure and heat stress. For certain measures like bans on certain pesticides, enforcement becomes less critical since exposure to the hazard is eliminated. However, for many of the other measures addressed above, adequate and meaningful enforcement to ensure compliance is the only means by which to ensure workers are protected.

In many instances, states have enacted laws and regulations that appear to provide a high level of protection for workers. However, as discussed throughout this report, some of these laws and regulations have not been fully implemented, are not adequately or uniformly enforced, or require action on the part of a population of workers that may be fearful to act, thereby making the protections provided by the laws inadequate or meaningless. The following recommendations are based on the research and interviews conducted for this report and build upon and strengthen the federal and state frameworks to protect farmworkers.

Of the measures cited in this report, those targeted at prevention are the best means to address threats to farmworkers presented by pesticide exposure and heat stress.

Recommendations for Action at the Federal Level

As an overall recommendation for the federal government, the Biden Administration should prioritize farmworker health and safety through executive action and devote sufficient staffing and resources to implement existing protections, collect data on their efficacy, and identify needed amendments and protections.

- **Revoke all tolerances and cancel the registration for chlorpyrifos** and amend FIFRA to prevent EPA from deferring decisions on registrations where safety concerns are present.
- **Require pesticide product labels to be printed in Spanish** in addition to English, given the prevalence of Spanish-speaking farmworkers, and ensure language accessibility for farmworkers speaking Indigenous languages either written or orally, if needed. Alternatively, require **companion explanatory pamphlets** that accompany the pesticides and have been vetted for comprehension, **written in Spanish**, and ensure language accessibility for farmworkers speaking Indigenous languages either written or orally.
- **Strengthen rather than weaken the Application Exclusion Zone regulation** and include a requirement to notify neighboring farms, residences, and schools before applying pesticides within one-quarter mile of property lines.
- **Enact buffer zone requirements** in addition to the AEZ to protect workers in fields and housing from pesticide drift.
- **Require pesticide names and expiration dates and times on all field posting signs** warning of restricted entry intervals in effect and **require that the signs be removed** once the restricted interval period has passed.
- Require employers to **provide consistent and comprehensive safety trainings on the dangers of pesticides and heat-related illness, how to report illness and seek treatment, and how to enforce workers' rights** in a manner that ensures farmworker comprehension through language accessibility whether written or spoken.
- **Develop a national program that collects pesticide use information reporting** from the states to analyze data and identify specific risks and harms, or revive the SENSOR program.
- **Develop a national program for pesticide illness reporting** that requires employers, physicians, and the owners of the properties where pesticides are applied to report known or suspected cases of pesticide illness.
- EPA and CDC, in coordination with the states, should **develop national comprehensive occupational pesticide exposure monitoring and data collection for workers typically handling organophosphate and carbamate pesticides** to give EPA the ability to identify the most effective and targeted set of preventive measures.
- Implement a national program to **provide support to states to develop medical monitoring programs to measure baseline cholinesterase with required follow-up testing** to prevent pesticide overexposure.

- **Ensure the law takes into account the particular needs of women and children** farmworkers to protect their health and safety.
- **Increase the penalties for violation and strengthen enforcement** of existing laws and regulations that are intended to provide protections for farmworkers, and compensate workers impacted by pesticide and heat-related illness from the funds collected.
- Heed the calls from advocates and **replace OSHA's nonbinding guidance with an enforceable federal heat safety standard** requiring acclimatization, temperature thresholds that account for humidity, access and close proximity to shade and water, hourly breaks during extreme temperatures, and enough quality shade to protect all workers on site during breaks.

Elements of Proposed Federal Heat Safety Standard

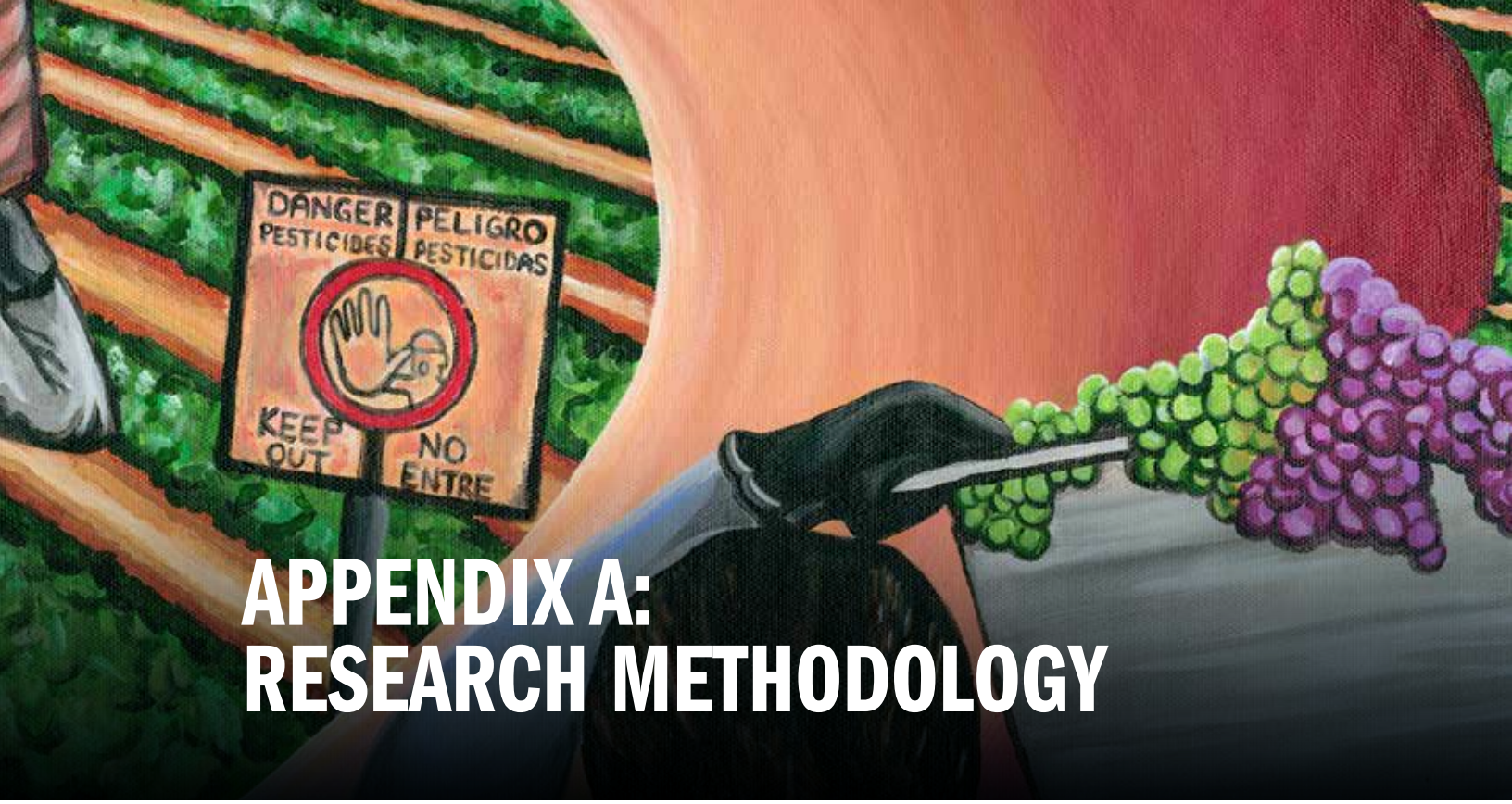
- **Acclimatization:** Many heat illnesses happen early in the season or when there are changes in the weather, such as heat waves. Many seasonal farmworkers feel pressured to be as productive as possible, but there must be better policies to ensure workers are not endangered by feeling obligated to work in high temperatures they are not accustomed to.
- **Temperature:** The temperature thresholds in California's regulation only account for the dry temperature level and not the humidity level. While California has drier heat, other states that have more humid atmospheres must account for this nuance in their regulations.
- **More Frequent Breaks:** Guidelines for preventing heat illness recommend hourly breaks in extreme temperatures.
- **Proximity to Shade and Water:** While California's regulation requires access to shade and water, it does not set a minimum distance for access.
- **Quality Shade:** There is ongoing controversy about what constitutes adequate shade. Sometimes employers use crops such as grape vines as shade where it is not safe or pleasant to rest. Furthermore, pesticide residue can exist on crops used for shade and further expose farmworkers to risks.
- **Enforcement:** Regardless of the strength of heat-related policies, adequate funding and training necessary to successfully implement and enforce regulations is essential to protect farmworkers from heat-related illness.

Recommendations for Action at the State Level

In addition to the recommendations above that can also be implemented at the state level, state law and policymakers should consider the following.

- Identify a **lead office or agency to identify and address issues related to farmworkers** and devote sufficient funding to fully implement a farmworker health and safety program.
- Enact state and/or local laws **restricting or prohibiting the use of dangerous pesticides** in the absence of federal protections.
- Require that employers **provide consistent and comprehensive safety trainings on the dangers of pesticides and heat-related illness and workers' rights that ensure farmworker comprehension**.
- Enact and effectively implement enforceable **state laws requiring the development and implementation of safer alternatives when a pesticide presents substantial adverse effects**.
- Develop **occupational pesticide exposure monitoring and data collection for workers typically handling organophosphate and carbamate pesticides**.
- **Develop a program that collects pesticide use information reporting** from localities to identify potential risks and make this information widely accessible.
- **Increase the penalties for violation and strengthen enforcement** of existing laws and regulations that are intended to provide protections for farmworkers, and compensate workers impacted by pesticide illness from the funds collected.
- In states with high populations of farmworkers, **fund and strengthen existing Migrant Health Centers**[277] **to serve farmworkers with medical professionals trained to identify and address farmworker health issues**.
- Develop state-funded **public/private partnerships to provide outreach, collect information, and connect with farmworker communities** to enable monitoring and inspection without fear of retaliation.

For over half a century, farmworkers and advocates that support them have protested, lobbied, and campaigned for humane workplace safety standards. Our country has deemed these workers essential, signifying their immense value to society, but has failed to enact significant and meaningful requirements to ensure fundamental aspects of their safety at work. The recommendations suggested above provide needed baseline standards that would protect this essential but undervalued workforce and ensure their dignity.



APPENDIX A: RESEARCH METHODOLOGY

THE GOAL OF OUR RESEARCH was to identify state laws and regulations related to public health protections for farmworkers, looking specifically at measures related to heat stress, pesticide exposure, and illness reporting. At the outset, it should be noted that the project team did not conduct field research but did engage in a number of conversations and interviews with individuals and organizations supporting farmworkers.

A. State Selection

Rather than providing a 50-state survey of laws and regulations addressing heat-related illness, pesticide exposure, and reporting, the project team narrowed the scope and selected a set of states representing the different USDA National Agricultural Statistics Service (NASS) regions in the US, including the Eastern Mountain, Northeastern, Southern, Upper Midwest, Great Lakes, Heartland, Northwest, Paci c, Delta, Northern Plains, Southern Plains, and Mountain regions. The project team then examined the most current NASS Data to determine the states in each region with the highest number of farmworkers by reviewing the "Hired Farm Labor - Workers" and "Total Migrant Workers" data (see Table 4 below). The state in each region with the highest number of farmworkers combined from both categories was selected. If the state with the highest number of farmworkers differed between the two data sets, the project team considered the overall highest number by adding the two categories together.[278] Finally, the project team included two states from the Northwest region, Washington and Oregon, because they have two of the largest populations of farmworkers in the country in addition to a number of state policies targeting farmworker health protections. Consequently, this report focuses on the following 13 states: California, Colorado, Florida, Illinois, Louisiana, Michigan, Nebraska, New York, North Carolina, Oregon, Texas, Washington, and Wisconsin.

B. Search Process

To conduct research on the 13 selected states, the project team used Westlaw and input a specific set of identified search terms (included below) for each state in the study. Referrals and conversations with individuals at organizations working with and representing farmworkers helped to identify additional laws and regulations.

Westlaw search terms included:

Pesticide Exposure: "farmworkers" "pesticides" "agriculture" "illness reporting" "surveillance" "worker protection standard" "occupational health" "clinics" "medical training" "hazardous chemicals" "hazardous materials" "cholinesterase" "pesticide spray drift" "medical supervision of employees who handle pesticides" "illness reporting related to pesticide exposure" "research on health impact of pesticides" "pesticide use reporting and monitoring" "field entry requirements for pesticide application" "investigations" "pesticide poisoning" "sanitation and personal protective equipment" "labeling" "hazard communication" "chlorpyrifos" "working committee pesticide exposure" "language accessibility of labels"

Heat Exposure: "farmworkers" "heat exposure" "agriculture" "illness reporting" "worker protection" "surveillance" "work restrictions during heat advisories" "mandatory breaks" "shade requirements" "heat illness training" "medical supervision"

Additionally, the project team included Occupational Safety and Health Administration (OSHA) state guidance documents on heat illness exposure found on state OSHA websites.

Complimentary Protections: "protections for undocumented workers" "right to unionize" "child labor protections" "anti-retaliation" "workers' compensation" "minimum wage standards" "language accessibility" "migrant and seasonal workers"

The project team used combinations of these search terms to identify state laws and/or regulations. Policies were initially identified through Westlaw, although additional relevant policies were identified through research in state codes. Proposed and recently enacted state legislation was also included.

C. Inclusion Criteria

Laws and regulations identified through the search process were reviewed to determine whether they fell within the scope of our research. The project team focused on laws and regulations directly related to pesticide exposure or heat exposure protections for farmworkers and excluded laws that only related to the impact of pesticide application on animal life or the environment, pesticide dealers, and pesticide application close to residential communities or schools. Additionally, laws and regulations related only to heat exposure for employees in industrial work settings or indoor work environments were excluded.

D. Categorization of Laws and Regulations

Selected laws and regulations were added to an outline document and categorized by type. The categories chosen included pesticide exposure prevention, pesticide exposure response, heat exposure, and complimentary protections.

Pesticide exposure prevention laws and regulations included those that ban or restrict particular types of pesticides, pesticide application committees and advisory boards, mandatory PPE requirements for farmworkers, field entry requirements, hazard communication, labels and language accessibility on pesticides, requirements for licensing and certification of pesticide handlers and applicators, pesticide drift prevention, pesticide use reporting, registration of pesticides, recordkeeping of pesticide applications, research and evaluation of the health impact of pesticide application, worker safety education and training, pesticide residue monitoring, and baseline cholinesterase testing.

Pesticide exposure response laws and regulations included mandatory illness reporting (for suspected or actual pesticide poisoning), timeframe to report injury or exposure, medical monitoring, accessibility of first aid or emergency medical services, illness reporting follow-up, investigations of pesticide exposure, and surveillance systems and programs.

Heat exposure laws and regulations included those that set a temperature threshold for restricting outdoor work, create year-round or seasonal protections, have a shade requirement, water requirements, or mandatory break requirements. This category also included laws and regulations addressing education and training programs for employers and handlers related to heat exposure, worker education and training programs related to heat exposure, a surveillance system for heat illness, a working committee on heat illness, medical education to detect heat-related illness, work restrictions during heat advisories, and mandatory illness reporting.

Complementary protections included laws and regulations that support farmworkers' health outcomes such as communication about pesticides to farmworkers and language accessibility, the right to unionize, protections for undocumented workers, migrant and seasonal workers, protections for child laborers, minimum wage standards, and workers' compensation.

E. Final Dataset

After developing an extensive Excel spreadsheet of state laws and regulations related to pesticide and heat exposure, the project team transferred the information into a more dynamic interface that would allow users to more easily sort and filter by policy type, category, state, etc. The final dataset is displayed in an Airtable database and includes 216 state laws, 155 state regulations, 15 pieces of proposed or enacted legislation, and 3 other state-level guidance documents, which do not have the force and effect of law but provide details about how state regulators interpret the law. The Airtable includes a row for each enacted or proposed law, regulation, or guidance document. The rows include a summary, tags for different categories, whether the provision includes implementation or enforcement measures, and identifies the responsible agencies.

TABLE 4: NATIONAL AGRICULTURAL STATISTICS SERVICE (NASS) DATA AND STATE SELECTION PROCESS

NASS Regions	"Hired Farm Labor- Workers"	"Total Migrant Workers"	Combined Data
Eastern Mountain Region	Highest per region	Highest per region	Highest per region
North Carolina	67,496	28,063	95,559
Kentucky	52,701	10,605	63,306
Tennessee	40,056	5,038	45,094
Virginia	39,657	5,153	44,810
West Virginia	9,025	475	9,500
Northeastern Region			
Pennsylvania	61,071	4,731	65,802
Delaware	3,509	648	4,157
Maryland	15,143	1,341	16,484
New Jersey	25,256	10,675	35,931
New York	55,636	11,821	67,457
Maine	13,440	2,191	15,631
Vermont	8,458	786	9,244
New Hampshire	4,832	209	5,041
Rhode Island	1,759	14	1,773
Massachusetts	13,142	837	13,979
Connecticut	11,897	688	12,585
Southern Region			
Georgia	48,972	19,331	68,303
Alabama	26,136	1,864	28,000
Florida	96,247	34,177	130,424
South Carolina	20,938	4,693	25,631
Great Lakes Region			
Michigan	77,475	19,602	97,077
Indiana	43,528	2,359	45,887
Ohio	58,785	3,666	62,451
Upper Midwest Region			
Iowa	73,257	352	73,609
Minnesota	70,695	3,044	73,739
Wisconsin	72,425	3,684	76,109

Heartland Region			
Missouri	50,269	829	51,098
Illinois	55,584	1,845	57,429
Delta Region			
Arkansas	29,047	1,794	30,841
Louisiana	23,019	4,528	27,547
Mississippi	27,166	3,530	30,696
Northern Plains Region			
Nebraska	44,785	1,048	45,833
Kansas	43,102	464	43,566
North Dakota	24,143	1,807	25,950
South Dakota	25,914	493	26,407
Southern Plains Region			
Texas	143,763	5,394	149,157
Oklahoma	42,431	592	43,023
Mountain Region			
Colorado	36,733	3,687	40,420
Arizona	24,648	4,059	28,707
Montana	21,800	1,287	23,087
New Mexico	20,355	1,312	21,667
Utah	19,136	833	19,969
Wyoming	10,402	356	10,758
Northwest Region			
Washington	228,588	56,348	284,936
Alaska	1,988	123	2,111
Idaho	45,585	5,302	50,887
Oregon	86,240	21,131	107,371
Pacific Region			
California	377,593	105,057	482,650
Hawaii	11,891	793	12,684
Nevada	5,315	247	5,562

Sources: NASS Regions Data: NAT'L AGRIC. STAT. SERV., STATISTICS BY STATE: REGIONAL OFFICES (last updated Apr. 6, 2021) https://www.nass.usda.gov/Statistics_by_State/RFO/index.php.

NASS Data (2017): NAT'L AGRIC. STAT. SERV., 2017 CENSUS OF AGRICULTURE - STATE DATA, (2019) https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_US_State_Level/st99_2_0007_0007.pdf.

TABLE 5: CATEGORIZATION OF LAWS AND REGULATIONS

Selected laws and regulations were added to an outline document and categorized by type. The categories chosen included:	
PESTICIDE EXPOSURE PREVENTION	■ Ban or restrict particular types of pesticides ■ Pesticide application committees and advisory boards ■ Mandatory PPE requirements for farmworkers ■ Field entry requirements ■ Hazard communication ■ Labels and language accessibility on pesticides ■ Requirements for licensing and certification of pesticide handlers and applicators ■ Pesticide drift prevention ■ Pesticide use reporting ■ Registration of pesticides ■ Recordkeeping of pesticide applications ■ Research and evaluation of the health impact of pesticide application ■ Worker safety education and training ■ Pesticide residue monitoring ■ Baseline cholinesterase testing
PESTICIDE EXPOSURE RESPONSE	■ Mandatory illness reporting (for suspected or actual pesticide poisoning) ■ Timeframe to report injury or exposure ■ Medical monitoring ■ Accessibility of first aid or emergency medical services ■ Illness reporting follow up ■ Investigations of pesticide exposure ■ Surveillance systems and programs
HEAT EXPOSURE	■ Set a temperature threshold for restricting outdoor work ■ Create year-round or seasonal protections ■ Shade requirements ■ Water requirements ■ Mandatory break requirements ■ Education and training programs for employers and handlers related to heat exposure ■ Worker education and training programs related to heat exposure ■ Surveillance system for heat illnesses ■ Working committee on heat illnesses ■ Medical education to detect heat-related illness ■ Work restrictions during heat advisories ■ Mandatory illness reporting
COMPLEMENTARY PROTECTIONS INCLUDING LAWS AND REGULATIONS THAT SUPPORT FARMWORKERS' HEALTH OUTCOMES:	■ Communication about pesticides to farmworkers and language accessibility ■ The right to unionize ■ Protections for undocumented workers and/or migrant and seasonable workers ■ Protections for child laborers ■ Minimum wage standards ■ Workers' compensation

Endnotes

1 USDA Economic Research Service (ERS), Ag and Food Sectors and the Economy, (last updated Dec. 16, 2020) https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/ag-and-food-sectors-and-the-economy/#:~:text=Agriculture%2C%20food%2C%20and%20related%20industries,about%200.6%20percent%20of%20GDP.

2 The National Institute for Occupational Safety and Health (NIOSH), AGRICULTURE, Forestry and Fishing: Program Description (May 13, 2020), https://www.cdc.gov/niosh/programs/agff/description.html.

3 Eduardo González, Jr., *Migrant Farm Workers: Our Nation's Invisible Population*, Extension Foundation (June 6, 2019), https://copdei.extension.org/migrant-farm-workers-our-nations-invisible-population/.

4 Purdue Food and Agriculture Vulnerability Index, Dep't of Agric. Econ. at Purdue Uni., https://ag.purdue.edu/agecon/Pages/FoodandAgVulnerabilityIndex.aspx?_ga=2.49471334.1159720487.1600111458-250602208.1598985334, (last visited Apr. 5,2021). Approximately 496,000 agricultural workers have tested positive for COVID-19. *Id.*; National center for Farmworker Health, Inc. (NCFH), COVID-19 in Rural America: Impact on Farms & Agricultural Workers (last updated Feb. 1, 2021) http://www.ncfh.org/msaws-and-covid-19.html. The actual numbers of agricultural workers testing positive for COVID is likely higher as this figure does not include temporary or contract workers. *Id.*; Helena Bottemiller Evich et al., *Harvest of shame: Farmworkers Face Coronavirus Disaster*, Politico (Sept. 8, 2020), https://www.politico.com/news/2020/09/08/farmworkers-coronavirus-disaster-409339.

5 National center for Farmworker Health, Inc. (NCFH), Facts About Agricultural Workers (last updated Dec. 2020), http://www.ncfh.org/facts-about-agricultural-workers.html;
JBS International, Findings From the National Agricultural Workers Survey (NAWS) 2015-2016: A Demographic & Employment Profile of U.S. Farmworkers 2-3 (Jan. 2018) [hereinafter *NAWS 2015-2016*] https://www.dol.gov/sites/dolgov/files/ETA/naws/pdfs/NAWS_Research_Report_13.pdf (explaining that of farmworker respondents, "84 percent classified their race as Latino or Hispanic (including Latino/a, Hispanic, Hispano/a, Mexican, Mexicano/a, Mexican-American, and Chicano), 10 % referenced their complexion (including moreno/a and café), 3 % identified with an indigenous group, 2 % identified with their Central American origin (Guatemalan, Honduran, and Salvadoran), and another 1 % provided a variety of other responses (examples include American, Filipino, and Portuguese").

6 *See* National Center for Farmworker Health, Inc. (NCFH), *supra* note 5.

7 *Id.*; *see also* NAWS 2015-2016, *supra* note 5 at 23-24, 36 (illustrating median wages are between $20–25,000/year).

8 NAWS 2015-2016, *supra* note 7, at 10. Some suggest these numbers likely underestimate the true number of Indigenous farmworkers given that this population may not self-identify as Indigenous. *Id.*

9 Stephanie Farquhar et al., *Recruiting and Retaining Indigenous Farmworker Participants*, 16,5 J. of immigrant and Minority Health, 1011, 1011-5 (2014), iok https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3838453/.

10 Daniel Costa et al., Economic Policy Institute, Federal Labor Standards Enforcement in Agriculture: Data Reveal the Biggest violators and Raise New Questions about How to Improve and Target Efforts to Protect Farmworkers (Dec. 15, 2020), https://www.epi.org/publication/federal-labor-standards-enforcement-in-agriculture-data-reveal-the-biggest-violators-and-raise-new-questions-about-how-to-improve-and-target-efforts-to-protect-farmworkers/.

11 U.S. Gov't. Accountability Off., GAO-19-26, Working Children: Federal Injury Data and Compliance Strategies Could be Strengthened 23 (2018) [hereinafter *GAO-19-26*]. Because data is collected inconsistently by different agencies, it is difficult to ascertain precise figures for this population, *Id.*

12 American Public Health Association (APHA), Improving Working Conditions for U.S. Farmworkers and Food Production Workers (Nov. 07, 2017) https://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2018/01/18/improving-working-conditions.

13 Charlene Galarneau, *Farm Labor, Reproductive Justice: Migrant Farmworkers in the U.S.*, 15 Health and Human Rights 144 (2013).

14 GAO-19-26, *supra* note 11, at 28.

15 Costa et. al., *supra* note 10.

16 Rafter Ferguson et. al., Farmworkers at Risk: The Growing Dangers of Pesticides and Heat (Dec. 9, 2019), https://www.ucsusa.org/resources/farmworkers-at-risk#:~:text=The%20estimated%202.4%20million%20farmworkers,to%20compounding%20climate%20change%20threats.

17 Memorandum from Directorate of Enforcement Programs on Policy Clarification on OSHA's Enforcement Authority at Small Farms to Regional Administrators (July 29, 2014), https://www.osha.gov/dep/enforcement/policy_clarification_small_farms.html; *See e.g., Applicability of Standards in 29 C.F.R. § 1910*, Occup. Safety and Health Standards for Agriculture, https://www.osha.gov/laws-regs/regulations/standardnumber/1928/1928.21. Agricultural workers are only included in the specifically listed standards. *Id.*; *See also* 29 C.F.R. § 1910 (2021).

18 U.S. Dep't of Labor, OSHA, Adding Inequality To Injury: The Costs Of Failing To Protect Workers On The Job (June 2015), https://www.osha.gov/sites/default/files/inequality_michaels_june2015.pdf.
19 *Id.* at 12-13.
20 29 U.S.C. §651 *et seq.* (1970).
21 29 U.S.C. § 667 ("After the Secretary approves a State plan…he may, but shall not be required to, exercise his authority… with respect to comparable standards….until he determines, on the basis of actual operations under the State plan, that the criteria set forth in subsection (c) are being applied."); *State Plans*, U.S. Dep't of Labor, OSHA, https://www.osha.gov/stateplans (last visited Apr. 5, 2021)[hereinafter *State Plans*]. 21 states and Puerto Rico have OSHA approved state plans – Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming. *Id.*
22 29 U.S.C. §651(b).
23 U.S. Dep't of Labor, OSHA, Worker's Rights (2017), https://www.osha.gov/Publications/osha3021.pdf.
24 Make the Road New York, Immigrant Worker Health & Safety (2011), https://www.osha.gov/sites/default/files/2018-11/fy10_sh-20830-10_Advocate_Guide.pdf; *FAQ: Worker's Rights and* COVID-19, National Employment Law Project (Apr. 10, 2020), https://www.nelp.org/publication/faq-immigrant-workers-rights-and-covid-19/.
25 *State Plans Frequently Asked Questions*, Occupational Safety & Health Admin., U.S. Dep't of Labor, https://www.osha.gov/stateplans/faqs. These states are Connecticut, Illinois, Maine, New Jersey, New York, and the Virgin Islands. *Id.*
26 *Id.*
27 29 U.S.C. §660(c).
28 29 C.F.R. § 1977.12 (b)(1) (stating that employers must be given the opportunity to correct the hazard).
29 29 U.S.C. §651 (b)(11).
30 Jane Flanagan et al., National Employment Law Project, How States and Localities Can Protect Workplace Safety and Health 2 (2020), https://lwp.law.harvard.edu/files/lwp/files/state_local_workplace_protection_lwp_nelp.pdf.
31 *Id.* at 3.
32 29 U.S.C. § 659.
33 Letter from Directorate of Enforcement Programs on Small Farming Operations and Exemption from OSHA Enforcement Activity under CPL-02-00-051 to Associated Safety Consultants Inc., (Jul. 16 2007), https://www.osha.gov/laws-regs/standardinterpretations/2007-07-16; Occupational Safety & Health Admin., Field Operations Manual (FOM) ch. 10 (2020), https://www.osha.gov/enforcement/directives/cpl-02-00-164/chapter-10.
34 Nat'l Agric. Stat. Serv., 2017 Census of Agriculture: Summary and State Data 339 (2019), https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf; Eli Wolfe, *Death on a Small Farm*, The Atlantic (Nov. 28, 2018), https://www.theatlantic.com/politics/archive/2018/11/congress-exempts-small-farm-deaths-osha-inspection/576010/.
35 Field Operations Manual (FOM), *supra* note 33, at ch. 1.
36 Phillip D. Somervell & George A. Conway, *Does the Small Farm Exemption Cost Lives?* 54 Am. J. Indus. Med. 2011 461-466 (Mar. 11, 2011) https://pubmed.ncbi.nlm.nih.gov/21400559/.
37 Field Operations Manual (FOM), *supra* note 33.
38 *Using the Heat Index: A Guide for Employers*, Occupational Health & Safety Admin., U.S. Dep't of Labor, http://bit.ly/2KRy9mC.
39 *Protective Measures to Take at Each Risk Level,* Occupational Health & Safety Admin., U.S. Dep't of Labor, https://www.osha.gov/heat/heat-index/protective-measures.
40 *OSHA's Campaign Heat Illness Prevention Campaign*, Occupational Health & Safety Admin., U.S. Dep't of Labor, https://www.osha.gov/heat; *Overview: Working in Outdoor and Indoor Heat Environments*, Occupational Health & Safety Admin., U.S. Dep't of Labor, https://www.osha.gov/SLTC/heatstress/.
41 29 U.S.C. § 654(a)(1).
42 Field Operations Manual (FOM), *supra* note 33, at ch. 4
43 *Id.*
44 *Id.*
45 *Id.*
46 Memorandum from Kimberly Stille, Acting Director, Directorate of Enforcement Programs to Regional Administrators (Nov. 02, 2018), https://www.osha.gov/laws-regs/standardinterpretations/2018-11-02.
47 Alan Ferguson, *OSHA's General Duty Clause: 5(a)(1),* Safety+Health Magazine (Dec.20, 2019), https://www.safetyandhealthmagazine.com/articles/19258-oshas-general-duty-clause.
48 *Id.*

49 Sec'y of Labor v. A.H. Sturgill Roofing, Inc., OSHRC No. 13-0224, at *2 (2015), https://www.oshrc.gov/assets/1/18/A.H._Sturgill_Roofing_Inc.%5E13-0224%5EComplete_Decision_signed%5E022819%5EFINAL.pdf?8324. Item 1 alleged a violation of 29 U.S.C. § 654(a)(1) for exposing employees "to the hazard of excessive heat from working on a commercial roof in the direct sun" while Item 2 alleged a violation of 29 C.F.R. § 1926.21(b)(2) "for failing to instruct employees on the recognition and avoidance of risk factors related to the development of heat-related illnesses". *Id.*

50 Sec'y of Labor v. A.H. Sturgill Roofing, Inc., OSHRC No. 13-0224, at *3 (2019), https://www.oshrc.gov/assets/1/18/A.H._Sturgill_Roofing_Inc.%5E13-0224%5EComplete_Decision_signed%5E022819%5EFINAL.pdf?8324.

51 *Id.* at *4.

52 *Id.*

53 *Id.* at *5.

54 *Id.* at *6.

55 *Id.*

56 *Id.* at *8.

57 *Id.*

58 Bruce Rolfson, *Worker Heat Death Citations Reversed by Review Commission*, Bloomberg Law (Mar. 1, 2019), https://news.bloomberglaw.com/safety/worker-heat-death-citations-reversed-by-review-commission-1.

59 Overview: Working in Outdoor and Indoor Heat Environments, *supra* note 40.

60 Emergency Temp. Standards on Organophosphorus Pesticides, B-179768 (Comp. Gen. Feb. 24, 1975), https://www.gao.gov/assets/120/114568.pdf.

61 Environmental Management White Papers, EPA and OSHA on Pesticide Worker Safety, BLR (Apr. 08, 2014), https://enviro.blr.com/whitepapers/hazmat-and-chemicals/pesticide-manufacture-and-application/EPA-and-OSHA-on-Pesticide-Worker-Safety.

62 *Id.*

63 7 U.S.C. §136v(a), (b).

64 *Enforcement: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Facilities*, U.S. Env't. Protection Agency, https://www.epa.gov/enforcement/federal-insecticide-fungicide-and-rodenticide-act-fifra-and-federal-facilities#main-content.

65 C.f. *Id.*

66 *Id.*

67 *Id.*

68 *Id.*

69 Pesticides; Agricultural Worker Protection Standard; Revision of the Application Exclusion Zone Requirements, 85 Fed. Reg. 68760 (Dec. 29, 2020) (to be codified at 40 C.F.R. 170).

70 S. Goldman, A. Aspenson, P. Bhatnagar, & R. Martin, Essential and in Crisis: A Review of the Public Health Threats Facing Farmworkers in the US (2021), https://clf.jhsph.edu/node/957/; *Revised Methods for Worker Risk Assessment*, U.S. Env't Protection Agency (Feb. 26, 2021), https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/revised-methods-worker-risk-assessment.

71 *Enforcement: Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Federal Facilities*, *supra* note 64; 40 C.F.R. § 156.10(a).

72 40 C.F.R. §§ 157.20–157.36.

73 7 U.S.C. § 136q.

74 40 C.F.R. § 170.1.

75 40 C.F.R. § 170.112(c)(4).

76 40 C.F.R. § 170.120.

77 40 C.F.R. § 170.7(b).

78 PRIA Overview and History, U.S. Env't Protection Agency (July 16, 2019), https://www.epa.gov/pria-fees/pria-overview-and-history.

79 *Id.*

80 U.S. Gov't Accountability Office, GAO/RCED-00-40, Pesticides: Improvements Needed to Ensure the Safety of Farm workers and Their Children 4 (2000), https://www.gao.gov/assets/230/229013.pdf.

81 *Agricultural Worker Protection Standard (WPS), Pesticide Worker Safety*, U.S. Env't Protection Agency, https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps#:~:text=The%20WPS%20offers%20occupational%20protections,farmworkers%20and%20their%20family%20members.

82 *Id.*

83 7 U.S.C. § 136w-1.

84 *Agricultural Worker Protection Standard (WPS), Pesticide Worker Safety*, *supra* note 81.

85 40 C.F.R. § 170.103(b).

86 40 C.F.R. § 170.7

87 40 C.F.R. § 130.
88 *Agricultural Worker Protection Standard (WPS), Pesticide Worker Safety*, *supra* note 81.
89 *Id.*
90 *Id.*
91 *Id.*; U.S. Env't Protection Agency, How to Comply with the 2015 Revised Worker Protection Standard for Agricultural Pesticides: What Owners and Employers Need to Know 33 (2017), http://www.pesticideresources.org/wps/htc/htcmanual.pdf.
92 *Agricultural Worker Protection Standard (WPS), Pesticide Worker Safety*, *supra* note 81.
93 *Id.*
94 40 C.F.R. § 170.311(b).
95 U.S. Gov't Accountability Office, GAO-21-63, Farmworkers: Additional Information Needed to Better Protect Farmworkers from Pesticide Exposure (2021), https://www.gao.gov/assets/720/711833.pdf.
96 *Id.* at 11.
97 Jaya Brooks et. al., Off. of Inspector Gen., U.S. Env't Protection Agency, EPA Needs to Evaluate the Impact of the Revised Agricultural Worker Protection Standard on Pesticide Exposure Incidents, Rep. No. 18-9-0080, (Feb. 15, 2018), https://www.epa.gov/sites/production/files/2018-02/documents/_epaoig_20180215-18-p-0080.pdf.
98 *Wisconsin Pub. Intervenor v. Mortier,* 501 U.S. 597 (1991) (holding FIFRA does not preempt local governmental regulation of pesticide use).
99 Beyond Pesticides, A Beyond Pesticides Fact Sheet (2015), https://www.beyondpesticides.org/assets/media/documents/lawn/activist/documents/StatePreemption.pdf. To date, 43 states have laws effectively banning local governments from developing laws and regulations addressing pesticides, *Id.*
100 Press Release, Office of the Governor, Hawaii, Hawaii Becomes First in Nation to Enact Law Banning Pesticides Containing Chlorpyrifos (June 15, 2018), https://governor.hawaii.gov/newsroom/latest-news/office-of-the-governor-news-release-with-photos-hawaii-becomes-first-in-nation-to-enact-law-banning-pesticides-containing-chlorpyrifos/.
101 21 U.S.C. § 346a.
102 21 U.S.C. § 346a(b)(2)(A)(ii).
103 U.S. Env't Protection Agency, Chlorpyrifos: Proposed Interim Registration Review Decision 5, Docket No. EPA-HQ-OPP-2008-0850 (Dec. 2020), https://www.epa.gov/sites/production/files/2020-12/documents/chlorpyrifos_pid_signed_120320.pdf.
104 *Chlorpyrifos*, U.S. Env't Protection Agency (Dec. 04, 2020), https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos.
105 U.S. Env't Protection Agency, Petition to Revoke All Tolerances and Cancel all Registrations for the Pesticide Chlorpyrifos; Notice of Availability, 72 Fed. Reg. 58845 (2007), https://www.regulations.gov/document/EPA-HQ-OPP-2007-1005-0001.
106 *Chlorpyrifos*, U.S. Env't Protection Agency (Dec. 04, 2020), https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos.
107 Chlorpyrifos: Proposed Interim Registration Review Decision, *supra* note 123, at 5.
108 U.S. Env't Protection Agency, Chlorpyrifos Revised Human Health Risk Assessment, EPA-HQ-OPP-2015-0653-0454 (2016); *Revised Human Health Risk Assessment on Chlorpyrifos*, U.S. Envtl. Protection Agency, https://www.epa.gov/ingredients-used-pesticide-products/revised-human-health-risk-assessment-chlorpyrifos.
109 Chlorpyrifos Revised Human Health Risk Assessment, *supra* note 128, at 6.
110 Chlorpyrifos; Order Denying PANNA and NRDC's Petition to Revoke Tolerances, 82 Fed. Reg. 16581 (Jun. 5, 2017) 82 Fed. Reg. 16581 (Apr. 5, 2017); *Chlorpyrifos*, U.S. Envtl. Protection Agency (Dec. 04, 2020), https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos
111 Chlorpyrifos; Order Denying PANNA and NRDC's Petition to Revoke Tolerances, 82 Fed. Reg. 16581.
112 *League of United Latin American Citizens v. Andrew Wheeler*, No. 17-71636 (9th Cir. Apr. 19, 2019).
113 Chlorpyrifos; Final Order Denying Objections to March 2017 Petition Denial Order, 84 Fed. Reg 35555 (Jul. 24, 2019), https://www.federalregister.gov/documents/2019/07/24/2019-15649/chlorpyrifos-final-order-denying-objections-to-march-2017-petition-denial-order
114 Chlorpyrifos: Proposed Interim Registration Review Decision, *supra* note 123, at 5.
115 Attorneys General of New York, California, Hawaii, Maryland, Massachusetts, Oregon, Vermont, Washington, and Washington, D.C., Comments on Notice of Availability for Comment on EPA's Proposed Interim Registration Review Decision, Revised Draft Human Health Risk Assessment, and Ecological Risk Assessment for Chlorpyrifos (EPA–HQ–OPP–2008-0850) (Mar. 5, 2021).
116 *Id.*
117 Wash. SB 6518 § 1 (2020), http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Senate%20Passed%20Legislature/6518-S2.PL.pdf#page=1.
118 Press release, California Environmental Protection Agency, Department of Pesticide Regulation, Agreement Reached to End Sale of Chlorpyrifos in California by February 2020 (Oct. 09, 2019), https://www.cdpr.ca.gov/docs/pressrls/2019/100919.htm

119 Wash. SB 6518 § 1 (2020), http://lawfilesext.leg.wa.gov/biennium/2019-20/Pdf/Bills/Senate%20Passed%20Legislature/6518-S2.PL.pdf#page=1.; General Assembly Passes Maryland Chlorpyrifos Ban, WBOC (Mar. 18, 2020), https://www.wboc.com/story/41912070/general-assembly-passes-maryland-chlorpyrifos-ban.
120 Press release, California Environmental Protection Agency, Department of Pesticide Regulation, Agreement Reached to End Sale of Chlorpyrifos in California by February 2020 (Oct. 09, 2019), https://www.cdpr.ca.gov/docs/pressrls/2019/100919.htm
121 *Id.*
122 Oregon HB 4109 (2020), amending Or. Rev. Stat. § 634, https://olis.oregonlegislature.gov/liz/2020R1/Downloads/MeasureDocument/HB4109/Introduced.
123 News release, European Food Safety Authority, Chlorpyrifos: assessment identifies human health effects (Aug. 02, 2019), https://www.efsa.europa.eu/en/press/news/chlorpyrifos-assessment-identifies-human-health-effects.
124 Hawaii S.B. No. 3095 § 149A-31 (7)(a) (2018), https://www.capitol.hawaii.gov/session2018/bills/SB3095_CD1_.htm.
125 *Id.*
126 Nathan Donley, *The USA Lags Behind Other Agricultural Nations in Banning Harmful Pesticides*, 18 Envtl. Health 44 (2019), https://doi.org/10.1186/s12940-019-0488-0.
127 Farmworker Justice, Exposed and Ignored: How pesticides are endangering our nation's farmworkers 10 (2013), https://kresge.org/sites/default/files/Exposed-and-ignored-Farmworker-Justice-KF.pdf
128 Shafeesha Ali et al., Cal. Envtl. Protection Agency, Summary of Results From the California Pesticide Illness Surveillance Program 15 (2016), https://www.documentcloud.org/documents/6824281-2016summary-Complete.html#document/p18/a559105. Recent data on pesticide exposure in California is available here: *California Pesticide Illness Query* (CalPIQ), Cal. Dep't of Pesticide Reg., https://apps.cdpr.ca.gov/calpiq/
129 Dan Ford et al., Human Exposure to Pesticide Drift: Washington State Report 5 (2017), https://columbialegal.org/wp-content/uploads/2018/11/PesticideReportFINALWeb.pdf.
130 Geoffrey M. Calvert et al., *Acute Pesticide Poisoning Among Agricultural Workers in the United States, 1998-2005*, 51 Am. J. Industrial Med. 883 (2008); Geoffrey M. Calvert et al., *Acute Occupational Pesticide-related Illness and Injury – US 2007-2011*, 63 MMWR Morb. Mortal. Wkly. Rep. 11 (2016); Soo-Jeong Lee et al., *Acute Pesticide Illnesses Associated with Off-Target Pesticide Drift from Agricultural Applications- 11 states 1998-2006*, 119 Envtl. Health Persp. 1162 (2011).
131 *Pesticide Drift*, Nat'l Pesticide Info. Ctr., (Mar. 10, 2021), http://npic.orst.edu/reg/drift.html.
132 Goldman, Aspenson, Bhatnagar, & Martin, *supra* note 70.
133 Dan Ford et al, *supra* note 149, at 5.
134 Geoffrey M. Calvert et al., *Acute Pesticide Poisoning Among Agricultural Workers in the United States, 1998-2005*, 51 Am. J. Industrial Med. 883 (2008); Geoffrey M. Calvert et al., *Acute Occupational Pesticide-related Illness and Injury – US 2007-2011*, 63 MMWR Morb. Mortal. Wkly. Rep. 11 (2016); Soo-Jeong Lee et al., *supra* note 150.
135 Tiffany Dowell Lashmet& Hannes Zetzsche, 50-State Survey: Landowner Liability for Pesticide Drift 1 (2020), https://nationalaglawcenter.org/wp-content/uploads//assets/articles/LashmetZetzsche-spraydriftsurvey.pdf.
136 *Id.* at 1-2.
137 Complaint at *1, Garcia v. Pioneer Hi-Bred International, Inc., No. 3:20-cv-03322-SEM-TSH (Dist. Ill. Dec. 02, 2020), https://static1.squarespace.com/static/5b58f65a96d455e767cf70d4/t/5fc903b36dd88709bff303de/1607009206113/Pioneer_Hi-Bred_Complaint.pdf.
138 *What EPA is Doing to Reduce Pesticide Drift,* U.S. Envtl. Protection Agency (Sept. 02, 2016), https://www.epa.gov/reducing-pesticide-drift/what-epa-doing-reduce-pesticide-drift.
139 *EPA-Verified and Rated Drift Reduction Technologies*, U.S. Envtl. Protection Agency (July 17, 2019), https://www.epa.gov/reducing-pesticide-drift/epa-verified-and-rated-drift-reduction-technologies.
140 Pesticides; Agricultural Worker Protection Standard; Revision of the Application Exclusion Zone Requirements, 85 Fed. Reg. 68760 (Dec. 29, 2020), to be codified at 40 C.F.R. 170), https://www.federalregister.gov/documents/2020/10/30/2020-23411/pesticides-agricultural-worker-protection-standard-revision-of-the-application-exclusion-zone.
141 *Worker Protection Standard Application Exclusion Zone*, U.S. Envtl. Protection Agency (Apr. 05, 2021), https://www.epa.gov/pesticide-worker-safety/worker-protection-standard-application-exclusion-zone
142 *See e.g.*, Plaintiff's Proposed Order to Show Cause at *1, Rural & Migrant Ministry, Inc. v. U.S. Environmental Protection Agency, No. 1:20-cv-10645-LJL (S.D.N.Y. Dec. 18, 2020), https://earthjustice.org/sites/default/files/files/20cv10645_order_12.18.2020.pdf.
143 Complaint at *1, New York v. U.S. Environmental Protection Agency, No. 1:20-cv-10642 (S.D.N.Y. Dec. 16, 2020), https://www.courthousenews.com/wp-content/uploads/2020/12/ny_v_epa_complaint.pdf.
144 *Worker Protection Standard Application Exclusion Zone, supra* note 161.

145 40 C.F.R. § 170.30.
146 40 C.F.R. § 170.60.
147 Fla. Stat. § 487.031; Cal. Food & Agric. Code § 12972.
148 Cal. Code. Regs. tit. 3, § 6614.
149 *Id.*
150 Wash. Admin. Code § 16-228-1220 (5).
151 Or. Admin. R. no. 437-004-6406.
152 Margaret Reeves, Anne Katten, Martha Guzmán, Fields of Poison 2002: California Farmworkers and Pesticides 5 (2002), http://www.panna.org/sites/default/files/FieldsofPoison2002Eng.pdf.
153 Cal. Food & Agric. Code § 12996.5 (b).
154 *Hierarchy of Controls*, Ctrs. For Disease Control and Prevention (Jan. 13, 2015), https://www.cdc.gov/niosh/topics/hierarchy/default.html.
155 Goldman, Aspenson, Bhatnagar, & Martin, *supra* note 70.
156 Cal Food & Agric. Code § 12841.2.
157 *Id.*
158 Cal. Env't Protection Agency, Environmental Justice Program Update 2016-2018 8 (2019), https://calepa.ca.gov/wp-content/uploads/sites/6/2020/10/ej_report_2016-2018_a.pdf.
159 Joshua Yeager, *Ag Commissioner Finds 'No Proof of Violation' After Pesticide Incident*, Visalia Times Delta (Jun 25, 2019), https://www.visaliatimesdelta.com/story/news/local/visalia/2019/06/25/ag-commissioner-finds-no-proof-violation-after-pesticide-accident/1502518001/.
160 Wash. Rev. Code Ann. § 70.104.110.
161 Farmworker Justice, *supra* note 147, at 10; 40 C.F.R. § 156.10(a)(3). Under EPA's regulations, either EPA or the applicant can propose text in other languages if necessary to protect the public, *Id.*
162 Biologic and Econ. Analysis Division, Off. of Pesticide Programs, U.S. Envtl. Protection Agency, Economic Analysis of The Agricultural Worker Protection Standard Revisions vi (2019), https://www.regulations.gov/document/EPA-HQ-OPP-2011-0184-2522.
163 Off. of Pesticide Programs, U.S. Env't Protection Agency, Spanish Translation Guide for Pesticide Labeling (2019), https://www.epa.gov/sites/production/files/2019-10/documents/spanish-translation-guide-for-pesticide-labeling.10.10.19.pdf.
164 Biologic and Econ. Analysis Division, *supra* note 182.
165 7 U.S.C. § 136v(b).
166 Cal. Code Regs. tit. 3, § 6764.
167 *Id.* at §§ 6723, 6761.
168 *Id.*
169 *Id.*
170 Fla. Stat. Ann. § 487.1585 (2).
171 *Restricted Use Products (RUP) Report*, U.S. Envtl. Protection Agency (Nov. 30, 2020), https://www.epa.gov/pesticide-worker-safety/restricted-use-products-rup-report.
172 *Id.*
173 *Id.*
174 Cal. Code Regs. tit. 3, § 6420.
175 *Id.* at § 6432(a).
176 Cal. Dep't of Pesticide Reg., What You Need to Know About The Permit Process for Restricted Pesticides (2015), https://www.cdpr.ca.gov/docs/dept/factshts/permitting.pdf
177 Timothy Malloy et al., Governance on the Ground: Evaluating the Role of County Agricultural Commissioners in Reducing Toxic Pesticide Exposures (2019), https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/_CEN_EMM_PUB_Governance%20on%20the%20Ground.pdf
178 40 C.F.R. § 170.112.
179 40 C.F.R. § 170.112(a).
180 U.S. Env't Protection Agency, Worker Protection Standard Application Exclusion Zone Requirements: Updated Question and Answers (2018), https://www.epa.gov/sites/production/files/2018-02/documents/aez-qa-fact-sheet-final.pdf.
181 40 C.F.R. § 156.208(c).
182 40 C.F.R. § 156.208(b)(2).
183 40 C.F.R. § 170.409 (a)(1).
184 40 C.F.R. § 170.409 (b)(2).
185 Cal. Code Regs. tit. 3, § 6619(f).
186 *Id.* at § 6761(b).

187 *County Administrative Penalty Actions 1/1/17-12/30/19,* Cal. Dep't of Pesticide Reg., https://www.cdpr.ca.gov/docs/enforce/admnacts/cvlpnlty.htm
188 *Understanding General Pesticide Recordkeeping*, Agric. Marketing Serv., U.S. Dep't of Agric., https://www.ams.usda.gov/rules-regulations/pesticide-records/understanding.
189 *Id.*
190 *Id.*
191 *Id.*
192 Farmworker Justice, *supra* note 181, at 14.
193 Cal. Code Regs. tit. 3, § 6627.
194 P*esticide Use Reporting (PUR)*, Cal. Dep't of Pesticide Reg. (May 23, 2018), https://www.cdpr.ca.gov/docs/pur/purmain.htm.
195 *Id.*; *see also, Reports of Pesticide Sold in California,* Cal. Dep't of Pesticide Reg., https://www.cdpr.ca.gov/docs/mill/nopdsold.htm.
196 N.Y. Envtl. Conserv. Law § 33-1201.
197 Wash. Admin. Code § 296-307-14505 (1) (i).
198 Wash. Admin. Code § 296-307-14505 (4).
199 *Pesticide Illness & Injury,* The Nat'l Inst. For Occupational Safety & Health, Ctrs. For Disease Control & Prevention, (Mar. 27, 2017). The participating states are California, Florida, Illinois, Iowa, Louisiana, Michigan, Nebraska, North Carolina, New Mexico, New York, Oregon, Texas, and Washington and all receive federal funding to participate in the program. *Pesticide Illness & Injury Surveillance,* Nat'l Inst. For Occupational Safety & Health, Ctrs. for Disease Control & Prevention (Mar. 27, 2017), https://www.cdc.gov/niosh/topics/pesticides/overview.html.
200 Geoffrey M. Calvert et al., *Acute Occupational Pesticide-Related Illness and Injury – United States, 2007-2011,* 63 MMWR Morb. Mortal. Wkly. Rep. 11 (2016); http://dx.doi.org/10.15585/mmwr.mm6355a3external icon
201 *Id.*
202 *California Pesticide Illness Query (CalPIQ),* Cal. Dep't of Pesticide Reg., https://apps.cdpr.ca.gov/calpiq/
203 Calvert et al., *supra* note 220.
204 Goldman, Aspenson, Bhatnagar, & Martin, *supra* note 70.
205 Wash. Admin. Code § 296-307-006.
206 Wash. Admin. Code § 296-307-14810.
207 Wash. Rev. Code Ann. § 49.17.285.
208 *Id.*
209 *Id.*
210 Wash. Admin. Code § 296-307-14810.
211 *Id.* at § 296-307-14820.
212 *Id.* at § 296-307-14825.
213 *Id.* at § 296-307-14830.
214 *Id.* at § 296-307-14835.
215 *Id.* at § 296-307-14840.
216 Cal. Code Regs. tit. 3, § 6728 (a),(b).
217 *Id.* at § 6728 (c)(2)(A).
218 *Id.* at § 6728 (B).
219 *Id.* at § 6728 (C)(4).
220 *Id.* at § 6728 (d).
221 *Id.* at § 6728 (e).
222 *California Medical Supervision Program,* Cal. Off. of Envtl. Health Hazard Assessment, https://oehha.ca.gov/pesticides/california-medical-supervision-program.
223 *Id.*
224 The Center was established in conjunction with the Mary Imogene Bassett Hospital of Cooperstown, New York. *See* Bassett Healthcare Network New York Center for Agricultural Medicine and Health, https://www.nycamh.org/.
225 N.Y. Pub. Health Law § 3900.
226 *Id.*
227 N.Y. Pub. Health Law § 3903.
228 *Pesticide Reporting and Workers Compensation in Agriculture-Interactive Map,* Migrant Clinicians Network (2017), https://www.migrantclinician.org/issues/occupational-health/pesticides/reporting-illnesses.
229 *Pesticide Illness Surveillance Program,* Cal. Dep't of Pesticide Reg., https://www.cdpr.ca.gov/docs/whs/pisp.htm; Cal. Health & Safety Code § 105200.
230 Cal. Health & Safety Code § 105200.

231 *Pesticide Illness Surveillance Program, supra* note 249.
232 *Id.*
233 Cal. Health & Safety Code § 105200.
234 Cal. Labor Code § 6409.
235 Reeves, *supra* note 172, at 8 ("[M]ore than 85% of documented violations incurred no fine. Of fines issued, less than 5% exceeded $1,000; nearly half fell below $151.").
236 Wash. Rev. Code Ann. § 70.104.055.
237 *Id.* at § 70.104.057.
238 *Id.* at § 70.104.060.
239 La. Admin. Code tit. 7, § Pt XXIII, 3501.
240 *Pesticide Surveillance Program,* Off. Of Pub. Health, La. Dep't of Health and Hospitals, Summary of Pesticide Surveillance Data: Louisiana, 2006-2014 (2016), https://ldh.la.gov/assets/oph/Center-EH/envepi/Pest/Documents/Summary_Review_of_Pesticide_Surveillance_Data_6-3-2016.pdf
241 Union of Concerned Scientists, Farmworkers at Risk: The Growing Dangers of Pesticides and Heat 8 (2019), https://www.ucsusa.org/sites/default/files/2019-12/farmworkers-at-risk-report-2019-web.pdf.
242 Bryan Moy, Wildfires and Public Health: A View from the Front Lines, https://usclimateandhealthalliance.org/wildfires-public-health-view-front-lines/
243 Union of Concerned Scientists, *supra* note 261.
244 *Id.*
245 Laura Molinari, *Hazardous air quality threatens California farmworkers after devastating wildfires,* CBS News (Sept. 03, 2020), https://www.cbsnews.com/news/california-wildfires-farmworkers-labor-to-feed-america-despite-covid-19-heat-smoke-and-unsafe-air-quality/.
246 29 U.S.C. § 654(a)(1).
247 P*rotective Measures to Take at Each Risk Level,* Occupational Safety & Health Admin., https://www.osha.gov/heat/heat-index/protective-measures.
248 Brenda Jacklitsch, Kristin Musolin, Jung-Hyun Kimm Nat'l Inst. for Occupational Safety and Health, Occupational Exposure to Heat and Hot Environments 87 (2016), https://www.cdc.gov/niosh/docs/2016-106/
249 *Heat*, Occupational Safety & Health Admin., https://www.osha.gov/SLTC/heatstress/(last visited Dec. 23, 2020).
250 Cal. Code Regs. tit. 8, § 3395.
251 Ruxandra Guidi, *Farmworkers face illness and death in the fields,* High Country News (Aug. 20, 2018), https://www.hcn.org/issues/50.14/agriculture-californias-farmworkers-face-illness-and-death-in-the-fields.
252 Tapan B. Pathak et al., *Climate Change Trends and Impacts on California Agriculture: A Detailed Review,* 8 Agronomy 25 (2018), https://www.mdpi.com/2073-4395/8/3/25/htm.
253 Guidi, *supra* note 271.
254 Cal. Code Regs. tit. 8, § 3395.
255 *Id.*
256 *Id.*
257 Cal. Lab. Code § 226.7; *Piece-Rate Legislation (AB 1513) Fact Sheet,* Cal. Dep't of Industrial Relations (July 2016), https://www.dir.ca.gov/pieceratebackpayelection/AB_1513_FACT_SHEET.htm.
258 Cal. Lab. Code § 226.2; F*requently Asked Questions: Piece-Rate Compensation – Labor Code § 226.2 (AB 1512),* Cal. Dep't of Industrial Relations (Nov. 2017), https://www.dir.ca.gov/pieceratebackpayelection/AB_1513_FAQs.htm.
259 Division of Occupational Safety and Health, Heat Illness Prevention Special Emphasis Program 8 (2020) https://www.dir.ca.gov/DOSHPol/Heat-SEP.pdf.
260 *Id.* at 6.
261 United Farm Workers, Bautista Settlement Summary, https://ufw.org/wp-content/uploads/2017/04/BautistaSettlementSummary.pdf
262 *Id.*
263 Wash. Admin. Code § 296-307-09740.
264 *Id.* at § 296-307-09750.
265 *Id.* at § 296-307-09760.
266 *Id.* at § 296-307-10020.
267 William F. Terheyden, *Heat Illness Prevention Regulation for California Employers Made Permanent,* Littler Mendelson, Aug. 15, 2006, https://www.littler.com/heat-illness-prevention-regulation-california-employers-made-permanent.
268 Sasha Khokha, *Teen Farmworker's Heath Death Sparks Outcry,* NPR (June 6, 2018), https://www.npr.org/templates/story/story.php?storyId=91240378.
269 Complaint, Bautista v. California, No. BC418871 (Cal. Super. Ct. Jul. 30, 2009), https://www.ufw.org/pdf/UFWComplaint.pdf.

270 *Id.* at 2.
271 *Id.*
272 *Id.*
273 *Id.* at 3.
274 *Id.* at 4.
275 *Id.* at 4.
276 *Id.* at 4.
277 ***Migrant Health Program***, NAT'L CTR. FOR FARMWORKER HEALTH, INC., http://www.ncfh.org/migrant-health-centers.html
278 The only state the project team selected that did not have the highest number of farmworkers using this calculation was Louisiana, which was included because of some recent policy developments that were of interest to the research team.

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