IPM Use in California School Districts

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Abstract A new California law, AB 2260, encourages the adoption of integrated pest management (IPM) programs by all school facilities. The purpose of this study is to determine the influence of cost on the implementation and outcome of IPM programs in school environments. Facilities managers in California unified school districts were surveyed by telephone. The facilities managers were asked to evaluate their pest control practices, compare their districts with others in California, and to estimate expenses for pest control. IPM districts were compared with non-IPM districts for expenditures on pest management per student. Results indicate that there is no significant difference in the pest management expenditures per student between IPM and non-IPM districts. While IPM is often cited as a cost-effective, long-term solution to pesticide use, the results show that there is very little correlation between the length of time districts have practiced IPM and the amount districts are spending. Although IPM may not provide large financial savings in California school districts, it will provide a safer school environment without much if any increase in pest management costs.

Introduction

Exposure to pesticides in California schools has resulted in illness, acute and chronic health problems, and even death (Boise and Feeney 1998, Fischer and Eikmann 1996, Sesline *et al*. 1994). Currently, researchers are examining the link between pesticides and childhood cancer (Landrigan *et al*. 1999, Solomon *et al*. 2000, Zahm and Ward 1998). Following on the heels of measures to eliminate lead and asbestos from school premises, pesticides are among the newest toxicants to become more heavily regulated by policymakers and government officials.

On February 24, 2000, Assemblyman Kevin Shelley, D-San Francisco, introduced AB 2260, a bill designed to establish the Healthy Schools Act of 2000. Seven months later, California Governor Gray Davis signed the bill into law. Since January 1, 2001, the bill requires that parents receive written notification of pesticide use in schools and provides training for staff in integrated pest management, or IPM (Bill Number: AB 2260, elect. comm.).

By encouraging IPM in schools, policymakers hope to see a reduction in the amount of pesticides being used. Now that AB 2260 is law, information on districts that have endeavored to limit pesticide exposures with IPM may help to evaluate the benefits and costs of the change in legislation (Rosynsky 2001, Sahagun 1999, Tuhus 1999). According to the National Coalition Against the Misuse of Pesticides, there are 11 unified school districts in California using integrated pest management (NCAMP, elect. comm.). As the proposed safer alternative to pesticides, IPM aims to minimize pesticide use and the associated risks to human health and the environment while controlling pest populations. A pest is legally defined as any unwanted organism, and includes rodents, insects, and weeds. As defined by AB 2260:

> "Integrated pest management" or "IPM" means an approach to pest control that utilizes regular monitoring and record keeping to determine if and when treatments are needed and employs a combination of strategies and tactics to keep pest numbers low enough to prevent unacceptable damage or annoyance. Chemical controls shall be used only when necessary (Bill Number: AB 2260, elect. comm.)."

There are several reasons why IPM may be a practical alternative to pesticide use in schools. While pesticides are often a temporary control for pests, IPM offers long-term solutions, which aim to reduce costs and pesticide use (Owens and Feldman 2000). Some critics of pesticide use have claimed that pesticides do more to address the symptoms of a pest problem than the causes (Owens and Feldman 2000). Findings of the Environmental Protection Agency (1993) indicate that one-time expenses of IPM, such as improving waste management, installing physical

barriers, training school staff in IPM, relandscaping and structural maintenance, result in fewer pests, less reliance on other pest control measures, and reduced overall costs of pest control.

In using IPM, several school districts have been successful at decreasing pest management costs. In Montgomery County, Maryland, outside contractors charged $2400 per school per year prior to the implementation of an IPM program (WTC). Following the implementation of IPM, operating costs were in the range of $500 per school per year (WTC). The IPM program in Gwinnett County, Georgia, has lowered costs by 40% (EPA 1995). A comparison of schools, Peabody Charter and Vista de Las Cruces, in the Santa Barbara School District, indicates that IPM strategies demand more money up front, but less in the long run (Boise and Feeney 1998, Lynch and Small 2000). One year after its implementation, the IPM program in the Anne Arundel school district in Maryland cut budget expenditures for pest management from $46,000 to $14,000 (Spitzer 2000).

Given the above information, I designed a survey to test the following three hypotheses: (1) IPM districts use fewer pesticides than non-IPM districts. (2) IPM districts spend less money than non-IPM districts. (3) IPM districts decrease their pest management costs over time.

Methods

For my survey, I compiled questions similar to those asked for the CWA survey of IPM Use in Pennsylvania School Districts (CWA and CWF 1997). Additionally, I worked with the survey center on the UC Berkeley campus and followed specific guidelines for conducting effective survey research. To test the question of whether IPM districts spend less money than non-IPM districts, I asked districts to identify their current pest control method, expenditures for pest management, and number of students (Appendix: Questions 1, 10, 20). To test the question of whether IPM districts decrease their pest management costs over time, I asked IPM districts to indicate how long they had practiced IPM and if they were spending less, more, or equal to the amount spent before transitioning to IPM (Appendix: Questions 2, 9). To gain a general understanding of the implementation and outcome of IPM in the districts, I asked districts to detail their pest management expenses, indicate the factors important to the implementation and outcome of their programs, comment on their policy, and report the decision-makers influencing the districts' financial decisions (Appendix: Questions 3, 4, 5, 6, 7, 12, 13). I did not design my survey to test the question of whether IPM districts use fewer pesticides.

I chose to conduct a telephone interview for my survey method after comparing the outcomes of CALPIRG and CWA studies. CALPIRG performed studies of California schools and their efforts to reduce pesticide use by inquiring about policy specifics, pesticide use, and alternatives to pesticides (Kaplan *et al*. 1998, Olle 2000). In the end, CALPIRG relied on legal counsel and the Public Records Act to solicit written responses from school districts. The type of information CALPIRG was seeking made this type of action necessary. Because I did not have these same tools at my disposal, I planned my questions to be less intrusive and decided to rely on a phone survey. CWA's success in interviewing IPM programs by phone confirmed my decision to administer a phone survey.

I pretested my survey in 15 Pennsylvania school districts. With feedback from facilities managers, I narrowed my answer choices, reworked my salary ranges, and incorporated a question on pests.

During the weeks of March 12th through March 26th, I phoned all 272 unified school districts in California. I used the California Public School Directory 2000 published by the California Department of Education to obtain phone numbers for each school district. In all, I conducted 62 surveys, which is close to a 23% response rate.

Statistical Techniques Of the 62 surveys completed, 28 were IPM districts and 34 were non-IPM districts. To determine which type of district spends more on pest management, I set method (IPM or non-IPM) as my factor, cost as my dependent variable, and student population size as my covariate for an analysis of covariance (ANCOVA). I log-transformed student population size to fit the assumptions of my model. I followed up with a t-test to look more closely at the interaction between pest control method and student population size. In examining the impact of time since converting to IPM on cost, I performed a chi-square test comparing answers for Question 2 and Question 9 (See Appendix).

Because there are liability costs associated with pest control practices in schools, many districts are reticent to provide explicit information on school pesticide use. For this reason, I could only get information on use by focusing intensively on a small number of districts. It was not feasible to try to gather accurate information on use from a large number of districts. Therefore, I selected two similar unified school districts, San Francisco (IPM) and Oakland (non-IPM), in order to characterize the pesticide use in non-IPM and IPM districts. For obtaining data on pesticide use, I utilized a network of contacts that included the Women's Cancer Resource

Center (WCRC), CALPIRG, Pesticide Action Network (PAN), and facilities personnel in both districts. I also visited the pesticide applicators for Oakland Unified School District (OUSD), Webb's Pest Control, where I learned about the reporting and licensing requirements for pesticide use in the district.

Results

In general, my data did not support the hypothesis that IPM districts spend less on pest control than non-IPM districts (Fig. 1). There was no effect of pest control method on cost ($df = 1, 52$; $F = .045$; $p = .83$), or cost interaction between method and size ($df = 1, 52$; $F = .48$; $p = .49$). However, costs increased with district size ($df = 1, 52$; $F = 8.88$; $p = .004$), as did the likelihood of IPM use ($p = .023$). Only the very largest districts spent the most on pest control, but it is not necessarily true that the larger districts spent more on pest control than the smaller districts. It is important to note that costs were poorly known for each district, as only 27 districts determined an amount. The remaining 35 assigned their costs to a set range (Appendix: Question 10). For these districts, the mean of each range was determined to be the estimated cost. All costs, except those for several districts with extremely large expenditures, have been included in the figure below.

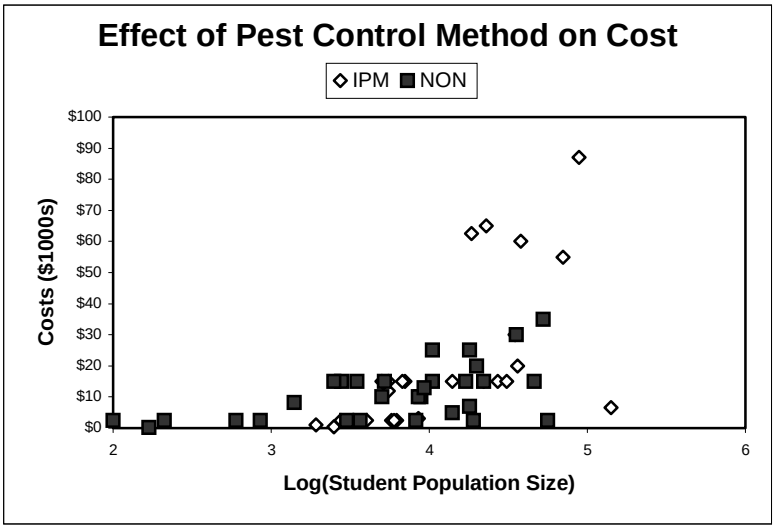

Figure 1. IPM and non-IPM districts do not differ significantly in their pest control expenditures, but the larger districts tend to spend more on pest control and practice IPM.

Also, my data did not support the hypothesis that IPM districts decrease their pest management costs over time (Fig. 2). More school districts spend less or equal to the amount they spent before transitioning to IPM. These differences decline over time, but they are not significant ($p = .22$). While there was no correlation between the length of time districts have practiced IPM and the amount districts are spending, 17 out of 26 IPM districts claim they are spending less money after transitioning to IPM.

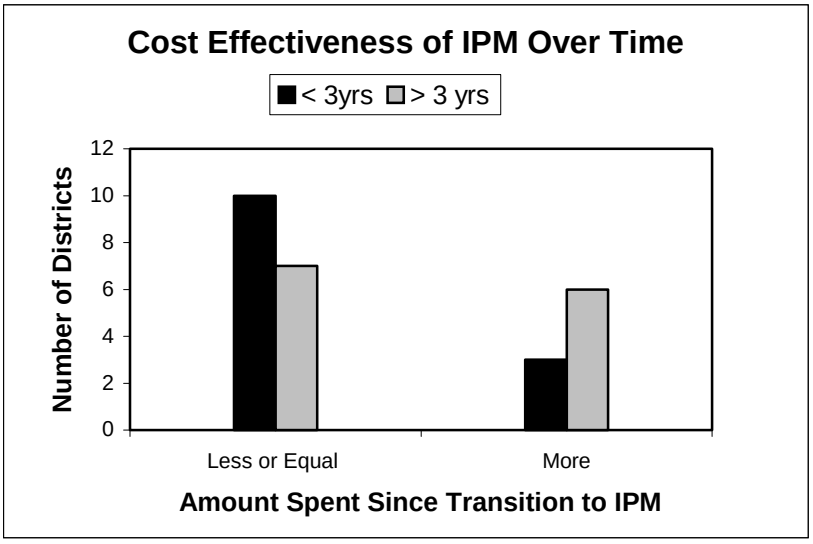

Figure 2. Pest management costs do not significantly decrease over time. However, 65% of IPM districts are spending less than or equal to the amount they spent before transitioning to IPM.

Comparing San Francisco and Oakland Unified School Districts supports the hypothesis that IPM may result in decreased pesticide use. In Oakland, 221 sites were sprayed, while only 2 sites were sprayed in San Francisco (Tables 1 and 2).

Pesticide	Number of Sites
Maxforce	61
Dursban TC	81
Talon-G	46
PT 565 Plus XLO	7
Stick-em Glue Traps	25
Insect Spray	1

Table 1: Pesticide Use in OUSD (1997-1998)

Pesticide	Number of Sites
Prelude/Precor	2

Table 2: Pesticide Use in SFUSD (1999-2000)

There were several general findings on how cost affects the implementation and outcome of IPM. In terms of implementation, 79% of IPM districts have a written IPM policy, but only one school district incorporated details on IPM costs into their board policy. 46% of all IPM districts reported that cost was important in switching to IPM and 32% were neutral. In terms of outcomes, 79% of facilities managers in IPM districts rated their satisfaction level as good or excellent. Facilities managers in IPM districts believed communication and commitment were more important in determining the outcome of their IPM programs than other factors, such as money, education, and teamwork. 62% of districts agreed that IPM is a cost- effective, long-term solution to pesticide use in schools. More than 50% of districts cited decreased pesticide use as the primary reason for cost effectiveness of IPM. Education of staff was the second highest response.

Some schools felt that IPM was not cost effective over the long run, but this was not reflected in the general trends of the survey. 50% of both IPM and non-IPM districts cited increased need for labor as the main reason for the cost ineffectiveness of IPM. The remaining IPM districts cited costs of maintenance, while the remaining non-IPM districts cited notification expenses. Facilities managers in IPM districts claim that training and labor are the highest expenses for their current IPM budget.

Discussion

The results of this study indicate that IPM is no more expensive than conventional pest control methods, and that it is an effective method for controlling pests in schools. Results also show that larger districts are likely to spend more on pest control than smaller districts. While larger districts can spend a lot on pest control, it does not mean that they do. Factors that may attribute to conservative spending by larger districts may include the nature of the pest problem, attitudes towards pest control, and problems in figuring pest management costs. Larger districts may also be more likely to practice IPM. There is a greater chance that someone in a larger district will be more motivated to advocate IPM use. Local news stories and series reports by environmental organizations are testimony to the fact that there is more of a focus on IPM use in larger school districts (Rosynsky 2001, Olle 2000, Kaplan *et al*. 1998). In general, IPM districts are spending roughly equal amounts compared to what they initially spent for conventional pest management and their pesticide use has decreased. A decrease in pesticide use is a likely

explanation for why IPM appears to be cost effective. San Francisco, an IPM district, used fewer pesticides than Oakland, a non-IPM district. If these two districts are representative of IPM and non-IPM districts, then IPM policies are having a significant effect on pesticide use in schools.

Other studies confirm that IPM results in decreased pesticide use. Until IPM, school districts contracted pest control companies for routine spraying in schools. But, the regular monitoring and record keeping of IPM discourages schools from standard pesticide practice. A study of pesticides and inner-city children reveals that IPM may reduce pesticide use by 50% without lessening the effectiveness of pest population control (Viehweg 1997). The same public schools that saved money with IPM in Montgomery County, Maryland, also saw a 90% reduction in pesticide use (Spitzer 2000).

Research also indicates that IPM is cost effective. In 1997, Clean Water Action (CWA) and Clean Water Fund (CWF) evaluated the practice of using the least toxic methods available to control pests, specifically IPM, in Pennsylvania school districts. CWA discovered that most school administrators were satisfied with the outcome of their IPM program, and concluded that IPM was an economical alternative to traditional pesticide spraying by resulting in lowered or equal costs to that of the original program. In 1998, the General Accounting Office (GAO) conducted a national review of 110,000 public schools identifying the extent to which pesticides are used and the risks of exposure. The report found that IPM involved increased costs in the beginning, but that the costs reach a level that is equal to or below those of traditional pest control programs after a year or two (GAO/RCED-00-17, elect. comm.). Although this study did not find that IPM costs change over time, most districts in California have implemented IPM within the last five years and are still resolving issues concerning its implementation.

Where IPM does not seem to be cost effective, the Department of Pesticide Regulation notes that districts with high training and labor expenses are typical of most pest control programs (Hawkins 1999). IPM programs may save money by relying less on contracted services, but lose money with staff training. While cost is always an important consideration for school districts, it is not an overriding factor in the outcome of IPM. Findings from the Department of Pesticide Regulation indicate that factors such as communication and commitment are more critical to the success of IPM (Hawkins 1999).

From this study, it is reasonable to conclude that IPM decreases pesticide use and effectively controls pests without an increase in cost. IPM creates a school environment safe for children,

but one unwelcoming to pests. The fact that most districts can transition to IPM without having to budget more money for pest control may facilitate the adoption of IPM by more school districts under AB 2260. The number of school districts currently practicing IPM has already grown under AB 2260 as the number surveyed in this study is much larger than earlier estimates preceding the passage of AB 2260 (NCAMP). Also, the number of California school districts with an IPM policy, nearly 79%, has risen dramatically over the years, up from 10% in 1994 (Hawkins 1999). However, while the amount of schools practicing IPM seems to be on the rise, this could very well be attributed to the variation in how schools define IPM. Ultimately, it is public education and outreach efforts that will increase the knowledge districts have of their pest control practices.

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Appendix

An Assessment of IPM Use in California School Districts

Your name: _____ Job Title: _____
District Name: _____County: _____

1. Does your school district currently practice IPM?

☐ Yes ☐ No

If respondent answered "No" to Question 1, skip to Question 10.

2. How long has your district practiced IPM?

☐ < 1 year ☐ 1-3 years ☐ > 3 years

3. Does your district have a written IPM policy?

☐ Yes ☐ No ☐ Don't know

If respondent answered "No" or "Don't know" to Question 3, go to Question 5.

4. Does the written IPM policy for your district include details on IPM costs?

☐ Yes ☐ No ☐ Don't know

If respondent answered "Yes" to Questions 3 and 4, request copy of IPM policy.

5. How important was cost in switching to IPM?

☐ Very important
☐ Important
☐ Neutral
☐ Unimportant
☐ Very unimportant

6. Of the following, what are the highest expenses for your current IPM budget?

☐ Training
☐ Labor
☐ Start-up
☐ Material
☐ Other: _____

7. What has been the most important factor in determining the outcome of your IPM program?

☐ Communication
☐ Education
☐ Teamwork
☐ Commitment
☐ Other: _____

8. Please rate your satisfaction level with the IPM program in your district.

☐ Excellent
☐ Good
☐ Fair
☐ Poor

9. Does your district spend less, more, or equal to the amount it spent before transitioning to IPM?

☐ Less ☐ More ☐ Equal

10. Approximately, how much does your district budget for pest management? $ _____

☐ Less than $5,000
☐ $5,000 to $25,000
☐ $25,000 to $50,000
☐ $50,000 to $75,000
☐ More than $75,000

11. Who oversees pest management in your district?

☐ District staff ☐ Outside contractor ☐ Both

12. What influence do you have on the district's expenditures for pest management?

☐ A lot
☐ Some
☐ Neutral
☐ Little
☐ None

13. Who makes the ultimate financial decisions regarding pest management for your district?

☐ School board
☐ Department of Education
☐ Superintendent
☐ Myself
☐ Don't know
☐ Other: _____

14. On a scale of 1 to 5, how would you characterize the pest problem in your district with 1 being extreme and 5 being insignificant?

1 2 3 4 5

For districts without IPM:

15. Select the most likely explanation for why your district does not have IPM:

☐ Never heard of it
☐ Heard of it, but not interested
☐ Interested, but can't get it started
☐ In the process of implementing IPM
☐ Other: _____

If respondent answered "Never heard of it" to above question, skip to Question 18.

16. Do you agree or disagree with the following statement?

    "IPM is a cost-effective, long-term solution to pesticide use in schools."

    ☐ Agree
    ☐ Somewhat agree
    ☐ Neutral
    ☐ Disagree
    ☐ Strongly disagree

If respondent is neutral to the previous statement, have them go to Question 19. Otherwise, if respondent disagrees, he/she answers Question 17. If respondent agrees, he/she answers Question 18.

17. Over the long term, what do you believe is the main reason for the cost ineffectiveness of IPM?

    ☐ Unimproved waste management
    ☐ Staff not educated in IPM
    ☐ Lack of physical barriers
    ☐ Increased pesticide use
    ☐ Lack of structural maintenance
    ☐ Increased need for labor
    ☐ Unmodified landscapes
    ☐ Lack of equipment replacement

18. Over the long term, what do you believe is the main reason for the cost effectiveness of IPM?

    ☐ Improved waste management
    ☐ Education of staff in IPM
    ☐ Physical barriers
    ☐ Decreased pesticide use
    ☐ Structural maintenance
    ☐ Decreased need for labor
    ☐ Modified landscapes
    ☐ Equipment replacement

19. How would you rank your district in comparison with others in California?

    A. Buildings are: ☐ Newer OR ☐ Older

    B. Schools are: ☐ More affluent OR ☐ Less affluent

    C. Grounds in: ☐ Better condition OR ☐ Poorer condition

20. Roughly, how many schools and students are in your district?

    # of schools: _____ # of students: _____