

**EPA Region 2**

**Pesticides in Child Care Initiative**

**2010 Staten Island Pilot Project**

**Final Report**



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## Executive Summary

It is well known that infants and small children are among the most likely groups to suffer long-term health effects from exposure to chemical pesticides.<sup>i</sup> There are two main reasons for this: higher exposure risk and greater vulnerability. The youngest children are often the most vulnerable to pesticide exposure, because their small bodies are undergoing rapid growth and development of vital organs and complex systems. Early exposure to pesticides and other toxic pollutants and exposure to low-levels of pesticides in utero or during early childhood has been linked to increased risk for many health problems.<sup>ii</sup>

In an attempt to evaluate the potential exposure of children to pesticides in child care settings, in December 2009 the U.S. Environmental Protection Agency (EPA) Region 2 launched the “Pesticides in Child Care Initiative”. Given the large universe of child care centers, the Staten Island Pilot Project was conducted in 2010 focusing on identifying the manner, type and frequency of pesticides being applied in child care centers in a target environmental justice area of Staten Island, N.Y. The initiative’s main premise was that children ages 0-6 may be potentially exposed to pesticides from indoor and/or outdoor pesticide applications in the childcare setting. In addition the pilot project was expected to help the EPA identify strategies needed to reduce the overall use of pesticides being applied in child care centers.

Through a three-phased process of child care center (CCC) site visitations, pest control company (PCC) records inspections and follow-up child care visitations, we were able to document the methods currently used to mitigate pest problems in child care centers including the type, amount, method and frequency of pesticide application. Through a process of educating CCC administrators and staff about the integrated pest management (IPM) process of proper pest management strategies, and the importance of reducing the use of pesticides around young children, we were able to reduce the frequency of pesticide applications in the target child care centers, while increasing their familiarity with IPM. Specifically, while at the beginning of this study (Phase 1) 80% of the centers were applying pesticides on a weekly/monthly schedule basis regardless the actual need, by Phase 3, regularly scheduled application of pesticides was reduced to only 36%, and the number of entities not applying pesticides at all increased from 9% to 20%. Another notable accomplishment is that the number of centers adopting and implementing IPM practices increased from 7% during Phase 1 to 80% by Phase 3, either having developed/implementing their own IPM plan or adopting/implementing the IPM plan of the pest control company servicing them.

The study also tested the efficiency of IPM education in CCC by measuring the base number and type of IPM issues found in CCC during the initial visit versus IPM corrected issues in a second visit, after IPM outreach was conducted, centers informed of the IPM issues found, and corrective actions taken. Of the six main IPM Issue categories evaluated (Maintenance, Outdoor Garbage, Indoor Trash, Cleaning, Clutter and Storage, Outdoor Standing Water), the greatest improvement was noted for Maintenance related issues, with 75% improvement rate.

## Study Goals and Objectives

The goals of this pilot project were to:

1. Assess pest management practices in child care centers (CCCs) located in the target area.
2. Assess the pesticide use patterns in CCCs.
3. Identify who is applying the pesticides in CCCs.
4. Assess status of Integrated Pest Management (IPM) practices in CCCs.
5. Assess the adherence to applicable federal, state, and local regulations regarding pesticide use.

The objectives of this initiative were to:

1. Document the methods currently used to mitigate pest problems in child care centers including the type, amount, method and frequency of pesticide application.

2. Identify strategies and materials needed to educate child care center (CCC) administrators and staff about IPM and reduce the need for pesticide application.
3. Create IPM educational materials specific to child care centers.
4. Educate administrators / maintenance staff about IPM in CCCs and the importance of reducing the use of pesticides around young children.
5. Reduce the need for the application of pesticides through the use of IPM and proper pest management strategies in child care settings.
6. Test the efficiency of IPM education in CCCs by measuring the base number and type of IPM issues found in CCCs during the initial visit measured to IPM corrected issues in a second visit, after IPM outreach was conducted and centers informed of the IPM issues found.

The information obtained from this initiative is intended to be used to: 1.) Identify the educational needs of child care center staff in order to comply with local and state regulations and 2.) Improve pest management practices in child care centers in New York City and 3.) Guide the US EPA in developing standards for pest management practices in child care centers, first in Region 2, and eventually throughout the Nation.

## Project Background

The Staten Island Pilot Project was conducted from January to October 2010. The project focused on identifying the manner, amount and frequency of pesticides applied in child care centers in a target environmental justice area of Staten Island, N.Y. The initiative's main premise was that children ages 0-6 may be potentially exposed to pesticides from indoor and/or outdoor pesticide applications in the childcare setting. In addition, the pilot project was expected to help the EPA in identifying strategies needed to reduce the overall use of pesticides being applied in child care centers.

Forty-five (45) CCCs located in a Staten Island, N.Y. Environmental Justice area, met the study parameters for inclusion into the study. These parameters included: a day-time program only (not after-care), children must be in the 0-6 age group, and the willingness to participate in the study.

## Introduction

### A. Importance of Studying Pesticide Use in Child Care Centers

Infants and small children are among the most likely groups to suffer long-term health effects from exposure to chemical pesticides. <sup>iii</sup>There are two main reasons for this: higher exposure risk and greater vulnerability. The youngest children are often the most vulnerable to pesticide exposure, because their small bodies are undergoing rapid growth and development of vital organs and complex systems. Even small chemical exposures during critical periods of development can disrupt normal development and result in permanent damage and lifelong health problems. Exposure to low-levels of pesticides in utero or during early childhood has been linked to increased risk for many health problems, including miscarriage, birth defects, some childhood cancers, asthma, and abnormal brain development. <sup>iv</sup> Early exposure to pesticides and other toxic pollutants can also disrupt and permanently change the structure and function of organs and body systems, and scientists just do not know how much exposure is too much for children.

**Exposure.** On any normal day, children and child care providers may potentially be exposed to pesticides. Exposure may occur whether pesticide applications are made shortly before people enter the building or while they are present. Especially sprayed chemicals may become airborne and settle on toys, desks, counters, shades, and walls. Children and staff may touch contaminated surfaces and unknowingly expose themselves to invisible residues that can remain for days. These pesticides may break down into other compounds or may contain other ingredients that also could be allergenic or hazardous.

Infants and young children live closer to the floor, 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.<sup>v</sup> For example, pesticides applied by baseboard spraying reach levels 4.5 times higher in the air 10 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, residues can remain high for an extended period –over 24 hours.<sup>vi</sup>

Studies have shown that there are larger amounts of pesticides sprayed in urban and, particularly, in Environmental Justice (EJ) areas. Children in these areas may be exposed to higher doses of spray pesticides in their homes, daycares, and schools than the general population.<sup>vii</sup> This pilot study was designed to assess whether the use of IPM and proper pest management strategies in childcare settings could reduce the need for application of spray pesticides and as a result possibly reduce the exposure to children ages 0-6.

Even with multiple studies available, there is still a great amount of controversy surrounding the issue of potential negative chronic health effects caused by pesticides. While the acute effects of pesticides are well documented, it is much more difficult to assess chronic effects of long-term low dose pesticide exposure.<sup>viii</sup>

From a pilot study of child care centers in North Carolina, researchers detected organophosphate and pyrethroid pesticides in the air and dust and suggested that exposures in child care environments may constitute a significant portion of total child care poisoning incidents.<sup>ix</sup> The fact that residues from numerous pesticides have been identified in child care settings suggests that pesticide use is widespread.

Since many children spend a large portion of their days at childcare facilities or schools it is clear that reducing their exposures in these facilities would greatly reduce children's cumulative exposure to pesticides.<sup>x</sup> With even acute poisoning very hard to diagnose correctly, the chronic effects of pesticide exposure due to school and childcare exposure are even more difficult to diagnose. This is even more of a concern for children living in urban areas who are more frequently exposed to pesticides than other populations. Heavy applications of pesticides in environmental justice areas have been justified as needed due to the age and poor maintenance of urban buildings and houses<sup>xi</sup>. In a study conducted by the New York State Department of Environmental Conservation (NYSDEC) it was found that the heaviest applications of registered pesticides in all of New York State, including the upstate agricultural region, occurred in the urban boroughs of Manhattan and Brooklyn, NYC<sup>xii</sup>. Pesticides in New York City were used 51% more frequently when compared to other areas of New York State, and more than half of the people surveyed applied pesticides more than once a week.<sup>xiii</sup> The high incidence of pesticide application in EJ areas is compounded by the fact that children living in these areas spend 90% of their day indoors either at school, home, or a friend's house making them exposed to these chemicals for longer periods of time.<sup>xiv</sup>

## **B. Importance of IPM Alternatives**

With children being potentially exposed to increasing amounts of pesticides applied in their schools, using alternative pest control methods becomes paramount. This is why adoption and implementation of integrated pest management (IPM) is very important in child care settings. The underlying concept of IPM is that a detailed assessment of the pest problem must be performed in order to determine the best control method; pests can be controlled by eliminating their access to food, water and shelter, and blocking points of entry, rather than just by chemical control. In addition, by utilizing maintenance, sanitation, education, and exclusion, and by using the least toxic gels, traps and baits, the majority of pests in child care centers can be controlled with little to no use of pesticides<sup>xv</sup>. Only if pests cannot be eliminated by non-chemical means, then pesticides may be used as needed. IPM not only reduces the amount of pesticide being applied, but also is effective against most pests, saves money, and ultimately, may also reduce potential pesticide exposure to young children.

A study in the public schools in Montgomery County, Maryland, found that the use of IPM reduced pesticide use by 90% and resulted in 18% savings over 6 years.<sup>xvi</sup>

## **Methodology**

## Questionnaire / Checklist Development

A questionnaire was developed with the purpose of gathering information on current pest management and pesticide use practices. The questionnaire consisted of two parts: a two-page series of questions including child care center demographics, such as the number and age 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 pest control company serving the child care center, frequency of visits by pest control company and questions about adherence to local and state regulations. The second part of the questionnaire was a five-page checklist tool developed to identify pest management area issues of concern in most child care facilities. The areas consisted of:

1. Kitchens and cafeterias,
2. Storage areas,
3. Custodial and Maintenance areas,
4. Restrooms,
5. Classrooms, Offices, hallways, teachers rooms and naptime areas, and
6. Playground and outdoor areas.

The questionnaire / checklist were field tested in multiple Child care facilities prior to the start of visits and modified as needed.

## Outreach Materials Evaluation and Development

The primary tasks were to: 1.) Inventory and evaluate existing IPM outreach materials; 2.) Identify information gaps; and 3.) Identify changes needed to adapt materials for Childcare providers.

After a detailed inventory of existing IPM outreach materials was conducted, it was concluded that there was a lack of outreach materials addressing child care specific issues. Therefore, it was decided that new materials needed to be developed to adequately provide significant IPM advice specific to child care centers.

Consequently, one flier was developed to fill information gaps with regard to key IPM issues. This flier covered several IPM topics such as clutter management, handling waste and garbage management, relationship between standing water, mosquitoes and diseases, bed bugs prevention, and playgrounds. In addition, an IPM in Child Care Center brochure was developed in collaboration with the New York City Department of Health and Mental Hygiene (NYCDOHMH).

## Data Collection and Analysis

The Staten Island Pilot Project consisted of three phases:

**Phase 1.** The objectives of phase one were to establish the current level of knowledge that child care centers had about Integrated Pest Management practices, to evaluate pest control practices at each facility, and to teach the child care center administration and staff about Integrated Pest Management. EPA employees visited the 45 child care centers identified as meeting all of the inclusion criteria of the initiative. Child care center directors were interviewed about their current and past pest problems, pest management practices and pesticide application records. The directors identified which pest company serviced their facility, as well as the type of pesticides applied and the frequency of their application visits. They were also asked if they had a pest management plan of action, if parents were notified 48 hours before application of pesticides (a NYCDOHMH requirement), and about their knowledge and use of IPM. Copies of pesticide records and labels were obtained when available. Finally, the EPA team was given a guided tour of the child care center where they completed a checklist focusing on proficiencies and deficiencies in the child care centers current IPM practices. Photographs were taken of the facilities' interior and exterior, documenting examples of both good IPM practices, and those that could use improvement. No photographs of children's faces were taken. Following completion of the site visits, EPA staff prepared and mailed individualized "After Visit letters" to the child care center administrators which included the

scope of the project, common misunderstandings about pesticide laws, commendations of any positive IPM practices already in use, identified deficiencies and recommended improvements.

**Phase 2.** The second phase consisted of federal inspections of the 19 pest control companies (PCCs) that serviced 40 of the childcare centers. PCC officials were directed to submit all pesticide application records pertinent to the serviced CCCs. The inspectors collected copies of application records that included: 1.) date of pesticide application, 2.) target species for which application was administered, 3.) application receipt ticket showing application details such as time and date of application, pesticides used, rate, method, quantity and location of application, 4.) EPA registration number of pesticide applied, 5.) label of pesticide applied, 6.) record of IPM practices performed including monitoring and 7.) copy of the pest control company IPM plan. Any record discrepancies were also documented.

**Phase 3.** This phase consisted of revisits of the child care centers to evaluate pest management and record keeping improvements made since the first visit. Revisits were conducted in much the same manner as phase 1. During the interview, the directors were questioned regarding any changes made to pesticide application practices or IPM since the initial visit. Copies of pesticide records and labels were made if there were changes in record keeping from the first visit. A slightly modified checklist was used to shorten the visit time, as many questions did not need be asked a second time. Photographs were taken to document changes. Upon completion of the visit, the directors were given information on current IPM practices and other pest control related topics. After the re-visits, comparison tables were constructed comparing the first and second visits. The “After Visit” letters were mailed to each facility, identifying positive pest management strategies, commending the centers on any positive changes made since the initial visit, while also bringing to their attention to existing deficiencies and providing specific recommendations for improvement.

## Data Analysis.

All data were taken from the checklists and interviews with the directors performed during the initial visits conducted during phase 1, the revisits conducted during phase 3 and documents obtained during the Phase 2 inspections. Checklists were written in the form of “yes” or “no” questions, data collected were translated into a binary code and entered into Microsoft Excel. For some phase 3 visits, data from the inspector notes taken during the revisit were translated back into the form of the checklist to validate results.

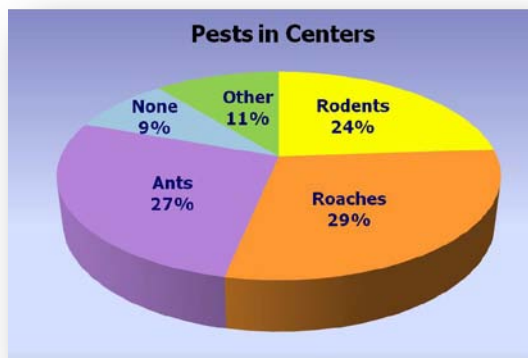
For IPM-related data, percentages of total deficiencies observed in each child care center for both visits were calculated using Microsoft Excel (2003). Percentages were calculated instead of means because every aspect of the checklist was not necessarily applicable for every child care facility.

## Results and Discussion

In fifteen child care centers, administrators reported having no pest problems, yet many of these centers had pest control companies come on a regular basis, allowing the application of pesticides as a preventative measure. When questioned about this practice, many administrators responded that they were under the impression that they were required, by law, to have regular visits and application of pesticides. It soon became apparent that there was some confusion by the center administrators as to the content of state and local child care pesticide laws.

### A. Pests in Child Care Centers

Phase 1 interviews identified roaches as the number one pest in child care centers, with 27 centers identified as having a history with roaches. Ants were a close second, with 25

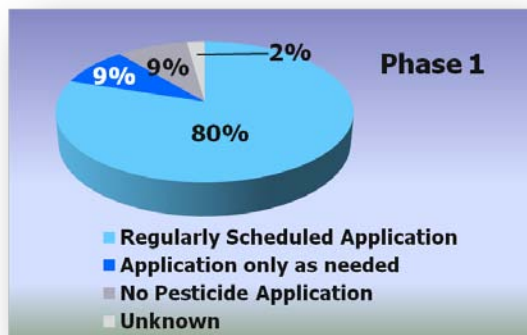




centers having either ant visits or infestations, followed by 22 centers with occasional rodent visitors. Another 10 centers have had other pest issues such as bees, wasps, bed bugs, snakes living in the play equipment, mosquitoes, lice, fruit flies and gnats. Fifteen facilities reported no pest problems.

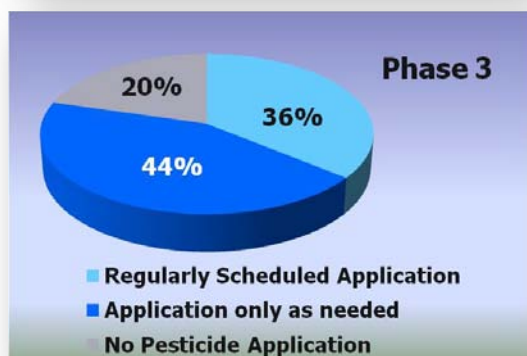
### Scheduled Pesticide Applications in Child Care Centers

Of the 45 child care centers visited, 80% (36 centers) had regularly scheduled applications of pesticides in Phase 1. A total of 9% (4) had pesticides applied by a pest control company only as needed and 9% (4) of Child Care Centers did not apply any pesticides. In one center (2%), application information was unknown as the owner of the building who manages pest control has been unavailable for comment.



It was determined that only five (5) out of the forty five (45) Staten Island child care centers has 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 child care centers was reduced to 36% (14 centers), and there was a significant increase, of no pesticide applications in Child Care Centers from Phase 1, 9% (4 centers), to 20% (8) in Phase 3. This resulted in a significant reduction of scheduled pesticide applications in Staten Island child care centers due to EPA compliance assistance, thus a drop in the number of children being potentially exposed to chemical pesticides.

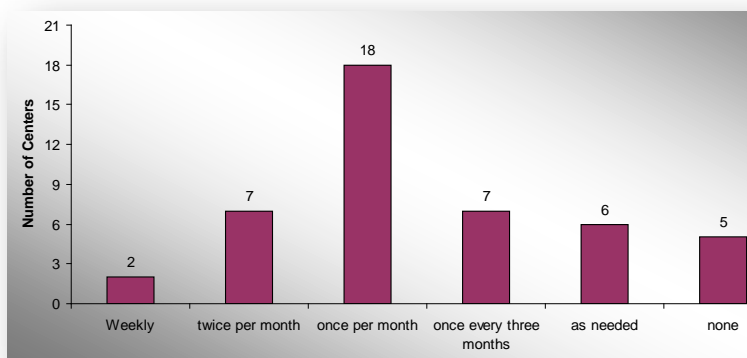


### B. Frequency of Pesticide Application

A comparison of application records collected at both child care centers and pest control companies, documented not only the frequency of pesticide application, but also the method of application. Records were collected documenting pesticide applications over a period of roughly four months. It was found and the types of pesticides varied greatly. For instance, some

that the frequency of methods of applications, centers may have had pesticides sprayed once a month, but had baits and traps laid every other month, while monitoring occurred twice a month.

As Phase 1 and 2 data show, only 5 child care facilities did not have visits by a pest control company for a period of over 3 years. There were 6 child care centers that had pest control company (PCC) visits “as needed”. Pest control companies visited 34 child care centers on a regularly scheduled basis. Some (18) child care centers had pest control companies come monthly, seven (7) twice/month, seven (7) once every three months and two (2) had PCCs come weekly. Out of the 45 facilities in the study, 27 facilities (60% of the total) apply pesticides at least once per month. This high frequency of applications shows a strong dependence on pesticides being applied solely as a preventative measure. Considering the documented vulnerability of children to even minute amounts of pesticides, such repeated pesticide applications may increase the potential for pesticide exposure of some children in these child care centers.



### C. Method of Pesticide Application

69% of the Staten Island child care centers (31 centers) use baits and traps to combat both insects and rodents, while 58% of child care centers (25 centers) rely on the spraying of pesticides by pest control companies to combat pests. Only 5% of PCCs monitor for pests only. There are 19 pest control companies servicing the 40 child care centers that do apply pesticides. Of the 25 centers having spray applications, 16 child care centers are being serviced by just three pest control companies and account for the majority of the spray practice.



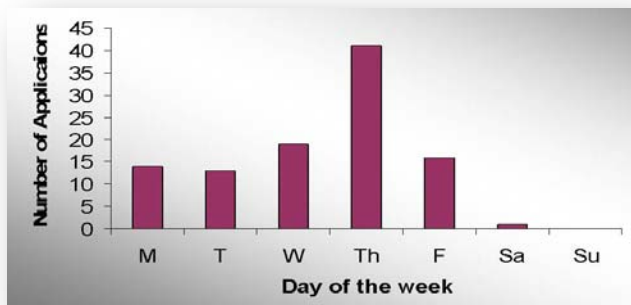
### D. Time of Day and Days of the Week that Pesticides Were Applied

The time of the day and day of the week when pesticides application took place are very important. For example: 1.) If pesticides are sprayed before school begins, on weekday mornings, the pesticide

does not have time to settle down prior to children entering the building. The pesticide is still in the air, creating potential inhalation exposure. 2.) If a pesticide is applied to a child care center by spraying on a weekday afternoon after the children have left the building, pesticide residues may still be present where children play when the children return the next day creating the potential for contact exposure.

Pesticide residues vary depending on the chemical properties of the active ingredient with vapor pressure and soil binding playing a major role. For example, pyrethroid pesticides have a lower vapor pressure and a high ability to bind to dirt and dust, therefore they spend more time in the particulate phase decreasing the risk of inhalation exposure, but increasing the risk of dermal and indirect ingestion exposure. Pyrethroids account for 38% of pesticides applied to the Staten Island study child care centers.

Other studies have shown that up to 2 weeks after the initial spray settles the compound can vaporize into a gas and again become airborne where it can then be inhaled or settle on the surface of other objects.<sup>xvii</sup> Another study performed in 16 different daycares on 127 different children found that pesticides, particularly pyrethroids, were present in 100% of all dust samples collected and on greater than 78% of hand wipe samples.<sup>xviii</sup> After spraying, transferable surface residues of pesticides remained 2 weeks, and surface residue remained for 1 month leading to a risk of dermal absorption.<sup>xix</sup>



Of the initial 45 childcare centers, 26 centers, more than half (58%), were identified as using spray pesticides. This means that over half of all the children in the study were at a heightened potential risk to exposure to pesticides because sprays volatilize and become

airborne, leading to inhalation exposure. Sprays also settle down on all surfaces, leading to additional risk of dermal exposure. When children put toys in their mouths that spray has settled on, or put their fingers in their mouths, the children are at risk for exposure from ingestion.

NYCDOHMH Law #51 clearly states the need for a '48-hour' parental notification of pesticide applications in child care centers for all non-exempt pesticides. While baits, traps and gels are considered less-toxic and are exempt, sprays are not. If pesticides must be sprayed, Friday applications are encouraged, as they do not require a 48 hour notification. However, five times more pesticides are applied from Monday through Thursday, requiring notification. Yet, despite the law, only 20% of centers notify parents.



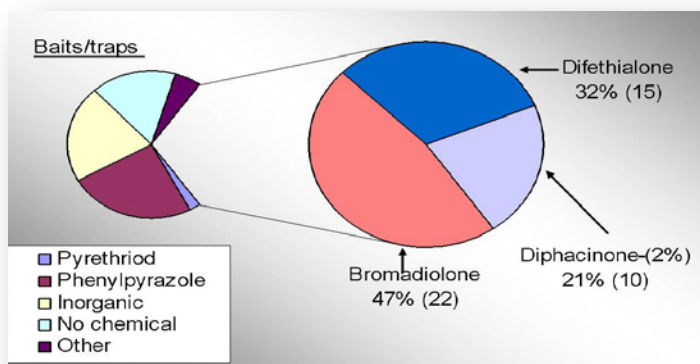
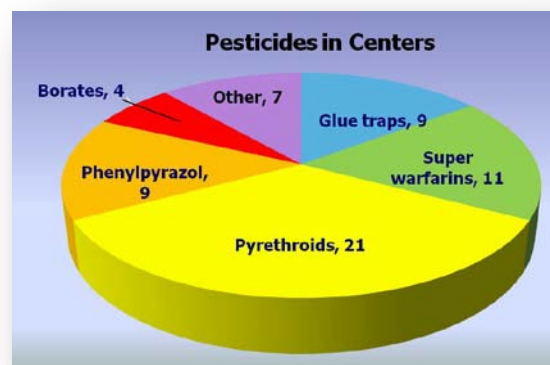
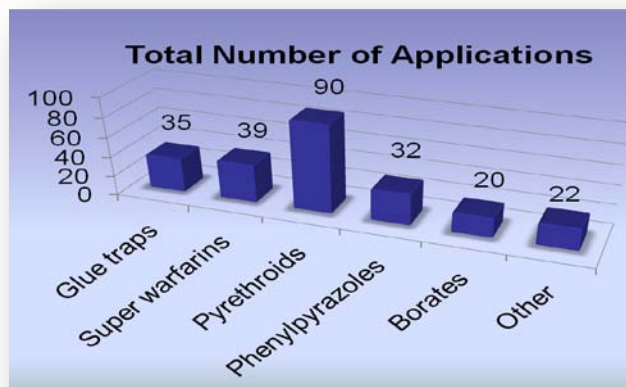
## E. The Overall Type and Percentage of Pesticides being Applied in Child Care Centers

In the Staten Island child care study over half of all applied pesticides (51%) were pyrethroids applied in 21 child care centers, which also include the phenylpyrazole family of pyrethroids applied in nine (13%) centers. This was followed by the super warfarin rodenticides applied in eleven (16%) of CCCs, least toxic monitoring glue traps in nine (15%) of the centers, borates in four centers and other pesticides in seven centers.

### F. Pyrethroids in Staten Island Child Care Centers

Pyrethroids are the most common pesticide used in homes, schools, and childcare centers<sup>xx</sup> and account for 51% of pesticides applied in the Staten Island child care center study. Pyrethroids account for 122 applications in Staten Island child care centers over a 4 month study period. Pyrethroids are becoming more and more popular as pesticides for roach and ant control. Case in point, in 2000, there were 3,105 calls nationally to poison control centers for potential exposure of children 0-6 years of age to pyrethroids, accounting for 32.1% of all pyrethroid cases. By 2008, this number has steadily increased to 5,919 calls nationally to poison control concerning young children, yet the percentage stayed roughly the same (30.9% in 2008), telling us that the usage of the pesticide had increased and the number of potential exposures to young children has grown with the market expansion<sup>xxi</sup>.

Exposure to pyrethroids in child care centers may take place through inhalation, dermal contact with residues, dust, indirect ingestion of residues attached to dust or soil, and direct ingestion of foods containing residues.<sup>xxi</sup> Pyrethroids have a low volatility and have a high affinity to bind to dust and soils causing it to favor the particulate phase.<sup>xxii</sup> As a result, the main transport mechanism involves dust rather than vapor leading to an increased importance of dermal and indirect ingestion.<sup>xxiii</sup> The chronic effects of low dose pyrethroids exposure have been linked to cancer, developmental interference, reproductive, endocrine, immune, and nervous system disruption.<sup>xxiv</sup>



### G. Rodenticides Applied in Child Care Centers

Eighteen child care centers were identified as having problems with rodents. Of these, eleven centers had super warfarin rodenticides applied in their facilities as per data from pest control company records obtained in Phase 2; of these only seven centers used tamper resistant baits. Six centers relied on monitoring the rodent problem with the application of glue boards, and three in combination with rodenticides.

The super warfarin rodenticides account for 30% of all bait and trap applications used, and all three rodenticides used in this study are the long acting anti-coagulant rodenticides (super warfarins), difethialone, bromadiolone and difenacoum, that have a potency of up to 100x that of warfarin<sup>xxv</sup> and all three are also known as second-generation anti-coagulants.

Anticoagulant rodenticides are generally applied in the form of pelletized baits or bait blocks which are odorless and tasteless.<sup>xxvi</sup> They cause death in rodents after repeated feedings result in accumulation to a lethal internal dose.<sup>xxvii</sup> Among the super warfarin rodenticides applied to the study centers, bromadiolone poses the greatest secondary toxicity risk. They are acutely toxic, and are more persistent in animal tissues resulting in mortality after only a single feeding.<sup>xxviii</sup>

Young children are especially vulnerable to exposure from rodenticides, as they are most often placed low to the ground, at the same altitude as the play, potentially adding to their increased susceptibility to exposure of laid baits and traps, and increased dermal absorption of residues on the floor.<sup>xxix</sup> In children, rodenticide exposure generally occurs via ingestion and one study determined that most of the reported exposed cases in 2007 had obtained the poison from the site where a bait trap was placed.<sup>xxx</sup> One study suggested that among the six million children living in poverty in inner cities, there is an increased risk of exposure to rodenticides that are used extensively in schools, homes and child care centers.<sup>xxxi</sup>

Nationally there are about 90,000 calls to Poison Control Centers concerning pesticide exposure annually. Of these, 20% (about 19,000) of those calls are for Rodenticides. Annually, over 15,000 of Rodenticide calls (86%) are for children under 6 years of age ingesting rodenticides.<sup>xxxii</sup>

## H. Types of Spray Pesticides Applied

In this study it was observed that seven different types of spray pesticides were used: deltamethrin, esfenvalerate, cyfluthrin, cypermethrin, beta-cyfluthrin, bifenthrin, and hydroprene.

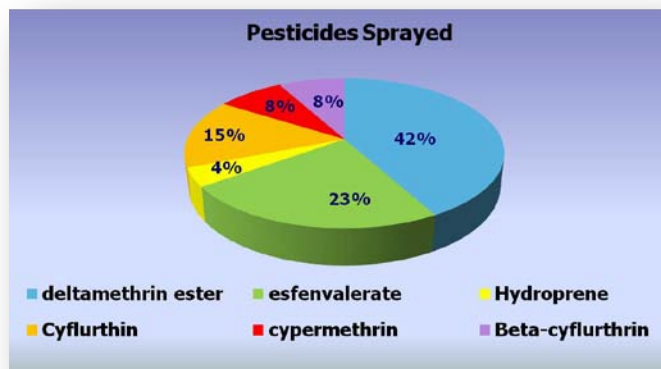
Below are some facts about these seven spray pesticides used in Staten Island child care centers:

- Only 1, bifenthrin, is a Class C carcinogen meaning that it is a possible carcinogen to humans. All of the other spray pesticides are listed as non-carcinogenic or not thought to be carcinogenic.
- Five of the seven pesticides used were the generally more toxic Type II pyrethroids, one was a Type I pyrethroid, and one was an Insect Growth Regulator (IGR).
- Deltamethrin was the most commonly applied spray pesticide in this study. Deltamethrin has a half-life of 4.8 weeks in indoor dust and soil, meaning that in these buildings where it is sprayed on a regular monthly basis there is a continuous low dose supply of deltamethrin in the indoor air, dust and dirt. The second most applied pesticide was esfenvalerate.
- Excluding bifenthrin, the rest of the pesticides used in this study are among the least toxic of the pyrethroid pesticides.<sup>xxxiii</sup>

## I. Playgrounds

In regard to another type of pesticide exposure found in child care centers, it was found that 20% of the centers (9) had older wooden playgrounds or play structures on premises.

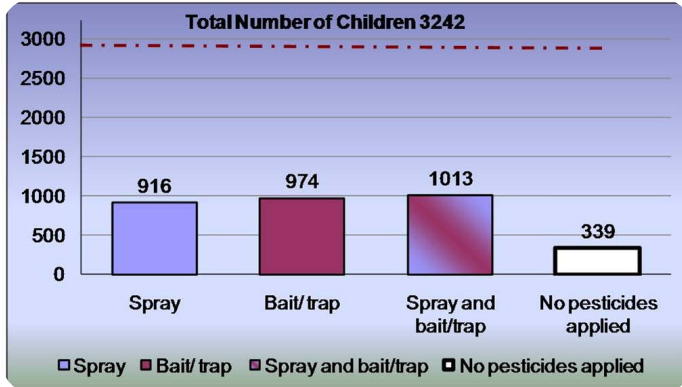
Wood play structures (especially the ones installed before 2004) may be treated with chromated copper arsenate (CCA). CCA helps the wood repel water, so your playscape lasts longer. Though CCA is forced deep into treated wood under pressure, it can leach out over time where children can come into contact with it as they play. Most wood play structures are likely to be pressure treated with CCA and will leach substantial quantities of this



carcinogen and neurotoxic agent into soil. For decades, CCA-treated lumber was the wood of choice, for play structures, picnic tables, decks, landscape timbers and fencing, in the U.S.

### J. Number of Children Potentially Exposed to Pesticides

In general, there are two main factors that contribute to the higher exposure rates of children, behavior and physiology. Behaviorally, children ages 0-6 have breathing zones much closer to the floor, spend more time in contact with the floor, and also engage in mouthing behaviors that can increase exposure to environmental



contaminants, each of which lead to greater inhalation, indirect ingestion, and dermal exposures<sup>xxxiv</sup>. Children in the 0-6 age bracket are known to intentionally or unintentionally ingest significant amounts of dust and dirt that adheres to their hands which results in higher indirect ingestion of pesticides than adults. Additionally, the blood-brain barrier and skin of children, and infants especially, is more permeable to environmental toxicants like pesticides<sup>xxxv</sup>. Finally, children’s metabolic pathways are not fully formed and have reduced expression of detoxifying enzymes and a reduced ability to detoxify and eliminate harmful substances<sup>xxxvi</sup>.

#### 2903 Children potentially exposed to pesticides

Of a total of 3242 children enrolled in the 45 child care facilities in this study, 339 children attend CCCs that are not serviced by a PCC or have had no pesticides applied for over 5 years. The remaining 2903 children in these Staten Island CCCs are potentially exposed to pesticides due to the practice of allowing regularly scheduled visits by pest control companies who apply pesticides during their visits for preventative measures, instead of monitoring for pests and treating only if other measures do not deter pests.

### K. Child Care Specific Local, State, and Federal Regulations

**Local Regulations.** The NYC DOHMH Law 44, Article 51 states that: (1.) Child care facilities must have a preventative pest control action plan in place in which pesticide use cannot be a substitute for pest management. (2.) Article 51-c requires that all childcare centers must give notification of pesticide application no later than 48 hours prior to application. (This requirement is also covered by The City of New York, 2003, Social Services Law § 390-c. (3.) Article 51-b also states that a log of pesticide application must be maintained for inspection by NYSDEC and that routine extermination shall not include the use of insecticidal aerosol sprays and foggers.

**State Regulations.** The NYS DEC Neighbor Notification Law, Rule and Regulation (Chapter 285 of the Laws of 2000), requires child care centers to provide at least 48 hours notice before application of pesticides on the property.<sup>xxxvii</sup> The NYS DEC requires that Pest Control Companies retain records of pesticide application to care centers maintain records for three years and to make the records available for public inspection upon request. The New York State Office of Child and Family Services require that Child Care Centers maintain records of all pesticide applied in CCCs.

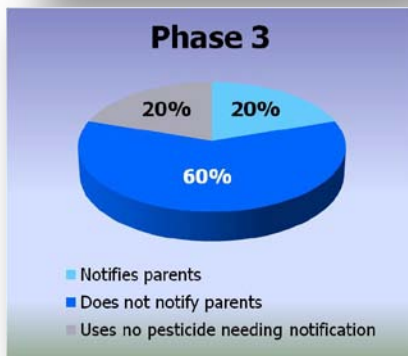
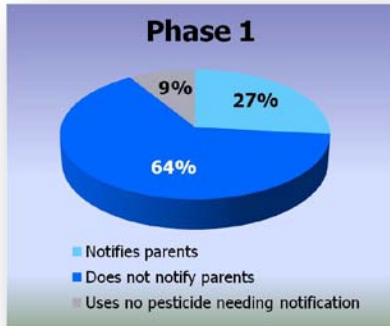
**Federal Regulations.** The US Environmental Protection Agency, under FIFRA, requires that all pesticides must be applied according to label directions.

### L. Pesticide Application Notification

The NYS DEC Neighbor Notification Law, Rule and Regulation (Chapter 285 of the Laws of 2000), along with the New York City Department of Health and Mental Hygiene (DOHMH) Law #51, requires child care centers to provide at least 48 hours notice before application of pesticides on the property.<sup>xxxviii</sup> The notice must be posted in a location that can easily be seen by people picking up and dropping off children and must include: the date of pesticide application, name and EPA registration number of the pesticide being applied, a statement suggesting discussion with a day care representative of steps to minimize exposure of children to the pesticide being applied, the name of a daycare representative to contact for further information and “1-800” telephone numbers for

pesticide product information.<sup>xxxix</sup> Non-volatile, tamper resistant rodenticide baits are exempt from these prior notification regulations due to their classification as low impact under NYS Law, Chapter 285<sup>xl</sup>; however, only seven centers were found using such exempt baits.

NYC DOHMH Law #51 states the need for a '48-hour' parental notification of pesticide applications in child care centers for all non-exempt pesticides. While baits, traps and gels are considered less-toxic and are exempt, sprays are not. If pesticides must be sprayed, Friday applications should be encouraged, as they reduce the potential exposure risks while also not requiring a 48-hour notification. However, five times more pesticides are applied from Monday through Thursday, requiring notification. Yet, only 20% of centers notify parents.



64% of the child care centers did not notify parents or employees of the application of pesticides in Phase 1, yet even by Phase 3, 60% of child care centers (24) still did not notify. There was no significant change in the notification practices or record keeping processes of centers from the phase 1 visit to the phase 3 visits.

This data supports the idea that many child care centers do not completely understand the current laws. The data does not account for the fact that 58% (26) of the child care centers, have pesticides sprayed in their facility, and most, 69% (in 31 centers) use either exempt only pesticides, such as baits, traps and gels, that do not require notification, or a combination of both exempt and non-exempt (sprays).

### M. Application Records Maintenance in Childcare Facilities

Both the NYS DEC and the NYC DOHMH require that child care centers 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 child care centers visited during Phase 1 of the study, 33% did not maintain complete records, 22% had

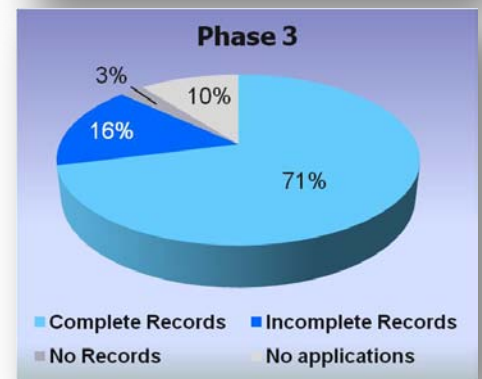
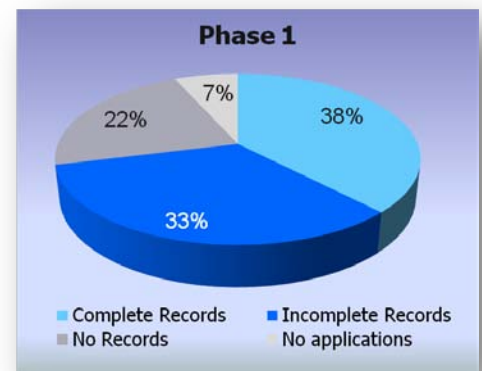
no records and only 38% maintain complete records.

By Phase 3, these numbers had changed dramatically, with all but one child care center having some form of record keeping. 71% (27) of child care centers maintained complete records and 10% of the child care centers now do not apply pesticides, so there is no need for them to maintain pesticide application records. These results were also due to direct compliance assistance to both child care centers and pest control companies.

### N. Pest Prevention Management Plan

Law 47, Article 151 of the NYC DOHMH requires that each childcare center develop and implement a pest prevention management plan. The law clearly states that the use of pesticides shall not substitute for pest prevention management measures (a plan). This plan should include the following:

- A schedule for routine inspections.
- Actions to be taken when pests are present.
- A log of visits by pest management professionals.





- Elimination of conditions conducive to pests and the presence of pests.
- Elimination of existing routes of pest movement (sealing and repairing holes/gaps).
- Elimination of existing harborages.
- Removal of existing sources of water.
- Elimination of existing sources of food for pests.

During the course of the phase 1 interviews with child care administrators, EPA inspectors found that 69% (31) of child care centers did not have a pest prevention management plan as required by the NYC DOHMH, while 24% (11) of child care centers used a plan provided by the Pest control company to fulfill the requirement.



By the phase 3 revisits, only 20% (8) of child care centers had no plan and 67% (26) of child care centers have now adopted the plans provided by the pest control companies. As the NYC DOHMH specifically disallows the use of a pesticide application company as a ‘plan’, some of the pesticide companies have provided child care centers with a copy of their pest management plan. In some cases, however, these pest control company plans are not specifically geared to schools or child care facilities.

The plans provided by the pest control companies, in most cases, do not contain all of the elements required of a child care center pest management plan, but are being used by some child care centers until they have more information and a template for a plan provided to them.

In Phase 1, only 7% (3) of Child Care Centers had a pest prevention management plan of their own, but by Phase 3, 13% (5) of child care centers had developed a comprehensive pest management plan of their own. Some centers expressed an interest in writing their own plans, and requested EPA to provide them with assistance in the form of a plan template.

### O. Violations

No federal violations were identified. One State violation was documented at a pest control company and it was referred to the NYSDEC for follow up and enforcement action.

The study identified multiple potential violations in child care centers concerning compliance with pertinent NYCDOHMH regulations. These potential violations, all related to NYC DOHMH Law 47, including lack of a Pest Prevention Management plan for the child care center, lack of parental notification for the application of pesticides in the child care center, and lack of complete pesticides application records were referred to NYCDOHMH for follow up and enforcement actions.

### P. Knowledge of IPM in Child Care Centers

Alternatives to applications of pesticides as the only means of combating pests in child care centers do exist. IPM while not explicitly required by the federal government, is highly recommended by federal, state pesticide regulatory agencies, and required by other state and local agencies. Following the steps, as outlined in IPM is required by some states to be implemented before any pesticide applications are allowed in schools.<sup>xli</sup> The state of New York, for example, requires the establishment of integrated pest management (IPM) approaches and allows only minimal pesticide application after repeated IPM attempts have failed.

IPM focuses on reducing pests to acceptable levels by eliminating sources of food, water, shelter, and entry through the use of sanitation, maintenance, and other physical, biological, and chemical control methods. This process focuses on the proactive prevention of pests rather than reactive mitigation once they have entered an

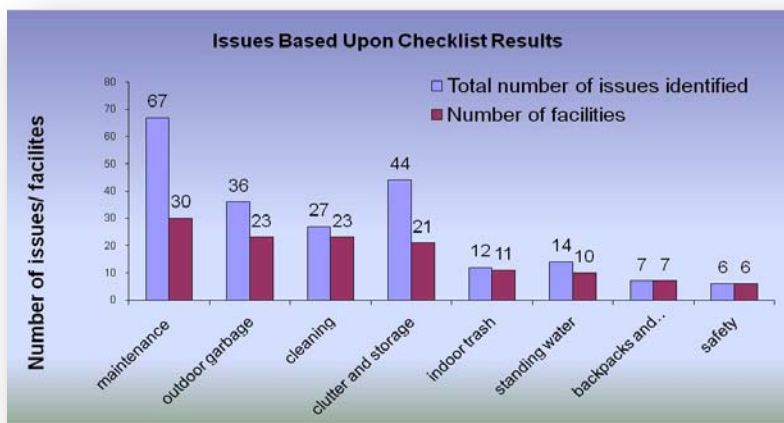


establishment. In IPM, pesticides may be used if they are deemed necessary, but only after all other methods have failed, and then selecting the least toxic pest-specific alternatives.

Although IPM was found to not be a recognizable term for most child care center directors during the first visit interviews (only 7 out of 45 center administrators had some knowledge about IPM), it was found via the facility tour, that most child care centers did indeed practice various forms of IPM. Both by walking and talking with the child care 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. These discussions were followed up by an after-visit letter that documented positive IPM practices and pointed out areas that could use improvement. Upon the second visits in Phase 3, inspectors reported that study CCC administrators have a good idea of the concept of IPM.

## Q. IPM Issues Identified in Childcare Facilities

IPM issues in the 45 child care centers were successfully identified through the course of this study. The most prominent IPM issue categories found in the Staten Island child care centers through the checklist and visitation process were: maintenance, clutter and storage, outdoor garbage, cleaning and sanitation, outdoor standing water, personal item storage, indoor trash and outdoor garbage. By utilizing both checklist and photographic methods of documentation, we found 67 maintenance issues in 31 centers, 81 clutter and storage issues in 23 different centers, 43 outdoor garbage issues in 28 centers, and 14 outdoor standing water issues in 10 different centers.



## R. IPM Improvements

This study documented, through the use of the questionnaire and photographs, significant changes in IPM practice in 38 of the child care centers that were re-visited in Phase 3 of the study. By using the negative practices in the after visit letters and comparing them with changes in those exact areas, we were able to filter out most subjectivity in the observational skills of the different inspectors visiting the child care centers between Phases 1 and 3. For instance, if an inspector missed some key negative IPM practices in Phase 1, and a different inspector documented those discrepancies in Phase 3, the additional negative practices would not deter from the specific practice improvements that a center made via the after-visit letters and any additional IPM issues that were not initially identified within that child care center were not counted in the final tally.

Maintenance showed the greatest total number of improvements. Filling cracks, holes, leaks and adding door sweeps were quick fixes often performed by maintenance staff and added up to a 75% 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 because organizing materials and cleaning up clutter in a classroom is often done by the teaching staff and requires considerable time.

| IPM Issue Category According to Checklist | CCCs with IPM Issues (Phase1) | Percent Improvement (Phase 3) |
|---|-------------------------------|-------------------------------|
| Maintenance                               | 30                            | 75%                           |
| Outdoor Garbage                           | 23                            | 84%                           |
| Cleaning                                  | 23                            | 82%                           |
| Clutter and Storage                       | 21                            | 45%                           |
| Indoor Trash                              | 11                            | 83%                           |
| Outdoor Standing Water                    | 10                            | 66%                           |

## Conclusions

Initially, fifteen facilities reported having no pest problems, and many child care centers relayed that they had few, if any signs of insects. Many had pest control companies come on a regular basis, either as a preventative measure, or because they thought that they were required to by law. It soon became apparent to survey staff that there is profound confusion among the child care center directors as to what the state and local child care pesticide laws are, what is required and what the proper pest management procedures should be.

The reasons provided for the decision to use pesticides as a form of pest prevention suggests that IPM education is needed to ensure that pesticides are considered to be a pest management choice of last resort, after all other methods have been exhausted.

The high frequency of pesticide applications found in the course of this study, demonstrates a strong dependence on pesticides being applied routinely as a preventive method, and that child care center administrators are unaware of the vulnerability of children to potential pesticide exposures. Based upon the vulnerability of children to even minute amounts of pesticides, such practice may have deleterious effects. 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.

Therefore, this study concludes that through a multi-faceted IPM educational program, it can effect a reduction in pesticide spraying which will, in turn, reduce the likelihood of pesticide exposure to young children within the child care settings. This study succeeded in its goals to assess the prevalence of specific pest problems in child care centers, to assess the compliance with local, state and federal laws of the pest control companies that were engaged to service the CCCs. It also succeeded in assessing the awareness of IPM by CCC administrators and maintenance personnel, and to reduce pesticide exposure to children in the child care setting. In most cases by conducting this three phase approach to IPM outreach, the study team was able to successfully instruct child care administrators and maintenance personnel about the principles of IPM and the importance of reducing pesticide use in child care centers.

This study documented that some child care centers changed their overall pesticide application and pest management practices. The study also successfully documented current pest management procedures, identified key areas that needed child-care-specific instructional materials, tested the efficacy of a hands-on approach to IPM instruction, and as a result the inspectors were able to evidence reduction of the amount of pesticides applied to child care centers within the study area.

This study indicates that all child care centers need timely and sustained education in order to learn about and adopt safer pest management practices, as they are outlined by IPM principles. Once educated about IPM, significant improvements in pest management practices can be accomplished in a timely manner reducing both pests and the use of pesticides in sensitive environments.

## Recommendations

**1. New York City DOHMH Regulations.** The Staten Island study indicated that many of the child care centers were confused or unsure of the pest management practices that they were required to implement. New York City DOHMH needs to improve outreach efforts concerning their own pesticide application regulations, notification requirements and IPM plan development to their constituent Child Care Centers.

Among the responses given for having pesticides applied on a regularly scheduled basis, many child care administrators believed that they were required to have pest control companies come and apply pesticides on a regular basis, regardless of actual needs, simply as a preventative measure. The reasons provided for the decision to use pesticides suggests that education is needed to ensure that pesticides are considered to be a pest management choice of last resort, after all other methods have been tried and fail.

Furthermore, the NYC DOHMH needs to amend pesticide regulations to improve clarity. There needs to be better outreach by the NYC DOHMH clearly stating all city laws and regulations pertaining to the proper pest management practices that the childcare center should be following. The NYC DOHMH also needs to develop

specific pest control guidelines for child care center administrators and staff and provide subsequent training to all DOHMH's CCC inspectors.

**2. NYS DEC Training to Pest Control Companies.** The Staten Island study also indicated the need for IPM related training of the pest control companies servicing CCCs. NYS DEC needs to focus their educational and training efforts on ensuring that all pest control companies servicing child care centers implement Integrated Pest Management. Through its continuing certification & training program of the licensed pest management professionals, NYS DEC needs to ensure that IPM practices are actually implemented in CCCs city-wide.

**3. Targeted Pest Control Company and CCC Outreach.** This study revealed that many of the child care centers were serviced by the same pesticide company and, therefore, having very similar approaches to pest management. More than half of the child care centers retained the services of a pest control company and 22 out of 39 centers were being serviced by only 3 pest control companies. Each of the three companies had a practice of spraying pesticides in most of the centers that they serviced, rather than using less toxic alternatives and assessing first the need for using pesticides. Targeting IPM outreach initiatives to pest control companies, especially the ones that service the most child care centers, may help to reduce the amount of spraying in these facilities, the overall pesticide use and subsequently reduce potential pesticide exposures.

**4. Develop and disseminate informational resources for CCCs and parents.** The NYS DOHMH, in collaboration with EPA, should develop extensive resources on the risks of pesticides to young children and IPM. Information about IPM, local regulations, the parental rights to be notified when pesticides are applied in their child's care facility and warnings about the risks of pesticide exposure should be disseminated to all CCCs and parents. Child care centers and agencies providing services to families with small children are natural venues to disseminate this information.

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