



Kids on the Frontline in California

The science is very clear: our food system's continued reliance on pesticides is harming the health of children in California's rural communities and beyond.

Children in agricultural communities are exposed to pesticides above and beyond the exposures all kids share from residues on food and applications in schools, parks, homes and gardens.

Pesticides used in agricultural fields rarely stay where they're applied, traveling on wind currents and contaminating water and soil. These chemicals are found in nearby homes, schools and playgrounds.

In recent years, the science linking pesticide exposure to childhood health harms has gotten consistently stronger — particularly for childhood cancers and neurodevelopmental harms. National health data show that these and other childhood diseases and disorders are on the rise.

Scientists have understood for years that children are particularly vulnerable to the harms of pesticides. From the brain to reproductive organs, the body's systems undergo rapid changes at various stages throughout childhood. Interference from pesticides at critical moments of development — even at very low levels — can derail the process in ways that lead to significant health harms that can last a lifetime.

For rural children, economic and social stressors can amplify the health risks of agricultural chemicals. And, in California, exposure to agricultural pesticides is an environmental justice issue, with rural children in low-income and Latino communities carrying a disproportionate burden of risk.

Children living in agricultural communities — in California and beyond — are bearing the burden of our ongoing reliance on pesticides. It's time to build a system of food and farming that protects and promotes the wellbeing of all children, while also supporting thriving rural economies and ensuring a safe and healthy food supply.

State agriculture in focus

Just over 25 million of California's 101 million total acres are dedicated to agriculture, with more than 77,000 farms in the state. The average farm size (327 acres) is well below the national average (435 acres). This is in part because of the emphasis on high-value "specialty crops" in California, which can be more lucrative on smaller farms than field crops. California has the largest agricultural economy in the country, generating more than \$46 billion in 2013.

In the state's three primary agricultural regions — the Central Valley, the Central Coast and southern California — rural communities are often in close proximity to agricultural production. This is particularly the case in the Central Coast region, where high-value specialty crops like strawberries, lettuce and broccoli are grown on relatively small plots of land, often very near schools or residential areas.

TABLE 1

Top synthetic pesticides used in California by volume, 2012

Pesticide	Type	Volume (million lbs)	Associated health effects
1,3-Dichloropropene	Fumigant	12.0	Acute toxicity, carcinogen
Chloropicrin	Fumigant	9.0	Acute toxicity*
Metam sodium	Fumigant	8.4	Carcinogen, reproductive or developmental toxicant
Metam potassium (potassium n-methyldithiocarbamate)	Fumigant	8.3	Acute toxicity, carcinogen, reproductive or developmental toxicant
Glyphosate, potassium salt	Herbicide	5.4	"Probable" carcinogen**
Glyphosate, isopropylene salt	Herbicide	5.0	"Probable" carcinogen**
Methyl bromide	Fumigant	3.9	Acute toxicity, reproductive or developmental toxicant
Propanil	Herbicide	2.2	Slight acute toxicity, suspected endocrine disruptor, possible carcinogen

*Source: California use reporting data and associated health effects accessed on Pesticideinfo.org and Pesticide Action Network's whatsonmyfood.org. *Though chloropicrin is not listed as a carcinogen by U.S. EPA, debate between California's Department of Pesticide Regulation (DPR) management and other California EPA scientists over the carcinogenicity of chloropicrin is discussed in PAN's report, "Air Monitoring in Watsonville, California, November 3-12, 2014." **The World Health Organization listed glyphosate as a probable carcinogen in 2015.*

Key crops & pesticides

California is the top U.S. producer of more than 80 crops. In terms of acreage, the top five crops in the "Golden State" are alfalfa, almonds, grapes, rice and wheat. The state also boasts more organic farms than any other state, but the vast majority of the state's agricultural lands are conventionally farmed.

California's pesticide use reporting system has been in place since 1990, providing county- and crop-level information for pesticide applications. These data provide a clear picture of pesticide usage and potential pesticide exposures, including trends and hotspots throughout the state. That said, there are still gaps and delays in reporting.

The top crops in terms of overall volume of pesticides applied are grapes (both wine and table), almonds and strawberries. In terms of intensity of application rate (pounds/acre), the top crops are raspberries, sweet potatoes and lemons.

A range of pesticides are applied to these high volume crops. The top chemicals applied in strawberry production, for example, include soil fumigants such as metam sodium and chloropicrin, the fungicide captan and the insecticide malathion. The top pesticides applied by volume for all crops are soil fumigants, which are most commonly applied to soil via injection or drip line before planting. The top counties in terms of overall volume of pesticides applied are the Central Valley counties of Fresno, Kern and Tulare.

Pesticide exposure & children's health



Children in agricultural communities can face exposure to pesticides in air, water and dust, at home, at school or on playgrounds. As listed in Table 1, seven of the top eight pesticides used in California are considered probable carcinogens by health officials; the eighth, the herbicide propanil,

is “possibly” carcinogenic as well. Impacts on neurodevelopment and respiratory health are also areas of concern.

Cancer

Overall, cancer incidence for California children under 20 years of age is the same as the national rate according to CDC data; for 18 of the state’s 58 counties, however, the rates are well above average, ranging from 18.2–23.0 cases per 100,000 (compared to 17.4 per 100,000 nationwide). Napa County had the highest incidence of childhood cancer in the state, and overall incidence for boys was higher than girls; 26.9 per 100,000 boys in Napa County, 18.5 per 100,000 boys statewide.

Neurodevelopmental impacts

Nationally, developmental disorders are rising. Some 15 percent of all U.S. children—one of every six—have one or more developmental disabilities. This number rose 17 percent between 1997–2008; for some disorders, the numbers are rising even more rapidly. According to 2012 estimates from the Centers for Disease Control, one of every 68 children is on the autism spectrum with more boys (1 in 42) than girls (1 in 189) diagnosed with Autism Spectrum Disorder (ASD).

A number of pesticides used in California agriculture have been linked to increased risk of effects on neurodevelopment. A compelling number of studies have reported adverse effects on cognitive development associated with exposure to various organophosphate (OP) insecticides. An association between prenatal exposure to OPs and a 7-point decrease in the IQs of children from the Salinas Valley has been reported.²

A 2014 UC Davis study of more than 1,600 children in California’s Central Valley found that women who lived within a mile of agricultural fields where organophosphate (OP) insecticides were applied during pregnancy had a 60 percent increased risk of having children with ASD. Living near fields where pyrethroids were applied also increased risk for both ASD and developmental disabilities.³

Respiratory effects

The rate of childhood asthma in California is well above the national average (15.4 vs. 8.6 percent). Ten of the 11 counties with rates over 20 percent are rural, agricultural counties; Merced had the highest rate, with 32.5 percent of the county’s children affected.

The effects of low-level exposure to pesticides on children’s respiratory health have not been as extensively studied, but two 2015 studies have reported associations between prenatal and/or childhood exposure to OP pesticides and respiratory effects in children from the Salinas Valley in two 2015 studies.⁴

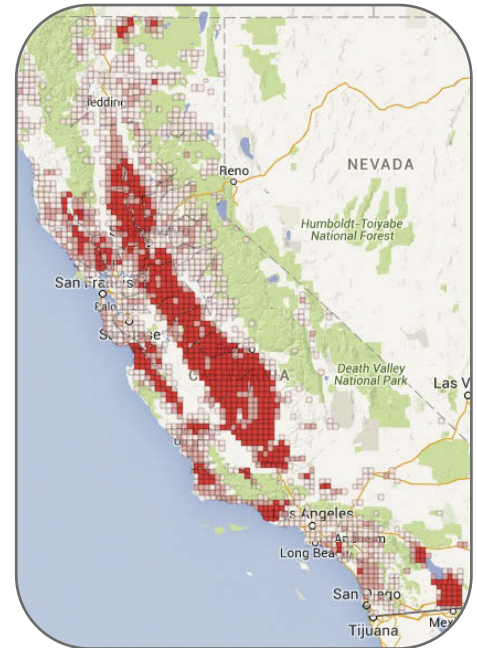
Latino schoolkids on the frontline

A 2014 report from California’s Department of Public Health found that hundreds of thousands of children in the state’s rural counties attend school within a quarter mile of fields where hazardous pesticides “of public health concern” are applied. The study found that Latino school children are 91 percent more likely— or nearly twice as likely — than white children to attend school near the heaviest use of the most hazardous pesticides.

Two of the ten pesticides most used within a quarter mile of schools are organophosphate (OP) pesticides. OPs have been linked in several studies to adverse effects on cognitive development, and two recent studies have reported OPs associated with effects on respiratory function. Half of the top ten pesticides are fumigants and all are either carcinogenic or have compelling evidence of carcinogenicity.¹

Cumulative risk & cumulative impacts

A recent report from scientists at the Sustainable Technology and Policy Program at University of California, Los Angeles (UCLA) examined the cumulative risks of exposure to more than one fumigant at a time. The UCLA report focused on synergistic effects, which is the interaction of two or more chemicals resulting in toxicity greater than their sum. Looking at three fumigants most commonly used within a quarter mile of schools in California — metam sodium, chloropicrin, and 1,3-dichloropropene — the researchers found that some California residents and farmworkers are regularly exposed to more than one of these fumigants at a time. They also found that these pesticides may interact to increase human health hazards, including cancer. Currently, state officials do not assess cumula-



Pesticide use patterns in California

Source: CA Dept. of Public Health.⁵

Necessary changes

It's time to build a system of food and farming that protects and promotes the wellbeing of our children — while also supporting thriving rural economies and ensuring a safe and healthy food supply. The following common-sense changes are both possible and long overdue.

- To better protect schoolchildren from pesticide exposure, we urge the California Department of Pesticide Regulation Director, Brian Leahy, to establish protective one-mile buffer zones around schools and daycare centers where use of pesticides of high concern for human health would be prohibited.
- Until robust buffer zones are enacted, we urge that schools be provided a week's advance notification when pesticides of high concern for human health are scheduled to be applied within a one mile radius of schools.
- We urge that CDFA, DPR, California EPA and other agencies work collaboratively to provide incentives to farmers in transforming these buffer zones into "agricultural innovation zones," adopting practices that reduce reliance on child-harming pesticides.

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1. California Department of Public Health. "Agricultural Pesticide Use near Public Schools in California." California Environmental Health Tracking Program, April 2014.
 2. Bouchard, Maryse F., et al. "Prenatal Exposure to Organophosphate Pesticides and IQ in 7-Year-Old Children." *Environmental Health Perspectives*, 119, no. 8 (April 21, 2011): 1189–95. doi:10.1289/ehp.1003185.
 3. Shelton, Janie F., et al. "Neurodevelopmental Disorders and Prenatal Residential Proximity to Agricultural Pesticides: The CHARGE Study." *Environmental Health Perspectives*, June 23, 2014. doi:10.1289/ehp.1307044.
 4. Raanan, Rachel, et al. "Decreased Lung Function in 7-Year-Old Children with Early-Life Organophosphate Exposure." *Thorax*, December 3, 2015, thoraxjnl-2014-206622. doi:10.1136/thoraxjnl-2014-206622. California Department of Public Health. "Agricultural Pesticide Use near Public Schools in California." California Environmental Health Tracking Program, April 2014.
 5. California Department of Public Health. "Pesticide Mapping Tool: Agricultural Pesticide Use in California," April 13, 2016. <http://cehtp.org/page/pesticides>
 6. Zaunbrecher, Virginia, et al. "Exposure and Interaction: The Potential Health Impacts of Using Multiple Pesticides." University of California, Los Angeles: UCLA Sustainable Technology & Policy Program, 2016.

For a full list of relevant resources, see the report *Kids on the Frontline* at www.panna.org/KoF.

