National Institute of Environmental Health Sciences

Protecting Children From Pesticides

NIEHS-Funded Integrated Pest Management Reduces Exposure to Pests and Pesticides

The National Institute of Environmental Health Sciences (NIEHS) funds researchers working to improve the health of people exposed to pests and pesticides. This effort focuses on where children live, learn, and play, in both urban and rural communities.[1,2,3]

Allergens from pests, such as rodents and cockroaches, can trigger asthma symptoms, particularly among children.[4,5] Exposure to pest allergens in early life — even in the womb — can increase the risk of developing asthma.[6] Using chemical pesticides to control pests can be problematic because of ingredients that can make people sick or exacerbate disease.

One environmentally sustainable approach for reducing pesticide use is integrated pest management (IPM). This approach first addresses the conditions that lead to pest problems, and then encourages the use of baits instead of pesticides sprays, when necessary.[1,2,3]

NIEHS-funded researchers have worked with pregnant mothers, children, and child care providers to understand the effects of pesticide exposure on asthma, and whether IPM can reduce exposures and associated health effects.[2,5,6]

What Is IPM?

- **Prevent:** Use barriers and limit access to food, water, and shelter that could attract pests.
- **Inspect:** Trained professionals check buildings for evidence of pests.
- **Identify:** Document types of pests to choose the correct management approach.
- **Monitor:** Regularly look for pests and pest damage.
- **Manage:** Use materials and practices that maximize safety and minimize exposure to harmful chemicals.

"Over the past 20 years, our collective work has evolved from understanding the health effects of pest allergens and pesticide exposure, to developing education materials that can be used in home and child care environments, and finally to measuring the success of IPM interventions."

– Study Lead Asa Bradman, Ph.D.

Impacts of Pest Management Research

Understanding Exposures

Uncovering Health Effects

Reducing Exposures

Informing Policy

Community Engagement

- Scientists **linked poor housing conditions, with the likelihood of pest infestations and pesticide use**, particularly among low-income residents of apartment buildings in New York City and farmworker households in California.[4]
- Researchers **discovered that certain pesticide chemicals can cross the placenta** during pregnancy and potentially expose the fetus.[6]
- Studies in urban communities **revealed a connection between indoor pesticide exposure and the prevalence of asthma**.[5]
- Intervention trials **showed how IPM can be tailored to the characteristics of a specific home or building** to reduce pest infestation levels.[1,2,3]
- **Results informed regulations in New York City** to limit the use of certain pesticides and promote an IPM approach in residential and child care settings.[7]
- Researchers **collaborated with communities to develop IPM educational materials** for homes and child care centers.[8,9,10]

Then and Now

Then

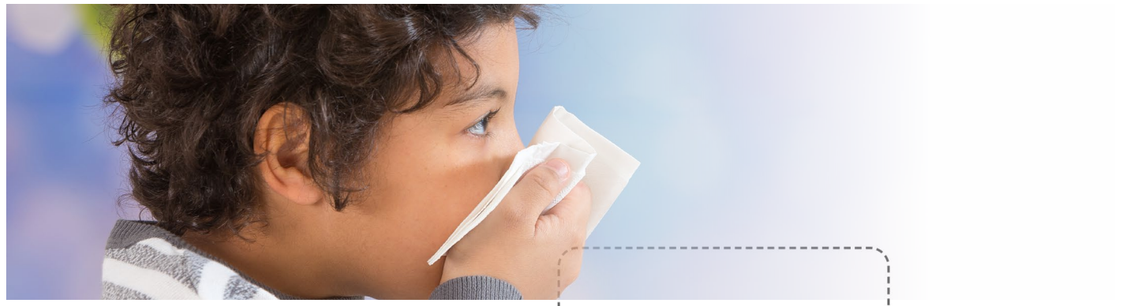
- Researchers had not defined the links between building conditions and the prevalence of pest allergens and pesticide exposure among people in urban and rural settings.
- Spraying pesticides was the primary method of managing pests.
- California's Healthy Schools Act of 2000, legislation which was supported by grassroots public health advocacy, required schools and child care centers to adopt IPM practices, providing a policy model for other communities.[11]

Now

- Housing conditions, such as building age, poor ventilation, water damage, and building disrepair, are recognized factors that can affect pest infestations and use of pesticides.
- IPM is accepted as an effective strategy to reduce pests and pesticide exposure.
- Researchers have developed detailed toolkits in English and Spanish that assist families, educators, and child care center staff with practicing IPM.
- With California as a model and the research findings to support IPM, New York City adopted regulations to reduce urban residential pesticide use.[12,13,14]

Protecting Children From Pesticides

Fundamental Questions | Application and Synthesis | Implementation and Adjustment | Policy and Practice | Impact



2000

California Education Code (Article 4) includes the Healthy Schools Act of 2000, which defines IPM requirements for school and child care center staff.[12]

2005-2006

Exposure assessments documented cockroach and mouse droppings as allergens.[4,5]

2002-2009

Interventions compared IPM with other treatments.[1,2,3,7]

2006

First study to document that IPM reduced pesticide exposure during pregnancy.[6]

2007

NYC Pesticide Reduction Law (Intro 329A, Local Law 37) established requirements for use of pesticides and promoted IPM practices.[9]

2007

NYC Neighborhood Notification Law (Intro 328A) requires providing sufficient notice to neighbors about certain pesticide applications.[10]

2008

NYC Health Code (Article 151) stated, "Pesticide use should not be the first and only line of defense against pests."[11]

2011

Researchers worked with community partners to develop toolkits on IPM and Green Cleaning and Sanitizing.[8]

2013

Researchers worked with community partners to develop an IPM training program for pest control companies serving schools and child care centers.[13]

2016

IPM training for pest control companies became a required component of the continuing education curriculum in California's statewide IPM program.[14]

2022

Researchers identified pesticide exposures of preschool children in child care centers.[16]

NIH National Institute of Environmental Health Sciences

NIEHS supported research for all of the milestones highlighted above.

Putting Research Into Practice

Leveraging findings from 20 years of NIEHS-funded research, key protocols were developed for implementing IPM in child care settings.[8,9,10] Toolkits that incorporate these protocols are distributed by researchers in California to child care centers and family child care homes during workshops. They outline specific actions that can reduce pests and pesticide use.

Research Challenges and Solutions

Challenge: Objectively measure the effectiveness of IPM in reducing exposure to pest allergens and pesticides.

Solution: NIEHS funding allowed for measurements of pesticide use before and after IPM interventions. Survey data were collected on practices and problems with pest infestation, along with objective measures of pesticide concentration in dust samples from carpets and silicone wristbands worn by preschool-age children in child care centers.[16]

Challenge: Encourage people to use IPM as an alternative to chemical pesticides.

Solution: Researchers discussed IPM with parents and child care professionals. This input informed the design of toolkits that give clear instructions on how to use IPM and its value when compared to pesticides.

NIEHS Supported IPM-Related Research

The Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS)

CHAMACOS is a community-university partnership investigating the effect of allergen and pesticide exposures on growth, neurodevelopment, and respiratory disease in children residing in the Salinas Valley, an agricultural region in California. The researchers also examined the efficacy of IPM strategies to reduce pests and pesticide exposure in child care facilities.[4]

IPM in the Urban Environment

NIEHS-funded researchers investigated associations between pesticide use and health outcomes, and the effectiveness of IPM in an urban setting.[1,2,3,7] Study findings influenced laws in New York City that restricted the use of spray pesticides in homes.

University of California, San Francisco, Healthy Children and Environments Study

This NIEHS-funded study evaluates an IPM intervention in child care centers serving socio-economically and ethnically diverse preschool-age children in four California counties.[15] The goal of the intervention is to reduce children's exposure to pesticides.

"We were fortunate to receive NIEHS funding to run a randomized control trial using the IPM intervention. This study was designed to use the information in the toolkit and present it in workshops so that we could facilitate interactive discussions with the child care providers."

– Study Co-Lead
Abbey Alkon, Ph.D., RN

For references, supplementary information, and more on the impact of NIEHS research, please visit **https://niehs.nih.gov/research/programs/translational/examples**.