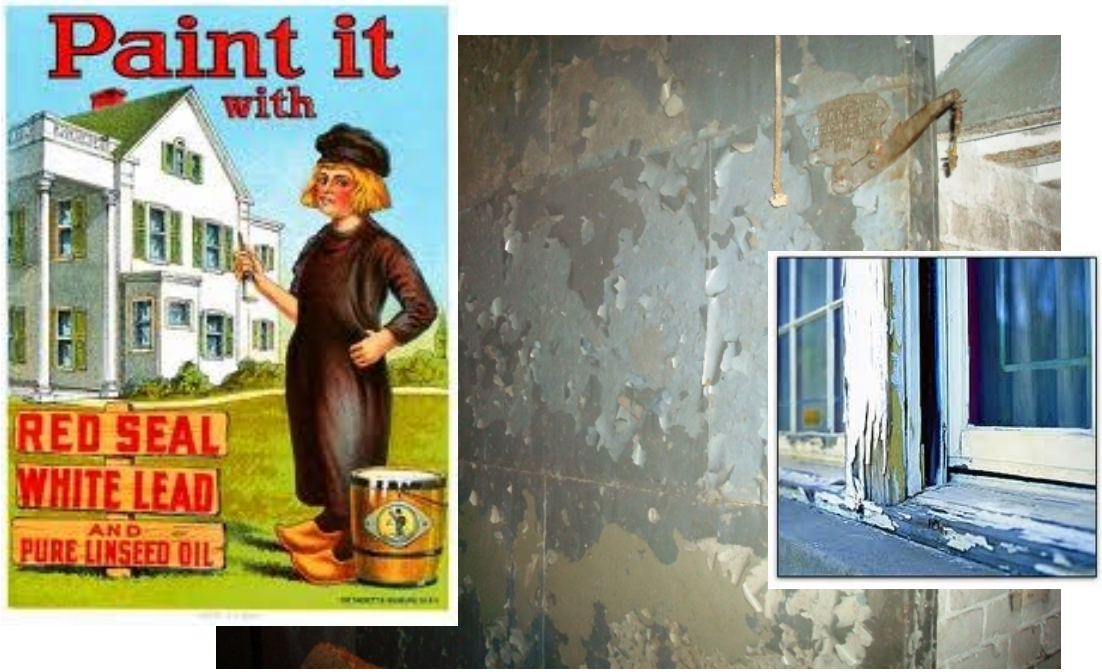
Case: Lead-Based Paint



Use of lead in house paint banned in 1978

Exposure to Lead Paint: Adults

- Adults exposed to lead can suffer from:
  - Nervous system effects
  - Cardiovascular effects, in increased blood pressure and incidence of hypertension
  - Decreased kidney function
  - Reproductive problems (in both men and women)

Source: https://www.epa.gov/lead/learn-about-lead#effects (2017)

Exposure to Lead Paint: Pregnancy

- Lead in a pregnant woman's body can result in serious effects on the pregnancy and her developing fetus, including:
  - Reduced growth of the fetus
  - Premature birth

Source: https://www.epa.gov/lead/learn-about-lead#effects (2017)

Exposure to Lead Paint: Children

- Main target for lead toxicity is the nervous system. Even very low levels of lead in the blood of children can result in:
  - Behavior and learning problems
  - Lower IQ and Hyperactivity
  - Slowed growth
  - Hearing Problems
  - Anemia

Source: https://www.epa.gov/lead/learn-about-lead#effects (2017)

Exposure to Lead Paint: Children

Classification	Level
Normal	<10 mg/dL
Moderately elevated	10-19 mg/dL
Highly elevated	20-44 mg/dL
Urgently elevated	> 45 mg/d/L; chelation

As of 2012, no safe level, reported at or above 5 mg/dL, children and environments to be monitored.

Source: CDC (2013)

Lead Exposure in Baltimore City 1993

- 95% of housing stock in low income neighborhoods filled with lead paint
- Rate of lead poisoning among children in Baltimore 10-15 times the national average and in some neighborhoods 20-30 times higher.

Source: Pollack (2002)

Lead Exposure in Baltimore City 1993

- 33.9% of children tested had lead levels above 10 mg/dL (Statewide 25%)
  - In certain low income neighborhoods up to 60% of children had elevated blood levels
  - 20% of children had extremely high levels (40 times the national average)

Source: Pollack (2002)

Lead Exposure in Baltimore City 1993

- Kennedy Krieger Institute (KKI) at forefront of *treating* children exposed to lead.
- In cooperation with Congress, EPA and other relevant Federal agencies KKI designed Repair and Maintenance Study
  - Funded by EPA Office of Pollution Prevention and Toxics and HUD Office of Lead Hazard Control

Repair and Maintenance Study (1993)

- What is the short term (6 months)and long term (24 months) efficacy of lead abatement methods previously proven to be effective in reducing children's exposure to residential paint and dust?
  - Funded by the EPA
  - Conducted by Johns Hopkins researchers in collaboration with Kennedy Krieger Institute

Repair and Maintenance Study (1993)

- Repair and Maintenance Properties
  - Category 1 ($1650)
  - Category 2 ($3500)
  - Category 3 ($6500)
- City Lead Abated Houses
  - Previously abated by City of Baltimore (Control 1)
  - Properties built after 1978 (Control 2)

Based on pilot work, expected reductions in lead dust: 89.3.6%, 91.1% and 96.6%

Repair and Maintenance Study (1993)

- Repair and Maintenance Properties
  - Common measures
    - Removal of loose and peeling paint
    - Sealing floors with sealant
    - Aluminum caps on window wells
    - Professional cleaning
  - More extensive
    - Removal and replacement of windows

Source: Pollack (2002)

Repair and Maintenance Study (1993)

- Repair and Maintenance Properties
  - Eligible families: Those living in designated properties or seeking to rent properties with children under 4 years of age.

Source: Pollack (2002)

Repair and Maintenance Study (1993)

- Procedures
  - Enrollment
  - Interviews
  - Blood Testing
    - Follow-up in response to elevated levels
- Families received
  - Small payments, tokens of appreciation
  - Lead-safety education
  - Cleaning supplies

Repair and Maintenance Study (1993)

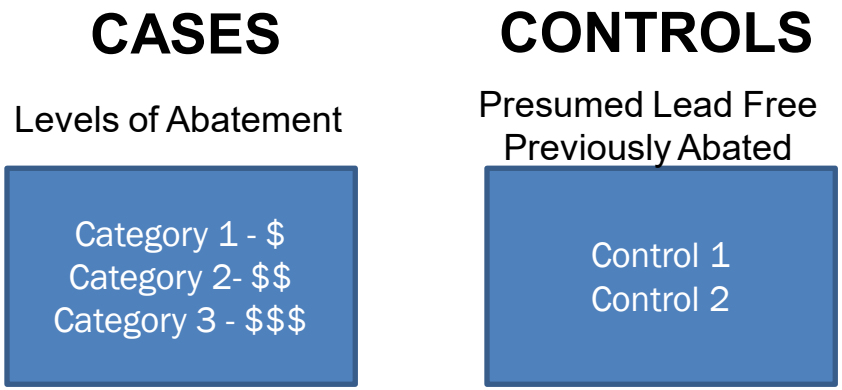
RESEARCH QUESTION: What is the short term (6 months) and long term (24 months) efficacy of lead abatement methods previously proven to be effective in reducing children's exposure to residential paint and dust?

- **QUESTION 1:** Does the research question posed, have social/scientific value?
  - **Yes**
  - **No**

Repair and Maintenance Study (1993)

- Why yes?
- Why no?

Repair and Maintenance Study (1993)

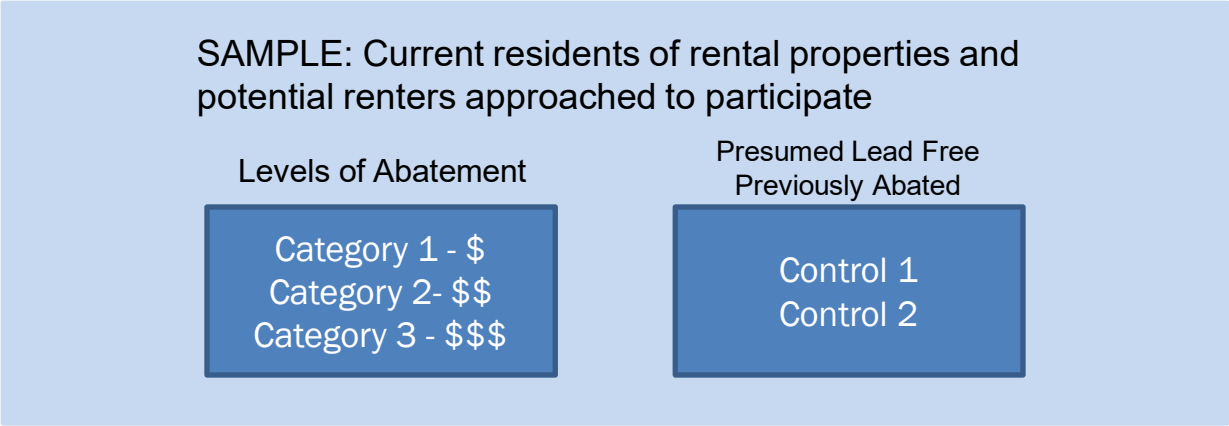


- **QUESTION 2:** Will the study as designed answer the research question?
  - **Yes**
  - **No**

Repair and Maintenance Study (1993)

- Why yes?
- Why no?

Repair and Maintenance Study (1993)



- **QUESTION 3:** Were the families being recruited to enroll in the study likely to benefit from the findings?
  - **Yes**
  - **No**

Repair and Maintenance Study (1993)

- Why yes?
- Why no?

Repair and Maintenance Study (1993)

- **QUESTION 4:** Could family decisions to enroll in the project be adequately informed and free from controlling influence?
  - Yes
  - No

Repair and Maintenance Study (1993)

- Why yes?
- Why no?

Repair and Maintenance Study (1993)

- **QUESTION 5:** Could the promise of " trinkets, food [coupons], money" be a controlling influence on family decisions?
  - Yes
  - No

Source: Grimes v. Kennedy Krieger (2001)

Repair and Maintenance Study (1993)

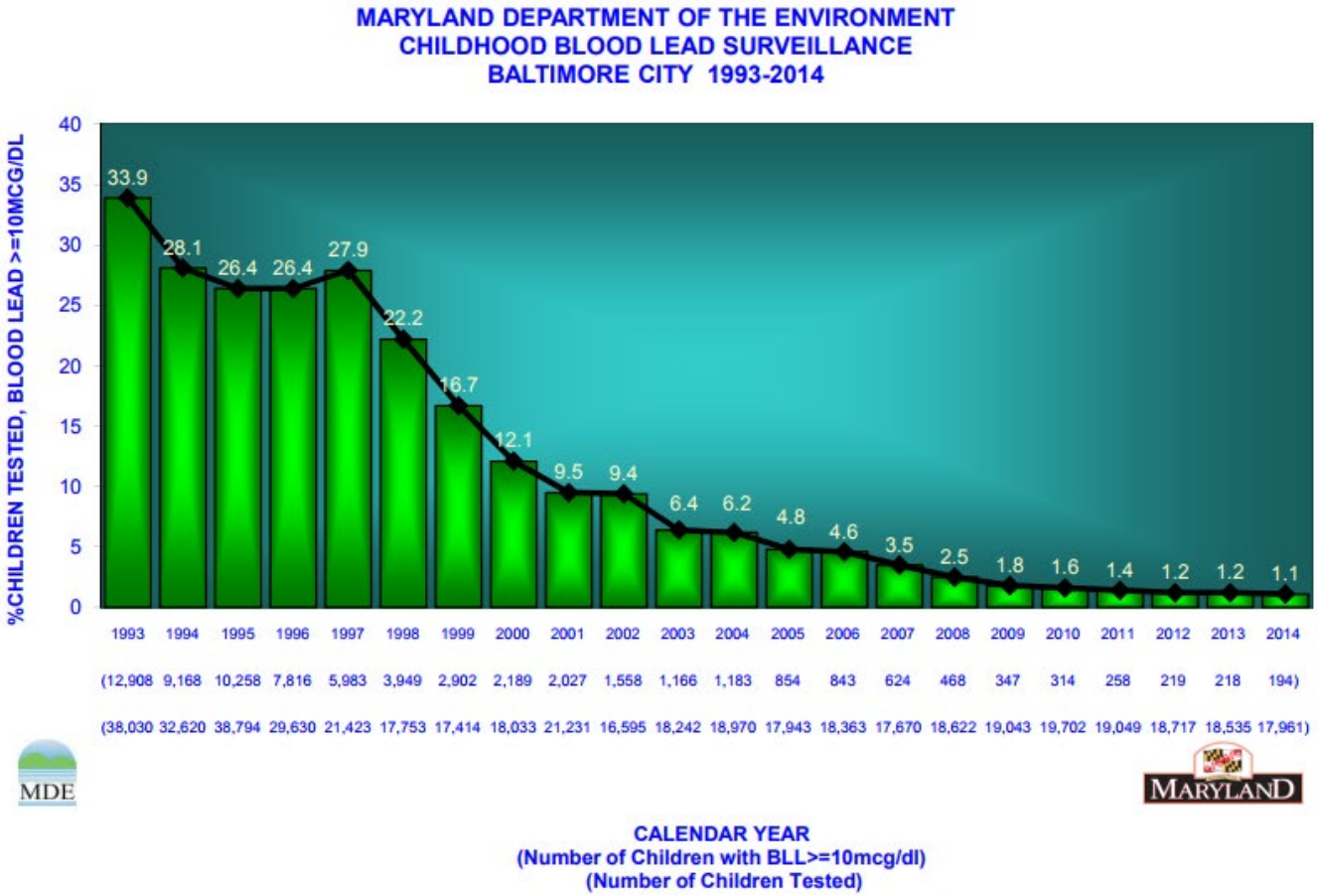
- Why yes?
- Why no?

Repair and Maintenance Study (1993)

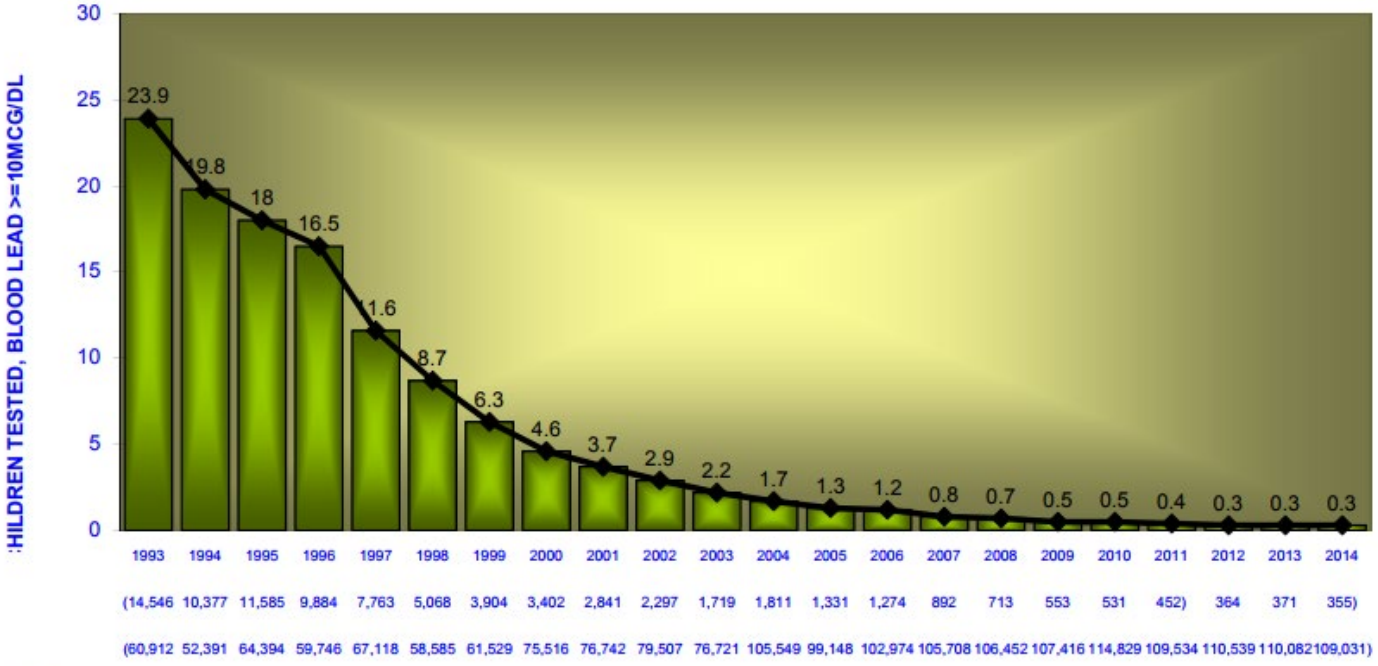
- Findings
  - Lead abatement measures reduced lead dust
  - Blood levels of most children stayed constant or went down, in a few cases they rose
  - Statistically significant reduction in blood lead levels for those who had levels of above and below 15 mg/dL

Repair and Maintenance Study (1993)

- Legacy
  - How to balance protection of subjects with advancing knowledge
  - Measures incorporated into state/local laws and HUD lead safety regulations
  - HUD funded replication in 13 other cities


MARYLAND DEPARTMENT OF THE ENVIRONMENT
CHILDHOOD BLOOD LEAD SURVEILLANCE
BALTIMORE CITY 1993-2014
%CHILDREN TESTED, BLOOD LEAD >=10MCG/DL
40
35
30
25
20
15
10
5
0
33.9
28.1
26.4
26.4
27.9
22.2
16.7
12.1
9.5
9.4
6.4
6.2
4.8
4.6
3.5
2.5
1.8
1.6
1.4
1.2
1.2
1.1
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
(12,908 9,168 10,258 7,816 5,983 3,949 2,902 2,189 2,027 1,558 1,166 1,183 854 843 624 468 347 314 258 219 218 194)
(38,030 32,620 38,794 29,630 21,423 17,753 17,414 18,033 21,231 16,595 18,242 18,970 17,943 18,363 17,670 18,622 19,043 19,702 19,049 18,717 18,535 17,961)
MDE
MARYLAND
CALENDAR YEAR
(Number of Children with BLL>=10mcg/dl)
(Number of Children Tested)

MARYLAND DEPARTMENT OF THE ENVIRONMENT
CHILDHOOD BLOOD LEAD SURVEILLANCE
STATEWIDE 1993-2014



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