

Boston Public Housing: Partnerships and Policy Advances

Traditional pest control in low-income multifamily housing, with initial flush out and periodic spray, has failed to eliminate pests long-term. As a consequence, residents may take pest control into their own hands, using over-the-counter, restricted and illegal pesticides. A series of integrated pest management (IPM)-based initiatives at Boston Housing Authority serves as a model for other public housing authorities. The model uses peer educators and increasingly standardized approaches to IPM training, contracts, data collection, and teams. Public housing authorities can adapt the lessons learned to their situation.



Why Cockroaches?

Live cockroaches, as well as their remains and feces, cause asthma attacks in people sensitive to cockroach allergens according to a 2000 Institute of Medicine Report. The Inner City Asthma Study found that more than 60% of inner city children were sensitive to cockroach allergens. Asthma is a costly disease that disrupts a family and undermines a child's ability to learn. There is growing evidence that mice might have a similar effect.

The Healthy Public Housing Initiative: Research for Action and Community Empowerment (2000-2004)

The Healthy Public Housing Initiative (HPHI) is a community-university-city agency collaborative (Collaborative) formed to improve resident respiratory health and building conditions in Boston public housing using an IPM intervention in 44 apartments of 57 asthmatic children enrolled in the project. It includes Boston Housing Authority (BHA), the City of Boston Public Health Commission, the New England Asthma Regional Council, Tufts University, Harvard University and Boston University.¹

The package of IPM interventions included:

- Educating and assisting residents with sanitation, clutter control, and preparation for IPM application;
- Deep cleaning with a vacuum equipped with a high-efficiency particulate air (HEPA) filter¹;
- Monitoring for roaches with sticky traps;
- Flushing out cockroach harborages;
- Exclusion by sealing holes and cracks; and
- Application of gel baits and boric acid.

The collaborative conducted pre- and post-study interviews with residents over the course of a year and had monthly standardized interviews with residents to capture data on the change in asthma symptoms, caretaker quality of life, doctors' visits, and hospitalizations for asthma. The collaborative also collected dust samples in apartments for cockroach allergens and pesticide residues as part of our study.

Key Findings

1. **Traditional approaches to pest control are ineffective, especially for cockroaches.**³
 - Nearly 50% of the BHA homes tested in HPHI showed cockroach allergen levels in excess of asthma sensitivity exposures;
 - Nearly 60% of the tested children showed allergic sensitivity to the most prevalent cockroach antigen.

This case study is one of a series addressing integrated pest management (IPM) in low-income housing. To access the series, visit www.healthyhomestraining.org/ipm/studies.htm.

IPM is a commonsense approach to pest management to exclude pests, reduce their harborage, food and water, and, where necessary, use low-risk pesticides.

¹ HEPA filters are designed to remove 99.97% of fine particulates. Fine particulates are dangerous because they penetrate deep into the lungs.

- Pest-related allergen levels correlated to lack of housing renovation, holes in walls, poor housekeeping practices, and season of the year.²
- Every BHA home tested showed evidence of between three and eight pesticides used, at least one of which is either banned or restricted to non-residential use.
- BHA residents in our study have a higher rate of pesticide use than the national average.

2. **A package of IPM interventions designed to reduce allergen burden and re-infestation was effective and improved both environmental and health indicators.**

The collaborative's intense cleaning and cockroach control reduced allergen loads in all homes. The reduced allergen levels were sustained over four months and then began to rise, showing the need to implement the intervention on a regular basis to maintain results.⁴ During the period of IPM intervention, asthmatic children involved in the study reported a significant reduction in asthma symptoms, including coughing and wheezing, activity limitations, and poor sleep quality.⁵

Every home tested showed evidence of between three and eight pesticides used, at least one of which is either banned or restricted to non-residential use.

3. **Residents are central to successful IPM in their housing developments.** HPHI trained more than 20 public housing residents to conduct housing surveys and inspections as both health advocates and IPM educators.

Second Generation IPM in Boston Housing Authority (2005)

The research results spurred the collaborative to launch two pilot projects which refined the IPM model developed in the research project.

1. IPM Educator Pilot in Charlestown Housing Development

The collaborative designed this pilot to measure the effectiveness of training and employing an IPM peer educator on residents' preparation for IPM and on cockroach control.

Thirty-four moderately infested and highly infested units in BHA's Charlestown Family Development received baseline assessment and three applications of gel baits, with two to four weeks between applications, by a pest management professional. Before the first pest control application, residents received written notice to prepare their units for treatment, a routine industry method of alerting residents to prepare for pest control treatment. Before the second and third gel bait treatments, an IPM peer educator:

- Instructed residents in how to prepare for IPM treatment;
- Educated them on pest biology and habits;
- Explained the role of sanitation and clutter in infestation; and
- Used a HEPA vacuum to remove dead insects and allergens in dust.

Cyfluthrin, a neurotoxin that is the active ingredient in the roach powder Tempo, is used in its undiluted, powder form by some residents, and is sold illegally in some neighborhood bodegas with no health and safety information.

The IPM treatment with peer education resulted in a significant decrease in cockroach activity in the infested apartments, whereas IPM treatment with a written notice but without peer education did not have a significant decrease. All of the units that were both clean and prepared for IPM treatment were much improved and had little or no pest activity by the end of the study. In contrast, 100% of units that were both not clean and not prepared for IPM treatment showed no improvement in pest infestation at the end of the study.⁶

2. IPM Pilot in Holgate Apartments Senior Housing

The Collaborative conducted a second pilot project in an 85-unit housing development, Holgate Apartments. Holgate Apartments are reserved for elderly and disabled people. The collaborative trained and employed two residents as IPM educators. It formed an IPM team including BHA management and maintenance personnel.

The team received a short training on IPM, and the role of the IPM educators and the pest control operator. Over a period of five to six months, peer educators visited every apartment to to:

- Monitor baseline infestation;
- Educate residents;
- Schedule treatments for infested apartments;
- Assist with HEPA vacuuming and preparation for IPM treatment;
- Call in work orders for repairs; and
- Elicit resident feedback on program satisfaction.

Results showed that by the end of the pilot program, units with little or no pest activity increased from 77% to 100% and the common areas with little or no pest activity improved from 0% pre-IPM to 100% post-IPM. In six of the units visited, IPM educators arranged for needed social services for the residents, another benefit of this model program.



Healthy Pest-Free Housing Initiative (2006-2009)

With five years of promising results, the collaborative received funding to scale up IPM in the Boston Housing Authority (BHA) with an ambitious schedule to implement IPM in 15 family developments over the course of three years. The Healthy Pest-Free Housing Initiative (HPFHI), as the demonstration is called, established the following goals:

- Improve asthma and overall health;
- Eliminate cockroach and rodent infestation;
- Reduce pesticide use and exposure;
- Maximize resident peer education; and
- Promote IPM in public policy on housing and health.

The HPFHI activities are ongoing. They include:

- Hire and train 10 BHA residents to be employed as health advocates and IPM educators for their peers. These IPM educators provide residents with multilingual health education on asthma and information about IPM, assist residents with reducing clutter and placing work orders, and serve as a bridge for residents to other needed health and social services.
- Develop a multilingual, multimedia public health information campaign for BHA residents. The Safe Pest Control Campaign reaches all the BHA developments and includes posters, flyers, and videos in several languages to educate residents about IPM and health risks associated with exposure to pesticides, with emphasis on illegal and restricted pesticides.
- Train BHA managers, staff, and resident leaders in the model IPM program as they prepare to implement it in their developments. Work with BHA to set up a database to track baseline housing conditions and IPM results, develop a model IPM contract, and prepare an IPM orientation for new residents.
- Distribute up to 800 Healthy Home Kits. The kits include important information and supplies for safer pest management and for reducing asthma triggers in the home.
- Develop a pesticide buyback program to eliminate potentially toxic substances from the home environment in all developments. Residents participating in the buyback will receive free pest control equipment and supplies.

HPFHI Preliminary Results: Year 1

The IPM team in each development includes the housing manager and maintenance staff, the IPM contractor, the peer educator, and the residents. The team collected baseline data on infestation, sanitation, clutter, repairs needed, and any unique social needs. The IPM contractor and development manager developed a list of *focus units*. Focus units are those units in need of continued IPM treatment, peer education, social services, and repair.

"This demonstration project builds on an earlier initiative, which proved that including residents as full partners to educate their neighbors is the most successful method of addressing health related issues in public housing,"

*Sandra B. Henriquez
BHA Administrator*

The collaborative assigned peer educators to work with the residents of these focus units to educate them about IPM, advocate for other needed services, and ensure that work order repairs are made. A comparative study of work orders for pest problems in the 12 months before and after the IPM program is being conducted to help evaluate the effectiveness of the IPM program in both the Charlestown Family Development and the Holgate Apartments. Other components of evaluation include a comparison of pest control contract and services costs and a comparison of unit inspection findings pre- and post-IPM.

Related Initiatives

The collaborative's work has resulted in a number of initiatives that reach well beyond the Boston Housing Authority.

1. Healthcare Funding for IPM Intervention

The New England Asthma Regional Council (ARC) identified a need to create policies that would support sustainable financing mechanisms to address environmental controls in the home. ARC has spearheaded discussions with the healthcare payer and healthcare purchaser communities about supporting policies for delivering and/or paying for home-centered environmental interventions. These interventions include IPM services and supplies.

Healthcare payers have indicated they are receptive to addressing environmental triggers but want guidance on what are considered to be best practices and how implementing the practices will affect their bottom line. To that end, ARC has produced the entitled *Investing in Best Practices for Asthma: A Business Case for Education and Environmental Interventions*.⁷ The business case documents the health and cost benefits associated with offering asthma education programs and home-based interventions to reduce environmental triggers.

2. Training Center for Healthy Housing and IPM

The Center for Healthy Homes and Neighborhoods in the Boston University School of Public Health offers trainings in New England as a member of the National Healthy Homes Training Center and Network. The Center has developed and offered IPM courses for managers of low-income, multifamily housing, including public housing authorities, community development corporations, and Section 8 programs. The Center has provided one-day and two-day trainings in IPM to:

- Large and medium public housing authorities in six New England cities, with the goal of launching IPM programs in those housing developments;
- Two community-based organizations; and
- Local health officers in Massachusetts.

The following table compares the two IPM interventions in Boston Housing Authority to the 10 key elements for an effective IPM program based on the U.S. Department of Housing and Urban Development's *Guidance on Integrated Pest Management* issued on February 3, 2006, and renewed May 27, 2007. The two initiatives are the Healthy Public Housing Initiative (HPHI) from 2000 to 2004 and the Healthy Pest-Free Housing Initiative (HPFHI) from 2006 to 2009. The results for HPFHI are not yet available.

| COMPARISON OF TWO PHASES OF IPM INITIATIVES WITH BOSTON HOUSING AUTHORITY | | |
|---|---|---|
| HUD IPM Program Elements <i>(Results of Study in Bold Italics)</i> | Healthy Public Housing Initiative 2000-2004 | Healthy Pest-Free Housing Initiative 2006-2009 |
| 1. Communicate Policies Communicate Housing Authority's IPM policies and procedures to: <ul style="list-style-type: none"> • All building occupants • Administrative staff • Maintenance personnel • Contractors. | Researchers talk to managers and residents about IPM intervention program. | BHA told administration to managers and maintenance staff about policies and held community meeting for residents with manager and IPM contractor. |
| 2. Identify Problems Identify pests and environmental conditions that limit the spread of pests. | Conducted comprehensive initial visual assessment of 44 units in three developments. | Conducted comprehensive visual assessment of all units, common areas, yards, and basements in five developments annually for three years. |
| 3. Monitor and Track Establish an ongoing monitoring and record keeping system for: <ul style="list-style-type: none"> • Regular sampling and assessment of pests; • Surveillance techniques • Remedial actions taken • Assessment of program effectiveness. | Monitored traps every two weeks and intervened as necessary <i>Research Results: Allergens reduction in all homes sustained for four months, after which they began to rise. Statistically significant reduction in asthma symptoms during study period.</i> | <ul style="list-style-type: none"> • Developed short list of units with persistent pest problems and monitored these units. Inspected every two to three weeks and treated with gel baits until no infestation. • Provided data on sanitation, infestation, repairs, and social services needs to building manager after every visit. |
| 4. Set Thresholds for Action Determine, with involvement of residents: <ul style="list-style-type: none"> • Pest population levels – by species – that will be tolerated • Thresholds at which pest populations warrant action. | <ul style="list-style-type: none"> • Set tolerance at zero pests. • Acted on evidence/presence of pest | No change from initial study. |
| 5. Improve Non-Pesticide Methods Improve: <ul style="list-style-type: none"> • Mechanical pest management methods • Sanitation • Waste management • Natural control agents | <ul style="list-style-type: none"> • Vacuumed units with vacuum with HEPA filter. • Educated residents to improve sanitation and to prepare for IPM treatment. • Provided residents with plastic containers for food and garbage. | Same as initial study but also worked with residents needing more education, repairs, and social services. |
| 6. Prevent Pest Entry and Movement <ul style="list-style-type: none"> • Monitor and maintain structures and grounds including <ul style="list-style-type: none"> ○ Sealing cracks ○ Eliminating moisture intrusion and accumulation • Add physical barriers to pest entry and movement. | <ul style="list-style-type: none"> • Sealed cracks and small holes with copper mesh and expanding foam. • Reported water leaks to BHA for repair | No change from initial study. |

| COMPARISON OF TWO PHASES OF IPM INITIATIVES WITH BOSTON HOUSING AUTHORITY | | |
|--|--|---|
| HUD IPM Program Elements <i>(Results of Study in Bold Italics)</i> | Healthy Public Housing Initiative 2000-2004 | Healthy Pest-Free Housing Initiative 2006-2009 |
| 7. Educate Residents and Update Leases <ul style="list-style-type: none"> • Develop an outreach/educational program • Ensure that leases reflect residents' responsibilities for: <ul style="list-style-type: none"> ○ Proper housekeeping ○ Reporting presence of pests, leaks, and mold. | <ul style="list-style-type: none"> • Educated residents through peer educators and research staff regarding sanitation preparation, and hazards of pesticides, and assisted with work orders. • Ensured lease spells out resident responsibilities for housekeeping and reporting. | No change from initial study. |
| 8. Enforce Lease Enforce lease provisions regarding resident responsibilities, such as: <ul style="list-style-type: none"> • Housekeeping • Sanitation • Trash removal and storage. | <ul style="list-style-type: none"> • BHA enforced lease where necessary. | No change from initial study. |
| 9. Use Pesticides Only When Necessary Use pesticides only when necessary, with preference for products that, while producing the desired level of effectiveness, pose the least harm to human health and the environment, and, as appropriate, notifying PHA management before application. | <ul style="list-style-type: none"> • Flushed and vacuumed where high infestation. • Worked with residents to improve sanitation. • Excluded pests. • Where evidence of infestation, applied get baits and boric acid. | Same as initial study but added rodent control using traps and tamper-resistant bait boxes. |
| 10. Post Signs Provide and post "Pesticide Use Notification" signs or other warnings. | Notice given. | No change from initial study. |
| <i>Treatment Cost Per Unit at End of Study</i> | Cost information not collected. | Not yet available. |
| <i>Total Cost Per Unit Over Length of Study</i> | Cost information not collected. | Not yet available. |

REFERENCES:

- ¹ Hynes HP, Brugge D, Osgood N, Snell J, Vallarino J, Spengler JD. (2004). Where does the damp come from? Investigations into the indoor environment and respiratory health in Boston public housing. *Reviews on Environmental Health*, Special Issue on Housing and Health, 19(3-4),171-190.
- ² Peters J, Levy J., Rogers C, Burge H, Spengler JD. (2007). *Journal of Urban Health*, 84(2), 185-197.
- ³ Julien R, Adamkiewicz G, Levy J, Bennett D, Nishioki M, Spengler JD. (2007). Pesticide loadings of select organophosphate and pyrethroid pesticides in urban public housing. *Journal of Exposure Science and Environmental Epidemiology*, 1-8.
- ⁴ Peters J, Levy J., Rogers C, Burge H, Spengler JD. (2007). *Journal of Urban Health*, 84(2), 185-197.
- ⁵ Clougherty JE., Levy J., Hynes HP, Spengler JD. (2006). A longitudinal analysis of the efficacy of environmental interventions on asthma-related quality of life and symptoms among children in urban public housing. *Journal of Asthma*, 43(5), 335-343.
- ⁶ Condon C, Hynes HP, Brooks D, Rivard D, McCarthy J. (2007). The integrated pest management educator program in Boston public housing: Results and recommendations. *Local Environment*, 12(3), 223-238.
- ⁷ New England Asthma Regional Council (2007). Investing in Best Practices for Asthma: A Business Case for Education and Environmental Interventions. www.asthmaregionalcouncil.org/documents/InvestinginBestPracticesforAsthmaJune2007.pdf
- ⁷ U.S. Department of Housing and Urban Development (2007). Guidance on Integrated Pest Management. www.hud.gov/offices/pih/publications/notices/07/pih2007-12.pdf

For More Information

On Case Study

H. Patricia Hynes,
Professor of Environmental Health
Center for Healthy Homes and Neighborhoods
Boston University School of Public Health
hph@bu.edu

Healthy Public Housing Initiative
<http://www.hsph.harvard.edu/hphi/>

Healthy Pest-Free Housing Initiative
Margaret_Reid@bphc.org

New England Asthma Regional Council
www.asthmaregionalcouncil.org

Tom Neltner
National Center for Healthy Housing
10320 Little Patuxent Parkway, Suite 500
Columbia, MD 21044
443.539.4160 / Fax: 443.539.4150
tneltner@nchh.org

On Series

Kathy Seikel
U.S. Environmental Protection Agency
Mail Code 7506P, 1200 Penn. Ave., N.W.
Washington, DC 20460
703.308.8272 / Fax 703.305.5558
Seikel.Kathy@epa.gov

This case study was prepared by the
National Center for Healthy Housing
through a contract with U.S. Environmental
Protection Agency's Office of Pesticide
Programs and Battelle.

