



EVALUATING THE PRICE OF POLLUTION: ECONOMIC IMPACTS OF LEAD EXPOSURE AND ABATEMENT IN MICHIGAN

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DISCLAIMER

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WHAT WE DID

- Took an economic look at impacts of lead exposure and remediation in Michigan
- Applied well-documented, published measures of impacts of lead exposure to Michigan
 - Study by Elise Gould in 2009 on national impacts
- 1-year (2012) snapshot estimate

WHY WE DID IT

- To build on a previous report by the MNCEH and the Ecology Center, adding more variables to the analysis
- To put investment in lead abatement in a context with other environmental hazards – how does the Return on Investment (ROI) compare?
- To put lead abatement in a context for policy-makers

HOW WE DID IT

- Estimated costs of lead exposure
- Assumed a scenario where exposures through lead paint remediation were avoided
- Estimated costs of avoiding those exposures and compared to the benefits of avoiding those exposures



ESTIMATING THE COSTS OF LEAD EXPOSURE

- 4 costs estimated:
 - Health care
 - Crime
 - Special education
 - Loss of lifetime earnings



HEALTH CARE

- Healthcare costs for children requiring treatment for elevated BLL

Blood lead level in µg/dL	Number of children in Michigan under the age of 6 ⁶	Recommended treatment ⁶	Cost of recommended treatment (in 2012 USD) ⁷	Total cost
10-20	863	diagnostic testing, venipuncture, lead assay, nurse-only visit	\$84	\$72,803
20-45	166	above treatments, plus 8 visits for diagnostic testing, nurse follow-up, environmental investigation of the home	\$1,171	\$194,949
45-70	9	above treatments, plus oral chelation	\$1,522	\$13,697
70+ ⁸	0	above treatments, except oral chelation is replaced with intravenous chelation	\$3,926	0
				\$280,849

HEALTH CARE

- Lead-associated ADHD

Table 5: Healthcare costs of lead-associated ADHD

Michigan Children Age 4-15 ⁷	Estimated 8.4% diagnosed with ADHD ⁸	21.1% of cases associated with elevated blood lead levels ⁹	Health care costs - medication and counseling per child for one year ¹⁰	Total costs
1,577,790	132,534	27,965	\$648.54	\$18,136,259

CRIME

- Juvenile crime
 - Costs of incarceration estimated only

Table 6: Cost of lead-associated juvenile crime (incarceration)

Number of Michigan youth in residential facilities (2011, assumed same for 2012) ¹¹	Cost per day of care ¹²	Total cost per year	10% attributable to lead ¹³
2085	420.08	\$319,691,382	\$31,969,138

CRIME

- Adult crimes linked to childhood lead exposure
 - Costs include direct victim costs, legal proceedings, incarceration, and lost earnings to both the criminal and victim

Table 7: Cost of Adult Crime Linked to Childhood Lead Exposure

	Offenses reported 2012 ¹⁴	Proportion of crimes linked to childhood lead ¹⁵	Number of crimes linked to childhood lead	Direct costs per crime ¹⁶	Direct costs of lead linked crimes
Burglaries ¹⁷	243,095	2.9%	7,061	4,601	\$32,487,054
Robberies	10,779	0.4%	40	26,242	\$1,051,688
Aggravated Assaults	28,497	5.1%	1,462	23,369	\$33,751,084
Rape	4,439	3.7%	164	32,404	\$5,350,263
Murder	681	2.9%	20	35,496	\$697,008
TOTAL	287,491				\$78,298,107

SPECIAL EDUCATION

- Lifetime costs incurred by 2-year-old cohort
- Only estimated for 20% of children with BLL 25+ µg/dL – which we think to be conservative

Table 8: Costs of special education related to lead exposure – incurred by 2-year-old cohort in 2012

Children with BLL 25+ µg/dL ¹⁸	Cost per year of special education ¹⁹	Total cost for 9 years of special education for 20% of children with blood lead level 25+ µg/dL
77	18,219	\$2,533,524

REDUCTION IN LIFETIME EARNINGS

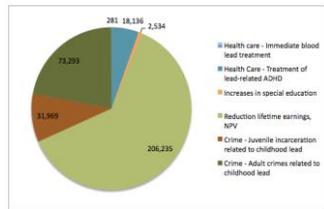
- Largest component of cost savings
- Each IQ point lost equates to \$20,441 in lost lifetime earnings
- Calculated for the 2-year old cohort
- Conservatively assume the 2-year-old BLL to be the maximum level for each child

Table 9: Reduction in lifetime earnings

Maximal blood lead level	Estimated number of 2-year-olds ²⁰	Associated loss in IQ points for each child ²¹	Lifetime earnings loss per child, per IQ ²²	Total lifetime lost earnings, 1977
5-10	3029	2.565	\$2,431	\$158,818,843
10-20	435	3.9	79,720	\$34,695,771
20-30	38	5.8	118,558	\$4,507,856
30 or greater	58	6.9	141,043	\$8,218,679
Total				\$206,235,149

SUMMARY COSTS

- Breakdown of all costs, 000s



BREAKDOWN OF COSTS TO THE TAXPAYER

Table 10: Summary of costs associated with lead exposure, 2012

	Amount	Costs to the Taxpayer	Description of assumed taxpayer costs
Increases in health care			
Blood lead treatment	280,849	252,764	estimated 90% of children with elevated BLL are on Michigan medical programs
Treatment of lead-related ADHD	18,136,259	16,322,633	estimated 90% of children with elevated BLL are on Michigan medical programs
Increases in special education	2,533,524	2,533,524	estimated 100% of costs through public education
Reduction lifetime earnings, NPV	206,235,149	16,498,812	estimated 8% state and local effective tax rate
		41,247,030	estimated 20% effective federal tax rate
Increased crime			
Juvenile incarceration related to childhood lead	31,969,138	31,969,138	100% taxpayer cost
Adult crimes related to childhood lead	73,293,337	36,646,668	50% taxpayer cost
TOTAL costs of lead exposure in year (2012)	332,448,296	145,470,570	

ESTIMATING THE COSTS OF LEAD REMEDIATION

- Created a scenario of remediating the 100,000 most at-risk homes in Michigan
- Scorecard estimates there are 100,000 homes in Michigan that are at high risk of lead hazards: were built before 1950 and occupied by residents living below poverty level
- 100,000 also matches with the likely Michigan proportion of US most at-risk homes in 2010 (2.3 million homes), as estimated by the President's Task Force (2000)

ESTIMATING THE COSTS OF LEAD REMEDIATION

- Estimated an average cost of abatement of \$6,000 per home
- Less than the average \$8,400 spent per home by MDCH in 2013, but we're casting a wider net, homes won't all need as much remediation as the top 150 remediated by MDCH
- Estimated cost of remediation scenario: \$600 million



WHAT WE LEARNED

- Putting together the costs and the benefits of remediation:
 - Estimate that the 100,000 home remediation scenario eliminates lead poisoning attributed to paint and dust in homes
 - 70% of elevated lead levels are avoided
 - 70% of costs of lead exposure are avoided, reducing the costs of lead exposure to Michigan residents from over \$300 million to \$70 million – cost savings of \$230 million/year
 - Included here is a 70% cost savings on the taxpayer burden, saving over \$100 million annually
 - ROI depends on the length of time that the abatement is effective – an estimated \$2.80 over 10 years; \$6.60 after 30 years; \$10.50 after 30 years.

WHAT WE LEARNED

- The illustrative scenario indicates that lead abatement is a worthwhile economic, as well as public health, investment
- Although abating 100,000 homes at once is unlikely, abating a targeted number of most at-need homes would likely have higher than average benefits



WHAT WE LEARNED

- We believe a number of quite conservative assumptions make these estimates quite conservative overall
 - We looked only at a narrow range of impacts of lead exposure – we didn't include other indirect impacts, such as productivity for parents of lead exposed children, wider impacts of lead associated crime, and lost quality of life
 - In a number of measures, we considered a cohort of 2-year-olds, and estimated impacts assuming that their BLL at age 2 was their maximal level, though many children may have higher levels later in childhood

RECOMMENDATIONS

- Complex problem, we need more than just investment in abatement
- In MI: Reconvene Michigan's Lead Prevention and Control Commission
- Recommendations from the last Commission include:
 - Reinvest in local public health department capacity in order to provide nursing and home inspection services in communities
 - Increase financial incentives for property owners to undertake lead hazard remediation
 - Enhance the Statewide Housing Registry
 - Fully fund the program
- Your ideas and feedback?



THANK YOU!

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Download the report:
http://bit.ly/MI_Lead_Costs_2014