

Pest Management and Pesticide Use

in California Child Care Centers



Prepared for **THE CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION**
by **THE CENTER FOR CHILDREN'S ENVIRONMENTAL HEALTH RESEARCH,**
UC BERKELEY SCHOOL OF PUBLIC HEALTH

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Abbreviations

Cal/EPA:	California Environmental Protection Agency
CCLD:	Community Care Licensing Division of the California Department of Social Services
CCEHR:	Center for Children’s Environmental Health Research
DPR:	California Department of Pesticide Regulation
HSA:	Healthy Schools Act
IPM:	Integrated Pest Management
GIS:	Geographic Information Science
U.S. EPA:	United States Environmental Protection Agency

Executive Summary

“The mission of the Department of Pesticide Regulation (DPR) is to protect human health and the environment by regulating pesticide sales and use and by fostering reduced-risk pest management.”¹ Under the California Food and Agricultural Code section 13183, DPR is directed to promote the voluntary adoption of integrated pest management (IPM) programs for school sites and child care facilities and to facilitate adoption of these practices by creating educational and informational materials on IPM for the child care setting.²

Background

In 2008, the Center for Children’s Environmental Health Research (CCEHR), in collaboration with the California Environmental Protection Agency’s Department of Pesticide Regulation (DPR) and the California Childcare Health Program, conducted a study to identify pest problems and pest management practices in California’s licensed child care centers. This study was prompted by the implementation of AB 2865, which extended the Healthy Schools Act of 2000 (HSA) to private

child care centers in California. (Publicly funded centers such as state-funded preschools and Head Start programs were already covered by the HSA in 2000.) (See Appendix 1 for the full text of the law.) Briefly, the HSA requires that private child care centers keep records about pesticide use, notify parents and staff before pesticide are applied, and post signs in areas where pesticides will or have been applied. The HSA regulates the use of “non-exempt” pesticide application methods in school settings; that is, broadcast methods such as spray or



fogger applications. The use of pesticides contained in baits, gels, or traps are exempt from the law. The extension of the HSA to private child care centers (AB 2865), which went into effect in January of 2007, mandates that DPR collect information about pesticide use and pest management in child care centers in order to develop programs to support the adoption of voluntary integrated pest management (IPM) programs in California child care centers. The HSA defines IPM as a strategy to prevent and treat pest problems using a combination of monitoring and record keeping, establishing pest thresholds, and employing non-chemical control methods. Chemical controls that pose the least possible hazard to human health and the environment are used only after careful monitoring and when non-chemical methods have failed.

The five major purposes of the study were to:

- assess the prevalence of specific pest problems in child care centers;
- identify methods currently used to mitigate pest problems in centers;
- determine how and by whom pest management decisions are made in centers;
- assess compliance of child care centers with key requirements of the HSA; and
- assess awareness of IPM in child care centers and identify preferred education strategies.

The information obtained from this study will help DPR identify the educational needs of child care center staffs in order to comply with the HSA and improve pest management practices in child care centers in California.

Methods

A survey of California child care centers was undertaken using a questionnaire (Appendix 2). Keeping in mind the time constraints of child care providers and the survey's reliance on voluntary

participation, the length of the questionnaire was deliberately limited to promote participation. The questionnaire was available in two languages, English and Spanish, and in paper and electronic formats. The California Department of Social Services Community Care Licensing Division (CCLD) maintains a database of all licensed California child care centers (approximately 12,000). A paper questionnaire was mailed to 2,000 randomly selected child care centers from that database in November 2008. For each questionnaire that was returned by the U.S. Postal Service due to erroneous or incomplete address information (n=105), an additional child care center was randomly selected to be added to the sample and was mailed a questionnaire to maintain the overall sample size at 2,000 child care centers. Respondents were instructed to fill out the paper questionnaire and return it by mail in the envelope provided or to complete the questionnaire online. Duplicate questionnaires were mailed to non-responding centers to improve the response rate, and a telephone and email campaign was conducted to encourage participation.

A total of 637 centers completed the questionnaire, for a response rate of 32%. The response rates were slightly higher in the San Francisco Bay Area, North Coastal Region, and Sierra (38%) versus the Central Valley and Southern California (30%). Reported pest problems and pesticide use were slightly higher in the low response rate counties. Overall, there were some differences in demographic characteristics between the neighborhoods of responding versus non-responding centers, but characteristics likely to be associated with pest infestations and pesticide use, such as poverty and building type, were similar, suggesting minimal bias due to these factors.

Results

Ninety percent of child care centers reported at least one problem with indoor and/or outdoor



pests. More than half of centers (55%) reported using pesticides to control pests, with 47% reporting the use of sprays or foggers that can leave residues on surfaces and in the air and potentially expose children and staff. These methods were used most often for ants, spiders, and cockroaches. In contrast, fewer centers (8%) reported using only exempt pesticide application methods such as baits. Exempt methods were used most commonly for rodents and cockroaches.

The frequency of pesticide applications varied widely. Twenty-nine percent reported that pesticide applications occurred once or a few times a year, suggesting spot applications in response to specific problems. As many as one in five centers were applying pesticides on a weekly or monthly basis. These types of scheduled applications are not consistent with an IPM program and may not be necessary if no specific pests have been identified.

Child care centers reported that many different people, and in some cases multiple people, were involved in making pest management decisions. Most (87%) child care centers reported the child

care director or providers as having pest management decision-making responsibilities. However, 24% of surveyed programs reported that custodial staff also made decisions about pest management indoors and/or outdoors, and nearly a third of the programs involved pest management professionals when making these decisions. These overlapping responsibilities indicate that IPM education and outreach should be targeted to include all individuals responsible for pest management in child care centers.

Similarly, many different people were responsible for applying pesticides. Most programs reported using pest management companies for pesticide applications (69%), although other individuals were also responsible for applying pesticides: 25% identified child care staff, 25% identified custodial staff, 9% identified property owners, and 12% identified “other” individuals as applicators. Thus, in many facilities, more than one person may be applying pesticides. Moreover, some of these people may not be directly affiliated with the child care center, such as property owners or, in the case

of centers located in a larger building or complex, custodial staff maintaining the larger facility.

Among the multiple reasons cited by respondents for pesticide use in their child care centers, more than half (55%) considered pesticides more effective than other pest-control methods. Pesticide use was also considered safer (30%), more convenient (20%), and a strategy to keep the child care environment clean (14%).

The reasons provided for decisions to use pesticides suggest that education is needed to ensure that pesticides are considered to be only one of several pest management strategies, and, according to IPM principles, a choice of last resort.

Fewer than half of the surveyed child care centers using non-exempt pesticide application methods (e.g., sprays and foggers) reported that they always notified parents and posted warning signs when pesticides are applied in their centers. This notification is required by the HSA. Notably, 26% of programs using sprays or foggers reported that they never notify parents of pesticide applications, and an additional 12% said that parental notifi-

cation was not applicable, when, in fact, it was applicable. Similarly, 35% of programs using sprays or foggers never posted warning signs when pesticides were used, and an additional 14% reported that the requirement to post warning signs was not applicable, when, in fact, it was applicable.

The HSA also requires child care centers to maintain records of all pesticides used at the facility for four years and to make the records available to the public upon request. Among the centers reporting non-exempt pesticide use, a majority (57%) reported keeping records; conversely, 27% reported no record keeping, and an additional 4% reported that the requirement to keep written records was not applicable when, in fact, it was applicable.

Finally, only 25% of respondents reported knowing what the term IPM meant, although 68% of centers reported the use of at least one IPM-based strategy, such as eliminating food sources or sealing cracks. Child care centers received information from multiple sources about pest management. Pest management companies were the most common source of pest management information to respondents, with 63% citing this source; other common



sources were government agencies, property owners, the Internet, and product packaging. Websites, email, and pamphlets were the most popular formats to receive future IPM education, with 40-57% of respondents preferring these methods.

In summary, our results indicate that a variety of personnel in child care centers, and in some cases multiple personnel, are involved in making decisions about pest management methods and in applying pesticides, with a large role reserved for directors and child care staff as well as pest management professionals. The reasons provided for decisions to use pesticides suggest that education is needed to ensure that pesticides are considered one of several pest management strategies, and, under the requirements of the HSA and IPM principles, a choice of last resort.

Child care centers caring for our youngest children, those most vulnerable to the health effects of exposure to pesticide residues, need immediate and sustained help in order to learn about and adopt safer pest management practices as they are outlined in the principles of IPM. They also need education about the requirements of the HSA as they apply to child care centers. Readministration of this survey in future years will provide data to assess the effectiveness of educational approaches and child care centers' degree of compliance with the requirements of the HSA.

Recommendations

Disseminate education and resource materials to child care providers to explain how prevention can be integrated with existing maintenance activities and facility operations so that IPM is not regarded as a separate, new, and expensive undertaking. DPR is currently supporting the development of extensive training materials on the HSA and IPM for child care providers. These resources should be broadly disseminated through the DPR website, child care health consultants, continuing education courses, community college programs,



First 5 Commissions, Resource and Referral Agencies, the Department of Social Services Community Care Licensing Division, and other health education organizations.

Develop and disseminate resources for parents.

DPR and the UC Statewide IPM Program have developed extensive resources on the risks of pesticides to young children and IPM. Information about the risks of pesticides, IPM, the HSA, and parental rights to be notified when pesticides are applied in their child's child care center should be disseminated to parents. Child care providers and agencies providing services to families with small children are natural venues to disseminate this information.

Develop and disseminate resources for pest management companies. DPR supervises continuing education for licensed pest management professionals. Continuing education training resources for pest management professionals that describe how to implement an IPM program in child care settings and the requirements of the HSA for child care need to be developed and disseminated.

Conduct additional research to determine pesticide exposure in child care settings in different regions of the state.

Chapter 1: Introduction

Pesticide Use and Exposure in Child Care Facilities

Young children spend up to 90% of their time indoors, mostly at home.³ However, many infants and young children spend as much as 10 hours per day, 5 days per week, in child care and preschools.^{4,5} In 2008, 57% of U.S. children under age 6 had all parents in the labor force, requiring some kind of non-parental care.⁶ In California, there are approximately one million child care slots in licensed facilities, with 693,267 children in centers, which by definition are not in homes, and 379,676 children in family child care homes.⁷ California has the largest number of licensed child care facilities in the United States⁸ at 50,000.⁹ By the time they enter kindergarten, over 50% of all California children have attended some type of licensed child care facility.¹⁰ Additionally, 146,000 staff work in California's licensed child care facilities.¹⁰

Recent studies have documented the presence of pesticides and other hazardous contaminants in child care centers.^{3,5,11} The First National Environmental Health Survey of Child Care Centers, conducted by the U.S. Department of Housing and Urban Development, U.S. Environmental Protection Agency, and the Consumer Product Safety Commission, assessed children's exposures to lead, allergens, and pesticides in licensed U.S. child care centers.¹² Sixty-three percent reported pesticide applications, and an estimated 75% of these centers reported at least one pesticide application in the last year.⁵ Pyrethroid and organophosphate pesticides were detected in surface and soil samples in 80% of the centers in the study. In a pilot study of child care centers in North Carolina, researchers detected organophosphate and pyrethroid pesticides in air and dust and suggested that exposures in child care environments may constitute a significant portion of total child exposures.¹³ The



Table 1-1. Pest Management Practices¹

Pest Management Method	Potential for Human Exposure	IPM Compatible	Regulated under the HSA
Sprayed pesticides	Higher	No	Yes
Pest foggers	Higher	No	Yes
Bait or poison traps	Lower	Yes	No
Poison pellets or powders	Lower, if contained	Yes, if contained	No if contained
Sticky fly strip or mouse/rat trap	None	Yes	No
Removed food sources	None	Yes	No
Cleaned the area	None	Yes	No
Sealed cracks and openings	None	Yes	No
Installed screens or other barriers	None	Yes	No
Fixed leaks	None	Yes	No
Wasp traps	None	Yes	No
Mowed/watered the lawn	None	Yes	No
¹ Exposure potential based on scientific literature. ³² IPM compatibility based on legislative definition. Regulation status based on HSA.			

fact that residues from numerous pesticides have been identified in child care settings suggests that pesticide use is widespread.

Several factors increase both children's exposures and their vulnerability to these exposures compared to adults. Children spend more time on the floor, where residues can transfer to skin and be absorbed.¹⁴ Young children also frequently place their hands and objects in their mouths, resulting in non-dietary ingestion of pesticides.^{15,16} They are also less developed immunologically, physiologically, and neurologically, and, therefore, may be more susceptible to the adverse effects of chemicals and toxins.¹⁵⁻¹⁷ There is increasing evidence of adverse effects of pesticides on young children, particularly on neurodevelopment. For example, research in California and elsewhere suggests exposure to organophosphate pesticides may be associated with abnormal reflexes in neonates and with poorer mental development and neurobehavior in young children,¹⁸⁻²⁰ and pyrethroids have been associated with asthma.²¹

Research in residential environments clearly demonstrates that the implementation of IPM strategies

reduces pest infestation, pesticide use, and human exposures to pesticides.³¹

Given the large number of very young children potentially being exposed to pesticides, the California legislature enacted AB 2865 in 2007, which extended the Healthy Schools Act of 2000 to all California child care centers. (See Appendix I for enabling legislation.)

The Healthy Schools Act and California Child Care

The Healthy Schools Act (HSA), passed in 2000, was enacted in response to parental concern about the health effects of pesticide use on children and school staff in California's public schools (see Appendix I for text of HSA). HSA regulates the use of "non-exempt" pesticide application methods in school settings; that is, broadcast methods such as sprayers or foggers. The use of pesticides contained in baits, gels, or traps are exempt from the law. The law also established the right of California parents and school staff to know when pesticides are used in California public schools, mandated using least



toxic pest management methods in schools as state policy, and required the California Department of Pesticide Regulation (DPR) to collect pesticide use information from schools and to promote and facilitate the voluntary adoption of IPM in public schools. The HSA defines IPM as a means of preventing and suppressing pest problems using a combination of monitoring and record keeping, establishing pest thresholds, and employing non-chemical methods to manage pests. Chemical controls that pose the least possible hazard to human health and the environment are used only with careful monitoring, when non-chemical treatments have failed, and when pre-established thresholds have been exceeded. Table 1-1 identifies common pest management practices in commercial buildings and whether the method is consistent with IPM principles. The HSA requires schools and child care centers to do the following:

- **Annual notification.** Each school/center must provide to parents and staff a written notification of all pesticide products that are expected to be used during the upcoming year.
- **Maintain a registry.** Each school/child care center must provide a way for parents and staff to sign up to be notified ahead of time each time a pesticide is used in the center.
- **Post warning signs.** Every school/child care center must put up warning signs around each area where pesticides will be applied. These signs should be in place 24 hours before and stay in place 72 hours after pesticides are used. These signs should be large enough that they prevent any adult from accidentally entering areas where pesticides have been used.
- **Keep records.** Every school/child care center must keep records of what pesticides have been used at the facility site for the past four years, and the records must be available to anyone who asks to see them.
- **Prohibit entirely the use of certain pesticides.** Some pesticides are never allowed to be used in school/ child care center settings. For a list of these pesticides, see AB 405 List of Pesticide Products Prohibited from Use in Schools ([http:// apps.cdpr.ca.gov/schoolipm/school_ipm_law/prohibited_prods.pdf](http://apps.cdpr.ca.gov/schoolipm/school_ipm_law/prohibited_prods.pdf)).

In addition, the HSA mandates that:

- If the owners of a property where a school/ child care center is located use pesticides, they must provide written notice to the school at least 120 hours before they apply a non-exempt pesticide.
- The California DPR must provide information to schools and child care centers on effective, least-hazardous pest management practices.

The HSA catalyzed a series of initiatives by DPR to document pest management and pesticide-use practices in California's K-12 schools before and after the law's implementation and to increase the use of IPM practices in California public schools. Surveys of California K-12 schools were conducted in 2001, when existing practices at the time the HSA went into effect were documented, and again in 2002, 2004, and 2007. The 2001 survey, which preceded initiation of DPR's training effort, served as a baseline for subsequent surveys.²²

DPR's 2002 survey of K-12 schools was intended to profile schools' pest management practices and measure their progress toward adoption of IPM. Analysis of the 2002 survey results revealed that, two years after the HSA's passage, school districts that had developed IPM programs generally used more ecologically sound pest management tactics than districts that did not, and most of those said that IPM had improved their pest management effectiveness.²³ Additional surveys have con-

firmed continued success in meeting the objectives of the HSA.²⁴

While California's public schools were making progress toward more ecologically sound pest management practices as a result of the HSA, child care facilities remained unregulated and many continued to use traditional pest management practices. In response, the California legislature passed AB 2865 in 2007, extending the Healthy Schools Act to all child care centers. (The legislation excludes licensed family child care homes and unlicensed, exempt providers.) This extension of the Healthy Schools Act ensures that parents and staff in child care centers are notified of pesticide use, and it encourages the promotion of safer pest prevention practices in child care centers. Licensed pest management businesses must also report yearly to DPR on pesticide applications they make to public and private child care facilities. Finally, the bill requires DPR to collect information on pest management and pesticide use practices in child care centers, as DPR has already done for K-12 schools.

In 2008, DPR contracted with the Center for Children's Environmental Health Research (CCEHR) at the University of California, Berkeley to conduct a study to identify pest problems and pest management practices in California's licensed child care centers. A survey was undertaken of California licensed child care centers to assist DPR in identifying existing practices and the extent of pesticide use in child care centers in order to determine the pest management education needed by child care providers. Based on these survey findings, DPR intends to build upon existing educational programs to facilitate the adoption of effective, least-toxic pest management practices at school sites and child care centers.



Chapter 2: Methods

Study Population

Child care centers in California are regulated by the Community Care Licensing Division (CCLD) of the California Department of Social Services.²⁵ CCLD defines “child care center” as “any child care facility of any capacity, other than a family child care home...in which less than 24-hour per day nonmedical care and supervision are provided to children in a group setting.” Child care centers serve children who are of pre-kindergarten age. Infant child care centers care for children under the age of two. For this report, the term “child care center” refers to any licensed facility serving children below kindergarten age.

CCLD maintains a database, updated weekly, of all licensed child care centers in California. Contact information, addresses, license type (infant

versus child), and facility size were downloaded for 12,506 licensed child care centers on June 18, 2008. A random sample of 2,000 centers (16%) was selected using a randomized selection algorithm (Stata Corp Version 10). Each selected center was sent a survey questionnaire in the mail. For each questionnaire that was returned by the U.S. Postal Service due to erroneous or incomplete address information (n=105), an additional child care center was randomly selected to be added to the sample and was mailed a questionnaire to maintain the overall sample size at 2,000 child care centers. A final sample of 637 completed questionnaires was attained. (See data collection and data management section, below.)

Questionnaire

CCEHR worked with the DPR Growing Up Green project staff and the California Childcare



Health Program²⁶ to develop and finalize the survey instrument. This questionnaire was initially modeled on questionnaires developed by DPR for implementation of the HSA. Also examined were questionnaires developed by other groups such as GreenCare for Children.²⁷ Keeping in mind the time constraints of child care providers and the survey's reliance on voluntary participation, the length of the questionnaire was deliberately limited to promote participation. The questionnaire was available in two languages, English and Spanish, and in paper and electronic formats. The electronic version of the questionnaire was web-based, hosted online by a private company (surveymonkey.com), and contained identical questions to the paper questionnaire, allowing respondents to complete the questionnaire entirely online if they preferred. See Appendix II for a copy of the questionnaire.

The questionnaire collected information on five key areas: prevalence of specific pest problems, methods used to mitigate pest problems, how and by whom pest management decisions are made, frequency of pesticide use, and compliance with two key requirements of the HSA: parental notification and the posting of signs in areas where pesticides are applied. The questions addressed both indoor and outdoor pest problems and management practices at the child care centers. Specific pest management information collected included use of any pesticides, use of non-exempt application methods such as sprays and foggers, use of exempt application methods such as pesticide bait stations (e.g., roach motels), and use of alternative pest control methods such as cleaning, pest exclusion, eliminating food sources, sealing cracks, installing barriers, and building and lawn maintenance. Additionally, the questionnaire asked if the respondent knew of IPM and about how they would prefer to receive educational information about pest management in child care centers.

For questions asking about personnel who make decisions about pest management and who apply pesticides, respondents were asked to check "all that apply," i.e., more than one response was possible. This option allowed assessment of circumstances where more than one person made pest management decisions or applied pesticides, such as at a child care center where a landlord may hire a pest management professional to maintain the grounds while facility staff may use hand-held sprays for indoor spot applications.

Finally, respondents were given the opportunity to provide their center's contact information. They were also assured that all information would be kept confidential.

Data Collection and Management

Questionnaires were addressed to the attention of the child care center contact name listed in the CCLD database "or Current Director." Respondents were instructed to return the completed questionnaire in the stamped, self-addressed reply envelope provided with the questionnaire. Each questionnaire was assigned a unique code number, printed on the questionnaire, linking the questionnaire responses with its center's CCLD database record. Respondents were also informed on the questionnaire that the survey could be completed using the web-based version of the questionnaire. When completing the web-based version of the questionnaire, respondents were asked to enter their center's unique code number printed on the questionnaire sent by mail. This allowed for the identification of centers that responded to the questionnaire online and for the exclusion of web-based responses from centers that were not part of the random sample.

Responses to completed questionnaires were data-entered and merged with data from the questionnaires completed online. A final dataset was created in a format suitable for analysis with Stata,

a statistical analysis software package (Stata Corp Version 10). Because there were cases of respondents leaving some questions unanswered, the total number of responses to a particular question was taken as the denominator when calculating response frequencies unless indicated otherwise.

Follow Up to Improve Response Rate

In March 2009, duplicate questionnaires were mailed by CCEHR to the 1,502 centers that did not reply to the first mailing. In April 2009, a telephone and email campaign was undertaken to encourage the participation of still unresponsive child care centers. Phone calls were placed to contacts at 140 centers, and follow-up emails were sent to contacts at 368 centers. Thirty-nine additional centers received both a phone call and an email, for a total of 547 follow-up contacts. These contacts yielded approximately 60 additional completed questionnaires, or about 11% of those directly contacted. A follow-up reminder to fill out the questionnaire was also sent out in the quarterly electronic newsletter, Child Care Updates, by CCLD, and in an electronic newsletter to California's Child Care Health Consultants produced by the California Childcare Health Program.

Table 2-1. Questionnaire Administration

	Number
Questionnaires mailed	2,105
Returned as undeliverable	105
Questionnaires assumed to be delivered	2,000
Final sample size (response rate%)	637 (32%)
Questionnaires completed by mail	584
Questionnaires completed online	53

Table 2-1 summarizes the steps in the questionnaire administration and follow up. A final sample size of 637 child care centers was achieved, which represented a response rate of 32%. However, two of the returned questionnaires were returned with the center code removed and, thus, could not be linked to the information in the CCLD database including the centers' addresses. These two completed questionnaires were included in the sample for analysis of responses, but in the demographic analysis (Table 2-2) they were considered non-responders as, without center-specific identifying information, they could not be linked to geographic statistical units.

Table 2-2. Neighborhood and Demographic Characteristics of Responding and Non-responding Centers

Characteristic	Non-Responders (N=1365)	Responders (N=635)
# Child Care Slots	66,481	34,071
% Population Urban ¹	95.7%	95.7%
% Population Rural ¹	4.3%	4.3%
% Population White ethnicity ^{1,2}	56.9%	61.6%
% Population Black ethnicity ¹	7.4%	6.7%
% Population Asian ethnicity ¹	11.0%	11.2%
% Population Hispanic ^{1,3}	35.2%	28.1%
% Population Below Poverty Level ¹	15.4%	13.4%
% Population Living in 2-unit structures or larger ¹	33.3%	33.7%
Median Income Level ^{1,3}	\$42,500	\$45,893

¹Source: 2000 US Census data summarized at block group or block level.

²p-value<0.05; ³p-value<0.01.

Geographic Distribution of Sample and Response Rates

Because the 2,000 targeted child care centers were randomly selected, the sample is assumed to be representative of the 12,506 licensed centers in California. However, response rates varied slightly by region, with somewhat higher rates for the San Francisco Bay Area, Sierra, and North Coast (38-39%) and somewhat lower rates for the Central Valley and Southern California (29-30%). See Appendix III for response rates by region. Reported pest problems and pesticide use were slightly higher in the low response rate counties. Because the survey was designed to assess statewide trends, results for individual counties or regions are not presented.

Comparison of Neighborhood and Demographic Characteristics Between Responding vs. Non-responding Centers

Limited demographic information was available from the CCLD database to assess whether responding and non-responding centers differed from each other, which would bias the sample data.

While adjacent neighborhood characteristics may not necessarily reflect the demographics of individual child care centers, this information, available through the 2000 U.S. Census, was the only available data to examine differences between responding and non-responding centers. Publicly available population-based Geographic Information Science (GIS) datasets and supporting software was used to link the street address of each center in the sample to its 2000 U.S. Census tract, block group, and block.

The mean capacity of responding facilities (54 children) was slightly higher compared to non-responding centers (49 children) ($p\text{-value} < 0.01$). Neighborhood characteristics that were evaluated included rural versus urban location, ethnicity,

poverty level, and the proportion of people living in buildings with two or more housing units (an indicator of multi-unit apartment dwelling, a factor associated with rodent and cockroach infestations)²⁸. There were no differences in the proportion of centers located in urban or rural areas (Table 2-2). The neighborhoods of responding centers had slightly more White residents ($p\text{-value} < 0.05$) and slightly fewer Hispanic residents ($p\text{-value} < 0.01$) than neighborhoods of non-responding centers. Neighborhoods of responding centers also had slightly higher median income ($p\text{-value} < 0.01$). Overall, these comparisons suggest some differences in demographic characteristics in the neighborhoods where responding and non-responding centers were located. Even where statistically significant, the differences were small.

These results suggest that, based on neighborhood characteristics, there may be some bias in the sample. However, the proportions of factors known to be associated with pest infestations and pesticide use in buildings, such as poverty and building type, did not differ among responders and non-responders.²⁸ Overall, this assessment suggests there were no major differences that would grossly bias the sample.



Chapter 3: Results

Prevalence of Pest Problems

Ninety percent of all surveyed child care centers reported having at least one indoor or outdoor pest problem (Table 3-1). Among centers responding to questions about the presence of indoor pests, ants were reported by 53% of centers, while spiders, head lice, mice or rats, cockroaches, and flies were each reported to be indoor problems by 23-34% of programs (Figure 3-1).

Outdoor pest problems that were most frequently reported were ants (50%) and stinging insects (i.e., bees/wasps) (49%). Spiders, weeds, squirrels or gophers, and mice or rats were also common reported outdoor pest problems, with 44%, 36%, 22%, and 19% of centers, respectively, reporting these as outdoor pest problems (Figure 3-2).

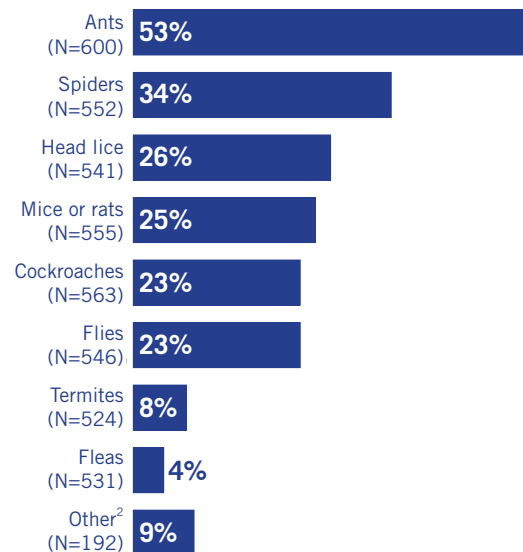
While most of these pests are a nuisance, cockroaches, mice, and rats can be the cause of poten-

Table 3-1. Prevalence of Pest Problems in Child Care Centers

Location	Prevalence ¹
Indoor	78%
Outdoor	80%
Indoor or Outdoor	90%
¹ Prevalence is among all surveyed child care centers (N=637)	

tially serious health problems, including the spread of infectious diseases and exacerbation of asthma. That one in five centers report a problem with cockroaches and one in four report problems with mice or rats indicates that education about IPM for these pests should be a priority. Similarly, because venom from bee or wasp stings can result in anaphylactic shock in vulnerable children, the high prevalence (49%) of these outdoor insects indicates a high priority for guidance on IPM control methods.

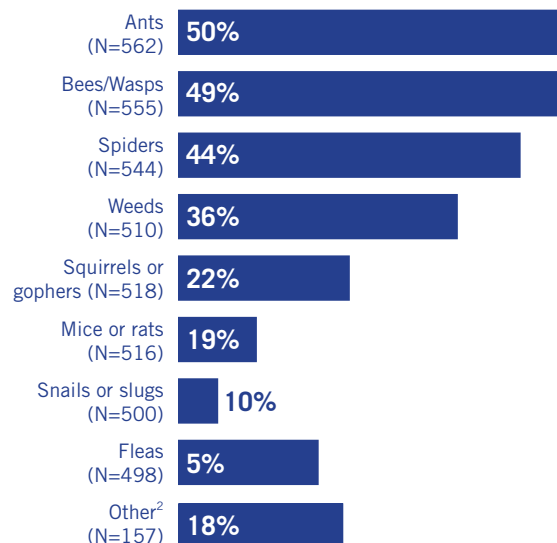
Figure 3-1. Prevalence of Indoor Pest Problems by Pest¹



¹N indicates the number of centers responding to respective question.

²“Other” included fruit flies, mosquitoes, wasps.

Figure 3-2. Prevalence of Outdoor Pest Problems by Pest¹



¹N indicates the number of centers responding to respective question.

²“Other” responses included cats, caterpillars, cockroaches, moles, mosquitoes, rabbits, raccoons, roaches, and skunks.

Table 3-2. Proportion of Centers Using Pest Control Method (N=637)

Location	Used Any Pesticide	Used Any Non-Exempt Pesticide Application Methods	Used Exempt Pesticide Application Methods	Used at Least One IPM Method
Indoor	39%	30%	9%	61%
Outdoor	43%	39%	4%	38%
Indoor or outdoor	55%	47%	8% ¹	68%

¹Excludes all facilities that used non-exempt pesticide application methods indoors or outdoors.

Head lice were also a common nuisance in child care centers. The recommended treatment is usually direct topical application of pyrethroid pesticides to the child, and multiple applications of these insecticides are often required, which increases exposure. For this reason, head lice should also be a priority when developing IPM materials for child care.

Pest Management Practices

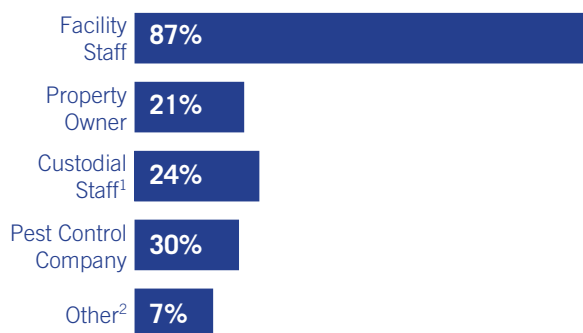
Among all child care centers sampled, more than half (55%) reported using pesticides to control a pest problem within the last year, with 47% reporting the use of non-exempt pesticide application methods, including spraying or use of foggers, that can leave residues on surfaces and in the air and potentially expose children and staff (Table 3-2).

Thirty percent of centers reported using these non-exempt pesticide application methods indoors, where the risk of contamination and human exposure is highest; 39% reported using non-exempt pesticide application methods outdoors. Fewer programs (8%) reported using only exempt pesticide application methods, with 9% using these methods indoors and 4% outdoors. Sixty-eight percent used at least one IPM method, with 61% and 38% using an IPM method indoors and outdoors, respectively. See Appendix IV for additional details on pest-specific management practices.

The frequency of pesticide applications varied widely. Two centers reported weekly applications, while 20% reported monthly applications. Twenty-nine percent reported that pesticide applications



Figure 3-3. Who Makes Decisions About Pest Management Needs?



¹“Custodial Staff” included groundskeeper.

²“Other” included corporate, church, or district administrative staff, board members.

N=628

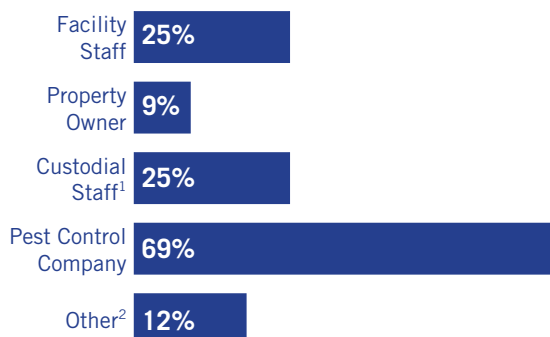
occurred once or a few times a year, suggesting spot applications in response to specific problems. Overall, it appears that as many as one in five centers were applying pesticides on a regular basis. These types of scheduled applications are not consistent with an IPM program and may not be necessary if no specific pests have been identified.

Pest Management Decision-making¹

Child care centers reported that there was a variety of people in different job categories, and, in some cases, multiple people, involved in making pest management decisions. For example, most (87%) child care centers reported that child care directors or staff make pest management decisions (Figure 3-3). However, 24% of surveyed programs also reported that custodial staff made decisions about pest management, and nearly a third of programs involved pest management companies in decision-

¹As noted in the methods, for questions asking about personnel who make decisions about pest management and who applies pesticides, respondents were asked to check “all that apply,” i.e., more than one response was possible. This option allowed assessment of circumstances where more than one person made pest management and application decisions, such as a child care center where a landlord may hire a pest management professional for outdoor maintenance while staff may use hand-held sprays for spot applications indoors. Thus, aggregate responses for these categories may sum to greater than 100%.

Figure 3-4. Who Applies Pesticides?



¹“Custodial Staff” included maintenance and facilities staff, groundskeeper, landscaper, and gardener.

²“Other” included corporate, church, or district administrative staff, board members, and pastor.

N=508

making, suggesting that there is overlap of decision-making responsibilities at child care centers.

Similarly, a variety of people were responsible for applying pesticides. If pesticides are used, 69% of centers assigned responsibility for applying pesticides to pest management companies, although many other people were also identified as having responsibility for applying pesticides: 25% identified child care staff, 9% identified property owners, 25% identified custodial staff, and 12% identified “other” individuals (Figure 3-4). Thus, in many facilities, more than one person may be applying pesticides, and some of these people may not be directly affiliated with the child care center, such as property

Table 3-3. Why Are Pesticides Used for Pests?

Less Expensive	8%
More Effective	55%
More Convenient	20%
Keeps Things Clean	14%
Safer	30%
Required	21%
Didn't Know What Else To Do	6%
Other ¹	28%

¹“Other” reasons given included it was decided or recommended by the pest management company and to be proactive.

N=435



owners or, in the case of centers located in a larger building or complex, custodial staff maintaining the larger facility.

Among the multiple reasons provided for pesticide use in child care centers, more than half (55%) of the respondents considered pesticides more effective than other pest-control methods (Table 3-3). Pesticides were also considered to be safer (30%), more convenient (20%), and a strategy to keep their environment clean (14%). Twenty-one percent of the centers indicated that they believed they were required to use pesticides. (The survey instrument did not capture who required use.) Other reasons given included a recommendation or decision by a pest management company or to be proactive.

Table 3-4. Proportion Of Centers Using Non-Exempt Pesticide Application Methods in Compliance with HSA Notification Requirements (N=300)

	Notify Parents?	Post Warning Signs?
Always	47%	42%
Sometimes	13%	7%
Never	26%	35%
Not Applicable	12%	14%
Did Not Respond	2%	2%

Overall, the results indicate that a variety of personnel, and in some cases multiple personnel, are involved in making decisions about pest management methods and in applying pesticides, with a large role reserved for facility staff and pest management companies. The reasons provided for decisions to use pesticides suggest that education is needed to ensure that pesticides are considered one of several pest management strategies, and, under the requirements of the HSA and IPM principles, a choice of last resort.

Compliance with Healthy Schools Act Requirements

Fewer than half of the surveyed child care centers using non-exempt pesticide application methods reported that they always notified parents (47%) and posted warning signs (42%) when pesticides are applied in their centers, which is required by the HSA (Table 3-4). Notably, 26% of programs using non-exempt pesticide application methods reported that they never notify parents of pesti-

Table 3-5. Proportion of Centers Using Pesticides and Keeping Written Records

	Used Any Pesticide (n=345)	Used Any Non-Exempt Application Method (n=295)	Used Only Exempt Application Methods (n=50)
Yes	52%	57%	22%
No	26%	27%	18%
Don't Know	12%	12%	8%
Not Applicable	11%	4%	52%



cide applications, and an additional 12% said that parental notification was not applicable, when, in fact, it was applicable (Table 3-4). Similarly, 35% of programs using non-exempt pesticide application methods never posted warning signs when pesticides were used, and an additional 14% reported that the requirement to post warning signs was not applicable, when, in fact, it was applicable.

The HSA also requires child care centers to maintain records of all non-exempt pesticide use at the facility for four years and to make the records available to the public upon request. Among the centers reporting non-exempt pesticide use, a majority (57%) kept written records, while 27% reported no record keeping, and 4% responded that the question was not applicable, contrary to the requirements of the HSA (Table 3-5). Finally, 12% of the centers reported that landlords never or only sometimes provide advance notice of pesticide applications. The HSA requires landlords to provide at least 120 hours' notice before pesticides are applied.

Overall, these practices suggest that both children and staff in these centers are possibly being exposed to potentially high risk pesticides. These findings are in contrast to reasonably good compliance of K-12 schools with the HSA²³ and argue for the need to provide education on both the requirements of the HSA and on IPM practices to the child care community.

IPM Knowledge and Preferred Education Sources

Seventy-five percent of respondents indicated they had never heard of IPM. Pest management companies were the most common source of pest management information to respondents, with 63% citing this source (Table 3-6). Other common information sources included government agencies, the Internet, product labels, and property owners (17-19%). Websites, email, and pamphlets were the most popular formats for future IPM education, with 40-57% of respondents preferring these venues. One in five respondents indicated interest in a DVD, and only 11% were interested in seminars.

Table 3-6. Current Sources of Pest Management Information¹

Pest management company	63%
Government agencies	19%
The Internet	18%
Property owner	18%
Product packaging	17%
Other ²	14%
Training sessions	9%
Other child care providers	8%
Associations of child care providers	7%
Books/magazines	7%
Advertisements	6%
Friends	5%

¹Question permitted response to "all that apply", thus aggregates sum to greater than 100%. See footnote, above.

²"Other" responses included maintenance/facilities department, parents/staff, corporate/district/church personnel, board members, landscaper/gardener, safety office, insurance company. N=597

Chapter 4: Recommendations

These survey results indicate widespread pest problems and pesticide use in licensed child care centers in California and underscore the need for a strong emphasis on prevention of pest infestations. Currently, it appears that many centers are not following guidelines established by the Healthy Schools Act, and there is a large unmet need in the child care community for education about pest management, the risks of pesticide use to young children, and integrated pest management strategies.

Our recommendations follow:

Develop and disseminate education and resource materials for child care providers.

DPR has developed extensive resources to promote pest prevention and IPM strategies in school environments and is supporting new efforts to develop training materials for child care centers. Developing and disseminating IPM training resources to child care centers is challenging. In contrast to K-12 schools, which have a teacher turnover rate of 11% and higher staff education requirements, child care centers have fewer staff members with post-secondary degrees and staff turnover is 22-40% annually.^{29,30} For many child care center staff, English is not a first language. Fifty-four percent of licensed child care centers and thirty-eight percent of licensed family child care homes have Spanish-speaking staff.⁹ Therefore, educational materials for child care providers must meet the needs of a very diverse, and changing, audience. In addition, dissemination of educational materials is challenging because child care providers often receive little or no continuing education in health and safety, and the system for providing such education is fragmented and hard for many to access.

DPR's support for the development and dissemination of IPM resource materials that are specific to child care providers will help to ensure understanding and implementation of the Healthy Schools Act in this population. Model policies and forms that can be easily adopted by individual centers will make it easier for already overburdened child care staff to implement an IPM program in their center. Materials for parents are another way to support the implementation of IPM in child care. As DPR has emphasized, a key to success is to explain how prevention can be integrated with existing maintenance activities and facility operations so that IPM is not regarded as a separate, new, and expensive undertaking. Specific recommendations include:

- ✓ DPR is supporting the development of a curriculum on IPM and environmental health that can be used to train current providers. This curriculum could also be used by community college instructors teaching health and safety courses to future child care providers, by Resource and Referral Agencies at the county level throughout the state, and by instructors of the health and safety classes required by the Community Care Licensing Division. Minimally, child care providers should be made aware of the requirements of the HSA for child care centers.
- ✓ Training on IPM and the requirements of the HSA should also be provided to CCLD licensing analysts to ensure awareness of HSA requirements.

- ✓ A DVD is needed that provides visual examples of IPM practices specific to child care settings, including exclusion, monitoring, and safe application of least-toxic products when pest thresholds are exceeded. A DVD can be used to train child care staff in individual programs as well as in classes and online.
- ✓ Educational materials should be translated into Spanish and other appropriate languages and disseminated in a variety of ways via:
 - The DPR website
 - Email listserves
 - Child Care Health Consultants
 - Continuing education courses
 - Community college programs
 - Child Care Resource and Referral Agencies
 - County First 5 Commissions
 - The California Childcare Health Program
 - Electronic newsletters such as CCLD's Child Care Updates
- ✓ DPR is supporting the development of model policies to help child care centers adopt IPM programs. These model policies should include:
 - IPM/pesticide policies for child care providers/programs
 - IPM contracts between child care providers and pest management companies
 - Agreements with landlords that ensure compliance with HSA requirements

Develop resources for parents.

- ✓ Extensive resources within DPR and the University of California Statewide IPM program address pesticide hazards, the HSA, and IPM. DPR should consolidate this information and develop resources for parents of children in child care. These materials can be disseminated by child care providers and agencies providing services to families with young children. Resources for parents should:
 - Address the hazards of pesticides to young children.
 - Describe the HSA and parental rights to be notified when pesticides are applied in their child's child care center.
 - Describe how to adopt an IPM program at home.

Develop resources and guidelines for pesticide management professionals.

- ✓ DPR supervises continuing education requirements for licensed pest management professionals

(PMPs). Continuing education courses for PMPs that specifically address the requirements and recommendations of the HSA and how to implement an IPM program in child care settings are needed..

Conduct additional research.

- ✓ Given the extent of the use of non-exempt pesticide application methods reported by survey respondents, there is a need for exposure studies to determine pesticide levels in child care settings in different regions of the state.
- ✓ There is increasing concern about the possible adverse health effects of cleaners and sanitizers, particularly those that are aerosolized, in child care settings. Disinfectants and sanitizers are not often recognized as pesticides; however, the reduction of microbes is a common concern in child care and these agents are used routinely, and are even required by law, and they are pesticides. Research on least-toxic agents that are effective at reducing microorganisms to acceptable levels in order to reduce the spread of infectious disease in young children is an urgent need.

Acknowledgements

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Appendix I: AB 2865

Assembly Bill No. 2865

CHAPTER 865

An act to amend Sections 17609, 17610, 17610.1, and 17612 of the Education Code, to amend Sections 13181, 13183, 13185, and 13186 of the Food and Agricultural Code, to amend Section 1596.845 of, and to add Section 1596.794 to the Health and Safety Code, relating to school safety.

[Approved by Governor September 30, 2006. Filed with
Secretary of State September 30, 2006.]

LEGISLATIVE COUNSEL'S DIGEST

AB 2865, Torrico. School safety.

Existing law, the Healthy Schools Act of 2000 requires that the preferred method of managing pests at schoolsites be to use effective, least toxic pest management practices and requires schoolsites to maintain records of all pesticides used at the schoolsite for a period of 4 years. Existing law requires schools to provide all staff and parents or guardians of pupils enrolled at a school written notification of, among other things, expected pesticide use at that site.

This bill would expand the definition of “schoolsites” as used in these provisions to also include private child day care facilities, as specified. This bill would also require property owners to notify tenants who operate a child day care facility of their pest management practices and to provide a specified notice prior to the application of pesticides. This bill would also require child day care facilities to inform contractors hired to apply pesticide at the schoolsite that the facility must comply with the act and require persons hired to apply pesticides at a child day care facility to provide specified information to the facility. This bill would require the Department of Pesticide Regulation to promote and facilitate the adoption of integrated pest management programs at child day care facilities, as specified. This bill would make other conforming changes.

The people of the State of California do enact as follows:

SECTION 1. Section 17609 of the Education Code is amended to read:
17609. The definitions set forth in this section govern the construction of this article unless the context clearly requires otherwise:

(a) “Antimicrobial” means those pesticides defined by the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sec. 136(mm)).

(b) “Crack and crevice treatment” means the application of small quantities of a pesticide consistent with labeling instructions in a building

into openings such as those commonly found at expansion joints, between levels of construction and between equipment and floors.

(c) “Emergency conditions” means any circumstances in which the school designee or a property owner of a property where a privately operated child day care facility is located, or the property owner’s agent, deems that the immediate use of a pesticide is necessary to protect the health and safety of pupils, staff, or other persons, or the schoolsite.

(d) “School designee” means the individual identified by a schoolsite or school district to carry out the requirements of this article at the schoolsite.

(e) “Schoolsite” means any facility used as a child day care facility, as defined in Section 1596.750 of the Health and Safety Code, or for kindergarten, elementary, or secondary school purposes. The term includes the buildings or structures, playgrounds, athletic fields, vehicles, or any other area of property visited or used by pupils. “Schoolsite” does not include any postsecondary educational facility attended by secondary pupils or private kindergarten, elementary, or secondary school facilities. For child day care facilities, the State Department of Social Services shall serve as the liaison to these facilities, as needed.

SEC. 1.5. Section 17610 of the Education Code is amended to read:

17610. (a) It is the policy of the state that effective least toxic pest management practices should be the preferred method of managing pests at schoolsites and that the state, in order to reduce children’s exposure to toxic pesticides, shall take the necessary steps, pursuant to Article 17 (commencing with Section 13180) of Chapter 2 of Division 7 of the Food and Agricultural Code, to facilitate the adoption of effective least toxic pest management practices at schoolsites. It is the intent of the Legislature to encourage appropriate training to be provided to school personnel involved in the application of a pesticide at a schoolsite.

(b) (1) A property owner of a property where a child day care facility is located, or the property owner’s agent, who personally applies any pesticides on any area listed in paragraph (2) shall provide notice to the child day care facility as described in paragraph (3) at least 120 hours before the application, unless an emergency condition, as defined in Section 17609, exists.

An owner of property on which a child day care facility is located shall be subject to the requirement to provide notice pursuant to this subdivision 30 days after it has received notice from a child day care facility of its presence at the property, unless the property owner, or his or her agent received that notice pursuant to paragraph (1) of subdivision (d) of Section 1597.40 of the Health and Safety Code prior to the effective date of this subdivision in which case the property owner will be subject to the notice requirements on and after the effective date of this subdivision.

(2) This subdivision applies when a property owner or his or her agent intend to personally apply pesticides on any of the following:

(A) Inside the rented premises on which child day care facility is located.

(B) Upon a designated child day care facility playground designated by the property owner.

(C) Upon an area designated for use by the child day care facility.

(D) Upon an area within 10 feet of the perimeter of the child day care facility.

(3) The notice required by paragraph (1) shall include the following:

(A) The product name.

(B) The manufacturer's name.

(C) The active ingredients of each pesticide.

(D) The United States Environmental Protection Agency's product registration number.

(E) The intended date of application.

(F) Those areas of application listed in paragraph (2).

(G) The reason for application.

(4) A notice of pesticide application provided to a tenant pursuant to subdivision (d) of Section 13186 of the Food and Agricultural Code shall satisfy the notice requirements of this section.

(5) If the child day care facility ceases to operate on the property, the provisions of this act shall no longer apply to the property.

SEC. 2. Section 17610.1 of the Education Code is amended to read:

17610.1. (a) (1) The use of a pesticide on a schoolsite is prohibited if that pesticide is granted a conditional registration, an interim registration, or an experimental use permit by the Department of Pesticide Regulation, or if the pesticide is subject to an experimental registration issued by the United States Environmental Protection Agency, and either of the following is applicable:

(A) The pesticide contains a new active ingredient.

(B) The pesticide is for a new use. This paragraph does not apply to a conditionally registered pesticide that is approved for other uses that has fulfilled all registration requirements that relate to human health, including, but not limited to, the completion of mandatory health effect studies pursuant to the Birth Defect Prevention Act of 1984 (Art. 14 (commencing with Sec. 13121), Ch. 2, Div. 7, F. & A.C.). The requirements of this section are not intended to impose any new labeling requirements.

(2) The use of a pesticide on a schoolsite is prohibited if the Department of Pesticide Regulation cancels or suspends registration, or requires phase out of use, of that pesticide.

(b) Vendors or manufacturers of pesticides that are prohibited for use on a schoolsite pursuant to subdivision (a) are prohibited from furnishing those pesticides to school districts or schoolsites either by sale or by gift.

(c) This section does not apply to public health pesticides or antimicrobial pesticides registered pursuant to Section 12836 of the Food and Agricultural Code.

SEC. 3. Section 17612 of the Education Code is amended to read:

17612. (a) The school designee shall annually provide to all staff and parents or guardians of pupils enrolled at a schoolsite a written notification

of the name of all pesticide products expected to be applied at the schoolsite during the upcoming year. The notification shall identify the active ingredient or ingredients in each pesticide product. The notice shall also contain the Internet address used to access information on pesticides and pesticide use reduction developed by the Department of Pesticide Regulation pursuant to Section 13184 of the Food and Agricultural Code and may contain other information deemed necessary by the school designee. No other written notification of pesticide applications shall be required by this act except as follows:

(1) In the written notification provided pursuant to this subdivision, the school designee shall provide the opportunity for recipients to register with the schoolsite if they wish to receive notification of individual pesticide applications at the schoolsite. Persons who register for notification shall be notified of individual pesticide applications at least 72 hours prior to the application. The notice shall include the product name, the active ingredient or ingredients in the product, and the intended date of application.

(2) If a pesticide product not included in the annual notification is subsequently intended for use at the schoolsite, the school designee shall, consistent with this subdivision and at least 72 hours prior to application, provide written notification of its intended use.

(b) The school designee shall make every effort to meet the requirements of this section in the least costly manner. Annual notification by a school district to parents and guardians shall be provided pursuant to Section 48980.3. Any other notification shall, to the extent feasible and consistent with the act adding this article, be included as part of any other written communication provided to individual parents or guardians. Nothing in this section shall require the school designee to issue the notice through first-class mail, unless he or she determines that no other method is feasible.

(c) Pest control measures taken during an emergency condition as defined in Section 17609 shall not be subject to the requirements of paragraphs (1) and (2) of subdivision (a). However, the school designee or property owner shall make every effort to provide the required notification for an application of a pesticide under emergency conditions.

(d) The school designee shall post each area of the schoolsite where pesticides will be applied with a warning sign. The warning sign shall prominently display the term “Warning/Pesticide Treated Area” and shall include the product name, manufacturer’s name, the United States Environmental Protection Agency’s product registration number, intended date and areas of application, and reason for the pesticide application. The warning sign shall be visible to all persons entering the treated area and shall be posted 24 hours prior to the application and remain posted until 72 hours after the application. In case of a pest control emergency, the warning sign shall be posted immediately upon application and shall remain posted until 72 hours after the application.

(e) Subdivisions (a) and (d) shall not apply to schools operated by the Division of Juvenile Justice. The school administrator of a school operated by the Division of Juvenile Justice shall notify the chief medical officer of that facility at least 72 hours prior to application of pesticides. The chief medical officer shall take any steps necessary to protect the health of pupils in that facility.

(f) This section and Section 17611 shall not apply to activities undertaken at a school by participants in the state program of agricultural vocational education, pursuant to Article 7 (commencing with Section 52450) of Chapter 9 of Part 28, if the activities are necessary to meet the curriculum requirements prescribed in Section 52454. Nothing in this subdivision relieves schools participating in the state program of agricultural vocational education of any duties pursuant to this section for activities that are not directly related to the curriculum requirements of Section 52454.

(g) Sections 17610 to 17612, inclusive, shall not apply to family day care homes or property owners of day care homes, as defined in Section 1596.78 of the Health and Safety Code, or their agents who personally apply any pesticides.

(h) If pesticide is applied by a property owner or his or her agent, or by a pest control operator, failure to provide notice pursuant to subdivision (b) of Section 17610 or subdivision (d) of Section 13186 of the Food and Agricultural Code shall relieve a privately operated child day care facility from the requirements of this section.

SEC. 3.5. Section 13181 of the Food and Agricultural Code is amended to read:

13181. Notwithstanding any other provision of law, for purposes of this article, “integrated pest management” means a pest management strategy that focuses on long-term prevention or suppression of pest problems through a combination of techniques such as monitoring for pest presence and establishing treatment threshold levels, using nonchemical practices to make the habitat less conducive to pest development, improving sanitation, and employing mechanical and physical controls. Pesticides that pose the least possible hazard and are effective in a manner that minimizes risks to people, property, and the environment, are used only after careful monitoring indicates they are needed according to preestablished guidelines and treatment thresholds. This definition shall apply only to integrated pest management at school facilities and child day care facilities.

SEC. 4. Section 13183 of the Food and Agricultural Code is amended to read:

13183. (a) The Department of Pesticide Regulation shall promote and facilitate the voluntary adoption of integrated pest management programs for schoolsites, excluding privately-operated child day care facilities, as defined in Section 1596.750 of the Health and Safety Code, that voluntarily choose to do so. For these schoolsites, the department shall do all of the following:

(1) Establish an integrated pest management program for schoolsites consistent with Section 13181. In establishing the program, the department shall:

(A) Develop criteria for identifying least-hazardous pest control practices and encourage their adoption as part of an integrated pest management program at each schoolsite.

(B) Develop a model program guidebook that prescribes essential program elements for schoolsites that have adopted a least-hazardous integrated pest management program. At a minimum, this guidebook shall include guidance on all of the following:

- (i) Adopting an IPM policy.
- (ii) Selecting and training an IPM coordinator.
- (iii) Identifying and monitoring pest populations and damage.
- (iv) Establishing a community-based school district advisory committee.
- (v) Developing a pest management plan for making least-hazardous pest control choices.
- (vi) Contracting for integrated pest management services.
- (vii) Training and licensing opportunities.
- (viii) Establishing a community-based right-to-know standard for notification and posting of pesticide applications.
- (xi) Recordkeeping and program review.

(2) Make the model program guidebook available to schoolsites and establish a process for systematically updating the guidebook and supporting documentation.

(b) The department shall promote and facilitate the voluntary adoption of integrated pest management programs at child day care facilities, as defined in Section 1596.750 of the Health and Safety Code, through the following:

(1) Modifying the department's existing integrated pest management program for schoolsites as described in subdivision (a) of Section 13183 for the child day care setting.

(2) Creating or modifying existing educational and informational materials on integrated pest management for the child day care setting.

(3) Making the materials available to child day care facilities and establishing a process for systematically updating them.

SEC. 5. Section 13185 of the Food and Agricultural Code is amended to read:

13185. (a) The department shall establish an integrated pest management training program in order to facilitate the adoption of a model IPM program and least-hazardous pest control practices by schoolsites. In establishing the IPM training program, the department shall do all of the following:

(1) Adopt a "train-the-trainer" approach, whenever feasible, to rapidly and broadly disseminate program information.

(2) Develop curricula and promote ongoing training efforts in cooperation with the University of California and the California State University.

(3) Prioritize outreach on a regional basis first and then to school districts. For outreach to child day care facilities, the department shall participate in existing trainings that provide opportunities for disseminating program information broadly on a regional basis.

(b) Nothing in this article shall preclude a schoolsite from adopting stricter pesticide use policies.

SEC. 6. Section 13186 of the Food and Agricultural Code is amended to read:

13186. (a) The Legislature finds and declares that the Department of Pesticide Regulation, pursuant to Section 12979 of the Food and Agricultural Code and Sections 6624 and 6627 of Title 3 of the California Code of Regulations, requires persons engaged for hire in the business of pest control to maintain records of pesticide use and report a summary of that pesticide use to the county agricultural commissioner or director. The Legislature further finds and declares that it is in the interest of the state, in implementing a school integrated pest management program pursuant to this article, to collect specified information on the use of pesticides at schoolsites.

(b) The Department of Pesticide Regulation shall prepare a school pesticide use form to be used by licensed and certified pest control operators when they apply any pesticides at a schoolsite. The form shall include, for each application at a schoolsite, the name and address of the schoolsite, date and location of application, pesticide product name, and the quantity of pesticide used. Nothing in this section shall change any existing applicable pesticide use reporting requirements.

(c) Persons who are required to submit pesticide use records to the county agricultural commissioner or director shall complete and submit to the director the school pesticide use forms established pursuant to this section. The forms shall be submitted annually and may be submitted more often at the discretion of the pest control operator maintaining the forms. Child day care facilities, excluding family day care homes, as defined in Section 1596.78 of the Health and Safety Code, which are subject to the Healthy Schools Act of 2000, shall inform contractors hired to apply pesticides at the schoolsite that the facility must comply with the Healthy Schools Act of 2000.

(d) Any person who is hired to apply pesticides at a child day care facility, excluding family day care homes, as defined in Section 1596.78 of the Health and Safety Code, shall provide that facility's school designee with all of the following information at least 120 hours in advance of any pesticide application, except in the case of an emergency condition, as defined in Section 17609 of the Education Code:

- (1) The pesticide product name.
- (2) The pesticide manufacturer's name.

(3) The United States Environmental Protection Agency's product registration number.

(4) The active ingredient or ingredients in the pesticide product.

(5) The areas of application.

(6) The intended date of application.

(7) The reason for the pesticide application.

(e) If a person hired to apply pesticides contracts directly with the property owner or his or her agent rather than directly with the child day care facility, excluding family day care homes, as defined in Section 1596.78 of the Health and Safety Code, the property owner or his or her agent must notify the contractor that a child day care facility is being operated on the property at which the pesticides are to be applied to enable the contractor to comply with subdivision (d).

SEC. 7. Section 1596.794 is added to the Health and Safety Code, to read:

1596.794. The department shall serve as the liaison to child day care facilities for the purposes of Sections 17608 to 17613, inclusive, of the Education Code.

SEC. 8. Section 1596.845 of the Health and Safety Code is amended to read:

1596.845. Prior to the issuance of a new license or special permit pursuant to this chapter, Chapter 3.5 (commencing with Section 1596.90), or Chapter 3.6 (commencing with Section 1597.30) the applicant shall attend an orientation given by the department. The orientation given by the department shall outline all of the following:

(a) The rules and regulations of the department applicable to child day care facilities.

(b) The scope of operation of a child day care facility.

(c) The responsibility entailed in operating a child day care facility.

(d) Information about the Healthy Schools Act of 2000 and integrated pest management practices.

Appendix II: Questionnaire

CODE: _____

PEST MANAGEMENT AND PESTICIDE USE IN CALIFORNIA CHILD CARE CENTERS

The California Department of Pesticide Regulation, the California Childcare Licensing Division, and the University of California at Berkeley Center for Children's Environmental Health Research are working together to help make indoor environments healthier and safer for children. Your child care facility is one of 2,000 across California that has been selected to participate in this important work. Please take a few minutes to complete this short survey on pest problems and the methods that are used to control pest problems in your facility. **Please complete and return this survey by January 1, 2009.** Alternatively, you can complete this survey online by going to <http://www.childcareipm.info>. Your answers will help us learn about the kinds of pest problems faced by California child care facilities and the things we can do to help you keep these problems from harming our children. At the end of this survey, you can enter a drawing for a \$100 gift certificate to Michaels Craft Store for your child care facility.

- 1. In the last year, did you have problems **INSIDE** your facility with any of the pests listed below? If yes, please mark what was done. Please check all that apply.

Indoor Pests	No	Yes	Did nothing	Sprayed Pesticides	Used bait or poison traps	Used poison Pellets or powder	Used pest bombs or foggers	Used sticky fly strip Or mouse/rat trap	Removed food sources	Cleaned the area	Sealed cracks and openings	Installed screens or other barriers	Fixed leaks	Other (Please write in your answer)
Ants	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Cockroaches	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Fleas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Head lice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Mice or rats	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Spiders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Termites	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Flies	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Other:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

- 2. Who decides how or when to control indoor pest problems at your child care facility? Please check all that apply.

☐ Me
☐ Director
☐ Teacher
☐ Another Staff Member
☐ The property owner
☐ The custodial staff
☐ A pest control company
☐ Don't know/Not sure
☐ Don't have indoor pest problems
☐ Other: _____

- 3. If indoor pesticides were used at your child care facility in the last year, who applied them? Please check all that apply.

☐ Me
☐ Director
☐ Another Staff Member
☐ The property owner
☐ The custodial staff
☐ A pest control company
☐ Don't know/Not sure
☐ Indoor pesticides were not used in the last year
☐ Other: _____

- 4. Why were indoor pesticides used? Please check all that apply.

☐ It was less expensive.
☐ It was more effective.
☐ It was more convenient.
☐ It keeps things clean.
☐ It was safer.
☐ It was required.
☐ I didn't know what else to do.
☐ Don't know/Not sure
☐ Indoor pesticides were not used
☐ Other: _____

► 5. In the last year, did you have problems **OUTSIDE** your facility with any of the pests listed below? If yes, please mark what was done. Please check all that apply.

Outdoor Pests	No	Yes	Did nothing	Sprayed Pesticides	Used bait or poison traps	Used poison	Used pest bombs or foggers	Used sticky fly strip Or mouse/rat trap	Used bee traps	Removed food/ breeding sources	Mowed or watered the lawn	Other (Please write in your answer)
Ants	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Bees or wasps	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Fleas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Mice or rats	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Snails or Slugs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Spiders	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Squirrels or Gophers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Weeds	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
Other:	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

► 6. Who decides how/when to control outdoor pest problems at your child care facility? Please check all that apply.

- ☐ Me
- ☒ Director
- ☐ Another staff member
- ☒ The property owner
- ☐ The custodial staff
- ☒ A pest control company
- ☐ Don't know/Not sure
- ☒ Don't have outdoor pest problems
- ☐ Other: _____

► 7. If outdoor pesticides (including weed killer) were used at your child care facility in the last year, who applied them? Please check all that apply.

- ☐ Me
- ☒ Director
- ☐ Another staff member
- ☒ The property owner
- ☐ The custodial staff
- ☒ A pest control company
- ☐ Don't know/Not sure
- ☒ Outdoor pesticides were not used in the last year
- ☐ Other: _____

► 8. Why were outdoor pesticides (including weed killers) used? Please check all that apply.

- ☐ It was less expensive.
- ☒ It was more effective.
- ☐ It was more convenient.
- ☒ It keeps things clean.
- ☐ It was safer.
- ☒ It was required.
- ☐ I didn't know what else to do.
- ☒ Don't know/Not sure
- ☐ Outdoor pesticides were not used
- ☐ Other: _____

► 9. Over the past year, how frequently were pesticides sprayed, scattered, or "bombed"?

- ☐ Once per week
- ☒ Once per month
- ☐ Once per year
- ☒ A few times per year
- ☐ Whenever pests become a problem
- ☒ No pesticides were used
- ☐ Not applicable (No pesticides were sprayed, scattered, or "bombed.")

► 10. Over the past year, did your child care facility notify parents before pesticides (including weed killers) were applied inside or outside your facility?

- ☐ Always
- ☒ Sometimes
- ☐ Never
- ☒ Not applicable

► 11. Over the past year, did your child care facility post warning signs after pesticides (including weed killers) were applied?

- ☐ Always
- ☒ Sometimes
- ☐ Never
- ☒ Not applicable

► 12. If your landlord or building manager is responsible for pest control, does she/he tell you in advance when pesticides are going to be applied?

☐ Always

☒ Sometimes

☐ Never

☐ Not applicable

► 13. Integrated Pest Management (IPM) is an approach to keeping pests, like the ones mentioned in this survey, below harmful levels and reducing or eliminating pesticide use. Have you heard of IPM?

☐ Yes

☒ No

► 14. Does your child care facility keep written records of applications of bug killers, weed killers, rat killers, or other pesticides?

☐ Yes

☒ No

☐ Don't know/Not sure

☐ Not applicable

► 15. Does your child care facility have a written policy for use of bug killers, weed killers, rat killers, or other pesticides, stating when and how to apply pesticides?

☐ Yes

☒ No

☐ Don't know/Not sure

☐ Not applicable

► 16. Where do you or your center get your information about pest and weed control? Please check all that apply.

☐ Training sessions

☒ Pest control company

☐ Friends

☒ Other child care providers

☐ Associations of child care providers

☒ Government agencies

☐ Product packaging

☒ Advertisements

☐ The Internet

☒ Books, magazines, or other publications

☐ The property owner or building manager

☐ Other: _____

► 17. How would you like to see free information on less risky and more effective pest control methods? Please check all that apply.

☐ On a website

☒ In an email

☐ In a pamphlet

☒ At a seminar

☐ On a DVD

Thank you for participating in this study! Please return this survey to us in the addressed, stamped envelope provided. If you would like to enter a drawing to win a \$100 gift certificate to Michaels Craft Store for your center, please provide your contact information. Providing this information is optional, and any information provided will be kept confidential.

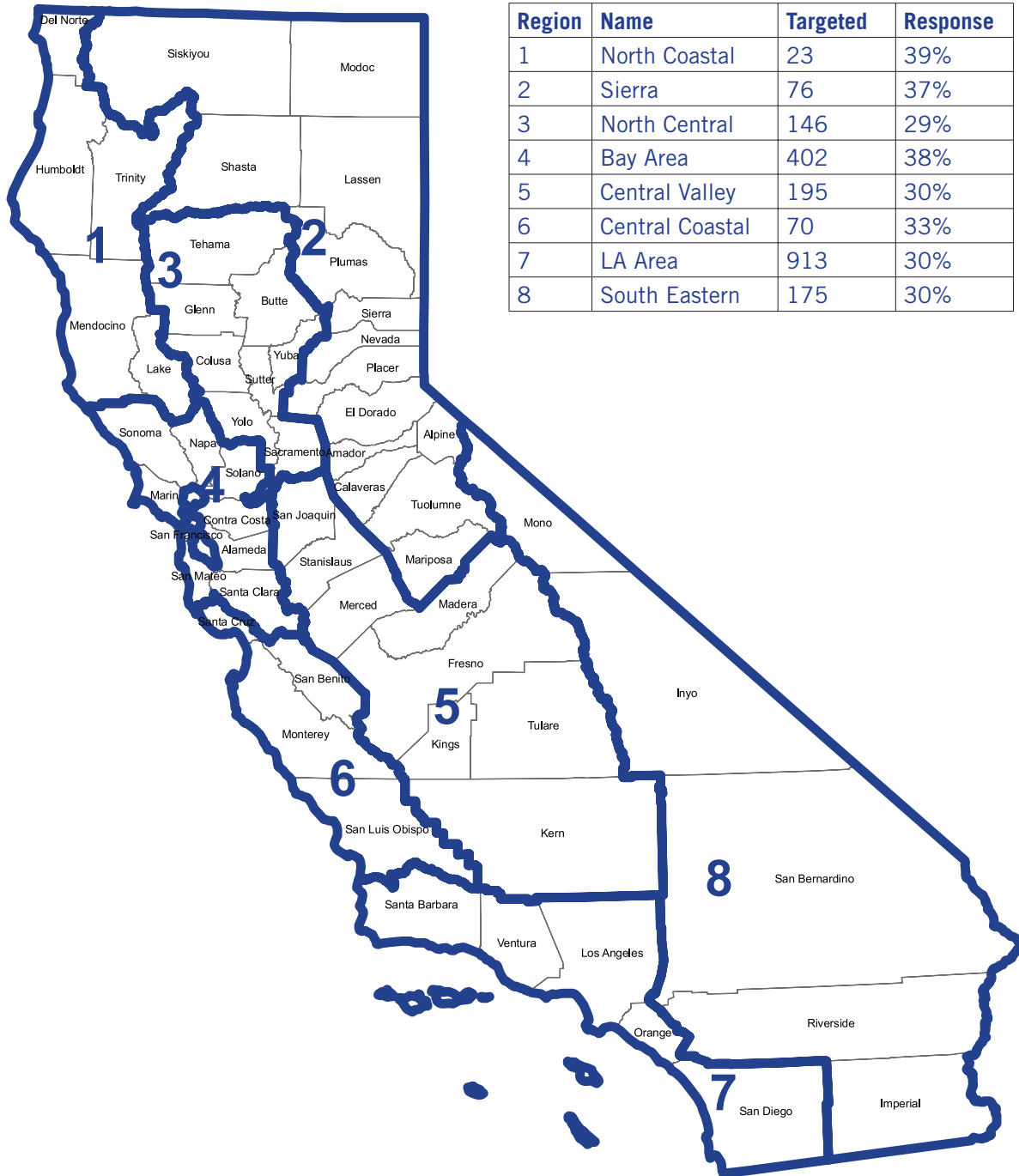
Your name: _____ Your title: _____

Name of your Child Care Center: _____

Address: _____ Phone number: (____) _____

_____ Email Address: _____

Appendix III: Response Rate by Region



Appendix IV: Pest-specific Pest Management Practices

These tables show pest-specific control methods reported by the responding child care centers. Note that the proportions presented are a percentage of the centers who reported taking some action to control the pest.

For example, of the 531 centers that responded to the query about fleas, 4% (n=22) indicated the presence of fleas indoors. Of those 22 centers with fleas, 64% (n=14) used some form of pesticides, 59% (n=13) used a non-exempt application method, 5% (n=1) used an exempt application method, and 32% (n=7) used at least one IPM method.

Table IV-1. Proportion of Centers Using Pest-Specific Abatement Methods Indoors

Pest	Used Any Pesticide for This Pest	Used Non-Exempt Methods	Used at Least One IPM Method	Used at Least One IPM Method
Ants	46%	37%	12%	75%
Spiders	39%	38%	2%	36%
Head lice	10%	10%	0%	59%
Mice or rats	29%	5%	27%	89%
Cockroaches	59%	38%	26%	71%
Flies	9%	8%	1%	44%
Termites	21%	17%	7%	17%
Fleas	64%	59%	5%	32%
Other ⁴	50%	50%	11%	44%

Table IV-2. Proportion of Centers Using Pest-Specific Abatement Methods Outdoors

Pest	Used Any Pesticide for This Pest	Used Non-Exempt Methods	Used Exempt Methods	Used at Least One IPM Method
Ants	59%	56%	5%	21%
Bees	23%	20%	3%	43%
Spiders	48%	47%	1%	8%
Weeds	17%	15%	2%	43%
Squirrels or gophers	17%	7%	10%	21%
Mice or rats	45%	5%	41%	74%
Snails or slugs	8%	8%	0%	4%
Fleas	54%	42%	12%	27%
Other ⁴	25%	21%	11%	11%

References

1. California Department of Pesticide Regulation; <http://www.cdpr.ca.gov/>.
2. California Department of Pesticide Regulation. California School IPM Model Program Guidebook, 2nd Edition. Sacramento; 2003.
3. Breyse P, Farr N, Galke W, Lanphear B, Morley R, Bergofsky L. The relationship between housing and health: children at risk. *Environ Health Perspect* 2004;112:1583-8.
4. U.S. Consumer Product Safety Commission. CPSC Staff Study of Safety Hazards in Child Care Settings. Washington, DC.; 1999.
5. Tulse NS, Jones PA, Nishioka MG, et al. Pesticide measurements from the first national environmental health survey of child care centers using a multi-residue GC/MS analysis method. *Environ Sci Technol* 2006;40:6269-74.
6. Children's Defense Fund. Children in California. Available at: <http://www.childrensdefense.org/child-research-data-publications/data/state-data-repository/cits/children-in-the-states-2008-california.pdf>. Washington, DC; 2008.
7. Lucille Packard Foundation for Children's Health. Child Care: Number of Child Care Slots in Licensed Facilities, by Type of Facility: 2006 Available at: <http://www.kidsdata.org/data/topic/table.aspx?ind=101>. Palo Alto, CA; 2009.
8. U.S. General Accounting Office. Child Care: State Efforts to Enforce Safety and Health Requirements. Washington, DC.; 2004.
9. California Childcare Resource and Referral Network. 2009 California Child Care Portfolio. Available at: <http://www.rrnetwork.org/our-research/2009-portfolio.html>; 2009.
10. Goveia Mea. Pediatric Asthma-Related Environmental Practices and Asthma Awareness in California Child Care Centers. *Asthma, Allergy & Immunology* 2005;18:12-24.
11. U.S. EPA. Child-Specific Exposure Factors Handbook. Washington, D.C: National Center for Environmental Assessment; 2008 September. Report No.: EPA-600-P-00-002B.
12. Viet S, Rogers J, Marker D, Fraser A, Bailey M. First National Environmental Health Survey of Child Care Centers Final Report: Volume II: Analysis of Allergen Levels on Floors. In: Office of Healthy Homes and Lead Hazard Control U.S. Department of Housing and Urban Development, ed.; July 15, 2003.
13. Wilson NK, Chuang JC, Lyu C. Levels of persistent organic pollutants in several child day care centers. *J Expo Anal Environ Epidemiol* 2001;11:449-58.
14. Bradman A, Whitaker D, Quiros L, et al. Pesticides and their metabolites in the homes and urine of farmworker children living in the Salinas Valley, CA. *J Expo Sci Environ Epidemiol* 2006;17:331-49.
15. Cohen Hubal EA, Sheldon LS, Burke JM, et al. Children's exposure assessment: a review of factors influencing children's exposure, and the data available to characterize and assess that exposure. *Environ Health Perspect* 2000;108:475-86.
16. Lo B, O'Connell M. National Research Council and Institute of Medicine: Ethical Considerations for Research on Housing-Related Health Hazards Involving Children: Washington, DC: The National Academy Press; 2005.

17. Bearer CF. The special and unique vulnerability of children to environmental hazards. *Neurotoxicology* 2000;21:925-34.
18. Eskenazi B, Marks AR, Bradman A, et al. Organophosphate pesticide exposure and neurodevelopment in young Mexican-American children. *Environ Health Perspect* 2007;115:792-8.
19. Rauh VA, Garfinkel R, Perera FP, et al. Impact of prenatal chlorpyrifos exposure on neurodevelopment in the first 3 years of life among inner-city children. *Pediatrics* 2006;118:e1845-59.
20. Eskenazi B, Rosas LG, Marks AR, et al. Pesticide toxicity and the developing brain. *Basic Clin Pharmacol Toxicol* 2008;102:228-36.
21. Karpati AM, Perrin MC, Matte T, Leighton J, Schwartz J, Barr RG. Pesticide spraying for West Nile virus control and emergency department asthma visits in New York City, 2000. *Environ Health Perspect* 2004;112:1183-7.
22. Tootelian DH. 2001 Integrated Pest Management Survey of California School Districts. Sacramento, CA: California Department of Pesticide Regulation 2001.
23. Geiger CA, Tootelian DH. 2002 Integrated pest management survey of California School Districts. Sacramento, CA: California Department of Pesticide Regulation 2003.
24. California Department of Pesticide Regulation. California School Integrated Pest Management Program: School Integrated Pest Management (IPM). Available at: <http://apps.cdpr.ca.gov/schoolipm/>; 2009.
25. California Department of Social Services. Community Care Licensing Division Available at: <http://cclid.ca.gov/>; 2009.
26. California Childcare Health Program. Available at: <http://www.ucsfchildcarehealth.org/>. 2009.
27. Measuring Environmental Hazards in the Childcare Industry: Pesticides, Lead, and Indoor Air Quality. Available at: <http://www.greenchildcare.org/Resources.html>. 2008.
28. Bradman A, Chevrier J, Tager I, et al. Association of housing disrepair indicators with cockroach and rodent infestations in a cohort of pregnant Latina women and their children. *Environ Health Perspect* 2005;113:1795-801.
29. Whitebook M, Sakai, L., Kipnis, F., Lee, Y., Bellm, D., Speiglmán, R., Almaraz, M., Stubbs, L., and Tran, P. California Early Care and Education Workforce Study 2006. The Center for the Study of Child Care Employment and the California Resource and Referral Network. Center for the Study of Child Care Employment Institute for Research on Labor and Employment, University of California at Berkeley; 2006.
30. National Association of Child Care Resource & Referral Agencies. (2010). Child Care Workforce Retrieved February 22, 2010, from http://www.naccra.org/randd/child-care-workforce/cc_workforce.php
31. Williams MK, Barr DB, Camann DE, Cruz LA, Carlton EJ, Borjas M, Reyes A, Evans D, Kinney PL, Whitehead RD Jr, Perera FP, Matsoanne S, Whyatt RM. An intervention to reduce residential insecticide exposure during pregnancy among an inner-city cohort. *Environ Health Perspect*. 2006 Nov;114(11):1684-9.
32. Fenske RA, Black KG, Elkner KP, Lee CL, Methner MM, and Soto R. Potential exposure and health risks of infants following indoor residential pesticide applications. *Am J Public Health*. 1990 June; 80(6): 689-693.