

Agricultural Pesticide Use Near Public Schools in California Frequently Asked Questions

Generally, what is this report about?

This report by the California Department of Public Health's California Environmental Health Tracking Program (CEHTP), entitled *Agricultural Pesticide Use Near Public Schools in California*, examines the use of pesticides of public health concern within ¼ mile of public schools for the 15 counties with the most agricultural pesticide use in California during 2010. Funding was provided by the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Program.

Agriculture is a vital industry in California, producing nearly half of all fruits and vegetables grown in the United States. However, agricultural production frequently relies on the application of pesticides that, under some circumstances, can be hazardous to human health. The report increases our understanding of the potential for children to be exposed to agricultural pesticides in the school setting by describing patterns of agricultural pesticide use near California's schools.

The report is not intended to determine actual pesticide exposure or predict health effects. The study's methodology combined pesticide use data from the California Department of Pesticide Regulation with data on the location of agricultural fields provided by California Agricultural Commissioners and the California Department of Water Resources to estimate the location of each pesticide application on a wider scale than previously possible. This information was combined with school property location data. The methodology does not reflect local pesticide use restrictions that may have been in place in 2010.

Study results indicate that pesticide use near schools varied among counties. Most schools did not have any pesticides of public health concern applied nearby, while a small percentage of schools had many pounds of pesticides of public health concern applied nearby. Results should not be assumed to be representative of pesticide use patterns during other years.

The study methodology and data can be used to identify locations or pesticides that may warrant further assessment; assist in school siting decisions; target research, prevention efforts, and resource allocation; and inform policy decisions.

What new information did this study provide?

This is the first study to characterize pesticide use near public schools in the 15 counties with the most agricultural pesticide use in California. By using the best available data at the time of the study, we were able to estimate the amount and types of pesticides applied within ¼ mile of a school for over 2,500 public schools in 2010. The report provides a summary of these results.

This study was performed by the CEHTP, a collaboration of the California Department of Public Health and the Public Health Institute, funded by the Centers for Disease Control and Prevention. Extensive data were provided by the county agricultural commissioners, the California Department of Pesticide Regulation, and the California Department of Education.

What does this study tell us about pesticide use near schools?

For this study we assessed 2,511 public schools, attended by over 1.4 million students in the 15 counties with the highest total reported agricultural pesticide use in 2010. We linked geographic school data to over 2.3 million pesticide use records.

An estimated 538,912 pounds of pesticides of public health concern (144 distinct pesticides) were applied within 1/4 mile of public schools in the 15 counties in 2010. Some of these pesticides may persist in the environment for a period of time after application.

We found:

- Most schools (64%) did not have any pesticides of public health concern applied nearby
- Among the remaining 36% with some pesticide use, a small percentage of schools (5%) (45 schools attended by over 35,000 students) had amounts of pesticides applied within ¼ mile ranging from 2,635 to 28,979 lbs.
- Pesticide use near schools varied among counties
- Hispanic children were more likely to attend schools near the highest use of pesticides of public health concern
- There was no overall difference in household income levels between children attending schools with the highest pesticide use nearby, compared to schools with no use nearby

This study assessed the presence of a potential health hazard (i.e., agricultural pesticides) near a vulnerable population. This information can help guide policies and other efforts to minimize pesticide exposures of schoolchildren and design future public health research. However, the presence of pesticide use near a school does not mean that exposure has occurred or that the health of any child or adult has been impacted.

Do the findings tell us anything about pesticide exposure or health outcomes?

No. This study did not measure whether any children were actually exposed to pesticides at school. Exposure to a pesticide means that the pesticide entered the body through breathing, contact with the skin or eyes, or ingestion

(eating or drinking). Different factors can increase or decrease the chances of exposure. Examples include when the pesticide was used, where the pesticide was applied relative to the school's location, how the pesticide was applied, the weather conditions (such as wind and rain) during application, and how long it takes for the pesticide to break down in the environment.

While this study can suggest locations where the risk of exposure may be greater, actual exposure can only be determined by direct measurement of pesticides or their breakdown products in the body or inferred from physical symptoms or laboratory tests.

What pesticides were used the most near schools?

The ten pesticides of public health concern most commonly used near schools (as measured by pounds applied) are listed in Table 1. Chemicals designated by the California Department of Pesticide Regulation as restricted materials require special permits and are eligible for additional regulations by county agricultural commissioners. Of the top ten pesticides applied near schools, six have been designated as restricted materials.

Table 1. Top 10 pesticide active ingredients, by pounds applied within ¼ mile of schools in the 15 counties assessed, 2010

	Name	Total pounds applied	Restricted material
1	Chloropicrin	150,285	Yes
2	1,3-Dichloropropene	136,241	Yes
3	Methyl bromide	85,112	Yes
4	Metam-sodium	37,920	Yes
5	Potassium n-methyldithiocarbamate	19,141	Yes
6	Captan	8,790	No
7	Pendimethalin	8,198	No
8	Chlorpyrifos	7,769	No
9	Paraquat dichloride	6,543	Yes
10	Malathion	6,322	No

Which counties had the most pesticide use near schools?

We examined the use of pesticides near schools for six different categories of pesticides, as well as for all pesticides. In general, Monterey and Ventura had the highest percentage and number of schools in the top quartile of pesticide use and also the highest percentage and number of students attending schools in the top quartile of use. The results are summarized in Table 2.

Table 2. Counties with the most pesticides of public health concern used near public schools, 2010

	Top county by number of schools in the top quartile of use*	Top county by percentage of its schools in the top quartile of use*	Top county by number of students attending schools in the top quartile of use*	Top county by percentage of its students attending schools in the top quartile of use*
Carcinogens	Stanislaus (28)	Monterey (16.8%)	Ventura (17,023)	Monterey (19.5%)
Reproductive and Developmental Toxicants	Ventura (28)	Monterey (19.0%)	Ventura (20,433)	Monterey (22.1%)
Cholinesterase Inhibitors	Monterey (34)	Monterey (24.8%)	Monterey (21,079)	Monterey (28.5%)
Toxic Air Contaminants	Ventura (29)	Merced (14.6%)	Ventura (20,268)	Monterey (18.0%)
Fumigants	Ventura (19)	Monterey (10.9%)	Ventura (17,311)	Monterey (16.4%)
Priority Pesticides for Monitoring and Assessment	Fresno (35)	Monterey (19.0%)	Ventura (21,193)	Monterey (24.7%)
All pesticides (all categories)	Fresno (39)	Monterey (21.2%)	Ventura (21,193)	Monterey (25.1%)

* Quartiles (top 25% of schools) based on pounds of pesticides (within that category) applied within ¼ mile. Quartiles were calculated after excluding schools with no pesticides (within that category) applied nearby.

What did you learn about the students who attend schools near pesticide use?

We found that Hispanic children represented 54% of all public school students in the 15 counties assessed, 61% of the students in schools with any pesticide use nearby, and 68% of the students in schools with the most pesticide use nearby (top quarter of schools with any use).

Overall, there was no difference in household income levels between students who attended schools with no pesticide use nearby, with any pesticide use nearby, or with the most use nearby (top quarter of schools with any use). However, we did see differences within individual counties.

Where did the data used in this report come from?

Multiple data sources were used to assess pesticide use near schools. The California Department of Pesticide Regulation's Pesticide Use Reporting (PUR) program provided pesticide use data, which is reported by Public Land Survey Section (sections are square-mile areas). County agricultural commissioners provided data on field locations for their county, as available at the time of the study. The Department of Water Resources provided parcel and land-use data. The California Department of Education provided data on school location and enrollment. CEHTP used Geographic Information Systems (GIS) and satellite imagery to improve the accuracy and resolution of school boundary data.

How did you estimate agricultural pesticide use near schools?

The location of school property boundaries was determined using GIS and satellite imagery. Once school boundaries were confirmed, a $\frac{1}{4}$ mile distance was drawn around each school boundary.

Then, records of pesticide applications (from the PUR) were linked with other data, including field locations and crop information, to better pinpoint where the pesticides were applied.

This pesticide application data was then overlaid with the school boundary data to determine where pesticide applications likely occurred within $\frac{1}{4}$ mile of a school. After calculating how much of the field overlapped the area located within $\frac{1}{4}$ mile of the school boundary, area-weighted apportionment was used to estimate how much of a specific pesticide was used in the area of overlap for any given pesticide application. For example, if 10% of a field overlapped with the $\frac{1}{4}$ -mile area around a school boundary, it was then estimated that 10% of the pesticides applied on that field was used within $\frac{1}{4}$ mile of the school. Using this information, the types and amounts of pesticides used within $\frac{1}{4}$ mile were determined.

When apportioning pesticide use based on the area of overlap between the field and the $\frac{1}{4}$ mile area around the school, the study methodology assumes that pesticides were applied evenly across the entire field. There may be situations in which pesticides were unevenly or selectively applied, which could result in an overestimation or underestimation of the actual pounds applied within $\frac{1}{4}$ mile of a school. For example, if part of a field fell within $\frac{1}{4}$ mile of a school and if pesticides were not used on that portion of the field (e.g., in compliance with an existing regulation), this methodology would still assign some pesticide use to that portion.

Eighty percent (80%) of PUR records were successfully matched to field-location data provided by county agricultural commissioners. The remaining PUR records were matched to fields based on Department of Water Resources land-use surveys (19% of PUR records). Only 1% of records could not be geographically enhanced beyond the square mile Public Land Survey Sections already reported in the PUR.

Did this study consider county regulations in place at the time of the pesticide application?

No. This study did not account for any county-specific pesticide regulations that were in place during 2010. Counties are allowed to regulate the use of “restricted use” pesticides (i.e., those designated by CDPR as restricted materials) by application method, distance from a school, and time of application.

Currently, all 15 counties in the study have some restrictions regarding the use of pesticides near schools. However, information is not readily available about regulations in place at the time of each application during the study period. Many current regulations are based on both distance and time (e.g., no application within ¼ mile of a school while school is in session or when children are present). In these cases, applications do not have to maintain the specified distance from the school, as long as they occur outside of the restricted time period. The regulations vary by county. To learn more about local pesticide regulations and other processes that may be in place to protect children’s health, contact your county agricultural commissioner.

This study was not limited to pesticides used during school hours. Prohibiting applications of pesticides during school hours or when children are present is very important for protecting children from acute pesticide exposure. However, (1) school properties are often used when school is not in session; (2) there is the potential for pesticides applied at night or in the early morning to drift onto school properties; and (3) some pesticides with high chemical persistence may linger in the environment, allowing for low-level exposures to occur days or weeks after application, regardless of application methods.

Would consideration of county regulations have impacted project results?

Without the availability of more detailed data, it is difficult to assess how consideration of county regulations would impact project results for a report of this scale.

A more precise assessment of the amount of pesticides (measured in pounds applied) used near schools would require precise information about (1) the exact county restrictions in place at the time of each application, (2) whether the pesticide applied was a restricted material, (3) the application method used for

each pesticide application, (4) the starting and ending time of each application, and (5) the times in which each school was in session or when children were present over the course of the study period.

Why was 1/4 mile selected as the distance for determining pesticide use near schools?

The 1/4-mile distance was chosen for several reasons. The primary reason was that 1/4 mile is a common distance used in pesticide permitting regulations near schools. In the absence of knowing the application method or weather conditions in the immediate area at the time of application, 1/4 mile is a reasonable estimate of the distance that pesticides may “drift” (the offsite movement of pesticides away from their application target). According to CDPR, although the goal of all pesticide applications is that pesticides reach their target and remain there, scientists recognize that “almost every pesticide application produces some amount of drift,” even though it may not be harmful or illegal.¹

How does the volume of fumigants and where they are most often used affect the overall study findings?

Fumigants are used in much higher amounts than other pesticides on a pounds-per-acre basis, so this can influence patterns of use seen in study results. Fumigants were not removed from other categories to which they belonged (e.g., carcinogens), as that would provide an incomplete and inaccurate picture of the use patterns for those pesticide categories.

Do the findings reflect the impact of new fumigant regulations from 2012?

No. The most recent pesticide use data available at the time of this study were for pesticide use that occurred in 2010. The pesticide use data were provided by the California Department of Pesticide Regulation. New safety provisions for some fumigants went into effect December 2012. These are important measures for the protection of workers and nearby community members. This study focuses on pesticides applied in 2010, and it would be speculative to apply current restrictions to past data.

¹ California Department of Pesticide Regulation. *Community Guide to Recognizing and Reporting Pesticide Problems: Pesticide Drift*. April 2008. Online at: www.cdpr.ca.gov/docs/dept/comguide/drift_excerpt.pdf, last accessed April 14, 2014.

Can this study be used to assess effectiveness or compliance with existing regulations?

No. This study is not intended to assess the effectiveness of pesticide regulations existing in 2010 nor the extent to which those regulations affected potential exposure.

Can this methodology be used to inform planning decisions or other assessment efforts?

Yes. This methodology could be tailored to assess pesticide use at any single or group of locations, including potential development sites near other land uses, such as parks, hospitals, or elderly residences. The methodology could also be used to determine locations for further site-specific assessments and monitoring. This could include biomonitoring, air monitoring, or more detailed study of pesticide use that considers factors such as county regulations, application methods, and weather conditions.

Where can I get more information?

To learn more about the study and to download the full report, go to www.cehtp.org/p/pesticides_and_schools.

Please see the resources sheet, available at www.cehtp.org/p/pesticides_and_schools_resources, for more information about pesticide exposure, safety, regulation, and other related topics.

For questions about the study or media inquiries, please contact the CDPH Office of Public Affairs at CDPHPressOPA@cdph.ca.gov or by calling (916) 440-7259.