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The Effectiveness of Venue Strategies for Environmental Communication in Non-Agricultural, School Integrated Pest Management Campaigns

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THE EFFECTIVENESS OF VENUE STRATEGIES FOR ENVIRONMENTAL COMMUNICATION IN NON-AGRICULTURAL, INTEGRATED PEST MANAGEMENT CAMPAIGNS

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ABSTRACT

THE EFFECTIVENESS OF VENUE STRATEGIES FOR ENVIRONMENTAL COMMUNICATION IN NON-AGRICULTURAL, SCHOOL INTEGRATED PEST MANAGEMENT CAMPAIGNS

by Marcia L. Anderson

Pesticides have become a preferred approach to controlling pest problems in many, schools and childcare centers, despite the exposure hazards to children and the environment. The only other place where children spend more time is in their homes. Children are continually and unknowingly exposed to pests and pesticides while in and around school buildings. Pesticides are used on athletic fields, play areas, in cafeterias, classrooms, and more. Reducing the use of pesticides from the school environment is critical to lowering children's total exposure.

This research tests ways of communicating about Integrated Pest Management to a number of school-related target audiences. The study will test the three communication venues for IPM instruction and will evaluate them via a series of questions administered at the end of each presentation. This study compares traditional communication venues such as workshop and in-person visitation opportunities with electronic venues such as webinars. The research goal is to answer whether or not IPM educational webinars are an effective alternative /supplement to in-person classroom workshops and interpersonal IPM visit trainings, and under what circumstances. The venues are evaluated educationally, financially and environmentally. The study also addresses the importance of gathering pest and pesticide use data to identify target areas and groups for further intervention.

This study uses five types of environmental communication to deliver the message of Integrated Pest Management (IPM): rhetoric, advocacy, risk communication, education, and social marketing are all utilized to help to deliver the IPM message.

Through this study of presentation venues, the following are also discussed: 1.) The efficacy of the message, 2.) The demographics of attendees, 3.) The financial cost of venue, 4.) The volume (per event), and 5.) The environmental costs – carbon savings.

This research analyzes the means of spreading the message of a safer, greener approach to pest management in areas frequented by children.

The overarching goal of the study is to provide some insight about effective venues to educate key decision makers about the aspects of IPM so that they in turn can make pest management policy and behavior changes with respect to schools and childcare centers, to create safer learning environments for children.

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Finally, I must thank my loving husband Ken, for supporting my decision to pursue School Integrated Pest Management with the EPA, across the country to Dallas, Texas. My children, Michael, Monica, Matthew and Martin also need to be recognized for enduring mangrove swamps and glaciers; sitting through talks about bed bugs in public, and bringing home sand and rocks from trips around the world - all in the name of science.

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List of Abbreviations

AFT	American Federation of Teachers
B & G	Building and Grounds
CCC	Childcare Center
CDC	Center for Disease Control and Prevention
CoE	Center of Expertise – refers to School IPM CoE
DOA	Dept. of Agriculture – used in reference to states: NJ DOA, KY DOA
DOE	Department of Education
EPA	Environmental Protection Agency (Federal)
ESB	Environmental Stewardship Branch (US EPA)
GTA	Greening the Apple (EPA R2 Blog)
IAQ	Indoor Air Quality
IPM	Integrated Pest Management
ISD	Independent School District – used after city or district name: Dallas ISD
NASN	National Association of School Nurses
NGO	National Government Organization
NPMA	National Pest Management Association
NPTA	National Parent Teacher Association
NRC	National Research Council
NYC	New York City
NYDOH (NYCDOHMD)	New York City Department of Health and Mental Hygiene
OCHP	Office of Children's Health Protection (EPA)

OPP	Office of Pesticide Programs (US EPA)
PIRG	Public Interest Research Group – used with states: VTPIRG or CAL PIRG
PMP	Pest Management Professional
PPDC	Pesticide Program Dialogue Committee (US EPA standing committee)
R2	Region 2 (US EPA) – Consists of the states of NY, NJ, PR and USVI
SEPA	School Environmental Protection Act
SIPM	School Integrated Pest Management
SPCP	Safer Pest Control Project
US EPA	US Environmental Protection Agency
USDA	US Department of Agriculture (Federal)
WHO	World Health Organization

Preface

"*This Doctoral Dissertation was produced in accordance with guidelines which permit the inclusion as part of the Doctoral Dissertation the text of an original paper, or papers, submitted for publication. The Doctoral Dissertation must still conform to all other requirements explained in the "Guide for the Preparation of the Doctoral Dissertation at the Montclair State University." It must include a comprehensive abstract, a full introduction and literature review, and a final overall conclusion. Additional material (procedural and design data as well as descriptions of equipment) must be provided in sufficient detail to allow a clear and precise judgment to be made of the importance and originality of the research reported.*

It is acceptable for this Doctoral Dissertation, to include as chapters, authentic copies of papers already published, provided these meet the type size, margins, and legibility requirements. In such cases, connecting texts, which provide logical bridges between different manuscripts, are mandatory. Where the student is not the sole author of a manuscript, the student is required to make an explicit statement in the introductory material to that manuscript describing the student's contribution to the work and acknowledging the contribution of the other author(s). The signatures of the Supervising Committee which precede all other material in the Doctoral Dissertation attest to the accuracy of this s

Chapter 1

The Effectiveness of Venue Strategies for Environmental Communication in Non-Agricultural, School Integrated Pest Management Campaigns

1.1 Introduction

To understand the reasoning behind the goals of this research, the reader must first understand what School Integrated Pest Management (SIPM) is, its background, and the environmental health concerns behind it. The presences of many pests, such as cockroaches and rodents have a known association with health conditions, such as asthma and allergy triggers. These pests require management; however the management methods are called into question due to the susceptibility of children to the use and misuse of pesticides in schools and childcare centers. (See chapter 2.3)

Because humans and pests depend on the same food chain, it is not surprising that the use of pesticides that are intended to kill pests, come with some unknown risks to people. Although it is important to keep schools free of pests, many pesticides used in their control have potential health risks, especially when used in the vicinity of children. Pesticides may become airborne and settle on toys, books, desks, counters and walls. Children and staff may breathe in contaminated air or touch surfaces and unknowingly expose themselves to invisible residues that may linger for months beyond the initial pesticide application.

Until recently, the common approach to pest control in many educational facilities was to “see-a-bug, spray-a-bug” with pesticides. That sort of knee-jerk reactionary behavior led to numerous pesticide poisonings throughout the nation (Chapter 2.3). Integrated Pest Management (IPM) was borrowed from the agricultural sector, modified and applied to environments so that sensitive populations, such children can have a healthier learning environment.

IPM is a process involving common sense and sound solutions for controlling pests. The focus is finding the best strategy for a pest problem and not necessarily the simplest. IPM is not a one-size-fits-all method, but rather utilizes a three part practice: inspection, identification and treatment. Treatment options in IPM can vary from proactive measures like sealing cracks, fixing leaks, and removing food, water and harborage sources, to applying traps and baits, or using pesticides for the most severe problems. In an IPM approach school buildings and grounds are inspected closely to see where pests are finding their life-sustaining resources. Steps are then taken to exclude pests from the buildings and to make conditions unfavorable to them by keeping everything clean, dry and tightly sealed.

This dissertation delves into the ways that the IPM message is delivered to potential change agents like school and childcare administrators and staff. The traditional communication venues like classroom / lecture hall presentations and interpersonal visits are compared to the newer, electronic webinar presentations. Electronic venues, like webinars, are becoming more and more popular as a training alternative. Considerable amounts of money that are normally spent on travel and venue rental can be saved when electronic venues are used. In addition, the webinar venue can accommodate a much larger audience, and people from distant locations can attend as long as they have internet access. But are webinars as effective as traditional training methods? All three IPM training venues are evaluated for efficacy attendance preference along with associated positives and negatives.

The forms of environmental communication that comprise the IPM message are advocacy - for safer pest control practices; rhetoric – denouncing common “pesticide first” use behavior; risk communication - highlighting the exposure potential of pesticide use and misuse in the environments that children frequent; environmental education; and social marketing - as it strives toward behavior and policy changes with respect to pest management practices. This SIPM campaign is described through a Regional and a National perspective and some of the environmental communication messaging is shared through different venues with the reader.

1.2 Research Goal and Questions

As the goal of the SIPM movement is to advance the adoption and implementation of IPM in schools and childcare centers, this research hopes to advance the dialogue by testing and evaluating the training venues used to convey the SIPM message.

Some of the questions that need to be answered with regard to traditional v/s webinar SIPM training venues are considered here. Are webinars an effective substitute or supplement to traditional IPM training venues? Are there any differences between venues in measuring quantifiable behavior change with regard to pesticide use? Does the audience understand the IPM message? What is the efficacy of the training message with regard to the venues? What venue does the audience prefer for training? What are the environmental and economic savings when using the webinar venue? What are the differences in attendance prospects for a classroom training session as opposed to a webinar? What are the added benefits and drawbacks of electronic trainings in SIPM, as opposed to traditional training methods? Can surveys and webinars be an additional means of collecting base-line data? Are these forms of data verifiable? If not, are they still useful for identifying physical areas and populations to target further outreach initiatives? What are the challenges found in the implementation of SIPM in suburban districts v/s urban and rural districts? Is there a difference in SIPM implementation in a state with a SIPM law, as opposed to a state or territory that does not have a mandate?

1.3 Organization of Thesis

Chapter 2 is the literature review portion of the dissertation. It provides the setting and background of this thesis study in School Integrated Pest Management (SIPM) including the birth of the movement from its inception, and the history of federal involvement with SIPM. The chapter goes into the environmental health issues that triggered concern about the use of pesticides in schools and childcare centers, and how SIPM has evolved into a national environmental health initiative.

The following chapter, 3, describes the general types of environmental communication messaging as they relate to SIPM. These include advocacy for safer pest control practices, lots of rhetoric, risk communication highlighting the exposure potential of pesticide use and misuse around children, environmental education used to disseminate the message, and social marketing as it strives toward behavior change with respect to pest management practices.

Chapter 4 provides an in-depth look at one of the forms of environmental communication messaging: Social Marketing. The steps involved in the social marketing process are discussed along with how they are currently being implemented in the federal SIPM social marketing initiative. The campaign strives to change the policies of school–related agencies, organizations at the upstream level and work to change the behavior of school and childcare administrators and staff with regard to pesticide use, at the downstream level.

A close look at the message venues follow in chapter 5. Traditional learning venues such as in-person workshop sessions, and interpersonal facility visits are compared to the newer electronic venues such as webinars and introduces the expanding social media forums. This chapter begins to answer the question: **Can electronic webinars substitute or augment in-person educational sessions, and if so, are they as effective in delivering the message? What are the added benefits and drawbacks of electronic trainings in SIPM, as opposed to traditional training methods?**

The next four chapters, 6 through 9, elaborate on some of the questions asked in chapter 5.

Chapter 6 is a study written and conducted by the author and federal colleagues (Anderson et al., 2010) focused on researching pesticide use and base-line IPM practices in childcare centers (CCCs). It gives verifiable use data through pre and post-test visits to the centers, and records inspections of the pest management companies that serviced the CCCs. It documents changes in IPM practices, pesticide use, and behavior change among CCC administrators.

Chapters 7 and 8 analyze the data collected from CCC visits, surveys and webinars. They also discuss webinars as a greener form of training. In addition the chapters delve into the added benefits of surveys and webinars as a means of collecting base-line data. Are these forms of data verifiable? If not, are they still useful for identifying general areas and populations to target further outreach initiatives?

Chapter 9 discusses the successes and challenges of the implementation of SIPM in the field. It reviews successes and areas that need improvement. It also compares and evaluates progress made in suburban districts v/s urban and rural districts and discusses the effectiveness of SIPM implementation in a state with a SIPM law, as opposed to a state and territory that do not have a mandate.

Chapter 10 concludes the research thesis, but is far from the end of this thesis. The appendices are an integral part of the thesis and provide supporting documents for chapter discussions and conclusions.

Through the literature review process, the author examined the very long list of federally funded school and CCC-related surveys, research, and visits conducted from early 1990 through present. Appendix A lists all of the studies in a table that includes authors, year of study, university or group conducting the research, and a brief description. The CCC SIPM research initiatives are listed separately after the larger all-inclusive table.

Appendix B gives examples of all of the different surveys used in the research related to this thesis – from interpersonal visits to schools and childcare centers to classroom presentations and webinars. The surveys were modified slightly as the initiatives progressed. Studies from the research literature (Appendix A) showed that groups conducting SIPM initiatives are all using different questions which makes cross-analysis and comparison of the of collected data difficult. So a new list was developed for future initiatives. The newly defined metrics can be available to all SIPM stakeholders to facilitate sharing and comparing initiatives.

Appendix C contains summary data tables used in these dissertation studies. The actual raw data contained personally identifiable information such as names, places of business and e-mails, so the data is not presented in its original form.

Appendix D contains the actual power point presentations given to the audiences during this project. They are followed by a more refined set of presentations that the author helped to develop for future stakeholder use and will be on the Federal SIPM webpage when launched in the spring of 2014.

Chapter 2

History and Development of the EPA School IPM and Related Programs

2.1 Abstract

Despite the potential hazards to children and the environment, pesticides have become a preferred approach to controlling pest problems in many, schools, school districts and childcare centers. Children attend at least 180 days in school each year, and those in child care centers, even more. The only other place where children spend more time is in their homes. Children are continually and unknowingly exposed to toxic chemicals while in and around school buildings. Toxic chemicals are being used on school athletic fields, play areas, and in cafeterias, classrooms, and more. Eliminating, or reducing pesticide use in school environments is critical to lowering children’s total potential exposure.

2.2 Introduction

The research objectives for this chapter focus on the historic development and a literature review of School Integrated Pest Management (SIPM). IPM is an ecological, common sense approach to pest management, as opposed to repeated, regular applications of chemical pesticides to eradicate target pests.

Serious research on IPM approaches to pest control began in the 1970’s when the USDA created a nationwide agricultural IPM Program. The underlying concept of IPM is that pests can be controlled by eliminating their access to food, water, shelter, and blocking points of entry. IPM not only reduces the amount of pesticide being applied, but is effective against most pests, saves money, and ultimately, may reduce pesticide exposure to young children. A further research objective is to review the progress of SIPM via grants and research in individual states, the attempts in Congress to pass the School Environmental Protection Act (SEPA). This chapter also examines what is needed for implementation of School IPM nationwide to fulfill the EPA goal of School IPM in every US school.

2.3 The problem

Many people assume that schools are environmentally safe places for children to learn. It often takes pesticide poisoning or repeated illnesses to alert a school district to the acute and chronic adverse health effects of pesticides and the viability of safer pest management strategies. (See next page) Despite the hazards to children and the environment, pesticides have become a preferred approach to controlling pest problems in many childcare centers and school districts. Children attend at least 180 days of school each year. The only other place where children spend more time is in their homes. In order to protect children's health, pesticide use in schools must be reduced, and families must be routinely notified whenever pesticides will be applied in schools. Eliminating pesticides from the school environment is critical to lowering children's total exposure.

Children are continually and unknowingly exposed to toxic chemicals while in and around school buildings. Toxic chemicals are being used on school athletic fields, shrub beds, parking lots, tracks, play areas, and in cafeterias, classrooms, gymnasiums, and restrooms. Too often pesticides are applied on a calendar basis whether pests are present or not. When not at home, most children spend a large portion of their days at childcare facilities or in school, so it makes sense that reducing their exposures in these facilities through the implementation of IPM would greatly reduce children's cumulative exposure to pesticides (Weiss, 2000).

As pesticides are designed to kill or otherwise adversely affect living organisms, there exists a clear balance between the risks and benefits of the use of pesticides. The very nature of most pesticides creates some risk of harm to humans, animals and the environment. At the same time, pesticides are useful to society. Pesticides can kill pests and organisms that spread disease, and cause harm to infrastructure, food sources and more. Some pesticides, such as biologically-based pesticides, pheromones, and microbial pesticides are often safer than traditional chemical pesticides.

Children are not simply "little adults." Early developmental stages of their organs, nervous systems and immune systems; greater rates of cell division; and lower body weight increase their susceptibility to pesticide exposure (WHO, 2011). Pesticide concentrations in their fatty tissues may be greater because their fat as a percentage of total body weight is lower than for adults (Wargo, 1966). Children are more susceptible than adults to the health effects from low-level exposures to some pesticides over the long term (NRC, 1993; Wantabe, et al., 1990, Repetto and Baliga, 1996).

The American Medical Association's Council on Scientific Affairs states that "Particular uncertainty exists regarding the long-term health effects of low-dose pesticide exposure. Considering these data gaps, it is prudent to limit pesticides exposures and to use the least toxic chemical pesticide or non-chemical alternative" (AMA, 1994).

2.4 The Awakening of the public and government to a pesticide application problem in schools:

Between 70-93% of schools use pesticides either indoors or outdoors. There were a high number of routine, calendar applications in schools along with 2,300 reported school pesticide exposure incidents in the years from 1993-1996 (US GAO, 1999). There were likely considerably more exposures incidents as everyone does not report an incidence plus pesticide exposure is difficult to diagnose as doctors are unlikely to make association between symptoms unless given direct background information.

Fourteen of the high profile, headline horror stories of children exposed to pesticides in schools that prompted public reaction to the lax regulation of pesticides in the school environment:

1. In Fontana, California, 1996, an eighth grader logged numerous visits to the school nurse complaining of dizziness, nausea and headaches, twice before the girl had inexplicably stopped breathing and collapsed at school. She had an abnormal heart rhythm which was detected by electrocardiogram (EKG) tests. While playing baseball on a local park field, she died six days later. Round Up (Glyphosate) and several nerve-poisoning pesticides, including chlorpyrifos, cyfluthrin, cypermethrin and diazinon, were applied regularly at the school and the park playing field. Exposure to nerve-poisoning pesticides, such as organophosphates and pyrethrins, can disrupt proper nervous system functioning, causing heart rhythm abnormalities such as rapid heartbeat and heart palpitations. Exposure to the nerve-poisoning pesticides sprayed at school and in the park was

determined as the cause of the young girl's death (Olle et al., 2000, Mateko, 1999, Plat, 1999, 96, 97).

2. In May 2003, an exterminator sprayed weed killer around Madison Middle School in Madison, Ohio. As a result, air pouring into the sixth- and seventh grade classroom windows became tainted with the acrid smell of Formula 190, sending one teacher home and forty-two children to the hospital with nausea and dizziness (Henry, 2005).

3. On November 12, 1998, Mount Pleasant, South Carolina, a pest control firm mistakenly drilled through wall voids and into two classroom walls at Laing Middle School during a termiticide application to the building's exterior foundation. The pesticide Dursban TC (chlorpyrifos), which is not registered for interior use, was injected into the holes and into at least one of the classrooms. The next day, the teacher reported a strong odor that lingered for two and a half months. The students were moved to another classroom, while the classroom was cleaned and the holes patched. Contaminated carpeting was removed along with textbooks. Numerous children were experiencing flu-like symptoms and one child displayed peeling hands. The peeling hands may have been from direct contact to the chemical and the illnesses their children had been suffering from were linked to the application of the Dursban. Chlorpyrifos residues were found in carpet samples collected by state investigators two and a half months after the application, and after two professional carpet cleanings (Levine, 2000, 1999).

4. In August of 1994, a school custodian in Pierre Part, Louisiana, sprayed the Pierre Part Primary School schoolyard with the unregistered insecticide lindane in an effort to control rodents and fleas and Diazinon in and around fourteen portable classrooms. Teachers reported strong odors in the classrooms, and forty-one individuals, reported adverse health effects in the first three days of school. Then another lindane application was made after school one day and again just before students arrived the following morning. The school was closed later that day due to continuing health complaints and the lingering odor of the chemicals. A total of ninety-eight health complaints were received and reviewed by the Louisiana Office of Public Health (LOPH). Symptoms reported by children and adults included headaches, abdominal pain, diarrhea, nausea, skin rashes, difficulty breathing, and sore throats. The school remained closed for weeks. The presence of pesticides was confirmed by analysis of wipe samples from classrooms and the playground. The National Guard was called in to help with the cleaning of classrooms, removal and replacement of playground soil and sod and demolition of the contaminated portable classrooms. The LOPH concluded that children were exposed to pesticides by inhaling vapors when they entered treated classrooms and possibly via hand-to-mouth contact and skin absorption from touching residues on desks and teaching materials. The agency also concluded that the health symptoms reported were precipitated by pesticide exposure. The district spent nearly a million dollars for soil testing, cleanup, and rebuilding (Levine, M.J.,1994a).

5. On September 27, 1993, in Montgomery County, Pennsylvania, seventeen children were sent home from Montgomery Elementary School just after lunch with headaches, nausea, vomiting, diarrhea, and low-grade fevers. Food poisoning was ruled out, as the children ate different things. The symptoms returned when the children went back to school the following week, but cleared up over the weekend. One girl suffering from the symptoms had a grand mal seizure. The school was making regular applications of Dursban (chlorpyrifos) in the kitchen, cafeteria, and teacher's lounge in an effort to control ants. A blood cholinesterase test indicated a recent exposure to organophosphate pesticides (Levine, M.J., 1994b).
6. On October 26, 1992, in Eastchester, New York, children, and staff of Eastchester High School noticed a strong odor and experienced headaches, nausea, and eye irritations, sore throats and rashes on Monday morning. The school had been sprayed over the weekend for roach control with the pesticides Empire 20 (chlorpyrifos), Vectrin (resmethrin), and diazinon. The applications were part of routine pest control used throughout the school district. The school was closed later in the day, ventilated, reopened, and closed again due to continuing strong odors. Air and surface wipe samples taken after two professional cleanings showed the chlorpyrifos was still present in many locations. The school was closed for almost three weeks as crews worked to clean up the pesticide residues. Both state and county health department reports concluded that the symptoms among students, teachers, and staff were consistent with exposure to the

pesticides. Inhalation and dermal exposure to the ‘‘inert’’ petroleum distillates in one of the products was identified as the likely cause of most of the symptoms (Lombardi and Stone, 1993).

7. On May 8, 1991, in Coral Springs, Florida, thirty-four students and eight adults were sent to hospitals and ten others were treated by paramedics at Forest Hill Elementary School. Symptoms reported included churning stomachs, dizziness, and a bad pepper-like taste in the mouth. The school had been sprayed the night before with two synthetic pyrethroid insecticides, Tempo 20 WP (cyfluthrin) and Micro-Gen ULD BP-100 (pyrethrins and piperonyl butoxide). Some of the insecticide had landed on top of steamers or ovens in the cafeteria, and it was determined that they vaporized when the ovens were turned on, resulting in the fumes. All 175 schools in the Broward County school district were sprayed regularly with these chemicals in an effort to control roaches, ants, and fleas (Levine, 1994d).

8. On May 5, 1989, in Cross Lanes, West Virginia, “Andrew Jackson Junior High School was closed after four years of complaints by teachers and students of persistent coughs, fatigue, headaches, respiratory problems, nausea, and numbness in their limbs. Federal investigators found the cancer-causing pesticide chlordane in the air at levels eleven times higher than the federal evacuation limit. The chemical was applied at the school to combat termites. Sixty-seven students and school employees experienced nerve damage, immune system problems, bone marrow dysfunction, aching joints, allergic reactions, and cancer resulting from

the exposure. The school was reopened in February of 1990 after an extensive cleanup" (Baron and Elliot, 1989; Levine, M.J.; 2007; NCAP, 2000).

9. In Jurupa Hills Elementary School, California, 1996, one five-year-old developed rashes and blisters where his body contacted classroom surfaces, another child developed a smoker-like cough, diarrhea, stomach pains and shortness of breath, while yet another kindergarten student suffered head blisters and hair loss. A fifth-grader suffered fatigue and stomach pains requiring hospitalization, resulting in months of school missed. The school was automatically dispensing pyrethrins-containing pesticides every 15 minutes in a mist over their children's heads (Matelko, 1995, 99, 2000; SBC DOA, 1998). Pyrethrins, the active ingredient of the pesticide used in the automatic dispensers, can be readily absorbed via inhalation. Symptoms of overexposure include contact dermatitis, allergic respiratory reactions such as rhinitis (inflammation of mucous membranes in the nose) and asthma, and some irritant or sensitizing reactions. The school was dispensing the pesticides and it was found that some of the pesticide dispensers in the school's cafeteria were located too close to food handling surfaces.

10. In the fall of 1993, an Indiana, eighth-grader was diagnosed with non-Hodgkin's lymphoma. The school district was routinely using 2, 4-D and other phenoxy herbicides to kill dandelions. Repeated exposure to 2, 4-D and other phenoxy herbicides have been shown to have elevated rates of this cancer. The girl was brought into remission through chemotherapy, however, on the girl's first day back at school, the school district made another application of herbicides to the

school grounds. The girl's lymphoma returned within the month. She died before summer's end that year (Mott et al., 1997; NRDC, 1997; NCAP, 2000).

City, State	Year	Grade	No. ill	symptoms	result	Pesticides used
Fontana, CA	1996	8	1	stopped breathing and collapsed	died	Round Up (Glyphosate), chlorpyrifos,cyfluthrin, cypermethrin,diazinon
Madison, OH	2003	6&7	42	Nausea; dizziness	hospitalized	of Formula 190
Mount Pleasant, SC	1998	MS (6-8)	2 classes	flu-like symptoms & peeling hands	Dr. visit	Dursban TC (chlorpyrifos)
Pierre Part, LA	1994	Elem (K-4)	98	Headaches, abdomen. pain, nausea, rashes, difficulty breathing	School closed; month; LAOPH;Nat. guard; $1M	unregistered - lindane
Montgomery, PA	1993	Elem (K-4)	17	nausea, vomiting, fever	Dr. & Hosp.	Dursban (chlorpyrifos)
Montgomery, PA	1993	Elem (K-4)	1	grand mal seizure	Hospitalized	Dursban(chlorpyrifos)
Eastchester, NY	1992	H.S. (9-12)	many	nausea, eye irritations, sore throats, rashes	school closed; 3 weeks, NYDPH;	Diazinon, Empire 20 (chlorpyrifos), Vectrin (resmethrin),
Coral Springs, FL	1991	Elem (K-4)	34	nausea , dizziness	Hospitalized	Tempo 20 WP (cyfluthrin);Micro-Gen ULD BP-100
Cross Lanes, WV	1989	MS (6-8)	67	headaches, respiratory, nausea, numb limbs.	nerve damage, bone marrow dysfunction, cancer; school closed ,1 yr;	chlordane
Jurupa Hills, CA	1996	Elem (K-5)	multiple	rashes, blisters, hair loss, breathless,	hospitalized	Pyrethrins in air system
IN	1993	8	1	non-Hodgkin's lymphoma	chemotherapy & death	2, 4-D & phenoxy herbicides

N Powellhurst, OR	1993	Elem K-4)	65	nausea, vomiting, diarrhea, headaches, rashes, dizziness	school closed, months 2 clean, hosp,	chlorpyrifos and dichlorvos
Waianae, HI	1986	Elem (K-4)	28	headaches, stomach,, aches, breathless, and nausea	Dr & Hosp.	flea spray with chlorpyrifos

Table 2.1.Llisting of selected profile child pesticide poisoning exposures in schools.

11. In 1993, chlorpyrifos and dichlorvos were applied for ant control in North Powellhurst School in Oregon. Soon after, at least sixty-five individuals, including infants, children, pregnant teenagers, teachers, and school staff reported nausea, vomiting, diarrhea, massive headaches, rashes, dizziness, itching eyes, sore throats, and other symptoms. The school was closed, cleaned and reopened, and eventually closed early because students and staff continued to experience health effects (Riley B., 1994).
12. In 1986, twenty-eight students and two faculty members at Waianae Elementary School in Hawaii developed headaches, stomach aches, breathing difficulties, and nausea after their school was treated with a flea spray containing chlorpyrifos. It was subsequently discovered that the children became sick from exposure to the "inert" ingredient, xylene, not the active ingredient, chlorpyrifos (Riley B., 1994).

2.5 A Short History of Integrated Pest Management

The ecological approach to pest management, rather than simple and repeated attempts at eradication using chemical pesticides, had been championed by scientists for years. However, during this century, it took many years and the development of public agencies with oversight of pesticide issues and public monies to fund such research (Frazier, 1997). Serious research began on IPM approaches to pest control began in the 1970's when the USDA created a nationwide IPM Program with funding to Land Grant Universities. After the EPA was created, it was given jurisdiction over pesticide registration and regulation and soon instituted pesticide education programs in same Land Grant Universities. There was an increase in IPM research in the 1980's followed by the beginning of genetic engineering applications in agriculture, under the initial premise of pest reduction.

The underlying concept of IPM is that pests can be controlled by eliminating their access to food, water, shelter, and blocking points of entry. In addition, by utilizing maintenance, sanitation, education, and exclusion, and by using the least toxic gels, traps and baits, the majority of pests can be controlled with little to no use of pesticides (Brenner et al., 2003). If pests cannot be eliminated by non-chemical means initially, then pesticides may be used as needed. IPM not only reduces the amount of pesticide being applied, but is also effective against most pests, saves money, and ultimately, may reduce pesticide exposure to young children.

So, the key message of the IPM communication initiative is that: 'it is better to reduce the use of pesticides and use a combination of less toxic strategies in an IPM approach, to promote the health and safety of vulnerable populations'. IPM can effectively reduce health risks to vulnerable populations by delivering a message that still uses pesticide as part of an IPM program, but only after less toxic methods are tried. This pest management practice can achieve maximum results with the application of fewer toxic chemicals and is often at a reduced cost.

2.6 Background of the US EPA School IPM Programs.

The EPA SIPM campaign, to date, has been a combination of both a bottom up and top down social marketing environmental educational campaigns. The top-down occurs when the state legislature passes a bill requiring IPM in schools, or make statements endorsing SIPM to their constituents. The bottom-up approach then occurs when USDA extension agents, EPA Regional staff, and third party advocates go to schools and childcare centers to educate administrators, facility managers and staff about IPM as a safer alternative to pest management as opposed to routine pesticide applications in environments that children frequent.

School IPM history began in 1991-1992 when the states of Texas and Michigan adopted School IPM Mandates. This requirement was brought about by a misapplication of pesticides for the treatment of head lice on a school campus and other pesticide incidents involving children in schools. In 1991, the Texas Legislature passed HB 2751, a law mandating that all public schools adopt integrated pest management (IPM) to deter incidents of pesticide misapplications. This was soon followed by the 1992 National Parent Teachers Association endorsement of the use of IPM in schools (NPTA, 1992).

In 1992 the US Environmental Protection Agency, after investigating multiple pesticide poisoning incidents around the country, entered into discussion with states, and began crafting the federal 1993 *Model School IPM policy statement: Pest Control in the School Environment* (USEPA, 1993).

2.7 A Time of Surveys: The mid to late 1990's and early 2000's

Due to a series of headline exposure incidents in school and child care centers, seed grant money became available from the USDA and the US EPA for studies to evaluate pesticide application practices in schools. A number of states universities and NGO's received grant money to evaluate how schools in their states were controlling pests and to document the current use practices of pesticide application in and around schools. Grants also included the development of materials to help schools understand a different way to control pests, through IPM.

The funded grant research was to create a base-line from which to judge future progress in pesticide use. More than 50 published surveys and studies since 1994 have documented deficiencies including unmanaged pest infestations, unsafe and illegal use of pesticides, and unnecessary pesticide exposures to individuals at schools. Improvement is feasible and affordable with IPM (Green and Gouge, 2009). These 50+ surveys were conducted, mostly by mail, others by phone, and some a combination of both. Studies and reports were published from all parts of the country. The results of these studies, along with the publicity of child exposure to pesticides in schools, prompted many states to subsequently adopt SIPM mandates and legislative endorsements.

An overview of some of the state surveys conducted utilizing EPA and USDA grants funding:

1. **California**. In 1996 the State of California EPA-DPR began conducting a series of surveys and published a number of resultant reports including: the *Overview of Pest Management Policies, Program and Practices in Selected California Public School District, (Simmons et al., 1996)* the *1998 Failing Health: Pesticide Use in California Schools* publication, (Kaplan et al.,1998) and the *Contaminated Classrooms* publication California schools reported 93% of 46 school districts surveyed use pesticides, 87% reported using one or more of 27 hazardous pesticides that can cause cancer, affect the reproductive system, mimic the hormone system or act as a nerve toxin (Watnick, 1997; Murray and Watzman, 1991; CEPA).

2. **Maryland**. In 1997, the Maryland DOA conducted a *Summary of Structural Pest Control Programs and Implementation of Integrated Pest Management in Maryland Public Schools*,(MD DOA,1997) followed by: *A 1998 Report on Pesticide Use in Maryland Schools* (MD DOA, 1998; MD PIRG, 1998) and the *Implementation of Integrated Pest Management in Maryland Public Schools* in 2000 (MD DOA, 2000).

3. **New York.** In 1992 New York State Department of Law produced a report *Pesticides in Schools: Reducing the Risks,* (Abrams et al., 1993) followed by a Model IPM policy statement (Browner, 1996) by the NY State DEC and 1999 survey of schools and the resultant 2000 *Pesticide Use at New York Schools:*

Reducing the Risk Report which includes an administrative mandate to reduce pesticide exposure (NY OAG, 2000).

4. **Vermont.** In 1999, Vermont PIRG conducted a survey of pesticides and maintenance chemicals use in Vermont schools followed by their report*: Chemicals in Vermont's Classrooms: Pesticides and Maintenance Chemicals in Vermont Schools* (Sterling and Browning, 1999; VT PIRG, 1999). The 1999, survey of Vermont schools indicated 75% of respondents used pesticides monthly and 30% made regular applications whether pests were present or not. Fifty-eight percent of schools using pesticides kept no records of use. Less than 13% of schools posted signs or warned students before or after applications. (Sterling and Browning, 1999). Illegal practices have been reported in several surveys, including application of pesticides no longer registered for use in schools (Becker *et al*. 1998; Miller, 2002).

5. **Wisconsin.** *The* Wisconsin Dept. of Agriculture conducted a survey and published the *1998 Final Report on Pesticide Use in Wisconsin Schools* (Madison et al., 1998) and the 1998 *Results of Wisconsin Department of Agriculture and Trade Survey on Pesticide Use in Schools*.

6. **Massachusetts**. Massachusetts conducted a Survey of pesticide use: *Practices and Perceptions in 1996*, then published the resultant reports: *Pest Management in Massachusetts Public Schools* (Hollingsworth, 1996) and *Pesticides in Massachusetts Schools (*Miller, S., 2002*).*

7. Other important state surveys and reports included: **Illinois**. In 1998, Safer Pest Control Project conducted a survey of *Pesticide Use in Illinois Public Schools* (SPCP, 1998): and the Survey Findings. **Iowa**. Iowa conducted *the Iowa School Pesticide Use Survey* (ISU, 2000) in 2000. **Maine.** The Maine DOA survey was evaluated in the 2000 publication: *2000 What's Bugging Our Schools: Pest Concerns and Pesticide Use in Maine Public Schools* (Murray, 2000). **Minnesota** conducted a survey in 2000 *Quantitative Research Regarding Pest Management Practices in Minnesota K-12 Schools*. (MN DOA, 2000) **Pennsylvania**. Univ. of Pennsylvania conducted a Survey of Pennsylvania Schools in 1998 followed by the report: *Results from the 1998 Survey of Pennsylvania Schools* (Long, 1998).

Surveys have indicated some improvement over time, or at the very least, an increased awareness of health and safety issues around pesticide use. For example, the number of school districts reporting insecticide use as the most common response to ant complaints dropped by 50% between 2001 and 2004 (Barnes and Sutherland 2005). Surveys continue to this day, including an on-going multi-state survey looking at nationwide progress of school IPM implementation being conducted by the IPM Institute, an NGO with EPA grant funding.

(A comprehensive list of government funded surveys and research is in Appendix A)

2.8 School IPM training programs. Soon after results of the state studies began to be released and research reports on the effects of pesticide misapplication on the health of children were also released, the EPA became even more involved in School IPM. Federal Grants were provided to land grant institutions to develop trainings and materials to help schools understand IPM. In, 2001 a joint venture between EPA, and State Regulatory State Lead Agency (SLA) embarked upon the establishment of statewide guidelines to assist schools with their needs to implement school IPM.

In 1999, Regional IPM Centers, funded by the USDA were founded to promote better adoption of IPM and research better solutions to problems. The Northeast, North Central, Southern and Western Regional IPM Centers were tasked to promote school IPM and SIPM research to continue through projected full implementation of SIPM .

2.9 The effects of the SIPM State laws. Texas and Michigan were the first to adopt School IPM mandates in 1991 and 1992, respectively. These were soon followed by Illinois, Louisiana, Maryland, and West Virginia. To date there are 39 states with some form of regulation or mandate that either requires or requests schools to follow IPM guidelines.

In 1995, the Texas SIPM law went into effect, the first of its kind. This law required all Texas public schools to use less toxic pesticides and to require licensing of all pesticide applicators on school district property. In addition, the law required all schools in Texas to adopt a school board-approved integrated pest management policy and to appoint and train a school district IPM coordinator. The enforcement action of the State Law has added teeth to the adoption in the state. Individuals help oversee state compliance requirements, plus educate and disseminate information.

For instance, in Texas, after the School IPM law was passed, during 2002, 832 independent schools were inspected. Classroom style training was provided for 30 to 50 people at a time. The training also included a tour of the school kitchen and site perimeter. During these inspections, Texas authorities found that a large percent were in noncompliance of the school IPM rules. This non-compliance was mostly found to be from a lack of education on the part of the IPM coordinator and the dissemination of IPM information within the schools and school districts. This prompted the use of more regular school visits, education and trainings, which were a combination of interpersonal and classroom/workshops.

The Department of Entomology at Purdue University, surveyed parent knowledge and perceptions of IPM conducted in an elementary school in 1998 in Indiana (Gibb and Whitford, 1998). The Vermont PIRG conducted case studies in Vermont schools in 1988 (Sterling and Paquette, 1998). While in California, a study was conducted in 1998 in two Elementary Schools, prior to the California School IPM regulatory legislation (Boise and Feeney, 1999). Currently, all of the states with School IPM legislation conduct regular inspections and school IPM workshops.

By 2002, Beyond Pesticides (2002) identified 10,108 school districts, or 59% of the school districts in 37 states that have adopted a policy, through a state law or local school district policy, toward the protection of children from school pesticide use. These legislated policies contain one or more of the four criteria: (a) establish an integrated pest management (IPM) program; (b) provide prior written notification pesticide applications; (c) the requiring of posted pesticides use notification signs; and, (d) the prohibition of certain toxic pesticide applications. The report did not evaluate if, or how, the school districts or states were implementing or regulating these policies.

Of the approximately 17,000 school districts around the country: 26.6% are required to have an IPM policy; 43.1% are required to provide prior written notification of pesticide use; 56.7% are required to post pesticide use notification signs for either indoor or outdoor applications; and, 18.9% have restrictions on certain pesticides (Piper and Owens, 2002; Owens and Feldman, 2002).

By 2002, 4,207 school districts, or 24.7 percent, were under state mandates to adopt IPM and 315 school districts and five individual schools, or 1.9 percent, had voluntarily adopted an IPM policy. Of the voluntary policies, 302 school districts and four individual schools nationwide define IPM in their policy as the use of least-toxic pest management practices, emphasizing non-chemical methods of pest control or pesticide use as a last resort. 253 of the voluntary school IPM programs represent Indiana school districts. Subtracting the Indiana schools, only 62 school districts and five individual schools had voluntarily adopted an IPM policy. Approximately 400 school districts and individual schools hire pest management companies that rely on some biological control methods to implement their IPM program (Piper and Owens, 2002).

By 2004, 12 states mandated IPM, 6 states had a voluntary IPM Rule and twenty states had pre-notification requirements. In an EPA meeting on the progress of SIPM, in March of 2004, a number of challenges in the early EPA SIPM program were identified and Federal funding was deemed essential to initiate any level of effort in states as states had little funding or staff time, schools had even few funds to change pest management practices (Baumgartner, 2004). Partnerships and commitment were deemed absolutely necessary between the Federal Government (funding), EPA Regions, State Lead

Agencies, Universities (CES), Pest Management Professionals**,** and advocacy organizations, such as the IPM Institute. It was also realized that acceptance of IPM over the traditional “Quick-Kill Spray” mentality, would be hard to overcome, especially within the pesticide industry and school staff would need to step up sanitation efforts.

In October of 2006, an EPA and stakeholder development workshop held in Nevada, participants identified and ranked the following research, regulatory and educational priorities to be addressed to optimize IPM in school systems in the United States.

Management Priorities. National management and coordination continued to be a major limiting factor to extending IPM to all school systems. Management functions include organizing information, developing a national school IPM coalition of stakeholder organizations to coordinate implementation, partnering with pest management professionals and organizations to implement effective IPM service relationships and establishing and training IPM coordinators in school systems to oversee day-to-day implementation of IPM policies and programs.

Educational Priorities include: disseminating the SIPM message to decision makers, policy makers, and implementers at all levels of school management; providing education certification for pest management professionals working in school environments; improving training of Extension, state regulators and other change agents; providing training for IPM coordinators to improve effectiveness in their role; and providing education for custodial, maintenance, kitchen and grounds staff, physicians and school nurses.

Research Priorities were identified as needing research on the comparative effectiveness of IPM on academic performance and the economics of IPM vs. conventional pest management and efficacy data on alternative IPM options.

Regulatory Priorities. Need to be focused on pesticide product selection, restrictions and requirements for school IPM plans and policies. Monitoring, enforcement, evaluating pesticide-use records, and mandated reporting for compliance, were cited as barriers to the effectiveness of regulation. High level IPM training / licensing needs to be mandated for pest management professionals. Mandating minimum standards for school IPM at the federal level, including PMP and applicator licensing, and written IPM programs were also considered a priority.

As of 2012, regulations addressing pest management in, around and adjacent to schools vary greatly between states. Requirements in some states include posting and notification of pesticide applications, re-entry periods before staff or students are permitted in treated areas, qualifications for applicators of pesticides in schools, pesticide product selection, adoption of IPM policies or plans, and buffers between neighboring pesticide uses and schools. School district policies also vary widely, with the majority of districts having no formal policies specific to pest management practices and no designated IPM coordinator directing program implementation. (See Table 2.1)

On-site evaluations of more than 29 school systems in more than 14 states indicated that nearly half were violating legal requirements or formal district policies related to pest management (Green *et al.* 2007). Three of the 29 districts had outdated, unregistered pesticides in storage, including DDT. School district and general use policies along with specifications for sanitation and maintenance, even those included in current standards for green buildings (US Green Building Council 2005) fall far short of even basic measures that impact pest management. Some of these measures include such as installing door sweeps at the base of exterior doors to prevent pest entry which can reduce pest complaints by up to 65% (Oi, 2007).

State	IPM Law	Re-entry Time	Notification Time	Post in/out	IPM Coord. Training Time	Applicator Training	Record keeping	Policy
AK	x	Label/24hrs	24 hrs	X	N/A	State L/C	2yrs	
AZ		Not specified	48 hrs		Not specified	State L/C		X
CA	X	Label/ 72 hrs	72 hrs	X	8 hrs	State L/C		
CO		Label	N/A		N/A	State L/C		
CT	X	Label	Not specified	X	N/A	State L/C +12Cr		
GA		Label +	Not specified	X	Not specified	State L/C		
IA		Label	24 hrs	X	N/A	State L/C	3yrs	
ID	X	Label	N/A		N/A	State L/C		
IL	X	Per label	Registry &2d	N/A	6 hrs / 5 yrs	L/C 9 hrs/yr		X
IN	X	Label /4hrs	Registry +48 hrs	N/A	Not specified	L/C 20hrs/yr		
KS		Label	N/A	N/A	N/A	State L/C +SIPM	1yr	X
KY	X	Label	Yes Registry	X	Not specified	State L/C		
LA	X	Label +8hrs	Registry	N/A	N/A	State L/C +SIPM	1yr	X
MA	X	Label +8hrs	48 hrs	X	Not specified	State L/C		
MD	X	Not specified	24 hrs	X	N/A	State L/C	2 yrs	X
ME	X	Label +	yes	X	Not specified	State L/C		
MI	X	Label/4hrs	Registry +48 hrs	X	Not specified	L/C 16hrs/3yrs		
MN	X-v	N/A	Registry	N/A	N/A	State L/C		
MO		Label	N/A	N/A	N/A	State L/C	3yrs	
MT	X-v	Not specified	yes	X	N/A	State L/C		
NC	X-v	Label	yes	X	Not specified	State L/C		
NE		Label	N/A	N/A	N/A	State L/C	3yrs	
NH		Label	48 hrs.	X	N/A	State L/C		
NJ	X	Label / 7hrs	72 hrs	X	Not specified	State L/C	3 yrs	X
NM	X-v	Label +6hrs	Registry	N/A	N/A	State L/C	3 yrs	Xprocedure

NY	X-v	Not specified	Not specified	X	Not specified	State L/C		
OH	X	Label/4hrs	Registry /4hrs	X	N/A	L/C 5hrs/3yrs		
OR	X	Label/72 hrs.	24 hrs	X	6 hrs	State L/C	4 yrs	X
PA	X	Label +7hrs	Registry+72 hrs	X	N/A	State L/C	3 yrs	
RI	X	Label	Registry/24hrs	X	N/A	State L/C		
TX	X	Label +(4-8)	Yes registry	X+48	6hrs/3yrs	State L/C	2 yrs	X
UT	X	Label	yes		N/A	State L/C		
VA		Label	N/A		N/A			X
VT	X-v							
WA		Label/24hrs	48 hrs	X	Not specified	State L/C	7 yrs	
WI		Label	72hrs	X	N/A	State L/C		
WV	X	Label	24	X	N/A	State L/C		

Table 2.2 List of states and associated SIPM regulations as of 3/3/14
Posting: Indoors / outdoors N/A – not applicable
Applicator training: State Certification / License
Re-entry time: according to label plus additional time (whichever is greater)
Law X = yes V = voluntary law

2.10 Federal Legislation. The School Environment Protection Act (SEPA) was introduced into the Congress in 1999, but it has never succeeded as states prefer local control, rather than Federal. Unfortunately, this has led to a split between states. By 2003, 13 states[1] had adopted SIPM laws, mandating that SIPM be practiced by all schools, and state agencies to help enforce and educate. Ten years later (2013) there are 39 states with some form of regulation or mandate that either requires or requests schools to follow some IPM guidelines.

[1] Florida, Illinois, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, New Jersey, Pennsylvania, Rhode Island, Texas and West Virginia all require SIPM in schools in their states.

Is Federal legislation is needed? Taylor and Esdaille (2010) discussed both points of view. Currently, every state takes a different approach to school IPM. Some states, such as Texas, California, New Jersey, and Illinois have comprehensive SIPM state legislation. Other states have only pesticide application notification laws in place, while the remaining states have no regulations as to the use of pesticides in schools. Many states with legislation have difficulties enforcing the regulation mandates, mainly due to funding.

In some states, SIPM is considered another un-funded state mandate burden on schools in other states. Some issues identified by North Carolina State University as to the lack of state support for Federal SIPM legislation was (1) a lack of understanding by school administrators and staff that SIPM programs require good cooperation, coordination and communication; (2) skepticism about the effectiveness of IPM; (3) the selection of the "low bidder" on pest management contracts, leading to poor contract pest management; (4) liability related to pest control; (5) the lack of motivation of Pest Management Professionals in some areas to use IPM; and (6) the lack of IPM education and the perception that pests can only be controlled by the application of pesticides (Nalyanya, et al., 2005). The most organized push for SIPM comes from the EPA and the IPM Institute with its push toward full implementation of School IPM in all US schools by 2015. *School IPM 2015, A Strategic Plan for Integrated Pest Management in Schools in the United States*, lays out a plan of action to achieve this goal by bring together government agencies, advocacy NGOs, Universities, and organized labor, and pesticide applicator licensing programs (Green and Gouge, 2009; *IPM Institute 2009*). Taylor and Esdaille argue that Federal legislation is the means to provide consistency for SIPM policies, however due to the anti-regulatory climate of the past 13 years, attempts to pass such legislation have been unsuccessful.

The Children's Environmental Protection Act **(** S.1112 Sen. Boxer, D-CA; H.R. 199, Rep. Moran, D-VA.), proposed that each school and day care center that receives Federal funding shall take steps to reduce the exposure of children to pesticides on school grounds, both indoors and outdoors; and provide parents with advance notification of any pesticide application on school grounds. This Senate bill had 4 Co-sponsors.

The School Environment Protection Act of 1999 (H.R. 3275, Rep. Holt, S.1716), introduced 10/99 by Sen. Torricelli, was an attempt to amend FIFRA (Federal Insecticide, Fungicide and Rodenticide Act). The FIFRA amendment was intended to require local educational agencies and schools to implement integrated pest management to minimize the use of pesticides in schools and to provide parents, guardians, and employees with notice of the use of pesticides in schools, and for other purposes. This House bill had 21 Co-sponsors.

The School Environment Protection Act of 2009 (SEPA) H.R. 4159, was introduced on Dec. 2, 2009 from the House Committee on Agriculture. This bill had 14 co-sponsors. Like its predecessor bill, it was unsuccessful in passing.

2.11 The Economics of IPM in Schools. Does IPM cost more than conventional (pesticide intensive) pest control? Over the long-run IPM is comparable or cheaper than conventional approaches**.** However, it takes more time to provide increased service and monitoring. Inefficient, pesticide-based programs can save money with IPM.

The fact that pest control is not a large part of the school's budget should not hinder the school's transition to an IPM program. Certain facets of an IPM program can be implemented over time in order to keep costs down. Short term costs may include IPM training, purchasing new equipment, hiring an IPM coordinator or making preliminary repairs to buildings. Depending on the school's current maintenance, sanitation, and pest management practices, some economic investment is usually required at the outset of an IPM program.

Activities that can be absorbed into a school's existing budget include training of maintenance, cleaning, and food service staff and educating students and teachers to modify their behavior. In addition, some school maintenance and structural repair funds may already be budgeted for activities such as replacing water-damaged materials, landscaping, waste management, and physical barriers. Generally, much of the costs that were allocated to chemicals application will go to labor in an IPM program.

IPM using contracted PMPs. A study was conducted in North Carolina elementary schools that compared IPM to conventional pest control practices. All of the schools used contracted PMP practices. After 5 months, PMPs in 5 of the 9 schools began using IPM through monitoring and inspection, determined that pesticide applications could be reduced simply by not treating when pests were not present (Williams et al., 2005).

Schools across the country are enjoying the effect of IPM on their budgets. A Maryland school district reported that their IPM program lowered pest control costs by $6,000 in its first three years. Several states with programs to promote IPM policies, including Florida, Maryland, Pennsylvania, and Texas, describe an overall reduction in pesticide use (up to 92 percent), fewer complaints about pests, and significantly reduced costs for pest control. Connecticut schools reported that 87% of the 77 school districts surveyed sprayed pesticides indoors. Pesticides reportedly applied indoors include organophosphate and carbamate insecticides that may adversely affect the human nervous system via cholinesterase inhibition. Washington schools reported that 88% of the 33 school districts surveyed use one or more pesticides that can cause cancer, or damage the nervous system, hormone system or reproductive system. Overall, "preliminary indications from IPM programs in school systems suggest that long term costs of IPM may be less than a conventional pest control program" (SEPA).

Additional cost benefit case studies:

The Santa Barbara School District, California, performed a before and after cost comparison on their IPM implementation. Contractors hired to do indoor pest management charged $1,740 per year for control that the school maintenance staff were able to achieve with a few hours of work and $270 for two years' worth of least toxic bait under the new IPM program.

1. After an initial investment in maintenance, the long term costs associated with pest management decreased for Auburn, Alabama schools: (1) since the IPM program began, the cost of pest management has been cut in half to $17,000

annually at MCCSC; (2) IPM saved West Ottawa schools $10,000 annually on their pest management; (3) pesticide related expenses have decreased 20 to 25 percent at Baldwin schools; and,(4) the herbicide-free project at Sandburg Elementary began with just $165, which the District used on its previous program, along with minimum funds from the District and PTA groups that were used for purchasing new supplies and almost four years later, it was "almost free to maintain" (Rumph, et al., 2000).

The IPM Institute highlighted successful school IPM programs in their 2011 *Business Case for Integrated Pest Management in Schools: Cutting Costs and Increasing Benefits* report of examples of school IPM stories that are a model for all school districts, and childcare facilities (Chambers et al., 2011).

2. The Lewis Cass Technical High School in Detroit, Michigan, a building that was over one hundred years old has had tremendous success with IPM for cockroaches and rats. Because toxic pesticides were not used, students at the school took the lead in running the school's pest management program. The students enjoyed knowing they were making a difference while at the same time creating a safe and healthy school environment (Lavendel, B.; 2001).
3. Montgomery County Public Schools, Maryland, voluntarily adopted an IPM program in the spring of 2000. The district serves over 9,000 students, grades K-12, in over 20 school buildings, totaling over two million square feet. The entire program is based on monitoring for pests and addressing *specific* problems, beginning with a comprehensive inspection of each facility to identify areas,

which need monthly monitoring (particularly in the cafeteria and kitchen). The primary differences between the old pest control contract and the new IPM contract are communication, support, and accountability. Under the old system, school custodians, officials, teachers, and parents were not informed on what pesticides and how many were applied in the school and whether there really was a pest problem. Now the pest control technician and custodian remain in regular contact and the District IPM manager oversees pest control in each school. Under the new system, anyone can easily access documents describing both the nature of pest problems and the treatment methods. The IPM program costs the school $32 a building per month, or an increase of $10 per month over the old contract. Included in the $32 is the cost of the initial inspection of each facility. After the initial inspection, the technician's monthly service visits typically take no longer than the traditional service of spraying. Aside from the initial round of inspections, the cost of the monthly service contract is reduced (Ruther, 2003).

4. In 2000, the South Burlington School District (SBSD), Vermont, was facing a drought that resulted in an influx of ants and bees. The school custodians were concerned about what the impact of pesticides would have on South Burlington's wetland environment and children's health, if used. South Burlington's written pesticide protocol stated that the District should reduce the use of pesticides in schools by employing IPM strategies, such as making structural changes to buildings and improving sanitation. It states that when pesticides are needed, "the least toxic chemical controls that will be effective should be used." The cost of

IPM strategies at SBSD has not increased the cost of pest management. Since the schools have made structural changes to keep the pests out, they have not had huge pest problems. If pest problems do occur, a contract PMP would only uses pesticides if non-chemical alternatives fail (Miller, 2003).

5. In the Irving Independent School District (ISD), Texas implemented SIPM as a result from the passage in 1991 of the *Texas Structural Pest Control Act,* which required the adoption of IPM programs in Texas public schools after 1995. The Irving ISD is comprised of 45 buildings, 4.4 million square feet, and 466 landscaped acres. Per the state law, IPM focuses on eliminating pests while reducing the use of chemicals. Requirements were established directing the use of least toxic methods available to control pests, with lists of allowable products. After several students in the Irving ISD had severe reactions to chemicals, the District wanted to provide as “clean” a learning environment as possible. The main pest problems confronting the District were mice, rats, roaches, weeds, and ants. The program had to overcome the attitude of “the silver bullet of spraying first”, from teachers and administrators. Pesticides are now used only when it is determined that non-toxic, IPM methods are failing and a health hazard exists. By paying attention to the sources of problems, the Irving ISD has operated a successful IPM program. Written plans are in place, principals are trained once a year and custodial and maintenance personnel are trained every six months (Reiner, 2003).

6. Locust Valley Central School District (LVCSD), located in Nassau County, New York, began their School IPM program in 1994. The pest problems facing LVCSD included termites, German cockroaches, bees, geese, and poison ivy. Thorough cleaning was a priority, with special emphasis on food service areas, restrooms, and areas with extensive plumbing. Although pets and snacks were allowed in the classrooms, even more targeted cleaning was implemented. The facility director is a certified pesticide applicator and is fully knowledgeable in IPM practices. Kitchen and other food areas were monitored with sticky traps on a monthly basis. Caulking and sealing of holes or cracks in the foundation became common practice. Since pesticides are not purchased, the IPM program has become more labor intensive, however, this is considered a savings (Hurst, 2003).

Non-chemical controls used in SIPM programs are: glue traps, pre-baited traps**,** laser lights (for starlings, grackles, sparrows) to disrupts roosting**,** caulking/pest proofing**,** other maintenance, expanding foam, 'Stuff-it', vent screening**,** air curtains, door sweeps**,** dumpster design, waste container placement, waste container cleaning**,** bird barriers, tape, netting, wires**, sanitation,** steam cleaning and vacuuming.

2.12 School IPM in 2013 through 2015

The EPA goal of **School IPM** is for every US public school to be practicing high-level IPM. The term "high-level" describes the progression of pest management strategies from high-risk, reaction-based action towards least-risk, long-term prevention and avoidance of pest problems.

The scope of the initiative includes approximately 49.1 million students that are served by 6.1 million staff including 3.1 million teachers in 14,383 public school districts in the US (US DOE, 2005, 2007). These districts include approximately 95,726 elementary and secondary schools. An additional 5.3 million K-12 students are served by 425,406 teachers at 28,273 private schools should also be included.

The IPM Institute compiled the report: *SCHOOL IPM 2015: A Strategic Plan for Integrated Pest Management in Schools in the United States* from USDA grant funding (Green and Gouge, 2009). According to this report, one of the goals of the IPM Institute is to have full SIPM implementation in schools nationwide by 2015: To accomplish this it would require that:

1) All school systems have a written board-approved IPM policy and plan.
2) All schools have an IPM coordinator, trained and responsible for day-to-day implementation of the school IPM policy.
3) IPM training is ongoing for staff in all schools.
4) All Departments of Education incorporate pest proofing into facility design specifications.
5) All states include school IPM in the state training and licensing process for applicators.
6) A National SIPM training should be offered annually for change agents (decision makers in the school community).

7) Sustainable funding should be secured for an individual in each state lead agency to focus on school IPM.

8) All school systems should use science-based criteria for identifying and selecting least-hazardous pesticides when pesticides are needed.

9) All school IPM programs and plans are should be reevaluated annually.

The *School IPM 2015 Strategic Plan* continues: “full implementation of Integrated Pest Management is affordable and cost-effective, and can reduce pesticide exposure, pesticide use and pest complaints. However, adoption remains low. A coordinated national effort is critically needed to make safe and effective pest management the standard for all of our schools” (Green and Gouge, 2009).

Many of the requirements of the *SIPM 2015 Strategic Plan* were dependent on unlimited funding into the hands of the writers and government imposed mandates. As funds and resources have tightened since these requirements were crafted, many of them are no longer applicable. Although the EPA does support the IPM Institute and its goals, its own strategy is a bit more realistic, and without hard and set deadlines. Beginning in 2013 a top down social marketing campaign began reaching out to the Dept. of Education, National Pest Management Association (NPMA) and National Association of School Nurses (NASN), among others, with blogs, articles in the trade publications, appearances at conventions, and high level talks between top agency officials, webinars, and educational materials development.

Although IPM has gained recognition among the school community as a desirable approach constraints to adoption remain similar to those developed by the Institutional Constraints Resolution Team at the National IPM Forum. These constraints to the full implementation of IPM include: (1) low awareness of the need and benefits among those agencies, organizations and individuals with potential roles in school IPM; (2) insufficient funding to apply available expertise and tools; (3) poor regulation enforcement and insufficient regulations in many states; (4) School budget shortfalls and deferred maintenance; and (5) a lack of national and regional coordination. (Sorensen 1992)

Some school districts face a poor understanding of the partnership required between pest managers and the rest of the school community, and poor quality control over pest management services. Many districts lack training in pest prevention for front line staff including administration, teaching, custodial, food service, maintenance and facility design and construction. Weed management is particularly challenging, with limited awareness and availability of alternatives to chemical-intensive management, which is exacerbated by the fallacy promoted by the chemical industry that chemical pesticides can easily mitigate any pest problem with no mention of potential consequences to the most vulnerable.

The strategic plan for pest management in schools is designed to: increase awareness among legislators, regulators, grant makers, researchers, non-governmental organizations, administrators and other school staff, pest managers, and others for the need for improvements in pest management in schools; and to persuade these key influencers and implementers that high-level IPM is possible, practical, affordable and effective.

2.14 IPM in Childcare Centers

Children's health has been an Environmental Protections Agency's priority since its inception. Over the years, numerous initiatives have focused on use of pesticides in K-12 schools; however, the 0-6 year age group has only marginally been the focus of such efforts. There is no federal statutory or regulatory pesticide authority to allow for conducting enforcement activities in childcare centers. State Lead Agencies have primacy on investigating and enforcing the use and misuse of pesticides. IPM is not a federally mandated program. While the Universe is large (In R2 alone there are roughly 46,000+ CCCs) the resources are limited. There are a large amount of stakeholders and partnerships that need to be established.

A few national studies have documented the presence of pesticide residues and other potentially hazardous substances in many childcare centers (Tulve et al., 2006; Breysse et al., 2004; USEPA, 2008; Viet et al., 2003). The First National Environmental Health Survey of Childcare Centers reported 75% of respondent child care centers as having pesticide applications in the previous year (Viet et al., 2003). There were also a number of state surveys including those taken in Iowa (ISUE, 2007), Minnesota (Jones, 2002), California (Messenger, et al., 2008), and North Carolina (Strandberg et al., 2009), showing significant pesticide application issues around the country.

Although exposure to pesticides may present a risk to all people, young children generally face higher risks than adults, may be more susceptible than adults to certain pesticides, and may be more greatly exposed than adults. Children bear a disproportionate burden of risk and need additional protection (NRC, 1993). Many infants and young children spend as much as 10 hours per day, five days of the week, in child care centers and preschools. (Tulve, et al., 2006) Children spend more time on the floor, where residues can transfer to skin and be absorbed. (Bradman et al., 2006) And young children also frequently place their hands and objects in their mouths, increasing the potential for non-dietary ingestion of pesticides. (Cohen et al., 2000; Lo and Connell, 2005) Young children are less developed immunologically, physiologically, and neurologically, therefore they may be more susceptible to the adverse effects of chemicals and toxins. (Cohen et al., 2000; Lo and Connell, 2005; Bearer, 2000)

A number of NGO's have been working to promote "Clean, Green and Healthy Schools and Childcares". In 2010, the EPA Region 2 Pesticides Program conducted an interpersonal study of childcare centers by visiting them and conducting before and after evaluations of pesticide practices (Anderson et al., 2010). The EPA Office of Children's Health Protection (OCHP) developed an extensive web page and linked to the best existing IPM resources available from NGOs, government agencies and State Lead Agencies. Following the lead of the EPA Region 2 pesticides program, they initiated the first IPM in CCC webinar in 2011 in an attempt to reach more child care stakeholders. Since then, OCHP has developed a series of Clean, Green webinars, for a full range of topics related to childcare centers.

2.14 Bed Bug IPM in Schools and Childcare Centers

Bed bugs create a huge panic problem in schools and childcare centers. Bed bugs have developed resistance to many common pesticides; therefore a multifaceted IPM approach is often the most effective way to mitigate these pests. Therefore, the bed bug IPM campaign dovetails nicely with the SIPM initiative. Schools, childcare centers and health care facilities are typically transitional sites, where bed bugs hitchhike in on belongings of students, patients or staff, and while they are looking for a new host, they are picked up by others. For some school districts, bed bugs have been the impetus for beginning to learn about SIPM programs.

2.15 Conclusion

State surveys reveal that routine pesticides are still commonly applied in schools across the country, however progress is being made. By 2002, school districts in 37 states that have adopted a policy, through a state law or local school district policy, and by 2004, 12 states mandated IPM, 6 states had a voluntary IPM Rule and twenty states had pre-notification requirements. As of 2012, regulations addressing pest management in, around and adjacent to schools vary greatly between states. (Table 2.1)

Federal Legislation, as far as The School Environment Protection Act (SEPA) has not succeeded as states prefer local control, rather than Federal, and is unlikely to be pass, if legislation is reintroduced in Congress.

As far as The Economics of IPM in Schools, it has been clearly demonstrated that over the long-run, IPM is comparable or cheaper than conventional approaches**.** The fact that pest control is not often a large part of the school's budget should not hinder the school's transition to an IPM program. Certain facets of an IPM program can be implemented over time in order to keep costs down. The cost of implementing an IPM program is not an impediment to moving IPM forward.

The research identified a number of challenges in the SIPM program were identified. Federal funding was deemed essential to initiate efforts in states as states had little funding or staff time and schools had even fewer funds to change pest management practices.

Although IPM has gained recognition among the school community as a desirable approach constraints to full implementation of IPM include: (1) low awareness of the need and benefits among those agencies, organizations and individuals with potential roles in school IPM; (2) poor regulation enforcement and insufficient regulations in many states; (3) School budgets and deferred maintenance; and (4) a lack of national and regional coordination.

Surveys and grant research found that some school districts face a poor understanding of the partnership required between pest managers and the rest of the school community, and poor quality control over pest management services. Many districts lack training in pest prevention for front line staff including administration, custodial, food service, maintenance and facility design and construction. Weed management has limited awareness and availability of alternatives to chemical-intensive management.

To date, the School IPM program has been a non-traditional environmental education campaign. Other environmental education campaigns conducted by the EPA such as Energy Star®, or by the CDC such as the healthy food-anti-obesity initiative, have relied heavily on outside advertising agencies and social marketing campaigns to deliver this information. In this case, the EPA uses more of a top-down partnership-building approach. High level talks between agencies, organizations, and other change agents are ongoing.

With sharp cuts in federal funding and the size and scope of the SIPM initiative and goals, we may need to call on new technologies to reach more schools in a more cost effective manner. SIPM webinars could be an effective agent for preliminary training to some school change agents such as school administrators and staff.

To date, only one state, Texas, is utilizing the webinar venue, and that is only for additional information on pests. EPA is just beginning to conduct webinars for IPM, beginning in EPA Region 2 in 2012, and other trainings in 2011, and just beginning to venture into the realm of social media. (See Chapter 4)

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Chapter 3.

The IPM message as related to Environmental Communication

3.1 Abstract Through a series of multiple case studies, this research utilizes five types of environmental communication to deliver the message of Integrated Pest Management (IPM) as it relates to schools, childcare centers and bed bugs. Elements of each of the following communication methods helps to deliver the IPM message: 1.) rhetorical, 2.) advocacy, 3.) risk communication, 4.) educational, and 5.) social marketing.

The hypothesis of this project is that through the use of both traditional training venues and new IT training venues, the combined use of these environmental communication strategies will be enough to change behavior of our selected target audiences with respect to pesticide use.

3.2 Introduction to forms of Environmental Communication.

Environmental communication refers to the study and practice of how individuals, institutions, societies, and cultures create, distribute, receive, understand, use, and interact with messages about the environment. (Wikipedia) Through a series of multiple case studies, this study utilizes five types of environmental communication to deliver the message of Integrated Pest Management (IPM) as it relates to schools, childcare centers and bed bugs. Elements of each of the following communication methods help to deliver the IPM message: 1.) Rhetorical, 2.) Advocacy, 3.) Risk communication 4.) Educational, and 5.) Social marketing.

Environmental Communication is both pragmatic and constitutive. Pragmatic because it helps individuals and organizations to accomplish goals and literally do things through communications, such as educating, alerting, persuading and collaborating. It is also constitutive because it helps to shape peoples' understanding of environmental issues themselves, such as environmental values, attitudes and ideologies through the environmental issues and problems (Cox, R., 2010).

The Argument / Rational. As pesticides are designed to kill or otherwise adversely affect living organisms, there exists a clear balance between the risks and benefits of the use of pesticides. The very nature of most pesticides creates some risk of harm to humans, animals and the environment. At the same time, pesticides are useful to society. Some pesticides can kill pests and organisms that spread disease, and cause harm to infrastructure, food sources and more, while other pesticides, such as biologically-based pesticides, pheromones, and microbial pesticides are often safer than traditional chemical pesticides. **The key message** of this project is that "it is better to reduce the use of pesticides and combine with other strategies, such as the use of less toxic pesticides, can be used in an IPM approach, to promote better health and safety of vulnerable populations". IPM can effectively reduce potential health risks to vulnerable populations by delivering a message that uses pesticide as part of an IPM program, often at a reduced cost, and can thus achieve maximum results with the application of fewer toxic chemicals.

Risk communication is a growing area of research in both the public health and environmental communication fields and includes two main areas: Evaluation of the effectiveness of a particular communication strategy for conveying technical information about health risks to potentially affected populations, such as the risk of pesticide exposure to young children and others, and evaluating the impact of the IPM message associated with these campaigns. The efficacy of the risk communication message will be measured by analyzing the answers to the post-presentation questions.

A subcategory of environmental communications, **environmental rhetoric**, characterizes the way the IPM message is delivered and the effectiveness of delivery. The environmental rhetoric employed in this study includes the modes of persuasion that are used to communicate about IPM and includes the study and analysis of the way this is communicated in educational campaigns. The rhetoric that is promoted is the questioning of common social behavior such as the application of pesticides at first sight of a bug or application of pesticides as a preventative measure. This study uses rhetoric within the presentations to question taken-for-granted views of behavior associated with the use of pesticides and includes the articulation of IPM as the alternate policy. The goal is to change the basic thought process with regard to pest management, and to influence our target audiences' attitudes toward the application of pesticides. The IPM focused rhetoric used in this campaign, prioritizes the precautionary principle (safety) and serves to expand the range of choices regarding pests and their management.

Another subcategory**, of environmental communications, environmental advocacy**, is the act of persuading or arguing in support of a specific cause, policy, idea or set of values. This advocacy campaign is a strategic course of action, involving communication that is undertaken for the specific purpose to protect vulnerable populations from unnecessary pesticide exposure. One advocacy topic that is discussed is the questioning of common social behavior, such as the application of pesticides at first sight of a pest. Another is the broad-based application of pesticides as a preventative measure, especially to indoor facilities that young children frequent.

This study uses critical rhetoric and advocacy to question or denounce these taken-for-granted views, and the behaviors associated with the use of pesticides. It also includes the articulation of IPM as the alternate policy. **The ultimate goal is to change the basic thought process, with regard to pest management, and to influence our target audiences' behavior and attitudes with regard to IPM and the application of pesticides.** This advocacy campaign is a strategic course of action, involving communication that is undertaken for the specific purpose to protect young children and vulnerable populations from unnecessary pesticide exposure. In addition, studies have shown that there are larger amounts of pesticides applied in urban Environmental Justice (EJ) areas. Children and other vulnerable populations in EJ areas, such as the elderly, or those with chronic illnesses may also be exposed to higher dose of pesticides in their homes, daycares, or schools then the general population. (US EPA, 2005; Surgan et. at., 2002; Brenner et al., 2003) The modes of environmental advocacy used here include public and intra-governmental agency education campaigns to influence public servants and private administrators to include IPM in their decision-making paradigm.

The difference between an advocacy campaign and critical rhetoric is not the goal, but the strategic course of action by which a campaign pursues such goals. This IPM focused advocacy and rhetoric prioritizes the precautionary principle (safety), envisioning a better quality of life, and serves to expand the range of choices regarding pests and their management and tests venues of delivery. Risk communication is also at play in these IPM campaigns, as it gives clear information about dangers and actionable guidance on the potential risks of pesticides to children and other vulnerable populations.

Social marketing is "the application of commercial marketing technologies to the analysis, planning, execution, and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of society (Andresen, 1995). Social marketing attempts to change public behavior in order to reduce health risks, or to achieve an environmental goal for the common good **(**Andresen, 1995; Kotler and Lee, 2008, Rothschild, 2003).

Remember that the ultimate goal is to change the basic thought process, with regard to pest management, and to influence our target audiences' behavior and attitudes with regard to Integrated Pest Management (IPM) and the application of pesticides. Social marketing in this study is about influencing the behaviors of target audiences with regard to the decisions they make about pesticide use and application to control pests.

While advocacy, risk communication and educational campaigns will deliver the message about IPM, they sometimes fail to alter their behavior and to overcome the attitude-behavior gap that social marketing strives towards bridging. Social marketing is simply about influencing the behaviors of target audiences to cause a social problem to go away (Andresen, 1995). It is not about mere education or attitude change, except to the extent that this might lead to the intended influence on behavior.

Risk, advocacy and rhetoric are applied within the Social Marketing framework to diverse upstream audiences, to influence behavior change which will ultimately improve health, prevent injuries, and protect the environment (Kotler and Lee, 2006, 2008). In this study, Environmental and policy changes to protect young children and other vulnerable populations from pesticide exposure, are the primary goals. Most of the presentations are given to audiences that provide an upstream change to provide safety to the downstream populations, the children and other vulnerable populations.

Through advocacy and social marketing we try to give an appealing argument for the safer, less toxic approach to pest management. The advocacy and social marketing aspects of the campaign promote the use of IPM in an attempt to change the behaviors of key administrators and managers with regard to pest control and pesticide use. In addition to the public health aspect of IPM advocacy, there is the need to educate the administrators about IPM to control other pests, such as bed bugs which have developed a resistance to many pesticides, and no longer respond well to conventional chemical treatments. Under these circumstances, it is also essential to provide administrators with knowledge of IPM to control these pests. Through environmental rhetoric we are promoting IPM and striving to measure the effectiveness of the message delivery venue.

The **Educational initiatives** included in this program instruct people on weighing the benefits and costs of pest management alternatives, list opportunities for action, and often impart in them into the skills that they need to give them the self-assurance to act, even if the actions may be outside their cultural norms. Educational systems' are not sources of influence, but teachers, school and childcare administrators, health department directors, health care professionals, and government officials are. They are the individuals who encourage and impart their knowledge of IPM within their facilities or with the people that they work with, resulting in safer actions.[i] The presentations are designed to impart in these upstream groups the knowledge of how to make smart choices to avoid chemical exposure to their charges. These smart choices may include getting rid of pests through the implementation of IPM, instead of picking up that can of bug spray, or not using toxic substances around vulnerable populations, or to make sure you read and follow the directions, and precautions on the pesticide label to avoid product misuse incidents. The presentations are also designed to instill the importance of becoming proactive about both environmental and personal safety when making pest management decisions.

3.3 How the elements of environmental communication will be evaluated

The data coming from the studies will be analyzed across multiple dimensions: 1.) Social advocacy, and risk will be evaluated by the effectiveness of the communication strategy and the impact of the message, 2.) Rhetoric will be reviewed by the course of action used to achieve the goal (the method of delivery or venue), and 3.) Effectiveness of the education will be measured by the results of the scores on the post evaluation questions. 4.) Social marketing will be measured by actual behavior change, where applicable and discussed further in Chapter 4.

The research goal of this project is to evaluate the use of three different communication venues that all utilize the five forms of environmental communication. These are all focused on changing the behavior of selected target audiences whose job it is to deal with pest problems in their facilities and to protect their specific charges. This leads to the greater question: **What is the most effective way to conduct campaigns promoting IPM?** This portion of the study will seek to answer this question by analyzing each of the modes of delivery.

3.4 Methods

The hypothesis of this part of the project is that combined use of these environmental communication strategies, will be enough to change behavior of our selected target audiences and to protect the vulnerable populations in their charge, from pesticide misuse. Here are the strategies used to implement the IPM campaigns.

In this study, educational approaches to social marketing were implemented in schools, childcare centers shelters, and health departments or in other local, state or federal programs. These social marketing messages were presented to diverse upstream audiences, to influence behavior change in pest management. Individual behavioral and institutional policy changes are the primary goals of the IPM outreach program. Most of these outreach programs were focused on behavior and policy changes made by the 'Enablers', such as: the CCC administrators, school administrators, health professionals, and care givers. These are the individuals who must act to provide a safer environment for the downstream individuals, the children. This approach to Social Marketing was in some cases, akin to a train the trainer approach. Each case study represented one or more approaches to administering the message of IPM.

3.5 Case Studies.

The data coming from the studies will be utilized across multiple dimensions: 1.) Social marketing will measure actual, or perceived behavior change, 2.) social advocacy and risk will evaluate the effectiveness of the communication strategy and the impact of the message via answers to evaluation questions, 3.) educational efficacy is also measured by correct answers to post-presentation questions, and 4. rhetoric will be analyzed by the success of the course of action used to achieve the goal (the method of delivery) and is also directly linked to the efficacy of the overall presentation.

Each case study represents one or more approaches to administering the message of IPM. The case studies include 1.) IPM in Childcare Centers, 2.) School IPM, 3.) Bed bugs go to School and 4.) Bed bugs for Health Care providers which all support IPM messaging.

The following presentations were developed and clearly fit the advocacy campaign profile. The titles demonstrate the branding of the issue, such as: *"School Integrated Pest Management: Protecting Children in Schools (Childcare Centers) from Pests and Pesticides".* "School Integrated Pest Management" is the name of the program we are advocating; however "Protecting Children in Schools (Childcare Centers) from Pests and Pesticides" describes the branding of the effort in a way that attracts attention and raises immediate empathy to the cause. The name of the program also reaches a broad audience.

The **"Bed Bugs Go to School"** presentations also have a branding title that hits home quickly. Bed bugs are the pests that we are discussing, "Go to School" hits a shocking note to all people who have children in school, or went to school – everyone. What are bed bugs doing in school? The question is raised, but the subtle, message really is: How to get rid of them safely, and without panic. This brings IPM into the discussion, but is not identified as IPM until late in the presentation – long after the audience has followed along and hopefully, bought into the safer, less toxic alternatives to heavy duty pesticides, that are often not effective against these pests.

The next step in all advocacy and social marketing campaigns is to determine who the audience and supporters will be and any potential detractors. For the School IPM and Child Care IPM, and Bed bugs Go to School, a list was made of the low hanging fruit: the supporters, and those easiest to reach were: school district administrators, school principals, school nurses, childcare administrators, buildings and grounds administrators, school board members and some pest management professionals. The detractors are mainly on the industry side. They feel that using IPM will use less pesticides and may cut into corporate profits. Perhaps, but that is only partly true. A main component of IPM is using least-toxic pesticides, baits and traps. The less-toxic pesticides, devices and monitoring also add to the economic profitability of the industry.

A considerable data base of e-mails was made of all key contacts through State Departments of Education, local town DOEs, regional and national school board Associations, state and county nurses associations and other contacts. This is the longest part of the process, but is one of the most important. Anyone can have a great message, but if you cannot reach people, your efforts will go nowhere. The same process was followed for the health care industry, relating to bed bugs. Contacts were developed for state, county and even local health care providers, first responders, local and state police, shelter administrators, HUD, the 2-1-1 system, and more. Detractors may be industry and local pest management companies that may be accustomed to 'the sprays first, think second' mentality.

3.6 Presentations

The presentations that were developed as part of this research program follow:

Presentations #1 and #2. "School Integrated Pest Management: Protecting Children in Schools (Childcare Centers) from Pests and Pesticides"

First, we will explain the relationship between the special vulnerability of young children and pesticides use in schools. (*The communication of pesticide risk to children is* *highlighted in this section.*) Then the presentation answers: What are the benefits of IPM, when adopted by your school district? (*Here is when advocacy enters into the presentation*.) What are the actions needed to eliminate pests through IPM in schools? (*Education and Rhetoric are the course of action*.) We will identify pests that commonly sneak into schools, how they get into schools, and what types of conditions they are looking for. Specific IPM steps are described, such as setting pest thresholds, inspecting for evidence, monitoring for pests, and identifying points of entry. You will be shown how to eliminate the pests' ways of entering the school, and why sanitation and maintenance are so important in IPM. By starving pests out, eliminating food and water, and then taking away their homes by eliminating clutter, pests are no longer happy in their surroundings, reducing pest problems. You will be given a tour of pest vulnerable areas in schools, such as: kitchen and food prep areas, food and supply storage areas, cafeterias, classrooms, classroom storage areas, coat storage, and bathrooms. Outdoor issues such as standing water and garbage areas are also reviewed. (*Mainly education for the attendee, however rhetoric, risk communication and advocacy are still in play during this section of the presentation*.)

This final section describes the essential ingredients for a School IPM program. It outlines what should be included in the district policy and plan, and the plan contents for individual schools. The responsibilities of your school IPM coordinator are defined, followed by an explanation of why staff, and even student involvement is important for a successful program. All teachers and staff should be aware of IPM best practices, and protocols for reporting pests when found in the school. (*Educating the attendee is still the focus in the last section. The entire presentation incorporates social marketing, as we are striving for behavioral change, or at least intent toward behavioral change, as will be measured by the post-presentation question answers.)*

See Appendix C for presentation outlines.

Presentation #3. "Bed Bugs Go to School"

As the pest populations boom, bed bugs can, and will hitchhike into your school. The school can be bed bug free one day and have bed bugs brought in the next. For school administrators and facilities managers, bed bugs arriving at the school can be a recipe for big headaches. (*Risk communication opens the presentation*.) The formula for success in dealing with bed bugs is to prepare for the inevitable, and educate everyone. This presentation discusses why bed bugs are such a challenge and how you can be proactive. The key is to educate everyone, as much as possible to stop bed bugs at their source, 99% of the time this is the home. To do this you must engage the entire school community by educating the administration, maintenance and custodial staff, faculty, staff, students and especially the parents. Next, develop a school-specific written "bed bug action plan" in advance of problems including the development of specific procedures and responsibilities when responding to a bed bug sightings, incidents, and possible bites on students, and things to avoid. The presentation also reviews how and where to inspect for bed bugs, how to manage bed bugs with control tactics that are consistent with school IPM guidelines and regulations; and bed bug prevention such as reducing hiding spaces through clutter containment and removal, limiting the items being brought to school, and proper coat and backpack storage. Finally we address avoiding litigation due to bed bugs. (*Education, education, education – is the way to prevent the hysteria that comes with bed bugs. Woven into the presentation is advocacy for IPM, however it is delivered subtly. Pesticides and pesticide safety are brought in toward the end of the presentation, using both risk communications again, along with advocacy and rhetoric. The entire presentation incorporates social marketing, as we are striving for behavioral change, elimination of most panic, panic management through mitigation education, as will be measured by the post-presentation question answers*.)

Presentation #4. “The Problem of Bed Bugs for Health Care Providers.” This is a modified version of presentation #3, however it is focused not on school or childcare facilities, but on healthcare facilities, shelters, and multifamily housing. Most of the slide content and the IPM message is the same, however the photos are different.

(See Appendix C for presentation outlines.)

3.7 Metrics used to determine presentation efficacy.

Risk communication for the presentations is measured by evaluating the effectiveness of a the communication strategy used for conveying technical information about IPM and the risk of pesticide exposure to young children and others, associated with these campaigns.

This **environmental advocacy** campaign argued in support of IPM as a strategic course of communication, undertaken for the specific purpose to protect vulnerable populations from unnecessary pesticide exposure. One advocacy topic that was discussed in each presentation was the questioning of common social behavior, such as the application of pesticides at first sight of a pest. Another, specifically in the SIPM and CCC IPM presentations was the broad-based application of pesticides as a preventative measure, especially to indoor facilities that young children frequent. Answers to the following questions were used to determine efficacy of the risk message and the success of the advocacy initiative.

- *Why use IPM?* IPM is more effective, easier, and safer and will save money.
- *Did you leave the presentation with a greater knowledge of IPM?*
- *Have you gained a greater knowledge of bed bug control methods?*
- *What should you do first if you think you see a bed bug?* A. Capture it for proper identification.
- *Which are not low – toxic pesticides?* A. Mosquito sprays
- *All of the following are dangerous and Illegal pesticides except***:** A. Diatomaceous Earth – a pesticide used to physically kill bed bugs
- *Did this presentation clearly explain on-the-job bed bug precautions?*
- *Did the presentation clearly explain the special vulnerability of children to pesticides?*
- *Which is NOT a step to follow in IPM?* A. Applying pesticides to prevent future pest issues is not a step to follow in IPM. Or posting a security guard at the entrance of their facility was not an effective way to keep pests out.

- *How can schools / Childcare centers be bed bug proactive?*
- *Who is responsible for reporting bed bugs in your facility?* A. Everyone is.
- *How can schools be bed bug proactive?*

Environmental rhetoric characterizes the way that the IPM message was delivered and the effectiveness of delivery. The environmental rhetoric employed in this study includes the modes of persuasion within the presentation that were used to communicate about IPM. The rhetoric that is promoted was the questioning of common social behavior and analysis was linked to the results from both overall efficacy and social marketing data.

The **educational initiatives** included in these presentations instruct people on weighing the benefits and costs of pest management alternatives, list opportunities for action, and impart in the attendee the skills that they need to give them the self-assurance to act, even if the actions may be outside their cultural norms. (i.e. capturing the pest for identification before treating, or using exclusion methods to try to eliminate pests from getting into the building in the first place, instead of preventative spraying.) Correct answers to the following questions are used to determine presentation educational efficacy.

- *Do you now have a better understanding of how to find and ID bed bugs?*
- *Did you leave the presentation with a greater knowledge of IPM?*
- *Have you gained a greater knowledge of bed bug control methods?*
- *What is not a school bed bug hot spot?* A. Cafeteria food storage closets.
- *What should you do first if you think you see a bed bug?* A. Capture it for proper identification.
- *Who is responsible for reporting bed bugs in your facility?* A. Everyone is.
- *Did this presentation clearly explain on-the-job bed bug precautions?*
- *Did the presentation clearly explain the special vulnerability of children to pesticides?*
- *Would you recommend the course to others?*

- *Which of the following common bed bug myths is true?* A. Adults can live longer than 6 months without feeding.
- *How can schools be bed bug proactive?*

Social marketing attempts to change public behavior in order to reduce health risks, and encourages behavior change that individuals are more willing to incorporate into their daily lives when they believe that the benefits that they receive are greater than the costs that they incur. Social marketing in this study is about influencing the behaviors of target audiences with regard to the decisions they make about pesticide use and application to control pests vs. potential health, environmental risks and dispelling fears about increased costs to using IPM. Correct answers to the following post-presentation questions will show if we were able to achieve potential behavior change. (Actual behavior change would only be measured in a verifiable scenario containing visits, and revisits to a location where direct changes could be measured.)

- *Why use IPM?* A. IPM is more effective, easier, and safer and will save money.
- *Did you leave the presentation with a greater knowledge of IPM?*
- *Have you gained a greater knowledge of bed bug control methods?*
- *What should you do first if you think you see a bed bug?* A. Capture it for proper identification.
- *Which are not low – toxic pesticides?* Mosquito sprays
- *All of the following are dangerous and Illegal pesticides except:* A. Diatomaceous Earth – a pesticide used to physically kill bed bugs
- *Did this presentation clearly explain on-the-job bed bug precautions?*
- *Which is NOT a step to follow in IPM?* A. Applying pesticides to prevent future pest issues is not a step to follow in IPM. Or posting a security guard at the entrance of their facility was not an effective way to keep pests out.
- *How can schools be bed bug proactive?*
- *Who is responsible for reporting bed bugs in your facility?* A. Everyone is.

3.8 Conclusion

This study investigated various environmental communication venues to change the behavior of populations of decision makers with regard to the use of pesticides. The IPM message sought to alter the social norm of the application of chemical pesticides as the first line of defense against pests, and to encourage the use of safer, less toxic, alternative pest control methods, especially around vulnerable populations.

The environmental communication presentations were pragmatic because they helped individuals and organizations to accomplish the goals of disseminating knowledge about IPM. We were able to accomplish outreach goals through communications, such as educating, alerting, persuading, and collaborating with stakeholders. They were also constitutive because the presentations helped to reshape peoples' understanding of IPM, and to dispel current attitudes, practices and ideologies about pesticide use, as are often advertised by industry.

By promoting IPM we were striving for an increase in knowledge of safer pest management strategies and condone behavioral changes that will ultimately improve health by preventing pesticide exposure. We tried to give an appealing argument for the safer, less toxic approach. The environmental rhetoric and advocacy within the campaign promoted the use of IPM in an attempt to change the behaviors of key administrators and public servants with regard to pest control and pesticide use. In addition to the public health aspect of IPM advocacy, we were able to educate administrators about IPM to control some pests, such as bed bugs, which have developed a resistance to many pesticides, and no longer respond well to conventional chemical treatments.

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Chapter 4

The School Integrated Pest Management Social Marketing Campaign

4.1 Abstract`

Social marketing in this study is about influencing the behavior of target audiences with regard to the decisions they make about pesticide use in the environments that children frequent. This includes the application of pesticides to control pests vs. potential health and environmental risks. By influencing our target audiences' behavior and attitudes to implement integrated pest management (IPM) programs they will ultimately reduce the use of pesticides. This study focuses on the aspects of social marketing that the US EPA has used to promote school integrated pest management (SIPM) including organization, messaging and message venues.

4.2 SIPM introduction

People tend to choose what they see to be in their own immediate self-interest. When the competitive choice is appealing, the agency sponsoring the SIPM message needs to make the desired behavior appear even more appealing (Andreasen, 1995, 2006). For example, the perceived ease of reaching for a can of bug spray, or calling a pest professional to apply pesticides when the first pest is sighted, and the potential risks involved with the misuse of pesticides, is weighed against IPM and the benefits of using exclusion, maintenance and sanitation, to keep pests under control. IPM is promoted by the EPA in an attempt to change the attitudes and the behaviors of key administrators, managers and local, state and federal officials with regard to pest control and pesticide use.

4.3. Introduction to Social Marketing

Many social marketing initiatives include elements from the behavioral sciences and health education which use mass communication and commercial marketing which are designed to reach many more participants and to bring about positive behavior changes more quickly. Often the term ‘social marketing” is erroneously used to mean an advertising or mass media campaign. While media can be an important aspect of social marketing, other components, including rigorous planning, consumer research, developing partnerships at many different levels, developing and testing training materials and developing messaging for specific audiences are equally important (USDA, 1997). Other campaigns have relied heavily on extensive public mass marketing. This one does not. The US EPA social marketing campaign uses an integrated approach by enlisting many partners to help disseminate the SIPM messaging.

The EPA SIPM social marketing campaign is being launched in a rather awkward period of time both economically and politically. The 2011-14 government sequestration and administrative spending problems at the highest levels of the US Government have caused economic challenges within many federal agencies, including the US EPA. This has also affected the amount of grant money, travel funds and other resources that can be spent on the ground by change agents and agency field operations. With the current economic climate, and cutbacks to agency funding, and the re-direction of federal funds to other programs, mass marketing of IPM is not an option. Although time, staff and funding are limited, that does not mean that SIPM social marketing campaign cannot move forward. In fact that is farther from the truth. Social media, blogging, webinars, web-linking, tweeting and articles in trade magazines have been identified as alternative main outreach strategy. These are all free message dissemination outlets.

The current political climate is also against the implementation of a federal mandate, such as a federal SIPM law (Chapter 2.9). Many people are just tired of more government regulations, and many states view SIPM as just another potentially unfunded government mandate, despite the overall environmental health benefits.

4.4 SIPM Social Marketing Basics

Social marketing is built on the cornerstones of the four P's: product, place, price and promotion (Kotler and Lee, 2006, 2008). The **product** in this campaign is the concept of IPM implemented in schools and CCCs to result in a healthier learning environment. The **Places** are the communication venues: interpersonal facility visits, classroom / lecture halls, electronic presentation via webinars, and print in magazines, websites, or social media connections. **Price**: What is the cost of adopting IPM and giving up old practices? In addition to the environmental health benefits of adopting IPM in schools and childcares, money will be saved on the purchase and application of pesticides. The down side is the additional cost of labor to fix leaks and patch holes along with other sanitation, exclusion, and maintenance components of IPM. **Promotion**: How will SIPM be communicated, especially with very limited funds? In traditional campaigns, promotion would include radio and TV advertising spots, bus, train and highway billboards, along with magazine and newspaper ads and brochures. This SIPM social marketing campaign has only one of these traditional marketing products: the brochures. But the EPA Social

Marketing campaign has begun to incorporate elements of social media as part of its promotion. (Continued in 4.6 – 4.8).

Six more P's were added to Social Marketing by Brooks and Weiner: policy, proof, politics, public relations partnerships and program planning (1995). These additional elements compliment the original four Ps and take into consideration the environment in which public health social marketing campaigns are created (USDA 1997).

Policy is a necessary component of social marketing, because while campaign materials may bring about individual change, the greatest challenge lies in initiating and maintaining behavior change. Policy can affect broader changes that can facilitate long-term behavior change. We need to develop a strategy to reach the partners that can make those pest management policy changes within the school education industry. (More in 4.5)

Proof refers to the ability to measure success. A clear set of SIPM metrics had to be developed, tested and agreed upon by all partners. (See Appendix B)

Politics often comes into play when designing social marketing interventions and building bridges between organizations for the first time, especially at the federal level. Yes, politics does play a part, but the partners must keep focused on the children's health aspect of this initiative.

Public relations is an important component of SM campaigns, because it can serve to set the agenda for what is considered important. Not only is public relations cost effective but news information is most likely viewed as credible source by your target audience. Blogging, social networking and press releases will have a key role in the EPA campaign.

Partnership is a strong foundation for public health social marketing initiatives. National partners have been identified and contacted. They will help to mobilizing support for a SM initiative to their state, local and regional chapters. We believe that behavior change will be more easily achieved if the several agencies work together. (See table 4.1)

Program planning is the key to all social marketing initiatives. Coordinate existing efforts, such as previous research and surveys, with new activities; Recruit private industry, non-profit organizations, local chapters of our national partners and policy makers in implementing the campaign; and develop a consistent, coordinated, targeted message. (Brooks and Weiner, 1995)

4.5 The Problem: Why is SIPM needed in schools and childcare centers?

On any normal day, children in schools and childcare centers may be exposed to pesticides especially if pesticide applications are made shortly before children enter the building, while they are present, or when misapplied. Sprayed chemicals may become airborne and settle on toys, desks, counters, shades, and walls (Gurunathan et al., 1998; Alacon et al., 2005). These pesticides may break down into other compounds or they may contain other inert ingredients that also could be allergenic or even more toxic than the original active ingredient when applied (Morgan et al., 2005; Fenske et al., 1990; Wright, et al., 1981). Infants and young children also live closer to the floor, than adults, which is where pesticide residues tend to concentrate and can linger in dust and in carpets.

Concentrations of some toxic substances, such as pesticides, are four to six times higher near the floor than at an adult's breathing level (Zahm and Ward, 1998). For example, pesticides applied by baseboard spraying reach levels 4.5 times higher in the air ten inches from the floor, the air a crawling child breathes, than in the air 39 inches from the floor where a seated adult breathes. In many cases, chemical residues can remain for an extended period of days, weeks, or even months, dependent on the method of application, active ingredients and quantity used (Guzelian, et al., 1992). Studies have also shown that there are greater amounts of pesticides applied in urban Environmental Justice (EJ) areas. Children in EJ areas may also be exposed to higher dose of spray pesticides in their homes, daycares, and schools then the general population (USEPA, 2005; Landrigan et al., 1999).

Behavior Change Desired

The goal of the SIPM social marketing campaign is to create healthier learning environments for students and staff by reducing the need for the application of pesticides through the adoption of IPM strategies in school and childcare settings. The goal of this research is to identify the various training and messaging venues and to test and evaluate the traditional venues as compared to the newer, IT venues.

4.6 Message development.

The underlying concept of IPM is that most pests can be controlled by exclusion, maintenance, and sanitation: blocking the pests' points of entry; and eliminating their access to food, water and shelter. If the pest problem persists, then the use of least toxic gels, traps and baits, is the next line of defense. If pests cannot be eliminated by least toxic means initially, then pesticides may be used for the most difficult cases. IPM not only reduces the amount of pesticide being applied, but also is effective against most pests, saves money, and ultimately, may reduce potential pesticide exposure to young children. Plus saving the pesticides for when they are really needed reduces the potential for pesticide resistance to occur among localized pest populations.

Since most children spend a large portion of their days at in schools or childcare facilities it is clear that reducing their exposures in these facilities through the implementation of IPM would greatly reduce children's cumulative exposure to pesticides (US EPA, 1993).

The SIPM messaging has been crafted so that the target audience, the school administrators, staff and contractors, know the desired pesticide use behavior change needed in schools and CCC facilities. The benefits of a healthier learning environment, along with cost savings and reduced pest complaints, are emphasized so the audience may contemplate them.

Researchers estimate that consumers are exposed to about 1400 messages per day; however, people perceive only those messages that they believe are relevant to their lives (Koetler and Andreasen, 1996). The SIPM message needs to stand out – reach over the din - over all of the competing messages. One way to do this is by creating a targeted messaging strategy through a network of partners. In this case, the EPA has chosen a diverse set of partners from other agencies, industry organizations, academia, NGO's and more.

While advocacy, risk communication and educational campaigns will deliver the message about IPM, they sometimes fail to alter the behavior needed to overcome the attitude-behavior gap that social marketing strives to bridge. In this initiative, risk, advocacy and rhetoric are applied within the social marketing framework to both upstream and downstream audiences. In turn, they will influence the behavior change, via policy change, which will ultimately improve health, (Kotler and Lee, 2006, 2008) and prevent potential pesticide exposure incidents. The presentations written for this study were given to audiences that can make changes at both levels which will ultimately provide safety to the furthest downstream population, the children. Obviously, when we speak of the bottom-up strategy in social marketing campaigns, this one is a bit different. The bottom here is the next higher tier, the school administrators, staff, school health care professionals (nurses), facility managers, and PMPs. The true bottom level is the children.

Through an advocacy pathway toward healthier school environments, the use of IPM in schools and CCCs is promoted in an attempt to change the behaviors of key administrators and managers with regard to pest control and pesticide use. Certain pests, such as bed bugs, may have developed a local resistance to many pesticides, and no longer respond well to conventional chemical treatments so IPM is a logical pest management choice. Therefore, we found the need to educate about these pests – and found their added usefulness as a doorway, breaking into the general IPM conversation.

4.7 Developing National SIPM Partners

The groups that have adopted social marketing to target personal behavior change, particularly in health communication are typically initiated by a governmental agency (Kotler and Lee. 2008). During the 1980's and 1990's, many US government agencies, such as the Center for Substance Abuse Prevention) and the National Cancer Institute's Office of Cancer Communication have used social marketing to further the mission of their organization (Chapman et al., 1993). More recent federal social marketing campaigns include: the Center of Disease Control and Prevention (CDC) - CDC Nutrition and Physical Activity campaign - (CDC, 2014), Environmental Protection Agency (EPA) LEED certification program and the Clean Green and Healthy Homes initiative (EPA, 2014) Department of Agriculture (USDA) - USDA SNAP-ED initiative (USDA1997), and the Food and Drug Administration (FDA) – Office of Women's Health initiatives (FDA, 2014).

Other agencies that are involved in SIPM are the CDC and the USDA. The USDA provides program funding for IPM research grants and funds for four National IPM Centers located in universities providing IPM education to their respective regions. They also fund State University and county extensions, which promote agricultural IPM. Also partnering with the EPM in the SIPM movement are the Department of Education (DOE), Bureau of Indian Education Indian Health Service (IHS) – an agency within the Department of Health and Human Services. Within the EPA are the Office of Children's Health, the Office of Air – Indoor Air Quality Campaign (IAQ) and, the Pesticide Program has funded SIPM FTEs in each of the 10 EPA Regional Offices.

A key component of the SIPM social marketing strategy is to form partnerships with other organizations such as government agencies, voluntary and professional associations, non-profit organizations and private industry. These partnerships will help to generate support, credibility and involvement for the campaign within the association membership. The target audience will be more open to the concept of change, if it comes from one of their own. So the plan is to provide the key partner organizations with SIPM messaging for them to distribute through their own publications and social media.

At the national level, EPA headquarters has reached out to heads of other national school related agencies / organizations at the administrative level. Some of these are the National Pest Management Association (NPMA), National School Nurse Association (NASN), National Parent Teacher Association (NPTA), American Federation of Teachers (AFT), School Business Officials, National School Plant Management Association, Entomological Society of America (ESA), and National Education Association (NEA), to name a few. The objective is to get buy-in to SIPM at the highest federal levels. Then through these partnerships, a combination of trickle-down policy changes, and messaging s should enable the pesticide use behavior change downstream.

So the thought process was to partner with agencies and organizations that had a stake in children's health. School nurses and buildings and grounds managers at both the local and national levels have been receptive of SIPM, however getting buy-in at the superintendent and BOE levels was going to take more work. Webinars attracted school nurses, facility managers, custodians and principals, and some PMPs, but not the change-agents who would make the district policy changes needed for district implementation of

SIPM. For example, most of the SIPM webinar invitations were sent to all superintendents in some states. They were either disinterested in the topic, or more-likely, bogged down with so many “more-important or more pressing” issues, that they simply did not have the time to spend to become engaged in learning about IPM. It soon became evident that other avenues were needed to reach them. (More on that later)

The environmental education aspects of health risk and critical rhetoric were most useful in reaching school nurses at all levels. They understood the potential health risks and consequences of pests and pesticide use in schools and childcare environments. They are clearly the low-hanging- fruit in this social marketing initiative. They could help advance the work in their schools, from an environmental health and safety standpoint in many districts, but they are not the policy makers that are needed to make the needed behavior changes.

In his book, Rogers describes how new ideas are introduced or “diffused” to an audience, known as the “innovation-decision process” (1983). His research reveals that there are both early and late adopters. The school nurses, childcare administrators and B&G in suburban areas with state SIPM mandates, were clearly the early adopters. Webinars helped to increase the knowledge, and adoption, but the people who signed up for the webinars were those already interested in learning more about IPM. Even though invitations were sent out to all superintendents in multiple states, there were very few that actually attended. Sometimes webinar invitations were directly passed onto principals or school nurses or B&G / facility managers. Rogers believes that mass media channels are more important for early adopters than for late adopters. In this case the mass e-mails and invitations were passed onto the early adopters. Rogers also states that interpersonal channels that involve a one-to-one, face-to-face exchange between two or more individuals are more effective in dealing with resistance or apathy on the part of the audience. Because interpersonal channels can provide a two-way exchange of information, individuals can obtain clarification or additional information from their peers or the person delivering the information (Rogers, 1983). We had to go back to the drawing board and re-think our superintendent-reaching strategy. In many of the larger districts, it is the superintendent that can make the policy change that is needed to implement SIPM throughout the entire district.

4.8 Organization. Developing a Core SIPM Network

Although the SIPM movement has been growing over the past 25 years, significant movement toward a social marketing initiative has occurred only within the last few years. Time has been spent studying past research, grants, pilot projects and surveys to determine a rough base line of implementation within many states. (See appendix A)

One of the initial steps needed to move forward with an EPA SIPM campaign was to identifying a campaign committee or workgroup. This is the group of people within the agency who will be responsible for turning research findings from all of the previous surveys, grant research, school visits and IPM outreach products into a coordinate communication strategy.

The lead for the SIPM initiative is within by EPA Headquarters within the Office of Pesticides Programs, which oversees the Biopesticide and Pesticide Programs Division

(BPPD), which includes the Environment Stewardship Branch (ESB), where the SIPM Center of Expertise (CoE) is located. The ESB and CoE are the main drivers. The ESB Branch oversees and directs the efforts, helps to identify partners and makes key contacts at the national administrative level.

The Center of Expertise (CoE) is a core group of individuals who were selected by EPA HQ to help spearhead the SIPM initiative: The CoE is comprised of four key individuals: 1.) has a wealth of SIPM knowledge who has been working on SIPM for over 20 years, 2.) a pest management professional who has both military and private pest management experience, 4.) a lead who knows the politics and structure of government and the rhetoric needed to advance the program, and 4.) a person who has a significant environmental management background, on the ground research, IPM field experience, materials development, and media writing experience.

Strategy sessions have been held internally with the EPA regions and externally with partnering organizations in standing committees, such as the Pesticide Programs Dialogue Committee (PPDC). This committee consists of industry, academia, extension, and agency members. Many of these individuals were the ones who were most involved in collecting secondary and primary data, and they are familiar with the needs and wants of the target audience, which is essential in the social marketing planning process. This knowledge will help to keep the goals and objectives of the SIPM campaign grounded in the research and on target.

Organization	Vehicles/ outreach
National Pest Management Association (NPMA)	NPMA publications, standing committee members, conventions, blogs
National School Nurse Association (NASN); Early SIPM advocates	NASN Journal articles, NASN weekly Digest blogs, reaches all members, Conference, webinars, state and local presentations
National Parent Teacher Association (NPTA).	One Voice blog, National Conference presentation
American Federation of Teachers (AFT), Nat., State and local chapters.	American Educator – Quarterly journal articles, American Teacher articles
National Science Teacher Assoc. (NSTA)	4 journals: Elementary, middle school, High school and College; articles, handouts and classroom educational programs
School Assoc. of Business Officials, (NSBO)	Assoc. International & Convention; articles
National State and local School Board Associations	Quarterly publications in states; articles
National School Plant Management Association,	ASBOI Annual Meeting; Presentations, handouts, U-tube video, webinars
State Buildings & Grounds Assoc., or Facility Mgrs. Assoc. & Chapters	State conferences and local chapters, newsletters, presentations and articles
Entomological Soc.of America (ESA)	Convention presentation and handouts
National Education Association (NEA),	State Conventions, NEA Health Information Network - on-line articles
Dept. of Education to Superintendents,	Green School Nat Conference, Green Ribbon Schools; school visits, presentations
Dept. of Health & Human Services to Bureau of Indian Edu. (BIE) - IHS	Committee meetings Indian Health Serv. (IHS) inspector training, presentations, handouts
EPA Office of Children's Health Protection (OCHP) lead	Clean Green Healthy school program, CCC programs; webinar, handouts
Educational Service Assoc.'s NESA (ESA's, BOESA's, CESA's)	State and local assoc. to disseminate directly to schools and districts; fliers, link to webinars, training materials
General Public	Blogs, articles, Social media

Table 4.1. The national partner organizations and the outreach vehicles being utilized to get out the SIPM message.

4.9 SIPM Challenges

In order to affect change, social marketers must understand what motivates and discourages their audience from adopting the desired behavior change (Kotler and Andreasen, 1996). In the EPA SI CCC Pilot Project (Anderson, et al, 2010) we saw a direct acceptance of change in pesticide use patterns by CCC administrators through interpersonal communication and facility site visits. Although the one-on-one approach was clearly effective in promoting change, it is not practical at the local level, considering limited time and financial resources. It may, however, be more beneficial at the national administrative level. That is the current approach.

Social marketers are often asked to influence behavior in an area where the audience has not considered changing or does not want to change. We have found this in many school districts, both urban and rural. Many facility managers are used to the status quo and resist change of any kind. The NPMA, whose members' service about 80% of school districts, nationwide, may be able to help influence and teach facility managers IPM techniques at the ground level.

We found the language barrier in Puerto Rico a challenge when looking to plan an SIPM initiative there. We had some of the key SIPM materials translated into Spanish and the agency hired a Spanish speaking trainer to visit the schools.

As mentioned earlier, budget cuts have made deploying a social marketing program, challenging, to say the least. Traditional marketers operate on much larger budgets than most social marketers. Smaller budgets will demand that networks develop creative low-cost communication channels, networks and partnerships, through which to deliver the message. With sharp cuts in federal funding and the size and scope of the SIPM initiative and goals, SIPM webinars have been employed as another effective agent for preliminary training to school change agents such as school principals, superintendents, school nurses, custodians and teachers. By late 2013, more and more trainings are being conducted by webinar in both the private and public sectors. The use and effectiveness of webinars for SIPM training are explored in other chapters of this study.

Being a Federal agency, the EPA is under considerable public scrutiny, and are accountable to the public for spending Federal monies (USDA, 1997). This is often where the "P" of politics comes into play. Accountability to the public and the agency, the planners know the obstacles that lay before them (Brooks and Weiner, 1995).

4.10 SIPM Social Marketing at the Regional and State level

It is at the local level where the needs of the target audience are met, to a greater extent than a national campaign, but by linking local and national efforts, more successful behavior change may be achieved.

In this social marketing strategy, the EPA has been using a combination of top-down and bottom up approaches to school administrators, staff and PMPs. The EPA is divided into 10 Regions covering all states and US territories. Each region has a SIPM coordinator. That coordinator and other Pesticide Programs staff and managers work within their own regions to contact state, county and local government agencies, universities, extension agents and NGO's to help distribute the information about IPM to schools, PMPs, and health care professionals. Workshops have been conducted in many states, some directly at the individual schools, others, as required training sessions to principals, head custodians and pest management professionals. Some of these training sessions are for compliance to state regulations or voluntary information, and some are simply to inform administrators and staff about SIPM alternatives to conventional pest management. For this combined approach to remain on track the following Regional objectives were outlined:

1) By state: Build and maintain list of state contacts including a database of organizations and key contacts with roles in school IPM such as: NGOs, PMPs, Superintendents, Principals, facility/ buildings & grounds managers, public agencies, PTA's, and school nurses.

2) Identify publications and meetings of all state and local change agents and NGOs with roles in SIPM. Facilitate presentations on school IPM in related-organization meetings.

3) Maintain a school IPM resources library, of standard headquarters vetted materials, including model proposals, model IPM policies, IPM plans, pre-approved least-toxic options lists, pest-specific fact sheets, curricula, blogs, and training modules. These will be on the SIPM website by the summer of 2014.

4) Circulate brief, regular and timely communications to the contact database.

5) Coordinate liaisons to regional school IPM working groups, including the EPA Pesticide Environmental Stewardship Program, and the USDA IPM Extension Coordinators.

6) Organize and hold local training opportunities for school change agents.

4.11 Conclusion

All of the SIPM interpersonal visits and workshop sessions were conducted at the local level. The webinars had a local/regional focus initially, but were offered to other programs, organizations and networks, so they soon became national in scope. Many more people from locations that may never have had the opportunity to take an SIPM webinar were able to partake.

As of the spring of 2014, the SIPM social marketing campaign was well under way. The core EPA group, the CoE, is in partnership with the PPDC and EPA Region 10. Washington, a state with no SIPM law, has been selected as the state for a pilot project, combining a large group of national, regional, and very dedicated state, and local stakeholders.

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Chapter 5

Modes of Delivery and Message Venues

5.1 Abstract. Improperly managed pest problems and unnecessary pesticide use impact our children's health and our ability to educate them effectively. Integrated Pest Management (IPM) is a powerful strategy to protect the health of students and adults alike. IPM is an effective and environmentally sensitive comprehensive approach to pest management and can reduce exposure to pests and pesticides, and reduce pesticide use and pest complaints. However, only a small percentage of US schools have verifiable IPM programs. This paper is focused on three venues for delivering the message of IPM: 1.) interpersonal, which is direct, individual education about IPM to childcare centers, school administrators and staff, 2.) through the use of workshop / classroom type IPM presentations to public and private school CCC administrators, and managers, and 3.) an IT electronic webinar approach for the dissemination of the IPM message to the same professional audiences. These three venues target the 'Enablers': the individuals who, by their job description, are charged to provide a safer environment for the children in their care (Andresen, AR, 2006). This method may be considered a train-the trainer approach to environmental management education, as the training of each person will affect the lives of many others. This study will attempt to assess which of these three modes of IPM communication are most successful under certain criteria.

5.2 Introduction. All three communication venues will be evaluated via surveys which will help to measure the effectiveness of the communication approach. Does the audience understand the message of IPM? Will they adopt it? How do they prefer to receive training? There have been numerous surveys conducted on pesticide use and pest management in schools (Appendix A) such as the California (Barnes & Sutherland,2005; Bush & Clary, 2004; Olle, 2000; Tidwell & Barry, 2006; Tootelian, 2001; McKendry, 2002), Wisconsin (Becker et al., 1998), Texas (Mitchell, 1999) and Vermont (Miller, 2002; Sterling & Browning, 1999; Sterling & Paquette, 1998) reports which are followed by numerous reports on the challenges to the development and integration of IPM into schools, childcare centers and community facilities (Baumgartner, 2004; Darr et al., 1997; Fournier, 2005; Lame et al., 2001).

Due to severe cuts in the federal, state and local training and travel budgets, conferences and workshops have become less of a realistic option for many people. By conducting a series of lower-cost training sessions via webinar, to augment traditional training, the financial barrier for many is removed. However, one of the questions to be answered: is the electronic IPM venue an effective substitute or supplement to traditional training venues?

5.3 Methods - Survey questions

Prior to developing our own survey instrument, a number of survey and evaluation questions were considered from those used to conduct pesticide use and pest management in schools and child care centers such as the Indiana (Gibb & Fournier, 2006), California, (Barnes & Southerland, 2005; Bush & Clary, 2004; McKendry, 2002; Olle, 2000; Tidwell & Barry, 2006; Tootelian,2001) Wisconsin (Becker et al., 2002), Texas (Mitchell, 1999), and Vermont survey tools (Miller, 2002 Sterling & Browning, 1999; Sterling & Paquette, 1998). All of the survey instruments studied had similar, yet different questions, and most referenced the survey research methods by Babbie (1993). (See Appendix A for all of the surveys and government funded research reviewed.)

The questionnaire that influenced the final list of questions used for this study was constructed based on survey objectives and background knowledge from the Indiana model pest management policy. That draft questionnaire was reviewed by Purdue University Extension personnel, including entomologists, an IPM specialist, a pesticide safety specialist, and an extension specialist with survey research expertise. The revised survey instrument was pre-tested by eight Indiana school administrators to ensure that the questions were understood, yielded the desired information, and was not offensive to survey participants (Gibb & Fournier, 2006).

Following our selection of questions for this study, the questions were pre-tested at five NJ childcare centers and modifications were made. The questions for NJ schools and NJ CCC differed slightly from NY facilities based upon differing State SIPM regulations. Bed bug related questions did not need any modifications due to state regulations and were based more heavily on comprehension. (See Appendix B for all of the surveys used.)

5.4 Methods - Messaging

All three training venues allowed administrators and IPM coordinators to view IPM practices discussed during our talk. During the interpersonal venue, we actually conducted an IPM inspection. The classroom/workshop and webinars both used a power point slide show of actual walkthroughs to simulate the walk-through experience. (See Appendix E for the actual presentations used.)

Both the physical and virtual IPM inspections covered specific pest related elements to look for in schools, as well as what to look for around the perimeter of the buildings. The physical walk-through was the most spontaneous portion of the study. In some districts, we found very high-level of implemented IPM practices; while in others, we found areas for improvement. In some buildings, we found pest evidence which we capitalized on for a teaching moment. As we walked around the school or CCC, we pointed out and documented potential or actual pest problems in both written and photographic form. The virtual presentation took about three quarters of an hour, while the actual physical walk-through took a little over one hour of time depending on the size of the facility.

The building walk-thru, either virtual or physical, helped administrators and IPM coordinators learn why building inspections are so important and how, by maintaining building integrity, through maintenance and sanitation, the school or childcare center can stay pest free. The majority of IPM practices for controlling indoor pests rely heavily on human behavior to report findings, to conduct proper sanitation and maintenance throughout the facility. It is important to work with others to ensure that pests are excluded from entering schools, in the first place. This can be accomplished by installing door sweeps and filling holes and gaps.

The interpersonal site visits offer the IPM trainer a chance to assess the facilities strengths and weaknesses and to provide solutions to problems.

5.5 a Management Approach - Interpersonal

This venue includes in-person case studies for both childcare centers and schools. The IPM in childcare centers case study included 45 childcare facilities in one NYC city borough, while the IPM in schools case study had 26 school visits in Newark along with 36 additional school visits to a variety of urban, suburban and rural school districts. The diversity of sites enabled us to compare IPM practices and adoption by: whether state legislation had an impact, or whether size and population density had an impact. Multiple sources for data collection were obtained, including: a.) Reviewing documents, and photographs taken during the visits, b.) Direct observations and c.) Conducting interviews with key administrators.

1. The individual facility administrators of both childcare centers and school administrators were interviewed and asked about their current pest issues, and pest management practices. They were asked to give us their definition of IPM, and then they were educated about IPM according to how they answered. During the visitations, the current pest management practices within the facility were documented. Following completion of the site visits, individualized "After Visit letters" were written to each administrator which gave commendations of any positive IPM practices already in effect, and deficiencies that had been documented during the visit, along with suggestions for improvements. In the childcare center case study, a return interview was conducted 4 to 6 months later, documenting actual verifiable improvements including the implementation of IPM practices. In the school districts,

the follow-up was a meeting and presentation which provided visit findings to district administration and district facility managers. (See Chapter 6)

2. **Questionnaire**. In both childcare centers and schools, a two-part questionnaire was used with the purpose of gathering information on current pest management and pesticide use practices. The first part consisted of a two-page series of questions including demographics, such as the number and age of children enrolled, number of staff, responsible party for pest management decisions at the center, current and recent pest problems, the name of the pest control operator, frequency of visits by pest control operator, questions about adherence to local and state regulations and IPM questions. The second part of the questionnaire was a checklist tool developed to identify pest management area issues of concern in most facilities. (See Appendix B for the surveys.)

5.5.b Workshop / Classroom Approach

This venue included in-person presentations to audiences including school and CCC administrators, facility managers, health care providers and teachers. The workshop case study includes at least seven workshop sessions, with between 26 to 79 attendees in each session. This form of environmental communication utilized an in-person presentation through a workshop / classroom setting. Again, the outreach was focused on influencing a diverse set of upstream audiences, with the end goal of influencing behavior change.

Educational benefits, economic costs and data collection issues of workshop / conference venues were tabulated into an Excel file. Questions were modified after preliminary testing to better align with the webinar questions.

Some knowledge questions were integrated within the presentation to gauge efficacy of the presentation messaging. Measurements of the understanding of IPM methods along with measurements of knowledge gained and behavior change was via post presentation evaluation questions. A table of outreach materials was available for all attendees to select SIPM materials at each presentation.

5..5.c Electronic Approach - Webinar

This case study focuses on a web-based environmental communication method to deliver the IPM message to large groups of attendees. The outreach focused on influencing a diverse set of upstream audiences, such as administrators, managers and local, state and federal officials. Twelve webinars were conducted with attendance ranging from 100 to over 1000 participants.

The efficacy of learning was measured via electronic poll questions administered at the end of the webinar. The efficacy rate of understanding of the material presented was measured, and the respondents were asked if they would recommend the course to others. They were also asked for a venue preference, of web-based (webinar) learning, workshop style trainings, or print. Drawbacks to this webinar training were also assessed.

The benefits of the webinar were analyzed through a number of different parameters. The biggest benefit of these webinars, even before the analysis phase, was that, unlike a conference workshop, we were able to invite an unlimited number of local, state, federal, and tribal stakeholders from all over the nation. The number of attendees was recorded, along with how many attendees were located both inside and outside of a 100 mile radius (estimated conference/ workshop travel restriction boundary). The increase in attendance from what we would have attending a workshop was calculated and assessed.

The study also measures the environmental benefits of the webinar by calculating the estimated air miles, road miles saved, and then calculating the number of pounds of carbon dioxide not emitted and acknowledges other economic benefits.

The set up costs of having someone research and prepare the talks, then moderate and present the trainings would be approx. the same for either a workshop conference or webinar venue. For either workshop or webinars, all invitations, correspondence and evaluations were electronic, however logging into the webinar cost pennies in electric versus hundreds of dollars in travel and venue expenses for those attendees who would have had to travel over 100 miles.

At the conclusion of each webinar, the school and CCC administrator and staff participants had the option to answer a second set of evaluation questions, voluntarily. Within a few days all participants received an e-mail containing a list of all questions and answers that were asked during and after the webinar. They were also provided with resource links to SIPM and related materials.

5.6 Results and Discussion

a. Attendance – The numbers of people reached.

Interpersonal visits. Through the interpersonal visits to childcare centers we were able to train two people per location, on average, one CCC administrator and one facility manager. School visits yielded slightly more than two people on average per location. (School principal - or vice principal, facility or regional manager and IPM Coordinator –if different from facility manager). We were able to conduct a maximum of two visits per day, yielding only 4-6 people trained per day. The interpersonal venue was therefore, an extremely time consuming, resource intensive means of training facilities about IPM. The IPM in CCC initiative reached approx. 90 administrators / facility managers in the CCC centers and approx. 130 in regional schools visited. The major benefit if this venue was that all of the administrators / managers were a captive audience for roughly two hours and could see first-hand potential pest problems in their own centers. In addition we were able to provide IPM solutions to their pest problems. (See Chapter 6)

Interpersonal visits		Students represented	Schools visited	Schools represented
SI CCC project visits	A	3307	45	45
Newark School visits	B	37443	26	71
Other SIPM School visits	C	29237	36	47
Total Interpersonal		69987	109	163

Table 5.1 Numbers of schools visits and number of children represented through interpersonal visits.

Another benefit was that we were able to collect accurate, verifiable data. The data was recorded on survey sheets at each facility. (Appendix B) Pesticide application record inspections were conducted at both the facilities and at the pest control company. Each school or childcare facility received written documentation of our findings after the visit. Follow-up visits to the CCCs documented verifiable progress in implementing IPM in the facilities, unlike any of the other venues studied in this research. 100% of the target audience was trained in IPM, through the interpersonal venue, despite being labor intensive. (See Chapter 6)

Category	#	Address	State	Atten.	Surveys	distance
School	1	501 W 152nd St;	NY	42	36	35
Lawyers & EPA	2	290 Broadway;	NY	52	21	35
Seniors	3	Scotch Hills, C Club	NJ	32	16	13
EPA & Industry	4	Woodbridge,Edison	NJ	60	0	0
Industry	5	Princeton,	NJ	50	13	30
EPA & Industry	6	290 Broadway,	NY	46	13	35
Trenton - Comm	7	Hamilton A, Trenton	NJ	36	0	38
Essex Co. Pub Hlth	8	Livingston, NJ	NJ	30	28	25
Middlsx, Monm, Union Co Hlth	9	Woodbrdge;,Edison	NJ	64	46	0
Seniors	10	MSMA Mountainside	NJ	26	26	15
Shelter/Soc. Services (UBHC)	11	Rt.1, Piscataway	NJ	79	30	9
Health Care	12	Sommerville	NJ	55	41	18
Schl Nurses IPM	13	Clark, NJ X-135	NJ	70	59	15
Trenton - Hisp Comm.	14	St. Francis Hosp, Trntn	NJ	40	0	38
Burlington Co. Hlth Dpt	15	Westampton	NJ	40	0	51
NYS Env Hlth Dpts	16	Syracuse, NY	NY	75	0	247
Kean University	17	Union, NJ	NJ	45	0	15
		49.5 avg attendance		842	329	619

Table 5.2 Workshop Attendance and Location (School & BB IPM)

Workshops. Thirteen workshops were conducted within a 100 mile travel radius of the base location, EPA regional office in Edison, NJ, with one exception exceeding the 100 miles. Some workshops were focused on bed bugs, but all carried the IPM message. Each workshop took close to a full day to travel, set up, and give a two hour presentation, including questions and answers, and a return trip to the base location. The workshops reached 645 attendees, or roughly 50 people per event day. The participants were given a “virtual tour” of facilities and were asked to fill out surveys, but only about half of the attendees (320) filled them out, resulting in 25 surveys returned per event, on average. Materials on IPM were distributed to all attendees. (See appendix D for the presentations and appendix B for the surveys).

Workshop	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Total	42	52	32	60	50	46	36	30	64	26	79	55	70	35	40	75	45	
Custodial Staff	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
Fed Govt	0	27	21	2	0	40	0	1	1	0	0	2	0		0	0	0	0
State Govt	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0
Co. Gov.	0	0	0	4	0	0	0	17	2	0	7	0	2	0	5	72	0	0
Local Govt	0	25	0	0	0	6	5	11	4	0	1	0	2	2	0	0	0	0
Schl/ CCC Admin	5	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	45
Edu-U	42	0	0	0	0	0	0	1	0	24	0	0	0	2	0	0	0	0
Nurse/ HlthCare	0	0	0	40	0	0	0	0	45	2	48	44	64	0	35	0	45	0
Other/ NGO	0	0	11	0	48	0	31	0	2	0	2	3	0	31	0	0	0	0
Shelter	0	0	21	14	0	0	0	0	12	0	22	6	0	0	0	0	0	0
% target audience	100	100	100	100	96	100	86	93	89	92	89	91	91	89	87	96	100	100

Total 94%

Table 5.3. Workshop demographics showing 94% target audience reached

94% of the participants were from the target audiences through the workshop venue (Appendix C Table 5b). It was observed that most people would not take the time to travel to the workshop location if they did not have a vested interest in the topic.

Webinars. Twelve webinars were conducted on a combination of SIPM, IPM in CCCs and BB IPM related webinars. Attendance was measured in three different ways for the webinar venue. The first base attendance numbers were calculated from the number of computers linked into the webinar for a total of 3522 attendees. Next, after the webinar, attendees were asked how many other participants were in the room sharing the computer with them. This would give a rough estimate of the number of additional people viewing in conference rooms. That data yielded a closer estimate of the number of actual participants, 5216 participants overall.

Webinar	Date	Attendance: (computers)	Attendance ex.: (actual)	No. Children represented	No. Schools represented	Number in Region 2
BB1 Legal (IPM)	5/25/2011	159	189	na	na	21
BB2 Prevention	10/20/2011	70	114	na	na	63
IPM CCC	4/24/2012	490	618	455566	260	48
IPM CCC	5/15/2013	456	624	453542	347	104
BB (IPM)	6/18/2012	701	1065	1070526	204	442
SIPM Out * Field	8/28/2012	134	165	1615693	88	39
BB to School (IPM)	9/4/2012	57	82	378607	63	9
SIPM	9/4&5/2012	147	147	208448	96	98
BB Health Depts	4/10/2013	562	871	1012316	132	235
BB to School	1/30/2013	189	278	773690	148	87
SIPM	1/23/2013	103	197	541706	110	96
BB SIPM	3/1/2012	496	866	na	227	257
		3335	5216	6510094	1685	1499

Table 5.4. Webinar participant attendance, number of schools and children represented and number in home Region 2.

The third total was derived from calculation of the number of people identified by state. In some cases, that number was different from the other totals, as some people were unidentifiable from the data provided, although we do know that they attended the webinar. The third total resulted in 4979 identifiable participants. On average, 435 participants viewed the two hour presentation and the question and answer session that followed, per presentation day. (For presentations see appendix D)
The attendance increased per contact/presentation day by approximately 10 times per venue type: 4.5 per interpersonal visit; 50 per workshop to 435 per webinar presentation. That is a substantial increase in participation per venue. We know that the interpersonal and workshop venues reached their target audiences, but did the webinar venue reach its intended target audience? Table 5.5 identifies the target audience for each webinar presentation. On average we reached at least 74% of our target audience, with a large number of federal and "other" attendees that were questionable as to being a direct target, so, for a conservative estimate, they were eliminated. We looked closely at the demographics to select the "enabler's" – those who could make changes to local policy to reduce pesticide applications, where warranted.

Webinar		Attendance	# Feds	# State	# Local	County	Edu	tribe	school admin/CCC	Other	Health Depts*	cust staff	school nurse	% attendees target audience reached
BB1 Legal	1	189	104	32	10	0	5	9	0	29	0	0	0	84.7
BB2 Prevention	2	117	32	58	8	0	1	1	0	17	*	0	0	57.3
BB Health Care	3	866	51	84	134	249	21	9	0	198	120	0	0	71.2
IPM in CCC	4	608	54	94	30	47	10	8	260	87	0	8	10	76.8
BB to School	5	82	5	0	0	1	7	0	61	8	0	0	*	82.9
BB	6	1065	20	120	142	82	0	0	185	365	151	*	0	63.8
O&F SIPM	7	165	31	0	1	44	19	3	42	65	0	0	0	65.5
SIPM*	8	147	11	3	0	13	2	6	62	2	0	18	30	87.8
BB Health Depts	9	871	35	153	233	252	28	6	164	0	*	0	*	96.0
BB to School*	10	189	31	24	0	0	15	5	45	13	0	17	39	76.7
SIPM	11	197	21	0	0	0	6	3	58	54	0	17	38	58.9
IPM in CCC	12	618	19	53	0	25	25	0	332	152	*	*	12	72.3
*= listed under another category														74.5

Table 5.5. Webinar demographic chart showing target audience

b. **The attentiveness of webinar participants.** Unlike the attendee sleeping in the back row of the workshop, how can the presenters be sure that the attendees are paying attention, or just listening to get a certificate? In the webinar venue there is an attention rating for each participant that measures if other screens are open during the presentation. If this rating dropped below 50, the participant was discounted from the number totals in the very beginning of the data calculation phase. This rating removed a handful of otherwise preoccupied participants, so this and the efficacy questions to follow will answer whether participants were paying attention.

c. **Training Venue preference.**

In the interpersonal venue we did not ask the administrators about a training preference. Initially most were hesitant about having federal officers “inspecting” their facilities, however after we explained that these were not official inspections, but friendly visits, they were more relaxed. Once we arrived, most administrators were glad to have had the opportunity to learn about IPM and related child safety issues, without having to leave their facility. The preference for the interpersonal venue was 100%.

Workshops. An IPM training venue preference was asked in nine of the workshops. Out of 417 respondents, 60% preferred the classroom/ workshop venue, 19% preferred printed materials, 11% selected webinars and 9% preferred websites.

Workshops	A	B	C	D	E	F	G	H	I	J	K	L	M	totals	% of total
Attendees	42	52	60	50	46	36	30	64	26	79	55	70	35	645	
Venue preference	36	37	0	0	0	0	20	50	31	30	53	88	72	417	
Webinars	0	19	0	0	0	0	0	3	5	0	2	11	6	46	11
Websites	0	6	0	0	0	0	0	6	0	0	8	6	13	39	9.3
Workshop sessions	36	8	0	0	0	0	20	35	26	20	29	51	28	253	60.7
Print material	0	4	0	0	0	0	2	6	0	10	14	20	25	81	19.4

Table 5.6. Workshop participant venue preference

Webinars. The same question was asked of the attendees in nine of the webinars. 2452 attendees responded to the question and 70% of them chose webinars as their preference, 15% chose classrooms/workshops, and 10% chose printed materials.

The attendees clearly preferred the venue that they were in, for many reasons.

Webinars	1	2	3	4	5	6	7	8	9	totals	% total
Total computers	159	147	189	701	496	70	189	82	134	2167	
T attendees	189	147	278	1065	866	117	278	103	165	3208	
Venue preference	146	64	173	702	749	97	194	82	245	2452	
Webinars	99	54	118	504	570	21	136	52	161	1715	69.9
Websites	8	1	18	41		21	21	9	20	139	5.67
Workshop sessions	30	7	18	94	130	21	18	8	37	363	14.8
Print	9	2	19	63	49	34	19	13	27	235	9.58
Blank	0	0	20	0	0	0	0	0	0	33	

Table 5.7 Webinar attendees training venue preference.

d. Number of children and schools reached per venue.

The interpersonal visits to the 45 childcare centers, and training of the 90 administrators/ managers, had a direct effect on the health of 3307 children that attended the facilities. All of the center administrators learned about the risks associated with pesticide use in places that young children frequent, and most changed their pesticide use practices between phases 1 and 3: a.) About half changed how they maintained pesticide records; b.) There was a 3/5 reduction in regular pesticide applications in facilities, with many applying only as needed and some electing not to apply at all; and c.) Almost all that did not have a pest management plan prior to Phase 1, had and were using a plan by phase 3. (View Table 5.1)

The school visits did not have a multi- phase and revisit strategy, which would have been helpful in documenting the measure of success of the visits. Regardless, we were still able to effectively show managers how IPM could be beneficial to their facility. We were able to point out areas where IPM could help improve their overall pest management control success and reduce the use of pesticides. The visits educated those who could potentially have an effect on the health of the approx. 69,987 students in the school districts that we visited.

The workshops reached far more nurses than administrators, but as school nurses are responsible for dealing with the health of students and the consequences of environmental decisions that are made in facilities that relate to the health of children, they are an important audience. Seven of the workshops had nurses or other health care officers as the majority of the attendees, however, only one measured the number of schools and student affected. In that one workshop, there were 59 nurses in attendance representing 48 schools and 25,663 students.

The webinar format enabled the researched to collect attendee demographic data much easier that the other two venues. Ten of the webinars were school and CCC IPM related and within webinar program we collected both the number of schools represented and the numbers of children represented by the attendees. The webinar venue reached 1,685 school or childcare administrators and at least 6,510,094 children. (Table 5.4) The fact that most of the attendees for these webinars were administrators or had oversight of school districts means that the IPM message reached those that may have the ability to affect policy change within their facilities or districts.

e. Efficacy of the venues

Did the attendees understand the IPM message that was delivered? Efficacy was measured in all three venues by the surveys administered. (See Appendix B)

Interpersonal understanding of the message during the CCC study saw a 100% increase in understanding of IPM by every administrator in every center revisited. (There were 7 centers that were not revisited – so are listed as 'unknown'. In Phase 1 of the study, there were not any administrators with full knowledge of IPM. By Phase 3 of the study, all of the administrators were able to give a rudimentary definition and describe IPM clearly.

CCC	Apply pesticides regularly?	Apply pesticides regularly?	Notification 4 pesticide application?	Notification 4 pesticide application?	CCCs aware IPM?	CCCs aware IPM?
Center	**Phase 1**	**Phase 2**	**Phase 1**	**Phase 2**	**Phase 1**	**Phase 2**
A-1	yes	as needed	no	No	no	Unknown
A-2	as needed	no	no	No	no	yes
A-3	yes	as needed	no	No	no	yes
B-1	as needed	unknown	no	Unknown	no	unknown
B-2	yes	as needed	yes	yes	no	yes
B-3	as needed	no	yes	yes	no	yes
C-1	yes	as needed	yes	No	no	yes
C-2	yes	yes	yes	No	no	yes

C-3	unknown	as needed	unknown	No	no	yes
C-4	yes	as needed	no	No	no	yes
C-5	yes	yes	yes	No	no	yes
C-6	yes	yes	no	No	no	yes
C-7	yes	as needed	no	No	no	Unknown
C-8	yes	as needed	yes	No	sort of	yes
E-1	yes	yes	no	No	no	yes
E-2	yes	as needed	no	No	no	yes
F-1	yes	as needed	no	No	no	Unknown
F-2	yes	yes	no	No	no	yes
J-1	yes	yes	no	No	no	yes
J-2	yes	as needed	no	yes	sort of	yes
J-3	yes	as needed	no	yes	sort of	yes
L-1	yes	yes	no	No	no	yes
L-2	yes	yes	no	No	no	yes
P-1	yes	as needed	no	yes	sort of	yes
R-1	yes	no	yes	No	no	yes
S-1	unknown	as needed	no	No	no	yes
S-2	yes	yes	no	No	no	yes
S-3	yes	yes	yes	No	no	yes
S-4	yes	as needed	no	No	no	yes
S-5	yes	yes	no	No	no	no
S-6	yes	as needed	yes	yes	no	yes
S-7	yes	unknown	yes	No	no	yes
T-1	yes	no	no	No	sort of	yes
T-2	unknown	no	unknown	no	no	yes
U-1	yes	as needed	no	No	no	yes
U-2	yes	no	no	No	sort of	yes
Y-1	yes	yes	yes	yes	no	yes
Z-1	as needed	no	yes	No	sort of	yes

Table 5.8. Efficacy of the IPM in Childcare centers revisited

The behavior changes, as described above, also show a clear increase in knowledge and change in policy with regard to pesticide use.

Ten of the thirteen workshops were bed bug related and had attendee post-presentation evaluation surveys to measure comprehension of the material presented. All attendees, 100%, acknowledged a greater insight of IPM as it relates to bed bug control along with a greater knowledge of bed bug control methods. 99.6% agreed that the presentation clearly explained on-the-job bed bug precautions and 83 % understood the components of bed bug IPM. Attendees were able to select the correct answers to questions based on the presentation, such as: “Do bed bugs live only in dirty conditions?” where 98.6% answered no. Most attendees, 86%, were able to identify that “bed bugs are most likely spread by contact with infested furniture”. Many of the attendees struggled with the responsibility question: “Who is responsible for bed bug IPM in your facility?” The correct answer was “Everyone is”. Half got the answer correct, the other half pointed to landlords, principals and facility/ maintenance personnel as the responsible parties. Another challenging question was “What should you do if you think you see a bed bug?” The correct answer is capture it for identification. One third of attendees (34.6%) answered correctly. The rest decided to call for help from the maintenance, landlord, or pest management professional, or to empty the room. The most important component of IPM is to know positively what pest you are dealing with, before any other steps are taken. Averaging all of the answers, the overall efficacy of the workshop venue was 83.5%.

Workshop	1	2	3	4	5	6	7	8	9	10	11	12	Totals	%
participants	42	52	32	50	46	36	30	64	26	79	55	70	582	
BB only live dirt?	0	19	14	13	13	0	27	40	24	30	41	0	221	
Yes	0	1	0	0	0	0	0	2	0	0	0	0	3	
No	0	18	14	13	13	0	27	38	24	30	41	0	218	98.6
BB spread?	36	25	15	2	14	0	23	46	22	17	44	0	244	
pet	0	6	1	2	2	0	3	6	0	6	8	0	34	
furniture	36	19	14	0	12	0	20	40	22	11	36	0	210	86
Other answers	0	0	0	0	0	0	0	0	0	0	0	0	0	
Responsible 4 BB?	0	25	26	0	20	0	40	63	0	40	46	26	286	
workers/staff	0	2	1	0	1	0	3	4	0	2	0	0	13	
Everyone	0	11	9	0	8	0	18	31	0	18	23	24	142	49.7
Maintenance	0	1	3	0	2	0	3	6	0	10	9	2	36	
Principals/ mgrs.	0	6	4	0	4	0	7	8	0	6	9	0	44	
landlord	0	4	6	0	4	0	5	11	0	2	5	0	37	
resident/ patient	0	1	3	0	1	0	4	3	0	2	0	0	14	
BB IPM insight?	35	21	10	0	0	0	27	44	26	26	41	53	283	
Yes	35	21	10	0	0	0	27	44	26	26	41	53	283	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	
Workshop	1	2	3	4	5	6	7	8	9	10	11	12	Totals	%
participants	42	52	32	50	46	36	30	64	26	79	55	70	582	
Know BB control?	32	21	8	0	0	0	28	46	22	28	40	58	283	
Yes	32	21	8	0	0	0	28	46	22	28	40	58	283	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	
Recommend course?	36	21	16	0	0	0	26	46	26	30	39	57	297	
Yes	36	21	16	0	0	0	26	46	26	30	39	57	297	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	
BB precautions?	31	21	0	0	0	0	28	46	26	24	42	58	276	
Yes	31	21	0	0	0	0	28	46	26	24	41	58	275	99.6
No	0	0	0	0	0	0	0	0	0	0	1	0	1	
You see a BB?		57	38	21	33	0	65	107	45	82	113	84	645	
call a PCCC	0	13	8	8	6	0	6	18	10	16	20	0	105	
capture for ID	0	15	7	11	11	0	22	39	11	22	34	51	223	34.6
kill& forget it	0	1	0	0	0	0	0	1	2	0	1	0	5	
empty room	0	14	12	1	9	0	20	22	22	22	27	33	182	28.2

scream	0	1	2	1	1	0	0	1	0	2	2	0	10	
Call landlord /maint.	0	13	9	0	6	0	17	26	0	20	29	0	120	
BB IPM steps?	36	9	7	0	13	0	24	39	24	30	37	88	307	
Pesticides first?	5	0	0	0	0	0	0	0	0	0	2	0	7	
only pesticides	0	0	0	0	0	0	0	0	0	0	1	0	1	
no pesticides	2	1	2	0	1	0	0	0	0	0	5	33	44	
a combination of practices	29	8	5	0	12	0	24	39	24	30	29	55	255	83.1

Table 5.9. Efficacy/ comprehension questions for bed bug related workshops.

Webinar efficacy was tabulated in a similar manner. Two different surveys were used: One to determine bed bug IPM related comprehension, the other to measure if IPM related to school and childcare environments was understood. In addition, a few questions were included to get a rough estimate of pesticide practices in the target region (EPA Region 2) of NY and NJ, as compared with other regions of the country. Seven webinars had bed bug IPM related comprehension efficacy questions. 96% of attendees stated that they had a greater insight of IPM as it relates to bed bugs, and 95% stated that they came away with greater knowledge of bed bug control methods. According to 97% of attendees the presentation clearly explained on-the-job bed bug precautions. Interestingly enough, through the webinar venue, 707 out of 743 attendees, 95%, stated "if they thought they saw a bed bug that they would capture it for identification", while only 34.6% of workshop venue participants answered the question correctly. Another question with a clear difference in answers from the workshop venue was "Who is responsible for bed bug IPM in your school? 91% of webinar attendees, 457 out of 504, answered “Everyone”, unlike the 50% correct answer in the classroom venue.

Webinars	1	2	3	4	5	6	7	Totals	%
T computers	189	701	496	159	562	57	135		
IPM insight?	75		254		371	34		734	
Yes	74		243		352	34		703	95.8
No	0		10		11	0		21	
Knowledge BB control?			272		366			638	
Yes	na	na	259	na	349	na	na	608	95.3
No	na	na	13	na	11	na	na	24	
BB cautions?			322		395			717	
Yes	na	na	309	na	388	na	na	697	97.2
No	na	na	9	na	4	na	na	13	
U see BB?	68	324		69	201	53	28	743	
call PCC	0	10	na	0	7	1	1	19	
catch4 for ID	67	306	na	66	191	50	27	707	95.2
close school	0	1	na	0	0	0	0	1	
kill & forget	1	1	na	0	2	2	0	6	
send letter	0	6	na	0	1	0	0	7	
empty room	0	0	na	3	0	0	0	3	
BB prevention steps except?	71	180			202			453	
Apply prevent treatment	63	159	na	na	152	na	na	374	82.6
Educate staff	0	3	na	na	5	na	na	8	
School to buy a Dryer	7	14	na	na	34	na	na	55	
Vacuum	0	1	na	na	2	na	na	3	
Reduce clutter/items	1	3	na	na	9	na	na	13	
BB myths true?	61	179						240	
Adults 6 mos.	57	154	na	na	na	na	na	211	87.9
BB at night	3	10	na	na	na	na	na	13	
Kill w/ Pest. Only	0	5	na	na	na	na	na	5	
Too tiny to see	1	6	na	na	na	na	na	7	
BB live in dirty	0	4	na	na	na	na	na	4	
Responsible 4 BB IPMl?	69	178		55	202			504	
Everyone	69	167	na	21	200	na	na	457	90.7
IPM Coord.	0	2	na	1	0	na	na	3	

Maintenance	0	6	na	10	0	na	na	16	
Principals	0	3	na	0	1	na	na	4	
landlord	0	0	na	16	0	na	na	16	
me/ tenant	0	0	na	7	1	na	na	8	
BB hot spot?	67	176			72			315	
cafeteria	64	160	na	na	57	na	na	281	89.2
classrooms	0	2	na	na	12	na	na	14	
closet, locker	1	4	na	na	1	na	na	6	
faculty lounge	2	8	na	na	2	na	na	12	
CCC & dorms	0	2	na	na		na	na	2	
BB Proactive?	69	180			233			482	
All of above	63	166	na	na	178	na	na	407	84.4
BB Policy		2	na	na	5	na	na	7	
plan of action	6	11	na	na	50	na	na	67	
Remove furniture		1	na	na	0	na	na	1	
Do bed bugs live only in dirty places?				69				69	
N0 = correct				69				69	100
incorrect				0					

Table 5.10. Webinar efficacy / comprehension for bed bug related questions.

One of the most effective measures of IPM understanding was “All are good bed bug prevention steps in schools except….?” The correct answer was “Apply preventative pesticide treatment”. The 83% that answered correctly demonstrated a clear comprehension of the IPM and children’s health message. Attendees were also able to correctly identify what was not a school bed bug hot spot: cafeterias. Cafeterias and kitchens are the No 1 pest hot spots in schools, but not for bed bugs, as 89% of attendees understood. Another question that challenged attendees was: “How can schools be bed bug proactive?” The question had a number of partially correct answers, but only one “All of the above” was correct. It was answered correctly by

84% of the webinar attendees. Overall the webinars had an efficacy rating of 92%, clearly above the efficacy rating of 83.5% of the classroom/workshops.

Seven webinars evaluated the comprehension of the general school IPM message and collected some pesticide use data at the same time. For efficacy, most attendees, 88% (489 out of 554 question respondents) agreed that the presentation explained the vulnerability of children to pesticides. 83% responded that applying pesticides to <u>prevent</u> pests is not a step to follow in IPM and 90% responded that "mosquito sprays" are not "low-toxic pesticides".

	1	2	3	4	5	6	7	totals	%correct
T computers	103	147	189	701	562	57	134		
Vulnerability of kids?	64	33	75	343		39		554	
no	1	1	2	29	na	0	na	33	
yes	61	31	72	287	na	38	na	489	88
PCC service school?		23	63	301		27	50	464	
As needed,	na	7	36	144	na	14	33	234	50
Monthly	na	10	16	52	na	8	9	95	
Seasonal 2-4x	na	3	8	8	na	3	8	30	
2x/ month	na	2	2	92	na	0	0	96	
Every o Mo.	na	1	1	5	na	2	0	9	
Pesticide appl. records?		24	64	237	192	30	75	622	
All (A, B,& C)	na	18	47	92	77	13	30	277	44.5
Pest. Application logs?	na	2	1	12	10	6	8	39	
Do not maintain	na	1	9	107	82	7	31	237	38
PCC receipts	na	3	7	26	23	4	6	69	
NOTIPM?		4	65		178				
Apply pest 2 prevent…	na	2	63	na	147	86.4			
Thresholds	na	1	0	na	0				
Keep Log	na	1	1	na	25				
Reduce clutter	na	0	1	na	0				
capture for ID	na	0	0	na	2				

inspect &ID	na	0	0	na	4
Not low toxic pest?		31			
Glue Boards	na	3			
Mosquito Spray	na	28	90.3		

Table 5.11. Webinar pesticide use and comprehension data.

f. **Are webinars an effective means of collecting pesticide use data?**

The only way to get verifiable data is through on site, in-person inspections, such as was conducted through the interpersonal venue. That said, webinars and other surveys can give some basic insight into general pesticide use practices. Half of webinar question respondents answered that their pest control company service as their facilities needed, when called. That is a clear indication that at least half of the schools and child care facilities that attended the webinar are not applying pesticides on a regular basis to “prevent” pests. As far as pesticide application record keeping, 44.5% maintain all of the records listed in the question and 38% do not maintain records as they do not apply any pesticides in their facilities. 66% of respondents state that they use low-impact pesticide products only (baits, gels and traps). Finally, when asked “What is your honest opinion of using IPM in your facility?” 87.5% of respondents answered they currently use IPM. (See Table 5.11)

The answer to the previous pesticide use questions show those agencies that are conducting SIPM social marketing and training programs, that inroads have been made in certain areas and in select states. However, the data also demonstrates there are areas that clearly need to be reached.

g. Areas in need of the SIPM message.

Where are the areas and states that were reached and what areas and states need to be targeted for a more intensive SIPM social marketing campaign?

The IPM message was well distributed within the target region, (EPA Region 2) mostly New York and New Jersey, with 1733, or 35% of all webinar attendees. (Puerto Rico and the USVI, also part of Region 2 were minimally attended due to language and culture barriers and will require a different outreach strategy.) Aside from EPA Region 2 states, what other states were well reached? California, Florida, Ohio and Pennsylvania all had over 200 attendees, while Illinois, Kansas, Minnesota, Texas, Virginia and Washington had a good showing, with over 100 attendees, each.

Webinar	1	2	3	4	5	6	7	8	9	10	11	totals
Total 1	103	147	189	701	496	70	159	134	456	520	490	3465
Total 2	197	147	278	1065	866	117	189	165	618	871	608	5121
NY	31	19	22	209	422	43	18	12	80	218	37	1111
NJ	48	72	36	227	93	15	10	26	35	20	20	602
OH	0	0	0	145	103	1	8	6	15	17	4	299
CA	20	0	17	15	7	1	15	2	26	93	25	221
FL	3	0	2	31	3	0	1	3	11	144	16	214
PA	3	2	34	64	6	0	3	1	22	9	60	204
VA	0	0	1	15	1	0	0	1	11	142	10	181
IL	3	2	4	14	7	9	22	8	24	3	72	168
KS	0	0	2	23	71	0	4	2	7	18	3	130
MN	0	2	0	38	10	5	14	25	4	21	6	125
WA	0	15	1	28	19	4	7	7	13	5	26	125
TX	4	3	9	13	16	0	4	8	28	1	28	114

Table 5.12.States with highest attendance viewing webinars

ID	5	1	4	0	1	2	5	0	4	2	0	24
WV	0	0	0	5	1	0	0	0	6	0	12	24
LA	2	1	0	3	0	0	0	1	5	2	9	23
MT	1	0	1	2	2	3	3	3	2	3	3	23
NM	1	2	8	1	2	0	0	0	7	0	0	21
AL	0	0	0	7	0	0	0	1	7	0	4	19
MO	0	0	0	2	0	1	0	3	3	4	6	19
AR	0	1	2	2	0	0	2	0	5	0	3	15
NV	0	3	0	2	0	0	0	1	1	0	4	11
SC	0	0	0	6	1	0	0	0	1	0	3	11
SD	1	1	2	0	0	4	1	0	1	0	0	10
WY	0	0	0	0	2	0	0	0	0	0	3	5
ND	0	1	0	0	0	0	0	0	1	0	2	4
DE	0	0	0	0	0	0	0	0	1	0	0	1

Table 5.13. States with few attendees, suggesting a different targeting approach is needed.

Attendance at webinars can be directly related to invitation distribution networks. The invitations were sent out by EPA regional SIPM coordinators, the EPA Office of Children's Health Protection, the 211 network, and some regional agriculture extension offices and NGO's. In addition, some rural states such as Nebraska, Idaho, Kansas, Colorado and North Dakota were directly targeted, with invitations going out to all school district superintendents. The targeting to those states was only partially successful in Kansas and Colorado. (See Appendix C, Table 9.) The attendance data from the webinars can be useful to show which districts have been actively obtaining the SIPM message, and which ones have not. State and regional SIPM coordinators can use the data to target areas for follow-up SIPM workshops or in-person visits.

The lists of school districts that attended the webinars were shared with the other EPA regional coordinators for just that purpose. If a school district had multiple persons attending, chances are, there is local interest in SIPM. Those districts are the low-hanging fruit for successful IPM implementation and possible state pilot project sites. Districts with no attendees, or only one, may be more difficult to reach and may require a different approach, such as in-person contact.

h. Preference or Ability to Travel.

Eight of the webinars asked attendees: 'If they had to physically travel…" (to either New York, New York, or Edison, New Jersey, depending on webinar) "…would they still be able to attend the training?" 2011 out of 2283 attendees, or 85.6% would have been unable to attend. Most were hampered by distance, budget, or time constraints. The webinar venue was what worked best for most rural and distant facilities. From this question, it was evident that 12% of the audience would have been trained, had it not been for the convenience and low cost (FREE to attendees) of the venue.

Webinars	1	2	3	4	5	6	7	8	totals
Total attended	160	147	281	1082	865	114	103	245	2997
# answering Q	160	134	194	702	749	17	82	245	2283
I would not attend	117	112	162	633	671	13	80	223	2011
% unable to travel	73.1	83.6	83.5	90.2	89.6	76.5	97.6	91.0	88 avg
I would still attend	24	22	14	69	78	4	2	22	235
% answering Q	100	91.2	69.0	64.9	86.6	14.9	79.6	100	

Table 5.14. Preference or ability to travel by webinar attendees.

Another way to evaluate ability to travel was to look at the distance the attendees were from the webinar base location. Some were hosted in New York City, others in Edison, New Jersey. After calculating the rough distance from the venue base to the attendee using www.travelmath.com , all attendees within a 100 mile radius were selected and sorted. 100 miles was used as it was the maximum distance many state, county, federal and local governments are allowed to travel, based on finances. Anything over 100 miles would probably mean overnight lodging and additional expenses for the attendees and their districts. This may not be an issue if the venue was an annual convention, or similar scenario. Also locations within 100 miles would be a rough determination of whether the attendee would fly or drive.

Webinar	Total attended	No. in Region 2	No of people w/in 100 mi	local miles - w/in 100 mi	local miles – two way	people outside 100 miles
1	197	96	69	1731	3462	128
2	147	98	78	3249	6498	69
3	278	87	49	3002	6004	229
4	1065	442	195	10351	20702	870
5	114	63	19	135	270	98
6	871	235	99	3317	6634	758
7	82	9	15	1047	2094	88
8	165	39	24	665	1330	141
9	189	21	20	553	1106	139
10	618	48	49	2840	5680	559
11	866	257	277	7011	14022	588
12	624	104	56	2602	5204	543
totals	5216	1499	950	36503	73006	4210

Table 5.15. Alternative ability to travel based upon distance from base.

There were 950 attendees out of 5216, or 18%, that were located within a 100 mile radius. That number of 18% is close to the 15% of attendees that said they could still attend the training if they physically had to travel.

A major bonus to the webinar venue was the 4210 additional attendees from around the country that cost nothing additional to train target audiences and guests about IPM.

i. Environmental Savings

All of the attendees located within 100 miles were assumed to be drivers, for the sake of continuity. The two-way mileage was calculated, then using a carbon calculation formula (See appendix C, page 6) auto emissions were estimated using average estimated fuel efficiency of 21 mpg and the amount of pounds of carbon dioxide that is emitted as a result of burning one gallon of gasoline. For local travel, 68014 pounds of carbon was saved via the webinar venue. A slightly different formula was used for the 4210 attendees located outside of the 100 mile radius. Two way air miles was calculated to be 328652 miles saved. The mileage was divided by the 23.88 pounds of CO_2 produced per gallon of jet fuel used, yielding 0.484 pounds of CO_2 per passenger mile flown. The sum of CO_2 saved from air transportation via the webinar venue was 159067 pounds. When the auto and air CO_2 emissions are combined, a total of 160852 pounds, or 72.9 metric tons of CO_2 were saved.

Webinar	Total attended	local miles - w/in 100 mi	local miles -two way	lbs CO2 local*	2-way air miles	2-way combined miles	Lbs CO2 from air*	Combined CO2 (local + air)	CO2 metric tons
1	197	1731	3462	3225	333732	337194	161526.3	164751.6	74.7173
2	147	3249	6498	6054	197180	203678	95435.12	101488.8	46.0267
3	278	3002	6004	5593	444364	450368	215072.2	220665.6	100.075
4	1065	10351	20702	19286	1307514	1328216	632836.8	652123.2	295.747
5	114	135	270	251.5	186332	186602	90184.69	90436.23	41.0142
6	871	3317	6634	6180	1363656	1370290	660009.5	666189.9	302.127
7	82	1047	2094	1951	141346	143440	68411.46	70362.27	31.9103
8	165	665	1330	1239	308764	310094	149441.8	150680.8	68.336
9	189	553	1106	1030	330108	331214	159772.3	160802.6	72.9264
10	618	2840	5680	5292	1261378	1267058	610507	615798.5	279.274
11	866	7011	14022	13063	945108	959130	457432.3	470495.4	213.377
12	624	2602	5204	4848	1169456	1174660	566016.7	570864.8	258.896
totals	5216	36503	73006	68014	7988938	8061944	3866646	3934660	1784.43

Table 5.16. Carbon savings for webinar participants.

Workshop carbon dioxide emitted was calculated for the instructor's travel. The 1222 miles traveled for the 17 workshops added 1138 pounds of CO_2 to the environment. We did not have the means to calculate travel by the attendees, with the exception of one workshop, which is used as an example in this study. School nurses from Union county and vicinity traveled to one workshop. Their schools were identified, yielding the distances traveled to the workshop location. Collectively they traveled 859 miles adding 800 lbs of carbon to the atmosphere. Taking a leap of faith, it this number was multiplied by the 17 workshops, perhaps 13600 more pounds of CO_2 may have been emitted. Although this is only an example, it does show some possible relative auto emissions.

Location	mileage	2-way travel
Workshops		
Bronx, NYC	35	70
Manhattan, NY	35	70
Scotch Plains,	13	26
Edison, NJ	0	0
Princeton, NJ	22	44
Manhattan, NY	35	70
Trenton, NJ	38	76
Livingston, NJ	25	50
Edison, NJ	0	0
Mountainside,	15	30
Piscataway, NJ	9	18
Somerville	18	36
Clark, NJ	15	30
Trenton, NJ	38	76
Westhampton,	51	102
Syracuse, NY	247	494
Union, NJ	15	30
total miles	1222	
lbs carbon	1138	

2013	state	number attendees	miles	miles x attendees	2-way travel
School Nurse Workshop					
Berkley Hits.	NJ	1	12.5	13	25
Clark	NJ	2	2	4	8
Cranford	NJ	4	3.6	14	28.8
East Orange	NJ	1	12.6	13	25.2
Elizabeth	NJ	4	8.4	34	67.2
Hackensack	NJ	1	26	26	52
Hillside	NJ	2	12.5	25	50
Irvington	NJ	1	25	25	50
Jersey City	NJ	1	25	25	50
Kenilworth	NJ	1	6	6	12
Linden	NJ	4	8.4	34	67.2
Maplewood	NJ	1	9.6	9.6	19.2
Mountainside	NJ	1	6.2	6.2	12.4
New Providence	NJ	1	18	18	36
Plainfield	NJ	3	6	18	36
Rahway	NJ	2	6	12	24
Roselle	NJ	3	7.8	23	46.8
Roselle Park	NJ	3	8	24	48
Scotch Plains	NJ	6	3.6	22	43.2
Springfield	NJ	3	6	18	36
Union	NJ	3	12	36	72
Westfield	NJ	7	3.6	25	50.4
total miles	859				
lbs carbon	801				

Table 5.17a & b Workshop Estimated workshop carbon used.

interpersonal visits	No. of centers	estimated mileage	centers x mileage*
Si CCC P 1	45	18	810
Si CCC P 2	38	18	684
SIPM Newark	26	13	338
SIPM Jersey City	6	22	132
SIPM Bronx NYC	6	35	210
SIPM St Isl. NYC	1	18	18
SIPM N Brunswick	3	6	18
SIPM Bernardsville	3	25	75
SIPM S Pls/Fan.	4	13	52
SIPM Ft. Covingtn	3	345	1035
SIPM Locust Vly	3	40	120
SIPM Mohawk T	1	341	341
S IPM USVI	1	1676	1676
total	5509		
lbs carbon	5126		

The interpersonal visits were not only time consuming, labor and resource intensive, they also cost the environment a total of 5126 pounds of added CO_2 to the atmosphere.

Table 5.18. Estimated carbon used for Interpersonal venue travel.

5.7 Conclusions

Attendance. The attendance increased per contact/presentation day by approximately 10 times per venue type: 4.5 per interpersonal visit; 50 per workshop to 435 per webinar presentation. That is a substantial increase in participation per venue.

Training Venue preference. The attendees clearly preferred the venue that they were in. 60% of workshop attendees preferred the classroom/ workshop venue, while 70% of webinar participants chose webinars as their preference.

Number of children and schools reached per venue. The interpersonal CCC visits had a direct effect on the health of 3307 children that attended those CCC facilities. As a result of the visits most CCC had verifiable changes in their pesticide use practices. Unlike the CCC initiative, the school visits did not have a multi- phase and revisit strategy, which would have been helpful in documenting the measure of success of the visits. However, the school visits did educate those who could potentially have an effect on the health of the 1,299,653 students in the school districts that were visited.

The webinar venue reached 1,685 school or childcare administrators who are responsible for at least 6,510,094 children. The fact that most of the attendees for these webinars were administrators or had oversight of school districts meant that the IPM message reached those that may have the ability to affect policy change within their facilities or districts.

Efficacy of the venues. Although the interpersonal venue was time, labor and economically more intensive, then the other venues, there was a 100% increase in CCC administrator understanding of IPM documented along with clear changes in policy with regard to pesticide use. Policy change, documentation and revisits were not conducted in the school interpersonal visits.

Averaging all of the survey answers, the efficacy of the workshop venue was 83.5%. The webinars had an efficacy rating of 92%, clearly above the efficacy rating of 83.5% of the classroom/workshops.

Are webinars an effective means of collecting pesticide use data? The only way to get verifiable data is through on site, in-person inspections, such as was conducted through the interpersonal venue. That said, webinars and other surveys can give some basic insight into general pesticide use practices. (See chapter 7). Half of webinar question respondents answered that their pest control company service their facilities needed, when called. That is a clear indication that at least half of the schools and child care facilities that attended the webinar are not applying pesticides on a regular basis to "prevent" pests.

The answers to the pesticide use questions show that inroads have been made in certain areas and in select states. However, the data also demonstrates there are areas that clearly need to be reached.

Areas in need of the SIPM message. The attendance data from the webinars can be useful to show which districts have been actively obtaining the SIPM message, and which ones have not. If a school district had multiple persons attending the webinar, chances are, there is local interest in SIPM. Those districts are the low-hanging fruit for successful IPM implementation and possible state pilot project sites. Districts with no attendees, or only one, may be more difficult to reach and may require a different approach, such as in-person contact.

Preference or Ability to Travel. The webinar venue was what worked best for most rural and distant facilities. 85.6% of webinar attendees would have been unable to attend the IPM training, had it not been in the webinar venue format. Most were hampered by distance, budget, or time constraints. So, less than 15% of the audience would have been trained, had it not been for the convenience and low cost of the venue. 18% of webinar participants were located within a 100 mile radius. That number of 18% is close to the 15% of attendees that said they could still attend the training if they physically had to travel.

Environmental Savings. The interpersonal visits were not only time consuming, labor and resource intensive, they also cost the environment a total of 5126 pounds of added CO_2 to the atmosphere. Compare that to the pounds of carbon saved via the webinar venue. When the auto and air CO_2 emissions are combined, a total of 160852 pounds, or 72.9 metric tons of CO_2 was saved. That is a significant savings to the environment.

Another major bonus to the webinar venue was the fact that 4366 additional attendees from around the country that were able to attend. It cost nothing additional to train target audiences and their guests about IPM were an even greater bonus.

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Chapter 6

Pest Control Practices and Integrated Pest Management in Childcare Centers Initiative: 2010 Staten Island Pilot Project; USEPA;

http://www2.epa.gov/childcare/pesticidesintegrated-pest-management-1

http://www2.epa.gov/sites/production/files/documents/StatenPilot2010.pdf

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6.1 Abstract

Children's health has been a top priority of the Environmental Protection Agency since its inception. Over the years, numerous initiatives have focused on use of pesticides in K-12 schools. However, preschoolers (ages six and under) have rarely been the focus of such efforts. National studies have documented the presence of pesticide residues and other potentially hazardous substances in many childcare centers.

This pilot project measured the efficacy of education strategies to reduce pesticide use and evaluated pesticide use patterns in 45 childcare centers located in Staten Island, New York. Selected childcare centers met the following study parameters: the program was daytime only (no aftercare), the children were ages six and under, and school officials were willing to participate in the study. Specifically, the project focused on identifying

the manner, type, and frequency of pesticides being applied in the centers. The initiative's main premises were: 1) preschool children (ages six and under) may be exposed to pesticides from indoor and/or outdoor pesticide misapplications in childcare centers and 2) pesticide use can be reduced through education and implementation of integrated pest management (IPM) in childcare centers.

The information obtained from this initiative is intended to: 1) illustrate how a random sample of childcare centers manages its pest control issues, 2) suggest how pest control in childcare centers may be improved by incorporating IPM and reducing reliance on pesticides, and 3) provide useful information that may help with the development of IPM practices in childcare settings nationwide. By educating childcare center administrators and staff about the importance of IPM to better control pests and to promote a process of wiser pest management strategies, we were able to document a reduction in the frequency of pesticide applications in the target childcare centers.

Keywords: integrated pest management, childcare centers, IPM in childcare centers, EPA childcare study, pesticide use around children

6.2 Introduction

Children's health has been a priority of the Environmental Protection Agency (EPA) so, over the years, many initiatives have focused on use of pesticides in K-12 schools. However, preschoolers (ages six and under) have rarely been the focus of such efforts. National studies have documented the presence of pesticide residues and other potentially hazardous substances in many childcare centers (Tulve et al., 2006; Breysse et al., 2004;

USEPA, 2008; Viet et al., 2003). The First National Environmental Health Survey of Childcare Centers reported that 75% of respondent childcare centers had had pesticide applications in the previous year (Viet et al., 2003). A number of state surveys, including those taken in Iowa (ISUE, 2007), Minnesota (Jones, 2002), California (Messenger et al., 2008), and North Carolina (Strandberg et al., 2009), were conducted following significant pesticide misapplications around the country.

Although exposure to pesticides may present a risk to all people, young children generally face higher risks than adults, are more susceptible than adults to certain pesticides, and may be more greatly exposed than adults. Children bear a disproportionate burden of risk and need additional protection (NRC, 1993). Many infants and young children spend as much as 10 hours per day, five days a week, in childcare centers and preschools (Tulve et al., 2006). Children also spend more time on the floor, where residues can transfer to skin and be absorbed (Bradman et al., 2006). Moreover, young children may frequently place their hands and other objects in their mouth, increasing the potential for non-dietary ingestion of pesticides (Cohen et al., 2000; Lo and Connell, 2005). Young children are less developed immunologically, physiologically, and neurologically. Therefore, they may be more susceptible to the adverse effects of chemicals and toxins (Cohen et al., 2000; Lo and Connell, 2005; Bearer, 2000).

This EPA study is unique because it is a comprehensive, onsite study of pesticide use in an urban environmental justice area of a large number of childcare centers. (*Note: The United States Environmental Protection Agency defines Environmental justice (EJ) as "the fair treatment and meaningful involvement of all people regardless of race, color,* *sex, national origin, or income with respect to the development, implementation and enforcement of environmental laws, regulations, and policies."(*USEPA EJ)) The study includes inspections of pest control companies (PCCs) that serviced the study facilities and onsite follow-up visits to the same centers.

6.3 **Project Background:**

Importance of Studying Pesticide Use in Childcare Centers

The increased vulnerability of young children to pesticide exposures may result from where they spend their time. The children's total exposure to persistent pesticides (CTEPP) study (Morgan et al., 2002) indicated that children in childcare settings in urban areas had a higher exposure rate to certain chemicals found in pesticides than children in rural and stay-at-home settings. Due to the mouthing behavior of young children, the large amount of time that they spend on the floor, and differences in metabolism rates compared to adults, infants and young children may be more susceptible to health effects as a result of pesticide exposure (EPA, 1995).

Pesticide residues tend to concentrate on the floor and can linger in dust and carpets. It was found that concentrations of some pesticides are four to six times higher near the floor than at an adult's breathing level (Zahn and Ward, 1998). For example, some pesticides applied by baseboard spraying may reach levels 4.5 times higher in the air 10 inches from the floor (where a crawling child breathes) than in the air 39 inches from the floor (where a seated adult breathes). Residues may often remain high for an extended period – a day, weeks, or even months, depending on method of application, ingredients, and quantity of pesticide (Guzelian et al., 1992; Morgan et al., 2002).

6.4 Methodology

Questionnaire / Checklist Development

A questionnaire was developed to standardize information on current pest management and pesticide use practices. The questionnaire consisted of two parts. Part 1 focused on childcare center demographics, including the number and ages of children enrolled in the center, number of staff, responsible party for pest management decisions at the center, current and recent pest problems, the name of the PCC serving the center, frequency of visits by pest control operators, and questions about adherence to local and state regulations. Part 2 was a five-page checklist developed to identify pest management area issues of concern in most childcare facilities, including: a) kitchens and cafeterias; b) storage areas; c) custodial and maintenance areas; d) restrooms; e) classrooms, offices, and hallways; f) teachers' rooms and naptime areas; and g) playground and outdoor areas. The questionnaire and checklist were field-tested in multiple childcare facilities before the start of researchers' visits and was modified as needed (Attachment A –Surveys 3 and 4: checklist and questionnaire)

6.5 Results and Discussion

All data was tabulated in an excel spreadsheet and condensed into the main questions in Table 6.1 and Appendix C – Tables 10a and b.

CCC	Apply pesticides regularly?	Apply pesticides regularly?	Notification 4 pesticide application?	Notification 4 pesticide application?	Records	Records	Pest mgmt. plan?	Pest mgmt. plan?
Center	**Phase 1**	**Phase 2**	**Phase 1**	**Phase 2**	Phase 1	Phase 2	**Phase 1**	**Phase 2**
A-1	yes	as needed	no	No	Yes	yes	no	use PMP
A-2	as needed	no	no	No	No	no	no	use PMP
A-3	yes	as needed	no	No	Yes	yes	no	use PMP
B-1	as needed	unknown	no	Unknown	Yes	unknown	no	unknown
B-2	yes	as needed	yes	yes	No	yes	no	use PMP
B-3	as needed	no	yes	yes	No	no	no	no
C-1	yes	as needed	yes	No	Yes	Inc.	use PMP	use PMP
C-2	yes	yes	yes	No	Yes	Inc.	no	use PMP
C-3	unknown	as needed	unknown	No	Unknown	Inc.	no	use PMP
C-4	yes	as needed	no	No	Yes	Inc.	no	no
C-5	yes	yes	yes	No	Yes	Inc.	yes	no
C-6	yes	yes	no	No	No	yes	no	use PMP
C-7	yes	as needed	no	No	Yes	yes	use PMP	use PMP
C-8	yes	as needed	yes	No	Yes	Inc.	yes	yes
E-1	yes	yes	no	No	Yes	yes	use PMP	no
E-2	yes	as needed	no	No	Yes	Inc.	no	use PMP
F-1	yes	as needed	no	No	Yes	Inc.	no	use PMP
F-2	yes	yes	no	No	Yes	Inc.	no	use PMP
J-1	yes	yes	no	No	No	Inc.	use PMP	use PMP
J-2	yes	as needed	no	yes	Inc.	yes	no	yes
J-3	yes	as needed	no	yes	Unknown	yes	no	yes
L-1	yes	yes	no	No	Inc.	yes	no	use PMP
L-2	yes	yes	no	No	Yes	yes	use PMP	use PMP
P-1	yes	as needed	no	yes	Yes	yes	yes	yes
R-1	yes	no	yes	No	Yes	yes	no	yes
S-1	unknown	as needed	no	No	No	Inc.	no	use PMP
S-2	yes	yes	no	No	Yes	yes	use PMP	use PMP
S-3	yes	yes	yes	No	Yes	yes	use PMP	use PMP
S-4	yes	as needed	no	No	No	yes	no	use PMP
S-5	yes	yes	no	No	No	yes	use PMP	use PMP
S-6	yes	as needed	yes	yes	Yes	Inc.	use PMP	use PMP
S-7	yes	unknown	yes	No	Yes	yes	no	use PMP
T-1	yes	no	no	No	Inc.	Unknown	no	use PMP

T-2	unknown	no	unknown	no	Unknown	no	no	no
U-1	yes	as needed	no	No	Yes	Inc.	no	use PMP
U-2	yes	no	no	No	Inc.	Inc.	no	use PMP
Y-1	yes	yes	yes	yes	Yes	yes	no	use PMP
Z-1	as needed	no	yes	No	No	no	no	no

Table 6.1. Summary of key results in IPM in CCC initiative.

6.5 a Pests in Childcare Centers

Phase 1 questionnaires identified cockroaches as the main pest in childcare centers: 27 centers had a history of roach problems. Ants were a close second: 25 centers had either ant visits or infestations. Twenty-two centers had occasional rodent visitors. Another 10 centers had other pest issues, including bees, wasps, bed bugs, and snakes in the play equipment, mosquitoes, lice, fruit flies, and gnats. Fifteen facilities reported no pest problems.

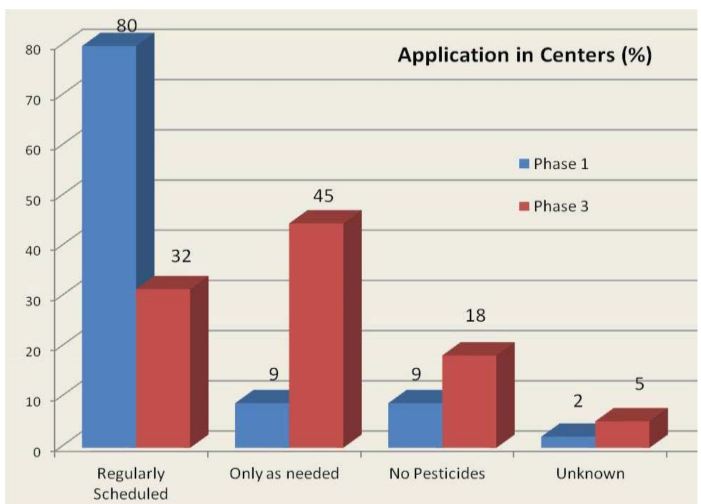

Figure 6.1. Changes in pesticide application rates in childcare centers, Phase 1 to Phase 3

6.5.b. Scheduled Pesticide Applications in Childcare Centers

Of the 45 Staten Island childcare centers visited, 80% (36 centers) had regularly scheduled applications of pesticides in Phase 1. Only five of the 45 centers had outdoor perimeter (around buildings only) pesticide applications, and none had any pesticide applications within the playground area.

By Phase 3, regularly scheduled applications of pesticides in childcare centers fell to 32% (14 centers), applications "as needed" increased from 9% to 45%, and there was a significant increase of no pesticide applications in the centers from Phase 1, 9% (4 centers), to Phase 3, 18% (8). These results showed a significant reduction of scheduled pesticide applications in Staten Island childcare centers (Figure 6.1).

6.5.c. Frequency of Pesticide Application

A comparison of application records collected at both childcare centers and pest control companies documented not only the frequency of pesticide application but also the method of application. As Phases 1 and 2 data show, only five childcare facilities had no visits by a pest control company for more than three years. Six childcare centers had PCC visits "as needed." Pest control companies visited 75% of childcare centers on a regular schedule. Eighteen childcare centers had pest control companies visit monthly. Of the 45 facilities in the study, 60% had pesticides applied at least once per month (Figure 6.2).

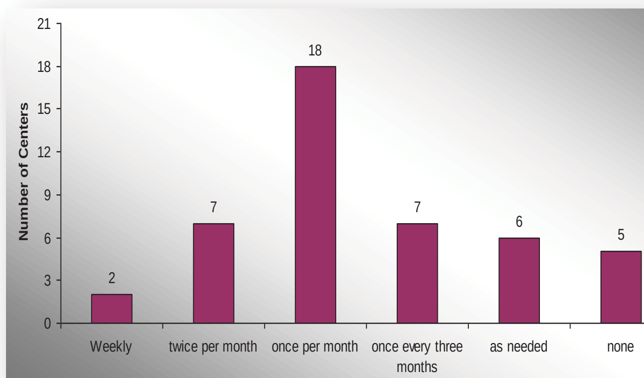

Figure 6. 2. Frequency of pesticide applications in childcare centers, Phase 1

6.5.d. Methods of Pesticide Application

Sixty-nine percent of the childcare centers surveyed (31 centers) used less-toxic pesticides, such as baits and traps, to combat insects and rodents. Fifty-eight percent relied on pest control companies to spray for pests, and 32% used a combination of spraying, baits, and traps. Only 5% of PCCs monitored for pests.

6.5.e. Timing of Pesticide Application

The time of day and days of the week that pesticides are applied may be very important. Here are two reasons: 1) If a pesticide is sprayed on a weekday morning before school, it may not have time to settle before children enter the building. Any pesticide left in the air may cause inhalation exposure. 2) If a pesticide is sprayed in a childcare center on a weekday afternoon after the children have left, some pesticide residue may remain in play areas when the children return the next day. This also creates potential for pesticide exposure.

According to PCC application records of pesticides used and the locations of their application, 58% of centers had spray applications. The data shows that five times more pesticides were applied from Monday through Thursday as on Friday and Saturday (Figure 6.3).

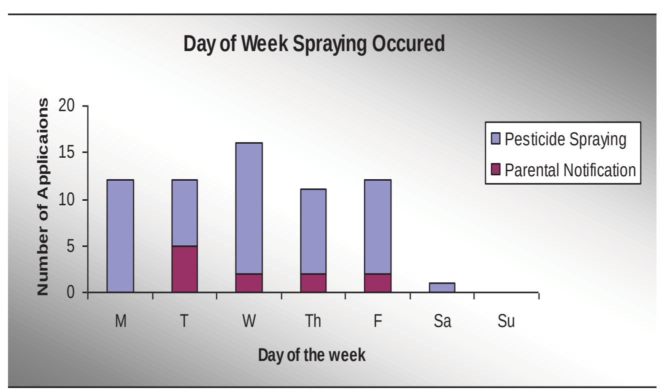

Figure 6.3. The day of the week that pesticides were applied in childcare centers, Phase 1

6.5.f. Type and Percentage of Pesticides Applied

In the Staten Island study, more than half of all pesticide applications (51%) were pyrethroids, applied in 21 childcare centers (Table 6.4). These products include the phenylpyrazoles, which were applied in nine centers (13%). These were followed by the super warfarin rodenticides, applied in 11 centers (16%); least-toxic monitoring glue traps, in nine centers (15%); borates, in four centers; and other pesticides (including hydroprene) in seven centers.

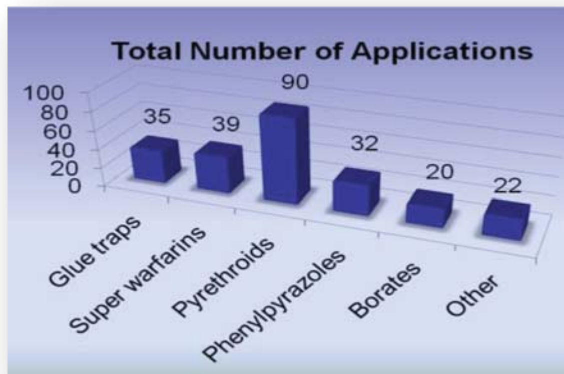

Figure 6.4. Number of pesticide applications in childcare centers via Phase 1

Pyrethroids

Pyrethroids were the most commonly used pesticide in homes, schools, and childcare centers (CDC, 2005). Pyrethroids – including phenylpyrazols, deltamethrin, esfenvalerate, cyfluthrin, cypermethrin, beta-cyfluthrin, bifenthrin, and hydroprene – accounted for 122 applications in Staten Island childcare centers over the four-month study period. Pyrethroid exposure in childcare centers may occur through inhalation, dermal contact with residues, dust, indirect ingestion of residues attached to dust or soil, and direct ingestion of foods containing residues (ATSDR, 2003). Pyrethroids have low volatility and a high affinity to bind to dust and soils, causing them to favor the particulate phase (CDC, 2005; EPA, 2007).

Information provided by the pest control companies suggests that these companies applied pesticide sprays formulated with one or more of the above-listed pyrethroid active ingredients.

Rodenticides

Eighteen childcare centers reported having problems with rodents. (Note: There is a difference between occasional visitors and a problem with rodents. 22 centers had rodent visitors, but only 18 centers considered them enough of a problem to necessitate rodent control measures.) Of the 11 centers that had super warfarin rodenticides applied, only seven used tamper-resistant baits. Six centers relied on monitoring the rodent problem with the application of glue boards, three in combination with rodenticides.

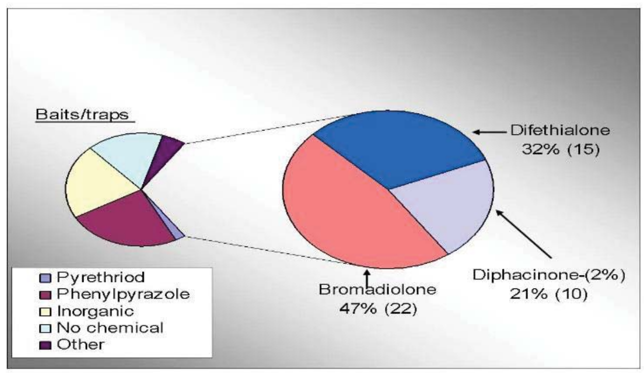

Figure 6.9. Rodenticides used in SI CCCs.

Super warfarin rodenticides account for 30% of all bait and trap applications used. All three rodenticides used in the childcare centers were super warfarin types: difethialone, bromadiolone, and difenacoum. These have a potency of up to 100 times that of warfarin. All three are also known as second-generation anticoagulants (ISPCC, 2009; Wu et al., 2009). Studies indicate that among the super warfarin rodenticides applied to the study centers, bromadiolone poses the greatest secondary toxicity risk to young children (Garry, 2004; Bradman et al., 2006).

6.5.g. Pesticide Application Notification

The New York State Department of Environmental Conservation (NYS DEC) Neighbor Notification Law and the NYC DOHMH require childcare centers to provide at least 48 hours' notice before applying pesticides on their property (OCFS, 2010). The notice must be posted where it can easily be seen by people picking up and dropping off children. It must include: the date of the pesticide application, name and EPA registration number of the pesticide being applied, and toll-free telephone numbers for pesticide product information (OCFS, 2010).

If pesticides must be sprayed, Friday applications – made after the children leave for the day – should be encouraged. These reduce the risk of exposure and do not require a 48-hour advance notification. Most pesticides are applied in the childcare centers from Monday through Thursday, requiring notification. Yet only 20% of centers notify parents. Sixty-four percent of the childcare centers did not notify parents or employees of the application of pesticides in Phase 1 – by Phase 3, 61% of the centers still did not notify. There was no

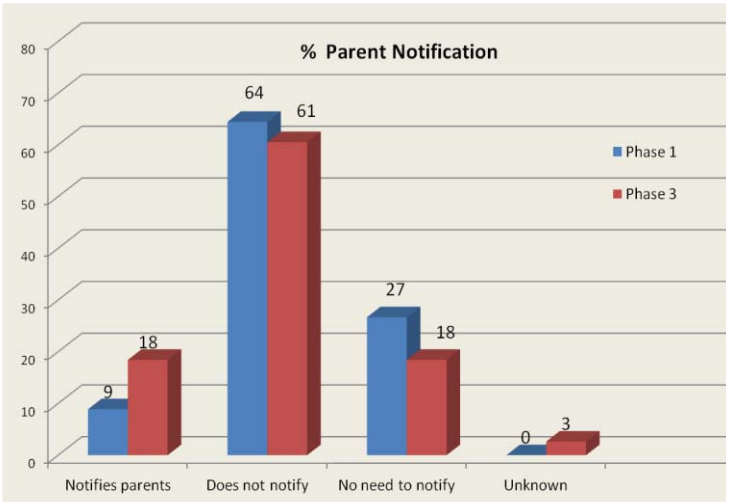

Figure 6.5. Changes in pesticide application notification in childcare centers, Phase 1 to Phase 3

significant change in notification practices from the Phase 1 to the Phase 3 visits (Figure 6.5).

6.5.h. Application Records Maintenance in Childcare Facilities

Both the NYS DEC and the NYC DOHMH require childcare centers to maintain records of all pesticides used at the facility for three years and to make the records available for public inspection upon request. Among the childcare centers visited during Phase 1 of the study, 33% had incomplete records, 22% had no records at all, and only 38% maintained complete records. By Phase 3, these numbers had changed dramatically – all but one childcare center had some form of recordkeeping. Seventy-one percent of childcare centers maintained complete records, and 10% of the centers did not apply pesticides (therefore, no need to maintain pesticide application records). These results were also influenced by direct compliance assistance to both childcare centers and pest control companies (Figure 6.6).

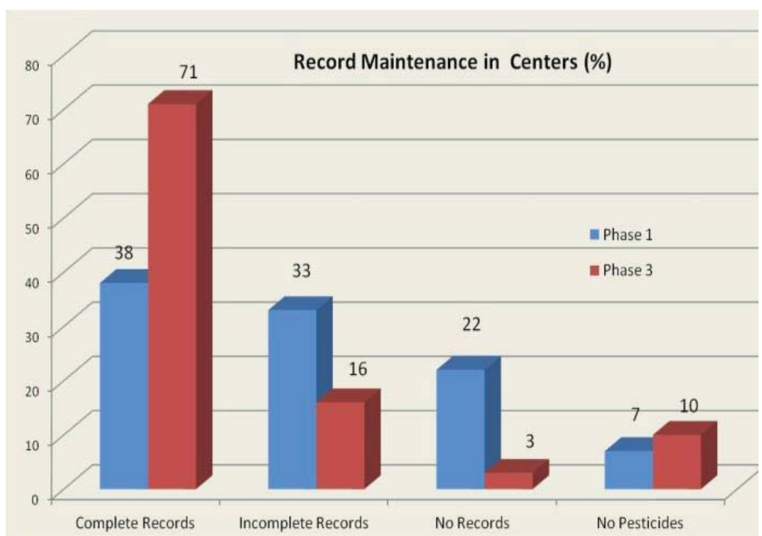

Figure 6. 6. Changes in application records maintenance in childcare facilities, Phase 1 to Phase 3

6.5.i. Pest Prevention Management Plan

New York City regulations require that pesticide use be a part of the IPM plan and should not substitute for pest prevention management measures.

During Phase 1 interviews with childcare administrators, it was found that 69% of childcare centers did not have a pest prevention management plan. Twenty-four percent of the centers used a plan provided by the pest control company to fulfill the requirement. By the Phase 3 revisits, only 20% of childcare centers had no plan; 67% of the centers had adopted the plans provided by pest control companies (Figure 6.7).

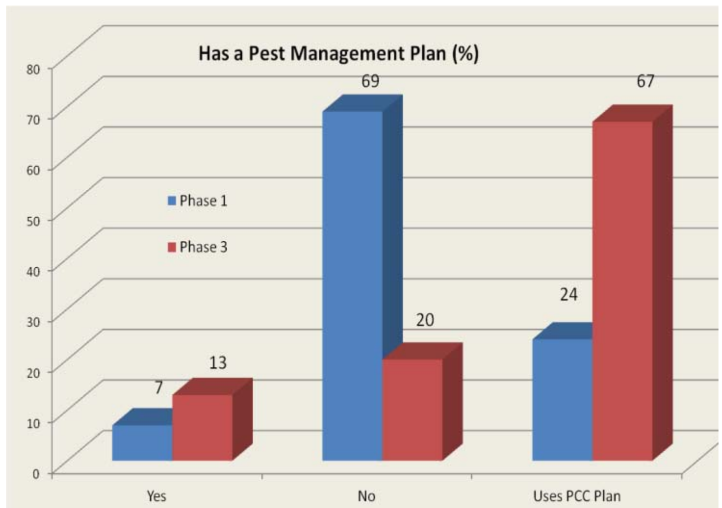

Figure 6.7. Childcare centers with a pest management plan: changes from Phase 1 to Phase 3

6.5 j. Knowledge of IPM in Childcare Centers

During the first-visit interviews, only seven out of 45 childcare center directors recognized the term “IPM.” However, it was found during the facility tours that most childcare centers did indeed practice various forms of IPM. After walking and talking with the center administrators and maintenance staff during the Phase 1 visits, most inspectors were able to point out areas that could be improved to reduce the presence of pests. By the end of Phase 3, all facility administrators were able to demonstrate that they knew what IPM was.

6.6. IPM Issues Identified in Childcare Facilities

The study also tested the efficiency of IPM education in childcare centers by measuring the base number and type of IPM issues found in centers during the first visit versus corrections made in a second visit – after IPM outreach was conducted, 75% of childcare centers informed of the IPM problems found, and corrective actions taken. Of the six main IPM issue categories evaluated (maintenance, outdoor garbage, indoor trash, cleaning, clutter and storage, and outdoor standing water), the greatest improvement was noted for maintenance-related problems. IPM issues in the 45 childcare centers were successfully identified through the course of this study. The most prominent IPM issue categories found in the Staten Island childcare centers through this study were: maintenance, clutter and storage, outdoor garbage, cleaning and sanitation, outdoor standing water, personal item storage, indoor trash, and outdoor garbage. By using both the checklist and photographic methods of documentation in Phases 1 and 3, we found 67 maintenance issues in 30 centers, 44 clutter and storage issues in 21 centers, 36 outdoor garbage issues in 23 centers, and 14 outdoor standing water issues in 10 centers (Figure 6.8).

6.7. IPM Improvements

Through the use of the questionnaire and photographs, this study also documented significant changes in IPM practice from Phase 1 to Phase 3 in 38 of the childcare centers that were revisited in Phase 3 of the study. (We were unable to obtain the final data from seven of the centers in Phase 3.) By comparing the negative practices noted in the after-visit letters to changes in those areas, we were able to filter out most subjectivity in the observational skills of the different inspectors visiting the centers between Phases 1 and 3. For instance, if one inspector missed some key IPM problems in Phase 1 and another inspector documented those discrepancies in Phase 3, the additional issues would not detract from the specific practice improvements that a center made via the after-visit letters. Any additional IPM problems that were not initially identified within any given childcare center were not counted in the final tally.

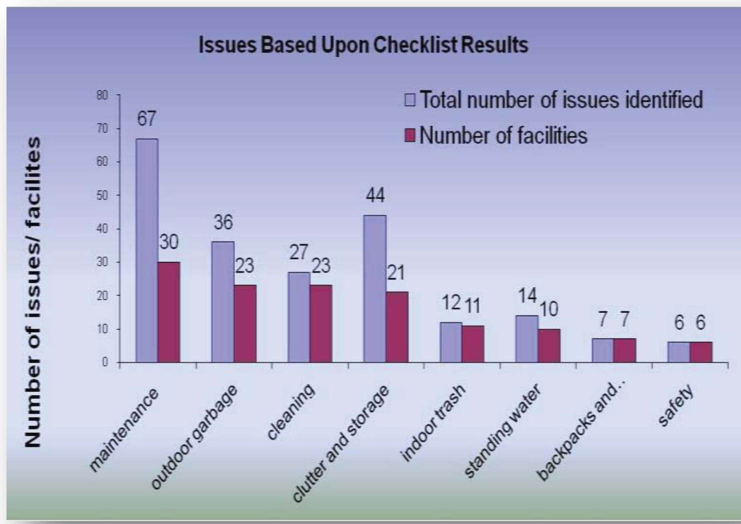

Figure 6.8. Number of IPM issues identified in childcare centers by category.

Filling cracks and holes, fixing leaks, and adding door sweeps were quick fixes often performed by maintenance staff and added up to a 75% maintenance improvement score between Phase 1 and Phase 3 visits. Alternatively, clutter and storage had the least overall percentage of improvement, with less than half of the documented clutter issues (45%) being rectified. Perhaps this is true because organizing materials and cleaning up clutter in a classroom is often done by the teaching staff and requires considerable time. By improving IPM practices, there may be fewer pests in the centers, thus reducing the need for pesticide applications (other than the use of monitors and other devices).

6.8 Conclusions

The frequency of pesticide applications at childcare centers found in the course of this study (such as regularly scheduled monthly preventive applications) demonstrated a strong dependence on pesticides. It also indicated that childcare center administrators may have been unaware of available IPM methods to reduce the use of pesticides and of the vulnerability of children to potential pesticide exposures. This study concluded that a multifaceted IPM educational program can help reduce pesticide applications. This will, in turn, reduce the likelihood that young children at a childcare center will be exposed to pesticides.

This study succeeded in its goals: to assess the prevalence of specific pest problems in childcare centers and to assess compliance of the pest control companies engaged to service the childcare centers with local, state, and federal laws. The study also succeeded in assessing the awareness of IPM by childcare center administrators and maintenance personnel, and in reducing potential pesticide exposure of children in the childcare setting. In most cases, by conducting this three-phase approach to IPM outreach, the study team was able to raise awareness of childcare administrators and maintenance personnel about the principles of IPM and the importance of reducing pesticide use in childcare centers.

The study documented current pest management procedures, identified key areas that needed instructional materials specific to childcare centers, and tested the efficacy of a hands-on approach to IPM instruction. As a result, this study was able to evidence reduction of the amount and frequency of pesticides being applied to childcare centers within the study area.

This study suggests that many childcare centers need timely and sustained education in order to learn about and adopt safer pest management practices. Once educated about IPM, significant improvements in pest management practices are possible.

Acknowledgments

This project would not have been possible without the hard work and dedication of many individuals. In addition to the cooperation and efforts of the administration and staff of the childcare centers involved in this project, we would like to acknowledge these EPA staff: Tara Glynn, Lynne Gregory; Mike Kramer; and the entire Region 2 pesticides team.

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Chapter 7

Training Childcare Center Administrators about Integrated Pest Management through Greener Environmental Communication Venues, and Collecting a Pesticide Use Data Snapshot

Journal of Applied Environmental Education and Communication (in Review)

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7.1 Abstract

Adverse health effects from pest allergy related illnesses or pesticide exposure incidents in childcare centers can demonstrate the need for safer and more effective pest management strategies. Until recently, the 0-6 year age group has only marginally been the focus of such efforts.

Due to reductions in training and travel budgets, many workshops have been eliminated, and replaced by web-based trainings. This research will attempt to measure the efficacy of IPM webinar training sessions to support the augmentation of introductory IPM training to childcare administrators and to collect a snapshot of pesticide use in childcare facilities nationally.

Key Words: Childcare centers, Integrated Pest Management, Pest Management in childcare, Pesticides and Children, IPM for Childcare Centers.

7.2 Introduction

Although exposure to pesticides may present a risk to all people, young children generally face higher risks than adults (NRC, 1993). Many infants and young children spend as much as ten hours per day, five days of the week, in child care centers and preschools (Tulve, et al., 2006). Young children spend more time on the floor, where pesticide residues can transfer to skin and be absorbed (Bradman et al., 2006). And young children frequently place their hands and objects in their mouths, increasing the potential for non-dietary ingestion of pesticides. Young children are less developed immunologically, physiologically, and neurologically, therefore, they may be more susceptible to the adverse effects of chemicals and toxins (Cohen et al., 2000; Lo and McConnell, 2005; Bearer, 2000).

With children subject to adverse health effects from exposure to pests and pesticides applied in their childcare centers, implementing effective and least-toxic pest control methods, such as IPM, is a very important public health measure (Brenner, et al., 2003). Over the years, numerous initiatives have focused on documenting the use and reduction of pesticides in K-12 schools (see Early School IPM Studies Appendix A). Until recently, however, the 0-6 year age group has only marginally been the focus of such efforts. A few state and national studies have documented the use of and presence of pesticide residues and other potentially hazardous substances in childcare centers (Boise et al., 2004; Tulve et al., 2006; Breysse et al., 2004; Fournier & Johnson, 2003; USEPA, 2008; Viet et al., 2003). The First National Environmental Health Survey of Childcare Centers reported 75% of respondent child care centers as having pesticide applications in the previous year (Tulve et al., 2006). There were also a number of state surveys including those taken in Iowa (ISU, 2007), Minnesota (Jones, 2002), California (Messenger, et al., 2008), North Carolina (Strandberg et al., 2009), and New Hampshire (Ozkan and Rousseau, 2011) illustrating significant pesticide application issues around the country.

Due to severe cuts in the training and travel budgets of many childcare facilities, many conferences and workshops have been curtailed or cut, thus reducing the opportunity to conduct introductory IPM training. This research will attempt to measure the efficacy of webinar training sessions to support augmentation of introductory IPM training to Childcare administrators and staff. Additional questions that are answered in this study: *Are webinars an effective supplement for introductory IPM education for administrators and stakeholders? Will administrators grasp the IPM concepts when taught in a web-based presentation? Are webinars a more economical and environmental approach to the dispersion of IPM concepts?*

The effectiveness of the IPM in Childcare Centers webinar presentations were evaluated via a series of presentation evaluation questions. This study analysis includes an evaluation of multiple criteria including: 1.) **Efficacy of the message.** Did people understand the IPM message? 2.) **Financial Costs**. What were the overall costs for delivering the message? 3.) **Environmental Costs**. The travel cost in carbon units saved /

spent. 4.) **Volume** of participants and national distribution. 5.) **Trade-offs associated with the webinar venue**.

In addition, the webinars were tested as a tool for gathering rough base-line data including the use of pesticides in childcare centers, most significant pest issues, and the need for IPM education to childcare administrative personnel.

7.3 Methods

Electronic Approach. The EPA "IPM in Child Care Centers" webinars were conducted in April of 2012 and May of 2013. The webinar venue focused on web-based environmental communications to deliver the IPM message to childcare center administrators, personnel, and partners. Data from the poll and survey questions was compiled using a binary coding system in Microsoft Excel (2003). Percentages were used, instead of means, because each question and each aspect of the checklist was not necessarily applicable to every childcare center. Webinar participants chose which questions to answer and which questions to skip, so the total number of answers varied for each question.

Webinar Content. Content of the "IPM in Childcare Centers: Protecting Children from Pests and Pesticides" webinars introduced the concept of Integrated Pest Management (IPM) and explained the relationship between the special vulnerabilities of young children and pesticide use in childcare centers. The presentation focused on IPM and actions needed to eliminate pests from entering into childcare centers. The key elements of an IPM program were discussed, including the importance of inspecting for pest evidence, monitoring, and managing pests with an emphasis on non-chemical controls such as sanitation and maintenance. The audience was then given a virtual tour of pest-vulnerable areas in child care centers, followed by polls, surveys and a question and answer session.

Methods for Environmental Analysis: The environmental benefits of the webinar were measured by calculating the estimated air miles, mass transit miles, and road miles, and then calculating the number of pounds of Carbon dioxide not emitted.

Formula to calculate carbon dioxide not emitted by automobile travel: 0.125 mmbtu/gallon * 71.35 kg CO_2/mmbtu * 1 metric ton/1,000 kg = $8.92*10^{-3}$ metric tons CO_2/gallon of gasoline. To estimate auto emissions, the calculator divides the average number of miles driven by the estimated fuel efficiency (21 mpg) of the average American vehicle = FE. 19.564 is the amount of pounds of carbon dioxide that is emitted as a result of burning one gallon of gasoline. No. miles x FE x 19.564/2,205 = metric tons of CO_2. Average distances used for local travel 100 miles or less. (IPCC, 1999; US DOE)

Formula to calculate air travel emissions: Total Revenue Passenger miles flown/year divided by total jet fuel consumed/year, resulting in 43.13 Passenger miles flown/ gallon of jet fuel. This figure is divided into the 23.88 pounds of carbon dioxide produced/gallon of jet fuel used, yielding 0.484 pounds of CO_2/ Passenger mile flown. The number of miles actually flown x 0.484 /2,205 = metric tons of CO_2. This calculation used an (radiative forcing index) RFI of 2.7; to estimate the impact of an airplane trip. (IPCC, 1999; US DOT)

Vetting. The webinars and questionnaires went through a development and vetting process via the Region 2 Pesticides Program, EPA OCHP and the Montclair State University IRB. E-mails were used to send out invitations, computer technology (Microsoft Go To Webinar) was used to develop and conduct the webinar, to conduct the poll and surveys, and e-mail was used to send out educational materials and answer follow-up questions.

The efficacy of learning Measurements. The efficacy of learning was measured via electronic poll questions administered at the end of the webinar. The respondents were asked if they would recommend the course to others and a number of other measures. (Table 1)

Collecting data to create a rough Baseline of IPM in CCC. A secondary objective of the webinar surveys was to obtain a national snapshot of the prevalence of specific pest problems in childcare centers, to identify pest control strategies and frequency, to assess the awareness of IPM among childcare administrative staff, and to identify preferred educational strategies. (Table 2)

7.4 Results

Efficacy of the Message.

The answers to the webinar questions in Table 1 illustrate the ability of the webinars to effectively get the IPM message out, especially to busy childcare center administrators who are typically the ones that make key decisions about facilities management including which pest control company to hire and what pesticide management practices should be allowed in their facility". Webinar efficacy ratings was and overall average of 93.4%, as measured by a number of after training poll questions.

Webinar Efficacy: Correct answers to efficacy questions	Web 1 (2012)	Web 2 (2013)	Average %
They left the webinar with a greater knowledge of IPM	96%	97%	96.5%
The presentation clearly explained the special vulnerability of children to pesticides	97%	98.9%	98%
They would recommend the course to others	98.5%	98.2%	98%
IPM is more effective, easier, safer and will save money	96%	97.7%	97%
Mosquito sprays are **not** a low toxic pesticide	81%	80%	80.5%
Applying pesticides to prevent future pest issues is **not** a step to follow in IPM	89%	81%	85%
Attendees participating (number of computers linked)	491	456	Σ=947
Actual number participating (Minimum)	617	624	Σ=1241
Blanks left on poll questions (rough average)	200	250	
Poll participants (rough range)	175-340	163-226	
Would be interested in implementing IPM after viewing webinar	34%	30%	32%
Overall Efficacy	96.5%	90.4%	93.5%
Round-Trip miles saved via the webinar venue	1,285,433	1,177,378	Σ=2,462,811
Pounds of Carbon Dioxide saved	626,322	567,322	Σ=541.3 metric tons

Table 7.1. *Webinar efficacy and carbon data from two nationwide IPM in CCC webinars.*

Results of the poll questions included: an average of 96.5% of the participant respondents stating that "they left the webinar with a greater knowledge of Integrated Pest Management" and 98% of the participants stated that "the presentation clearly explained the special vulnerability of children to pesticides." 98 % of the participants stated that "they would recommend the course to others" as was demonstrated by a majority of participants requesting access to the presentation so that they may share it with others in childcare. Why use IPM? An average of 97% of respondents stated that “IPM is more effective, easier, and safer and will save money”. In other poll questions, 80.5% of respondents were able to select “mosquito sprays as **not** a low toxic pesticide” and 85% realized that “applying pesticides to prevent future pest issues” is **not** a step to follow in IPM. Answers to all of these questions factored into the post webinar efficacy/knowledge level of 93.5%.

The answers to the questions also revealed information regarding the childcare providers’ lack of awareness of the Integrated Pest Management (IPM) program. After the webinar, Δ32% of the childcare administrators stated that “After viewing this presentation we will implement IPM”; 35% stated that they already use IPM and 20% said “We use it but didn’t know that’s what it was called”. This demonstrates an increased understanding of IPM by childcare center administrators following the training presentations. (See Table 1)

Financial Costs. The set-up costs including the time involved in background research, talk preparation, vetting and presenting the trainings would be approximately the same for either a workshop conference session or webinar venue. All communications: pre and post webinar were via e-mail, including distribution fo follow-up materials, web links and webinar results. In the end, the webinar venue cost pennies to both participants and presenters.

Environmental costs. This research demonstrated that the webinar venue provides considerable environmental and economic cost savings through the ability to conduct introductory trainings over a far greater distance and reach a larger audience for no increased financial expenditure. Webinars are an effective supplement to traditional IPM education venues and over 96% of CCC administrators were able to grasp the IPM concepts taught in the web-based presentations.

The webinars saved a total of 2,462,811 round-trip miles and educated over 6.6x the number of administrators and trainers that would have been able to attend IPM training in NYC. Approximately 1,193,654 pounds of carbon or a total of 541.3 metric tons for both webinars combined, were saved by utilizing the web-based training module as a form of outreach.

Volume. There were 947 direct participants linking in with their computers from 45 states plus Puerto Rico and Canada, plus others sharing computers or sitting in conference rooms bringing the numbers to over 1241. The webinars reached at least 572 childcare centers directly.

Pesticide related metric	Web1 (2012)	Web2 (2013)
Range of Webinar poll participants (number varied with question)	175-340	106-226
Number of children affected	Not collected	455,568
CCC relying on pesticides	22.6	35%
Administrator IPM awareness	89%	90.4%
Application Records kept	30%	64%
Application high risk: pump/spray/fog	17%	9%
Application combination	22.5%	44%
Application: only low impact bait/gel/ trap	40%	32%
Frequency of Application: 1-2x/mo+	30%	37%
Frequency of Application: as needed	50%	43.5%

Table 7.2. *Pesticide use data obtained from EPA IPM in CCC webinar surveys.*

Only 12 % of respondents from both webinars said that they would attend training in NYC, while the other 88% stated that they would not be able to attend. 73% of those that signed into either webinar stated that they preferred webinars. Approximately 13.5 % stated that they prefer classroom sessions.

Pesticides Use Data. The webinar surveys presented rough pest management practices, including general types of pesticides used, frequency of applications, and maintenance of application records. Results were equalized by comparing category percentages. Remember that all surveys, including webinar surveys, are considered hearsay as no actual verification was possible. That said, the study can still provide some idea of the issue of pests and pesticides in childcare facilities nationwide.

Pests. The biggest pest problems nationally, as revealed by the webinars, were ants for 52% of CCC administrators, then 25% identified cockroaches as their second most common pest and rodents came in third at 23% rodents.

How are pesticides applied in child care centers? 28.5 % of the webinar attendees said that they used a combination of low impact baits, gels or traps **and spray pesticides**, whereas 36% of webinar attendees said that they only use low impact products such as baits, gels and traps. In contrast, 21% stated that no pesticides were applied in their facilities, and only 12% use higher risk pesticides. This means that over half of all CCC, 57%, are being careful and judicious in the selection and use of pesticides around small children. (*Note: Low impact pesticides by definition specifically include certain formulation types: any gel; paste; or bait; specific active ingredients: boric acid; silica gels and diatomaceous earth; microbe-based insecticides such as Bacillus thuringiensis; botanical insecticides; biological, living control agents; and EPA FIFRA-exempt active ingredients including 25B (exempt) products.* (Rutgers pesticides website)).

Frequency of applications. Through the webinar poll questions, we learned that 30% of the respondent childcare centers admitted to having regularly scheduled service visits of pest management companies (PMCs) at once per month or more. The good news is that 47% of childcare administrators responded they had pesticides applied "as needed", meaning they were not having "preventative applications" which was discussed at length in the webinar.

Application Records: 28% of webinar childcare center administrators stated that they maintain all of the required records (as listed in the webinar), whereas 25% state that they do not need to maintain records, as they do not have pesticides applied. Partial to full records maintenance was 66.5% for national attendees, a good start.

7.5 Conclusions.

Effectiveness: The study concludes that the webinar venue can be part of a multi-faceted IPM educational program. The EPA webinar data documented that some childcare centers, once educated, may change their overall pesticide application and pest management practices hopefully resulting in the continued reduction of pests and potential pesticide exposures to children in childcare centers. The webinars successfully instructed childcare administrators and staff about the principles of IPM and the importance of reducing pesticide use in child care centers.

The webinar venue provided some data that may be used as a snapshot of some IPM practices around the country. This data demonstrates that there is still a dependence on pesticides being applied as a deterrent, and that some childcare center administrators may initially be unaware of the vulnerability of children to potential pesticide exposures.The decision by some centers to use pesticides as a form of pest prevention suggests that IPM education is needed to show that pesticides should be considered to be a pest management choice after all other methods have been exhausted. This is a childcare administrative decision paradigm that requires attention and continued education.

Of particular interest was the finding that that over half of the CCCs, 57%, claimed that they were being judicious in the selection and use of pesticides around small children (via the use of no or only low-impact pesticides), but also shows that there is considerable work to be done. Partial to full records maintenance was 66.5% for national attendees, a good start, and hopefully after viewing the webinar more administrators will have learned the importance of record keeping and will ensure they are better maintained in their facilities.

The numbers for administrator awareness does not give us a before and after training metric, but does shows that 90% of administrators on the webinar do know about IPM at least post-presentation. The most rewarding statistic was that 32% of the childcare administrators stated that “After viewing this presentation we will implement IPM”; and 20% said “We use it but didn’t know that’s what it was called”. This demonstrates a clear increased understanding of IPM by childcare administrators.

Are these national averages? No, that cannot be determined from this type of survey. On the other hand, the data does give us a glimpse into pesticide practices in a wide diversity of centers. The data pool was not large enough, diverse enough, nor did it cover all of the metrics needed for a study of that scope. However, this snapshot does show that many CCCs are on the right track, but there is still work to be done.

Volume. The feedback gained from childcare center administrators on their current pest control practices proved to be a valuable bonus, and validated the efficacy of the Web-based IPM training.

Another benefit was that, unlike a conference workshop, an unlimited number of childcare stakeholders from all over the nation were able to be invited and attend. The number of attendees was recorded, along with their locations. The increase in attendance via a webinar venue was over 6.6:1 times from what we might have attending an in-person workshop. States with the highest attendance were: NY, IL, PA, MA, NJ, TX, NC and DC, in order of participation. Although surrounding East coast states were the main target audience, the numbers demonstrate the far-reaching effect of the webinar venue.

Venue Tradeoffs. Most webinar efficacy and comprehension scores were in the 90th percentile range. The author believes this a fair trade off to in-person trainings, considering the added volume of remote participants and environmental savings. In addition to the 1.5 hour-long IPM presentations the webinars were followed up with e-mail links to materials, the answers to all questions asked during the 0.5 hour Q&A session and links to the power point presentation. Giving participants almost everything they would have received from in-person trainings. Many of these attendees were extremely grateful for the invitation and for the opportunity to learn about IPM and how it can be implemented into their facilities.

IPM webinars may take us one step farther in ensuring the safety of our nation’s most valuable resource, our children.

Author's Note: Concurrent with these studies and webinars, the EPA Office of Children's Health Protection (OCHP) developed a web page and links to the best existing IPM resources available from NGOs, Government Agencies and State Lead Agencies. This website target three main audiences – child care providers; parents of children in child care; and state and local officials involved in licensing or overseeing child care facilities.

The full recorded webinar presentation discussed in this paper is available along with a PDF of the power point on the EPA Office of Children's Health Protection website: For the actual webinar go to: *April, 2012 EPA Webinar on Integrated Pest Management (IPM) in Child Care Settings* **:** http://epa.gov/childcare/states.html. Option 1 - View the training document (PDF, 106 pp, 31.8 Mb). Option 2 - Replay the training session

EXIT Disclaimer

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Chapter 8

A nationwide snapshot of pesticide use practices in childcare centers via three different communication venues

Journal of Applied Environmental Education and Communication (In Review)

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8.1 Abstract

Many young children spend as much as ten hours per day, five days of the week, in childcare centers and preschools. We also know that childcare centers are located in very different environments with different pest pressures and differing ways that they deal with pests, when confronted with the problem. Some centers rely heavily on pesticides of all types while others promote the use a combination of common sense practices such as good sanitation, maintenance and exclusion to reduce the number of pest problems before considering the application of pesticides in such a sensitive environment. The second scenario is called Integrated Pest Management (IPM), a safer, often more economic, and more effective pest management strategy. With children subject to adverse health effects from exposure to pests, and pesticides applied in their childcare centers, implementing effective and least-toxic pest control methods, such as IPM, is a very important public

health measure. However, adverse health effects from pests allergy related illnesses or pesticide exposure incidents can demonstrate the need for safer.

How do childcare centers around the country deal with pest pressures? What types of pesticides do the use and how often? Do they know that there are alternatives such as IPM? This study is a cross-case synthesis of three different educational venues that have measured the use of pesticides, the frequency of use, and the knowledge of IPM concepts in child care centers. Can we come up with a nationwide snapshot of these practices?

These venues include studies from recent CA, NH and NC state childcare center surveys; the US EPA Staten Island, NY pilot project, and US EPA “Integrated Pest Management in Childcare Centers: Protecting Children from Pests and Pesticides” webinars.

Key Words: Childcare centers, Integrated Pest Management, Pest Control, Pests in childcare, Pests and Children, IPM for Childcare Centers

8.2 Introduction

As young children are less developed immunologically, physiologically, and neurologically, they may be more susceptible to the adverse effects of chemicals and toxins (Cohen et al., 2000; Lo and McConnell, 2005; Bearer, 2000). Many infants and young children spend as much as ten hours per day, five days of the week, in child care centers and preschools (Tulve, et al., 2006). If a childcare center regularly has pesticides applied, the pesticide residues tend to accumulate on the floors. These are the same floors where very young children spend most of their time, thus putting them at a greater risk of dermal pesticide absorption (Bradman et al., 2006). The hand-to mouth behavior of young children also increases the potential for non-dietary ingestion of pesticides (Cohen et al., 2000; Lo and McConnell, 2005). With children subject to adverse health effects from exposure to pests and pesticides applied in their childcare centers, implementing effective and least-toxic pest control methods, such as IPM, is an important public health paradigm (Brenner, et al., 2003).

Unfortunately, it often takes adverse health effects from exposure to pests and/or pesticide application incidents to alert childcare administrators to the need for safer pest management strategies. Until recently, the 0-6 year age group has only marginally been the focus of such efforts. A few national studies have documented the use of and presence of pesticide residues and other potentially hazardous substances in childcare centers (Tulve et al., 2006; Breysse et al., 2004; USEPA, 2008; Viet et al., 2003). The First National Environmental Health Survey of Childcare Centers reported 75% of respondent child care centers as having pesticide applications in the previous year (Tulve et al., 2006). There were also a number of state surveys including those taken in Iowa (ISU, 2007), Minnesota (Jones, 2002), California (Messenger, et al., 2008), North Carolina (Strandberg et al., 2009), and New Hampshire (Ozkan and Rousseau, 2011) illustrating significant pesticide application issues in childcare centers around the country.

Results gathered from three published state surveys, two EPA webinars, and results from an interpersonal (one-on-one) on-site visitation venue were compared to estimate current IPM knowledge and practices in childcare centers.

As a comparison to surveys, and site visits, webinars were tested as an additional tool for gathering rough data. An evaluation of multiple criteria for each IPM communication venue was also conducted, including:2.) **Financial Costs**. Which venue is most cost efficient for delivering the IPM message? 3.) **Environmental Costs**. What are the environmental costs involved for these different venues? Travel cost in carbon units? 4.) **Volume.** Which method enabled us to reach the most people? 5.) **Trade-offs associated with each venue**. Which venue provides verifiable data? Which venue is preferred by childcare industry to learn about topics such as IPM?

8.3 Methods: Developing a rough snapshot of pesticide practices in childcare centers.

To develop a baseline of current IPM practices in Childcare centers, this study compares findings from the EPA Region 2 Pesticides Programs' Staten Island Pilot Project which used an interpersonal on-site visitation approach; three state-run mail surveys conducted in three different regions: California, New Hampshire and North Carolina; and data from two national "IPM in Childcare Center" webinars.

The Venues used in the Comparisons:

8.3.a **The EPA Staten Island Pilot Project** (Anderson, M., et. al., 2010) used an interpersonal on-site visitation approach. A questionnaire was developed with the purpose of gathering information on current pest management and pesticide use practices. The questionnaire consisted of: identifying the responsible party for pest management decisions at the center, recent pest problems, frequency of visits by pest control operators, method and type of pest management practices, maintenance of pesticide application records, parental notification of pesticide applications, and the existence of pest management policies, plans and other metrics.

Data was recorded during actual on-site visits scheduled four to six months later, to document improvements and the implementation of IPM practices. The initial visit was followed by records inspections at Pest Management Companies (PMCs) that serviced the childcare centers. These inspections provided **verifiable data** including actual pesticides applied, application dates and times.

8.3.b Pest Management and Pesticide Use Surveys conducted for California, New Hampshire and North Carolina childcare centers. 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 survey to identify pest problems and pest management practices in California's licensed childcare centers. A questionnaire was developed, produced in both English and Spanish, and mailed to randomly -selected childcare centers. An aggressive telephone and email campaign along with re-mailing the questionnaire to well over 1,600 non-responders were methods used to improve the response rate. 637 centers completed the survey. The North Carolina study was a cooperative study conducted in 2009 with the NC Dept. of Agriculture and the MSPH Toxic Free North Carolina. The New Hampshire survey was conducted in 2011 with the assistance of the NH Dept. of Agriculture.

All of the surveys relied solely on the questionnaire responses. Since no actual childcare center visits took place, the information could not be verified for accuracy. Furthermore, no pesticide application information from the pest control companies servicing the surveyed childcare center was obtained. Consequently, the surveys could not offer any insight concerning the actual chemistry of pesticides used, other than just simply identifying the methods of pesticide applications i.e.: sprays or baits/gels.

Pesticide Use Metrics	CA	NC	NH	SI,NY (Phase1)	SI, NY (Phase2)	Web1 (2012)	Web2 (2013)
Number of respondents (CCCs)	637	89	325	45	39	617	624
Webinar poll participant range (number varied with question)	-	-	-	-	-	175-340	106-226
Number of children affected	na	na	na	3242	2756	na	455,568
CCC using a Pest Mgmt. Co.	55%	65%	na	89%	89%	na	na
CCC relying on pesticides	55%	na	na	93%	80%	22.6	35%
Administrator IPM awareness	25%	na	33%	15%	100%	89%	90.4%
Application Records kept	52%	22%		38%	71%	30%	64%
Parental Notification	47%	7%	20%	27%	20%	na	na
Application high risk: pump/spray/fog	47%	53%	14%	58%	47%	17%	9%
Application combination		na	na	37%	na	22.5%	44%
Application: only low impact bait/gel/ trap	53%	25%	17%	37%	na	40%	32%
Frequency of Application: 1-2x/mo+	37%	na	na	80%	32%	30%	37%
Frequency of Application: 1x/ week	25%	na	na	2%	na	na	na
Frequency of Application: as needed	29%	na	na	9%	45%	50%	43.5%

Table 8. 1. Comparison of pesticide use data from three different venues: California, North Carolina and New Hampshire surveys; EPA R2 Staten Island Pilot Project; and EPA IPM in CCC webinars.

8.3.c Electronic Approach - Webinar. This venue focused on web-based environmental communications to deliver the IPM message to childcare center administrators, personnel, and (local, state and federal) partners. The webinar survey questionnaires went through an extensive EPA OCHP and MSU IRB vetting process. Data from the poll and survey questions was compiled using a binary coding system in Microsoft Excel (2003). Percentages were used, instead of means, because each question and each aspect of the checklist was not necessarily applicable to every childcare center. Webinar participants chose which questions to answer and which questions to skip, this the total number of answers for each question varied.

8.3.d Comparison Methods of the three venues. The objectives of the surveys and the Staten Island, NY pilot project were to assess the prevalence of specific pest problems in child care centers; to identify methods currently used to mitigate pest problems in centers; to determine how and by whom pest management decisions are made in centers, to assess the awareness of IPM in child care centers; and to identify preferred educational strategies. Although the size and scope of the surveys and EPA SI project differed, as did the methodologies, the results are comparable, when percentages are used as an equalizer. Comparing results of these six IPM in childcare center related initiatives was used to give a rough baseline of current pesticide practices.

8.4 Results

The surveys present the results of pest management practices reported, including general types of pesticides used, frequency of applications, pest management decision processes, and maintenance of application records, parental notification, posting the treated areas, and IPM knowledge and preferred education sources. Not every category or question was covered by each survey, so results were equalized by comparing category percentages.

Pests. California survey revealed that 90% of childcare centers as had a pest presence, while the Staten Island study had 82% of centers with a pest presence.

What pests were determined the most frequent? In California 53% of centers listed ants as the number one problem as did North Carolina. Only 27% of centers in Staten Island had ants as their main pest problem. Spiders were the second worst pest problem for California with 34% of centers reporting major spider issues. New Hampshire centers listed spiders as their top pest problem at 45%, with ants as a major problem at 40% of NH facilities. In highly urban Staten Island, NY, roaches were the top problem for 29% of childcare centers, and rodents for 24%. The biggest pest problems nationally, as revealed by the webinars, were ants at 52%, cockroaches and rodents almost tied as a distant second pest problem (25% and 23%).

Current IPM Practices in Childcare Centers. The CA survey revealed that 55% of childcare centers used a Pest Management Company (PMC) on a regular basis to control pests, while 65% of childcare centers in NC used PMCs and 89% of childcare centers on SI, NY used a PMC.

Both, the California Study and the SI, NY Project reveal that the majority of childcare centers rely only on pesticides for controlling pests. In this respect, there is however a large difference between these two studies: 55% of childcare centers in California use pesticides versus 93% in SI, NY. Yet, it can be concluded that despite having adopted and implemented IPM mandates by both California HSA and NYC DOHMH, there may be an overall lack of awareness and compliance with these regulations – leading to a need for education, and enforcement. In SI, NY, initially, fifteen child care centers reported having no pest problems, and many other childcare centers stated that they had few, if any signs of insects. However, 2/3 of these facilities still had pest management companies apply pesticides on a regular basis, as a preventative measure.

How are pesticides applied in child care centers? The NC study revealed that 53% of childcare centers had pump sprayers and/or foggers used to control or prevent pests in their facilities compared to Staten Island, NY childcare center administrators with 58%, using high impact sprays and/or foggers and 37% using a combination of methods, as measured in phase 2 of the Staten Island childcare study, CA had 47% using a mix of application methods, while only 14% of NH childcare centers used these methods. 22.6 % and 35% of the webinar attendees said that they used a combination of low impact baits, gels or traps **and** spray pesticides.

40% and 32% of webinar attendees said that they only use low impact products such as baits, gels and traps and 17% and 24.5% stated that no pesticides were applied in their facilities. By comparison, 37% of SI, NY facilities used low-impact products, 53% in CA, 25% in NC and 17% in NH. (*Note: Low impact pesticides by definition specifically include certain formulation types: any gel; paste; or bait; specific active ingredients: boric acid; disodium octoborate tetrahydrate; silica gels and diatomaceous earth; microbe-based insecticides such as Bacillus thuringiensis; botanical insecticides, not including synthetic pyrethroids, without toxic synergists; biological, living control* *agents; and EPA FIFRA-exempt active ingredients including 25B (exempt) products.* (Rutgers pesticides website)).

High risk pest control practices were revealed as taking place in the majority of NC childcare centers. Along with the frequency of spraying and using foggers in childcare centers, only 24% of Pest Management Companies (PMCs) gave the childcare center options for pest control, and less than half of PMCs, 43%, tell the childcare center what chemicals are being used in the childcare center facility. Only 22% of PMCs provide copies of the product pesticide label, and 17% provide the Manufacturer Safety Data Sheets (MSDS). Only one (2%) North Carolina PMC post warnings for indoor applications and only 7% post warnings for outdoor applications. It seems that there is a lack of communication between the PMCs and the NC childcare centers. The NC study revealed in their key findings that childcare centers that use PMCs are less likely to be using IPM. NC also compared the size of facility to pesticide usage and revealed that size made little to no difference.

Frequency of applications. Through a series of webinar poll questions, we learned that 30% of the respondent childcare centers admitted to regularly scheduled service visits of PMCs at once per month or more. In the Staten Island Study, 80% of childcare centers had regularly scheduled pesticide applications initially dropping to 32% after training, and 2% weekly pesticide applications, CA only had 37% monthly or more, but 25% had weekly applications. 43% of childcare centers in NC apply pesticides 2x/month or less. Remember that only the Staten Island, NY data was validated. All other surveys, including the webinars are considered hearsay. That said, we still can get some idea of the issue of pests and pesticides in childcare facilities by examining these numbers.

50% and 43.5% of childcare administrators on the webinars responded they had pesticides applied “as needed”. Only 9% of SI, NY childcare centers had pesticides applied “as needed’ initially (Phase 1), with this number moving to 45% after training (Phase 2). California childcare centers responded on their survey that 29% of pesticides are applied “as needed”.

Application Records: It should be noted that while over 55% of California childcare center survey respondents relied on pesticides for pest control, only 52% of childcare centers reported having application records and 22% of NC childcare centers kept records. 38% of the SI, NY facilities during their initial visit, had complete application records, improving to 71% by the post-educational outreach phase of the project. 30% and 26% of webinar childcare center administrator attendees stated that they maintain all of the required records, whereas 26% and 24% state that they do not need to maintain records, as they do not have pesticides applied. Partial to full records maintenance was 69% and 64% for national attendees.

Parental Notification. On Parental Notification, 47% of the California childcare centers reported parental notification, 7% were notified in North Carolina, 20% of parents in NH were notified, and 27% of parents were notified in the first phase of the SI, NY project.

Educational Resources Needed. Authors of the CA study recommended that: 1.) education and resource materials need to be disseminated to child care providers; 2.)

resources for pest management companies need to be developed and disseminated; and 3.) additional research is needed. These surveys indicate there are some widespread pest problems, widespread pesticide use in childcare centers, and there may be a general unfamiliarity with state requirements. There is also an unmet need for education about safer pest management and IPM. The NC survey recommendations listed giving: 1.) PMC training and certification in IPM for all who service childcare centers along with 2.) Facilities provider education. 20% of the childcare centers in NC also requested information on reducing the use of pesticides.

Webinar Efficacy: Correct answers to efficacy questions	Web 1 (2012)	Web 2 (2013)	Average %
They left the webinar with a greater knowledge of IPM	96%	97%	96.5%
The presentation clearly explained the special vulnerability of children to pesticides	97%	98.9%	98%
They would recommend the course to others	98.5%	98.2%	98%
IPM is more effective, easier, safer and will save money	96%	97.7%	97%
Mosquito sprays are **not** a low toxic pesticide	81%	80%	80.5%
Applying pesticides to prevent future pest issues is **not** a step to follow in IPM	89%	81%	85%
Attendees participating (number of computers linked)	491	456	Σ=947
Actual number participating (Minimum)	617	624	Σ=1241
Blanks left on poll questions (rough average)	200	250	
Poll participants (rough range)	175-340	163-226	
Would be interested in implementing IPM after viewing webinar	34%	30%	32%
Overall Efficacy	96.5%	90.4%	93.5%
Round-Trip miles saved via the webinar venue	1,285,433	1,177,378	Σ=2,462,811
Pounds of Carbon Dioxide saved	626,322	567,322	Σ=541.3 metric tons

Table 8.2. Webinar efficacy data from two nationwide IPM in CCC webinars.

8.5 Efficacy of the Message. The studies reviewed in this research provide information regarding the childcare providers' lack of awareness of the Integrated Pest Management (IPM) program which is actually is required by California, and New York City regulations. Only 25% of the California childcare centers were aware of IPM and less than 15% in California were implementing IPM. The NH survey revealed 33% of childcare center administrators having IPM knowledge. In comparison, in Staten Island, NY, only 15% of the childcare center administrators were aware of what 'Integrated Pest Management' was in the initial visit, followed by 100% IPM awareness after the second visit. After the webinar, 34% of the childcare administrator participants stated that "After viewing this presentation we will implement IPM"; 35% stated that they already use IPM and 20% said "We use it but didn't know that's what it was called". This demonstrates an increased understanding of IPM by childcare center administrators following the training presentations. (See Table 8.2)".

Financial Costs. The set-up costs including the time involved in background research, talk preparation, and then moderate and present the trainings would be approximately the same for either a workshop conference session or webinar venue. For either workshops or webinars, all invitations, correspondence and evaluations were electronic. However, logging into the webinar cost pennies in electric to both participants and presenters versus thousands of dollars in travel and venue expenses as compared to physically traveling to conference workshops.

Volume. The EPA "IPM in Child Care Centers" webinars were conducted in April of 2012 and May of 2013. There were 491 (webinar 1) and 456 (webinar 2) direct participants from 45 states plus Puerto Rico and Canada, plus many others sharing computers or sitting in conference rooms for the broadcasts bringing the numbers to over 617 and 624 respectively. The webinars reached at least 247 and 325 childcare centers directly including Head Start locations, YMCA centers, plus many more federal, state, local, tribal, and NGO sponsored childcare centers. In addition, the webinars reached many NGOs that provide assistance and education to child care centers. States with the highest attendance were: IL, PA, NY, TX, and NC, in order of participation in webinar 1 and NY, MA, NJ, DC and TX in webinar 2.

8.6 Conclusions and Discussion.

The goals of the study to assess the prevalence of specific pest problems in childcare centers and the assessment of IPM awareness were met. In addition, the awareness of IPM by childcare center administrators and maintenance personnel was raised, resulting in the reduction of potential pesticide exposures to children in childcare centers.

The SI, NY, project revealed, that even if childcare centers reported having few to no pest problems, 2/3 of them still had pest management companies treat on a regular basis, as a preventative measure. The decision by childcare centers to use pesticides as a form of pest prevention suggests that IPM education is needed to highlight that pesticides should be considered to be a pest management choice of last resort, after all other methods have been exhausted. This study demonstrates that there is a strong dependence on pesticides being applied as a deterrent, and that childcare center administrators may also be unaware of the vulnerability of children to potential pesticide exposures. This is a child care administrative decision paradigm that requires attention and education of both administrators and staff to the potential dangers of this practice to their young charges.

Effectiveness: Both the EPA webinar and the SI, NY project documented that some childcare centers, once educated, quickly changed their overall pesticide application and pest management practices. The study also concludes that a multi-faceted IPM educational program can effect a reduction in pesticide spraying which will, in turn, reduce the likelihood of pesticide exposure to young children within the child care setting. The EPA IPM outreach in SI, NY, and webinars successfully instructed childcare administrators and staff about the principles of IPM and the importance of reducing pesticide use in child care centers. The SI, NY study, was the only study with verifiable data on pesticide use. The surveys and even the webinar poll questions relied mostly on opinion and recall. That said, by looking at all three outreach venues, this study data was still comparable and able to give us a window into current pesticide use and needs around the nation.

Venue Tradeoffs. The State surveys were fine for gathering rough base-line data on pesticide use practices in childcare centers, as were the webinars, however, the only verifiable data set came from the in-person visits to both the childcare facilities and their pest control companies through records inspections. The EPA Staten Island Pilot Project demonstrated that often administrators were unaware of many of the pest control practices used in their facilities and sharply underestimated their use when questioned. Although the Staten Island Project went from 15% of administrator understanding of IPM in the first phase of the project, to 100% understanding at the conclusion of the project, by way of one-on-one interpersonal visits, it is impractical for all IPM educational initiatives to be conducted in this way. The amount and cost of labor, time and travel would be cost prohibitive. Webinar comprehension was 83 to 89 % for two questions, but generally, efficacy and comprehension scores hovered in the mid to upper 90's percentile. The author believes this a fair trade off considering the added volume of remote participants and environmental savings. The State surveys were able to gather far more data than the other two venues, but there was a minimal amount of learning associated with the surveys. Most of the learning about IPM and safer pesticide practices from the surveys were follow-up activities by both mail and e-mail. In addition to the 1.5 hour-long IPM presentation, the webinars were followed up with e-mail links to materials, the answers to all questions asked during the 0.5 hour Q&A session and links to the power point presentation.

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EXIT Disclaimer

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Chapter 9

Challenges to Implementing Integrated Pest Management in Schools; what we have learned from Field Visits

Journal of Applied Environmental Education and Communication (In Review)

Category: Field Report

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9.1 Abstract

This study documents the findings of EPA Region 2 Pesticides Program staff field visits to three large urban school districts: Newark, N.J., Jersey City, N.J., and New York City, N.Y., multiple suburban districts in the same two northeastern states, one tribal area and one US territory. New Jersey has school Integrated Pest Management (IPM) law mandates, while New York State has a voluntary school IPM program. This study contributes to answering the questions: How have districts in these states faired with or without school IPM legislation? Has state legislation made a difference? What are some of the impediments to implementing school IPM in any region?

9.2 Introduction.

What is School Integrated Pest Management (IPM)? School IPM is a powerful strategy to protect the health of students and staff in the school environment. IPM is an effective, environmentally sensitive, comprehensive approach to pest management by reducing pest complaints and the need for pesticide use. IPM in schools is a national priority of the US Environmental Protection Agency (EPA), the US Department of Agriculture (USDA), and the US Center of Disease Control (CDC). It is supported by an extensive network of state, university and non-governmental organization partners (NGOs) who instruct and help to implement safe, effective pest management standard practices in our Nation's schools.

This study documents the findings of EPA Region 2 Pesticides Program staff field visits to three large urban school districts: N.J City A., N.J. City B, and N.Y. City A, multiple suburban districts in the same two northeastern states, one tribal area and a US territory. Although most visits were conducted by EPA R2 staff, a handful of these visits were conducted by EPA headquarters staff that had previously been with R2. All visit protocols were followed in the same way that the R2 visits had followed. The same field evaluation check sheets and questions were used at all schools. (Appendixes A & B)

9.3 Background

9.3.a New Jersey has a state SIPM mandate. Overview: New Jersey has a state law mandating that all schools adopt an Integrated Pest Management (IPM) Program. [*N.J.A.C. 7:30-13 Integrated Pest Management in Schools*.] The State lead agency, the NJ Department of Environmental Protection (NJDEP), provides SIPM training to IPM Coordinators and Pest Management Professionals (PMPs). In addition, the "*Child Safe*

Playing Fields Act": restricts the use of lawn care pesticides at schools, childcare centers and recreational fields. There are 604 school districts in the State of NJ educating approximately 1.4 million students. NJ schools have IPM coordinators, that are given SIPM training by the NJ DEP. PMPs are required to have SIPM training if they will be working in schools. School facilities managers and PMPs that work in the schools are trained to use low-impact pesticides and devices as part of the SIPM program.

i. **NJ City A; Urban School District Background:** The "City A" School District is comprised of 71 schools, educates 37,443 students, and is divided into 4 wards. There is a central SIPM manager, office staff, and regional manager for each city ward. Newark has been implementing SIPM for more than a decade, and has developed a centralized, advanced implementation system.

Findings: The U.S. EPA team visited a total of 26 schools in "City A" (36% of total). The City School District has a contracted PMP which is SIPM trained by the NJ DEP, and is dedicated to the implementation of IPM practices. Only low-impact pesticides are used in "City A" Schools. All schools (26/26) have IPM Coordinators, are using IPM practices, and have IPM protocols. Most schools have pest logs of visits, receipts, and records of service calls by the PMP (25/26). When visited, most had their school district policy present and posted (21/26), and a basic generic plan present (20/26). All schools have a procedural plan to notify parents of non-low impact pesticides, if needed. Most SIPM coordinators (17/26) were trained by the

NJDEP. All schools have lists of pesticide that may be applied as low-impact only, and no schools store pesticides on premises. We found food storage areas were clean, food was stored above floor, and 20/26 kitchens were clean. **Negative Findings:** The SIPM plans were down-loaded from the state website and were not site- specific. Most plans were not read by head custodians, as was evident by blanks left in the plan document where SIPM coordinators were supposed fill in site-specific information and sign. Nor were the SIPM plans reviewed annually by any school administrator for effectiveness. Only (5/26) principals could basically describe what SIPM was, while 17/26 of custodians were able to provide a working knowledge of SIPM. No other staff members were trained in SIPM at any school. More than half of (15/26) head custodians/ SIPM coordinators maintained pest logs. Most of the monitoring logs examined were actually maintained by the PMPs. Many head custodians did not realize that they needed to maintain non-chemical pest logs. This includes the pests found during monitoring (i.e.: number and size of roaches on glue traps) and any of the repairs that custodial staff performed prior to using low impact pest controls, all important components in the IPM decision-making process. Other areas of concern included a lack of proper pest proof storage, such as cardboard, found in quantity in all schools. 10/26 schools had intact door sweeps, and most (22/26) had holes in bathroom walls.

ii. **NJ City B; Urban School District Background:** "City B" has 38 schools and 27,832 students. The DOE has a district SIPM coordinator and staff.

Marked inconsistencies were found in school maintenance and SIPM implementation throughout the district. As facilities age, their susceptibility to pest invasions increases and established pest populations tend to expand, however in "City B", some of the oldest buildings were the best maintained, and the newer buildings were poorly maintained.

Positive Findings: The U.S. EPA team visited a total of 6 schools (6/38) in "City B". All schools had IPM coordinators and all were trained in SIPM by the NJDEP. Generally, City schools are using low impacts pesticides, such as glue boards and baits, by policy, and most schools maintain both records and labels from PMP visits.

Negative Findings: SIPM policies were missing from all "City B" schools visited and only one school had a generic plan present. There was a consistent lack of understanding concerning of monitoring and most SIPM coordinators did not maintain monitoring logs, however; they relied on PMPs to fill in the logs. Only one school had a plan for notification of parents and staff for non-low impact pesticides use. Some schools were found to be applying rodent baits and in areas where children had access, a violation of pesticide labeling directions.

Common district issues: Flooding issues were common to all schools, due to a high water table. All schools had holes in walls and holes around pipes. All schools had peeling paint in multiple areas, many of which were accessible to students.

Pests Pressures: Roaches. We found flourishing cockroach infestations in "City B" school kitchens, indicating deficiencies in sanitation. Grease traps were not cleaned; grease and debris were on the kitchen floor and under/in equipment. Mice were a common pest in every school visited. We viewed baits and droppings in areas that children frequent, such as coat closets. We found weeds and trash around buildings and in teacher parking lots. Piles of recycling are left outdoors for up to 3 days with no container in use. A container for recycling – even a large plastic covered bin on wheels – would provide easy access for recycling storage and removal, yet keep recycling from lying on pavement and harboring pests.

iii. **New Jersey Towns School Districts C, D, and E; Background:** The suburban school districts visited had 8,000 or fewer students educated in fifteen or fewer schools. Each school had a NJDEP SIPM trained facilities manager that acted as School IPM coordinator. The study team visited one half to one fourth of the schools in these districts, all randomly selected.

Positive Findings: Policies and generic plans were present in all schools. Most principals and all head custodians were aware of the general concept of IPM. All facilities had pesticide records, labels, application logs and monitoring logs. Only low impact pesticides, including sticky glue boards and traps are used. They also had notification letters ready for distribution in case of the need for application of non-low impact pesticides. No pesticides are applied by school staff and no pesticides are stored on school grounds.

Kitchens, classrooms and bathrooms were clean and clutter free. No plumbing or moisture issues were found. Custodian closets were clutter and moisture free. Door sweeps were in good condition. Garbage areas were clean and away from doors. Vegetation was kept pruned and away from buildings. **Negative Findings**: There were occasional pest invaders.

9.3.b New York State has a voluntary School IPM program. Overview. New York State does not have a School IPM law; however the NYS DoE has adopted a voluntary program: *NYS Education – Part 155 of the Regulations of the Commissioner of Education; establishment of a least-toxic approach to IPM (S 155.4(d) (2).* Some communities on Long Island and within NY State have adopted SIPM as a local program, adopted through community elections. There are 810 school districts in the state of NY, educating approximately 3.9 million students.

i. New York "City A" Background: NY "City A" has roughly 1700 schools and 1.2 million students over 5 boroughs, and 4 districts. There are 32 superintendents, 1 head SIPM director and 19 facility staff. The Local, NYC Law: *The Pesticide Neighbor Notification Law, Section 409-h of the State Education Law (SEL) and Social Services Law, as amended by Chapter 85 of the Laws of 2010*. NYC DOHMH Local law 37 covers notification to residents, parents and staff of non-low impact pesticide application. This 48 hour notification law covers all city properties – not just schools. The city has obtained

School IPM Star Certification for its IPM program; however, it does not include the actual buildings.

Impediments to SIPM in NY "City A" Schools. There are multiple schools housed in one building, with multiple administrators, yet there is only one group of custodial staff answering to these administrators, creating chaos according to custodial staff. There are union issues when it comes to the time required to maintain monitoring logs. BOE Management have found push-back by custodian unions concerning the additional time needed to maintain monitoring logs, thus requiring additional compensation. Due to budgets constraints, additional money is available. In "City A", kitchen staff and building custodial staff are separate work forces having different contracts and different unions. Only kitchen staff are SIPM trained and pest logs are maintained only in the kitchens.

Positive Findings: The IPM policy and plan are posted on the NY "City A" Dept. of Education website where schools can easily download them and parents can view them. It is one blanket plan for all schools. The head custodians are the IPM coordinators and they are all instructed to follow IPM guidelines. There is a central core of supervisors that visit schools, give guidance, and ensure that only low impact pesticides are used. If pest issues are found, custodians contact their DOE regional managers who then contact the PMPs. All "City A" school offices visited had the SIPM notification policy posted along with a list of all pesticides low-impact pesticides that are approved for use in "City A" schools. SIPM Coordinators keep records/receipts provided by PMPs.

District code name	NJ City A	NJ City B	NY City A	NJ Town C	NJ Town D	NJ Town E	NY Town C	NY Town D	Tribe	US Terr.
# schools in district	71	38	1700	10	3	8	3	3	1	63
# students affected	37,443	27,832	1,2M	7209	1858	5692	1620	1890	109	16000
# students actual	37,443	4,395	4941	2163	1858	5692	1620	1890	109	2667
IPM coordinators	26/26	6/6	7/7	5/5	3/3	4/4	no	3/3	no	no
Contracted PMP trained	SLA all26	SLA	USDA	SLA	SLA	SLA	USDA	USDA	n/a	no
Facility Mgr /IPM C trained	SLA 17/26	SLA	USDA	SLA	SLA	SLA	no	yes	no	no
IPM Practices followed	Y all26	yes	yes	yes	yes	yes	yes	yes	yes	no
Low Impact pstiside only	Y all26	yes	yes	yes	yes	yes	yes	yes	yes	no
Psticids stored in school	N 0/26	no	no	no	no	no	no	no	no	yes
Psticides applied by staff	N 0/26	no	no	no	no	no	no	Yes-PMP	no	yes
Pesticide records	Y 25/26	yes	yes	yes	yes	yes	yes	yes	yes	no
School/D IPM policy	Y 21/26	missing	yes	yes	yes	yes	no	yes	no	no
IPM plan generic	Y20/26	1y 5/n	yes	yes	yes	yes	no	yes	no	no
Faclty Mgr IPM knowldg	Y 17/26	no	yes	yes	yes	yes	yes	yes	no	no
Admin. IPM knowldg	N 5/26	no	n/a	1/2	1/2	1/2	no	yes	no	no
Parent notif. plan	Y all26	no 1/6	yes	yes	yes	yes	yes	yes	yes	no
Kitchen clean/ storage +	Y20/26	no	yes	yes	yes	yes	yes	yes	yes	no
Kitchen w/ pests	no	yes	no	no	no	no	no	no	no	yes
Pest monitoring /logs	15/26	no 1/6	No/Kit-Y	yes	yes	yes	some	yes	yes	no
Intact door sweeps	10/26	3/6	1/2	yes	yes	yes	yes	yes	yes	no
Plumbing leaks (L) Bathroom holes (H)	L. 6/26 H.22/26	all	1/4	none	none	none	none	none	none	yes
Bed bug issues	16/26	4/6	most	few	few	few	few	few	few	no
Rodent issues	25/26	all	all	few	few	few	few	few	few	yes
Cockroach issues	25/26	yes	all but 1	few	few	few	few	few	few	yes
Seasonal ant issues	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Flooding issues	18/26	indoor	indoor	no	no	no	no	no	no	Outside
Waste Mgmt issues	yes	yes	yes	no	no	no	no	no	no	yes

Table 9.1. Comprehensive list of SIPM Metrics in NY and NJ Study Schools

No pesticides are stored in schools and employees do not apply non-low impact pesticides. Kitchens have a log book of PMP visits; grease trap mandatory cleaning logs and kitchen supplies/food are stored above the floor. No non-low impact pesticide applications are allowed during school hours.

NYC Pest pressures. Bed bugs hitchhiking into schools are a common reality in NYC so a common bed bug policy is posted on the NYC DOE website. Mosquito control is coordinated by the NYC DOHMH. Custodians investigate roach sightings then place and replace glue traps when necessary. Other pest problems in NYC are seasonal, such as ants in early spring and bees in late summer. If pests are reported, custodians call NYC facility management who then call the PMPs.

Waste management is a huge issue in NYC schools. Garbage and recycling are placed on the streets and sidewalks in plastic bags and not in dumpsters or other containers. Even though garbage is picked up 2x/day curbside, this adds to the pest pressures in and around schools. The garbage bags are not rodent proof and are easily ripped open. Rats are abundant around the garbage. NYC fat-belly containers are scheduled to be deployed later this year, which may reduce the pest pressure. Another pest issue is the random dumping onto school grounds by neighboring residents.

Despite rodent pressures, some schools are cautious of the issue of secondary poisoning of wildlife from the use of super warfarin baits. Instead, they are using snap traps which are more time consuming for staff, but are safer for the wildlife (red-tailed hawks). As a result, rodenticides have been greatly reduced in some NYC schools.

Negative Findings: **Classrooms:** Teachers were found storing food improperly in most classrooms along with the unsafe use of refrigerators and microwaves. The SIPM district managers are working to educate the teachers about the fire safety issues of unauthorized appliance use. Clutter in many classrooms and storage in cardboard was commonly found.

ii. **New York Suburban Districts C, D, and E. Background**: These districts had 8,000 or fewer students educated in 15 or fewer schools. The facilities managers from some schools had received SIPM guidance from the regional USDA IPM center staff. The study team visited one half to one quarter of randomly selected schools in these districts.

The **tribal school** that was visited was following most IPM tenants; however had no idea what SIPM was. Sanitation, maintenance, monitoring, and exclusion were regular components of their facilities management routine.

9.3.c US Territory: Background. The US territory has two school districts: educating approximately 16 thousand students. Both school districts contract a PMP who services all schools in their jurisdiction and apply pesticides monthly throughout the schools, regardless of need. The PMP who services “Territory School District A” applies pesticides monthly in the kitchens of all 31 district schools. The school grounds are sprayed prior to the beginning of the school year and during the year if major pest problems are identified. IPM is a foreign concept to all BOE staff, administrators, and custodial staff in the territory. There is no IPM training to either PMPs or school staff. There are no IPM policies or plans for any of island schools, no monitoring, and no notification is given to parents or staff prior to pesticide applications. It is a common practice for school staff to apply flying insect spray, or their own pesticides, when they feel it is needed.

US territory Pest Pressures. Common pest problems were pigeons and chickens roosting in and on school buildings and grounds. Kitchens had roaches and rats. Standing water was present on and around school grounds. Rats and mongoose were in surrounding un-mowed grasses. Termites were common in both structural and non-structural wood, there were leaking pipes, and questionable sanitary conditions both inside and outside of school buildings.

Investigation by R2 Pesticides Program staff found that asthma rates are high among the students. The link between asthma and pest presence and pesticide use is well documented. (US HUD 2006; Katial, 2003; DeVera et al., 2003; Arrunda et al, 2001; Salam et al., 2004; Landrigan et al., 1999; Hernández et al., 2011) An intensive SIPM outreach program is needed for the Territory Board of Education, maintenance workers, principals, administrators, school nurses, and kitchen workers.

9.4 Overall Pest Challenges.

Bed Bugs: Bed Bugs: More than half (16/26) of NJ “City A” schools visited have had bed bug issues, yet district schools did not have a consistent bed bug protocol. We found a regional trend of teachers scavenging second-hand upholstered furniture and placing it in classrooms and teacher lounges. These were coincidently the same schools and rooms with bed bug incidents.

Bed bugs hitchhiking into schools are also a common reality in NY "City A", so a common bed bug policy is posted on the city DOE website. The school district owns multiple steam machines, a crinite machine, and all large buildings have a HEPA vacuum to mitigate bed bugs. The first bed bug inspection is by a PMP then the District DOE facility employees are dispatched to steam treat furniture on the second inspection. Many bed bug control educational materials are easily available to school staff and parents on the City website.

Rodents were a common challenge in NJ "Cities A and B" schools. The prevalence of rodents in many buildings occurred due to a combination of: 1.) Carelessness; such as propping outside doors open for long periods of time; 2.) Improper sanitation; for example floors are not cleaned to the corner, and food and other debris are left lying on the cafeteria floors; or 3.) Lack of maintenance; such as no or old door sweeps, holes in walls, floors, ceilings, and around pipes and ductwork. All holes should be sealed to prevent pest entry and harborage and door sweeps installed. Schools in the suburban districts 4-9 acknowledged an occasional field mouse invader.

Cockroaches: All but one school in NJ "City A" and NY "City A" had cockroach issues, but these pests were managed and not visible to the study team. In these cities custodians conduct daily cleaning, investigate roach sightings, and place glue traps and use boric acid and granular baits to control them. NJ "City B" school kitchens had severe cockroach issues, clearly visible to the study teams. The custodians informed us that the kitchen staff left for the summer and custodians were not allowed to enter or clean the kitchens during summer vacation. We found flourishing cockroach infestations, and grease buildup on floors and appliances. These infestations indicated severe deficiencies in sanitation, which were also noted. Cockroaches were considered occasional invaders in both NJ and NY towns.

Flooding issues were common to NJ “Cities A and B” and some schools in NY “City A”, due to a high water table and older infrastructure. Many had a reoccurrence of water in the basements, as was evident from lime scale on the walls and standing water. The presence of water leads to mold issues and contributes to a multitude of other pest problems.

All major results are shown in Table 9.1.

9.5 Conclusion.

Regardless of whether the state has a law or not, the team found that some districts were clearly following IPM protocols, while others were not. The state mandate does help by providing training to all facility managers and PMPs working in schools. If the PMPs are trained and understand and practice school IPM, it can make up for a breakdown in knowledge at the school facility manager level. In some schools, the PMPs actually instruct the facility managers in correct IPM practices to reduce pests. There is a higher number of school facility managers trained in IPM in a state with a mandate.

Most school districts had a written school IPM policy and an IPM plan. These plans are comprehensive; however, they are not school specific. As few school districts was vested in modifying the plan for their school, many of the facility managers had never read it, despite state school IPM mandates. The study team found most urban school administrators (principals) cannot even give a simple definition of school IPM. This finding highlights a communication disconnect between urban facility managers and school administration. The urban head district managers know about SIPM, but rely on the people under them for implementation. If the line of communication is strong, the school facility managers understand and implement SIPM. Whenever there is a lack of communication, via sub-managers, facilities managers may take short cuts or do not provide adequate school sanitation and maintenance. As a direct result, the team found questionable cleanliness conditions in some schools. An understanding and buy-in of school IPM by administrators would lead to safer pest management practices within the schools in their charge.

The team found that the suburban districts do not have the same chain of command or resultant break-down. The District head facilities managers have a direct responsibility for all schools in their districts and evaluate each of them on a regular basis. Tribal areas had the least access to IPM information and training. The tribal area was practicing IPM without realizing it, just by maintaining a high level of sanitation and maintenance. The territory has extreme pest pressures, no SIPM training whatsoever, and follows traditional pest management practices, characterizing what many schools were practicing pre-SIPM.

Interestingly, according to many of the SIPM district mgrs. and custodians interviewed: "*most pest control actions are still reactive – not proactive*"

Common abbreviations:

SIPM: School Integrated Pest Management;

PMPs: Pest Management Professionals

NYC DOE: New York City Department of Education

NYC DOHMH: New York City Department of Health and Mental Hygiene

9.6 **References**

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Chapter 10

Conclusions

Only a small percentage of US schools have verifiable IPM programs. The overreaching goal of this dissertation is to advance the adoption and implementation of Integrated Pest Management in schools and childcare centers. This research hopes to have advanced this goal by testing and evaluating the training venues used to convey the IPM message. The message was delivered to change agents such as school and childcare administrators and staff through three communication venues: 1.) interpersonal, 2.) workshop / classroom type, and 3.) an IT electronic webinar approach.

10.1 The Contribution to environmental management of this research was to document IT webinars as an effective venue for IPM initial training or as an IPM training supplement, as compared to traditional training venues to school administrators, childcare center directors, or related health care facility managers. This research filled a literature gap of no comparative studies for traditional vs. webinar training for non-agricultural IPM training.

10.2 The Contribution to society of this research was to expand the ability to teach school and CCC administrators about protecting children from the harmful effects of pesticide use and misuse in environments that children frequent.

10.3 The environmental management and health problem that needs to be corrected.

Because humans and pests depend on the same food chain, it is not surprising that the use of pesticides that are intended to kill pests, come with some unknown risks to people. Although it is important to keep schools free of pests, many pesticides used in their control have potential health risks, especially when used in the vicinity of children.

During any normal school day students and school personnel may be exposed to pesticides. Pesticides may become airborne and settle on toys, books, desks, counters and walls. Children and staff may breathe in contaminated air or touch surfaces and unknowingly expose themselves to invisible residues that may linger for months beyond the initial pesticide application. Exposure may occur whether pesticide applications are made shortly before people enter the building or while they are present. Accumulations of pesticides can linger well beyond the initial application, remaining on unsprayed furniture and children's toys for weeks or months after an indoor application. Residues linger in carpet dust for up to one year. Cleaning does not necessarily mitigate residue. Know that not all pesticides are created equal. Some pesticide products are much less-toxic than others. Some pesticides may break down into other compounds or contain many other (inert) ingredients that also could be allergenic or hazardous. Therefore: pesticides should never be applied as routine or "preventive treatments" in or around schools.

Remember that children are 20% of our population, but they are 100% of our future. If we protect our children, we generally protect everyone.

10.4 Background research on State surveys and early SIPM grant research revealed that routine pesticide use is still common in schools across the country, however they also showed that progress is being made in IPM education and implementation in some states.

The background research projects demonstrated that IPM is comparable or cheaper than conventional approaches and certain facets of an IPM program can be implemented over time in order to keep costs down. The research also identified a number of challenges in implementing a nationwide SIPM program. Federal funding and focused education was used to initiate efforts in some states as many state lead agencies had little funding.

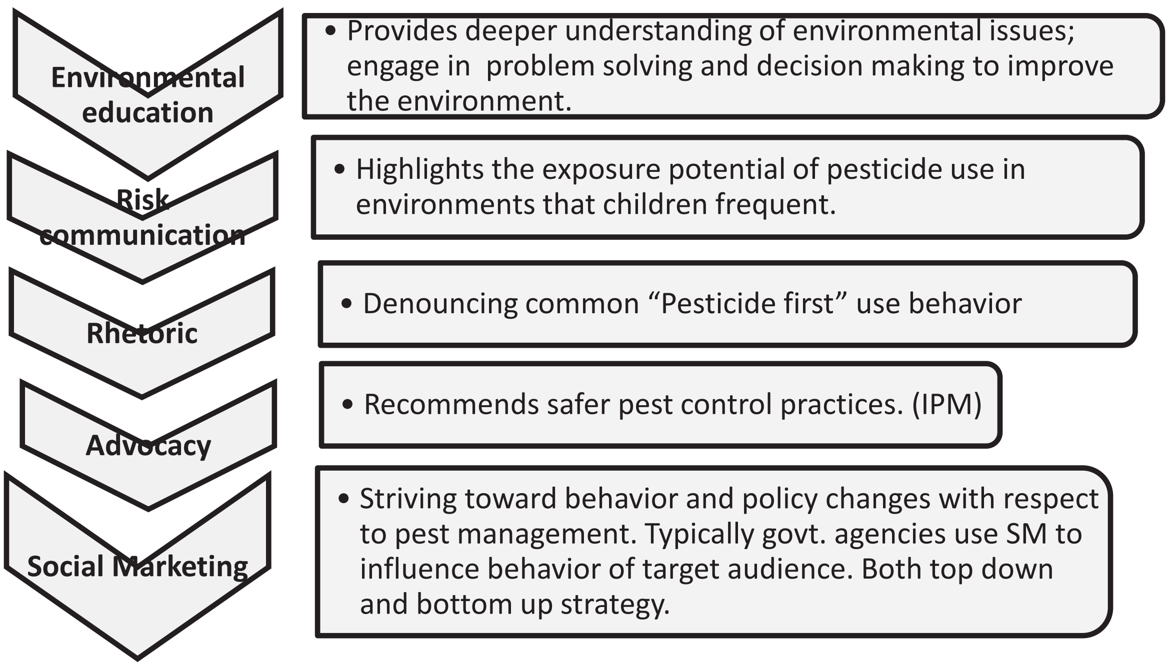

Figure 10.1. The five different forms of environmental communication used to convey the IPM message.

10.5 The forms of environmental communication that comprised the SIPM message. The IPM message was a combination of advocacy for safer pest control practices; rhetoric which denounced the common "see a pest – spray a pest" use behavior; risk communication that highlighted the exposure potential of pesticide use and misuse in the environments that children frequent; environmental education as a process that allows individuals to develop a deeper understanding of environmental issues, engage in problem solving, and obtaining the skills to make informed and responsible decisions to improve the environment; and social marketing which strives toward behavior and policy changes with respect to pest management practices. The SIPM social marketing campaign was studied through both a Regional and National perspective and some of the recent environmental communication messaging used over the three different venues was shared with the reader. (Chapters 3 and 4)

10.6 Identified Problems and Solutions. Although IPM has gained recognition among many school communities as a desirable approach to pesticide use, constraints to full implementation of IPM include: (1) low awareness of the need and benefits among those agencies, organizations and individuals with potential roles in school IPM – this is being addressed by targeted outreach to agencies and school related organizations at the national level to obtain buy-in. (2) insufficient funding to apply available expertise and tools – outreach tools are being compiled at a central national site – accessible to all schools and school related organizations pointing them to these centrally located resources; (3) poor regulation enforcement and insufficient regulations at the state level– this is a states' rights issue and will need to be addressed through multi-level education to state agencies and perhaps circumventing the lack of mandates in some state by introducing third party education and certification; (4) School budget shortfalls and deferred maintenance – is overcome through step-by step IPM implementation over time; and (5) a lack of national and regional coordination – is addressed through agency outreach at the national level and the formation of a center of expertise (CoE) that regularly coordinates with regions enabling the regional personnel to coordinate with states in their regions, supplying additional support when requested.

Weed management has also been identified as a specific challenge due to limited awareness and availability of alternatives to chemical-intensive management, which is exacerbated by the rhetoric promoted by the chemical industry that chemical pesticides can easily mitigate any pest problem with no mention of potential consequences to the most vulnerable. After interior SIPM has been addressed, outdoor SIPM is the next step. Once the primary contacts have been established and indoor facility IPM education has been provided, linkages and contacts for the second step toward gradual full outdoor implementation should be in place. (Chapter 2)

10.7 Research questions.

- Are webinars as effective as traditional introductory IPM training methods?
- What is the best venue to facilitate behavior change re: pesticide use?
- Which venue has the greatest attendance and reaches the greatest target audience?
- What are the venue benefits?
- Is the collected data verifiable? Useful?
- What are the environmental and economic ramifications of the venues?

As the overreaching goal of the SIPM movement is to advance the adoption and implementation of IPM in schools and childcare centers. This research advanced the dialogue by testing and evaluating the training venues used to convey the SIPM message. The study assessed two traditional IPM training venues: interpersonal and classroom/

workshop contrasted with the newer IT webinar training venue for successes under different criteria.

10.8 Research Questions on venues answered

Venue	Interpersonal	Workshop	Webinar
No. sites visited/ conducted	107	13 (17)[A]	12
No. admin./schools reached	220	58+	1,685+
Attendance general	220	661 (842)[A]	5215
No. children affected	69,987	25663*	6,510,094
No. reached/day	4.5	50	435
% target audience reached	100%	94%	74.5%+
Venue comprehension efficacy	100%	83.5%	92%
No. surveys obtained	107	329 (0)[A]	2452-1200[B]
% surveys obtained	100%	51%	47-23%[B]
Venue Preference	100%	61%	70%
Verifiable Data collected	yes	no	no
No. w/in 100 miles	220	586 (767)[A]	950
% 0f total w/in 100 miles	100%	88.6%	15%

Table 10.1 Comparison of data from the three venues studied. (* = only one workshop provided this data; [B] = There was variability from the number of people voluntarily answering a question and the number of webinars that provided a certain question; [A] = There were actually 17 workshops conducted, but surveys were only provided for 13).

10.8.1 What venue does the audience prefer for training? The attendees clearly preferred the venue that they were in. 60% of workshop attendees preferred the classroom/ workshop venue, while 70% of webinar participants chose webinars as their preference. (Interpersonal visit administrators found it convenient to have us come to them.)

10.8.2 Preference or Ability to Travel. State and local viewing analysis showed that 85.6% of webinar attendees would have been unable to attend the IPM training, had it not been in the webinar venue format. Most were hampered by distance, budget, or time constraints. So, less than 15% of the audience would have been trained, had it not been for the convenience and low cost of the venue. 18% of webinar participants were located within a 100 mile radius. That number of 18% is close to the 15% of attendees that said they could still attend the training if they physically had to travel. The webinar venue was what worked best for most rural and distant facilities.

10.8.3 What are the differences in attendance prospects for interpersonal and classroom training sessions as opposed to a webinar? The study found that attendance increased per contact/presentation day by approximately 10 times per venue type: 4.5 per interpersonal visit; 50 per workshop to 435 per webinar presentation. That is a substantial increase in participation per venue. With sharp cuts in federal funding and the size and scope of the SIPM initiative and goals, we may need to call on the newer IT webinar technologies to reach more schools in a cost effective manner.

10.8.4 Were the target audiences reached? How did this relate to the number of children and schools reached per venue? The interpersonal childcare visits had a direct effect on the health of 3307 children that attended those CCC facilities. As a result of the visits most CCC had verifiable changes in their pesticide use practices. Unlike the CCC initiative, the school visits did not have a multi- phase and revisit strategy, which would have been helpful in documenting the measure of success of the visits. However, the school visits did educate those who could potentially have an effect on the health of the almost 70,000 students in the schools and districts that were visited.

Only one classroom/workshop provided data to compare with the interpersonal and webinar venues. In that one workshop, 48 schools and 25,663 children were represented.

. The webinar venue reached 1,685 school or childcare administrators who are responsible for at least 6,510,094 children. The fact that most of the attendees for these webinars were administrators or had oversight of school districts meant that the IPM message reached those that may have the ability to affect policy change within their facilities or districts.

The IPM message was well distributed within the target region, (EPA Region 2), mostly New York and New Jersey, with 1733, or 35% of all webinar attendees. Although surrounding East coast states were the main target audience, the numbers demonstrate the far-reaching effect of the webinar venue to states all across the nation. CA, FL, OH, and PA were well represented with over 200 attendees. IL, KS, MN, TX VI and WA also had a good showing with over 100 attendees each. The data also showed that there were 13states having poor participation rates, perhaps indicating a need for an alternate approach to SIPM outreach.

10.8.5 Are webinars an effective means of collecting pesticide use data? Are there any differences between venues in measuring quantifiable behavior change with regard to pesticide use? The classroom surveys, State surveys and webinar surveys can be used for gathering rough base-line data on pesticide use practices in schools and childcare centers, however, the only verifiable data set come from the in-person visits to both the childcare facilities and their pest control companies through records inspections. The EPA Staten Island Pilot Project demonstrated that often administrators were unaware of many of the pest control practices used in their facilities and sharply underestimated their use when questioned. Although the Staten Island Project went from 15% of administrator understanding of IPM in the first phase of the project, to 100% understanding at the conclusion of the project, by way of one-on-one interpersonal visits, it is impractical for all IPM educational initiatives to be conducted in this way. The amount and cost of labor, time and travel would be cost prohibitive.

10.8.6 Benefits of Webinar Venue. Most webinar efficacy and comprehension scores hovered in the mid to upper 90th percentile. The author believes this a fair trade off to in-person trainings, considering the added volume of remote participants and environmental savings. In addition to the hour-long IPM presentation, the webinars were followed up with e-mail links to materials, the answers to all questions asked during the Q&A session and links to the power point presentation. Giving participants almost everything they would have received from in-person trainings. Many of these attendees were extremely grateful for the invitation and for the opportunity to learn about IPM and how it can be implemented into their centers.

An important outcome of the IPM webinar venue was the volume of participants over traditional communication venues. The knowledge gained by over 450 webinar attendees per webinar, mostly childcare and school administrators, about how to protect children from potential pesticide exposure was invaluable. Another benefit was that, unlike a conference workshop, an unlimited number of childcare stakeholders from all over the nation were able to be invited and attend. IPM webinars may take IPM advocates and facilitators one step farther in ensuring the safety of our nation's most valuable resource, our children.

10.8.7 Does the audience understand the IPM message? What is the efficacy of the training message with regard to the venues? Are webinars as effective as traditional training methods? Can they substitute or supplement traditional IPM training venues? Although the interpersonal venue was time, labor and economically more intensive, then the other venues, there was an increase from 15% to 100% in administrator understanding of IPM documented along with clear changes in policy with regard to pesticide use.

Averaging all of the survey answers, the efficacy of the workshop venue was 83.5%. The webinars had an efficacy rating of 92%, clearly above the efficacy rating of 83.5% of the classroom/workshops. Electronic venues, like webinars, are becoming more and more popular as a training alternative. The research concludes that SIPM webinars could be an effective agent for preliminary training to some school change agents such as school principals, superintendents, school nurses, custodians and teachers.

10.9 Evaluating and noting the limits of the non-verifiable pesticide use data.

Are there added benefits of surveys and webinars as a means of collecting base-line data? Are these forms of data verifiable? If not, are they still useful for identifying

general areas and populations to target further outreach initiatives? The only way to get verifiable data is through on site, in-person inspections, such as was conducted through the interpersonal venue. That said, webinars and other surveys can give some basic insight into general pesticide use practices. Half of webinar question respondents answered that their pest control company service their facilities needed, when called. That is a clear indication that at least half of the schools and child care facilities that attended the webinar were not applying pesticides on a regular basis to “prevent” pests.

The answers to the pesticide use questions show that inroads have been made in certain areas and in select states. However, the data also demonstrates there are areas that clearly need to be reached. The webinars also provided us some data that we may use as a snapshot of some IPM practices around the country. This data demonstrates that there is still a dependence on pesticides being applied as a deterrent, and that some school and childcare facility administrators may initially be unaware of the vulnerability of children to potential pesticide exposures.The decision by some facilities to use pesticides as a form of pest prevention suggests that IPM education is needed to point out that pesticides should be considered to be a pest management choice after all other methods have been exhausted. This is a child care administrative decision paradigm that requires attention and continued education.

Of particular interest was the finding that that over half of the CCCs in the webinars, 57%, are being judicious in the selection and use of pesticides around small children (via the use of no or only low-impact pesticides). Partial to full records maintenance was 66.5% for national attendees, a good start, and hopefully after viewing the webinar more administrators will have learned the importance of records and will implement better records management in their facilities.

The numbers for administrator awareness does not give us a before and after training metric, but does shows that 90% of administrators on the webinar know about IPM at least post-presentation. The most rewarding statistic was that 32% of the childcare administrators stated that “After viewing this presentation we will implement IPM”; and 20% said “We use it but didn’t know that’s what it was called”. That demonstrates a clear increase in understanding of IPM by childcare center administrators.

Are these national averages? No, that cannot be determined from this type of survey. On the other hand, the data does give us a glimpse into pesticide practices in a wide diversity of school and childcare facilities. This snapshot does show that many CCCs are on the right track, but there is still work to be done.

10.10 Additional information gathered from the verifiable interpersonal venue.

10.10.1 Is there a difference in SIPM implementation in a state with a SIPM law, as opposed to a state or territory that does not have a mandate? This question could only be answered through the boots-on-the-ground, interpersonal venue. Regardless of whether the state has a law or not, the team found that some districts were clearly following IPM protocols, while others were not. The state mandate does help by providing training to all facility managers and PMPs working in schools. If the PMPs are trained and understand and practice school IPM, it can make up for a breakdown in knowledge at the school facility manager level. In some schools, the PMPs actually instruct the facility managers in correct IPM practices to reduce pests. There is a higher number of school facility managers trained in IPM in a state with a mandate.

Most school districts had a written school IPM policy and an IPM plan. These plans are comprehensive; however, they are not school specific. As few school districts was vested in modifying the plan for their school, many of the facility managers had never read it, despite state school IPM mandates.

10.10.2 What are the challenges found in the implementation of SIPM in suburban districts v/s urban and rural districts?

The study team found most urban school administrators (principals) cannot even give a simple definition of school IPM. This finding highlights a communication disconnect between urban facility managers and school administration. The urban head district managers know about SIPM, but rely on the people under them for implementation. If the line of communication is strong, the school facility managers understand and implement SIPM. Whenever there is a lack of communication, via sub-managers, facilities managers may take short cuts or do not provide adequate school sanitation and maintenance. As a direct result, the team found questionable cleanliness conditions in some schools. An understanding and buy-in of school IPM by administrators would lead to safer pest management practices within the schools in their charge.

The team realized that the suburban districts do not have the same chain of command or resultant break-down. The District head facilities managers have a direct responsibility for all schools in their districts and evaluate each of them on a regular basis.

Tribal areas had the least access to IPM information and training in the study region. However, the tribal area was practicing IPM without realizing it, just by maintaining a high level of sanitation and maintenance. The territory in the region had extreme pest pressures, no SIPM training whatsoever, and follows traditional pest management practices, characterizing what many schools were practicing pre-SIPM (1970’s –like).

10.10.3 What are the some of the added benefits and drawbacks of traditional trainings in SIPM, versus webinar training methods? Only through interpersonal venue visits to CCCs were we able to determine the that there was a strong dependence on pesticides due to the type and frequency of pesticide applications as verified through pesticide records inspections. It also indicated that childcare center administrators may have been unaware of available IPM methods to reduce the use of pesticides.It also revealed that even if childcare centers reported having few to no pest problems, 2/3 of them still had pest management companies treat on a regular basis, as a preventative measure. The study succeeded in verifiably reducing the amount and frequency of pesticides being applied to childcare centers within the study area.

Through school visits we learned that according to many of the district facility managers and custodians interviewed that despite IPM training: “*most pest control actions are still reactive in schools – not proactive”*

10.11 The economic and environmental savings when using the webinar venue. Considerable amounts of money that are normally spent on travel and venue rental can be saved when electronic venues are used. In addition, the webinar venue can accommodate a much larger audience, and even people from remote locations can attend as long as they have internet access.

The number of attendees was recorded, along with their locations. We were able to calculate how many were located outside of a 100 mile radius for all webinars. The total combined was combined 4366 attendees. Within 100 miles were 950 attendees, or 18%. The increase in attendance via a webinar venue was about 10 times from what we might have attending an in-person workshop. Another major bonus to the webinar venue was the fact that 4366 additional participants from around the country were able to attend. It cost nothing additional to train additional target audiences and their guests about IPM.

Venue	Interpersonal	Workshop	Webinar
Outreach materials	Print (cost)	Print (cost)	electronic
Invitations	mail (cost)	electronic	electronic
Prepare/ give talk	human time	human time	human time
Surveys	Print (cost)	Print (cost)	electronic
travel to venue	vehicle (cost)	vehicle (cost)	electronic
facilitator travel-2w	5509 miles	1222 miles	none
lbs carbon: used (saved)	5126 lbs	1138 lbs	none used
participant travel *(1)	none	859 miles	see below
participant travel* (1)	none	801 lbs	see below
Participants w/in 100 miles	220	586	950
local miles (2 way)	na	na	-73006
lbs carbon: used (-=saved)	na	na	-68014
no. people outside 100 miles	na	na	4210
air miles (2way) (-=saved)	na	na	-7988938
lbs carbon: used (-=saved)	na	na	-386646
combined carbon metric tons	na	na	-1748.43

Table 10.2. Economic and Environmental costs/benefits per venue. (*= give representative data for only one workshop; na= not applicable)

10.12 Environmental Savings. The interpersonal visits were not only time consuming, labor and resource intensive, they also cost the environment a total of 5126 pounds of added CO_2 to the atmosphere. Compare that to the pounds of carbon saved via the webinar venue. When the auto and air CO_2 emission savings are combined, a total of 160852 pounds, or 72.9 metric tons of CO_2 was saved. Webinar trainings are a significant benefit to the environment.

The webinar attendance data can also be useful to show which districts have been actively obtaining the SIPM message, and which ones have not. If a school district had multiple persons attending the webinar, chances are, there is local interest in SIPM. Those districts are the low-hanging fruit for successful IPM implementation and possible state pilot project sites. Districts with no attendees, or only one, may be more difficult to reach and may require a different approach, such as in-person contact through traditional communication venues.

10.13 Conclusion. The study concludes that the webinar venue can be part of a multi-faceted IPM educational program. The EPA webinar data documented that some schools and childcare centers, once educated, they may change their overall pesticide application and pest management practices hopefully resulting in the continued reduction of pests and potential pesticide exposures to children.

1. All 3 venues reached target audience.

2. All 3 venues have reasonable efficacy.

3. Webinars have the best attendance. Little set-up or travel cost. Best venue for economic and environmental reasons.
4. Interpersonal venue had verifiable data and challenges were more easily identifiable.
5. Webinars were validated as an alternative to traditional IPM training venues.

10.14. Future non-agricultural IPM research needed.

A few burning questions came out of this research that may lead to further research.

A. Why was there a 9% gap between the efficacy for workshops and webinars? This wide gap resulted from the incorrect answering to two key questions pertaining to the understanding of bed bug IPM. Only 50% of the workshop attendees responded "Everyone" is responsible for bed bug IPM in their facility / school, while 90.7% got the answer correct in the webinar format. The presentations used were the same, however 50% of workshop attendees still felt that other people, such as maintenance staff, principals, and landlords were responsible. Another question that had a huge disparity was "What should you do if you see a bed bug? The clear first step in the presentation was "catch it for identification. 95.2% or webinar attendees got the answer correct, whereas only 34% of workshop attendees answered correctly. 28% of workshop attendees answered "empty the room", clearly a second step after identification.
B. Better numbers for carbon spent going to workshops would better define the environmental differences between workshops and webinars.

C. More comparative research need to be conducted as to why certain states and U.S. territories are not being reached via webinar or other means. Are there cultural differences or resistance from industry? Why do the state lead agencies not promote IPM? What are the opposing influences at play in these areas? This should lead to an SIPM outreach initiative to states with low SIPM implementation.

D. A pilot project could be undertaken using the information gained from this study and the comprehensive study of grant funded research previously conducted. A pilot project like this is about to be launched in Washington State by the EPA, but similar pilots could be launched in other areas.

E. More research is needed as to why the numbers for bed bug IPM related webinars and workshops were so much more popular that basic IPM. Does this have to do with the ICK factor? People are more terrified about getting bed bugs that most other pests? Is this related to press promoted by the pesticide industry to sell their products and services? One finding resulting from this study is that discussing bed bugs with administrators open the door to a discussion of IPM - in general. I am currently working on a paper specific to bed bug trainings: *"Green' Bed Bug Training for Schools, Health Departments and Social Service Providers"; but this could be expanded.*

F. How can we better effect quantifiable behavior change when it comes to reducing the use of pesticides in places that children frequent? Dr. Taylor and the author of this research are currently investigating a related topic "*Using Electronic Media*

Formats to Change Behavior in Environmental Campaigns for Sustainable Practices".

G. This project, and the verifiable data from the schools and child care centers leads to a heavy use of rodenticides in schools, childcare centers and multi-family housing, especially in urban areas. A related project currently underway is examining pesticide exposure data from Poison Control Centers in specific parts of the country. What are the products involved, safety issues, and ages of children? What types of communication would be appropriate for reducing rodenticide, a pesticide specific to rodents, exposure to children? "*The Need for Pesticide Safety Education for Parents of Young Children Due to Rodenticide Exposure Incidents in the Mid-Atlantic and South Central States*"; begins to look into the rodenticide a young children issue.

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USDA: Social Marketing Resource Manual – A guide for state nutrition education networks http://www.fns.usda.gov/sites/default/files/socmktman_0.pdf

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Appendix A

Government Funded SIPM and IPM in CCC Surveys and Research

Year		St.	Author/ Org./ Univ./ Agency	Research Title/ link / significance
			U. S. Environmental Protection Agency	Integrated Pest Management in Schools Nationwide Directory. *Links to state and regional school IPM Web sites; state list of government, University and Extension contacts for school IPM.* Available at http://www.epa.gov/reg5foia/pest/matilla/ipm_dir.html
1988			McCauley, M.	*Contaminated Classrooms: An Investigation of Pest Control Practices in Washington, D.C. Area Schools.* Public Citizen's Congress Watch. California Env. Prot. Agency., Sacramento, CA
1992		TX	National Parent Teachers Association	*Position Statement: The Use of Pesticides in Schools and Child Care Centers*. 1 pp. www.organicconsumers.org/school/pdf/PTA.pdf
1992		TX	Wallace, M., Anderson, J.; Glick, S.	*USEPA Pesticides Austin, Texas The start of SIPM in the EPA*
1993			Browner, C	Pest Control in the School Environment. US Environmental Protection Agency, Washington D.C. 43 pp. *Model IPM policy statement.*
1993			National Research Council	Pesticides in the diets of infants and children.
1993			US Environmental Protection Agency	. *Pest Control in the School Environment: Adopting Integrated Pest Management.* Publication No. EPA 735-F-93-012. 25 pp. www.epa.gov/pesticides/ipm/brochure/
1993		NY	Abrams, R., D.I. Volberg, M.H. Surgan, S. Jaffe and D. Hamer.	*Pesticides in Schools: Reducing the Risks.* New York State, Department of Law. Summary and update.
1993		NY	Volberg, D.I., M. H. Surgan, S. Jaffe, D. Hamer and J. A. Sevinsky	Pesticides in Schools: Reducing the Risks. New York State Department of Law, Environmental Protection Bureau. http://www.oag.state.ny.us/environment/schools96.html
1994			Northwest Coalition for Alternatives to Pesticides	*Model IPM policy statement.* Available at http://www.pesticide.org/default.htm
1994		MT	Montana Department of Agriculture	*The Montana Model School Integrated Pest and Pesticide Management Program.*
1995		NY	Rogers, E.M.	*Diffusion of Innovations.* 4th ed. The Free Press, NY, NY. 512 pp.
1996		CA	Simmons, S.E., T.E. Tidwell and T.A. Barry	*Overview of Pest Management Policies, Program and Practices in Selected California Public School Districts.* PM96-01. State of California EPA-DPR. www.schoolipm.info/overview/overview_report.cfm

1996	S	MA	Hollingsworth, C.S.	*Pest Management in Massachusetts Public Schools: A Survey of Practices and Perceptions*. University of Massachusetts Extension Bulletin no. 217, University of Mass. Extension, Amherst, MA. www.umass.edu/umext/ipm/ipm_projects/school/pest_management_MA_schools.html
1996		MA	Massachusetts Public Interest Research Group	*Primary Exposure: Pesticides in Massachusetts Schools.* www.masspirg.org/
1997			Daar, S., T. Drlik, H. Olkowski and W. Olkowski.	*Integrated Pest Management for Schools: A How-To Manual.* Publication no. EPA 909-B-97-001. US EPA, Washington, D.C. www.epa.gov/pesticides/ipm/schoolipm/index.html Chapter 3. Setting injury and action thresholds, pp. 15-18; Appendix A. IPM-related curricula and resources for the classroom, pp. 157-158; Appendix B. How to develop an IPM program, pp. 159-167; Appendix C. Developing an IPM policy statement for school pest management, pp. 169-170; Appendix D. Integrated pest management (IPM) contract performance specifications, pp. 171-175. *In* IPM for Schools: A How-to Manual. *Setting action thresholds; descriptions and contact information for IPM-related games, projects and curriculum guides; pest management roles; model IPM policy statement; model pest control service contract specifications.* Available at http://www.epa.gov/region09/toxic/pest/school/index.html
1997			Mallis, A.	Handbook of Pest Control, *B&W photos, chemical classifications, mode of actions, formulations and table of insecticides with trade names, common names, US EPA signal word and uses.* Available from GIE Media, (800) 456-0707.
1997	S	MD	Maryland Department of Agriculture	*Summary of Structural Pest Control Programs and Implementation of Integrated Pest Management in Maryland Public Schools*. 37 pp. Maryland Department of Agriculture. 2000. *Implementation of Integrated Pest Management in Maryland Public Schools*.
1997.		MD	Pinto, L. J., and S. K. Kraft,	IPM in Schools: A Practical Step-by-Step Guide. Maryland Dept of Agriculture, Pesticide Regulation Section, Annapolis MD. Video tape and companion guides.
1997.		TX	Merchant and Merchant	The ABC.s of IPM Video Series: Module 1. An Introduction; Module 2. Structural Pest Control; Module 3. Food Handling Areas; Module 4. Bids and Contracts; Module 5. The Administrative Challenge. Available from Distribution and Supply Office, Texas Agricultural Extension Service, P.O. Box 1209, Bryan TX 77806-1209, (979) 845-6571, (FAX 979) 862-1566.
1998			Owens, K., and J. Feldman	The Schooling of State Pesticide Laws: Review of State Pesticide Laws Regarding Schools. *Pesticides and You*. 18(3): 9-23.
1998	S	CA	Kaplan, J, S. Marquardt and W.	*Failing Health: Pesticide Use in California Schools*. CALPIRG Charitable Trust and Californians for Pesticide Reform.

			Barber.	www.environmentcalifornia.org/reports/environmental-health
1998	S	IL	Pesticide Use in Illinois Public Schools: Survey Findings.	Available from Safer Pest Control Project, 25 E. Washington St, Suite 1515, Chicago, IL 60602, (312) 641-5575, Fax (312) 641-5454, Email, Website http://www.spcpweb.org/
1998	S	IL	Safer Pest Control Project	Pesticide Use in Illinois Public Schools: Survey Findings, 1998. Available from SPCT, 25 E. Washington St, Suite 1515, Chicago, IL 60602, (312) 641-5575, Fax (312) 641-5454, Email. Summary available at http://www.spcpweb.org/resultsummary.pdf.
1998	S	IN	Gibb, T.J., and F. Whitford	*Parents, Public Schools and Integrated Pest Management*. Bulletin No. B-770. Department of Entomology, Purdue University, West Lafayette, IN. [Note: Survey of parent knowledge and perceptions of IPM conducted in a single elementary school in Indiana.]
1998		MD	Davidson, J.A., E. Lewis and M.J. Raupp.	. *Integrated Pest Management in Schools: IPM Training Manual for Grounds Maintenance*. Maryland Cooperative Extension Service, College Park, MD. pubs.agnr.umd.edu/Category.cfm?ID=L
1998	S	MD	Maryland, State of.	*A Report on Pesticide Use in Maryland Schools*. Available from Maryland Public Interest Research Group, Baltimore, MD, (410) 467-0439. E-mail: marypirg at pirg.org. www.marylandpirg.org/home
1998		MD	MP[RIG	Maryland, State of.. *A Report on Pesticide Use in Maryland Schools*. Available from Maryland Public Interest Research Group, Baltimore, MD, (410) 467-0439. E-mail: marypirg at pirg.org. www.marylandpirg.org/home
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Federally funded SIPM Researchers and Universities / Agencies/ Organizations

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Appendix B

Surveys used over the three different venues

Note: The surveys questions used for this set of visitation and pilot project initiatives were developed after reviewing surveys used in many of the school and childcare IPM studies (Appendix A).

Survey 1	School IPM visit checklist	Interpersonal visits
Survey 2	School IPM survey questions	Interpersonal visits
Survey 3	IPM in childcare center survey questions	Interpersonal visits
Survey 4	IPM in childcare center visit checklist	Interpersonal visits
Survey 5	Classroom presentation and webinar survey questions	
Survey 6	Proposed final metrics for future pilot project	

Survey 1

Interpersonal R2 School IPM Visitation Checklist

GENERAL SCHOOL INFORMATION

Date of Visit_______________ Time____________ EPA Personnel Initials: _______________

Name of School _______________________________________ District: __________________

Street Address ____Phone __________________

City / Town _______________________________________ Zip Code _________________

Name Principal / Lead Administrator ____

E-mail: ____

A. General Pest Management

1. Circle the person who makes the ultimate decisions with regard to pest management.
   a. Center Director/ School principal
   b. Pest Control Company
   c. Building Management (landlord)
   d. Other: ______________
   e. Head of Maint.: (phone, e-mail)

2. If someone sees a pest problem in or outside your facility, who do they report it to? ____
3. What does custodial staff do when they see a pest? ________________________
4. Have you had any pests in the last year? **Y or N** *Circle all that apply*: Ants, Bees, Bed bugs, Cockroaches, Head Lice, Mosquitoes, Mice, Rats, Stink Bugs, Other: _____
5. What are you biggest pest problems? _____________________________________
6. What are your biggest problem areas? ___________________________________
7. Do you retain the services of a Pest Management Professional (PMP)? **Y or N**
   a. If yes: Provide the name of the PMP, Address and phone number:__________
   b. Is PMP IPM certified? **Y or N**

B. IPM Policy and Plan

1. What is your definition of IPM? ____
2. Is an IPM Policy in place at the school? **Y or N** (get a copy)
3. Does the school have an IPM Plan? **Y or N** (get a copy)

C. IPM Coordinator (IPMC)

1. Who is the school IPM Coordinator? **Name _______________ e-mail ____________**
2. Has the IPM Coordinator received IPM Coordinator Training? **Y or N When: _____**
3. Are school staff trained in IPM? **Y or N** Which staff? _____________________
4. When are school staff trained for IPM? _______________
5. How are school staff trained for IPM? ___________________________
6. Does the SIPM Coordinator keep pesticide application records, labels, monitoring and MSDS sheets? **(Look at application records) Y or N**
7. Does the school have Posting and Notification requirements? **Y or N** (how?)

☐ Letter notifying parents: ☐ episodically upon spraying, ☐ posting, ☐ yearly newsletter

D. IPM Records

1. Does the school request and maintain <u>at the school</u>, records of any pesticide(s) applied at the school from the school's commercial pesticide applicator(s)? **Y or N**
   Both indoor and outdoor records. **Y or N**

E. Policy/Plan Annual Notification

1. Did the school send out annual notifications (to who?) regarding the School's IPM Policy and Plan? **Collect copies of current and old annual notices**. **Y or N**

F. Pesticide Use including Non-Low Impact, (NLI)

When a school determines that a pesticide, other than a low impact pesticide, must be used on school property, such a pesticide shall be used only in accordance with these regulations.

1. Does a school employee apply pesticides to this school? **Y or N**
2. Does the school store Pesticides? **Y or N**
3. Have any pesticides been applied in your school/center in the last year? **Y or N**
4. Are NLI pesticides applied as a preventative measure? **Y or N**
   If Yes, *check all of the methods of application that apply*: ☐ spray, ☐ bait, ☐ gel,
5. Are low-impact pesticides applied as a preventative measure? **Y or N**
   If Yes, *check* ☐ spray, ☐ bait, ☐ gel ☐ trap, ☐ sticky boards, ☐ other_____
6. How often does the pest control company come? *Check*: ☐ weekly, ☐ every other week, ☐ monthly, ☐ every other month, ☐ seasonally, ☐ as needed if a problem arises.
7. Does the school allow (NLI) pesticide applications on school property when students are expected for academic instruction or for organized extracurricular activities. **Y or N**
8. Are pesticides applied on school days? **Y or N**
   Check those that apply: ☐ during school hours, ☐ before school, ☐ after school
9. Where are pesticides applied? *Check all that apply*: ☐ Classrooms, ☐ hallways, ☐ lunch rm., ☐ kitchens, ☐ garbage areas, ☐ storage areas, ☐ maint. areas, ☐ basement, ☐ bldg..perimeter ☐other
10. Are pesticides applied to school fields and playgrounds? **N/A Y or N**
    What pesticides are used? _______________________ (Records)
11. Does the school Post signs for (NLI) pesticide application? **Y or N**

G. Mosquito Control

1. Has a County or local Mosquito Comm. used (NLI) pesticides on school property? **Y or N**
2. What is the school policy on pesticide application for mosquitoes? ___________________
3. Has the school ever made an emergency non-low impact pesticide application? **Y or N**

H. IPM Policy and Plan Analysis

4. Was the Principal involved in writing the IPM Plan? **Y or N**
5. Is the contact information of the IPM Coordinator included in the school's Plan? **Y or N**
6. Do your set pest thresholds? **Y or N** ☐ They work. ☐ They need to be adjusted?
7. Has staff been trained in appropriate components of IPM? **Y or N**
8. Has the school community received IPM training? **Y or N**
9. Does the Principal perform an annual review of the Plan? **Y or N**

Survey 2
SIPM School Walk-Through Checklist

Name of School: ______________________________________

EPA Staff: ___________________________ Date: ___________________

Kitchens and Cafeterias

☐ Cracks and crevices - walls, moldings and floors OK Problems _________________
☐ No openings around ☐ electrical conduits, ☐ pipe chases, and ☐ ducts Problems __________
☐ Plumbing in good repair (no dripping pipes, faucets, or plugged drains) Y N ________________
☐ Surfaces in food preparation/ serving areas clean. Problems _______________
☐ Cabinets – no accumulation of food products, dirt or debris. Problems _____________
☐ No Standing water on ☐counters, ☐ in drains, or ☐on floors. Problems ________________
☐ Food waste in sealed, leak-proof plastic bags before removal. OK Problems __________________
☐ Exterior doors: weather stripping and door sweeps present and in good condition. Yes No
☐ No grease build-up, debris or other material causing blockage in drains. Yes No _____________
☐ Free of clutter (cardboard boxes or paper products). Yes No _______________________
☐ Evidence of Pests? Ants Cockroaches Flies Gnats Mice/rats Other____________

Restrooms

☐ Rooms cleaned and trash removed daily. Y N ____________________________________
☐ Cracks and crevices in walls and floors sealed. Y N __________________________________
☐ Plumbing in good repair (no leaks, drips, clogged drains). Y N ________________________
☐ Gaps between pipes or vents and walls or floor are sealed. Y N ________________________
☐ Restrooms are free from mold. Y N ______________________________________
☐ Evidence of Pests? Ants Cockroaches Flies Gnats Mice/Rats Other _______________

Food Storage Areas and Teacher's Rooms

☐ Food products delivered in non-pest-proof containers (e.g., paper, boxes) – are stored, refrigerated or transferred to pest-proof containers, such as clear plastic boxes with lids, within 24 hours. Y N
☐ Indoor packing trash (bags, cardboard, pallets) disposed of or recycled by the end of the day. Y N
☐ Bulk stored products – no direct contact with walls or floors. Y N _______________________
☐ Clean, organized and free of clutter: ☐ Food Storage area ☐ Teacher's room. Y N
☐ Bulk stored products have inspection aisles (> 6" x 6"). Y N ____________________________
☐ Paper products and foods stored separately. Y N ____________________________________
☐ Paper products stored near food in plastic or pest-proof containers. Y N ___________________
☐ Clean - inside and out: ☐ Refrigerators, ☐ microwave ovens, ☐ vending machines. Y N _________
☐ Evidence of Pests? Ants Cockroaches Flies Gnats Mice/rats Other _____________

Custodial and Maintenance

☐ Are cleaning and disinfecting products stored in areas that are inaccessible to children? Y N
☐ Mops and mop buckets are clean, dried or hung upside down. Y N _______________________
☐ Indoor trash/recycling rooms regularly inspected and spills cleaned up promptly Y N _________
☐ Indoor garbage kept in lined, covered containers and emptied daily Y N ___________________
☐ Stored waste is collected and moved off site at least once per week Y N __________________
☐ Recyclables are rinsed or stored in pest-proof containers and moved off site weekly Y N _______
☐ Identify moisture sources: ☐ plumbing, ☐ roof leaks, ☐ dripping air conditioners). Y N ________
☐ Bulk goods stored off of the floor and 6" away from the walls Y N __________________
☐ Store rooms neat and organized. No Clutter. Y N ____________________
☐ Evidence of Pests? Ants Cockroaches Flies Gnats Mice/Rats Other _____________

Classrooms

☐ Cracks & crevices in walls and floors sealed. Y N ______________________
☐ Cubbies and desks emptied and cleaned at least once per season (3-4x/yr) Y N _____________
☐ Sufficient space between coat hooks (to prevent spreading of head lice and bed bugs) Y N ____
☐ Food or food wrappers removed from cubbies and desks daily. Y N NA ___________________

- ☐ Sink areas kept clean and dry (at end of day) Y N ________________________
- ☐ Food and beverages allowed only in designated areas that are cleaned daily Y N _____________
- ☐ Books and supplies put in plastic bins and/or stored off of the floor. Y N ______________________
- ☐ Paper stored in pest-proof packaging or placed in pest-proof containers Y N _________________
- ☐ Snacks stored in pest-proof packaging or containers Y N N/A ____________________________
- ☐ Closets, bookcases and storage areas neat and organized. No Clutter. Y N ___________________
- ☐ Evidence of Pests? Ants Cockroaches Flies Mice/Rats Spiders Other _____________

Rooms visited: _______________________, _______________________, ______________________

Playground and Outdoor Areas

- ☐ Tree limbs maintained at least 6 ft away from building. Y N NA _______________________
- ☐ Vegetation, shrubs, vines, and bark mulch kept at least 12 inches from building. Y N NA _______
- ☐ Windows and vents screened or filtered. Y N Screens in good condition. Y N ________________
- ☐ Window trim free of cracks. Y N Windows close properly. Y N _______________________
- ☐ Exterior doors: Weather stripping and door sweeps in good condition. Y N ___________________
- ☐ Exterior doors kept shut when not in use. Y N ____________________________
- No evidence of debris, water leaks or holes: ☐ Building eaves, ☐ walls, ☐ gutters, ☐ roofs. Y N __
- ☐ No Cracks in foundation or walls. Y N ____________________________
- ☐ No openings around conduit or plumbing. Y N _______________________
- ☐ No evidence of standing water on /in play structures, ground or infrastructure. Y N ___________
- ☐ No evidence of standing water on neighboring properties. Y N ____________________________
- ☐ Evidence of Pests? Ants Cockroaches Flies Pigeons Mice/Rats Bees Other _________

Garbage / Dumpster Areas

- ☐ Garbage storage areas and compactors, are away from building entrances. Y N _____________
- ☐ Dumpsters have close-fitting lids and are kept closed. Y N _______________________
- ☐ There is no standing water in garbage cans, dumpsters or ground drains. Y N ________________
- ☐ Dumpsters are emptied weekly and **cleaned regularly**. Y N _______________________
- ☐ Garbage containers/dumpster areas outside are clean and void of debris and trash. Y N _______
- ☐ Evidence of Pests? Ants Cockroaches Flies Pigeons Mice/Rats Bees Other ________

Survey 3

IPM in CCC Interpersonal visit questions

Name of Facility: ___________________________ Date of Initial visit: __________________

Address: _______________________________________ Phone: ____________________________

Director: _______________________________________Email: ____________________________

Number of children: ________________Number of staff: ________# children under 2 -___________

Age range of children: _________________ Size of facility (sq ft):_________________________

Child Care Center Compliance Review

1. If someone sees a pest problem in or outside your facility, who do they talk with to address it?
2. Do you have any custodial staff? YES/ NO. If so what do they do when they see a pest?
3. Do you have a Pest management strategy or plan* for your facility? YES / NO. What is your plan?
4. What kinds of pest problems have you had in the past and currently?
5. If you have a pest problem, do you have a Pest Control Company contract? Y N
   If yes, please list name, address and phone/email of the Pesticide Control Company: _______
6. How often does the pest control company come? Do they come on a scheduled basis or only if there is a pest problem? Do they come during school hours or after school hours?
7. Do you also have a lawn service/ landscape company do pesticide applications on your property outdoors? Is it the same company as above? If no, please list name, address and phone/email :
8. Records of pesticide applications: Who keeps them and are they accessible? Ask to see them and any pesticide labels they may have from the company. (make copies of them if possible)
9. How do you notify parents and the children of a pesticide application? If a letter, or announcement, may we see one? (make copies of them if possible)
10. Do you serve food or do they bring it from home (or do you allow both)?
11. Have you seen any bites or unusual rashes on the children? **Have there been any extended absences, if so do you know why?**
12. What type of playground equipment do they have? (ex –Plastic, metal, wood, other)
13. What is used to disinfect sleeping mats, toys and other surfaces?
14. **Do you know approximately the number of children who have asthma?**

14. What year was the building built?
    Has you facility had any window replacements between the years of 1950 - 1980?
15. If the answer to second part of the previous question is "Yes", does your facility have caulk installed around windows, in masonry expansion joints, or around doors?
16. Do you plan on conducting any renovation activities or window replacements?
17. Do you have any knowledge or reports pertaining to lead-based paint in your building?
18. If this is a commercial space building, this question does not apply. If this is a home child care facility: Do you lease or own this building?

    If your answer is no, please explain in more detail. Take pictures to document problems or to document extremely good practices.

Survey 4

IPM IN CCC VISITATION AREAS OF INTEREST: Checksheet

Kitchens and Cafeterias

 Cracks and crevices in walls, moldings and floors are sealed. Y ___ N ___ (# of cracks?)
If No, please explain: _________________________________

 Openings around electrical conduits, pipe chases, and ducts are sealed. Y ___ N ___ (# of openings)
If No, please explain: ______________________________

 Plumbing kept in good repair (no dripping pipes, faucets, or plugged drains) Y ___ N ___
If No, please explain: _____________________________

 All surfaces in food preparation and serving areas are regularly cleaned and there is no standing water. (inc. floors) Y ___ N___ If No, please explain:__________________

 Food waste from preparation and serving areas is stored in sealed, leak-proof plastic bags before removal from school grounds. Y ___ N___ If No, please explain: ___________________

 Weather stripping and door sweeps present and in good condition on exterior doors. Y ___N___
If No, please explain: ___________________________________

Storage Areas

 How quickly are food products delivered in non-pest-proof containers (e.g., paper, boxes) –stored, refrigerated or transferred to pest-proof containers indoors:
Immediately ___ Within 24 hours ___ More than 24 hours ___

 Is indoor packing and shipping trash (bags, boxes, pallets) promptly and properly disposed of or recycled by the end of the day? Y ___ N___ If No, please explain: _______________________

 Bulk stored products are not allowed direct contact with walls or floors, allowing access for inspection and reducing pest harborages.
If the stored products are on the floor or close to wall, please explain: __________________

 Inspection aisles (> 6" x 6") are maintained around bulk stored products. Y ___ N___ If No, explain: _

 Paper products and foods are stored separately. Y ___ N___ If No, please explain: __

Custodial and Maintenance

 Are cleaning and disinfecting products stored in areas that are inaccessible to children? Y __N__
If No, please explain: ____________________

 Mops and mop buckets are properly dried and stored. Y ___ N___ If No, please explain: ___

 Are indoor trash/recycling rooms regularly inspected and spills cleaned up and leaks repaired promptly. Y ___N___ If No, please explain: __________________________

 Indoor garbage is kept in lined, covered containers and emptied daily. Y ___ N___ If No, explain: __

 Is stored waste collected and moved off site at least once weekly. Y ___ N___ If No, explain:

 Are recyclables rinsed or stored in pest-proof containers and moved off site weekly? Y ___ N___
If no, how often? ______________

 Moisture sources are corrected (e.g., ventilate areas where condensation forms frequently, repair plumbing, roof leaks, dripping air conditioners). Y ___ N___ If No, please explain: ________

Restrooms

 Rooms cleaned and trash removed daily. Y ___ N___ If No, please explain: ____________

 Cracks and crevices in walls and floors sealed. Y ___ N___ If No, please explain: ______

 Plumbing in good repair (no leaks, drips, clogged drains). Y ___ N___ If No, please explain:

Classrooms, Offices and Hallways, Teachers Rooms, Nap Areas, Nurseries

 Cracks & crevices in walls and floors are sealed. Y ___ N___ (# of cracks?)
If No, please explain: _______________

 Cubbies and child storage emptied and cleaned at least once per season? Y ___ N___
If No, how often? _______________________

 Sufficient space between coat hooks provided so that each child's hat and coat do not touch those of another child to prevent spreading of head lice and **bed bugs.** Y ___ N___ **If** No, please explain:

 Floors cleaned regularly (**after every meal) Y** ___ N___ If No, please explain: _______

 Beverage and food containers kept for recycling are washed before sealed in pest-proof container and moved off-site regularly. Y ___ N___ If No, please explain: _________________

 Food or food wrappers are removed from Cubbies, desks, teachers' rooms daily Y ___ N___
If No, please explain: _______________

 Refrigerators, microwave ovens, and vending machines are maintained and clean - inside and out. Y ___ N___ If No, please explain: _______________________

 Sink areas kept clean and dry (at end of day) Y ___ N___ If No, please explain: ________

 Food and beverages are allowed only in limited designated areas that are cleaned daily. Y __N__
If No, please explain where? __________________

 Waste materials in all rooms within the school building are collected and removed to a dumpster, compactor or designated pickup location daily. Y ___ N___ If No, please explain: _______

 Is the room where children learn and play organized and are toys, books, supplies put in plastic bins and/or stored properly? Y ___ N___ If No, please explain: ________________

Playground/ Outdoors areas

 Tree limbs at least 6 ft away from building Y ___ N___ If No, please explain: _______

 Vegetation, shrubs, and bark mulch kept at least 12 inches from building. Y ___ N___
If No, please explain: _____________________

 Exterior doors kept shut when not in use. Y ___N___ If No, please explain: _____________

 Windows and vents screened or filtered and screens are in good condition. Y ___ N___
If No, please explain: ______________________
 Weather stripping and door sweeps present and in good condition on exterior doors. Y __N__
If No, please explain: _________________________________
 Building eaves, walls, gutters and roofs are sound. No evidence of water leaks or holes. Y ___ N___ If No, please explain: ______________________________
 Cracks in foundation or walls, and openings around conduit, plumbing, and doorways are sealed.
Y ___ N___ (# of cracks?) If No, please explain: __________________________
 Garbage containers, compactors, and garbage storage are placed away from building entrances.
Y ___ N___ If No, please explain where? __________________________________
 Dumpsters have close-fitting lids and are kept closed. Y ___ N___ If No, please explain:
 Dumpsters are emptied weekly and cleaned regularly Y ___ N___
If No, please explain: ________________ If Yes, how often? __________________________
 No evidence of standing water on/in play structures, toys, ground or infrastructure. Y ___N___
If No, please explain: _______________________________
 Garbage containers/dumpster areas outside are clean and void of debris and trash. Y ___N___
If No, please explain: ______________________________
Are there any visible signs of standing water around the neighboring properties? Y___ N___
If yes, explain potential problems: ______________________________

* This pest management plan is a framework through which pest management is defined and accomplished on the installation. The plan identifies elements of the program to include health and environmental safety, pest identification, and pest management, as well as pesticide storage, transportation, use and disposal. This plan is to be used as a tool to reduce reliance on pesticides, to enhance environmental protection, and to maximize the use of integrated pest management techniques.

Survey 5

Classroom Presentations and Webinar Survey:

Implied Consent: Would you please participate in a study of Integrated Pest Management (IPM) Communications? If you decide to participate, please complete this survey. Your completion of the survey indicates your consent. It will take about three minutes. Your decision whether or not to answer the questions is entirely up to you and you are free to stop at any time or to skip questions. You will not be personally linked to any presentations or data collected. Your consent also indicates that you are at least 18 years of age. Please feel free to ask me questions regarding this study. (anderson.marcia@epa.gov)

Assessment Metrics:

To determine how to measure the effectiveness of the delivery venue.

Questions to assess general demographics for all webinars and presentations.

1. Your government / trade affiliation
   a. Federal Gov
   b. State or Local Gov
   c. Non-Gov Org.
   d. Education
   e. Other

2. Organization:
   a. School / Child Care administrator
   b. IPM Trainer/ Oversight
   c. Government Official
   d. Public Health Official
   e. other

Questions to assess distance to calculate travel miles saved and carbon saved.

3. In what city and state are you located for this webinar training? (Webinar only)
   _______ State _____________ city

4. How many **other** people are in the room with you for this webinar? (Webinar only)
   a. 1
   b. 2
   c. 3 to 4
   d. 5 or more
   e. none, just me

(For presentations substitute: How many miles did you travel for this presentation? _______)

Questions to assess training preferences & additional numbers served due to venue.

5. I prefer receiving my training / instruction from:
   a) webinars,
   b) websites,
   c) printed materials,
   d) Classroom / workshop.

6. If I had to physically travel to New York, N.Y.:
   a) I would still attend the training.
   b) I would not be able to attend the training.

Questions to determine general content and delivery effectiveness.

7. Did this presentation explain vulnerability of children to pesticides? ☐ yes ☐ no ☐ n/a

8. Did you leave the webinar/presentation with greater knowledge of (Bed bug)/ IPM? ☐ yes ☐ no ☐n/a
9. Would you recommend this course to others? ☐Yes ☐no

Question to measure reach of presentation to vulnerable populations.

(Poll question identified specific to School and CCC administrators)

10. Approx. how many students are you responsible for? _________

Questions to determine understanding and efficacy of presentation.

11. What is your definition of IPM (Bed Bug IPM) as it relates to your facility? ________
12. List 2 important things that you learned from this webinar:
    a. __ b. __

Questions for understanding & efficacy of school/ CCC bed bug presentation.

1. What should you do first if you think you see a bed bug?
    a. Close school for the rest of the day.
    b. Call a Pest Control Company immediately.
    c. Capture it for proper identification.
    d. Send letters to parents advising them of a bed bug sighting.
    e. Kill it and forget it, because it is only one.
2. How can schools be bed bug proactive?
    a. Have a bed bug plan of action and educate everyone.
    b. Remove upholstered furniture.
    c. Place seasonal materials in clear bins.
    d. Develop policies and staff procedures for your school.
    e. All of the above.
3. Which of the following common bed bug myths is true?
    a. Adults can live longer than 6 months without feeding.
    b. You only get bedbugs if you are dirty.
    c. Bed bugs are active only at night.
    d. You can’t see bed bugs with the naked eye.
    e. Pesticide applications alone will easily eliminate bed bugs.
4. What is not a school bed bug hot spot?
    a. Closets and lockers for coats, and backpacks.
    b. Cafeteria food storage closets.
    c. Faculty lounge, office area or nurses office with cots.
    d. Classrooms with upholstered furniture.
    e. Schools with child care facilities or dormitories.
5. Good bed bug prevention steps in school include all except?
    a. Educate staff about bed bugs and school IPM.
    b. Inspect often, vacuum regularly and reduce clutter.
    c. Apply pesticide "preventive treatments" in schools.
    d. Reduce items brought back and forth from school.
    e. Have the school consider buying a drier.

6. Who is responsible for reporting bed bugs in your school?
    a. The principal and teachers
    b. Maintenance/ custodial staff
    c. Students
    d. IPM Coordinator
    e. Everyone is
7. Which is NOT a step to follow in School Bed Bug IPM?
    a. Conduct an inspection to identify extent of incident
    b. Apply pesticides to prevent bed bugs
    c. Keep log book of sightings and activities
    d. Capture and identify the bug
    e. Contact the school nurse and IPM Coordinator

Questions for understanding and efficacy of SIPM related presentation. (Non-bed bug)

1. Who is responsible for reporting pests in your school?
    a. The principal and teachers
    b. Maintenance/ custodial staff
    c. Students
    d. IPM Coordinator
    e. Everyone is
2. Which is NOT a step to follow in IPM?
    a) Develop pest thresholds
    b) Apply pesticides to prevent future pest issues
    c) Conduct an inspection to identify issues
    d) Starve them out – remove food and water sources
    e) Keep log book of sightings and activities
3. Which are not low – toxic pesticides?
    a) Glue boards
    b) Bait stations
    c) Baited traps
    d) Mosquito sprays
    e) Gels
4. Why use IPM
    a) Save money – will need less pesticides and fewer visits
    b) More effective – addresses root cause of pest problems
    c) Safer – prevents unnecessary pesticide exposure
    d) Easy –just change a few habits
    e) All of the above
5. Which is not an effective way to keep pests out?
    a) Fill gaps around pipes and holes around foundations
    b) Post a security guard at the entrance of your facility
    c) Ensure that window frames and screens are intact
    d) Ensure doors have sweeps and are kept closed, no propping
    e) Plug water leaks, holes in and gaps around pipes

Exit Poll questions for School & CCC administrators to gauge current practices/ opinions of the audience. (Measures future training needs in a particular region.)

1. What is your honest opinion of using IPM in your facility?
    a) We currently use IPM in our child care facility.
    b) We use IPM, but did not realize that's what it was called.
    c) Our Pest Control Company does not use IPM.
    d) After viewing this presentation, we will implement IPM.

e) We believe in preventative pesticide applications to deter pests.

2. Which pesticide application records do you maintain?
   a) Log of pest sightings
   b) Pest Control company visit receipts
   c) Pesticide application log sheets
   d) We maintain all of above (A, B & C)
   e) We do not need to maintain records, as we do not apply any pesticides.
3. How often does your Pest Control Co. service your School?
   a) As needed, when called
   b) Monthly
   c) Every other month
   d) Twice per month or more
   e) Seasonally (2-4x per) year
4. How are pesticides applied in your school building?
   a. Only low impact baits, gels or traps
   b. Monitors only
   c. Pesticides are often sprayed
   d. A combination of B & C
   e. No pesticides are applied

Questions to measure efficacy for other BB Webinars and presentations)

1. What should you do first if you think you see a bed bug?
   a. Evacuate the facility.
   b. Call a Pest Control Company immediately.
   c. Capture it for proper identification.
   d. Inspect the area where the bed bug was sighted.
   e. Kill it and forget it, because it is only one.

2. Which of the following common bed bug myths is true?
   a. Adults can live longer than 6 months without feeding.
   b. You only get bedbugs if you are dirty.
   c. Bed bugs are active only at night.
   d. You can't see bed bugs with the naked eye.
   e. Pesticide applications alone will easily eliminate bed bugs.

3. How can your facility be bed bug proactive?
   a. Have a bed bug plan of action and educate everyone.
   b. Remove upholstered furniture.
   c. Place seasonal materials in clear bins.
   d. Develop policies and staff procedures for your facility.
   e. All of the above.
4. Why use IPM
   a. Save money – will need less pesticides and fewer visits
   b. More effective – addresses root cause of pest problems
   c. Safer – prevents unnecessary pesticide exposure
   d. Easy –just change a few habits
   e. All of the above
5. Which is not an effective way to keep pests out?
   a. Fill gaps around pipes and holes around foundations
   b. Post a security guard at the entrance of your facility
   c. Ensure that window frames and screens are intact
   d. Ensure doors have sweeps and are kept closed, no propping

e. Plug water leaks, holes in and gaps around pipes

6. What is Bed Bug IPM?
   a. Controlling pests with pesticides first ______
   b. Controlling pests with only pesticides ______
   c. Controlling pests with no pesticides ______
   d. Using a combination of non-chemical strategies such as maintenance & sanitation, followed by pesticides, if other methods are not as effective as desired. _______

7. In your facility, who is responsible for reporting and controlling bed bugs?
   a. Owners ______
   b. Maintenance / custodial staff _______
   c. Building managers / landlords _____
   d. Residents / Renters ______
   e. Everyone is ______

8. What are the most likely ways that BB spread? (Check all that apply)
   a. Jumped up from Rover & Fluffy? _____
   b. From used furniture picked up on the street ______
   c. Sitting on infested furniture _______
   d. Through international travel _______
   e. In packages through the mail ______

Survey 6

A new set of metrics to be used in the next pilot project was developed through the summer and fall of 2013.

1. **Essential base data to be collected:**
    a. Primary: State, City, School, contacts & e-mails, number of students
    b. Secondary: Number of staff, faculty, custodial, square footage,
    c. **Number of students** positively impacted by School IPM Program. **Note**: Record the change from beginning (baseline) of project to outcome: The number of students attending K-12 public schools and the number of school districts (SDs) in the state and how many children are in the SDs.
    d. **School Attendance/absenteeism**. Working with the school nurses in the SDs and staff, we can try and make the correlation that school absences decrease with IPM programs in place.
2. **Final measureable outcomes/ Metrics for the Pilot**
    a) **Pest Complaints -** Assumption: school will record pest sightings by staff in school by pests' logs. Over time, these numbers will be reduced. The metric will be reduction in pest complaints. No ongoing, unresolved pest problems. Number of pests complaints before and after implementation. Will include maintenance of records for pest monitoring and complaints.
    b) **Pesticide applications.** Number of applications before SIPM v/s number of applications after SIPM implementation. This will include application record keeping. The school will record baseline amount of pesticide applications (usually done monthly) and at the end of the project, report the new number. The metric will be reduction in pesticide applications. Includes pesticide application recordkeeping.
    c) **Pest Management Costs**. Cost before SIMP v/s cost after SIPM implementation. May include costs for door sweeps, copper mesh, monitors, etc. Improvements in sanitation and maintenance standards: **Before and after implementation.** The school will be provided with parameters' on how to collect this data. There will be numbers collected as baseline for pest management services and costs for pest exclusion (door sweeps, screen repairs, windows, sealing openings). With clear guidance of data to collect, costs benefits can be shown by the costs of reducing pesticide applications (product used).
    d) **Change in working knowledge** of policy, action thresholds, pest SOPs and changes in perception and understanding of the objective risks associated with pests and pest management practices. Measured via pre and posttests at training sessions. Training for PMPs, food service workers, sanitation (custodians/assistants), facility managers
    e) Adoption of an IPM District policy and plan.
    f) Designation of a trained IPM coordinator for the school district.
    g) Does the school comply with all state and federal pest management and pesticide use regulations?

MSU IRB obtained to collect data through surveys

MSU IRB was approved June 2013.Partial answers to IRB application.

A. **Specific Aims.** The research is intended to test effective ways of communicating about Integrated Pest Management (including pesticide safety) to a number of different target audiences. The research will compare webinars with on-site, in-person traditional communication venues. The study will test three communication venues for IPM instruction and will evaluate them via a series of evaluations administered at the end of each presentation. The research goal is to answer whether or not IPM educational webinars are an effective alternative /supplement to both in-person classroom workshops and interpersonal IPM visit trainings, educationally, financially and environmentally.
B. **Recruitment Processes.** Invitations are to be sent out via E-mail for webinars and class presentation organizers. Invitations are to be also posted on separate provider websites.(i.e. NY & NJ health care provider websites , NJ and NY City Dept. of Education websites.) One on one presentations are to be requested to school/ child care administrators via phone call scheduling. There is a vetting process for speaking engagements at most state, county and educational institutions at which I am asked to be a guest lecturer on IPM and Bed bug IPM. The surveys are simple course evaluation forms.
C. **Methods.** All data will be entered first into Excel spread sheets for initial comparisons. Data for each of the three communication venues will be evaluated via questions, pertinent to each specific topic in order to measure the effectiveness of each communication venue.
The study analysis will include an evaluation of multiple criteria for each of the Integrated Pest Management (IPM) communication case study venues. The data coming from the studies will be analyzed across multiple dimensions: 1.) efficacy of the message, 2.) financial cost of venue and volume (per capita), 3.) Environmental costs – carbon footprint (Location).
D. **Precautions Taken.** In the classroom /lecture hall – participants are not to be providing any personal information. No names or contact information are to be collected on the end of presentation evaluation Course registration and attendance paperwork will be kept separate from surveys. Classroom sessions are to be located in federal, state, or county public facilities or convention sites. Classroom workshops use only paper evaluations which are later to be kept in a secure location in a locked and guarded government facility.
In the webinar format, all registration information, such as name and e-mail are to be separated from the course evaluation and survey portion questions upon receipt of electronic data sheet. All data is to be kept as confidential in a secure location on a secure computer locked in a secure government facility.
E. **Potential benefits**. Potential benefits are the use and expansion of the webinar venue as a viable way to educate administrators about the benefits of Implementing Integrated Pest Management (IPM). Immediate benefit is that each

participant in the free workshop, webinar or interpersonal visit, will learn the benefits of IPM which may potentially prevent exposure to pesticides and may lead to considerable savings in pest management cost to facility administrators. Another benefit is the ability for participants to request additional information on IPM or bed bugs if they indicate so on their surveys.

F. **Steps Taken to Maximize Benefit**. To encourage the use of more webinars in training, as funding for in-person government educational programs is shrinking. For some classroom type presentations, ie: health care providers may have state and county officials will be in attendance to register them, for gaining (Continuing Education Credits) CEUs from state or county providers. Then participant survey data will be collected at the end of the presentation. A consent question is to be provided for participants on the beginning of these sheets.

Appendix C

Presentation and Visit Data Tables

Table 1. SIPM and BB IPM Webinar Attendance

Webinar	Date	Attendance: (computers)	Attendance ex: (actual)	Number of Children represented	Number of Schools represented
BB1 Legal (IPM)	5/25/2011	159	189	na	na
BB2 Prevention	10/20/2011	70	117	na	na
IPM CCC	4/24/2012	490	608	455566	260
IPM CCC	5/15/2013	456	618	453542	347
BB (IPM)	6/18/2012	701	1065	1070526	204
SIPM Out * Field	8/28/2012	134	165	1615693	88
BB to School (IPM)	9/4/2012	57	103	378607	63
SIPM	9/4&5/2012	147	147	208448	96
BB Health Depts	4/10/2013	520	871	1012316	132
BB to School	1/30/2013	189	278	773690	148
SIPM	1/23/2013	103	197	541706	110
BB SIPM	3/1/2012	496	866	na	227
		3335	4918	6510094	1685

Table 1. Supplement - SIPM Workshop Children represented

SI CCC project visits	2010			3307	45
Nurse Workshop	2013			25663	48
SIPM School visits	2012-3			na	64

Table 2a. SIPM Travel and Carbon Savings Data

travel distances via: Travel math.com * see carbon calculation formula

Webinar Category and Date	Total computers attended	Total actually attended	Number in Region 2	No of people w/in 100 mi	local miles - w/in 100 mi	local miles – two way	lbs CO2 local*	Local people mass transit (20 & u mi)	Local mass transit (20 & under mi.)	Number of people outside 100 miles
SIPM 1/23/2013	103	197	96	69	1731	3462	3225	24	272	128
SIPM 9/4&5 /2012	147	147	98	78	3249	6498	6054	18	221	69
BB2S 1/30/2103	189	278	87	49	3002	6004	5593	19	219	229
BB2S 6/18/2012	701	1065	442	195	10351	20702	19286	65	837	870
BB 10/20/2011	70	114	63	19	135	270	251.5	14	35	98
BB 4/10/2013	520	871	235	99	3317	6634	6180	25	95	758
BB 9/4/2012	57	82	9	15	1047	2094	1951	0	0	88
BB2S 8/28/2012	134	165	39	24	665	1330	1239	6	69	141
BB 5/25/2011	159	189	21	20	553	1106	1030	10	21	139
IPM CCC 4/24/2012	490	618	48	49	2840	5680	5292	11	51	559
BB2S 3/1/2012	496	866	257	277	7011	14022	13063	78	863	588
CCC IPM 5/15/2013	456	624	104	56	2602	5204	4848	15	114	543
		5216	1499	950	36503	73006	68014	285	2797	4210

Table 2b. SIPM Travel and Carbon Savings Data

via: Travel math.com * see carbon calculation formulia

Webinar Category and Date	combined miles total	air miles	2-way air miles	Lbs CO2 from air*	Combined CO2 (local + air)	CO2 metric tons
SIPM 1/23/2013	168597	7070.712	14141.42	6844.449	6919.166	3.137944
SIPM 9/4&5 /2012	101839	6403.88	12807.76	6198.956	6244.982	2.832192
BB2S 1/30/2103	225184	10111.82	20223.65	9788.246	9888.321	4.484499
BB2S 6/18/2012	664108	31271.22	62542.45	30270.54	30566.29	13.86226
BB 10/20/2011	93301	3116.312	6232.624	3016.59	3057.604	1.386669
BB 4/10/2013	685145	25135.5	50270.99	24331.16	24633.29	11.17156
BB 9/4/2012	71720	3308.536	6617.072	3202.663	3234.573	1.466927
BB2S 8/28/2012	155047	5605.224	11210.45	5425.857	5494.193	2.491697
BB 5/25/2011	165607	5834.728	11669.46	5648.017	5720.943	2.594532
IPM CCC 4/24/2012	633529	23022.05	46044.1	22285.34	22564.62	10.23339
BB2S 3/1/2012	479565	22132.73	44265.46	21424.48	21637.86	9.813087
CCC IPM 5/15/2013	587330	21313.3	42626.59	20631.27	20890.17	9.473998
	4030972	164326	328652	159067.6	160852	72.94875

Carbon Calculation Formula

To calculate air travel emissions:. Total Revenue Passenger miles flown per year [U.S. Department of Transportation, Bureau of Transportation Statistics; TranStats, Air Carrier Summary: Schedule T-1] divided by total jet fuel consumed per year [U.S. Department of Transportation, Bureau of Transportation Statistics, "Airline Fuel Cost and Consumption"], resulting in 43.13 Passenger miles flown per gallon of jet fuel. This figure is divided into the 23.88 pounds of carbon dioxide produced per gallon of jet fuel used [U.S. Department of Transportation, Bureau of Transportation Statistics, "Airline Fuel Cost and Consumption"], yielding 0.484 pounds of carbon dioxide per Passenger mile flown. The number of miles actually flown (inputted) is multiplied by this figure, and to calculate metric tons, the product is divided by 2,205. Calculation used an RFI of 2.7; The IPCC calculated in 1999 that the average for full radiative forcing to be a factor of approximately 2.7, therefore to estimate the impact of an airplane trip a multiplier should notionally be used on the CO_2 emissions from jet fuel to account for full radiative forcing. IPCC (1999) Aviation and the Global Atmosphere: 6.2.3. Alternative Indexing of Aviation's Climate Impact-RF Index (online) at
http://www.grida.no/Climate/ipcc/aviation/index.htm
To estimate auto emissions, the calculator divides the average number of miles driven by the estimated fuel efficiency (21 mpg) of the average American vehicle. This amount is multiplied by 19.564 [U.S. Department of Energy and the Energy Information Administration, Instructions for Form EIA 1605B, Voluntary Reporting of Greenhouse Gas Emissions] the amount of pounds of carbon dioxide that is emitted as a result of burning one gallon of gasoline.
To calculate metric tons, this number is divided by 2,205.

Table 2c. Instructor Workshop carbon

Workshops Location	mileage	2-way travel
Bronx, NYC	35	70
Manhattan, NYC	35	70
Scotch Plains, NJ	13	26
Edison, NJ	0	0
Princeton, NJ	22	44
Manhattan, NYC	35	70
Trenton, NJ	38	76
Livingston, NJ	25	50
Edison, NJ	0	0
Mountainside, NJ	15	30
Piscataway, NJ	9	18
Sommerville, NJ	18	36
Clark, NJ	15	30
Trenton, NJ	38	76
Westampton, NJ	51	102
Syracuse, NY	247	494
Unoin, NJ	15	30

total miles	1222
lbs carbon	1138

Table 2d. Workshop Sample attendee carbon

School Nurse Workshop 2013	state	number attendees	miles	miles x attendees	2-way travel
Berkley Hts	NJ	1	12.5	12.5	25
Clark	NJ	2	2	4	8
Cranford	NJ	4	3.6	14.4	28.8
East Orange	NJ	1	12.6	12.6	25.2
Elizabeth	NJ	4	8.4	33.6	67.2
Hackensack	NJ	1	26	26	52
Hillside	NJ	2	12.5	25	50
Irvington	NJ	1	25	25	50
Jersey City	NJ	1	25	25	50
Kenilworth	NJ	1	6	6	12
Linden	NJ		8.4	0	0
Linden	NJ	4	8.4	33.6	67.2
Maplewood	NJ	1	9.6	9.6	19.2
Mountainside	NJ	1	6.2	6.2	12.4
New Providence	NJ	1	18	18	36
Plainfield	NJ	3	6	18	36
Rahway	NJ		6	0	0
Rahway	NJ	2	6	12	24
Roselle	NJ	3	7.8	23.4	46.8
Roselle Park	NJ	3	8	24	48
Scotch Plains	NJ	6	3.6	21.6	43.2
Springfield	NJ	3	6	18	36
Union	NJ	3	12	36	72
Westfield	NJ	7	3.6	25.2	50.4
total miles	859.4				
lbs carbon	800.6				

Table 2e. Interpersonal Instructor Travel Carbon

interpersonal visits	number of centers	estimated mileage	centers x mileage*
Si CCC Project Phase 1	45	18	810
Si CCC Project Phase 2	38	18	684
School IPM Newark	26	13	338
School IPM Jersey City	6	22	132
School IPM Bronx NYC	6	35	210
School IPM Staten Is. NYC	1	18	18
School IPM New Brunswick	3	6	18
School IPM Bernardsville	3	25	75
School IPM Scotch Plains/Fan.	4	13	52
School IPM Ft. Covington	3	345	1035
School IPM Locust Valley	3	40	120
School IPM Mohawk Tribe	1	341	341
School IPM USVI	1	1676	1676
total	5509		
lbs carbon	5126		

* 2 centers or schools/day negates two way travel calculation

Table 3a. Training Venue Preference - Webinar attendees

Webinars	SIPM: 1/23/2013	SIPM: 9/4&5/2012	BB2S: 1/30/2013	BB2S: 6/18/2012	BB2S: 3/1/2012	BB: 10/20/2011	BB2S: 1/30/2103	BB: 9/4/2012	BB 2S: 8/28/2012	totals	% of total responded
Total computers Registered	159	147	189	701	496	70	189	82	134		
Total actually attended	189	147	278	1065	866	117	278	103	165	3208	
I prefer receiving my training / instruction from:	146	64	173	702	749	97	194	82	245	2452	
Webinars	99	54	118	504	570	21	136	52	161	1715	69.9
Websites	8	1	18	41		21	21	9	20	139	5.67
Classroom / workshop sessions	30	7	18	94	130	21	18	8	37	363	14.8
Printed materials	9	2	19	63	49	34	19	13	27	235	9.58
Blank	13	0	20							33	

Table 3b. Training Venue Preference - Workshop att.

Workshops	3/7/2011	3/10/2011	7/26/2011	6/22/2011	10/6/2011	10/15/2011	2/24/2011	6/5/2012	8/15/2013	8/14/2012	9/5/2013	4/22/2013*	8/25/2012*	totals	% of total
Attendees	42	52	60	50	46	36	30	64	26	79	55	70	35	645	
Venue preference	36	37	0	0	0	0	20	50	31	30	53	88	72	417	
Webinar	0	19	0	0	0	0	0	3	5	0	2	11	6	46	11.0
Website	0	6	0	0	0	0	0	6	0	0	8	6	13	39	9.3
Classroom / workshop sessions	36	8	0	0	0	0	20	35	26	20	29	51	28	253	60.7
Print material	0	4	0	0	0	0	2	6	0	10	14	20	25	81	19.4
blank															

- Attendees gave multiple answers

Table 4a. Preference / Ability to Travel

Webinars	SIPM 1/23/2013	SIPM 9/4&5/2012	BB2S 1/30/2013	BB2S 6/18/2012	BB2S 3/1/2012	BB 10/20/2011	BB 9/4/2012	BB 2S 8/28/2012	BB 4/10/2013	totals
Total computers Registered	103	147	120	702	496	70	57	135	452	2282
Total actually attended	160	147	281	1082	865	114	103	245	920	3917
If I had to physically travel to NYC/Edison (# answering question)	160	134	194	702	749	17	82	245		2283
I would not be able to attend the training	117	112	162	633	671	13	80	223		2011
% unable to travel	73.1	83.6	83.5	90.2	89.6	76.5	97.6	91.0		85.6%
I would still attend the training	24	22	14	69	78	4	2	22		235
Blank	18		17							35
% answering Q	100	91.2	69.0	64.9	86.6	14.9	79.6	100		

Table 4b. Recommend course.

	SIPM 9/4/2012	SIPM 9/5/2012	BB2S 1/30/2013	BB2S 6/18/2012	BB 3/1/2012	BB 4/1/1013	BB 10/20/2011	totals	%
Would you recommend this course to others?	36	33	12 1	303	268	383	18	1162	
Blank	21	42	48			196	0	307	
No	0	0	1	21	3	1	2	28	
Yes	15	33	71	262	265	377	15	1038	89.3
n/a	0	0	0	20	0	3	1	24	

Table 5a. Webinar Attendee Demographics

Webinar	Date	Attendance	# Feds	# State	# Local	County	Edu	tribe	school admin/CCC	Other	Health Depts.*	Custod. staff	school nurse	% attendees target audience reached
BB1 Legal	5/25/2011	189	104	32	10	0	5	9	0	29	0	0	0	84.65
BB2 Prevention	10/20/2011	117	32	58	8	0	1	1	0	17	*	0	0	57.26
BB Health Care	3/1/2012	866	51	84	134	249	21	9	0	198	120	0	0	71.25
IPM in CCC	4/24/2012	608	54	94	30	47	10	8	260	87	0	8	10	76.81
BB to School	9/4/2012	82	5	0	0	1	7	0	61	8	0	0	*	82.93
BB	6/18/2012	1065	20	120	142	82	0	0	185	365	151	*	0	63.85
O&F SIPM	8/28/2012	165	31	0	1	44	19	3	42	65	0	0	0	65.45
SIPM*	9/465/2012	147	11	3	0	13	2	6	62	2	0	18	30	87.75
BB Health Depts	4/10/2013	871	35	153	233	252	28	6	164	0	*	0	*	95.98
BB to School*	1/30/2013	189	31	24	0	0	15	5	45	13	0	17	39	76.72
SIPM	1/23/2013	197	21	0	0	0	6	3	58	54	0	17	38	58.88
IPM in CCC	5/15/2013	618	19	53	0	25	25	0	332	152	*	*	12	72.33
														74.5

*=listed under another category

Note: Participants not accounted for in chart did not clearly identify affiliation.
Highlighted boxes were preferred target audiences

* Health Dept included in other categories such as fed, state and county

** Some attendees are noted in multiple boxes

*** Participants indicated both education and other school category

Table 5b. Workshop Demographics

% target	Shelter	Other /NGO	Nurse Hlth C	Edu	Sch/CC C Adm.	Local Govt	County Gov t	State Govt	Federal Govt	Custod .Staff	Total	Workshop dates
100	0	0	0	42	5	0	0	0	0	0	42	3/7/2011
100	0	0	0	0	0	25	0	0	27	0	52	3/10/2011
100	21	11	0	0	0	0	0	0	21	0	32	4/26/2011**
100	14	0	40	0	0	0	4	0	2	0	60	7/26/2011**
96	0	48	0	0	0	0	0	2	0	0	50	6/22/2011
100	0	0	0	0	0	6	0	0	40	0	46	10/6/2011
86	0	31	0	0	0	5	0	0	0	0	36	10/15/2011
93	0	0	0	1	0	11	17	0	1	0	30	2/24/2011
89	12	2	45	0	0	4	2	0	1	0	64	6/5/2012
92	0	0	2	24	2	0	0	0	0	0	26	8/15/2013
89	22	2	48	0	0	1	7	0	0	0	79	8/14/2012
91	6	3	44	0	0	0	0	0	2	0	55	9/5/2013
91	0	0	64	0	0	2	2	0	0	0	70	4/22/2013
89	0	31	0	2	0	2	0	0		0	35	8/25/2012
88	0	0	35	0	0	0	5	0	0	0	40	11/29/2012
96	0	0	0	0	0	0	72	3	0	0	75	12/18/2012
100	0	0	45	0	0	0	0	0	0	0	45	3/6/2013
100	0	0	0	0	45	0	0	0	0	45	90+	SI CCC 2010*
94%												

Table 6. Workshop Attendance and Location (School & BB IPM)

Category	Location Name	Date	Address	St.	Atten.	Survey	miles
School	PS/IS 210 21st Cent Academy	2011 .3.7	501 W 152nd St; NYC	NY	42	36	35
Lawyers & EPA	R2 EPA Lawyers Class	2011 .3.10	290 Broadway; NYC	NY	52	21	35
Seniors	SP/F Historic Society	2011 .4.26	Scotch Hills, C Club	NJ	32	16	13
EPA & Industry	EPA Edison & Locheed Martin	2011 .7.26	2890 Woodbrdg, Edison	NJ	60	0	0
Industry	Indoor Air Quality Assoc	2011;6.22	Princeton, NJ	NJ	50	13	22
EPA & Industry	EPA	2011;10.6	290 Broadway, NYC	NY	46	13	35
Trenton - Comm	Latin American Legal Defense Fund	2011;10.15	601 Hamilton A, Trenton	NJ	36	0	38
Essex Co. Public Health Officers	Essex Co Public Health Training	2012;2.24	Livingston, NJ	NJ	30	28	25
Middlesex, Union, Monmouth, Health O	EPA Edison	2012;6.5	2890 Woodbrdge Ave Edison	NJ	64	46	0
Seniors	Mt. St Mary Academy	2013;8.15	Rt.22W, Mountainside, NJ	NJ	26	26	15
Shelter / Soc. Services (UBHC)	UMDNJ	2012;8.14	Rt. 1, Piscataway, NJ	NJ	79	30	9
Health Care	Somerset Co. Health Dept	2013;9.5	Sommerville, NJ	NJ	55	41	18
School Nurses (IPM Q)	Union Co. School Nurses	2013;4.22	Clark, NJ @ X-135	NJ	70	59	15
Trenton - Hispanic Community	Latin American Legal Defense Fund	2012;8.25	St. Francis Hospital, Trenton, NJ	NJ	40	0	38
Burlington Co. Health Depts	Burlington & Atlantic Co Hlth	2012;11.29	Westampton., NJ	NJ	40	0	51
NY State Environ. Health Depts	Env Health Dept Annual Mtg	2012;12.18	Syracuse, NY	NY	75	0	247
Kean Univ.	Dept Earth & Env Studies	2013;3.6	Union, NJ	NJ	45	0	15

49.5 avg

Table 7. SIPM & BB2S pesticide use & comprehension efficacy

	SIPM 1/23/2013	SIPM 9/4&5/1012	BB2S 1/30/2013	BB2S 6/18/2012	BB 4/10/2013	BB 9/4/2012	BB2S 8/28/2012	totals	% correct
Total computers Registered	103	147	189	701	562	57	134		
Total actually attended	136	147	278	1082	871	82	165	2761	
Did this presentation explain the vulnerability of children to pesticides?	64	33	75	343		39		554	
No	1	1	2	29	na	0	na	33	
Yes	61	31	72	287	na	38	na	489	88
n/a	2	1	1	27	na	1	na	32	
How often does your pest control company service your school?		23	63	301		27	50	464	
As needed, when called	Na	7	36	144	na	14	33	234	50
Monthly	Na	10	16	52	na	8	9	95	
Seasonally (2 - 4x per) year	Na	3	8	8	na	3	8	30	
Twice per month or more	Na	2	2	92	na	0	0	96	
Every other Mo.	Na	1	1	5	na	2	0	9	
What pesticide application records are kept at your facility?		24	64	237	192	30	75	622	
We maintain all of the above (A, B, and C)	Na	18	47	92	77	13	30	277	44.5
Pesticide application log sheets	Na	2	1	12	10	6	8	39	
We do not maintain records, as we do not apply any pesticide	Na	1	9	107	82	7	31	237	38
Pest Control receipts	Na	3	7	26	23	4	6	69	
How are pesticides applied in your School building	12	23	35						
Comb of B&C	3	4	7						
No Pesticides	2	3	5						
Low impact only	7	16	23	66					

What is your honest opinion of using IPM in your facility?		24				
Preventative app	Na	2				
Currently use IPM	Na	21	87.5			
Use but did not know	Na	1				
Which pesticide application records do you maintain?		24				
Log	Na	2				
PestControl Co receipts	Na	3				
Do not apply	Na	1				
Maintain all records (ABC)	Na	18	75			
Which is NOT a step to follow in IPM?		4	64		178	
apply pesticides to prevent pests	Na	2	63	na	147	83
Develop Thresholds	Na	1	0	na	0	
Keep Log Book	Na	1	1	na	25	
Reduce clutter/items	Na	0	1	na	0	
capture for ID	Na	0	0	na	2	
inspect &ID	Na	0	0	na	4	
Which are not low toxic pesticides?		31				
Glue Boards	Na	3				
Mosq Spray	Na	28	90.3			
Why use IPM						
Blank	Na	40				
all of above (correct)	Na	35				

Table 8. Bed Bug SIPM Related Webinar Comprehension Efficacy

Webinars	BB2S 1/30/2013	BB2S 6/18/2012	BB2S 3/1/2012	BB 5/25/2011	BB 4/10/2013	BB 9/4/2012	BB2S 8/28/2012	Totals	percentage
Total computers Registered	189	701	496	159	562	57	135		
Total actually attended	278	1082	866	159	871	82	165	3620	
IPM knowledge – definition			124						
greater insight of IPM as it relates to BB?	75		254		371	34		734	
Yes	74		243		352	34		703	95.8
No	0		10		11	0		21	
n/a	1		1		8			10	
greater knowledge of BB control methods?			272		366			638	
Yes	na	na	259	na	349	na	na	608	95.3
No	na	na	13	na	11	na	na	24	
n/a	na	na		na	6	na	na	6	
Did this presentation explain on-the-job bed bug precautions?			322		395			717	
Yes	na	na	309	na	388	na	na	697	97.2
No	na	na	9	na	4	na	na	13	
N/A	na	na	4	na	3	na	na	7	
What should you do if you think you see a BB?	68	324		69	201	53	28	743	
Blank	52	0	na	0	361	82	29	524	
call a pest control company	0	10	na	0	7	1	1	19	
capture for ID	67	306	na	66	191	50	27	707	95.2
close the school	0	1	na	0	0	0	0	1	
kill it & forget it	1	1	na	0	2	2	0	6	
send letter to parent	0	6	na	0	1	0	0	7	
empty the room	0	0	na	3	0	0	0	3	
All are good BB prevention steps in school except?	71	180			202			453	
Blank	51		na	na	360	na	na	411	
Apply prevent treatment	63	159	na	na	152	na	na	374	82.6
Educate staff	0	3	na	na	5	na	na	8	

School to buy a Dryer	7	14	na	na	34	na	na	55	
Vacuum	0	1	na	na	2	na	na	3	
Reduce clutter/items	1	3	na	na	9	na	na	13	
Which of the BB myths is true?	61	179						240	
Blank	59		na	na	na	na	na	59	
Adults survive 6 months	57	154	na	na	na	na	na	211	87.9
BB only active at night	3	10	na	na	na	na	na	13	
Pesticides only way to kill	0	5	na	na	na	na	na	5	
Too small to see	1	6	na	na	na	na	na	7	
BB live in dirty conditions	0	4	na	na	na	na	na	4	
Who is responsible for BB IPM in your school?	69	178		55	202			504	
Blank	51		na	16	360	na	na	427	
Everyone	69	167	na	21	200	na	na	457	90.7
IPM Coordinator/pmp	0	2	na	1	0	na	na	3	
Maintenance	0	6	na	10	0	na	na	16	
Principals	0	3	na	0	1	na	na	4	
Landlord	0	0	na	16	0	na	na	16	
me/ tennant/ patient	0	0	na	7	1	na	na	8	
What is not S BB hot spot?	67	176			72			315	
Blank	53		na	na		na	na	53	
Cafeteria	64	160	na	na	57	na	na	281	89.2
Classrooms	0	2	na	na	12	na	na	14	
closets, lockers	1	4	na	na	1	na	na	6	
faculty lounge	2	8	na	na	2	na	na	12	
CCC & dorms	0	2	na	na		na	na	2	
How can schools be BB Proactive?	69	180			233			482	
Blank			na	na	359	na	na	359	
All of above	63	166	na	na	178	na	na	407	84.4
Develop BB Policy& plan		2	na	na	5	na	na	7	
PP plan of action & edu	6	11	na	na	50	na	na	67	
Remove furniture		1	na	na	0	na	na	1	
Do BBs live only in dirty places?				69				69	
Correct				69				69	100
Incorrect				0					

Table 9. States and Attendees Viewing Webinars

SIPM	SIPM 1/23/2013	SIPM 9/4&5/2012	BB 2S 1/30/2013	BB 2S 6/18/2012	BB 2S 3/1/2012	BB 10/20/2011	BB 5/25/2011	BB 8/28/2012	IPM in CCC 5/15/2013	BB 4/10/2013	IPM CCC 4/24/2012	totals
Total 1	103	147	189	701	496	70	159	134	456	520	490	3465
Total 2	197	147	278	1065	866	117	189	165	618	871	608	5121
AK	0	0	0	6	4	3	2	2	8	0	6	31
AL	0	0	0	7	0	0	0	1	7	0	4	19
AR	0	1	2	2	0	0	2	0	5	0	3	15
AZ	8	2	2	15	0	2	1	4	14	0	17	65
CA	20	0	17	15	7	1	15	2	26	93	25	221
CO	1	2	3	7	4	1	19	1	20	16	19	93
CT	0	0	0	2	0	0	0	2	14	5	8	31
DC	0	1	0	7	1	4	20	0	31	7	21	92
DE	0	0	0	0	0	0	0	0	1	0	0	1
FL	3	0	2	31	3	0	1	3	11	144	16	214
GA	7	1	0	10	5	0	7	0	24	25	6	85
HI	0	0	0	0	2	0	0	0	1	1	1	5
IA	0	0	1	4	0	0	0	1	10	41	9	66
ID	5	1	4	0	1	2	5	0	4	2	0	24
IL	3	2	4	14	7	9	22	8	24	3	72	168
IN	0	1	1	15	9	0	0	16	16	2	11	71
KS	0	0	2	23	71	0	4	2	7	18	3	130
KY	0	0	0	21	2	0	0	1	6	2	2	34
LA	2	1	0	3	0	0	0	1	5	2	9	23
MA	0	0	0	3	1	0	2	1	45	0	19	71
MD	0	0	1	2	3	1	2	1	13	3	8	34
ME	0	1	4	7	9	0	0	0	4	0	5	30
MI	2	0	2	6	0	0	2	1	9	2	8	32
MN	0	2	0	38	10	5	14	25	4	21	6	125
MO	0	0	0	2	0	1	0	3	3	4	6	19
MT	1	0	1	2	2	3	3	3	2	3	3	23
NC	0	0	0	35	11	2	0	3	15	5	27	98
ND	0	1	0	0	0	0	0	0	1	0	2	4
NE	8	0	8	5	11	0	2	2	7	1	13	57
NH	0	0	1	2	0	0	4	0	17	28	18	70

NJ	48	72	36	227	93	15	10	26	35	20	20	602
NM	1	2	8	1	2	0	0	0	7	0	0	21
NV	0	3	0	2	0	0	0	1	1	0	4	11
NY	31	19	22	209	422	43	18	12	80	218	37	1111
OH	0	0	0	145	103	1	8	6	15	17	4	299
OK	0	0	12	2	1	0	2	2	1	0	16	36
OR	0	2	5	7	24	0	6	3	16	15	18	96
PA	3	2	34	64	6	0	3	1	22	9	60	204
PR	1	4	0	0	7	11	0	0	1	0	3	27
RI	0	0	0	2	1	0	0	0	2	0	3	8
SC	0	0	0	6	1	0	0	0	1	0	3	11
SD	1	1	2	0	0	4	1	0	1	0	0	10
TN	0	1	0	8	0	0	0	1	11	11	2	34
TX	4	3	9	13	16	0	4	8	28	1	28	114
UT	0	1	0	3	0	0	0	0	1	0	0	5
VA	0	0	1	15	1	0	0	1	11	142	10	181
US VI	1	0	1	1	0	1	1	0	0	0	0	5
VT	0	0	0	0	0	0	0	0	0	0	5	5
WA	0	15	1	28	19	4	7	7	13	5	26	125
WI	0	1	1	23	0	4	2	12	12	1	3	59
WV	0	0	0	5	1	0	0	0	6	0	12	24
WY	0	0	0	0	2	0	0	0	0	0	3	5
total states	19	25	28	43	36	20	30	33	48	32	48	33 av.
in region	81	95	58	437	522	70	28	38	106	238	60	1733
Internat.	0	0	0	0	2	0	0	0	0	0	0	2
Belgium	0	0	0	1	0	0	0	0	0	0	0	1
Bulgaria	0	1	0	0	0	0	0	0	0	0	0	1
Canada	1	0	1	19	0	0	0	2	3	4	4	34
Total 3	151	143	188	1065	864	117	189	165	618	871	608	4979

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Note: Total 1=computers linked in to webinar
Total 2 = actual # of attendees
Total 3 = Total attendees identified by location

Table 10a. 2010 Staten Island CCC Visit Data

CCC	Apply pesticides regularurly?	Apply pesticides regularurly?	notification 4 pesticide application?	notification 4 pesticide application?
	Phase 1	**Phase 2**	**Phase 1**	**Phase 2**
A-1	yes	as needed	no	No
A-2	as needed	no	no	No
A-3	yes	as needed	no	No
B-1	as needed	unknown	no	Unknown
B-2	yes	as needed	yes	yes
B-3	as needed	no	yes	yes
C-1	yes	as needed	yes	No
C-2	yes	yes	yes	No
C-3	unknown	as needed	unknown	No
C-4	yes	as needed	no	No
C-5	yes	yes	yes	No
C-6	yes	yes	no	No
C-7	yes	as needed	no	No
C-8	yes	as needed	yes	No
E-1	yes	yes	no	No
E-2	yes	as needed	no	No
F-1	yes	as needed	no	No
F-2	yes	yes	no	No
J-1	yes	yes	no	No
J-2	yes	as needed	no	yes
J-3	yes	as needed	no	yes
L-1	yes	yes	no	No
L-2	yes	yes	no	No
P-1	yes	as needed	no	yes
R-1	yes	no	yes	No
S-1	unknown	as needed	no	No
S-2	yes	yes	no	No
S-3	yes	yes	yes	No
S-4	yes	as needed	no	No
S-5	yes	yes	no	No
S-6	yes	as needed	yes	yes
S-7	yes	unknown	yes	No
T-1	yes	no	no	No

T-2	unknown	no	unknown	no
U-1	yes	as needed	no	No
U-2	yes	no	no	No
Y-1	yes	yes	yes	yes
Z-1	as needed	no	yes	No

Table 10a.

CCC	Records	Records	Pest mgmt plan?	A pest mgmt plan in place?	CCCs aware IPM?
	Phase 1	Phase 2	Phase 1	Phase 2	Phase 2
A-1	Yes	yes	no	use PMP	Unknown
A-2	No	no	no	use PMP	yes
A-3	Yes	yes	no	use PMP	yes
B-1	Yes	unknown	no	unknown	unknown
B-2	No	yes	no	use PMP	yes
B-3	No	no	no	no	yes
C-1	Yes	Incomplete	use PMP	use PMP	yes
C-2	Yes	Incomplete	no	use PMP	no
C-3	Unknown	Incomplete	no	use PMP	yes
C-4	Yes	Incomplete	no	no	yes
C-5	Yes	Incomplete	yes	no	yes
C-6	No	yes	no	use PMP	yes
C-7	Yes	yes	use PMP	use PMP	Unknown
C-8	Yes	Incomplete	yes	yes	yes
E-1	Yes	yes	use PMP	no	yes
E-2	Yes	Incomplete	no	use PMP	yes
F-1	Yes	Incomplete	no	use PMP	Unknown
F-2	Yes	Incomplete	no	use PMP	yes
J-1	No	Incomplete	use PMP	use PMP	yes
J-2	Incomplete	yes	no	yes	yes
J-3	Unknown	yes	no	yes	yes
L-1	Incomplete	yes	no	use PMP	yes
L-2	Yes	yes	use PMP	use PMP	yes
P-1	Yes	yes	yes	yes	yes
R-1	Yes	yes	no	yes	yes
S-1	No	Incomplete	no	use PMP	yes
S-2	Yes	yes	use PMP	use PMP	yes
S-3	Yes	yes	use PMP	use PMP	yes
S-4	No	yes	no	use PMP	yes
S-5	No	yes	use PMP	use PMP	no
S-6	Yes	Incomplete	use PMP	use PMP	yes
S-7	Yes	yes	no	use PMP	yes
T-1	Incomplete	Unknown	no	use PMP	yes

T-2	Unknown	no	no	no	yes
U-1	Yes	Incomplete	no	use PMP	yes
U-2	Incomplete	Incomplete	no	use PMP	yes
Y-1	Yes	yes	no	use PMP	yes
Z-1	No	no	no	no	yes

Table 10 b. Summary of results of IPM in CCC visits

(Centers completing both phases)

Regular Application of Pesticides	Phase 1	Phase 3
No	0	7
Yes	31	12
As Needed	4	17
Unknown	3	2
Total	38	38

Parental Notification	Phase 1	Phase 3
None	24	30
Unknown	2	1
Yes	12	7
Total	38	38

Records Maint.	Phase 1	Phase 3
Complete Records (yes)	17	27
Incomplete Records	15	6
No Records	10	1
No Pesticides	3	4
Total	45	38

Pest Mgmt. IPM Plan	Phase 1	Phase 3
Yes	3	5
Use Pest Mgmt Co Plan	9	26
No	26	6
Unknown	0	1
Total	38	38

Table 11. Bed Bug IPM Workshop Comprehension Efficacy Data

	3/7/2011	3/10/2011	4/26/2011	7/26/2011	6/22/2011	10/6/2011	10/15/2011	2/24/2011	6/5/2012	8/15/2013	8/14/2012	9/5/2013	4/22/2013	Totals	
participants	42	52	32	60	50	46	36	30	64	26	79	55	70	642	
IPM definition	0	33	19	8	0	0	0	0	15	37	0	0	24	136	
Do BB only live in dirty conditions?	0	19	14	0	13	13	0	27	40	24	30	41	0	221	
Yes	0	1	0	0	0	0	0	0	2	0	0	0	0	3	
No	0	18	14	0	13	13	0	27	38	24	30	41	0	218	98.6
How do BB spread?	36	25	15	0	2	14	0	23	46	22	17	44	0	244	
pet	0	6	1	0	2	2	0	3	6	0	6	8	0	34	
furniture	36	19	14	0	0	12	0	20	40	22	11	36	0	210	86%
street	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
mail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Who is responsible for BB IPM in your school /facility?	0	25	26	0	0	20	0	40	63	0	40	46	26	286	
workers/staff	0	2	1	0	0	1	0	3	4	0	2	0	0	13	
Everyone	0	11	9	0	0	8	0	18	31	0	18	23	24	142	49.7
Maintenance	0	1	3	0	0	2	0	3	6	0	10	9	2	36	
Principals/ managers	0	6	4	0	0	4	0	7	8	0	6	9	0	44	
landlord	0	4	6	0	0	4	0	5	11	0	2	5	0	37	
resident/ patient	0	1	3	0	0	1	0	4	3	0	2	0	0	14	
greater insight of IPM as it relates to BB?	35	21	10	0	0	0	0	27	44	26	26	41	53	283	
Yes	35	21	10	0	0	0	0	27	44	26	26	41	53	283	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
greater knowledge of BB control methods?	32	21	8	0	0	0	0	28	46	22	28	40	58	283	
Yes	32	21	8	0	0	0	0	28	46	22	28	40	58	283	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Would you recommend this course?	36	21	16	0	0	0	0	26	46	26	30	39	57	297	
Yes	36	21	16	0	0	0	0	26	46	26	30	39	57	297	100
No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Did this presentation clearly explain on-the-job BB precautions?	31	21	0	0	0	0	0	28	46	26	24	42	58	276	
Yes	31	21	0	0	0	0	0	28	46	26	24	41	58	275	99.6
No	0	0	0	0	0	0	0	0	0	0	0	1	0	1	
What should you do if you see a BB?		57	38	0	21	33	0	65	107	45	82	113	84	645	
call a pest control company	0	13	8	0	8	6	0	6	18	10	16	20	0	105	
capture for ID	0	15	7	0	11	11	0	22	39	11	22	34	51	223	34.6
kill it & forget it	0	1	0	0	0	0	0	0	1	2	0	1	0	5	
empty/inspect the room	0	14	12	0	1	9	0	20	22	22	22	27	33	182	
scream	0	1	2	0	1	1	0	0	1	0	2	2	0	10	
call landlord/maintenance	0	13	9	0	0	6	0	17	26	0	20	29	0	120	
What are components to BB IPM?	36	9	7	0	0	13	0	24	39	24	30	37	88	307	
pesticides first?	5	0	0	0	0	0	0	0	0	0	0	2	0	7	
only pesticides	0	0	0	0	0	0	0	0	0	0	0	1	0	1	
no pesticides	2	1	2	0	0	1	0	0	0	0	0	5	33	44	
a combination of practices	29	8	5	0	0	12	0	24	39	24	30	29	55	255	83.1

83.5% avg.

Table 12. School IPM visit data

District Code	NJ City A	NJ City B	NY City A	NJ Town A	NJ Town B	NJ Town C	NY Town A	NY Town B	Tribe	US Territory
# schools in district	71	38	1700	10	3	8	3	3	1	63
# students affected	37,443	27,832	1,2M	7209	1858	5692	1620	1890	109	16000
IPM coordinators	26/26	6/6	7/7	5/5	3/3	4/4	no	3/3	no	no
Contracted PMP- IPM trained	SLA 26/26	SLA	USDA	SLA	SLA	SLA	USDA	USDA	n/a	no
Facility Mgr / IPM C trained	SLA 17/26	SLA	USDA	SLA	SLA	SLA	no	yes	no	no
IPM Practices followed	Yes 26/26	Yes	yes	yes	yes	yes	yes	yes	yes	no
Low Impact pesticide only	Yes 26/26	Yes	yes	yes	yes	yes	yes	yes	yes	no
Pesticides stored in school	No 0/26	No	no	no	no	no	no	no	no	yes
Pesticides applied by staff	No 0/26	No	no	no	no	no	no	Yes- PMP	no	yes
Pesticide use records	Yes 25/26	Yes	yes	yes	yes	yes	yes	yes	yes	no
District/ school IPM policy	Yes 21/26	missin g	yes	yes	yes	yes	no	yes	no	no
IPM plan generic	Yes 20/26	1y 5/n	yes	yes	yes	yes	no	yes	no	no
Facility Mgr IPM knowledge	Yes 17/26	No	yes	yes	yes	yes	yes	yes	no	no
Admin. IPM knowledge	No 5/26	No	n/a	1/2	1/2	1/2	no	yes	no	no
Parent notification plan	Yes 26/26	no 1/6	yes	yes	yes	yes	yes	yes	yes	no
Kitchen clean/ storage +	Yes 20/26	No	yes	yes	yes	yes	yes	yes	yes	no
Kitchen Pests - flourishing	no	Yes	no	no	no	no	no	no	no	yes
Pest monitoring /logs	15/26	no 1/6	No/ Kit-Y	yes	yes	yes	some	yes	yes	no
Intact door sweeps	15/26	3/6	1/2	yes	yes	yes	yes	yes	yes	no

Plumbing leaks (L) Bathrm holes (H)	L. 6/26 H.22/26	All	1/4	none	none	none	none	none	none	yes
Bed bug issues	16/26	4/6	most	few	few	few	few	few	few	no
Travel Distance from Edison to site	13	22	35	6	25	13	345	40	341	1676

Note: Trained by SLA = State Lead Agency
Trained by USDA = US Dept. of Agricultural Extension Agent

Table 13. Webinar efficacy and carbon data from two nationwide IPM in CCC webinars.

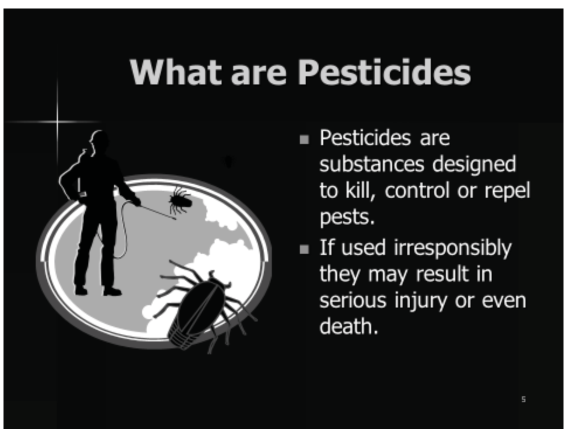
(Used as table 7.1 in Chapter 7 of paper)

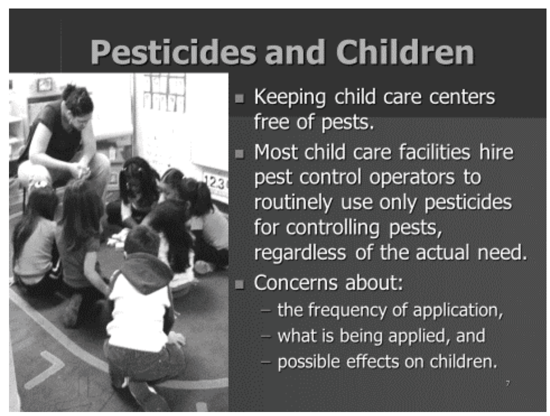
Webinar Efficacy: Correct answers to efficacy questions	**Web 1 (2012)**	**Web 2 (2013)**	**Average %**
They left the webinar with a greater knowledge of IPM	96%	97%	96.5%
The presentation clearly explained the special vulnerability of children to pesticides	97%	98.9%	98%
They would recommend the course to others	98.5%	98.2%	98%
IPM is more effective, easier, safer and will save money	96%	97.7%	97%
Mosquito sprays are **not** a low toxic pesticide	81%	80%	80.5%
Applying pesticides to prevent future pest issues is **not** a step to follow in IPM	89%	81%	85%
Attendees participating (number of computers linked)	491	456	Σ=947
Actual number participating (Minimum)	617	624	Σ=1241
Blanks left on poll questions (rough average)	200	250	
Poll participants (rough range)	175-340	163-226	
Would be interested in implementing IPM after viewing webinar	34%	30%	32%
Overall Efficacy	96.5%	90.4%	93.5%
Round-Trip miles saved via the webinar venue	1,285,433	1,177,378	Σ=2,462,811
Pounds of Carbon Dioxide saved	626,322	567,322	Σ=541.3 metric tons

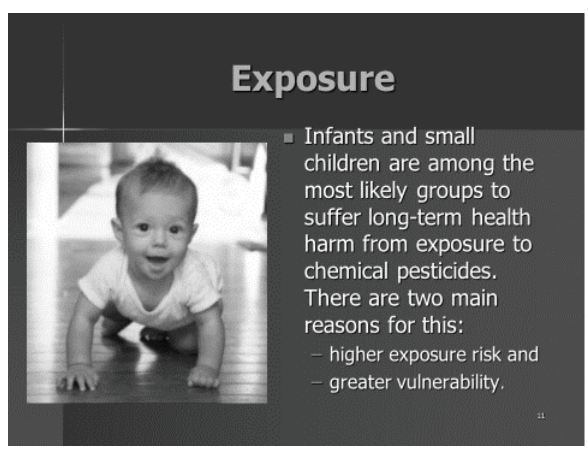
APPENDIX D

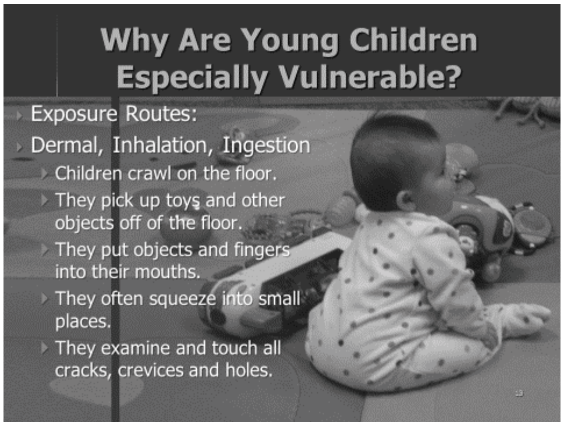
Presentations used for the thesis study

Presentation 1 Integrated Pest Management in Child Care Centers

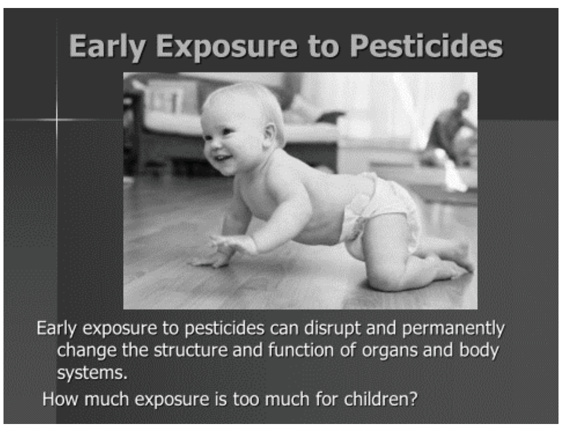


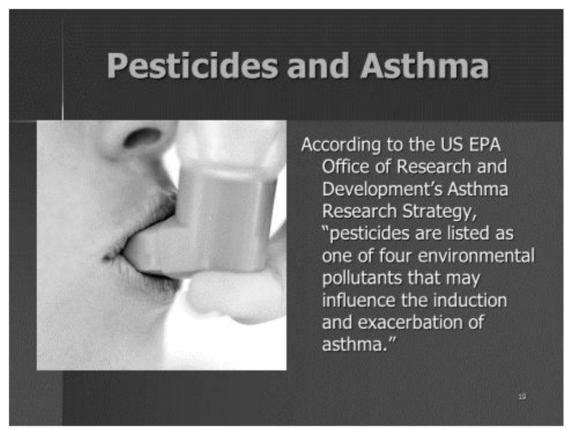


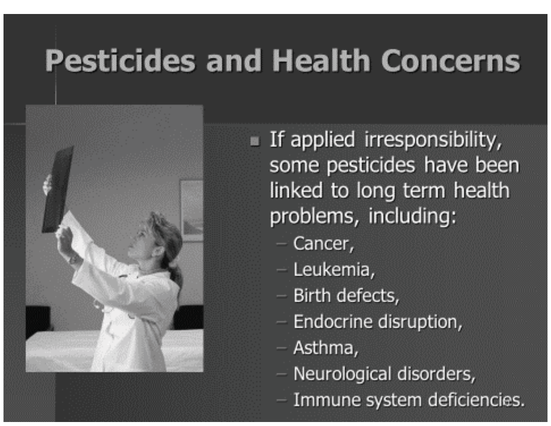


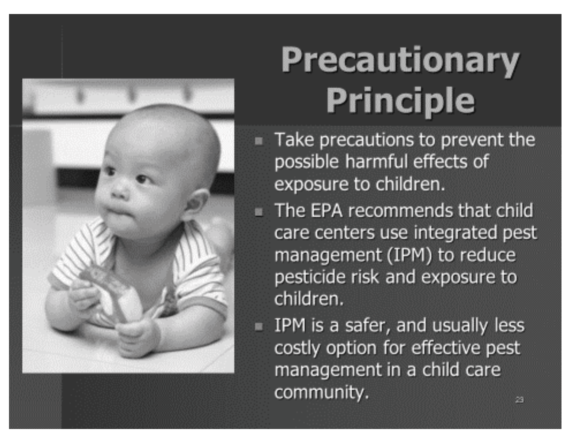

Why Are Young Children Especially Vulnerable?
Exposure Routes:
Dermal, Inhalation, Ingestion
Children crawl on the floor.
They pick up toys and other objects off of the floor.
They put objects and fingers into their mouths.
They often squeeze into small places.
They examine and touch all cracks, crevices and holes.


Life and Exposure are Different on the Floor
Infants and young children live closer to the floor, where pesticide residues may tend to concentrate and linger.
Concentrations of some toxic substances, are four to six times higher near the floor.


Early Exposure to Pesticides
Early exposure to pesticides can disrupt and permanently change the structure and function of organs and body systems.
How much exposure is too much for children?


Pesticides and Asthma
According to the US EPA Office of Research and Development's Asthma Research Strategy, "pesticides are listed as one of four environmental pollutants that may influence the induction and exacerbation of asthma."


Pesticides and Health Concerns
If applied irresponsibility, some pesticides have been linked to long term health problems, including:
Cancer,
Leukemia,
Birth defects,
Endocrine disruption,
Asthma,
Neurological disorders,
Immune system deficiencies.


Precautionary Principle
Take precautions to prevent the possible harmful effects of exposure to children.
The EPA recommends that child care centers use integrated pest management (IPM) to reduce pesticide risk and exposure to children.
IPM is a safer, and usually less costly option for effective pest management in a child care community.

What is IPM?
Integrated Pest Management

All creatures require food, water and shelter to survive.
Pests find buildings where these needs are met and take up residence.
Block pests out and remove their sources of food, water and shelter and you will need fewer pesticides to control pests.

What is Integrated Pest Management (IPM)?

EPA Definition:

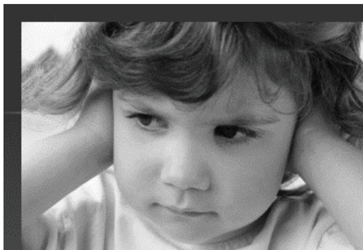
- Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices, with pesticide application as a last resort pest control method.
- IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment.
- This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.

The Steps to Follow in IPM

Develop and implement a Pest Management Plan,

1) Conduct an inspection to identify pest issues,
2) Monitor for signs of pest activity,
3) Use non-chemical approaches like sanitation and maintenance to:
   - A.) keep pests out,
   - B.) remove food and water sources,
   - C.) take away their homes/ harborages.
4) Apply low-toxicity pesticides such as baits, traps or gels.

Keep a log book of sightings and activities.



IPM in Child Care Centers

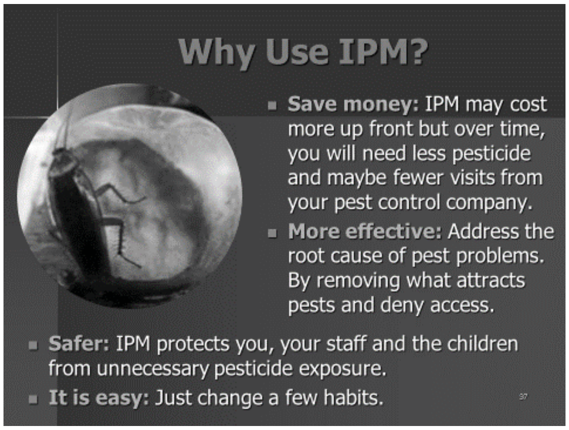
- Integrated pest management provides an opportunity to create a safer learning environment - - to reduce children's exposure to pesticides as well as eliminate pests.
- EPA encourages child care administrators to adopt IPM practices to reduce children's exposure to pesticides.

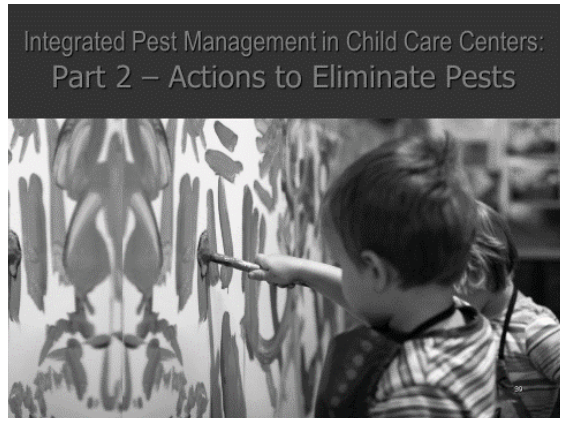
Benefits of Child Care Center IPM

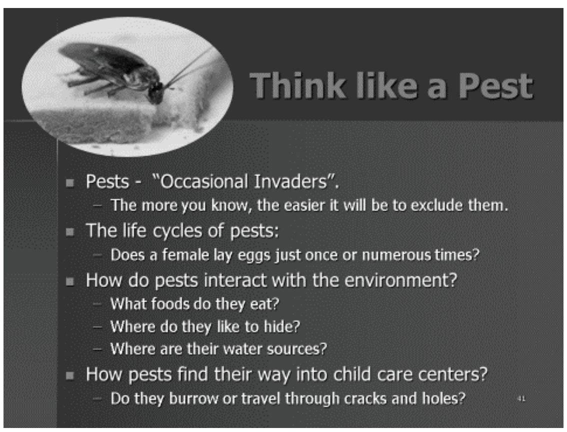
- More effective: Address the root cause of pest problems by removing what attracts pests and deny access.
- Healthier learning environment for our children.
- Better long-term control of pests.
- Reduced liability of facility.
- Lower cost to facility administrator / lowers the budget.
- Promotes cooperation between staff.

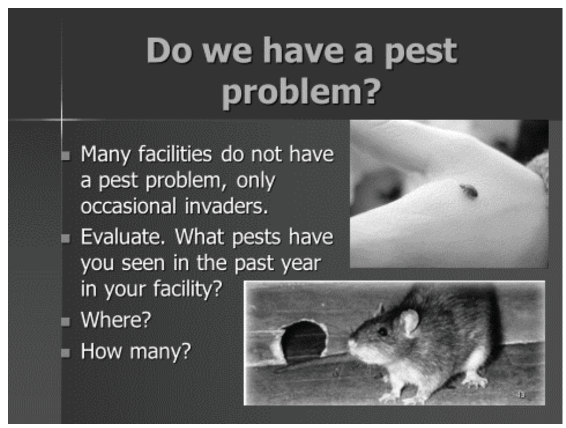
IPM Programs

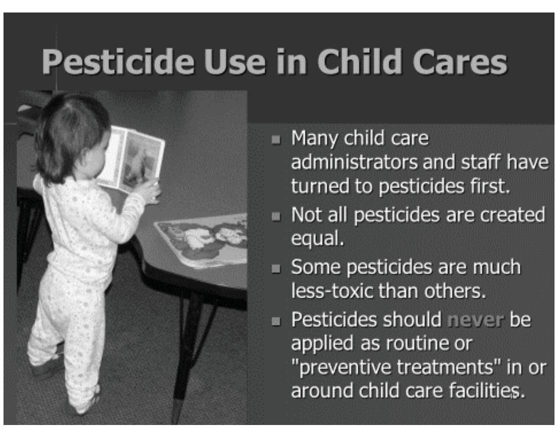
- Not all insects, weeds, and other living organisms require control.
- Many organisms are innocuous, and some are even beneficial.
- The Goals of IPM:
- Identify the pest accurately, monitor pest populations, and establish action thresholds to make appropriate control decisions.


Why Use IPM?
Save money: IPM may cost more up front but over time, you will need less pesticide and maybe fewer visits from your pest control company.
More effective: Address the root cause of pest problems. By removing what attracts pests and deny access.
Safer: IPM protects you, your staff and the children from unnecessary pesticide exposure.
It is easy: Just change a few habits.

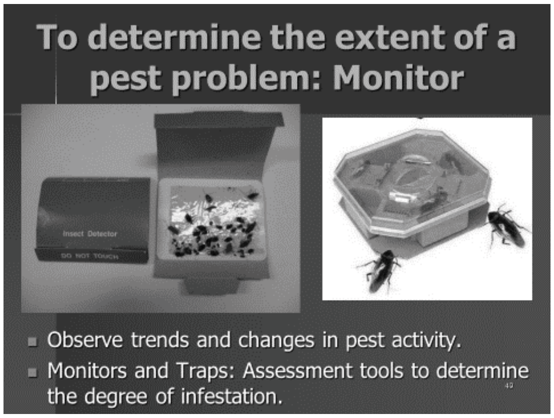

Integrated Pest Management in Child Care Centers:
Part 2 – Actions to Eliminate Pests

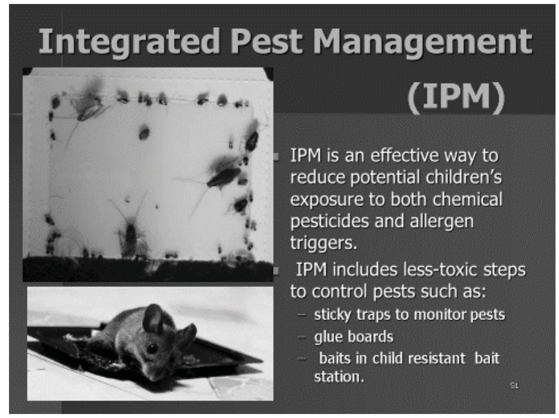

Think like a Pest
Pests - "Occasional Invaders".
– The more you know, the easier it will be to exclude them.
The life cycles of pests:
– Does a female lay eggs just once or numerous times?
How do pests interact with the environment?
– What foods do they eat?
– Where do they like to hide?
– Where are their water sources?
How pests find their way into child care centers?
– Do they burrow or travel through cracks and holes?


Do we have a pest problem?
Many facilities do not have a pest problem, only occasional invaders.
Evaluate. What pests have you seen in the past year in your facility?
Where?
How many?


Pesticide Use in Child Cares
Many child care administrators and staff have turned to pesticides first.
Not all pesticides are created equal.
Some pesticides are much less-toxic than others.
Pesticides should never be applied as routine or "preventive treatments" in or around child care facilities.


Pests that commonly sneak into child care:
Cockroaches
Ants
Rats and Mice
Head lice
Bed bugs
Termites
Spiders
Mold
Flies and Bees
Fleas


To determine the extent of a pest problem: Monitor
Insect Detector
DO NOT TOUCH
Observe trends and changes in pest activity.
Monitors and Traps: Assessment tools to determine the degree of infestation.


Integrated Pest Management (IPM)
IPM is an effective way to reduce potential children's exposure to both chemical pesticides and allergen triggers.
IPM includes less-toxic steps to control pests such as:
sticky traps to monitor pests
glue boards
baits in child resistant bait station.


Traps & Baits
Key ant, roach, and rodent management tool.
Baits contain slow acting poisons mixed with a substance that attracts pests looking for food.
Pests often carry the bait back to the nest.
Use baits in bait stations.
Place only where children do not have access to them.


Inspect for Evidence
Examples:
Droppings
Urine
Chewed boxes
Chewed wires
Chewed wood


A. Keep Pests Out
If pests can't get inside, then they won't be a problem.

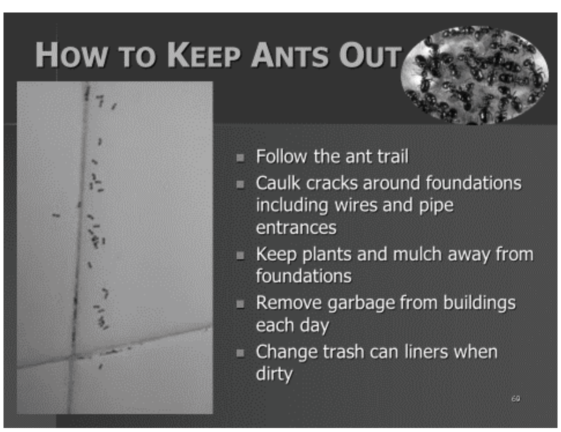

Keep Pests Out
Install Door Sweeps
Avoid propping doors open.
Ensure that weather stripping and door sweeps are present and in good condition on exterior doors.
Check all door moldings.

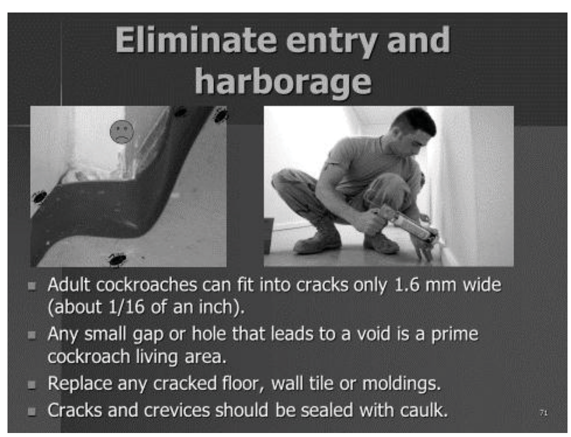

Keep Pests Out: Exclusion
Windows, screens and vents should be maintained in good condition.
Building eaves, walls, gutters and roofs are sound.
No evidence of water leaks or holes.
If pests cannot get into the facility than you won't need to use pesticides to kill them.

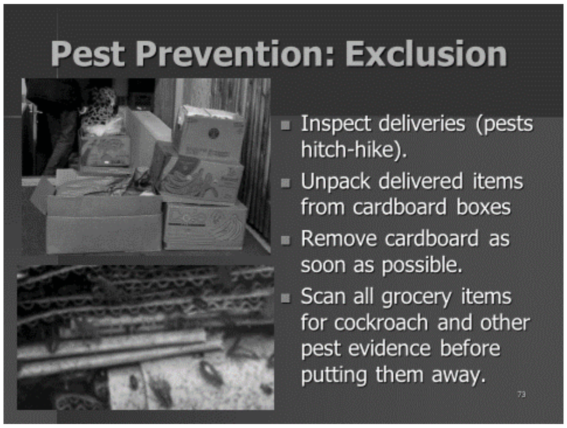

Keep Pests Out
Mice can fit through a hole smaller than a dime.
Prevent pests from getting into buildings by properly blocking the entry points.

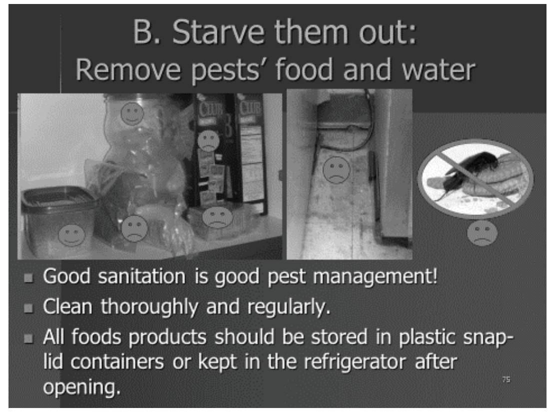

Be they large or small,
pests can crawl through any hole.

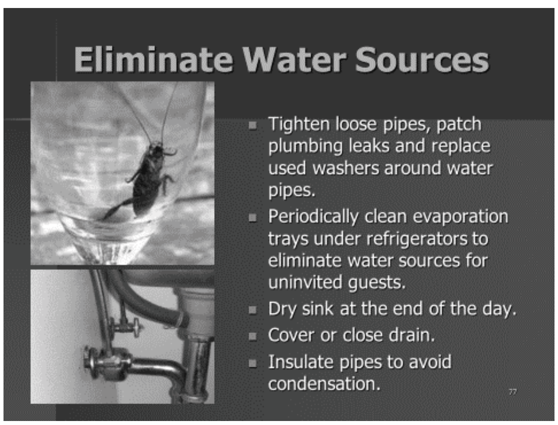

Pipe holes properly sealed
Where can I go? There are no places to hide!


How to Keep Ants Out
Follow the ant trail
Caulk cracks around foundations including wires and pipe entrances
Keep plants and mulch away from foundations
Remove garbage from buildings each day
Change trash can liners when dirty


Eliminate entry and harborage
Adult cockroaches can fit into cracks only 1.6 mm wide (about 1/16 of an inch).
Any small gap or hole that leads to a void is a prime cockroach living area.
Replace any cracked floor, wall tile or moldings.
Cracks and crevices should be sealed with caulk.


Pest Prevention: Exclusion
Inspect deliveries (pests hitch-hike).
Unpack delivered items from cardboard boxes
Remove cardboard as soon as possible.
Scan all grocery items for cockroach and other pest evidence before putting them away.


B. Starve them out:
Remove pests' food and water
Good sanitation is good pest management!
Clean thoroughly and regularly.
All foods products should be stored in plastic snap-lid containers or kept in the refrigerator after opening.

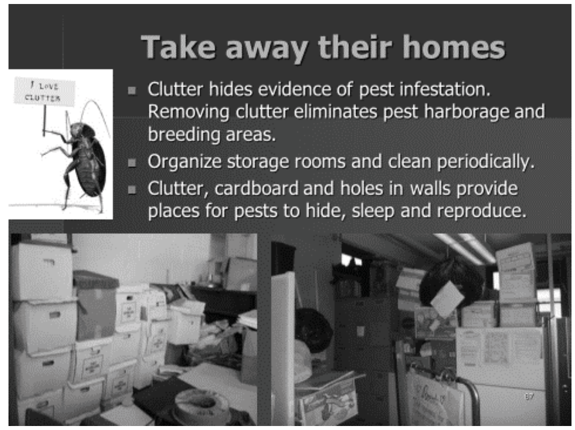

Eliminate Water Sources
Tighten loose pipes, patch plumbing leaks and replace used washers around water pipes.
Periodically clean evaporation trays under refrigerators to eliminate water sources for uninvited guests.
Dry sink at the end of the day.
Cover or close drain.
Insulate pipes to avoid condensation.


Pest Prevention: Sanitation
Empty sink strainer frequently.
Wash dishes immediately after use.
Do not leave dirty dishes overnight.

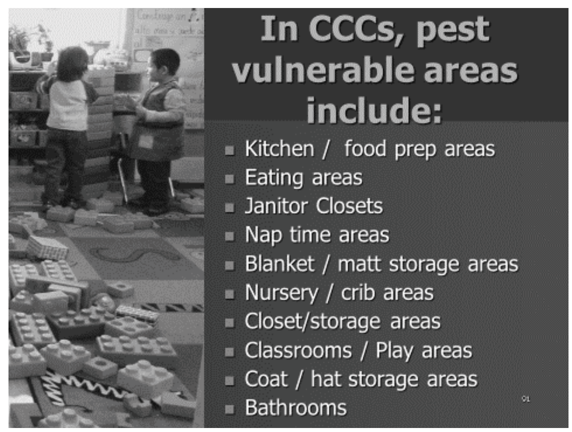

Custodial Storage


Remove Pest Food: Waste Management
Employ good trash management practices:
Indoor trash containers should be emptied frequently.
All trash cans should have lids.
Do not leave trash cans full overnight.
Keep trash cans clean both inside and out.
Tie Plastic bags linings tightly.


C. Take away their homes: Harborage/Shelter
Caulk or seal cracks or holes in:
interior walls,
around pipes;
behind sinks and
along baseboards.


Take away their homes
I LOVE CLUTTER
Clutter hides evidence of pest infestation. Removing clutter eliminates pest harborage and breeding areas.
Organize storage rooms and clean periodically.
Clutter, cardboard and holes in walls provide places for pests to hide, sleep and reproduce.


Take away their homes
Recycle corrugated cardboard.
Avoid using cardboard for storage.
It is a favorite living-space for cockroaches.


In CCCs, pest vulnerable areas include:
Kitchen / food prep areas
Eating areas
Janitor Closets
Nap time areas
Blanket / matt storage areas
Nursery / crib areas
Closet/storage areas
Classrooms / Play areas
Coat / hat storage areas
Bathrooms


Kitchen / Food Prep Areas
Ensure all cracks, leaks and moldings are sealed or caulked.
All surfaces in food preparation and serving areas should be cleaned regularly and thoroughly.


Kitchens and Food Prep Areas
Clean hard-to-reach areas.
Clean floor drains and ventilation screens.
Seal gaps around pipes and fixtures.

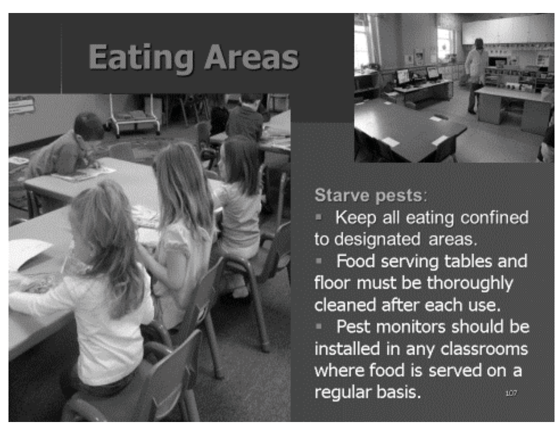

Remove pest food
Kitchen appliances should be kept clean and free of food particles and grease.


Kitchen Storage Areas
Eliminate access to food or water by keeping food and beverages in designated areas, and in tightly sealed containers.
Bulk stored products should not be allowed direct contact with walls or floors, allowing access for inspection and reducing pest harborages.
Store paper goods separately and away from food.

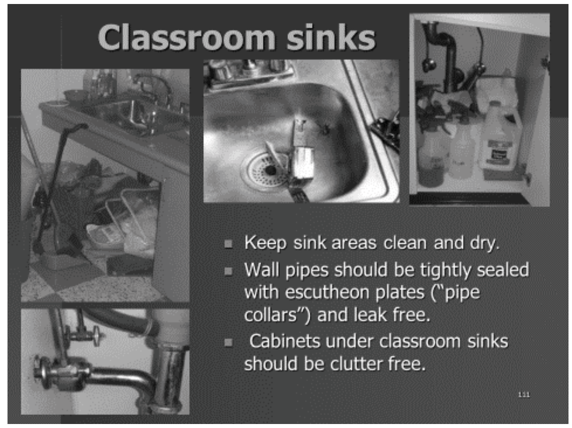

Kitchen storage
Keep all storage at least 6" above floor.
Mop down floor regularly.
101


Kitchen Storeroom
Use wire shelves
Shelves should be 6-12" above the floor
Avoid shelving with "kickplates"
Avoid shelving with hollow spaces
Eliminate most cardboard
Never place cardboard boxes on bottom shelves or floor.
Discard damaged goods.

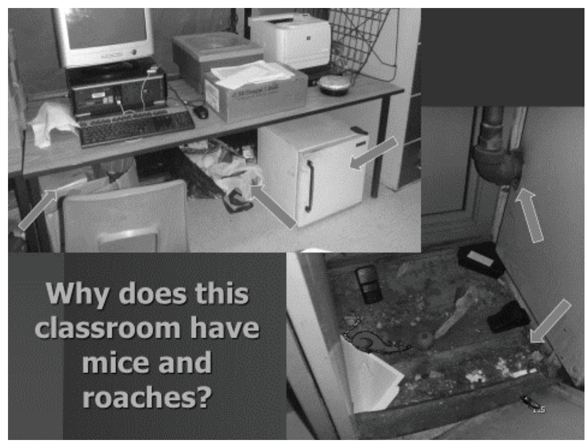

Even in tight spaces, IPM can be practiced effectively.

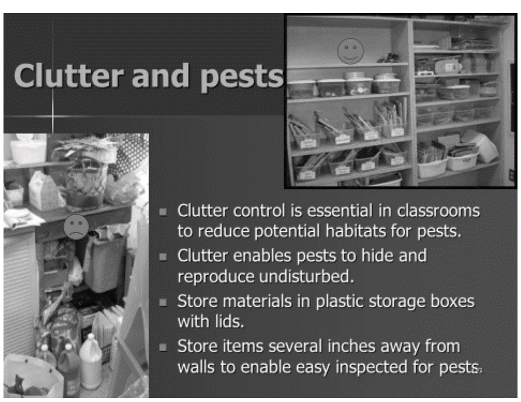

Eating Areas
Starve pests:
Keep all eating confined to designated areas.
Food serving tables and floor must be thoroughly cleaned after each use.
Pest monitors should be installed in any classrooms where food is served on a regular basis.

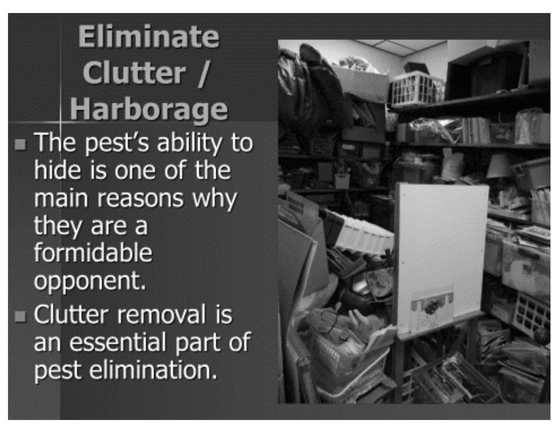

Food in Classrooms
Food in classrooms must be carefully stored in pest-proof plastic containers or sealable plastic storage bags.
Don't overlook food manipulatives such as beans or pasta.
Store food manipulatives in pest-proof containers.
109


Classroom sinks
Keep sink areas clean and dry.
Wall pipes should be tightly sealed with escutheon plates ("pipe collars") and leak free.
Cabinets under classroom sinks should be clutter free.
111


Classroom Areas
Sort paper and classroom materials in plastic see-through boxes, and store at least eight inches off of the floor to allow proper access for cleaning.
113


Why does this classroom have mice and roaches?


Clutter and pests
Clutter control is essential in classrooms to reduce potential habitats for pests.
Clutter enables pests to hide and reproduce undisturbed.
Store materials in plastic storage boxes with lids.
Store items several inches away from walls to enable easy inspected for pests.


Eliminate Clutter / Harborage
The pest's ability to hide is one of the main reasons why they are a formidable opponent.
Clutter removal is an essential part of pest elimination.

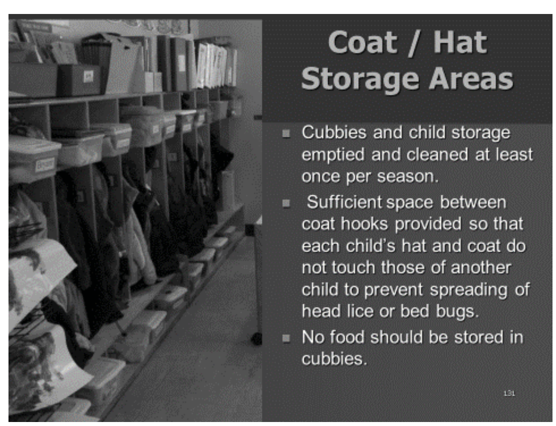

Pets in classrooms
Keep all pet food stored in plastic containers with tight-sealing lids.
Clean up any spilled foods promptly.
Pet cages and aquariums must be kept clean.
Check aquariums for water leaks.


Nursery & Crib Areas
Clean all surfaces
Empty trash
Vacuum daily
Confine eating


Nap Time Areas
Vacuum floors daily.
Mattresses / cots should be cleaned weekly.
Personal items sent home or laundered in-house regularly (weekly).

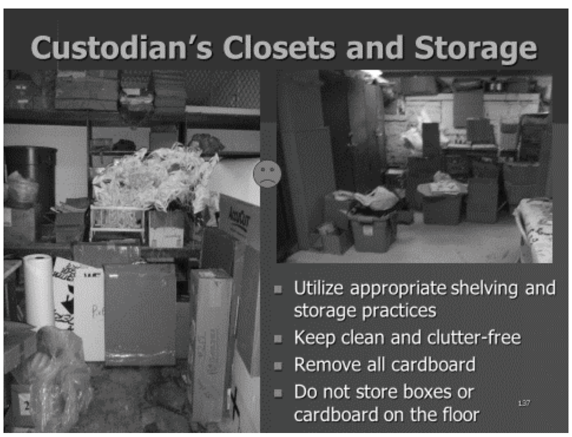

Bed Bugs in Child Care Centers?
Bed Bugs can hide in tiny cracks or crevices, or they may hitch a ride on backpacks, coats, shoes, clothing, or other objects in the backpack.
Following a regular stringent cleaning and monitoring regiment, will keep bed bugs from becoming established in your facility.


Nap Blanket / Cot Storage Areas
Walls and storage bins cleaned and inspected weekly.
Safely store all blankets, bedding, clothing and stuffed toys in individual plastic boxes with lids.


Coat / Hat Storage Areas
Cubbies and child storage emptied and cleaned at least once per season.
Sufficient space between coat hooks provided so that each child's hat and coat do not touch those of another child to prevent spreading of head lice or bed bugs.
No food should be stored in cubbies.

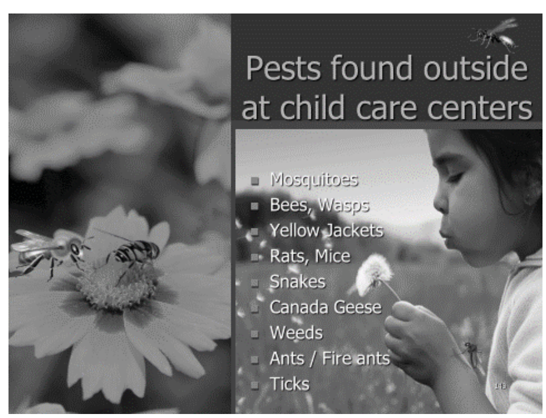

Restrooms
Clean rooms daily
Removed trash daily
Keep plumbing in good repair
Keep sink areas clean and dry
Fill all holes around pipes


Custodial Mop Room
To reduce pest harborage in custodial closets:
Keep mop sinks and buckets empty and dry when not in use.
Hang all mops, allow to dry.
Repair plumbing leaks.
Keep floor drains clean.
Seal gaps around pipes.


Custodian's Closets and Storage
Utilize appropriate shelving and storage practices
Keep clean and clutter-free
Remove all cardboard
Do not store boxes or cardboard on the floor


Integrated Pest Management
Manage waste areas, playgrounds, lawns and other areas to prevent pests from becoming a threat.
These control methods can be very effective and cost-efficient and present little or no risk to people or the environment.
Outdoors
Use sanitation, maintenance, traps, and other cultural methods to prevent pests.


Outdoor Pest Issues
Garbage disposal areas
Outdoor areas where water may collect
Neighboring properties
Outdoor pest harborages
Tires
Structural areas where pests can enter facility
Wood play structures

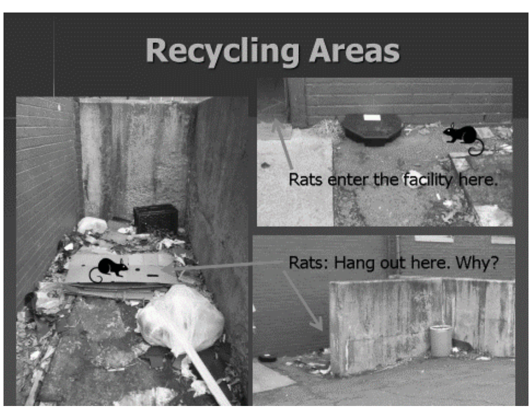

Pests found outside at child care centers
Mosquitoes
Bees, Wasps
Yellow Jackets
Rats, Mice
Snakes
Canada Geese
Weeds
Ants / Fire ants
Ticks


Outdoor Areas
Garbage containers, should be placed away from building entrances.
Dumpsters should have close-fitting lids and be kept closed.

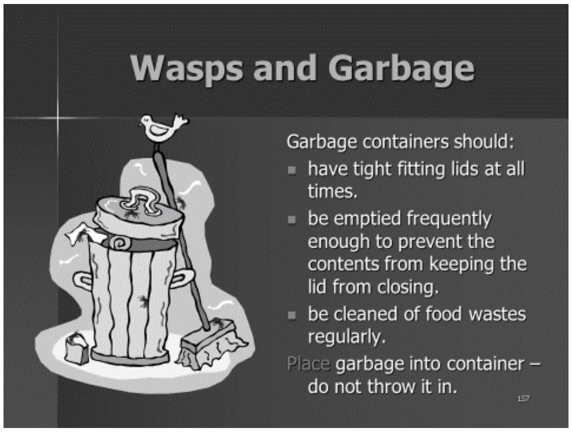

Keep Dumpster Areas Clean
Empty indoor garbage promptly into dumpsters. Keep area around dumpsters clean and free of debris.


Garbage Disposal Areas – Indoors and Out
Manage trash and waste properly by:
not overloading trash bags,
tying bags tightly,
emptying trash receptacles daily,
keeping both garbage cans and dumpsters lids on securely,
clean of food.

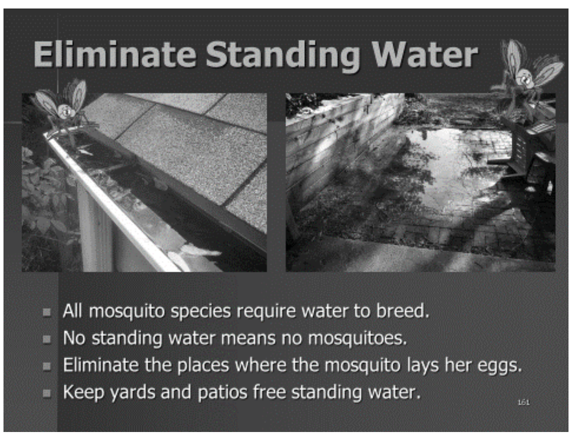

Pest Prevention:
Keep your recycling area clean.

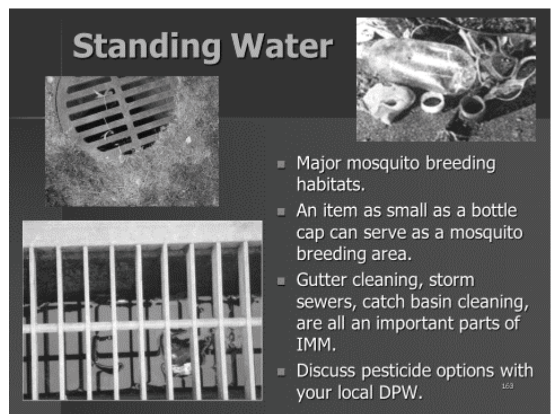

Recycling Areas
Rats enter the facility here.
Rats: Hang out here. Why?

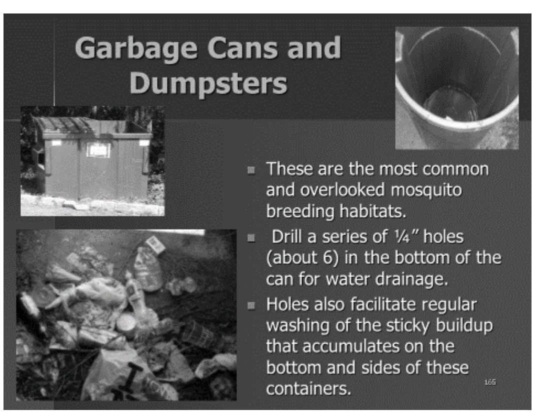

Rodent Management
Trapping is an important component of rodent control.
Rats are trap-shy and will avoid traps.
Put the traps out with bait, but do not set them for several days until the rats are used to them.
Only use baits within a child resistant bait station.
Never use loose baits – it is illegal.


Wasps and Garbage
Garbage containers should:
have tight fitting lids at all times.
be emptied frequently enough to prevent the contents from keeping the lid from closing.
be cleaned of food wastes regularly.
Place garbage into container – do not throw it in.


PLAYGROUNDS: BEES AND YELLOW JACKETS
Avoid swatting.
When a wasp is squashed, a chemical (pheromone) is released which attracts other nearby wasps.
Avoid bright colors or floral patterns.
Minimize sweet smelling hair rinse, lotions or soaps.


Eliminate Standing Water
All mosquito species require water to breed.
No standing water means no mosquitoes.
Eliminate the places where the mosquito lays her eggs.
Keep yards and patios free standing water.


Standing Water
Major mosquito breeding habitats.
An item as small as a bottle cap can serve as a mosquito breeding area.
Gutter cleaning, storm sewers, catch basin cleaning, are all an important parts of IMM.
Discuss pesticide options with your local DPW.


Garbage Cans and Dumpsters
These are the most common and overlooked mosquito breeding habitats.
Drill a series of ¼" holes (about 6) in the bottom of the can for water drainage.
Holes also facilitate regular washing of the sticky buildup that accumulates on the bottom and sides of these containers.


Playground Equipment and Toys
Monitor for puddles and other standing water issues.
Some play equipment may need to have drainage holes added.
Play structures and toy interiors can double as prime mosquito breeding habitat if water is left to sit for more than 4 days.


Tires: A Health Hazard
Tires collect and store rainwater, thus are another breeding habitat for mosquitoes.
A single tire can harbor tens of thousands of potentially disease carrying mosquitoes.
Drill ¼" holes in tires for drainage.
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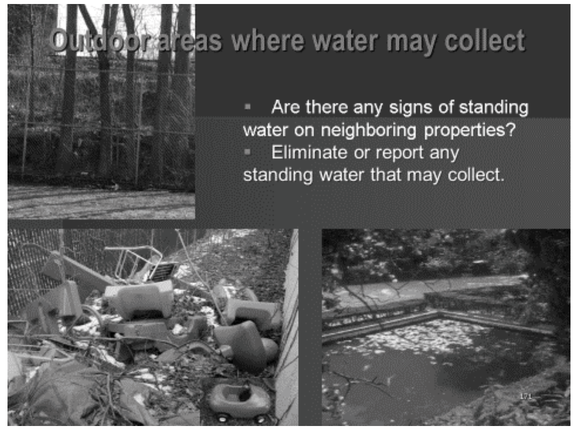
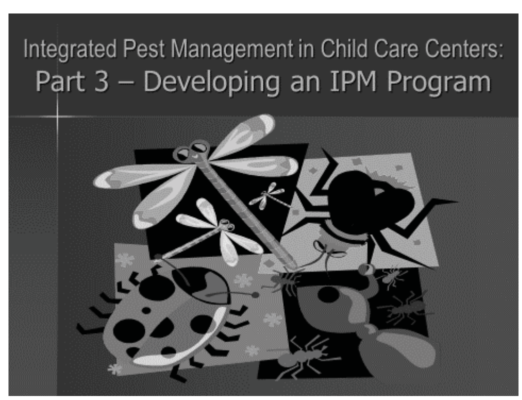
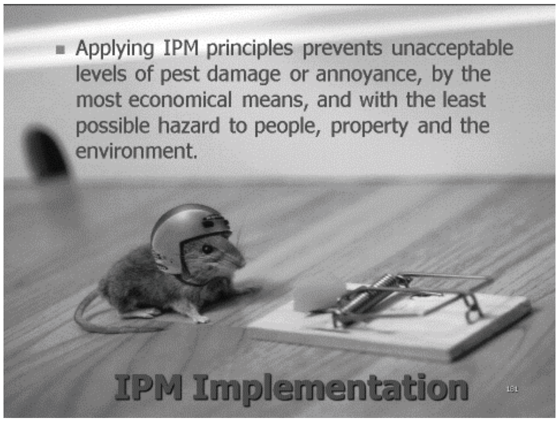

Outdoor areas where water may collect
Are there any signs of standing water on neighboring properties?
Eliminate or report any standing water that may collect.

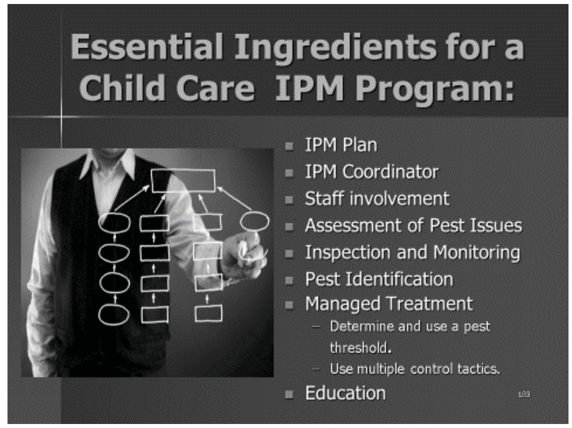

Outdoor Areas
Landscape plantings offer pests access to buildings.
Keep vegetation, shrubs, and bark mulch at least 18 inches from building.
Keep shrubs trimmed and not touching the structure.
Keep tree limbs at least 6 ft away from building and not overhang playgrounds.
Be aware of hazardous tree conditions.

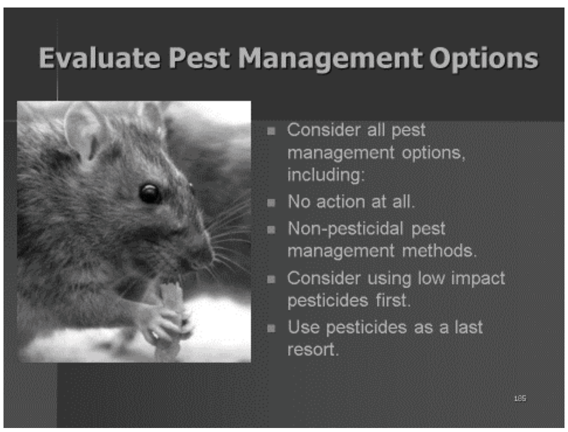

Other Playground Pests
Thoroughly inspect grounds on a routine basis for evidence of pests such as yellow jackets, fire ants, snakes, ticks and rodents.
Pests may overwinter in playgrounds, especially in sand, or wood-chipped areas.
Limit pesticide use on playgrounds.


Wooden Playground Equipment
Take precautions around older wooden playground structures as they may be a source of pesticide exposure.
Many decks and older wood playgrounds have been treated with chemicals, such as chromated copper arsenate (CCA), which repels water and insects but these chemicals may leach out over time, becoming contaminants on the surface of the play structure and in surrounding soil.

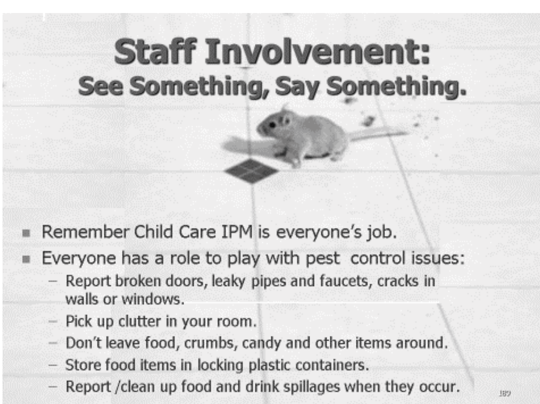

Integrated Pest Management in Child Care Centers:
Part 3 – Developing an IPM Program

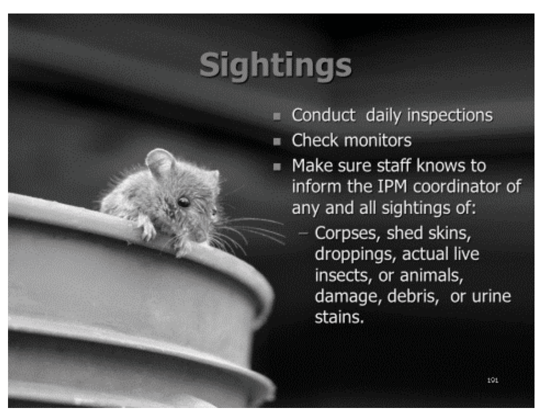

Applying IPM principles prevents unacceptable levels of pest damage or annoyance, by the most economical means, and with the least possible hazard to people, property and the environment.
IPM Implementation

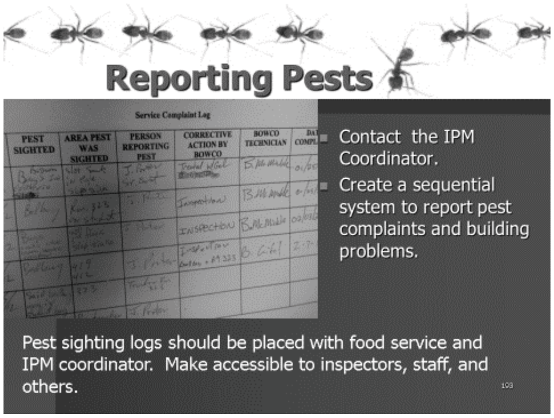

Essential Ingredients for a Child Care IPM Program:
IPM Plan
IPM Coordinator
Staff involvement
Assessment of Pest Issues
Inspection and Monitoring
Pest Identification
Managed Treatment
Determine and use a pest threshold.
Use multiple control tactics.
Education


Evaluate Pest Management Options
Consider all pest management options, including:
No action at all.
Non-pesticidal pest management methods.
Consider using low impact pesticides first.
Use pesticides as a last resort.


The Facility IPM Coordinator:
Is responsible for overseeing day to day pest problems.
Is responsible for maintaining the facility so that pests cannot move in.
Relies on facility employees to report repairs or pest problems.
Maintains all pesticide application records.
Ensures notice of pesticide treatments to parents and staff.
Is the main pest management co. contact.


Staff Involvement:
See Something, Say Something.
Remember Child Care IPM is everyone's job.
Everyone has a role to play with pest control issues:
Report broken doors, leaky pipes and faucets, cracks in walls or windows.
Pick up clutter in your room.
Don't leave food, crumbs, candy and other items around.
Store food items in locking plastic containers.
Report /clean up food and drink spillages when they occur.


Sightings
Conduct daily inspections
Check monitors
Make sure staff knows to inform the IPM coordinator of any and all sightings of:
Corpses, shed skins, droppings, actual live insects, or animals, damage, debris, or urine stains.


Reporting Pests
Service Complaint Log
Contact the IPM Coordinator.
Create a sequential system to report pest complaints and building problems.
Pest sighting logs should be placed with food service and IPM coordinator. Make accessible to inspectors, staff, and others.
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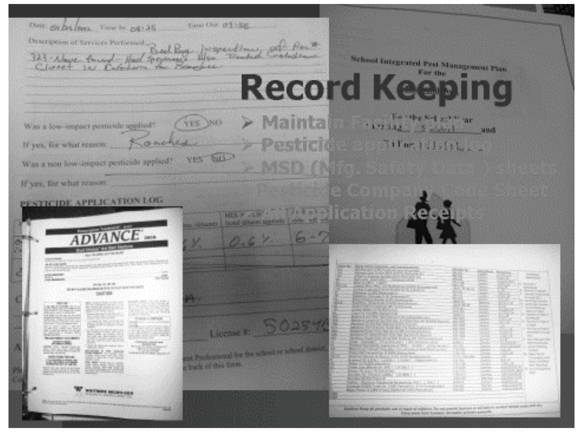
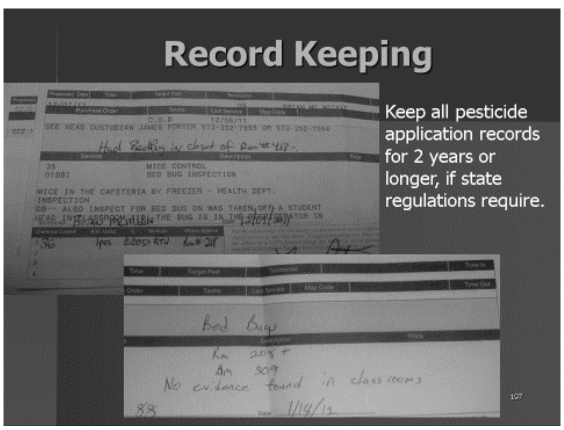
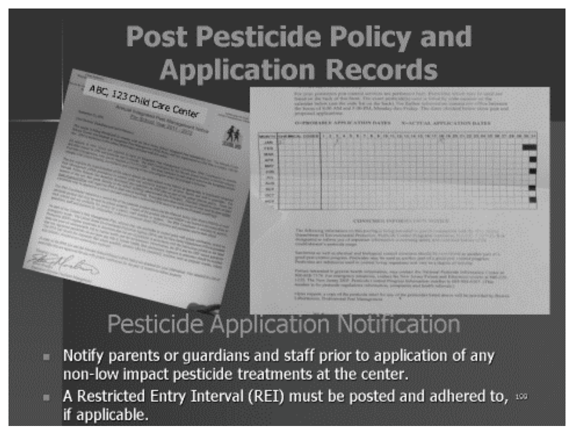
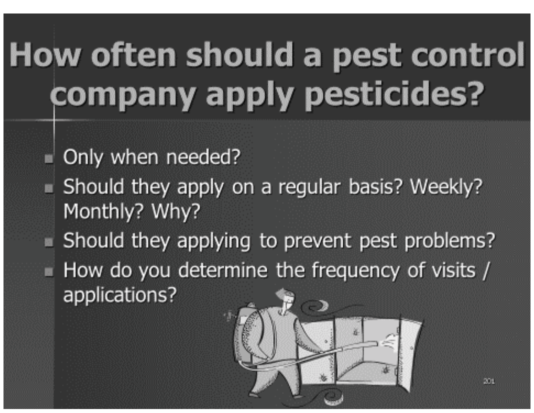
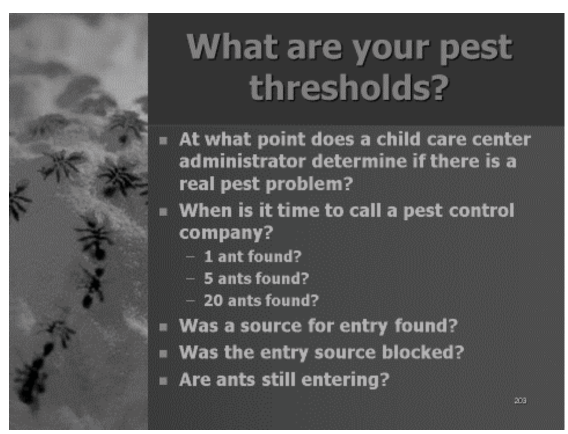

Record Keeping
MSD (Mfg. Safety Data) sheets
Application Receipts
PESTICIDE APPLICATION LOG
ADVANCE


Record Keeping
Keep all pesticide application records for 2 years or longer, if state regulations require.
107


Post Pesticide Policy and Application Records
ABC, 123 Child Care Center
Pesticide Application Notification
Notify parents or guardians and staff prior to application of any non-low impact pesticide treatments at the center.
A Restricted Entry Interval (REI) must be posted and adhered to, if applicable.


How often should a pest control company apply pesticides?
Only when needed?
Should they apply on a regular basis? Weekly? Monthly? Why?
Should they applying to prevent pest problems?
How do you determine the frequency of visits / applications?
201


What are your pest thresholds?
At what point does a child care center administrator determine if there is a real pest problem?
When is it time to call a pest control company?
1 ant found?
5 ants found?
20 ants found?
Was a source for entry found?
Was the entry source blocked?
Are ants still entering?
203

How to Hire a Pest Management Professional

- Call several companies.
- Insist on references.
- Check the references.
- Do they offer an Integrated Pest Management solution to the problem?
- Do they perform an inspection and give a check-list of issues?
- Do they offer both chemical and non-chemical treatment options?
- Are they licensed and insured?

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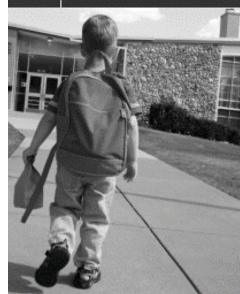
Integrated Pest Management



- IPM is a way to think and react to everyday actions.
- IPM is a commitment to using safer, low-impact pest control methods to keep facilities pest free.
- IPM is about people working together for the common goal of safer environments for our children.

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Benefits of Child Care IPM

- Reduced pesticide use.
- Healthier learning environment for our children.
- Better long-term control of pests.
- Reduced liability of the facility.
- Lower costs for pest management.
- Promotes cooperation between staff.

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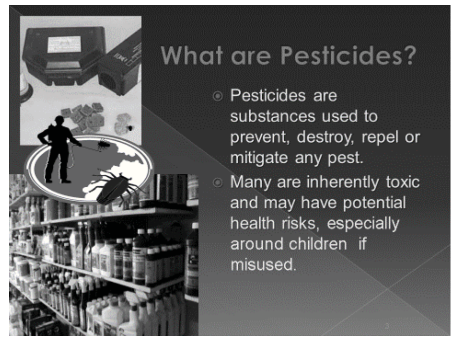
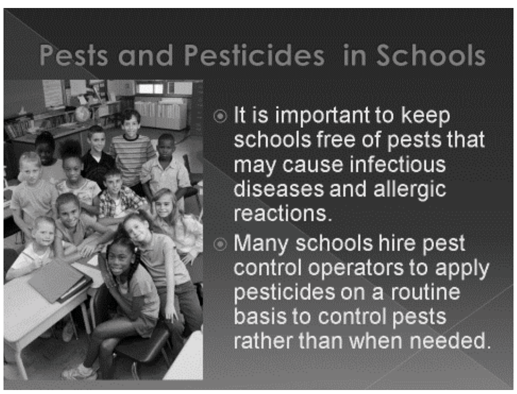
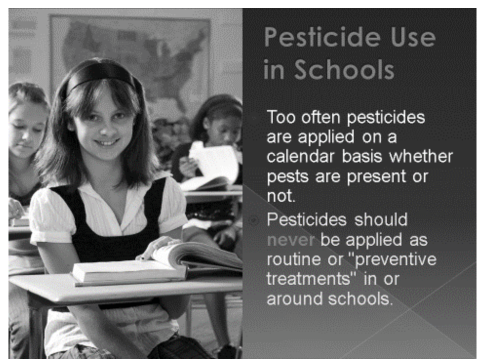
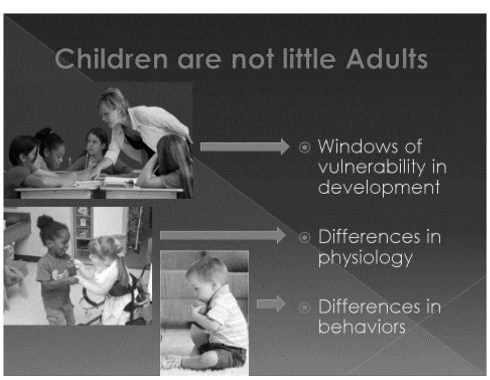
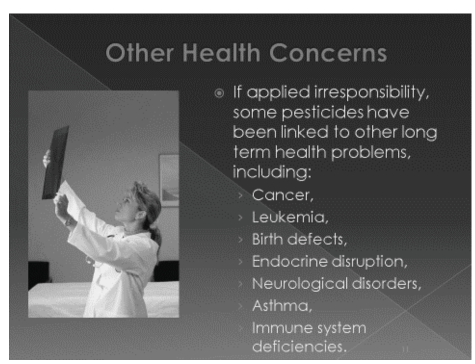
Presentation 2 Integrated Pest Management in Schools

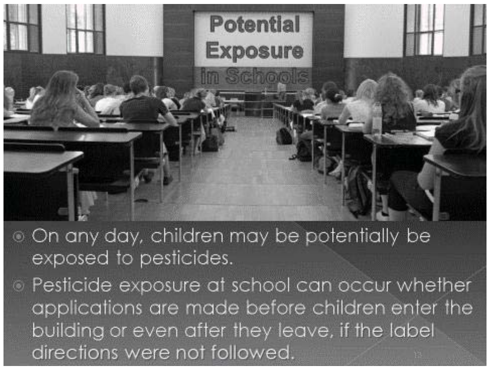


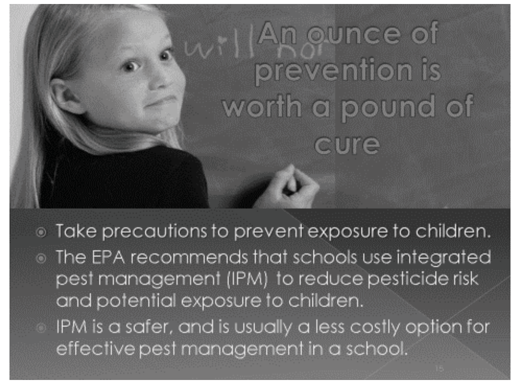






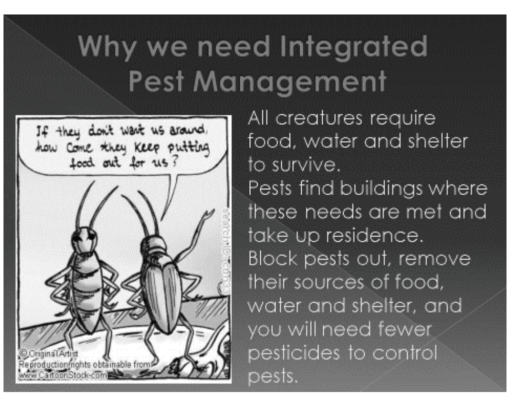


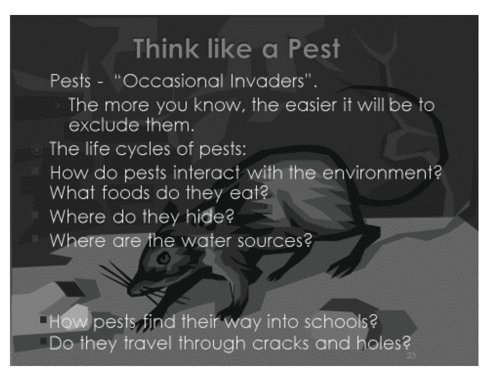

Potential
Exposure
in Schools
On any day, children may be potentially be exposed to pesticides.
Pesticide exposure at school can occur whether applications are made before children enter the building or even after they leave, if the label directions were not followed.

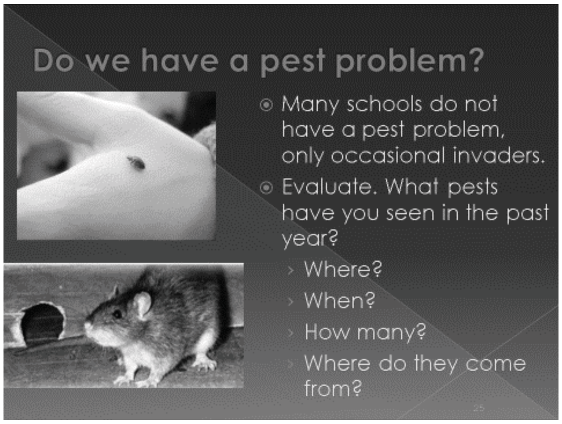

An ounce of prevention is worth a pound of cure
Take precautions to prevent exposure to children.
The EPA recommends that schools use integrated pest management (IPM) to reduce pesticide risk and potential exposure to children.
IPM is a safer, and is usually a less costly option for effective pest management in a school.

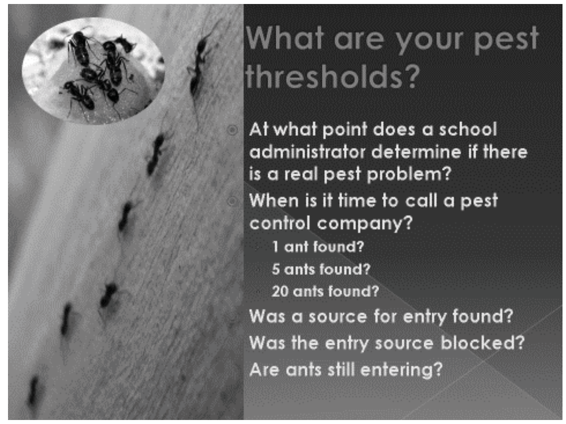

Integrated Pest Management
"Integrated Pest Management, is a long-standing, science-based, decision-making process that identifies and reduces risks from pests and pest management related strategies.
IPM serves as an umbrella to provide an effective, all encompassing, low-risk approach to protect resources and people from pests."
Put simply, IPM is a safer, and usually less costly option for effective pest management in a school community.


Integrated Pest Management
As a first line of pest control, School IPM programs work to manage indoor spaces and turf areas to prevent pests from becoming a threat.
IPM provides a safer learning environment.
IPM is effective, cost-efficient and presents little to no risk to people or the environment.


Why we need Integrated Pest Management
If they don't want us around, how come they keep putting food out for us?
All creatures require food, water and shelter to survive.
Pests find buildings where these needs are met and take up residence.
Block pests out, remove their sources of food, water and shelter, and you will need fewer pesticides to control pests.

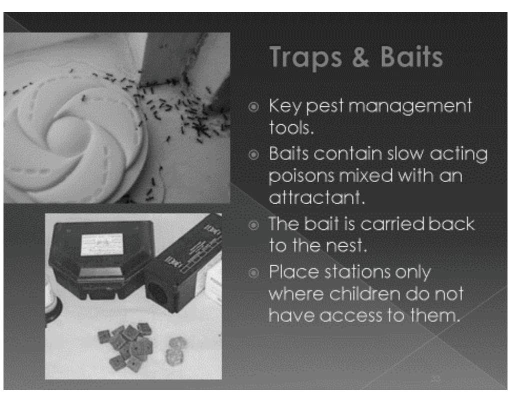

Think like a Pest
Pests - "Occasional Invaders".
The more you know, the easier it will be to exclude them.
The life cycles of pests:
How do pests interact with the environment?
What foods do they eat?
Where do they hide?
Where are the water sources?
How pests find their way into schools?
Do they travel through cracks and holes?


Do we have a pest problem?
Many schools do not have a pest problem, only occasional invaders.
Evaluate. What pests have you seen in the past year?
Where?
When?
How many?
Where do they come from?


What are your pest thresholds?
At what point does a school administrator determine if there is a real pest problem?
When is it time to call a pest control company?
1 ant found?
5 ants found?
20 ants found?
Was a source for entry found?
Was the entry source blocked?
Are ants still entering?

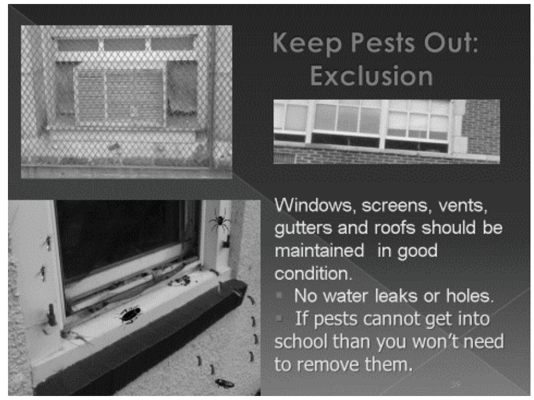

Inspect for Evidence
Examples:
Droppings
Urine
Chewed boxes
Chewed wires
Chewed wood


Integrated Pest Management
IPM takes advantage of newer technologies to monitor and control pests such as:
sticky traps
glue boards
baits in child resistant bait station.


Traps & Baits
Key pest management tools.
Baits contain slow acting poisons mixed with an attractant.
The bait is carried back to the nest.
Place stations only where children do not have access to them.


Exclusion:
Keep Pests Out


Keep Pests Out
Install Door Sweeps
Propped doors.
Lack of weather stripping.
Weather stripping in poor condition.

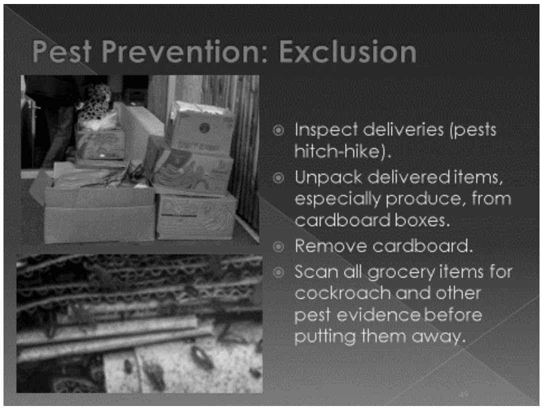

Keep Pests Out:
Exclusion
Windows, screens, vents, gutters and roofs should be maintained in good condition.
No water leaks or holes.
If pests cannot get into school than you won't need to remove them.


Be they large or small,
pests can crawl through any hole.

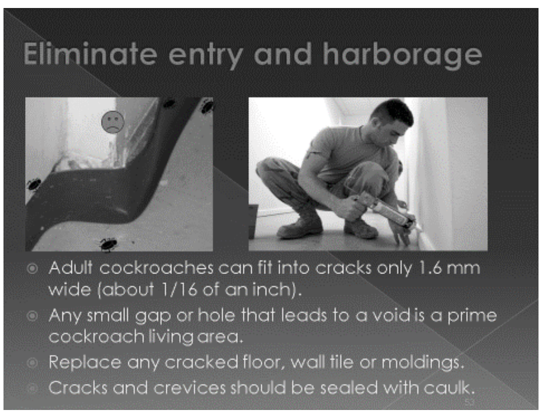

Keep Pests Out
Mice can fit through a hole smaller than a dime.
Prevent pests from getting into buildings by properly blocking the entry points.

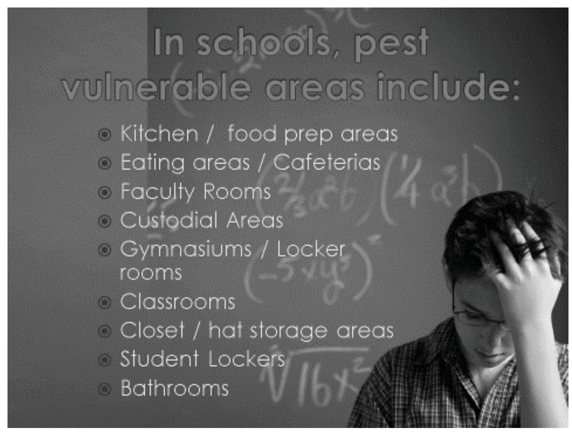

Keep Pests Out
Caulk, cement or fill cracks and holes including:
Holes in or around foundations
Gaps around pipes
Ducts and vents
Window frames

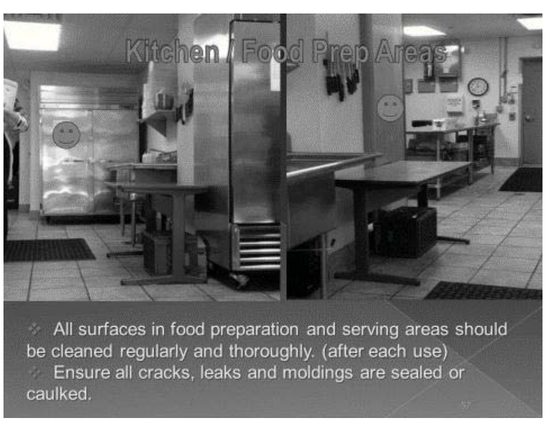

Pipe holes properly sealed
Where can I go? Access to my hiding places are gone!


Pest Prevention: Exclusion
Inspect deliveries (pests hitch-hike).
Unpack delivered items, especially produce, from cardboard boxes.
Remove cardboard.
Scan all grocery items for cockroach and other pest evidence before putting them away.

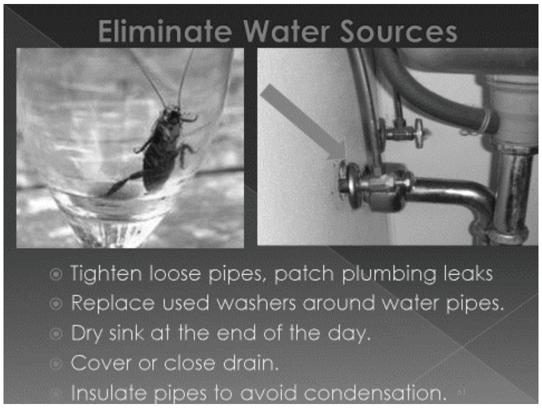

Take away their homes.
Recycle corrugated cardboard.
Avoid using cardboard for storage.
It is a favorite living-space for cockroaches and other critters.


Eliminate entry and harborage
Adult cockroaches can fit into cracks only 1.6 mm wide (about 1/16 of an inch).
Any small gap or hole that leads to a void is a prime cockroach living area.
Replace any cracked floor, wall tile or moldings.
Cracks and crevices should be sealed with caulk.


In schools, pest vulnerable areas include:
Kitchen / food prep areas
Eating areas / Cafeterias
Faculty Rooms
Custodial Areas
Gymnasiums / Locker rooms
Classrooms
Closet / hat storage areas
Student Lockers
Bathrooms


Kitchen / Food Prep Areas
All surfaces in food preparation and serving areas should be cleaned regularly and thoroughly. (after each use)
Ensure all cracks, leaks and moldings are sealed or caulked.


More Moisture Sources
A common source of moisture is condensation under refrigerators.
This area should be frequently wiped dry or, if possible, placed a pan under the appliance to collect water.
The collection pan should be emptied frequently.


Eliminate Water Sources
Tighten loose pipes, patch plumbing leaks
Replace used washers around water pipes.
Dry sink at the end of the day.
Cover or close drain.
Insulate pipes to avoid condensation.

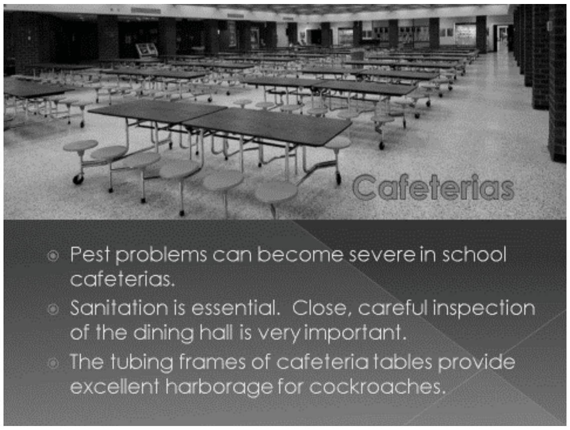

Pest Proofing
Flush and cover drain traps.
Place fiberglass window screening over vent pipes.
Use metal flashing, hardware cloth or copper wool to seal floor drains, vents, holes, and gaps around pipes.

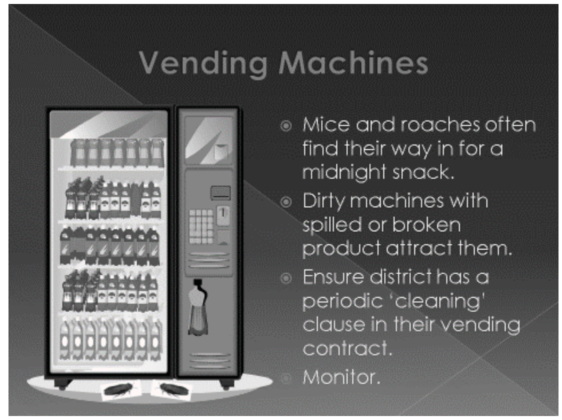

Remove pest food
Kitchen appliances should be kept clean and free of food particles and grease.
Areas underneath and behind these appliances should be kept grease and crumb free.


Kitchen Storage Areas
Keep food and beverages in tightly sealed containers.
Bulk stored products should not be allowed direct contact with walls or floors.
Store paper goods separately and away from food.


Kitchen Storeroom
Use wire shelves
Shelves should be 6-12" above the floor
Avoid shelving with "kickplates" or hollow spaces
Eliminate most cardboard
Never place cardboard boxes on bottom shelves or floor.
Discard damaged goods.

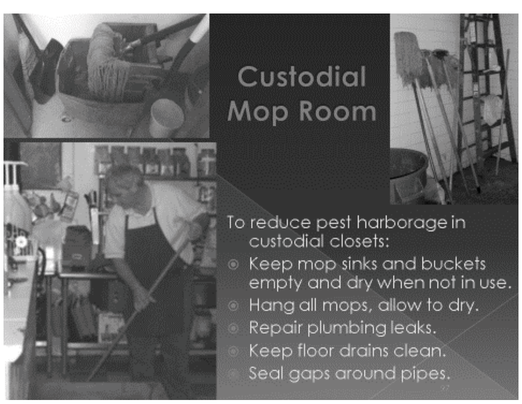

Even in tight spaces, IPM can be practiced effectively.


Cafeterias
Pest problems can become severe in school cafeterias.
Sanitation is essential. Close, careful inspection of the dining hall is very important.
The tubing frames of cafeteria tables provide excellent harborage for cockroaches.

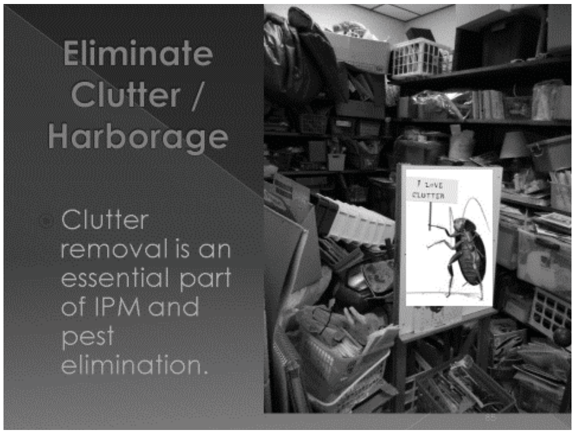

Vending Machines
Mice and roaches often find their way in for a midnight snack.
Dirty machines with spilled or broken product attract them.
Ensure district has a periodic 'cleaning' clause in their vending contract.
Monitor.


Cafeterias
Clean up serving line spills.
Thoroughly clean and dry trays and dish return areas.
Properly clean dishwashing racks.
Small amounts of water can sustain a pest population.


Other Eating Areas
Starve pests:
Keep all eating confined to designated areas.
Food serving tables and floor must be thoroughly cleaned after each use.
Pest monitors should be installed in any classrooms where food is served on a regular basis.

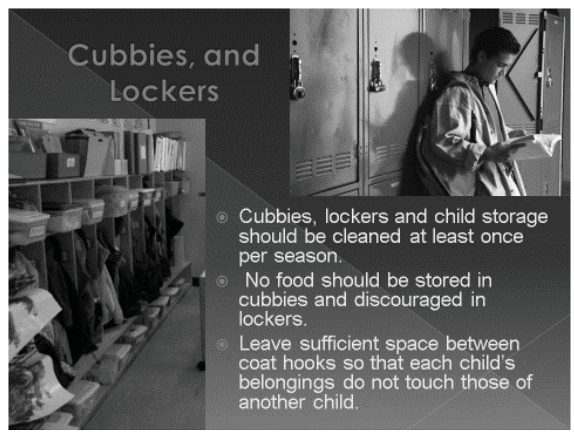

Custodial Mop Room
To reduce pest harborage in custodial closets:
Keep mop sinks and buckets empty and dry when not in use.
Hang all mops, allow to dry.
Repair plumbing leaks.
Keep floor drains clean.
Seal gaps around pipes.


Clutter and pests
Clutter control is essential in classrooms to reduce potential habitats for pests.
Clutter enables pests to hide and reproduce undisturbed.
Store materials in plastic storage boxes with lids.
Store items several inches away from walls to enable easy inspected for pests.

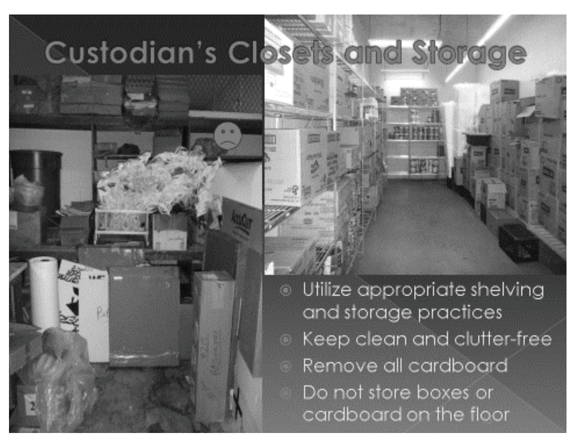

Eliminate Clutter / Harborage
Clutter removal is an essential part of IPM and pest elimination.


Pets in classrooms
Keep all pet food stored in plastic containers with tight-sealing lids.
Clean up any spilled foods promptly.
Pet cages and aquariums must be kept clean.
Check aquariums for water leaks.


Remove Pest Food: Waste Management
Employ good trash management practices:
Indoor trash containers should be emptied frequently.
Trash cans should have lids.
Do not leave trash cans full overnight.
Keep trash cans clean both inside and out.
Tie Plastic bags tightly.

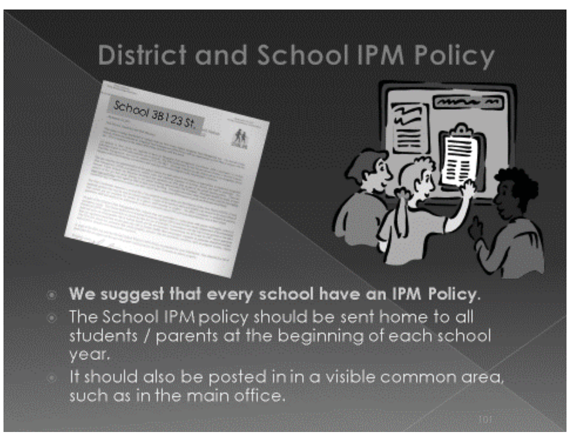

Cubbies, and Lockers
Cubbies, lockers and child storage should be cleaned at least once per season.
No food should be stored in cubbies and discouraged in lockers.
Leave sufficient space between coat hooks so that each child's belongings do not touch those of another child.

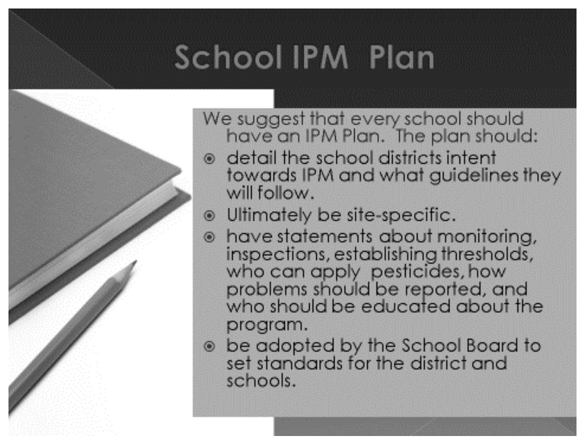

Restrooms
Clean rooms daily
Removed trash daily
Keep plumbing in good repair
Keep sink areas clean and dry
Fill all holes around pipes


Custodian's Closets and Storage
Utilize appropriate shelving and storage practices
Keep clean and clutter-free
Remove all cardboard
Do not store boxes or cardboard on the floor


Custodial Mop Room
To reduce pest harborage in custodial closets:
Keep mop sinks and buckets empty and dry when not in use.
Hang all mops, allow to dry.
Repair plumbing leaks.
Keep floor drains clean.
Seal gaps around pipes.

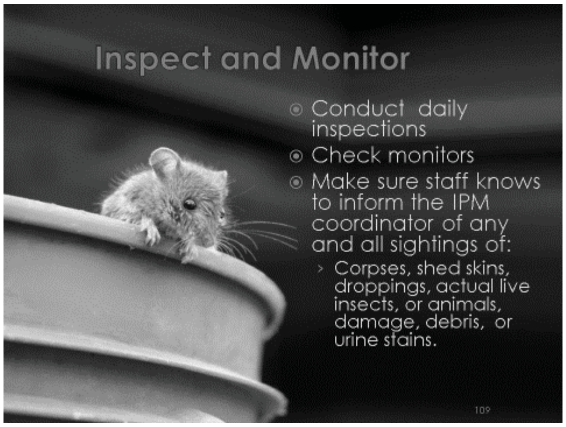

Essential Ingredients for a School IPM Program:
IPM Policy and Plan
IPM Coordinator
Staff involvement
Assessment of Pest Issues
Inspection and Monitoring
Pest Identification
Managed Treatment
Determine pest threshold.
Use multiple control tactics.
Education

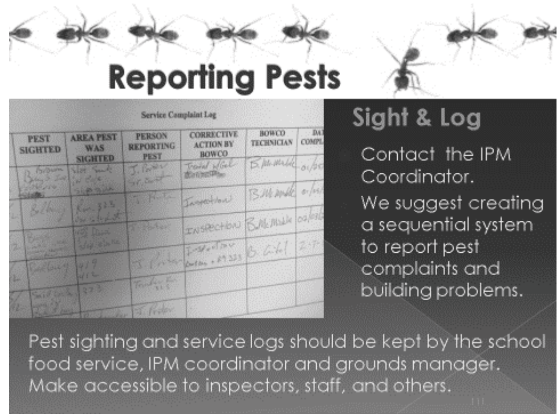

District and School IPM Policy
We suggest that every school have an IPM Policy.
The School IPM policy should be sent home to all students / parents at the beginning of each school year.
It should also be posted in in a visible common area, such as in the main office.

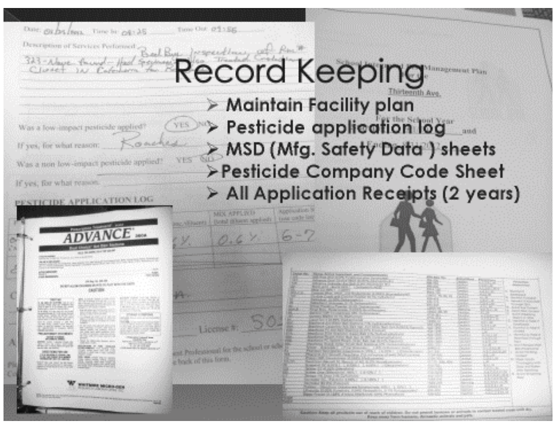

School IPM Plan
We suggest that every school should have an IPM Plan. The plan should:
detail the school districts intent towards IPM and what guidelines they will follow.
Ultimately be site-specific.
have statements about monitoring, inspections, establishing thresholds, who can apply pesticides, how problems should be reported, and who should be educated about the program.
be adopted by the School Board to set standards for the district and schools.

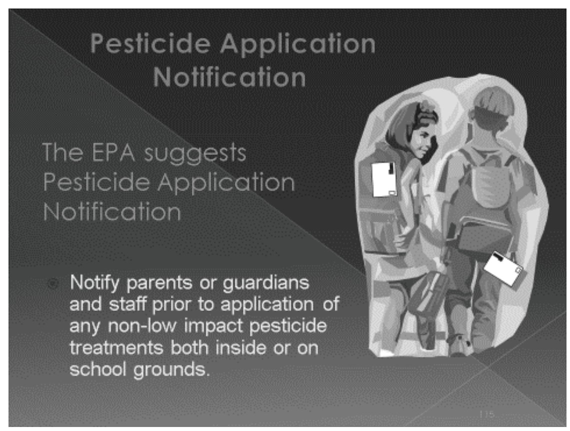

The Facility IPM Coordinator:
Oversees day to day pest problems.
Is responsible for maintaining the facility so pests cannot move in.
Relies on facility employees to report needed repairs or pest problems.
Maintains all pesticide application logs and records.
Ensures notice of pesticide treatments to parents and staff.
Is the main contact to the school pest management company.

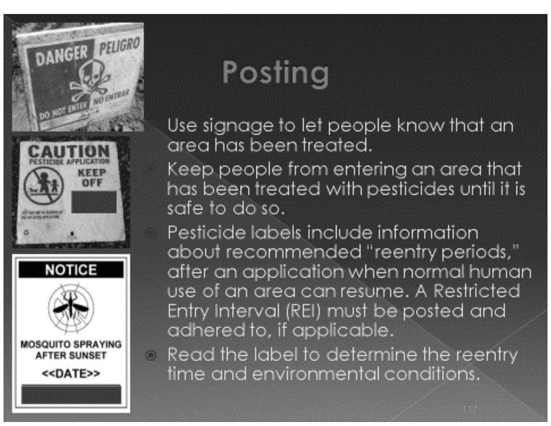

Staff Involvement:
See Something, Say Something.
Remember School IPM is everyone's job.
Everyone has a role to play with pest control issues:
Report broken doors, leaky pipes and faucets, cracks in walls.
Pick up clutter in your room.
Don't leave food, crumbs, candy and other items around.
Store food items in locking plastic containers.
Report food and drink spillages when they occur.

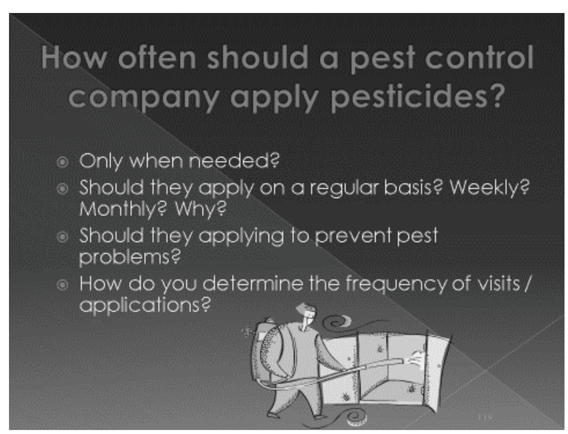

Inspect and Monitor
Conduct daily inspections
Check monitors
Make sure staff knows to inform the IPM coordinator of any and all sightings of:
Corpses, shed skins, droppings, actual live insects, or animals, damage, debris, or urine stains.


Reporting Pests
Sight & Log
Contact the IPM Coordinator.
We suggest creating a sequential system to report pest complaints and building problems.
Pest sighting and service logs should be kept by the school food service, IPM coordinator and grounds manager. Make accessible to inspectors, staff, and others.


Record Keeping
Maintain Facility plan
Pesticide application log
MSD (Mfg. Safety Data) sheets
Pesticide Company Code Sheet
All Application Receipts (2 years)

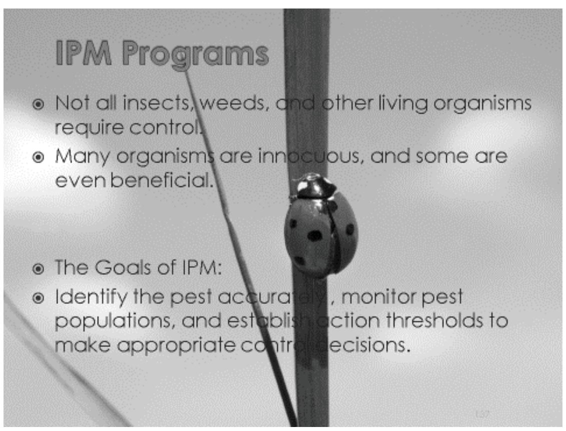

Pesticide Application Notification
The EPA suggests Pesticide Application Notification
Notify parents or guardians and staff prior to application of any non-low impact pesticide treatments both inside or on school grounds.

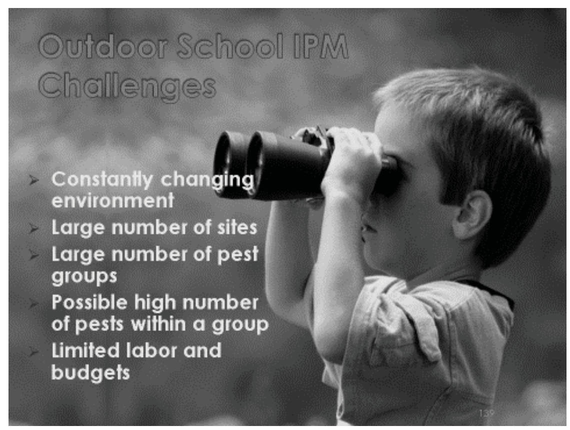

DANGER PELIGRO
DO NOT ENTER NO ENTRAR
CAUTION
PESTICIDE APPLICATION
KEEP OFF
NOTICE
MOSQUITO SPRAYING AFTER SUNSET
<<DATE>>
Posting
Use signage to let people know that an area has been treated.
Keep people from entering an area that has been treated with pesticides until it is safe to do so.
Pesticide labels include information about recommended "reentry periods," after an application when normal human use of an area can resume. A Restricted Entry Interval (REI) must be posted and adhered to, if applicable.
Read the label to determine the reentry time and environmental conditions.

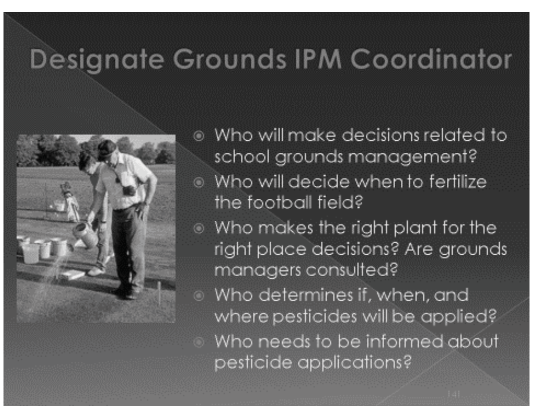

How often should a pest control company apply pesticides?
Only when needed?
Should they apply on a regular basis? Weekly? Monthly? Why?
Should they applying to prevent pest problems?
How do you determine the frequency of visits / applications?

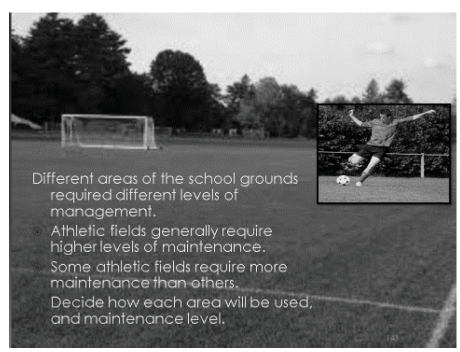

Integrated Pest Management in
Schools: Outdoors

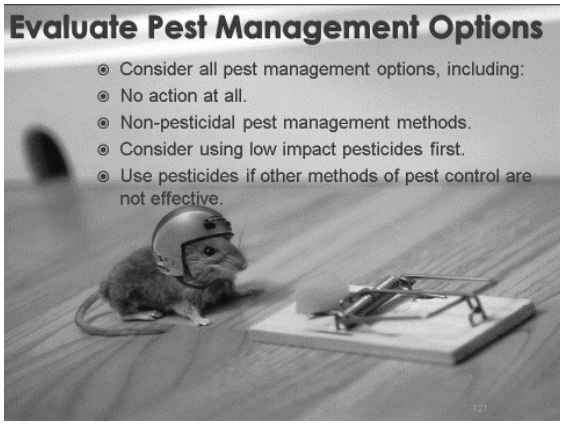

Why is IPM in Outdoor
Environments Important?
Pesticides may be carried indoors on the shoes and clothing of children.
Children may inhale pesticides kicked up by running, walking or playing on treated fields
Falling, rolling or playing on recently treated fields may lead to dermal and possibly ingestion exposures.


IPM Programs
Not all insects, weeds, and other living organisms require control.
Many organisms are innocuous, and some are even beneficial.
The Goals of IPM:
Identify the pest accurately, monitor pest populations, and establish action thresholds to make appropriate control decisions.


Outdoor School IPM
Challenges
Constantly changing environment
Large number of sites
Large number of pest groups
Possible high number of pests within a group
Limited labor and budgets

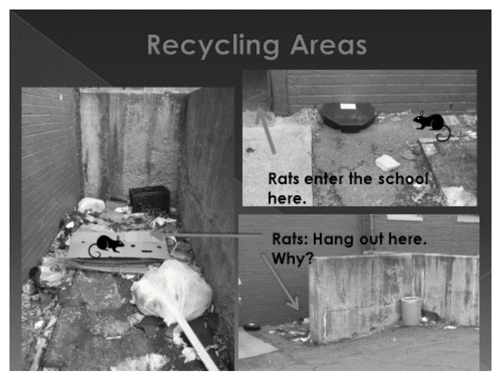

Designate Grounds IPM Coordinator
Who will make decisions related to school grounds management?
Who will decide when to fertilize the football field?
Who makes the right plant for the right place decisions? Are grounds managers consulted?
Who determines if, when, and where pesticides will be applied?
Who needs to be informed about pesticide applications?


Different areas of the school grounds required different levels of management.
Athletic fields generally require higher levels of maintenance.
Some athletic fields require more maintenance than others.
Decide how each area will be used, and maintenance level.

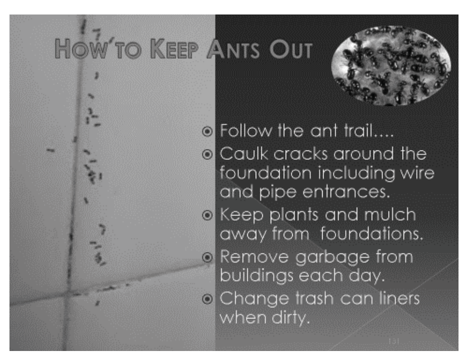

Evaluate Pest Management Options
Consider all pest management options, including:
No action at all.
Non-pesticidal pest management methods.
Consider using low impact pesticides first.
Use pesticides if other methods of pest control are not effective.


Keep Dumpster Areas Clean
Empty indoor garbage promptly into dumpsters.
Keep area around dumpsters clean and free of debris.


Pest Prevention:
Keep your recycling area clean.


Recycling Areas
Rats enter the school here.
Rats: Hang out here. Why?


Rodent Management
Trapping is an important component of rodent control.
Rats are trap-shy and will avoid traps.
Put the traps out with bait, but do not set them for several days until the rats are used to them.
Only use baits within a child resistant bait station.
Never spread loose baits – it is illegal


How to Keep Ants Out
Follow the ant trail....
Caulk cracks around the foundation including wire and pipe entrances.
Keep plants and mulch away from foundations.
Remove garbage from buildings each day.
Change trash can liners when dirty.


Integrated Pest Management in Schools: Outdoors


Why is IPM in Outdoor Environments Important?
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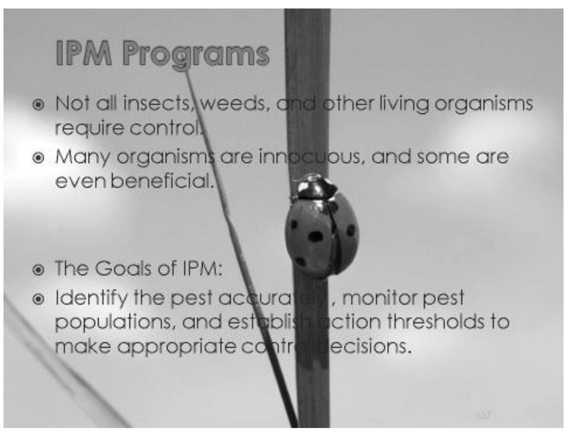
Falling, rolling or playing on recently treated fields may lead to dermal and possibly ingestion exposures.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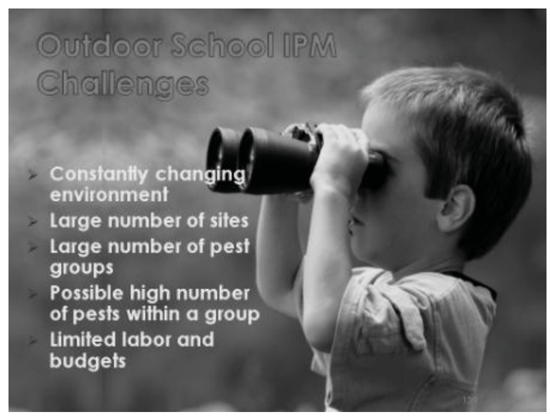
Identify the pest accura , monitor pest populations, and establi ction thresholds to make appropriate co tr ecisions.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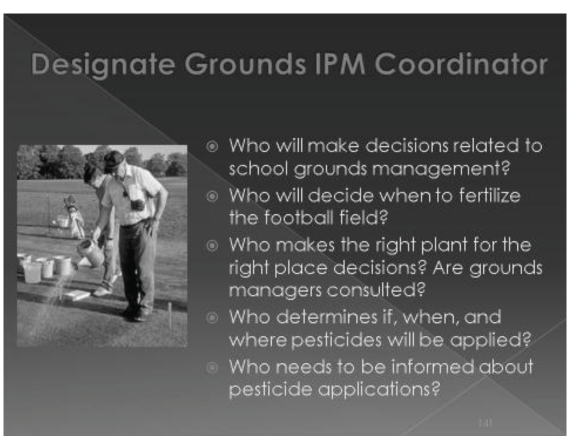
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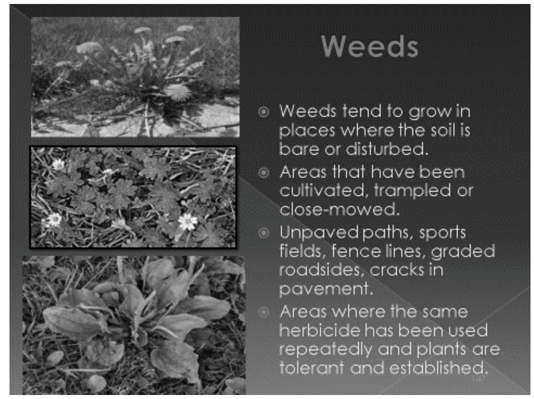
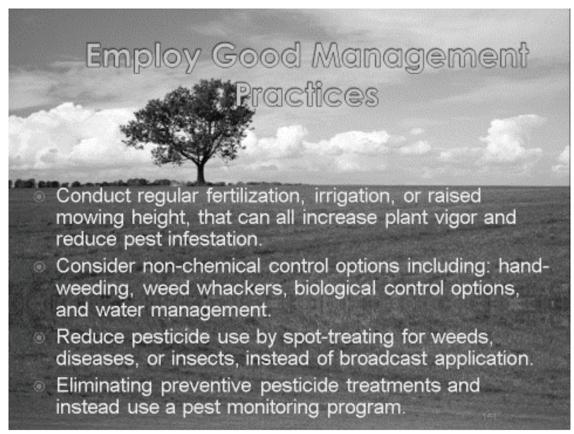
Who needs to be informed about pesticide applications?


Different areas of the school grounds required different levels of management.
Athletic fields generally require higher levels of maintenance.
Some athletic fields require more maintenance than others.
Decide how each area will be used, and maintenance level.

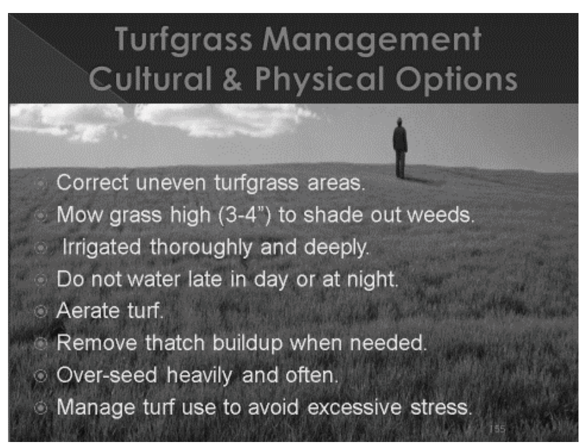

Identify management zones
Classify each turfgrass area into a management zone:
1. Highest care – varsity and practice athletic fields; high-visibility grounds.
2. Moderate care – multipurpose fields,
3. Lowest care – low use areas, utility areas, property lines.


Weeds
Weeds tend to grow in places where the soil is bare or disturbed.
Areas that have been cultivated, trampled or close-mowed.
Unpaved paths, sports fields, fence lines, graded roadsides, cracks in pavement.
Areas where the same herbicide has been used repeatedly and plants are tolerant and established.

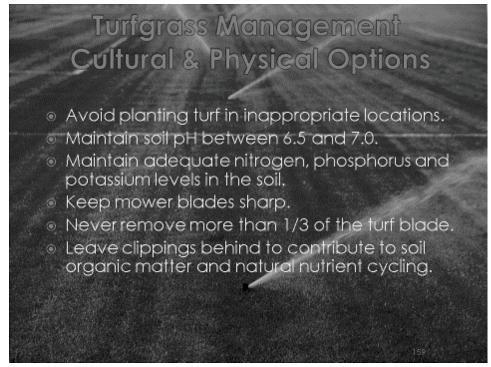

What are your pest thresholds?
At what point does an administrator determine if there is a real pest problem?
When is it time to have an herbicide applied?
1 dandelion found?
5 dandelions found?
dandelions found?
Are dandelions still sprouting?
Are dandelions dangerous?


Employ Good Management Practices
Conduct regular fertilization, irrigation, or raised mowing height, that can all increase plant vigor and reduce pest infestation.
Consider non-chemical control options including: hand-weeding, weed whackers, biological control options, and water management.
Reduce pesticide use by spot-treating for weeds, diseases, or insects, instead of broadcast application.
Eliminating preventive pesticide treatments and instead use a pest monitoring program.

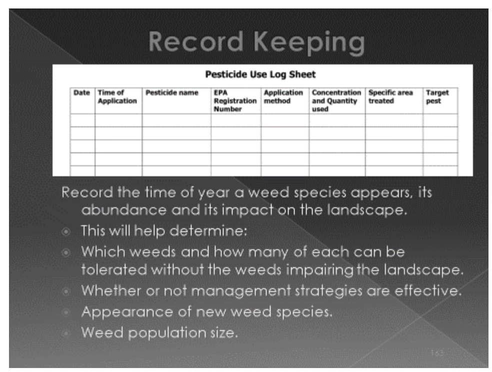

Good Management Practices
Keep turf vigorous and healthy to control weeds.
Turf mowing height affects weed development .
Tall turf impedes weeds.
Turf mowed too short creates plant stress and opportunities for weeds to develop.
Summer irrigation is necessary during hot, dry periods lasting more than 3 weeks.
If turfgrass goes dormant weeds will develop.

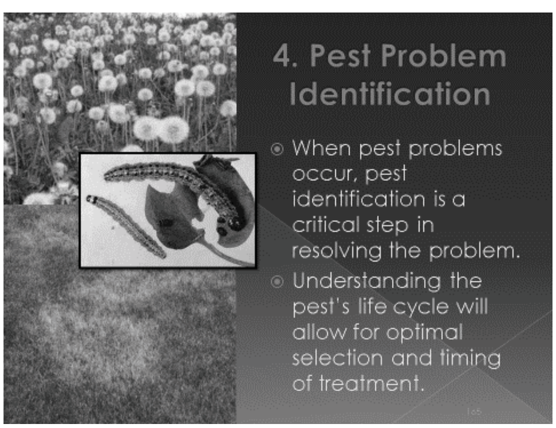

Turfgrass Management Cultural & Physical Options
Correct uneven turfgrass areas.
Mow grass high (3-4") to shade out weeds.
Irrigated thoroughly and deeply.
Do not water late in day or at night.
Aerate turf.
Remove thatch buildup when needed.
Over-seed heavily and often.
Manage turf use to avoid excessive stress.

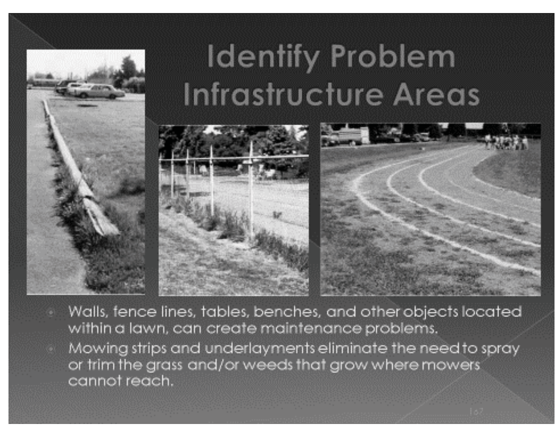

Pesticide Options for Turfgrass
Do Not use:
Routine or calendar-scheduled applications.
Widespread pesticide applications.
Instead:
Develop a comprehensive cultural management program.
Carefully select least-hazardous pesticides
Limit to affected areas.
Use only after cultural methods fail or are impractical.

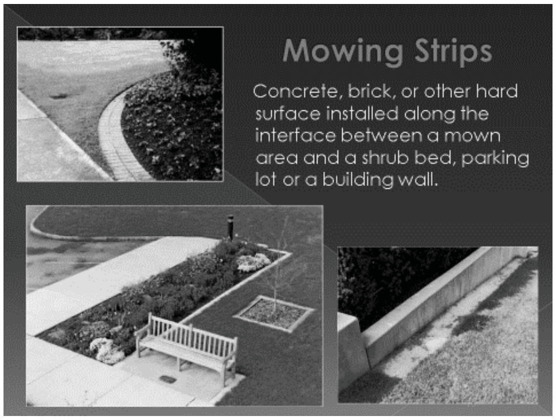

Turfgrass Management
Cultural & Physical Options
Avoid planting turf in inappropriate locations.
Maintain soil pH between 6.5 and 7.0.
Maintain adequate nitrogen, phosphorus and potassium levels in the soil.
Keep mower blades sharp.
Never remove more than 1/3 of the turf blade.
Leave clippings behind to contribute to soil organic matter and natural nutrient cycling.

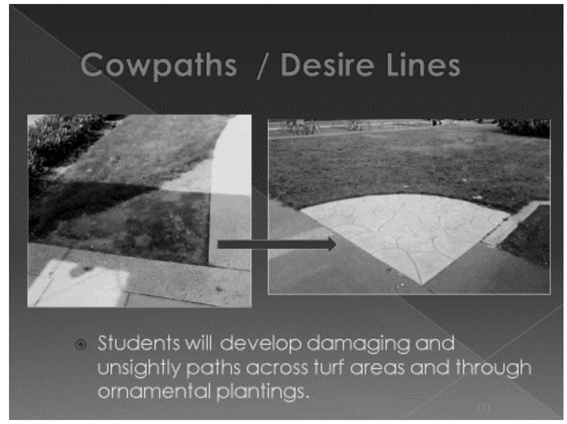

Turf Review Questions
What grass species are your fields?
Resistant varieties?
Are soils tested regularly?
Irrigation, Standing water?
Fertilization and aeration?
Mowing height, blade sharpness?
What are your pest problems?
Weed tolerance threshold?
How often are fields used?
Are fields rotated?
Outside influences?
Drainage issues?
Disease issues?

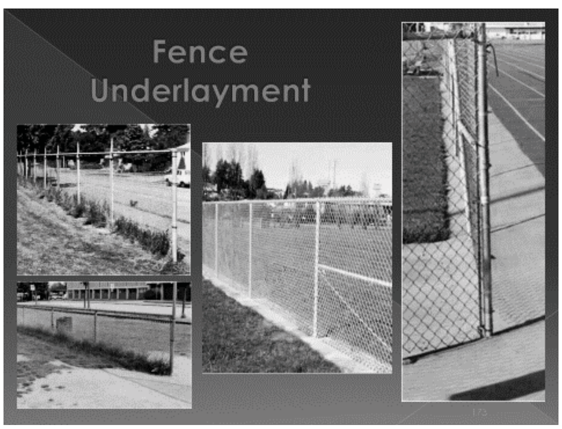

Record Keeping
Pesticide Use Log Sheet
Date
Time of Application
Pesticide name
EPA Registration Number
Application method
Concentration and Quantity used
Specific area treated
Target pest
Record the time of year a weed species appears, its abundance and its impact on the landscape.
This will help determine:
Which weeds and how many of each can be tolerated without the weeds impairing the landscape.
Whether or not management strategies are effective.
Appearance of new weed species.
Weed population size.


4. Pest Problem Identification
When pest problems occur, pest identification is a critical step in resolving the problem.
Understanding the pest's life cycle will allow for optimal selection and timing of treatment.

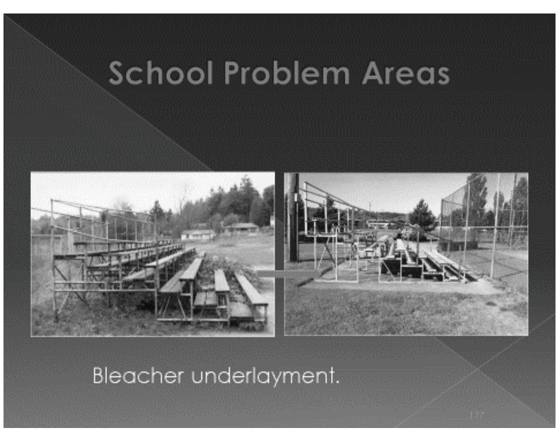

Identify Problem Infrastructure Areas
Walls, fence lines, tables, benches, and other objects located within a lawn, can create maintenance problems.
Mowing strips and underlayments eliminate the need to spray or trim the grass and/or weeds that grow where mowers cannot reach.

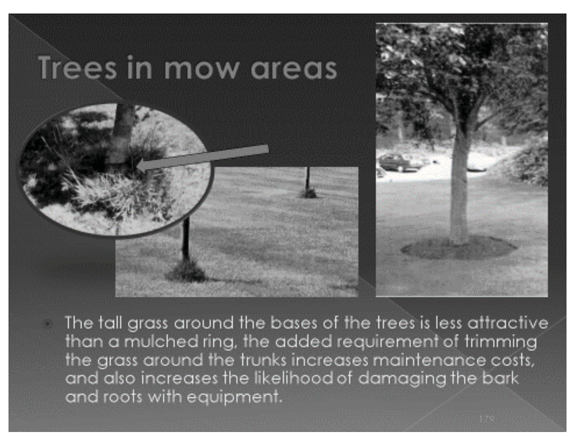

Mowing Strips
Concrete, brick, or other hard surface installed along the interface between a mown area and a shrub bed, parking lot or a building wall.


Cowpaths / Desire Lines
Students will develop damaging and unsightly paths across turf areas and through ornamental plantings.


Fence Underlayment

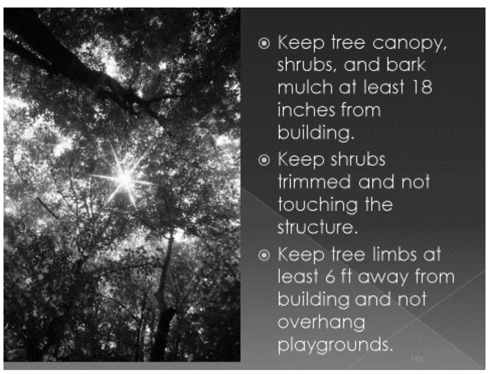

More Problems Solved with Underlayment

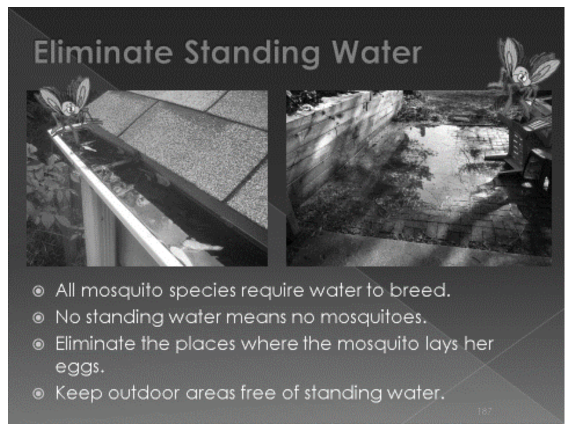

School Problem Areas
Bleacher underlayment.

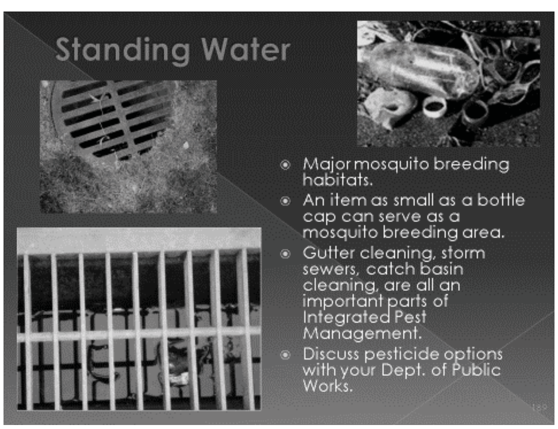

Trees in mow areas
The tall grass around the bases of the trees is less attractive than a mulched ring, the added requirement of trimming the grass around the trunks increases maintenance costs, and also increases the likelihood of damaging the bark and roots with equipment.


Take the trees off the lawn
The mulched area around the trunks of the trees aids in the efficiency of the mowing, eliminates the need for trimming tall grass around the tree trunks, and helps prevent injury to the bark from equipment.

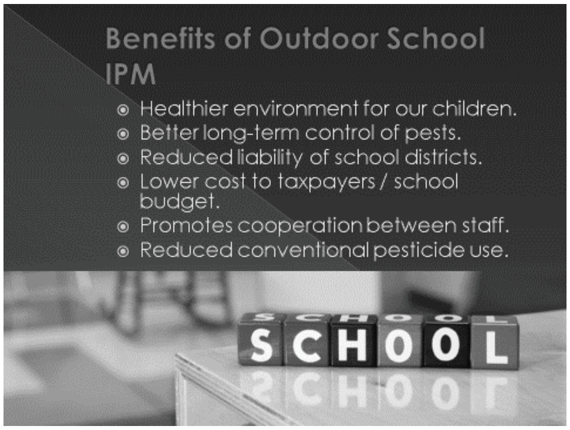

Other Outdoor Areas
Landscape plantings offer pests access to buildings.
Keep trees trimmed trimmed and not overhanging the school.
Be aware of hazardous tree conditions.

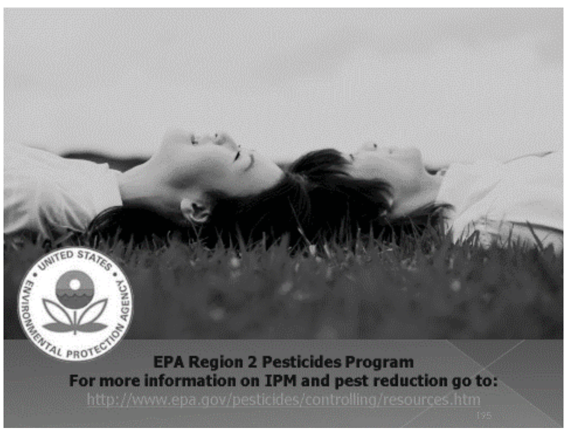

Keep tree canopy, shrubs, and bark mulch at least 18 inches from building.
Keep shrubs trimmed and not touching the structure.
Keep tree limbs at least 6 ft away from building and not overhang playgrounds.


Eliminate Standing Water
All mosquito species require water to breed.
No standing water means no mosquitoes.
Eliminate the places where the mosquito lays her eggs.
Keep outdoor areas free of standing water.

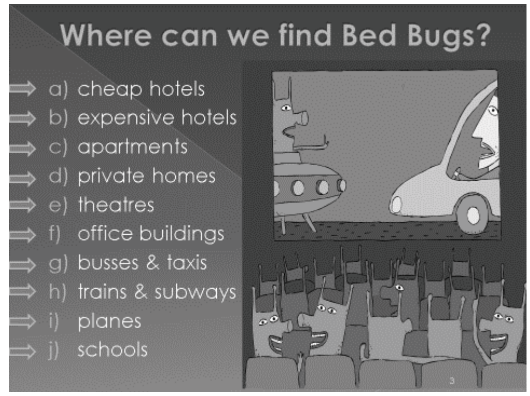

Standing Water
Major mosquito breeding habitats.
An item as small as a bottle cap can serve as a mosquito breeding area.
Gutter cleaning, storm sewers, catch basin cleaning, are all an important parts of Integrated Pest Management.
Discuss pesticide options with your Dept. of Public Works.

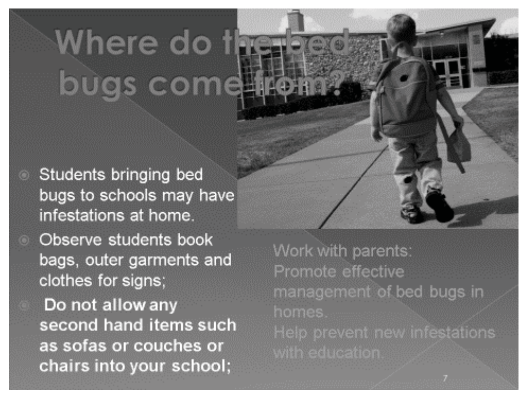

Tires: A Health Hazard?
Tires collect and store rainwater, thus are another breeding habitat for mosquitoes.
A single tire can harbor tens of thousands of potentially disease carrying mosquitoes.
Drill ¼" holes in tires for drainage.

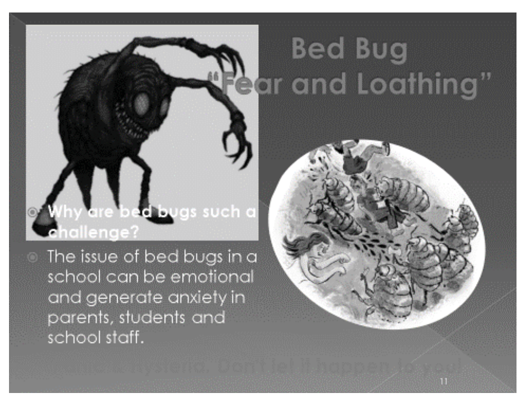

Benefits of Outdoor School IPM
Healthier environment for our children.
Better long-term control of pests.
Reduced liability of school districts.
Lower cost to taxpayers / school budget.
Promotes cooperation between staff.
Reduced conventional pesticide use.
SCHOOL

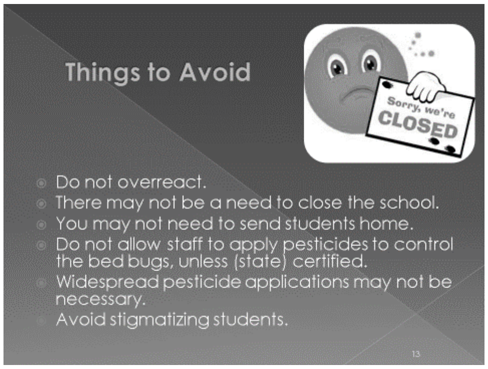

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EPA Region 2 Pesticides Program
For more information on IPM and pest reduction go to:
http://www.epa.gov/pesticides/controlling/resources.htm
195

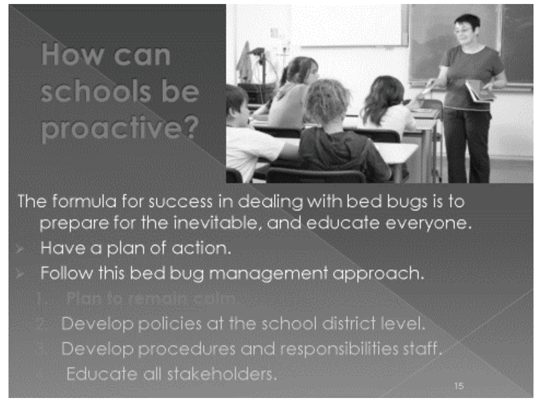
Presentation 3 Bed Bugs go to School: Staff

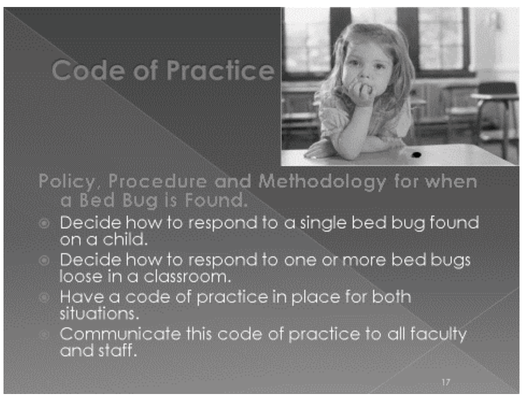




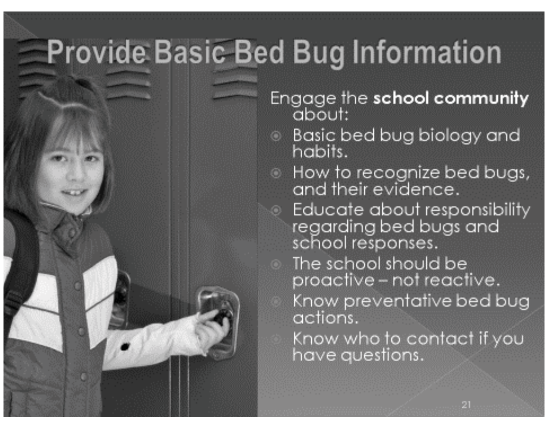


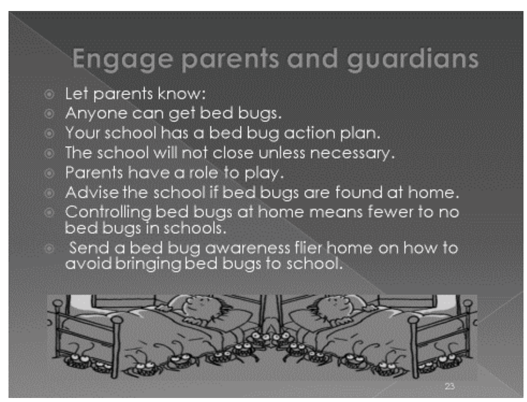

Things to Avoid
Sorry, we're CLOSED
Do not overreact.
There may not be a need to close the school.
You may not need to send students home.
Do not allow staff to apply pesticides to control the bed bugs, unless (state) certified.
Widespread pesticide applications may not be necessary.
Avoid stigmatizing students.
13

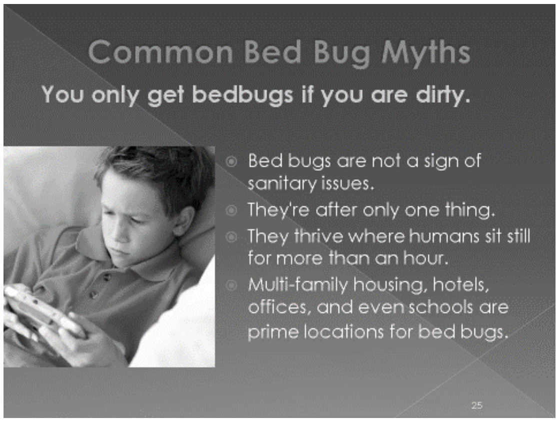

How can schools be proactive?
The formula for success in dealing with bed bugs is to prepare for the inevitable, and educate everyone.
Have a plan of action.
Follow this bed bug management approach.
1. Plan to remain calm.
2. Develop policies at the school district level.
3. Develop procedures and responsibilities staff.
4. Educate all stakeholders.
15


Code of Practice
Policy, Procedure and Methodology for when a Bed Bug is Found.
Decide how to respond to a single bed bug found on a child.
Decide how to respond to one or more bed bugs loose in a classroom.
Have a code of practice in place for both situations.
Communicate this code of practice to all faculty and staff.
17

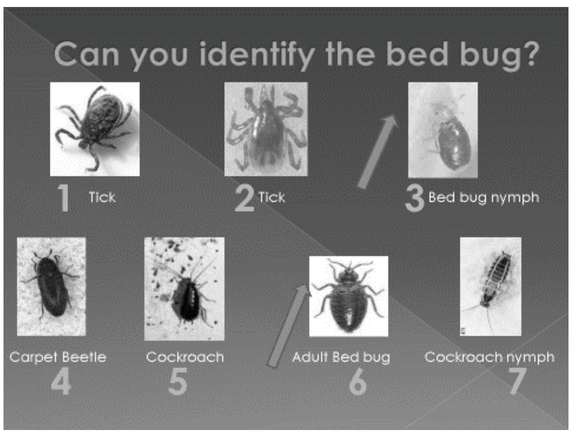

How can schools be proactive?
The formula for success in dealing with bed bugs is to prepare for the inevitable, and educate everyone.
Have a plan of action.
Follow this bed bug management approach.
1. Plan to remain calm.
2. Develop policies at the school district level.
3. Develop procedures and responsibilities staff.
4. Educate all stakeholders.

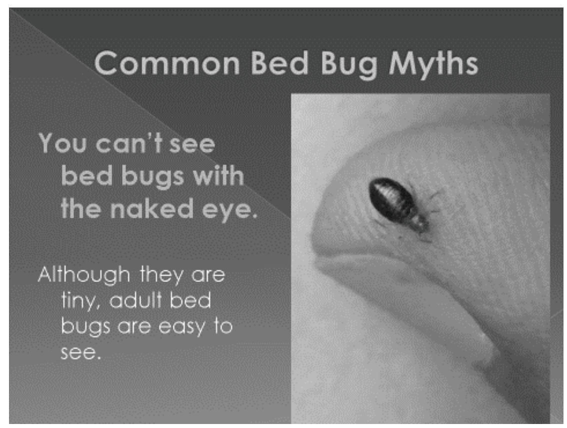

Provide Basic Bed Bug Information
Engage the **school community** about:
Basic bed bug biology and habits.
How to recognize bed bugs, and their evidence.
Educate about responsibility regarding bed bugs and school responses.
The school should be proactive – not reactive.
Know preventative bed bug actions.
Know who to contact if you have questions.
21


Engage parents and guardians
Let parents know:
Anyone can get bed bugs.
Your school has a bed bug action plan.
The school will not close unless necessary.
Parents have a role to play.
Advise the school if bed bugs are found at home.
Controlling bed bugs at home means fewer to no bed bugs in schools.
Send a bed bug awareness flier home on how to avoid bringing bed bugs to school.
23

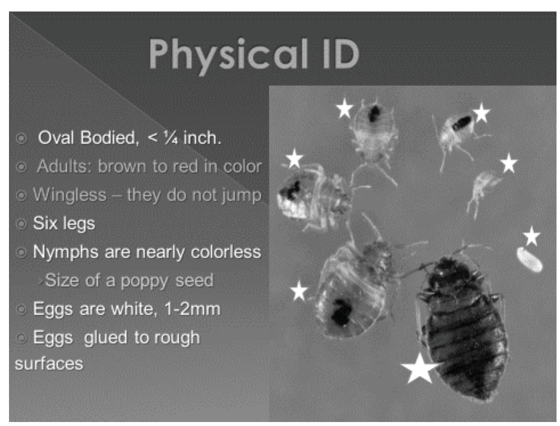

Common Bed Bug Myths
You only get bedbugs if you are dirty.
Bed bugs are not a sign of sanitary issues.
They're after only one thing.
They thrive where humans sit still for more than an hour.
Multi-family housing, hotels, offices, and even schools are prime locations for bed bugs.
25

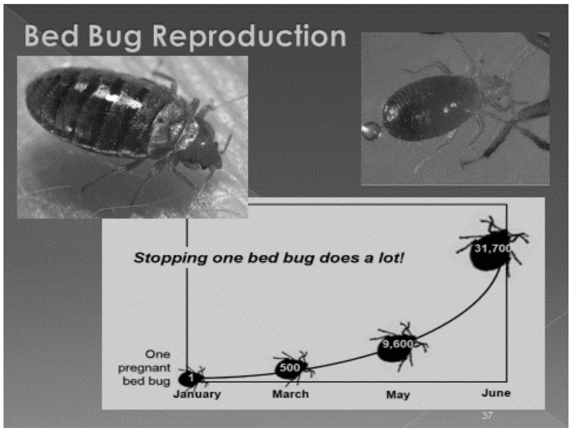

Common Bed Bug Myths
Are bed bugs only active at night?
While bed bugs prefer darkness, keeping the light on at night won't deter them from biting.
They are most active between 2 and 5am.

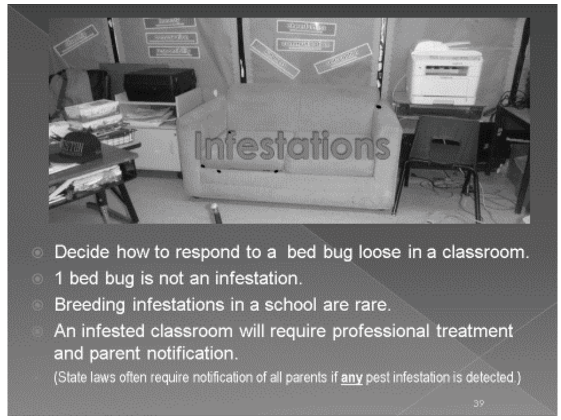

Can you identify the bed bug?
1 Tick
2 Tick
3 Bed bug nymph
Carpet Beetle 4
Cockroach 5
Adult Bed bug 6
Cockroach nymph 7

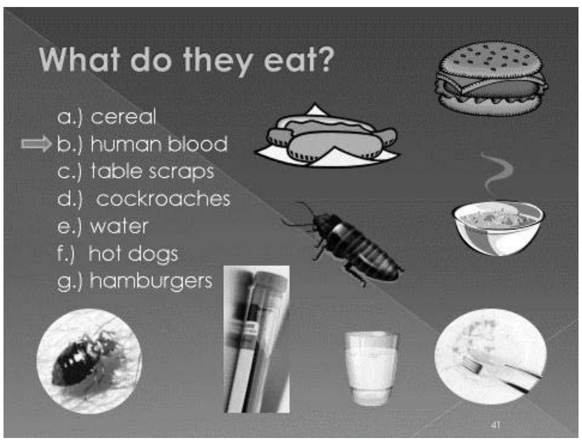

Common Bed Bug Myths
You can't see bed bugs with the naked eye.
Although they are tiny, adult bed bugs are easy to see.

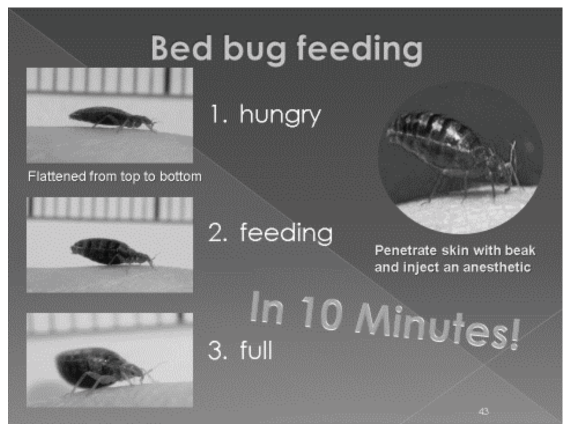

Common Bed Bug Myths
You should be able to see adult bed bugs.
Adults are a little smaller than an apple seed.
1st instar nymph is about the size of a period at end of sentence.

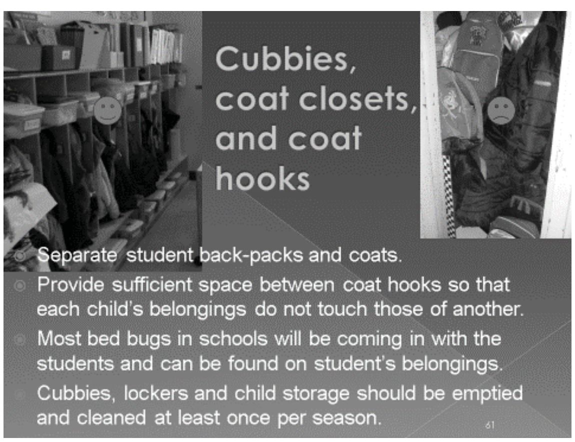

Physical ID
Oval Bodied, < ¼ inch.
Adults: brown to red in color
Wingless – they do not jump
Six legs
Nymphs are nearly colorless
Size of a poppy seed
Eggs are white, 1-2mm
Eggs glued to rough surfaces


Bed Bug Reproduction
Stopping one bed bug does a lot!
One pregnant bed bug
1
500
9,600
31,700
January
March
May
June
37

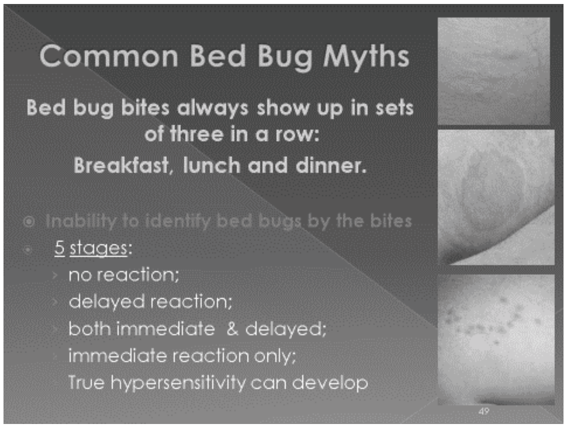

Infestations
Decide how to respond to a bed bug loose in a classroom.
1 bed bug is not an infestation.
Breeding infestations in a school are rare.
An infested classroom will require professional treatment and parent notification.
(State laws often require notification of all parents if any pest infestation is detected.)
39

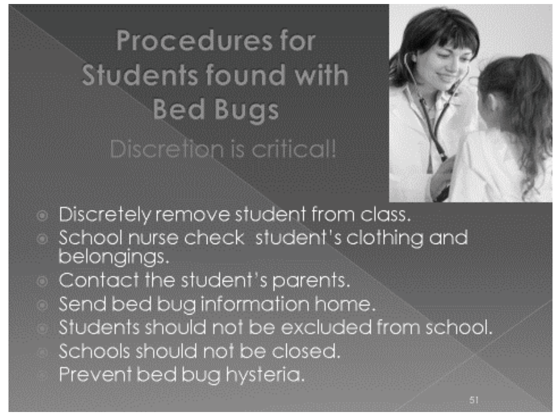

What do they eat?
a.) cereal
b.) human blood
c.) table scraps
d.) cockroaches
e.) water
f.) hot dogs
g.) hamburgers
41


Bed bug feeding
1. hungry
Flattened from top to bottom
2. feeding
Penetrate skin with beak and inject an anesthetic
In 10 Minutes!
3. full
43

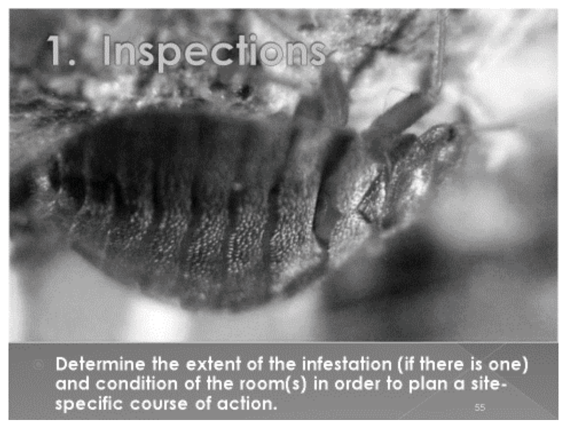

Cubbies, coat closets, and coat hooks
Separate student back-packs and coats.
Provide sufficient space between coat hooks so that each child's belongings do not touch those of another.
Most bed bugs in schools will be coming in with the students and can be found on student's belongings.
Cubbies, lockers and child storage should be emptied and cleaned at least once per season.
61

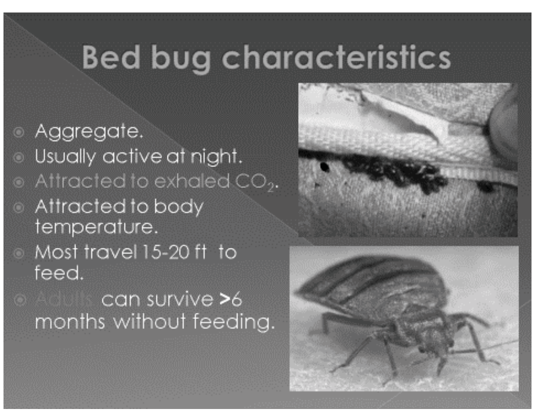

Unusual Harborages
63

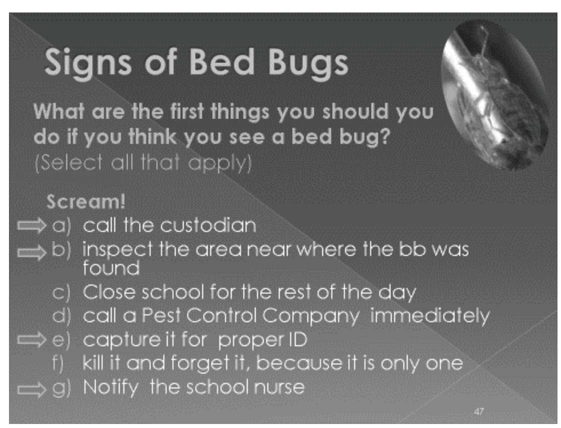

Common Bed Bug Myths
Bed bug bites always show up in sets of three in a row:
Breakfast, lunch and dinner.
Inability to identify bed bugs by the bites
5 stages:
no reaction;
delayed reaction;
both immediate & delayed;
immediate reaction only;
True hypersensitivity can develop
49


Procedures for Students found with Bed Bugs
Discretion is critical!
Discretely remove student from class.
School nurse check student's clothing and belongings.
Contact the student's parents.
Send bed bug information home.
Students should not be excluded from school.
Schools should not be closed.
Prevent bed bug hysteria.
51

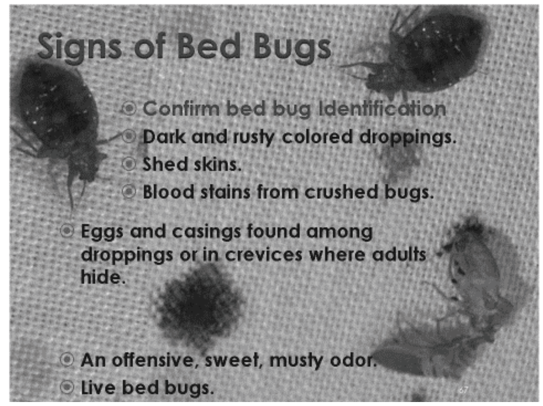

Inspecting for Bed Bugs
Look very carefully.
Can you see hitch hikers on this backpack?


1. Inspections
Determine the extent of the infestation (if there is one) and condition of the room(s) in order to plan a site-specific course of action.
55

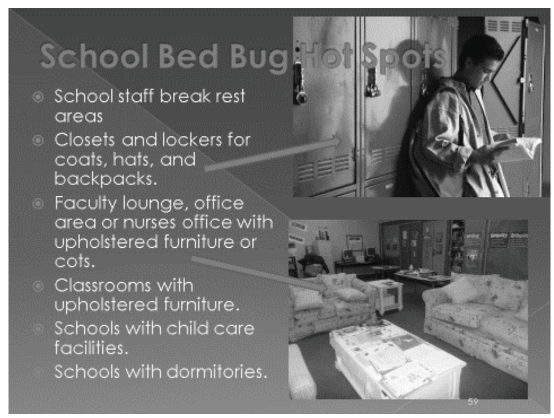

Bed bug characteristics
Aggregate.
Usually active at night.
Attracted to exhaled CO_2.
Attracted to body temperature.
Most travel 15-20 ft to feed.
Adults can survive >6 months without feeding.


Signs of Bed Bugs
What are the first things you should you do if you think you see a bed bug?
(Select all that apply)
Scream!
a) call the custodian
b) inspect the area near where the bb was found
c) Close school for the rest of the day
d) call a Pest Control Company immediately
e) capture it for proper ID
f) kill it and forget it, because it is only one
g) Notify the school nurse
47


Recommended Inspection Tool Kit
Magnifying glass
Strong flashlight
Plastic zip-bags or scotch tape
A probe,
Screwdrivers
Small tool kit
Cleaning wipes
Alcohol and Cotton swabs
Mirror

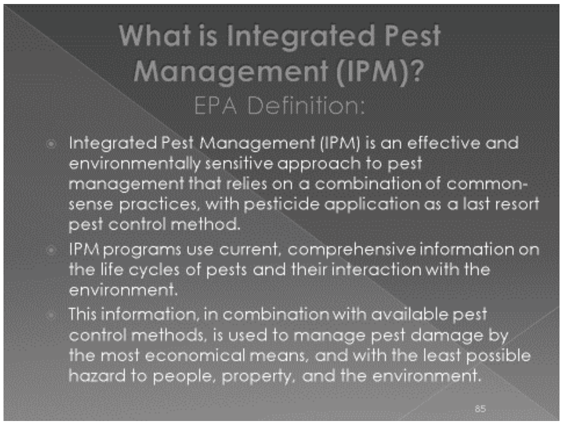

Signs of Bed Bugs
Confirm bed bug identification
Dark and rusty colored droppings.
Shed skins.
Blood stains from crushed bugs.
Eggs and casings found among droppings or in crevices where adults hide.
An offensive, sweet, musty odor.
Live bed bugs.


Inspections
Thoroughly inspect the surrounding area where the bed bug was found.
Include desks, floors, walls and storage areas.
Inspect any closets or lockers used to store the person's belongings.
Arrange for an inspection by a management professional.
Map out bed bug sightings and confirmed findings.

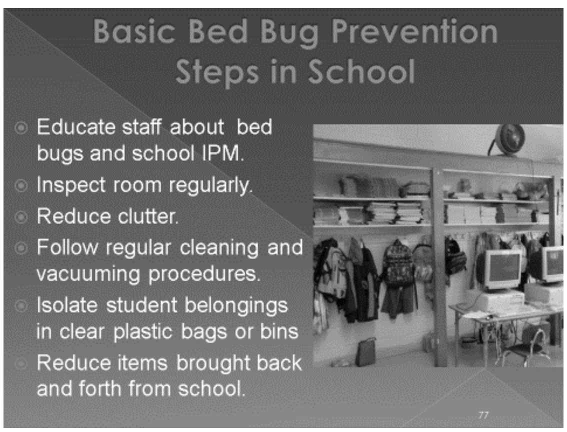

School Bed Bug Hot Spots
School staff break rest areas
Closets and lockers for coats, hats, and backpacks.
Faculty lounge, office area or nurses office with upholstered furniture or cots.
Classrooms with upholstered furniture.
Schools with child care facilities.
Schools with dormitories.

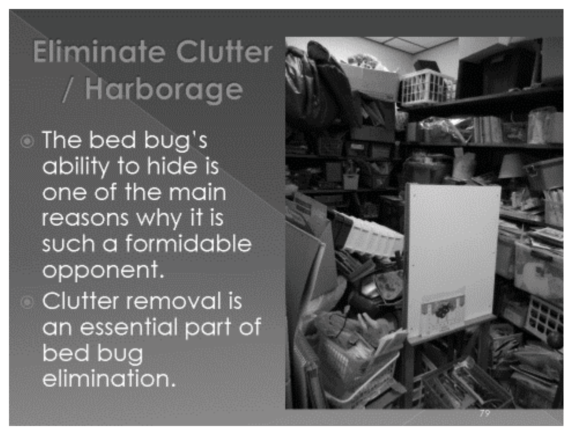

Monitors: Sticky Traps
BDS™
Trapper
Sticky traps are more effective for cockroaches and other pests, but can still catch a bed bug.
BB Alert ™Passive

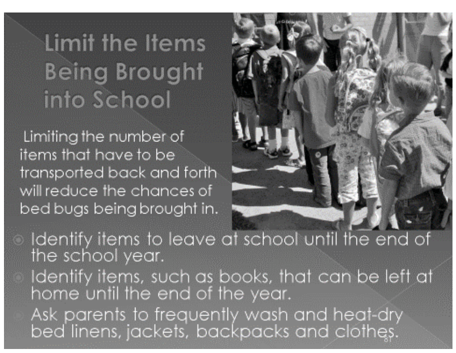

Pest Prevention
Seal up all cracks, holes, outlets
Eliminate all harborages (clutter)
Well maintained facility
Well educated staff
Well educated parents

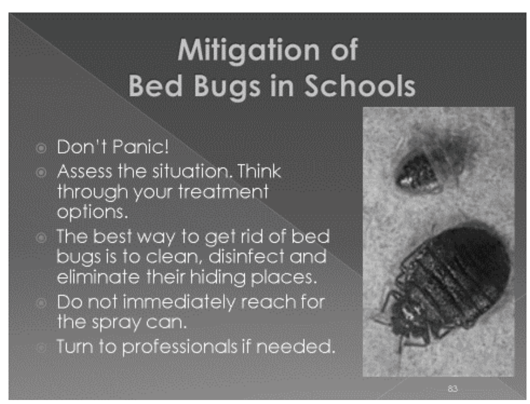

What is Integrated Pest Management (IPM)?
EPA Definition:
Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices, with pesticide application as a last resort pest control method.
IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment.
This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.


Zero Tolerance vs. IPM for Bed Bugs
Greatly reduce the need to resort to pesticides by:
A preventive attitude,
A plan of action,
An open reporting policy,
Schedule regular inspections,
Offer awareness training,
React immediately.


Basic Bed Bug Prevention Steps in School
Educate staff about bed bugs and school IPM.
Inspect room regularly.
Reduce clutter.
Follow regular cleaning and vacuuming procedures.
Isolate student belongings in clear plastic bags or bins
Reduce items brought back and forth from school.


Eliminate Clutter / Harborage
The bed bug's ability to hide is one of the main reasons why it is such a formidable opponent.
Clutter removal is an essential part of bed bug elimination.


Limit the Items Being Brought into School
Limiting the number of items that have to be transported back and forth will reduce the chances of bed bugs being brought in.
Identify items to leave at school until the end of the school year.
Identify items, such as books, that can be left at home until the end of the year.
Ask parents to frequently wash and heat-dry bed linens, jackets, backpacks and clothes.

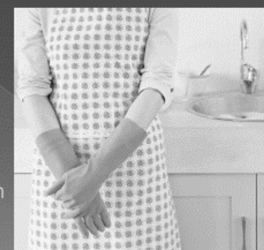

Mitigation of Bed Bugs in Schools
Don't Panic!
Assess the situation. Think through your treatment options.
The best way to get rid of bed bugs is to clean, disinfect and eliminate their hiding places.
Do not immediately reach for the spray can.
Turn to professionals if needed.

Additional Controls: Seal Cracks

- Use silicon caulk to seal.
- Create a perimeter barrier.
- Target walls that are shared with other homes.
- Plates covering wall openings should be sealed.

Good 'Ole Fashioned Washing

- Bleach and ammonia may not be effective against bed bugs.
- Soap and water is effective for removing bed bugs, eggs and debris from surfaces.



99

The Alternatives

- The most effective bed bug treatments use IPM, combining conventional products with eco-friendly alternatives to thoroughly kill the insects.
- After sanitation, maintenance and use of physical barriers, there are two other categories of non-chemical solutions to kill bed bugs:
- Temperature
- Bio-based

Bed Bug IPM Control Methods

Intent: Kill bed bugs and eliminate harborage without the use of pesticides, unless absolutely necessary.

1. Sanitation, maintenance and barriers
   - Vacuum regularly
   - Clutter removal
   - Seal cracks where bed bugs hide
   - Install bed bug interceptors under plush furniture legs
2. Temperature
   - Isolate items in plastic containers and bags
   - Hot steam or ambient heat treatments
   - Wash laundry and treat items in a hot dryer
   - Cryonite or carbon dioxide (Freezing method)
3. Bio-Based
   - Bio-based dusts like - diatomaceous earth, insect hormones and essential oils.

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Managing bed bugs: 1. Sanitation

- Use control tactics consistent with school IPM guidelines and regulations.
- Include nonchemical approaches such as, cleaning, vacuuming, reducing clutter, trapping.

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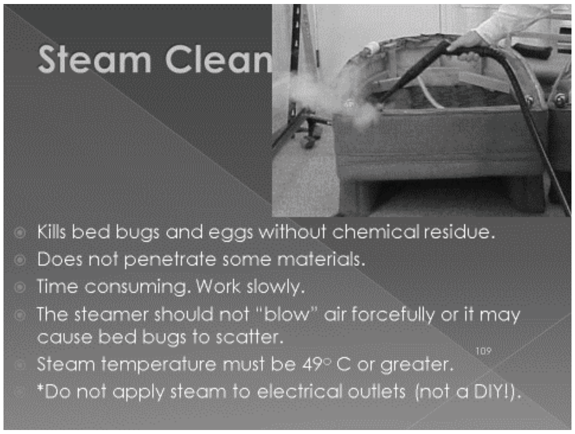
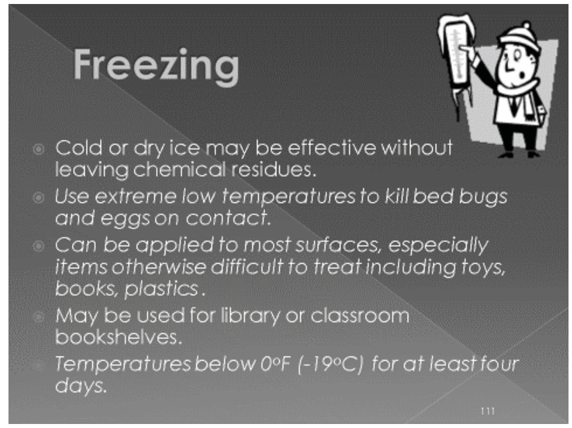
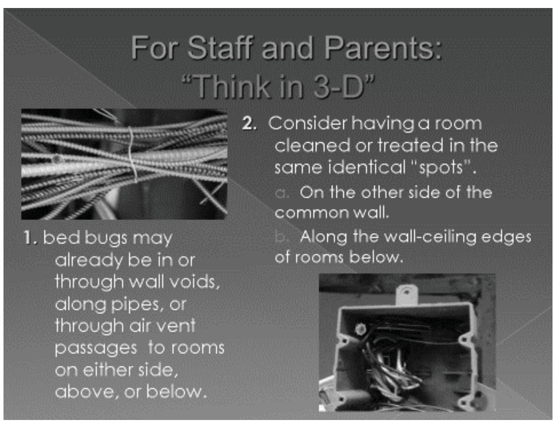
Vacuuming

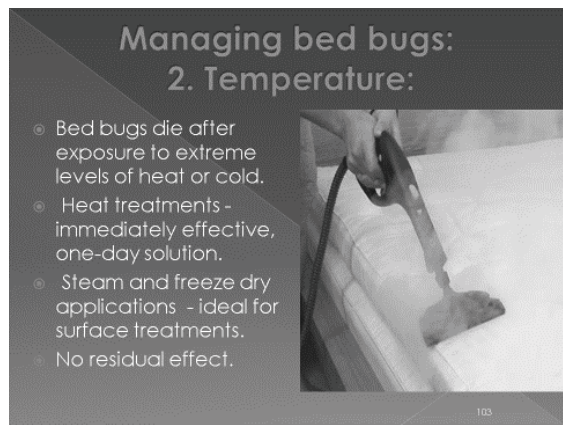
- **Vacuuming is a very effective way to control bed bugs.**
- It leaves no chemical residues.
- Vacuuming is an effective way to remove bed bugs and the dirt that provides them with shelter.
- A thorough vacuuming may be needed with special attention to cracks and crevices in furniture and equipment, walls and floors.
- Vacuum talcum powder and/or DE dust to inhibit bugs from crawling out of vacuum bag.
- Properly dispose of filter and/or bags. (seal in plastic bag).

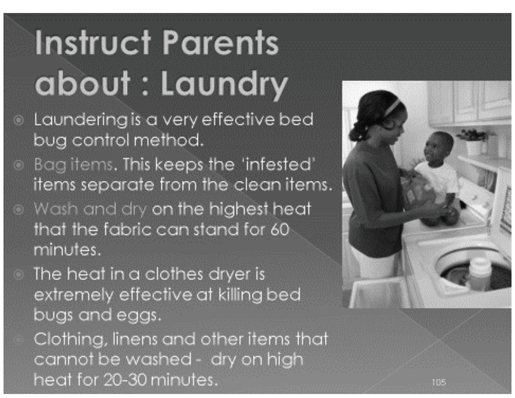
95

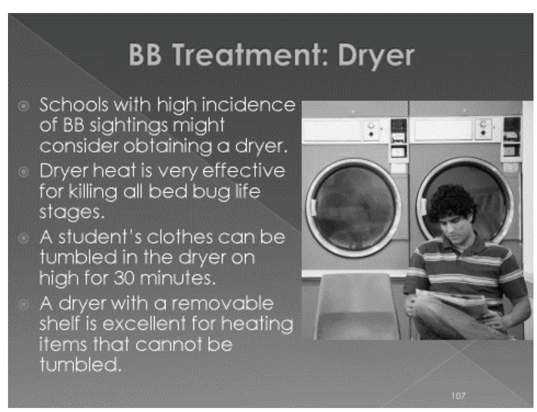

Steam Clean
Kills bed bugs and eggs without chemical residue.
Does not penetrate some materials.
Time consuming. Work slowly.
The steamer should not "blow" air forcefully or it may cause bed bugs to scatter.
Steam temperature must be 49° C or greater.
*Do not apply steam to electrical outlets (not a DIY!).
109

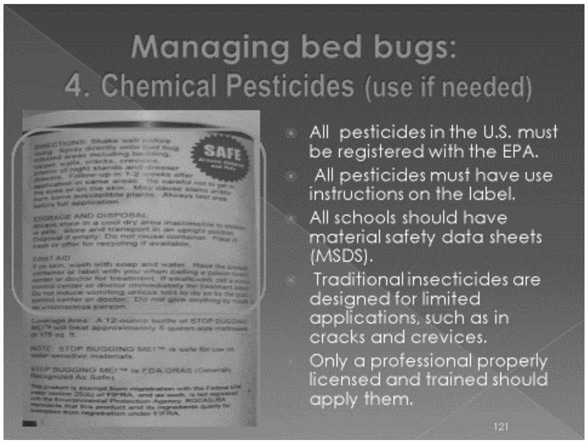

Freezing
Cold or dry ice may be effective without leaving chemical residues.
Use extreme low temperatures to kill bed bugs and eggs on contact.
Can be applied to most surfaces, especially items otherwise difficult to treat including toys, books, plastics.
May be used for library or classroom bookshelves.
Temperatures below 0°F (-19°C) for at least four days.
111

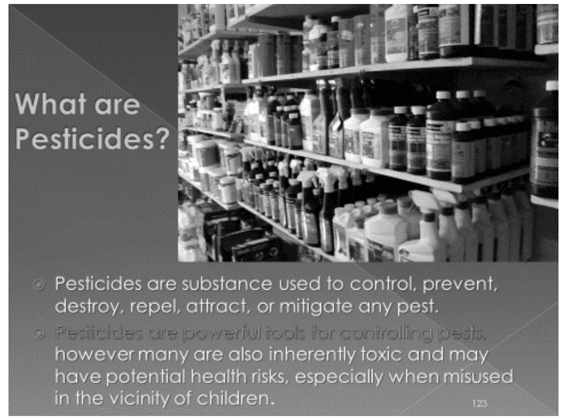

For Staff and Parents:
"Think in 3-D"
1. bed bugs may already be in or through wall voids, along pipes, or through air vent passages to rooms on either side, above, or below.
2. Consider having a room cleaned or treated in the same identical "spots".
a. On the other side of the common wall.
b. Along the wall-ceiling edges of rooms below.


Managing bed bugs:
2. Temperature:
Bed bugs die after exposure to extreme levels of heat or cold.
Heat treatments - immediately effective, one-day solution.
Steam and freeze dry applications - ideal for surface treatments.
No residual effect.
103


Instruct Parents about : Laundry
Laundering is a very effective bed bug control method.
Bag items. This keeps the 'infested' items separate from the clean items.
Wash and dry on the highest heat that the fabric can stand for 60 minutes.
The heat in a clothes dryer is extremely effective at killing bed bugs and eggs.
Clothing, linens and other items that cannot be washed - dry on high heat for 20-30 minutes.
105


BB Treatment: Dryer
Schools with high incidence of BB sightings might consider obtaining a dryer.
Dryer heat is very effective for killing all bed bug life stages.
A student's clothes can be tumbled in the dryer on high for 30 minutes.
A dryer with a removable shelf is excellent for heating items that cannot be tumbled.
107


Managing bed bugs:
4. Chemical Pesticides (use if needed)
SAFE
All pesticides in the U.S. must be registered with the EPA.
All pesticides must have use instructions on the label.
All schools should have material safety data sheets (MSDS).
Traditional insecticides are designed for limited applications, such as in cracks and crevices.
Only a professional properly licensed and trained should apply them.
121


What are Pesticides?
Pesticides are substance used to control, prevent, destroy, repel, attract, or mitigate any pest.
Pesticides are powerful tools for controlling pests, however many are also inherently toxic and may have potential health risks, especially when misused in the vicinity of children.
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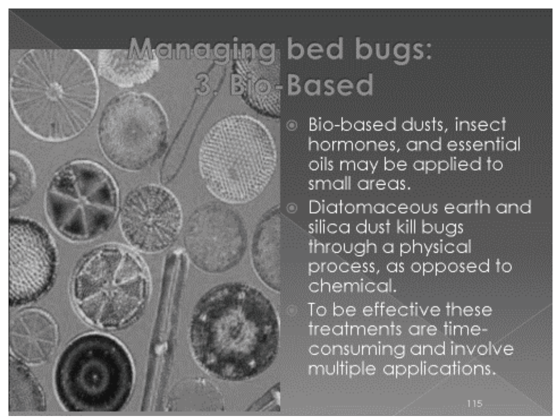
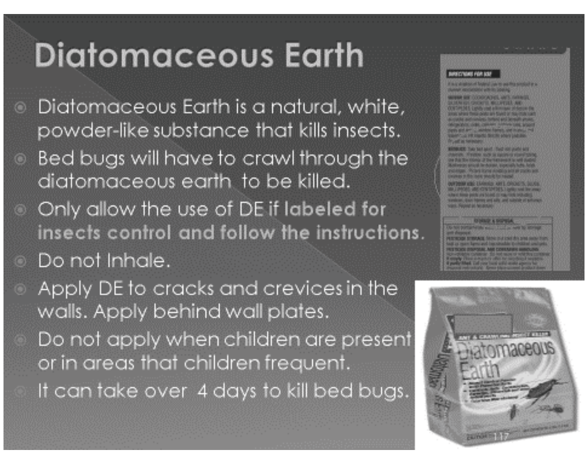
Ambient Heat Boxes
Radiant Heat
❖ 2 to 8 hours of intense area heating at 113° to 140° F
❖May not penetrate all areas.
❖Remove electronics, plants, medicine, perishables, art, pets, etc. before treatment begins.
❖ May require permission of local fire department.
❖ Sprinkler system must be disabled. Fuses changed.
Temp Adults Eggs
113°F 90 minutes 8 hours
118°F 2 minutes 90 minutes
122°F 0 minutes 0 minutes
113

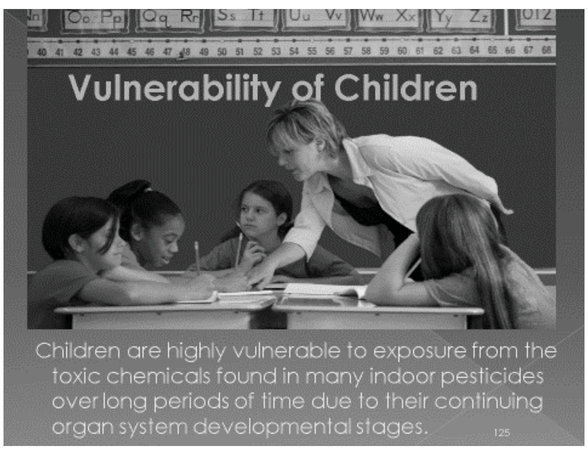

Managing bed bugs:
3. Bio-Based
Bio-based dusts, insect hormones, and essential oils may be applied to small areas.
Diatomaceous earth and silica dust kill bugs through a physical process, as opposed to chemical.
To be effective these treatments are time-consuming and involve multiple applications.
115

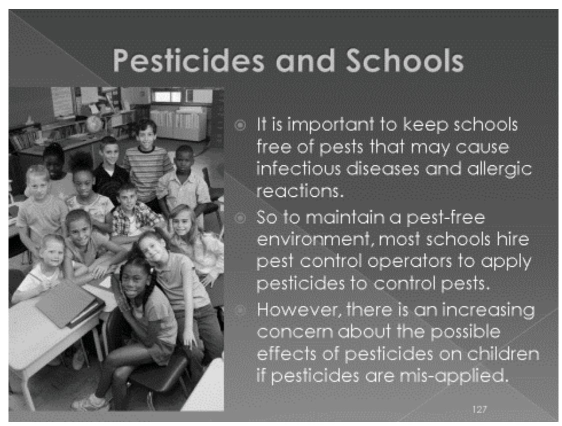

Diatomaceous Earth
Diatomaceous Earth is a natural, white, powder-like substance that kills insects.
Bed bugs will have to crawl through the diatomaceous earth to be killed.
Only allow the use of DE if labeled for insects control and follow the instructions.
Do not Inhale.
Apply DE to cracks and crevices in the walls. Apply behind wall plates.
Do not apply when children are present or in areas that children frequent.
It can take over 4 days to kill bed bugs.
Diatomaceous Earth
117


Pesticide Labels
Check the product label to see if it is registered.
PERMA-GUARD CRAWLING INSECT CONTROL
CAUTION
DIRECTIONS FOR USE
Earth
119

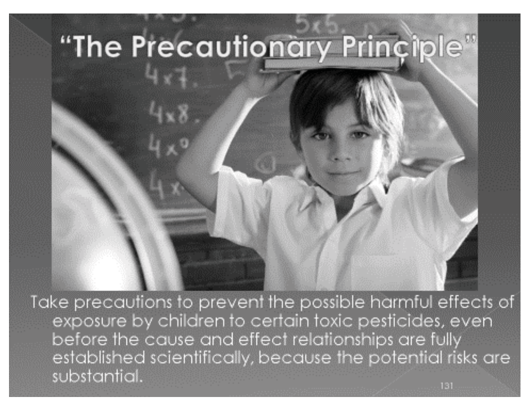

What if I need to have areas for children sleeping during the day?
Vacuum floors daily.
Mattresses / cots should be cleaned weekly.
Personal items sent home or laundered in-house regularly (weekly).
133

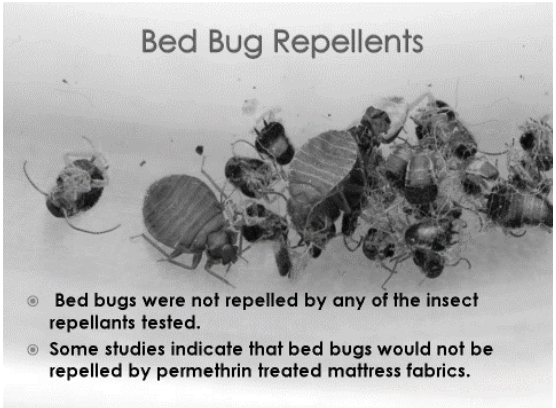

Nap Blanket / Cot Storage Areas
Walls and storage bins should be cleaned and inspected weekly.
Safely store all blankets, bedding, clothing and stuffed toys in individual plastic boxes with lids.
135

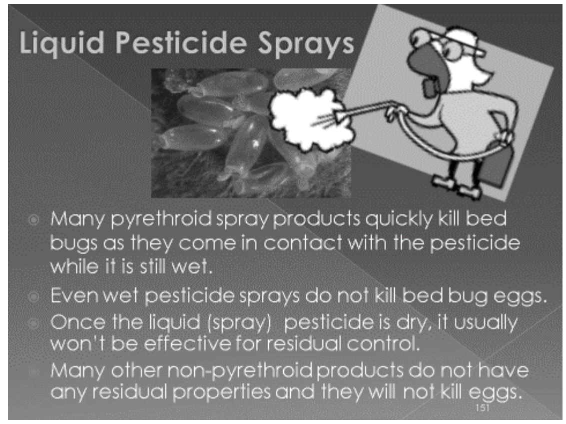

Vulnerability of Children
Children are highly vulnerable to exposure from the toxic chemicals found in many indoor pesticides over long periods of time due to their continuing organ system developmental stages.
125

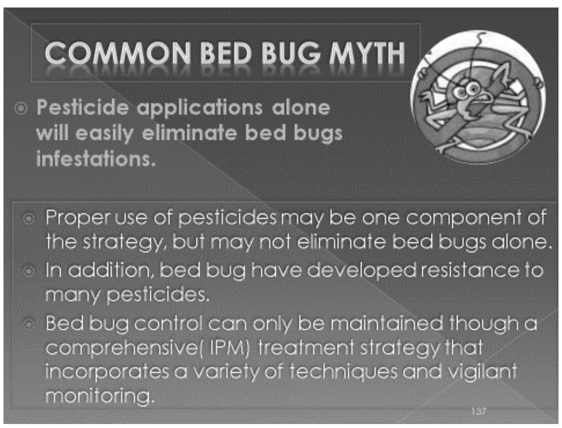

Pesticides and Schools
It is important to keep schools free of pests that may cause infectious diseases and allergic reactions.
So to maintain a pest-free environment, most schools hire pest control operators to apply pesticides to control pests.
However, there is an increasing concern about the possible effects of pesticides on children if pesticides are mis-applied.
127

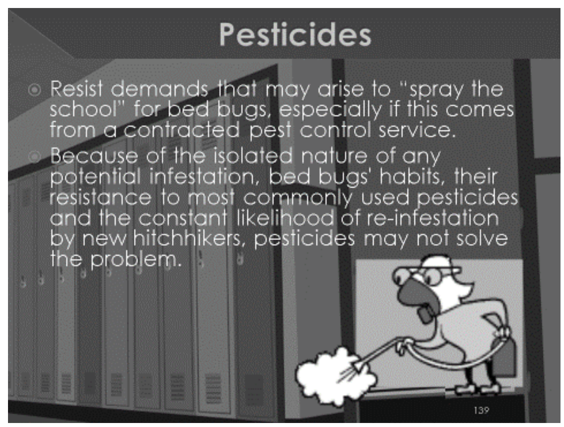

Pesticide Use in Schools
Many school administrators and staff turn to pesticides first.
Not all pesticides are created equal.
Some are much less-toxic than others.
Pesticides should never be applied as routine or "preventive treatments" in or around schools.
129

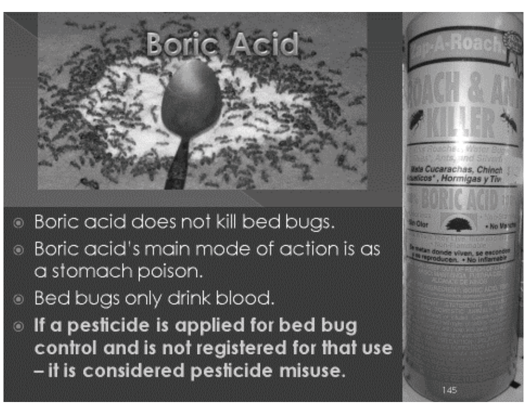

"The Precautionary Principle"
Take precautions to prevent the possible harmful effects of exposure by children to certain toxic pesticides, even before the cause and effect relationships are fully established scientifically, because the potential risks are substantial.
131


Bed Bug Repellents
Bed bugs were not repelled by any of the insect repellants tested.
Some studies indicate that bed bugs would not be repelled by permethrin treated mattress fabrics.

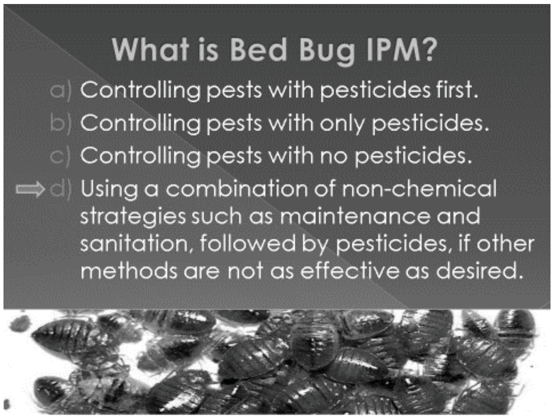

Liquid Pesticide Sprays
Many pyrethroid spray products quickly kill bed bugs as they come in contact with the pesticide while it is still wet.
Even wet pesticide sprays do not kill bed bug eggs.
Once the liquid (spray) pesticide is dry, it usually won't be effective for residual control.
Many other non-pyrethroid products do not have any residual properties and they will not kill eggs.
151

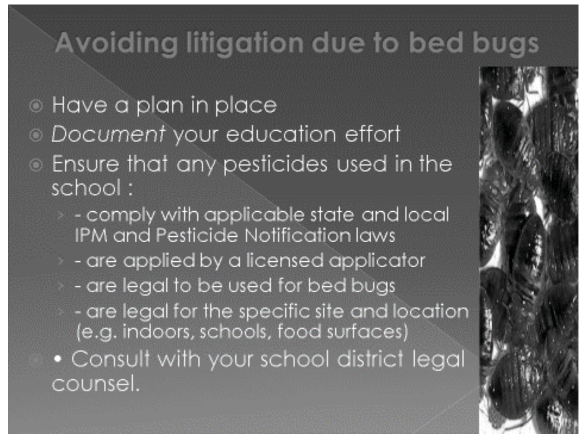

COMMON BED BUG MYTH
Pesticide applications alone will easily eliminate bed bugs infestations.
Proper use of pesticides may be one component of the strategy, but may not eliminate bed bugs alone.
In addition, bed bug have developed resistance to many pesticides.
Bed bug control can only be maintained though a comprehensive(IPM) treatment strategy that incorporates a variety of techniques and vigilant monitoring.
137

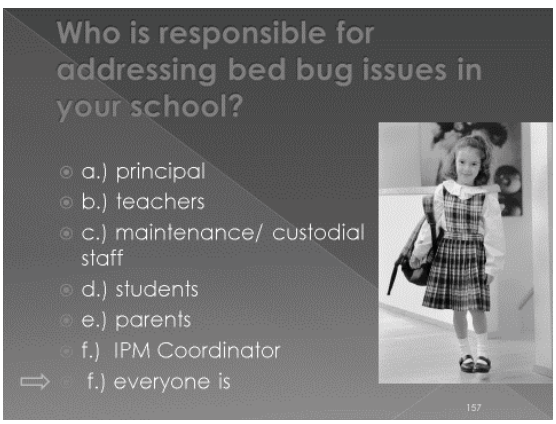

Pesticides
Resist demands that may arise to "spray the school" for bed bugs, especially if this comes from a contracted pest control service.
Because of the isolated nature of any potential infestation, bed bugs' habits, their resistance to most commonly used pesticides and the constant likelihood of re-infestation by new hitchhikers, pesticides may not solve the problem.
139

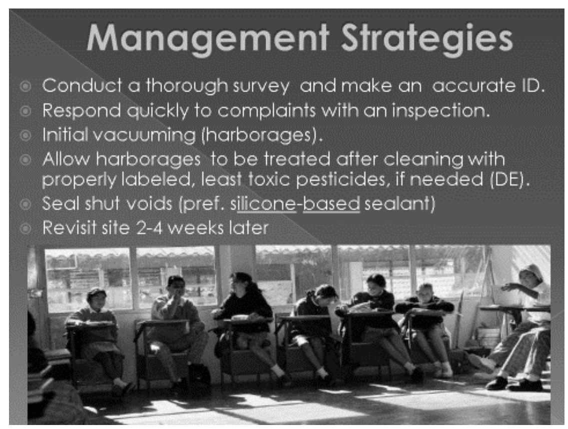

Boric Acid
Boric acid does not kill bed bugs.
Boric acid's main mode of action is as a stomach poison.
Bed bugs only drink blood.
If a pesticide is applied for bed bug control and is not registered for that use – it is considered pesticide misuse.
ROACH & ANT KILLER
BORIC ACID
145

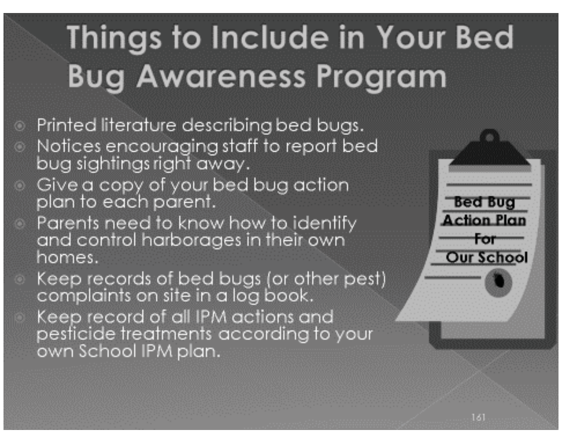

Total Release Foggers (Bug Bombs)
Create toxic fog
Do not penetrate well
Leave residues
Many bed bugs resistant to the chemicals in foggers
Unsafe if label directions not followed!
Foggers may act as dispersants, initiating bed bugs to scatter into adjacent rooms or units.
HOT SHOT
Bedbug & Flea Fogger
http://www.youtube.com/watch?v=DhQW9D5lsTk&feature=player_embedded
EPA Video:
http://www.epa.gov/pesticides/foggers/


What is Bed Bug IPM?
a) Controlling pests with pesticides first.
b) Controlling pests with only pesticides.
c) Controlling pests with no pesticides.
d) Using a combination of non-chemical strategies such as maintenance and sanitation, followed by pesticides, if other methods are not as effective as desired.

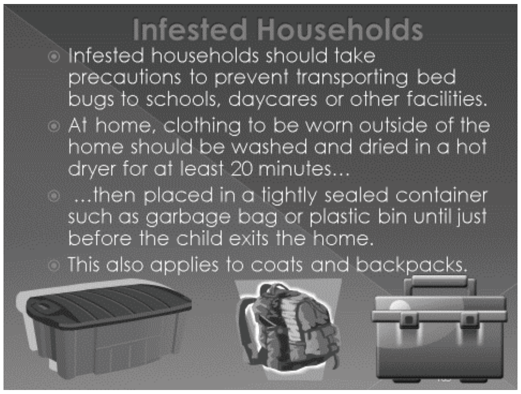

Avoiding litigation due to bed bugs
Have a plan in place
Document your education effort
Ensure that any pesticides used in the school :
- comply with applicable state and local IPM and Pesticide Notification laws
- are applied by a licensed applicator
- are legal to be used for bed bugs
- are legal for the specific site and location (e.g. indoors, schools, food surfaces)
• Consult with your school district legal counsel.

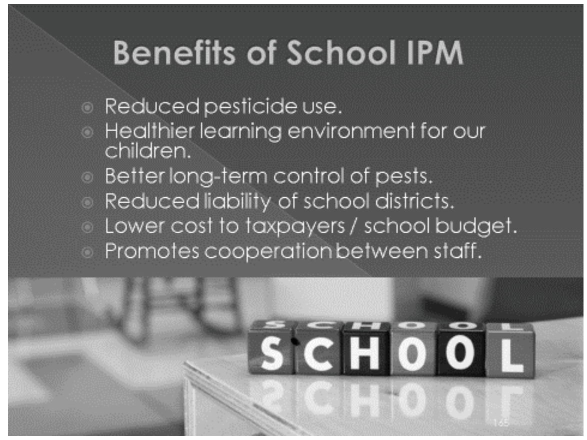

Who is responsible for addressing bed bug issues in your school?
a.) principal
b.) teachers
c.) maintenance/ custodial staff
d.) students
e.) parents
f.) IPM Coordinator
f.) everyone is
157


Management Strategies
Conduct a thorough survey and make an accurate ID.
Respond quickly to complaints with an inspection.
Initial vacuuming (harborages).
Allow harborages to be treated after cleaning with properly labeled, least toxic pesticides, if needed (DE).
Seal shut voids (pref. silicone-based sealant)
Revisit site 2-4 weeks later


Things to Include in Your Bed Bug Awareness Program
Printed literature describing bed bugs.
Notices encouraging staff to report bed bug sightings right away.
Give a copy of your bed bug action plan to each parent.
Parents need to know how to identify and control harborages in their own homes.
Keep records of bed bugs (or other pest) complaints on site in a log book.
Keep record of all IPM actions and pesticide treatments according to your own School IPM plan.
Bed Bug Action Plan For Our School
161


The End!
167


Infested Households
Infested households should take precautions to prevent transporting bed bugs to schools, daycares or other facilities.
At home, clothing to be worn outside of the home should be washed and dried in a hot dryer for at least 20 minutes…
…then placed in a tightly sealed container such as garbage bag or plastic bin until just before the child exits the home.
This also applies to coats and backpacks.


Benefits of School IPM
Reduced pesticide use.
Healthier learning environment for our children.
Better long-term control of pests.
Reduced liability of school districts.
Lower cost to taxpayers / school budget.
Promotes cooperation between staff.
SCHOOL