



BUILDING A FRAMEWORK FOR HEALTHY HOUSING

2008 National Healthy Homes Conference

Healthy Pest Free Housing Initiative Demonstration Project

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Supports, Boston Public Health Commission



Background

- Healthy Public Housing Initiative
 - Documented extent of pest infestation and pesticide use in BHA
 - Impact on health, especially asthma
 - Developed relationships, tested strategies
 - Involved public and private funders
 - BHA residents and management identified pest control as a top priority



Boston Housing Authority

- Houses 10% of Boston residents
 - 64 Developments, scattered sites, Section 8
 - Average income @ \$12,000 for a family of four
 - Aging properties

- Current asthma
 - 23.6% adult BHA residents
 - 9.4% other adults*

*Behavioral Risk Factor Surveillance System 2006, Boston Public Health Commission



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Healthy Pest Free Housing Initiative

- Address public health issues
 - asthma, pest control, pesticide use, tobacco
- Apply resident-based education /outreach model
- Promote sustainability within BHA
- Disseminate lessons and tools
- Inform policy



HPFHI Partners

- Boston Public Health Commission
- Boston Housing Authority
- Boston University School of Public Health
- Committee for Boston Public Housing
- West Broadway Task Force
- Asthma Regional Council of New England
- Boston Urban Asthma Coalition
- Massachusetts Public Health Association



Healthy Pest Free Housing Initiative

- Resident focus group framed messages
- IPM demonstration program in 15 developments
- Involved advocacy and policy partners
- Continued financial support
 - W.K. Kellogg Foundation
 - U.S. Environmental Protection Agency



Residential Integrated Pest Management (IPM)

- Requires involvement of pest control practitioners, housing management and residents
- Make environment less hospitable to pests
 - Eliminate sources of food and water, harborage
 - Repair cracks and leaks, maintain building structure
 - Monitor, trap, multiple visits to infested areas
 - Reduces the need for pesticides



Resident Focus Groups – Pest Control Practices

- Conducted in multiple languages at 4 housing developments
- Residents reported:
 - “Roaches severe in stove. I have to turn my stove on for half an hour before I start cooking.”
 - “Medicated powder, sprinkle on bathroom floor and near pipes and tub because it burns.”
 - “Fog because it is cheaper than Raid.”
 - “I use Chinese Chalk at the front entrance to prevent ants from getting in.”
 - “I use Tempo. It is illegal to sell but there is a store in Jamaica Plain that sells it.”
 - “Once we fogged three times in a week.”



Focus Group Outcomes, continued

- Aware of the hazards of pesticides, concerned about children and asthma
- Expressed that infestation is so bad, that there is no choice
- Interested in safer products if they are effective
- Trust friends, family, neighbors and doctors for information
- Purchasing products at neighborhood stores



Public Awareness

Multilingual materials

- Safe pest control brochure
- Posters



You deserve a home free of cockroaches, mice, and other pests. **Seal them out** and help keep your home and family safe.

- Repair window screens
- Seal leaks around sink, toilet, tub, and pipes
- Keep sink clean and dry when not in use
- Block holes in walls and floors
- Repair cracks in baseboards and around pipes

Contact us for a free home check-up and Home SAFE kit.

Healthy Homes
Asthma Prevention and Control Program
617.534.5966, www.bphc.org

Boston Public Health Commission
Thomas M. Menino, Mayor

Pests, like cockroaches and mice, can trigger asthma and other health problems, but some pesticides and sprays can also be harmful to the health of your family.

There is a safer way to get rid of pests. Contact the Boston Public Health Commission for more tips on how to keep the pests out.

Produced with funding from the W.K. Kellogg Foundation and the U.S. Environmental Protection Agency.



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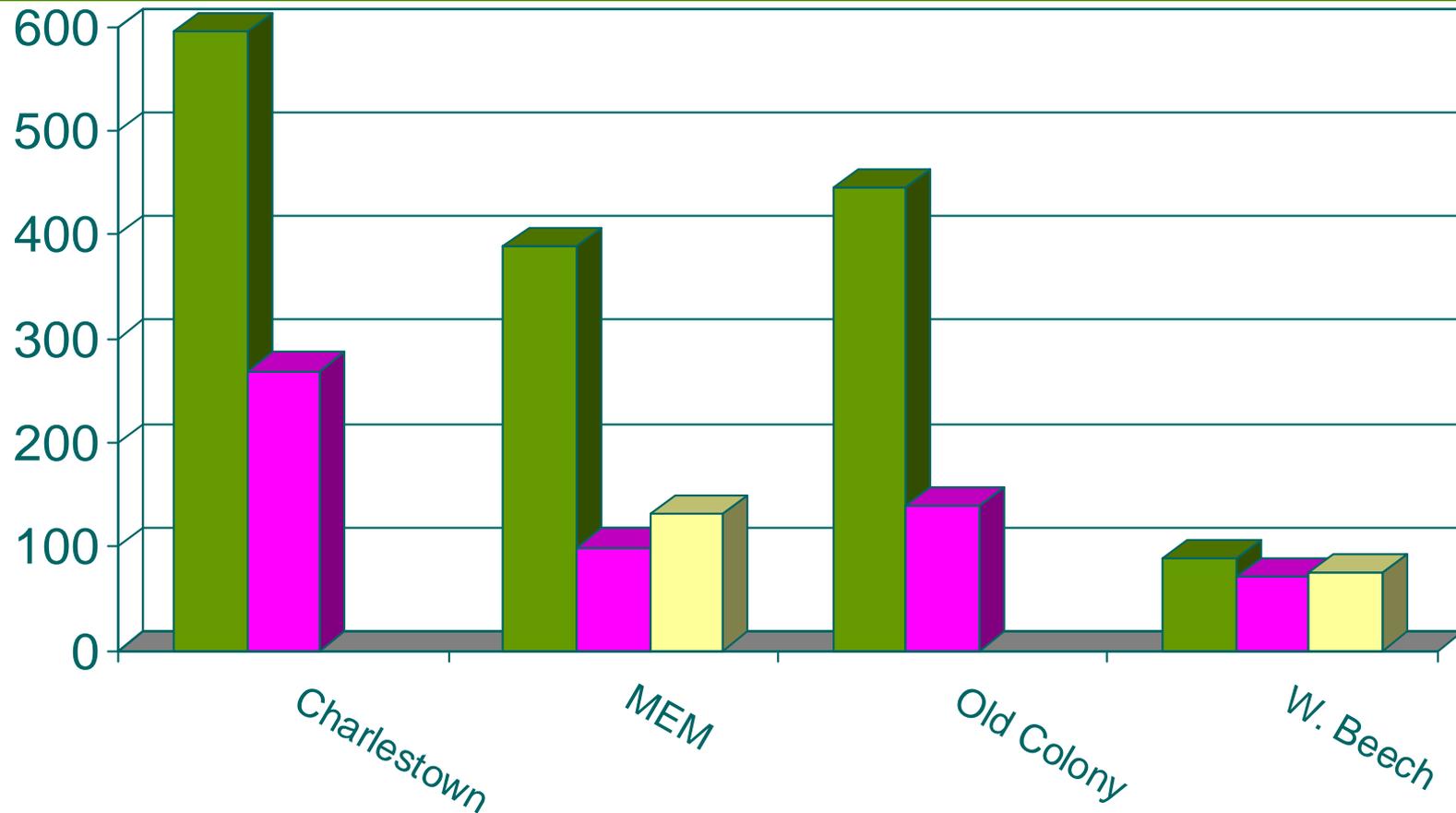
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Pesticide Buybacks

- Twice a year city's hazardous waste recycling
- Receive plastic food containers
- Offer home visits with low cost supplies



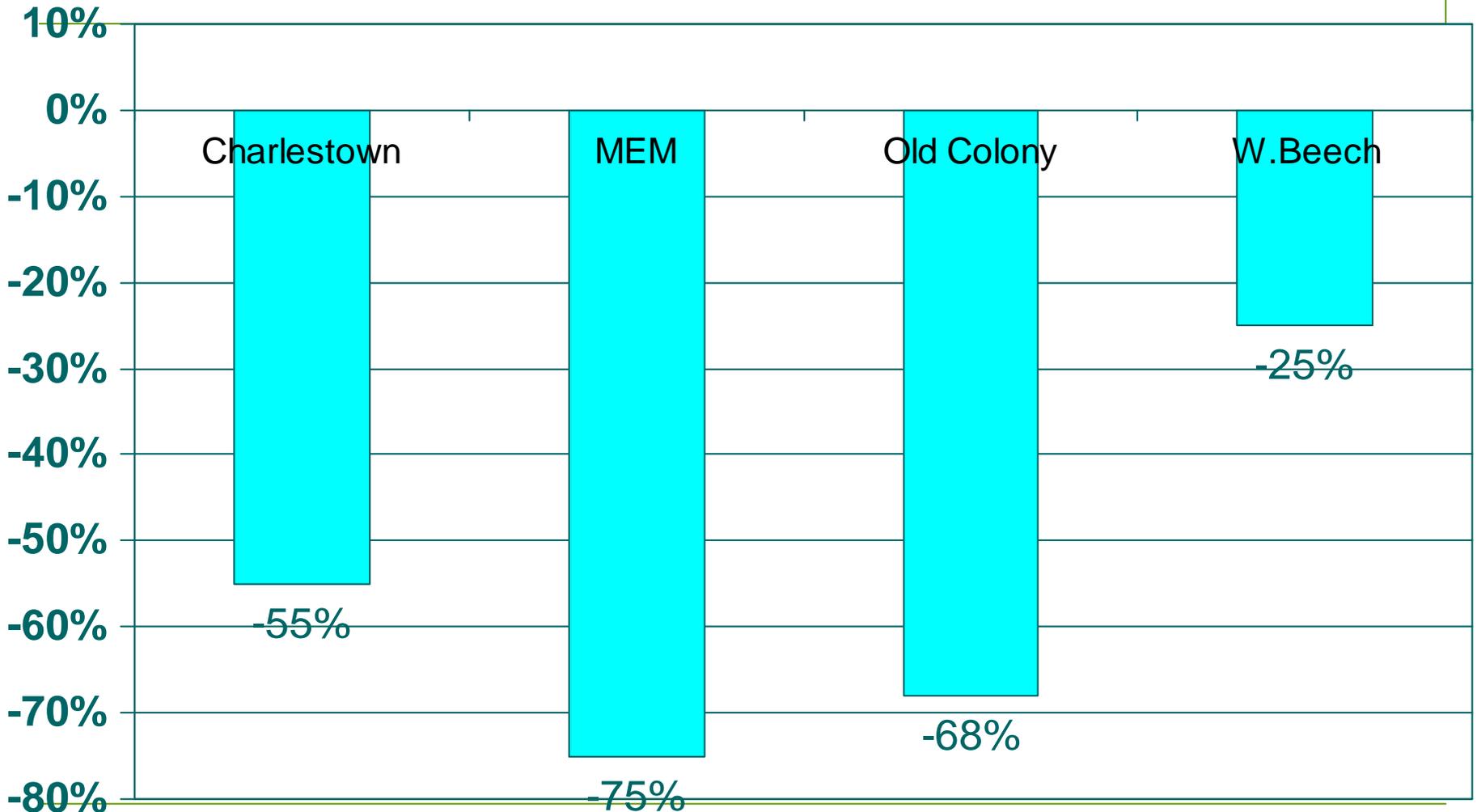
Cockroach work orders by development



■ Pre-IPM ■ Post-IPM (Y1) ■ Post-IPM (Y2)



Change in cockroach work orders by development





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Avg. mthly / unit	Pre-IPM	Post-IPM	Differenc e	% Change
Total Costs	\$3.44	\$8.08	\$4.63	135%
Contracts	\$3.13	\$8.06	\$4.93	158%
BHA staff	\$0.32	\$0.02	\$0.30	-94%

Institutionalization and Dissemination

- *Integrated Pest Management: A Guide for Managers and Owners of Affordable Housing*
- Multilingual written materials
- Trainings, contract specifications and protocols
- *IPM Policy Options for Residential Real Estate*



Intergovernmental Collaboration

- BHA involvement in **Boston Smoke Free Homes Campaign**
- **Advanced IPM Credentialing Program**
- BHA rapid response to sanitary code complaints
 - **Breathe Easy at Home Program** with Boston Inspectional Services Department





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Translating Healthy Housing Research into Practice:
Lessons Learned From a Boston-based IPM and Asthma
Research and Demonstration Project in Public Housing

Research Findings and Implications

Gary Adamkiewicz, PhD MPH
Harvard School of Public Health

Motivation

Can an environmental intervention improve the health of children living with asthma?

Study Finds Asthma In 25% of Children In Central Harlem

By RICHARD PÉREZ-PEÑA

A study has found that one of every four children in central Harlem has asthma, which is double the rate researchers expected to find and, experts say, is one of the highest rates ever documented for an American neighborhood.

Researchers say the figures, from an effort based at Harlem Hospital Center to test every child in a 24-block area, could indicate that the incidence of asthma is even higher in poor, urban areas than was previously believed.

The Centers for Disease Control and Prevention has estimated that about 6 percent of all Americans have asthma; the rate is believed to

(NYT, 4/19/2003)

Asthma hits N.E. hard, study finds

Diagnosis rates are higher than in rest of US

By Stephen Smith
GLOBE STAFF

The asthma epidemic has tightened its chokehold on New England, with one in seven adults and children diagnosed with the respiratory disease and its telltale wheezes and coughs, according to a report being released today.

The government-funded study shows the disease takes a higher toll in New England than in the rest of the country.

And although the precise cause remains a mystery, here, as elsewhere, the burden of the condition weighs most heavily on the poor.

The study, based on telephone surveys, estimates that the number of adults and children in the six New England states who report ever having been diagnosed with



(Boston Globe, 3/27/2006)

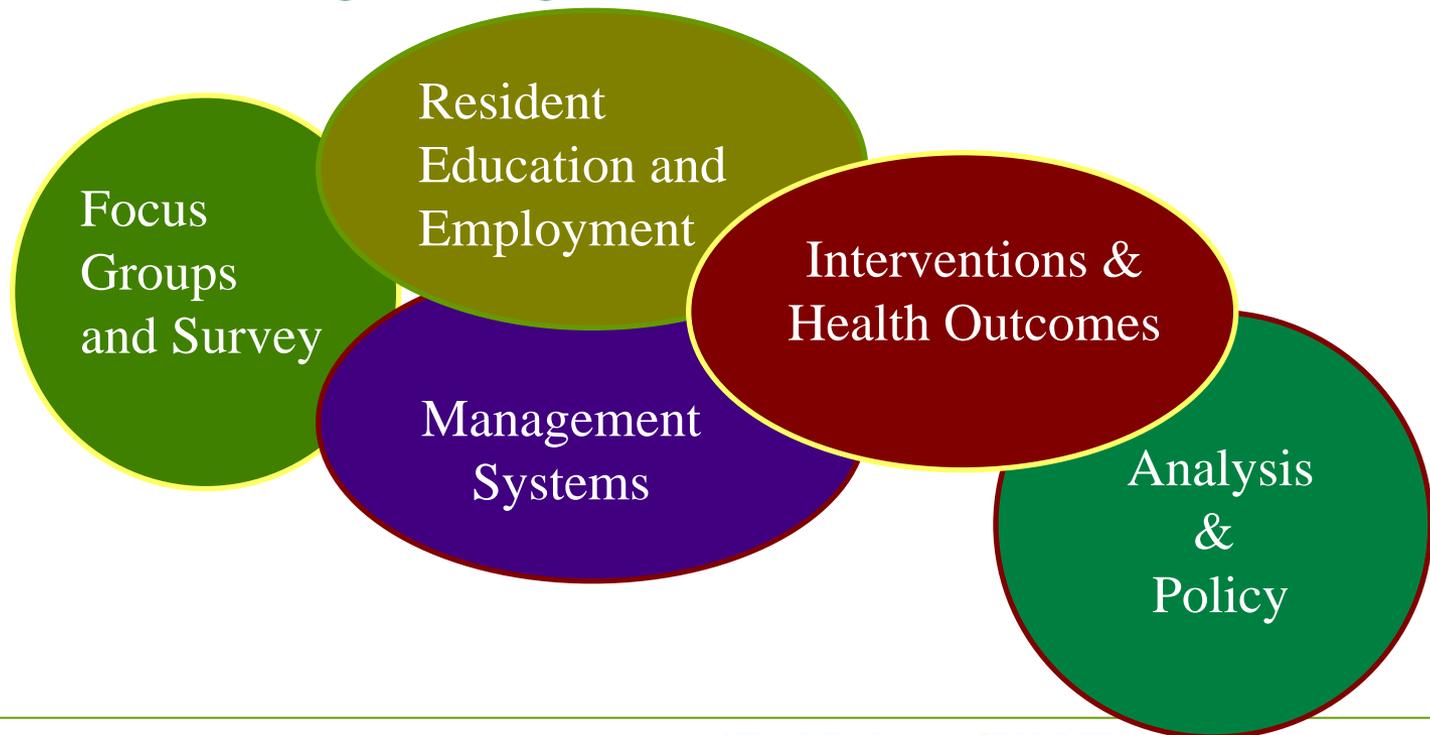


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Healthy Public Housing Initiative

- Primary Goal: To improve home environments for better respiratory health and increase quality of life for residents of public housing through interventions.



HPHI Partners

- Public/Government
 - Boston Housing Authority
 - Boston Public Health Commission
- Universities
 - Boston University School of Public Health
 - Harvard University School of Public Health
 - Tufts University School of Medicine
- Community
 - Committee for Boston Public Housing, Inc.
 - Franklin Hill Tenant Task Force, Inc.
 - West Broadway Tenant Task Force, Inc.



HPHI Intervention

- Aim: to reduce asthma triggers within BHA housing units
- Focused on **Integrated Pest Management** to reduce exposure to cockroach allergen
- Many developments were chronically infested

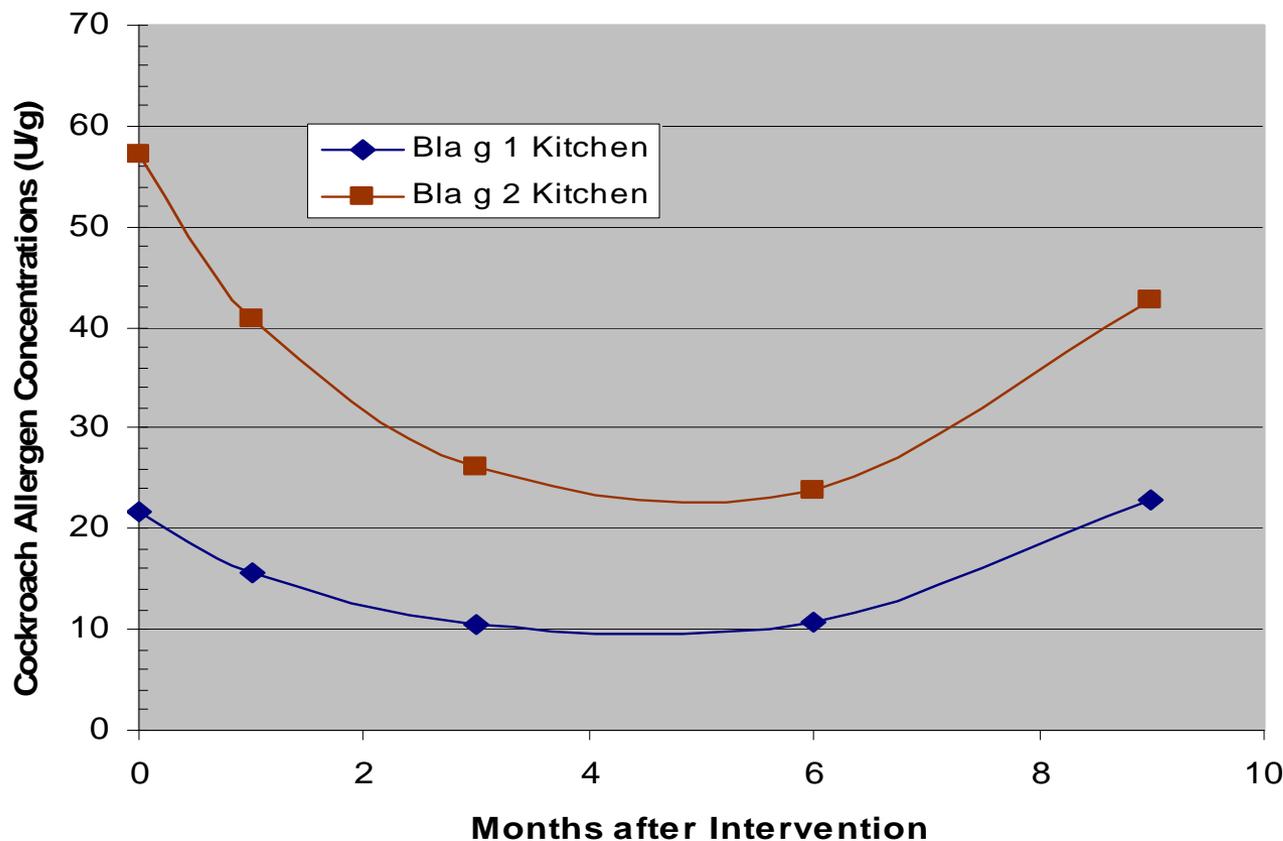


HPHI Intervention

- 60 families with asthmatic children from Boston Housing Authority developments enrolled in intervention study:
 - West Broadway
 - Washington Beech
 - Franklin Hill
- Health data
- Environmental Measurements
- Interventions
 - **Clinical** – Asthma case management: training, access to peak flow meters, monthly diaries and maintaining an appropriate medication regimen.
 - **Environmental** – IPM, new mattresses, pillow covers, plastic ware, minor home improvements, industrial cleaning.



HPHI – Cockroach Allergen Trends

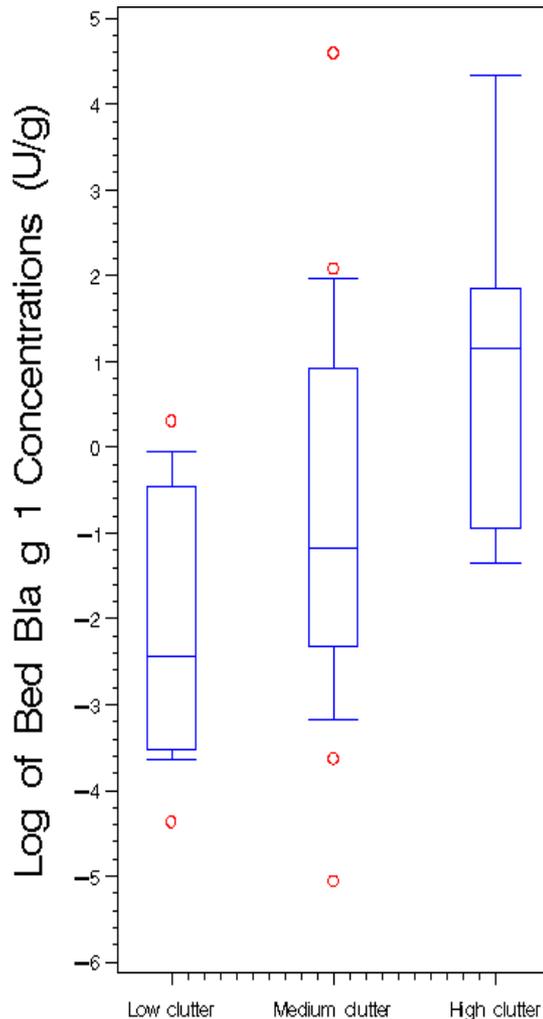


- Need to sustain efforts
- Focus should be building-wide



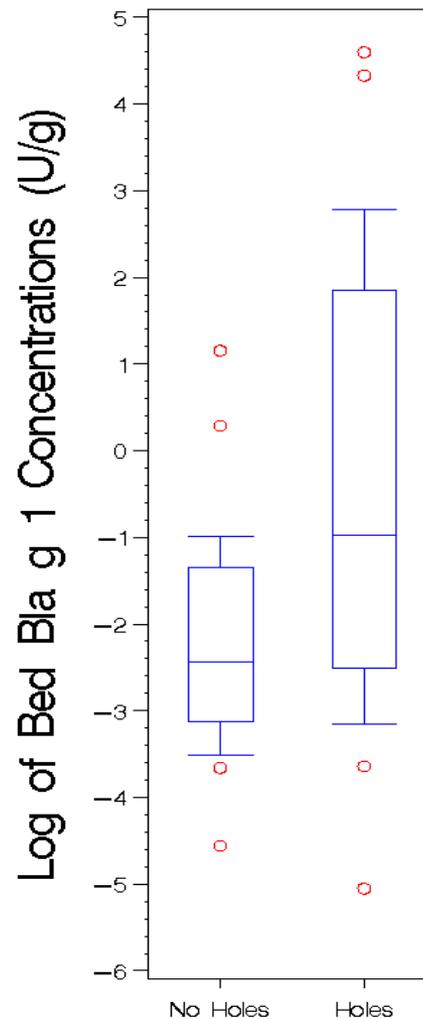
HPHI – Cockroach Allergen Trends

By “Clutter” level



(p-value=0.02)

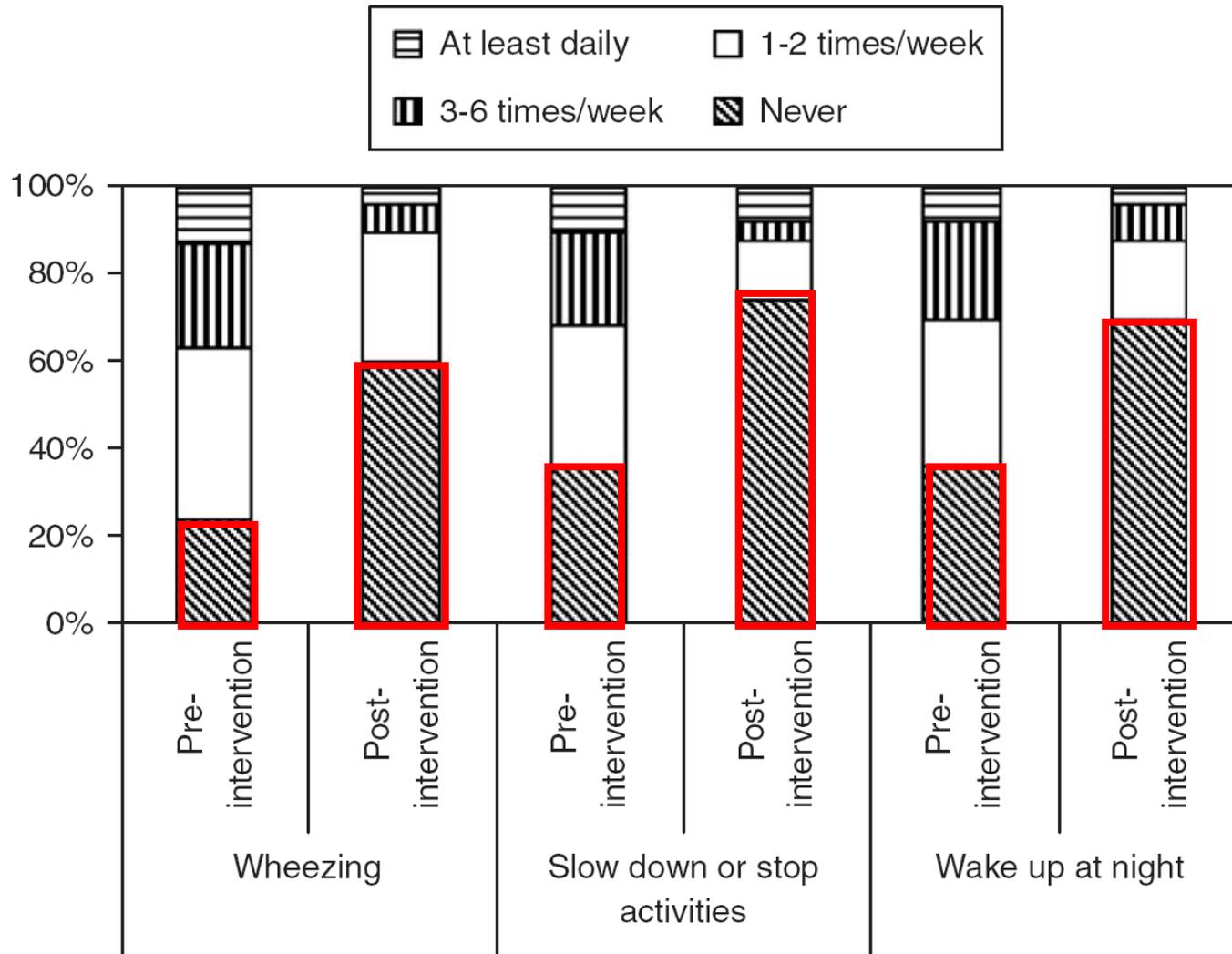
By “Holes in Walls”



(p-value=0.08)

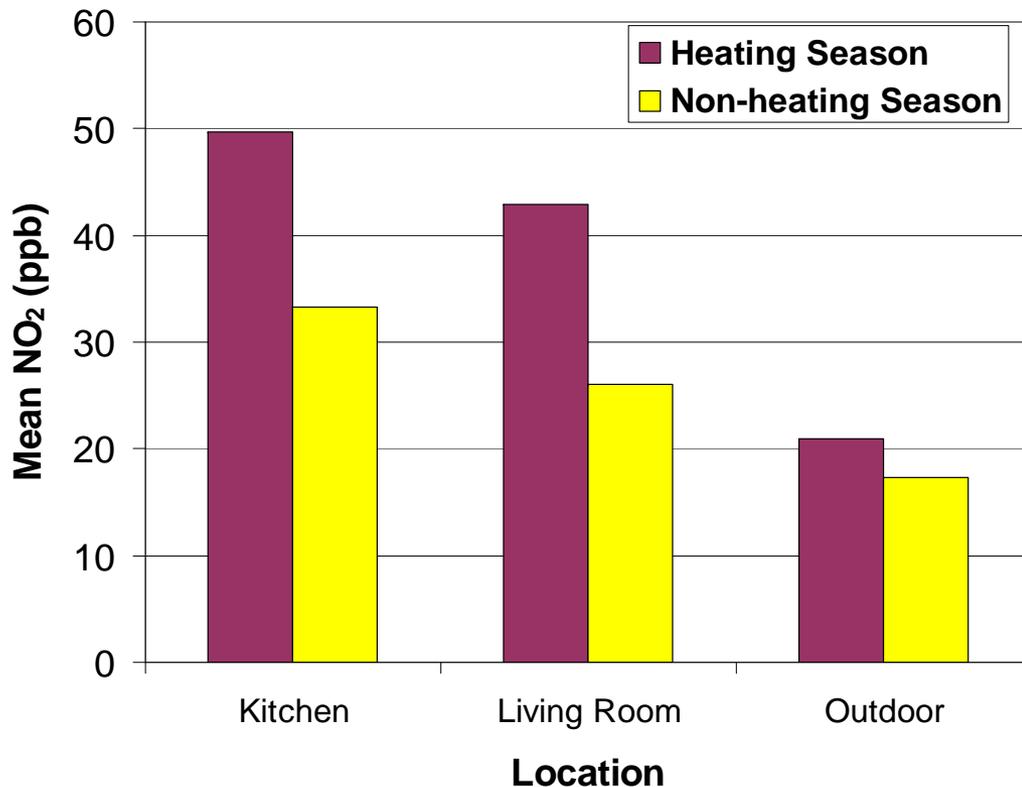
- Some root causes can be modified
- These lessons have been incorporated into current HPHFI project
 - Resident education
 - Repairs through work order system

HPHI Results - Asthma Symptoms



Additional research

● Nitrogen Dioxide and Air Exchange



- NO₂ strongly associated with air exchange rates
- In heating season, 40% above EPA standard
- Supplemental heating with stoves was common



Looking forward

- Research needs
 - Poor housing and pest infestation
 - Examining root causes (structural and behavioral)
 - Understanding context and pathways (e.g., psychosocial effects)
 - Chemical exposures
 - ‘Legacy’ effect
 - Pollutant mixtures



Looking forward

- Translating research into programs
 - Need to partner with residents
 - Interventions need to be tested
 - Integration of research results into standard operating procedures
 - Maintenance and operations
 - New construction
 - Rehab



Acknowledgments

- **BHA Families**
- **HPHI Team (PIs: H.P. Hynes, D. Brugge, J.D. Spengler)**
- **HSPH Pesticide/Allergen research team**
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 - Junenette Peters
 - Jon Levy
 - Ami Zota
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Thank you





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Classifying household exposures to pesticides in Boston Public Housing using house dust matrices.

Rhona Julien, ScD

Why Pesticides in Public Housing?

- Problem
 - Heavy pest infestation in multi urban dwelling
- Response
 - High use of pesticides
 - Preference for pesticides with quick knockdown
 - Misuse and use of illegal pesticides
- Concerns
 - Links to adverse health effects



A Changing Landscape

Organochlorines



Organophosphates



Pyrethroids



???

DDT (1972)

chlordane (1998)

diazinon (2001)

chlorpyrifos (2000)

permethrin

cypermethrin

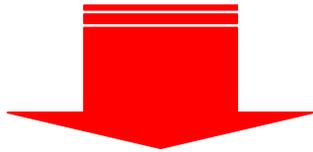
etc.



Indoor Exposures from Pest Control

- **High exposure** formulations

Foggers, aerosols, 'street' pesticides



- **Low exposure** formulations

Baits, gels, traps



Household Pesticides



Chinese Chalk



Tempo 20 WP Insecticide



- Research Aim

Compare sampling methodologies to classify exposures

- Study Objectives

Pesticide prevalence/concentrations

Classify household exposures (wipes vs vacuum dust)



Pesticide Monitoring

Vacuum Dust Samples- Living Room



Silent Spring Study
(Rudel et al. 2001)

Floor Wipe Samples – Living Room and Kitchen.



NHEXAS-AZ (Gordon et
al.1999)



Prevalence (%) and Distributions of Pesticide Concentrations ($\mu\text{g}/\text{m}^2$) in Kitchen Floor Wipes (N=42)

Analyte	%>LOD (n)	Min	Median	75th pct	Max
Chlorpyrifos	100 (42)	0.03	0.3	1.3	20
Permethrin	100 (42)	0.21	6.8	33.0	227
Diazinon	98 (41)	<LOD	0.4	2.6	556
Cypermethrin	90 (38)	<LOD	3.7	16.2	331
Cyfluthrin	71 (30)	<LOD	1.1	16.4	567.0
Esfenvalerate	67 (28)	<LOD	0.7	2.5	17.0
Cyhalothrin	26 (11)	<LOD	<LOD	0.4	4.0
Deltamethrin	16 (7)	<LOD	<LOD	<LOD	45.0



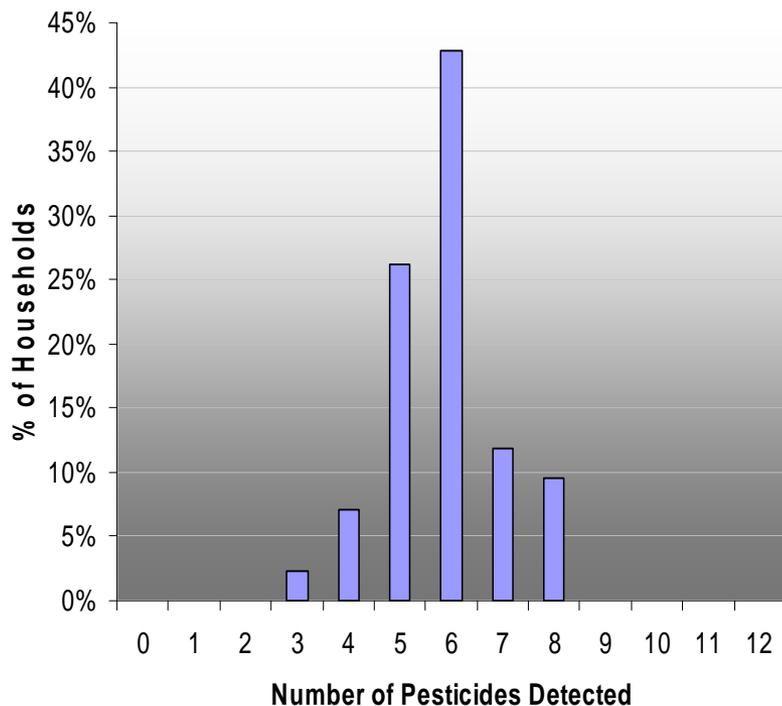
Prevalence (%) and Distributions of Pesticide Concentrations ($\mu\text{g/g}$) in Living Room Vacuum Dust (N=35)

Analyte	%>LOD (n)	Min	Median	75th pct	Max
Permethrin	100	0.13	0.92	1.3	13.1
Diazinon*	94	<LOD	0.05	0.2	4.4
Chlorpyrifos*	89	<LOD	0.06	0.2	3.0
Cypermethrin	60	<LOD	0.30	0.8	5.2
Cyfluthrin*	43	<LOD	<LOD	1.2	48.1
Esfenvalerate	29	<LOD	<LOD	0.20	1.2
Deltamethrin	9	<LOD	<LOD	<LOD	7.0
Tetramethrin	6	<LOD	<LOD	<LOD	6.0

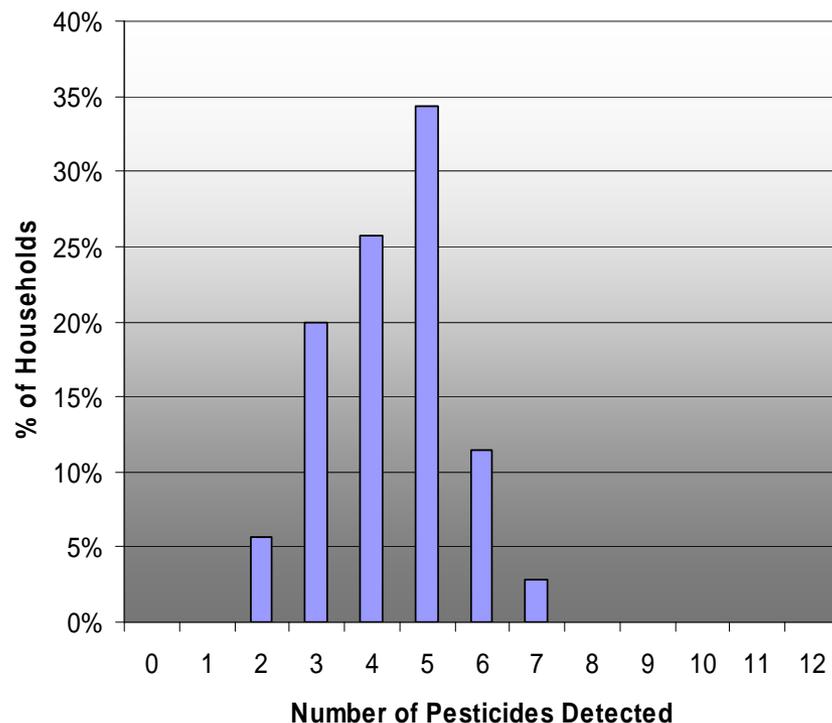


Prevalence of Pesticides Detected

Kitchen Floor Wipes (N=42)



Vacuum Dust (N=35)



Kitchen Floor Wipes

Vacuum Dust



Correlation Between Floor wipes and Vacuum Dust Matrices

Analyte	Floor Wipes vs Vac Dust (N=34)
Diazinon	0.62 ^{**}
Chlorpyrifos	0.41 [*]
Permethrin	0.51 ^{**}
Cypermethrin	0.01
Cyfluthrin	0.69 ^{**}

(*p<.05, ** p<.001)



Test of Equivalence on Exposure Classification: Floor Wipes and Vacuum Dust Methods

Prevalent Pesticides	Detected (>LOD) Kappa (S.E.)	Exposed (> Median) Kappa (S.E.)	Highly Exposed (>75 th pct) Kappa (S.E.)
Chlorpyrifos	N/A	0.35 (0.16)	0.23 (0.19)
Permethrin	N/A	0.59** (0.14)	0.51** (0.17)
Diazinon	-0.04 (0.03)	0.53* (0.15)	0.51* (0.17)
Cypermethrin	0.05 (0.13)	0.12 (0.17)	-0.02 (0.17)
Cyfluthrin	0.33* (0.13)	0.47* (0.15)	0.30 (0.18)

(*p<.05, ** p<.001)



Summary of Study Findings

- **Floor Wipes:**

Based on wipe samples, every home had at least 3 pesticides, some homes as many as 8 , most homes had 6

Chlorpyrifos were found in every home 2 years following withdrawal from sales

- **Vacuum Dust:**

Based on vacuum dust samples, every home had at least 2 pesticides, some homes as many as 7, most homes had 5



Study Findings Cont'd

- Restricted pesticides, e.g., Tempo were found in many homes.
- Positive correlations among target pesticides in dust matrices
- Reliability between sampling methods undetermined at this time



Public Health Implications

- High prevalence of 'banned' pesticides (diazinon, chlorpyrifos)
 - Possible pesticide persistence and/or continued use
 - Need **effective** interventions to prevent residents' potential exposures to pesticides in the home
 - Floor wipes possible proxy for vacuum dust



Disclaimer

This presentation was based on my research as a doctoral student at Harvard School of Public Health. It represents the views of the author and does not necessarily reflect the position of the U.S. Environmental Protection Agency. No official endorsement by the U.S. EPA is intended or inferred.



Thank you.

