Evaluation of the HUD Lead Based Paint Hazard Control Grant Program

Lessons Learned

Jonathan Wilson, MPP

ACCLPP

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National Center for Healthy Housing

Study Team

U.S. Government

- **HUD Office of Healthy Homes and Lead Hazard Control**
- **CDC National Center for Environmental Health**

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University of Cincinnati Department of Environmental Health

Motivation for the Evaluation

- No previous large scale study of lead hazard control in privately owned houses
- Programmatic evaluation of HUD Lead Hazard Control grant program
- Anticipation of Title X
  - Regulations to be issued
  - Guidance to be developed

Major Questions

- Can homes treated with less than full abatement meet clearance standards?
- Will children be poisoned in homes being treated?
- How long will dust lead loadings be reduced after treatment?
- Can housing treatments effectively reduce blood lead levels regardless of pre-intervention levels?

Key Data Collection Elements

- Detailed paint lead inspection performed pre-intervention
- Serial dust wipe samples collected and analyzed for lead pre- & post-intervention
- Serial blood lead samples collected from children 6 and under and analyzed for lead
- Lead hazard control treatments and costs

Research Design

- Basic evaluation (1994-1998)
  - 14 grantees
    - ☆Pre-intervention
    - ☆Clearance
    - ☆6 months after clearance
    - ☆12 months after clearance

Research Design

- Extended evaluation
  - Voluntary participation by 9 grantees
    - 24 months after clearance
    - 36 months after clearance
- Six-year evaluation
  - 4 grantees recruited into study
    - 72 months after clearance

Participating Grantees

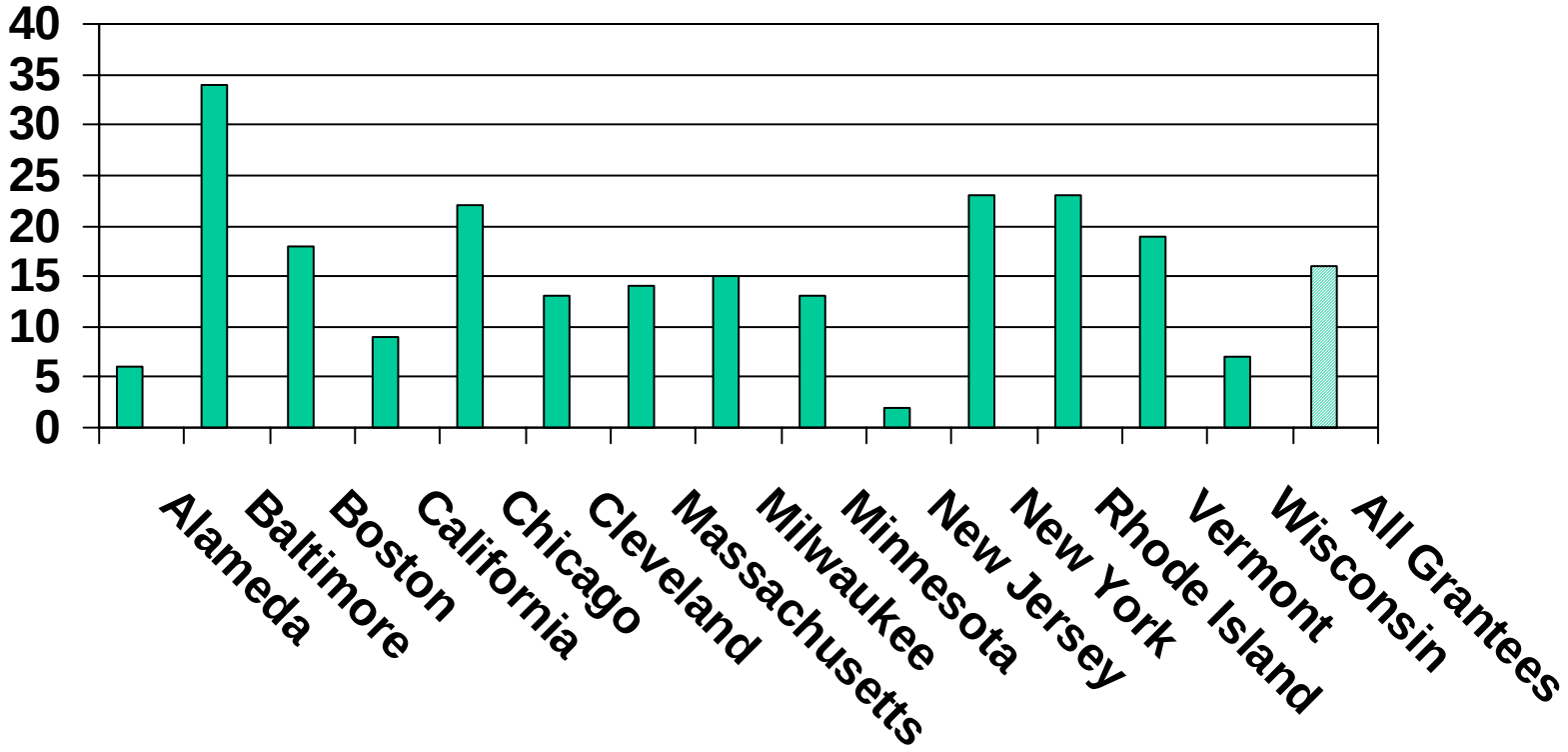
- Alameda County (E)
- Baltimore (E)
- Boston (E)
- California (E)
- Chicago (R2)
- Cleveland
- Massachusetts
- New Jersey
- New York City (S, R2)
- Milwaukee (E, S)
- Minnesota (E, S)
- Rhode Island (E)
- Vermont (E, S, R2)
- Wisconsin (E)

E = Extension
S = Six-Year
R2 = Round 2

Evaluation Report

- Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program
  - See NCHH website for full report including methods:
    - ☆http://www.centerforhealthyhousing.org

Pre-intervention (GM) Floor Dust Lead –Occupied (ug/ft^2)



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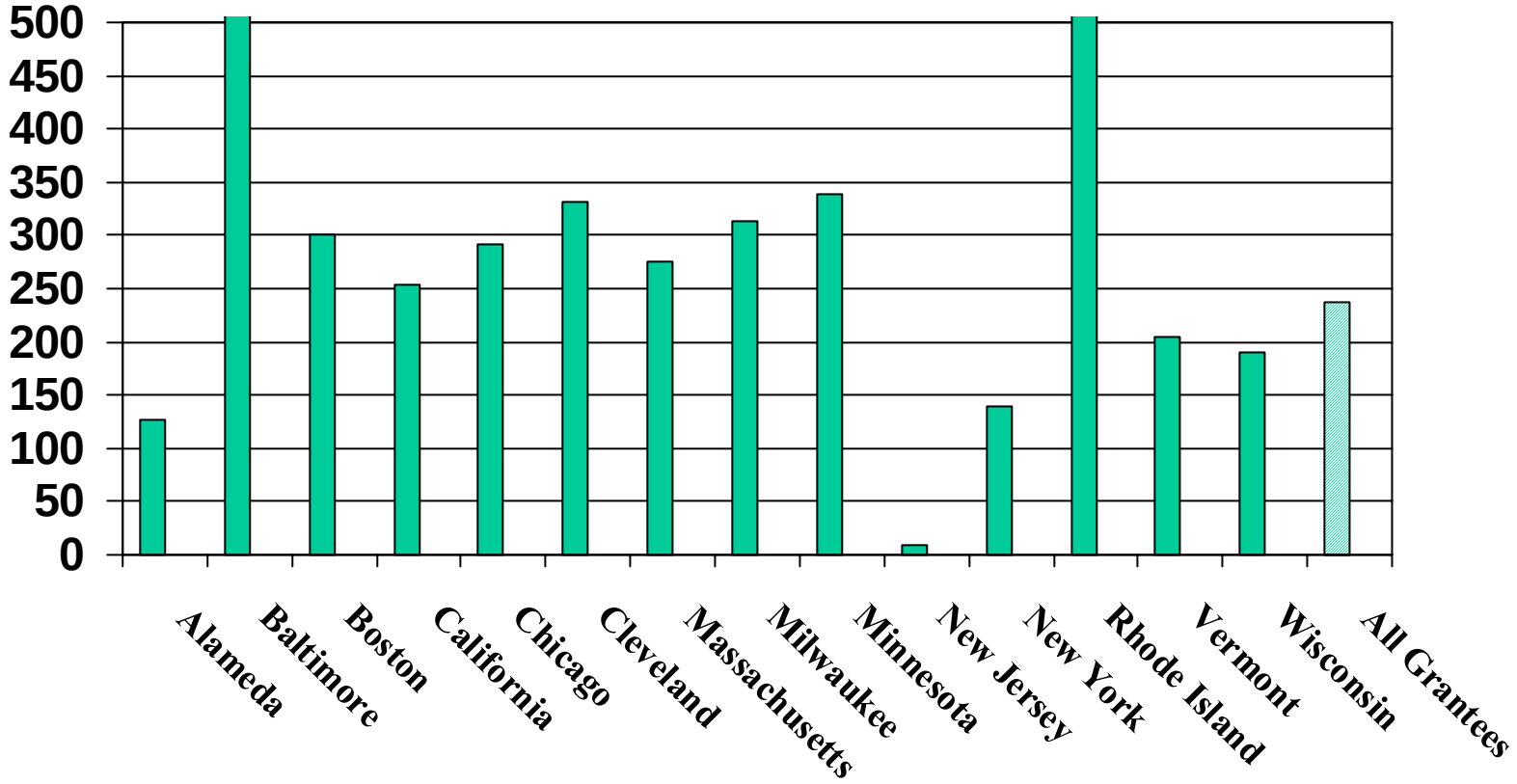
GM Pre-intervention Window Sill Dust Lead – Occupied (ug/ft^2)



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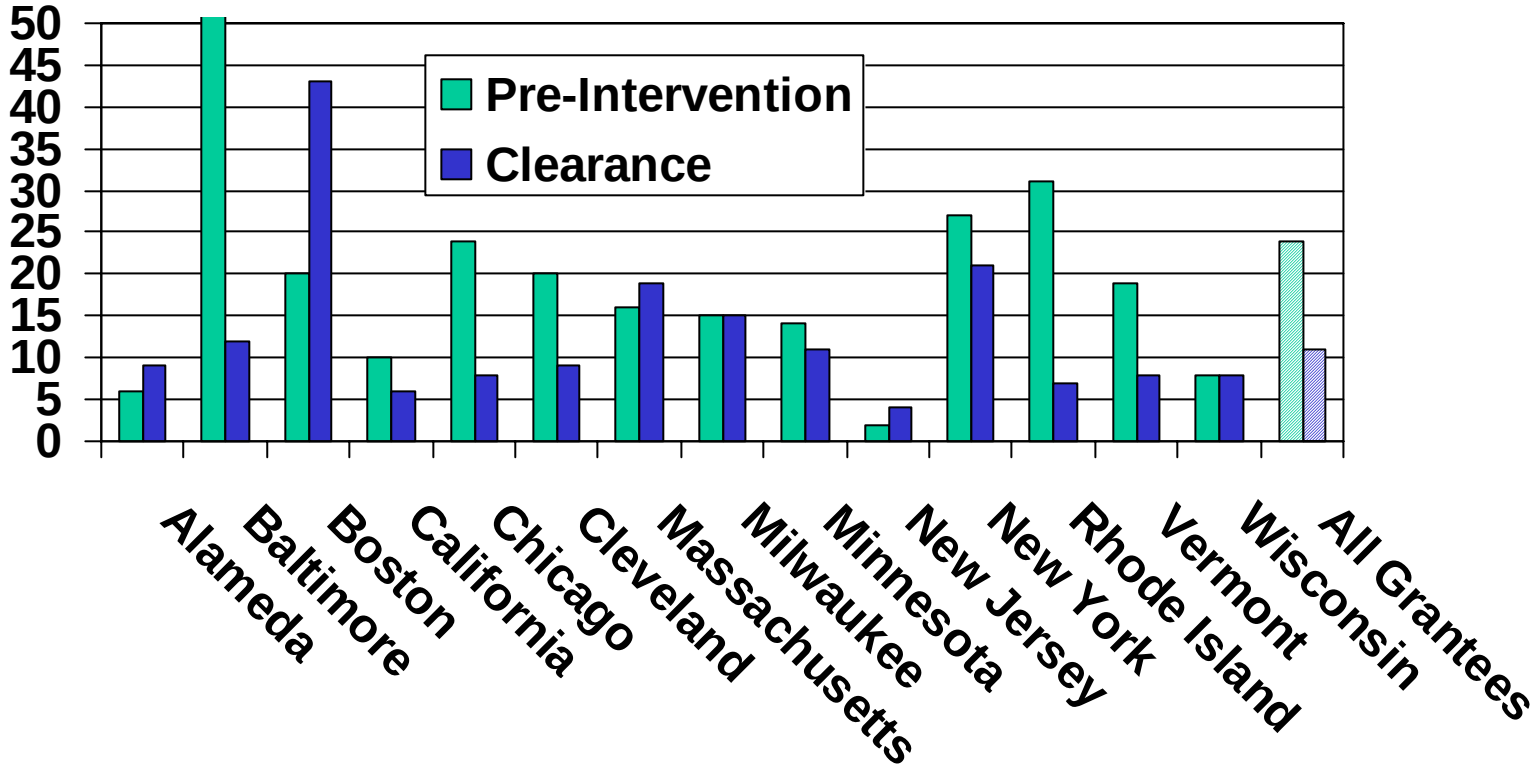
Successful Reductions Achieved in Floor Dust Leads Levels At Clearance



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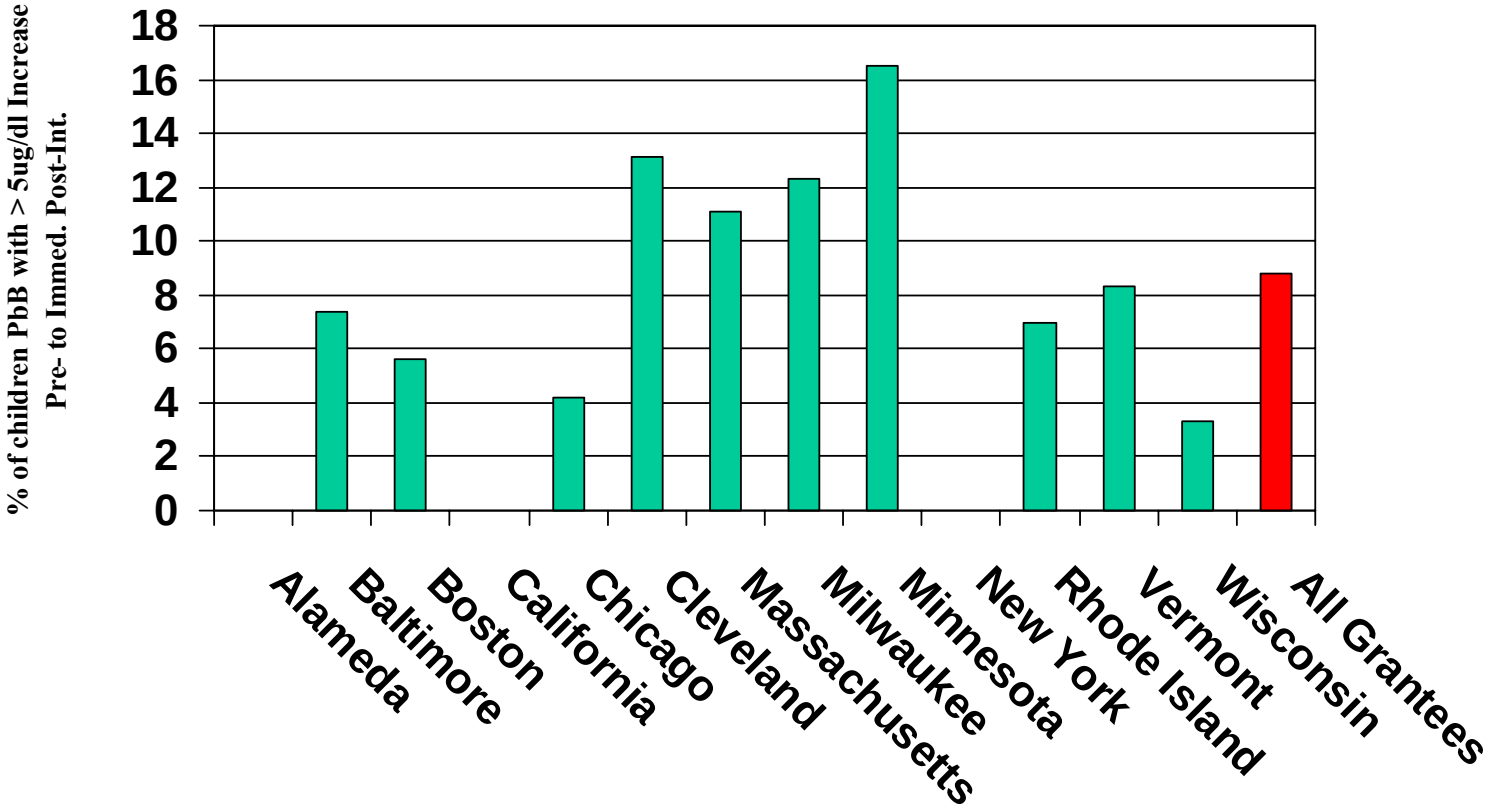
Lead Hazard Control Work Done per HUD Guidelines Does Not Pose Substantial Risk to Children



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Treatment Options

- Just cleaning: limited benefits
  - At 6-12 months post-intervention, dust lead not different from pre-intervention
- Full abatement: gold standard
  - Significant long-term reductions

    (At 6 years, floors <1 $\mu g/ft^2$; Sills < 20 $\mu g/ft^2$)
  - Less than perfect clean-up can be overcome

Interior Treatment Costs

	Estimated Interior Cost	
Int. Strat.	**Single Family**	**Multifamily**
02	$ 910	$ 610
03	$ 3,200	$ 2,100
04	$ 5,800	$ 3,900
05	$ 7,400	$ 5,400
06	$10,300	$ 6,900
07	$11,600	$ 7,700
	(1200 ft^2)	(800 ft^2)

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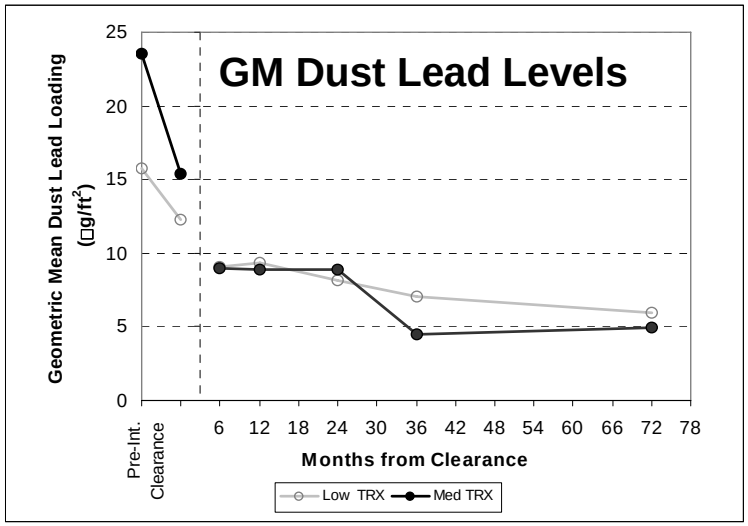
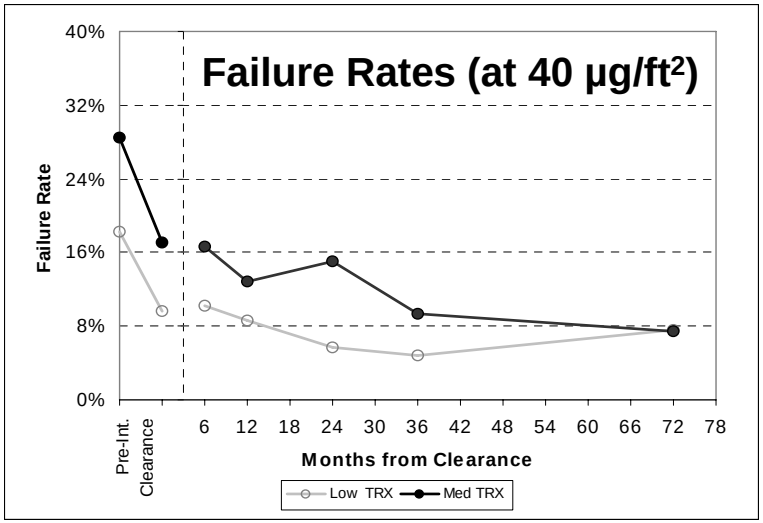
The Interim Control Option

- Paint Stabilization/Interim Controls significantly reduce dust lead loadings for at least six years
- Stabilized paint generally lasts for at least three years.

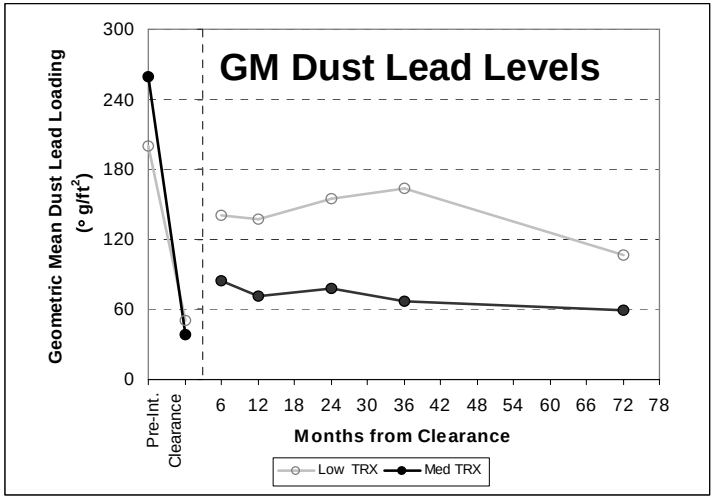
Floors: Pre-Intervention through Six Years Post-Clearance, by Treatment Level

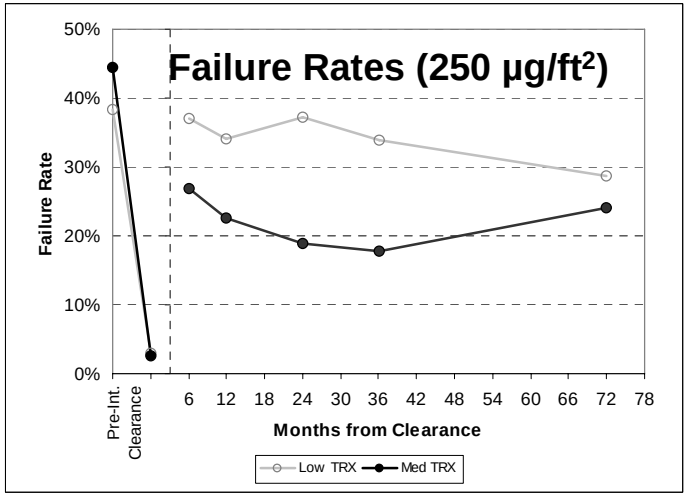




- Statistical modeling found no significant difference in floor dust lead loadings between levels of treatment over post-clearance period
- Both treatment groups have 8% failure rates at 6 years post-int.

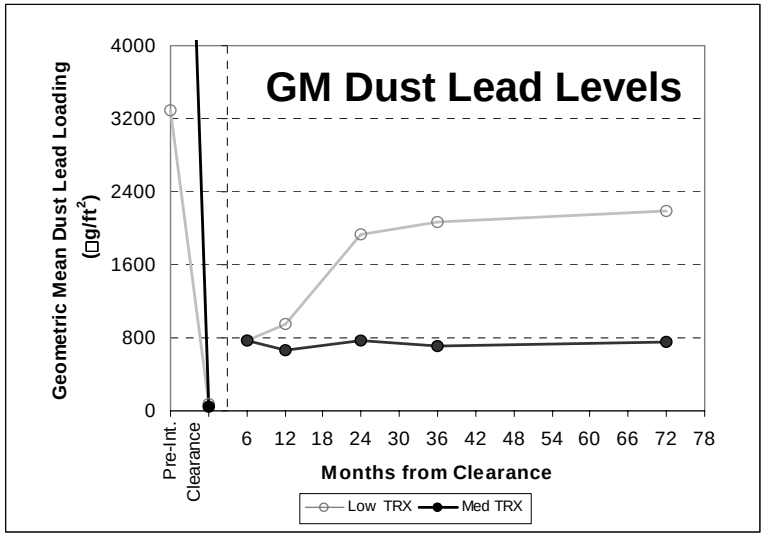
Window Sills: Pre-Intervention through Six Years Post-Clearance, by Treatment Level

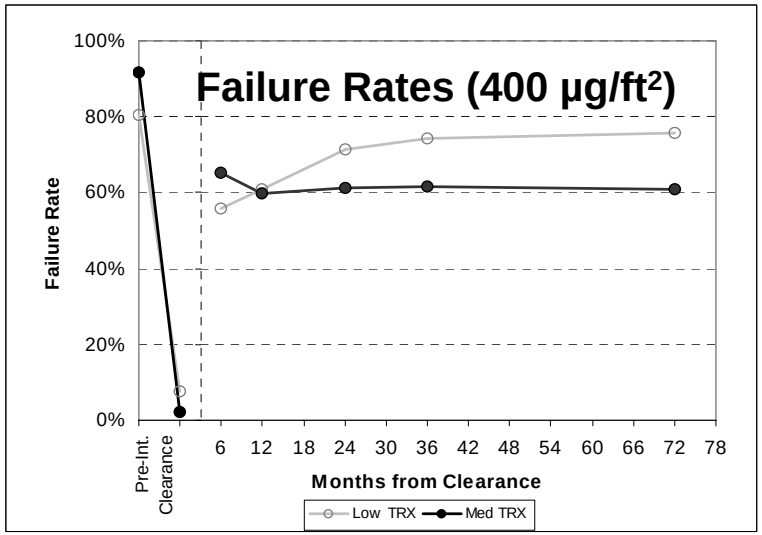




- Significant differences between treatment-levels in window sill dust lead levels over post-clearance period
- Evidence of higher failure rates in low-level treatment group across post-clearance period

Window Troughs: Pre-Intervention through Six Years Post-Clearance, by Treatment Level





- Statistically significant differences between treatment-levels in window trough dust-lead levels and failure rates over post-clearance period

Window Replacement

- Dramatic reductions in window dust lead levels that are maintained for at least six years
- Not associated with any better reductions in floor dust lead than interim controls. In units treated w/interim controls, dust lead reaccumulated on windows but did not on floors.

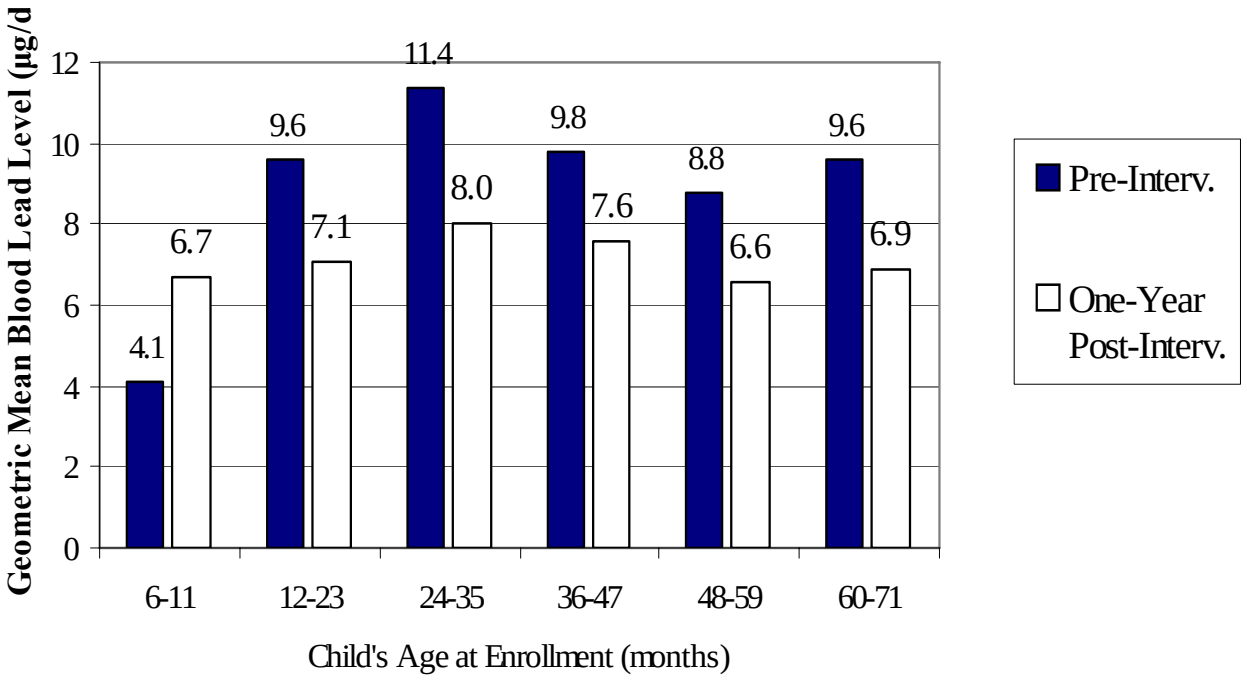
Treatment Outside Units

- Common areas and exterior spaces influence the dust lead in the dwelling.
  - No exterior treatment: +32% interior floor dust lead
  - No site/soil treatment: +45% interior floor dust lead
    - ☆Strong correlation between exterior/site work may affect estimates

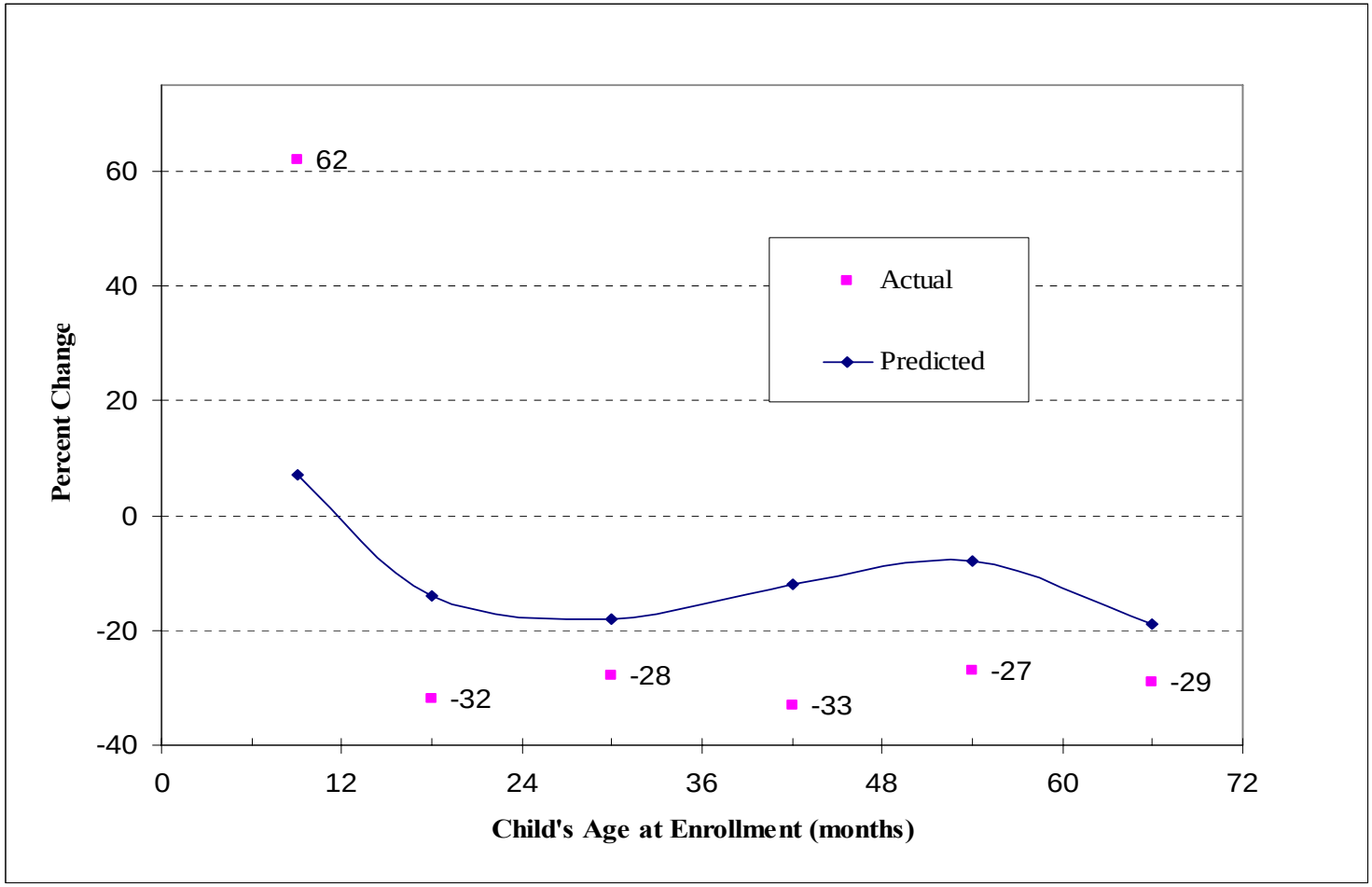
Interventions are Effective

- 37% reduction in blood lead levels 2 years post-intervention
- Children with pre-intervention blood lead levels as low as 10 μg/dl experienced substantial declines
- No significant difference by treatment strategy

Figure 9-7: Predicted Geometric Mean Blood Lead (µg/dL) at Pre-Intervention and One-Year Post-Intervention by Age of Child at Enrollment: Predicted from the One Year SEM



Actual and Predicted Percent Change in Blood Lead Levels from Pre-Intervention to One Year Post-Intervention by Age of Child at Enrollment



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Geometric Mean Pre-Intervention and One-Year Post-Intervention Blood Lead Levels and Blood Lead Changes by Pre-Intervention Blood Lead Levels

Pre-Intervention Blood Lead (µg/dL)	Number and Percent of Children	Geometric Mean Pre-Intervention Blood Lead (µg/dL)	Geometric Mean One- Year Post-Intervention Blood Lead (µg/dL)	Percent Change from GM Pre-Intervention Blood Lead to GM One-Year Post-Intervention Blood Lead	Percent Change from GM Pre-Intervention Floor Dust Lead[a] to GM One-Year Post-Intervention Floor Dust Lead[a]
<6	105 (25%)	3.5	3.7	6%	-43%
6-9	98 (23%)	7.2	5.6	-22%	-64%
10-14	76 (18%)	11.7	7.7	-34%	-48%
15-19	62 (15%)	16.5	11.2	-32%	-59%
20-25	38 (9%)	22.4	14.2	-37%	-52%
>25	39 (9%)	31.5	18.1	-43%	-51%
All	418	9.4	7.2	-23%	-53%

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