

7.7 Farmworker Exposure to Pesticides

Climate change is increasingly influencing pesticide use patterns that may impact pesticide exposure among California's agricultural workforce. For example, rising temperatures and extreme weather events may directly increase pest pressures which can increase pesticide use, enhance volatilization and drift, and alter exposure pathways for workers in agricultural settings. Additionally, increased temperatures and humidity may create more favorable conditions for the spread of pathogens that cause plant diseases, possibly requiring increased use of pesticides, like antimicrobials and/or fungicides. Changing precipitation patterns can also impact the spread and severity of plant diseases and spread spores, which may increase the growth of soil-borne pathogens (possibly requiring increased use of soil fumigants and/or fungicides) (Elad and Pertot, 2014). California agricultural workers are vital to both the state's economy and the nation's food supply, yet they often work under challenging conditions and are disproportionately affected by widening social inequalities, extreme heat, wildfires, and limited safety net resources (Brown et al., 2022; Edgerly et al., 2024). Climate change impacts are adding to these overlapping stressors, compounding and influencing pesticide exposure risk, a longstanding occupational hazard to farmworker health.

Farmworkers may be exposed to pesticides directly via mixing, loading, and applying them to crops; through contact with treated plants, soil, dust, and equipment; and from drift from nearby fields. Farmworkers and their families who live in or near agricultural areas may also face residential exposure through proximity to treated fields, particularly during and after pesticide application (Castillo et al., 2021). Pesticide residues can adhere to farmworkers' clothing, shoes, and vehicles, resulting in potential exposure to these chemicals in the workers' homes. Children in these households face elevated exposure through hand-to-mouth behaviors, and their increased vulnerability due to their developing bodies (Hyland & Laribi, 2017). Chronic exposure to certain pesticides has been linked to cancer, diabetes, and neurological disorders (Shekhar et al., 2024). A study of California farmworkers conducted by University of California, Merced found that among the 85 participants who had applied pesticides in the past year and received pesticide safety training, only 21% reported being able to fully understand the training.



The study specifically recruited a predominantly Indigenous group to fill a gap in existing research on health risks faced by this population (Brown et al., 2022).

Climate change is likely to increase the risk of exposure to certain pesticides. Higher temperatures increase pesticide evaporation and volatilization, elevating the risk of drift and off-target exposure. Greater evaporation can also mean additional applications are needed for the pesticide to be effective (Delcour et al., 2015; Kannan, 2023).

Additionally, warmer conditions support more pest generations and expand species' ranges, contributing to more pesticide use across California (Jha et al., 2024; Pathak et al., 2021). Pesticide labels already account for some of these risks; some restrict applications when temperatures exceed 85°F to limit volatilization and protect crops. Recognizing the compounding burden of heat on workers required to wear protective equipment, California recently updated regulations to reduce thermal load on workers required to wear chemical-resistant suits (DPR, 2026). As temperatures continue to rise, conditions that elevate pesticide exposure risk, such as increased volatilization and heat-related barriers to protective equipment, may occur with greater frequency. This highlights the importance of regularly evaluating whether existing worker protections remain effective. Heat exposure is a concurrent and urgent hazard. Farmworkers have a 35-fold higher risk of extreme heat-related death than workers in other sectors (Gubernot et al., 2015). As temperatures rise, farmworkers face a compounding risk: the protective clothing and equipment required to reduce pesticide exposure including long sleeves, long pants, boots, hats, masks, and gloves, can increase heat stress under extreme conditions. Studies have identified heat as a barrier to wearing full protective gear among farmworkers working in high-temperature agricultural settings. California's occupational heat illness prevention standard requires agricultural employers to take protective measures for outdoor workers (Heinzerling et al., 2020). The specific implications of these requirements for workers managing both heat stress and pesticide exposure simultaneously are not yet well understood and warrant further research. Higher temperatures may also increase pesticide volatilization which may also increase inhalation exposure, with potential for greater absorption through the skin (Tudi et al., 2022). Extreme heat can also disrupt harvest timing; if crops are not harvested on



time or are left unharvested because outdoor work is unsafe, pest populations may increase, leading to greater pesticide use.

Despite increasing awareness that pesticides and extreme heat pose dual threats to farmworker health, observational data capturing these exposures remain limited. Similarities between heat stroke and pesticide exposure symptoms may further complicate reporting and treatment, compounded by limited access to medical care and gaps in physician screening for occupational exposures among farmworker populations (US EPA, 2025; Castillo et al., 2021). Improved data collection is urgently needed (e.g., including monitoring of airborne pesticide concentrations during extreme heat events, expanded biomonitoring among farmworkers, and stronger tracking of pesticide-related occupational illness) to support targeted interventions as climate conditions continue to change.

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