2004

Lead Poisoning in Detroit Children

Angela Hill

Follow this and additional works at: http://commons.emich.edu/honors

Recommended Citation
Hill, Angela, "Lead Poisoning in Detroit Children" (2004). Senior Honors Theses. 94.
http://commons.emich.edu/honors/94

This Open Access Senior Honors Thesis is brought to you for free and open access by the Honors College at DigitalCommons@EMU. It has been accepted for inclusion in Senior Honors Theses by an authorized administrator of DigitalCommons@EMU. For more information, please contact lib-ir@emich.edu.
Lead Poisoning in Detroit Children

Abstract
Lead poisoning is a common health problem among children of America. Lead can be found in paint, dust, soil, and pottery, to name a few items. Lead has been proven to be a neurotoxin and causes adverse central and peripheral effects. Those affected may experience altered cognition and behavior, and reduction in intelligence and attention span. Children are at an increased risk for lead poisoning and its effects because of age related behaviors of putting hands and objects in their mouth, the immature brain of a child is more susceptible to toxic effects, and children absorb 50% of lead consumed.

Detroit is a major area of concern. In 2002 the city of Detroit identified 8.9% of the 93,365 children under age six to have elevated blood lead levels (Michigan Department of Community Health, 2003). Based on this information I decided to teach two lessons on lead poisoning prevention to three kindergarten classes in a Detroit Public Elementary School, which resided in a high risk ZIP code identified by the Michigan Department of Community Health in 2000. Based on objectives the outcomes of the educational sessions were as planned. The children learned about lead poisoning, its sources, and prevention..

Degree Type
Open Access Senior Honors Thesis

Department
Nursing

First Advisor
Professor Patricia Nunn

Second Advisor
Dr. Sandra Nelson

Keywords

This open access senior honors thesis is available at DigitalCommons@EMU: http://commons.emich.edu/honors/94
LEAD POISONING IN DETROIT CHILDREN

by

Angela S. Hill

A Senior Thesis Submitted to the

Eastern Michigan University

Honors Program

In Partial Fulfillment of the Requirements For Graduation

With Honors in Nursing

Approved at Ypsilanti, Michigan on this date 4-22-04
Lead poisoning is a common health problem among children of America. Lead can be found in paint, dust, soil, and pottery, to name a few items. Lead has been proven to be a neurotoxin and causes adverse central and peripheral effects. Those affected may experience altered cognition and behavior, and reduction in intelligence and attention span. Children are at an increased risk for lead poisoning and its effects because of age related behaviors of putting hands and objects in their mouth, the immature brain of a child is more susceptible to toxic effects, and children absorb 50% of lead consumed.

Detroit is a major area of concern. In 2002 the city of Detroit identified 8.9% of the 93,365 children under age six to have elevated blood lead levels (Michigan Department of Community Health, 2003). Based on this information I decided to teach two lessons on lead poisoning prevention to three kindergarten classes in a Detroit Public Elementary School, which resided in a high risk ZIP code identified by the Michigan Department of Community Health in 2000. Based on objectives the outcomes of the educational sessions were as planned. The children learned about lead poisoning, its sources, and prevention.
### Table of Contents

Statement of Health Concern ........................................... 3  
Sources of Lead .......................................................... 3  
Effects of Lead ............................................................ 4  
Community of Interest .................................................... 7  
Epidemiological Assessment ............................................. 8  
Risk Factors .................................................................... 9  
Diagnosis ......................................................................... 11  
Community Resources ..................................................... 12  
Plan ................................................................................. 14  
Outcome Evaluation ......................................................... 14  
Community Plan ............................................................. 14  
Desired Community Outcome ............................................ 16  
References ....................................................................... 18  

Appendix A- Michigan’s Poisoned Children  
Appendix B- Every Dot is a Detroit Child with Lead Poisoning  
Appendix C- Lead Poisoning Prevention Teaching Objectives
Lead Poisoning in Detroit Children

STATEMENT OF HEALTH CONCERN

Lead Poisoning

Lead is a natural element found throughout the environment (Miner, 1998). Lead is highly toxic and very harmful to the developing nervous systems of fetuses and young children (Meyer, 2003). The U.S. Centers for Disease Control and Prevention have declared lead poisoning “one of the most common and preventable pediatric health problems today” (Children’s Environmental Health Initiative, 2003). Lead poisoning is completely preventable, yet one in ten American children have unacceptable levels of lead in their blood (Stapleton, 1994). The acceptable lead level is much lower today than it was forty years ago. In the 1960’s the unacceptable level for lead was above 80 mcg/dl for adults and 60 mcg/dl for children (Pueschal, Linakis, & Anderson, 1996). The level of concern was lowered over the years to 30 mcg/dl in 1975, 25 mcg/dl in 1985, and then to 10 mcg/dl in 1991, where it currently remains (Pueschal et al., 1996).

Lead poisoning is a major health concern, and according to Mahon (1997) caregivers of children in high risk areas did not mention lead poisoning as a health concern. Although 61% of study participants identified paint chips as a cause of lead poisoning, only 15% identified lead paint dust as a source of lead poisoning. Forty nine percent of the participants in this study reported that they sometimes or never performed lead prevention activities (Mahon, 1997).

Sources of Lead

Lead is present in lead-based paint, soil and dust, drinking water, food, air, traditional medicines, cosmetics, casting ammunition, fishing weights, stained glass,
pottery, and formerly gasoline (U.S. Environmental Protection Agency, 2002). Lanphear, Hornung, Ho, Howard, Eberle, and Knauf (2002) studied 249 children living in Rochester, New York, from six months of age until twenty-four months to determine the effect of residential lead hazards on blood lead levels. Blood samples as well as samples of soil, dust, water, and paint were collected every six months, total of four collection times. This study found lead contaminated house dust to be the major source of childhood lead intake (Lanphear et al., 2002).

Effects of Lead

In 2000, Dr. Satcher, U.S. Surgeon General, released a public health report on lead poisoning in which he identified the number of ways that children were affected by lead poisoning. Satcher’s list of effects included delayed growth and development, increased dental caries, impaired hearing, altered cognition and behavior, nervous system effects, reductions in intelligence and attention span, behavior problems and reading and learning disabilities (Satcher, 2000).

Cohen (2001) reported that high lead levels, ≥ 100 mcg/dl, cause mental retardation, coma, seizures, and even death. While long term lead poisoning causes decreased red blood cell survival and prevents the formation of hemoglobin, chronic low level exposure can lead to learning disabilities, behavior changes, insomnia, hyperactivity, impaired growth, hearing loss, and upper extremity weakness (Cohen, 2001).

Pueschal, Linkais, and Anderson (1996) had similar yet more extensive findings of effects attributed to elevated lead levels. They identified lower intelligence scores, learning disabilities, aggressive and antisocial behavior, hyperactivity, attention deficit
disorders, autism, seizures, and hearing and speech problems to be related to elevated blood lead levels (Pueschal et al., 1996).

Stokes, Letz, Gerr, Koleczak, McNeill, Chettle, et al. (1998) conducted an epidemiological study to determine whether environmental exposure to lead during childhood was associated with neurobehavioral effects twenty years later. Two hundred and eighty one young adults, from towns surrounding a lead smelter in Washington, who were exposed to lead as children were compared to two hundred eighty seven unexposed young adults from other areas of Washington. Age and sex were matched for both groups. Neurobehavioral and neuro-physiological tests were administered. Demographics and health history were obtained, and tibial bone lead concentrations were estimated by K x-ray fluorescence. The study showed significant central and peripheral neurological effects in a group of young adults twenty years after childhood lead exposure when compared with a non-exposed group (Stokes et al., 1998).

Lanphear, Dietrich, Auinger, and Cox (2000) used data from the Third National Health and Nutritional Examination Survey (NHANES III) to assess relationship between blood lead level and performance on tests of arithmetic skills, reading skills, nonverbal reasoning, and short term memory. Subjects were 4,853 children from six to sixteen years of age. Analysis showed cognitive deficits associated with blood lead levels lower than 5 mcg/dl. For every 1 mcg/dl increase in blood lead concentration, there was 0.7 point decrease in mean arithmetic score, 1 point decrease in mean reading scores, 0.1 decrease in mean nonverbal reasoning, and 0.5 decrease in short term memory (Lanphear et al., 2000).
The Environmental Protection Agency (EPA) estimates that 9,150 children are expected to have an IQ score below 70 as a result of their exposure to lead (Johnson, 2000). The Children’s Environmental Health Initiative (2003) identified an IQ of 120 as genius and an IQ of 50 as mental retardation. CEHI also showed that lead induced IQ changes can remove a considerable amount of children from the genius category and put other children in the mental retardation category (CEHI, 2003). Mansen (2001) mentioned studies showing that blood levels of 10 mcg/dl can result in a two to eight point reduction in I.Q. and another two to eight points can be lost with each 10 mcg/dl increment. Figure 1 (Table 1) below shows the lowest observed effects of lead.

Decreased IQ is the first effect noted, at 10 mcg/dl (Weitzman et al., 1998).

<table>
<thead>
<tr>
<th>Blood lead concentration</th>
<th>Toxic effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 µg/dL</td>
<td>Decreased IQ</td>
</tr>
<tr>
<td></td>
<td>Decreased hearing</td>
</tr>
<tr>
<td></td>
<td>Decreased growth</td>
</tr>
<tr>
<td>20 µg/dL</td>
<td>Decreased nerve conduction velocity</td>
</tr>
<tr>
<td>30 µg/dL</td>
<td>Decreased vitamin D metabolism</td>
</tr>
<tr>
<td>40 µg/dL</td>
<td>Decreased hemoglobin synthesis</td>
</tr>
<tr>
<td>90 µg/dL</td>
<td>Nephropathy</td>
</tr>
<tr>
<td></td>
<td>Encephalopathy</td>
</tr>
</tbody>
</table>

*The level at which studies have adequately demonstrated an effect.


Trope, Lopez-Villegas, Cecil, and Lenkinski (2001) evaluated the metabolism of gray and white matter of the frontal cortex for neurotoxic effects of lead using magnetic resonance spectroscopy. Participants with elevated blood lead levels were compared to a
non lead exposed control group. All participants were evaluated at the University of Pennsylvania Medical Center. Results showed that lead exposed individuals had a reduction in N-acetylaspartate in comparison with the control group. N-acetylaspartate is a metabolite shown to decrease in processes that involve neuronal loss. This study was of statistical significance in showing that those with a history of elevated blood lead levels had decreased levels of brain metabolites in gray matter (Trope et al., 2001).

Lustberg and Silbergeld (2002) used mortality follow-up data for participants of the Second National Health and Nutritional Examination Survey (NHANES II) to evaluate the association of lead exposure and mortality in the United States. A total of 4,292 participants were followed from 1976 through December 31, 1992. Lustberg et al. (2002) found that individuals with blood lead levels of 20 mcg/dl to 29 mcg/dl in 1976 to 1980 experienced significant increased risk of circulatory and cardiovascular mortality from 1976 to 1992 when compared to participants whose blood lead levels were ≤ 10 mcg/dl (Lustberg et al., 2002).

COMMUNITY OF INTEREST

Detroit is a major area of concern for lead poisoning in Michigan. The elementary school where I chose to do lead poisoning prevention education is located in the Detroit ZIP code 48208, which is listed as one of the High Risk ZIP Codes in Michigan (Michigan Department of Community Health, 2000). The Third National Health and Nutritional Examination Survey (NHANES III) showed that 21% of children in the inner city had blood lead levels ≥ 10 mcg/dl compared to 5.8% of children in other areas (Lidsky et al., 2003).
Lead Poisoning

Epidemiological Assessment

National (United States), State (Michigan), and Local (Wayne County) rates show that lead poisoning is a large problem for the under six age group. In 2001, 3,228 of the 4,771, or 67% of the Michigan children diagnosed with Lead Poisoning lived in Detroit (Fleming, 2003, Michigan’s Poisoned Children). See Appendix A & B.

According to the Michigan Department of Community Health Child Lead Poisoning Data Facts for 2002, Michigan had 814,505 children under the age of six, 4,083 or 4.4% of those children with elevated blood lead levels, and 27% of housing built before 1950. Wayne County, excluding Detroit, had 92,253 children under six years old, 161 or 2.1% of those children with elevated blood lead levels, and 24% of housing built before 1950. The City of Detroit had 93,365 children under six years old, 2,830 or 8.9% of those children with elevated blood lead levels, and 56% of housing built before 1950 (Michigan Department of Community Health, 2003).

Figure 2 above shows that Michigan is one of ten states with the highest reported cases of children with elevated blood lead level in 2001 (Meyer et al., 2003). In 2001
Michigan had 5,109 children under age six with blood lead levels ≥ 10 mcg/dl compared to the U.S. with 74,887. Therefore, roughly 6% of the U.S. children with blood lead levels ≥ 10 mcg/dl are from Michigan. There were also 118 children in the U.S. with blood lead levels ≥ 70 mcg/dl, 9 children or 7% of those children were in Michigan (Meyer et al., 2003).

RISK FACTORS

There are many risk factors that predispose individuals to lead poisoning. One's risk is increased by living or spending a great amount of time in a house or a structure built before 1978. Risk factors also include recent renovation of a home that can stir up lead dust; home is near an industry or mine; family members work with home restoration or lead containing materials; children play in contaminated soil, eat or chew on lead painted crib, toys, or window sills (Livingston, 1997).

Children are at increased risk for many reasons. The immature brain of children is more susceptible to neurotoxic effects of lead, children have an increased tendency to ingest nonfood items, children often put their hands and other objects in their mouth, and children absorb up to 50% of lead compared to adults at 10% (Pueschel et al., 1996). Children's respiratory uptake of lead can be up to 2.7 times higher than for adults (Children's Environmental Health Initiative, 2003).

According to Lidsky and Schneider (2003) a variety of factors can increase or decrease an individual's sensitivity to a toxin, one factor being social economic status. When income level is compared, 16.3% of children from low income families had blood lead levels ≥ 10 mcg/dl, compared to 4% of children from middle and high income families (Lidsky et al., 2003).
Children's Environmental Health Institute (2003) reported similar findings from results of phase two of the Third National Health and Nutritional Examination Survey (NHANES III). The social economic status, age of housing, and race/ethnicity are risk factors for exposure. As figure 3 below shows, the blood lead levels for children of low income families was 8%, eight times higher than children from high income families at 1% (Children's Environmental Health Institute, 2003).

Figure 3. Lead poisoning risk factors for children aged 1 to 5 years: Income

Of the children living in housing before 1946, 8.6% had elevated blood lead levels, compared to 4.6% of those children living in houses built between 1946 and 1973, and 1.6% living in houses after 1973 (Children's Environmental Health Institute, 2003). Race/ethnicity was another factor listed by the Children's Environmental Health Initiative (2003). As figure 4 on page 11 shows, the prevalence of elevated blood lead levels for non-Hispanic black children ages one to five is 11.2%, almost five times higher than the 2.3% among non-Hispanic white children, and three times higher than the 4% of Mexican-American children (Children's Environmental Health Institute, 2003).
The Surveillance for Elevated Blood Lead Levels among Children in the U.S., 1997-2001, had similar findings. In 1997 there was a total of 63,458 non-Hispanic black children with blood lead levels \( \geq 10 \text{ mcg/dl} \) compared to the 15,713 non-Hispanic white children with blood lead levels \( \geq 10 \text{ mcg/dl} \) and the 14,383 Hispanic children with blood lead levels \( \geq 10 \text{ mcg/dl} \). In 2001 there was a total of 28,291 non-Hispanic black children with blood lead levels \( \geq 10 \text{ mcg/dl} \) compared to the 8,738 non-Hispanic white children with blood lead levels \( \geq 10 \text{ mcg/dl} \) and the 8,625 Hispanic children with blood lead levels \( \geq 10 \text{ mcg/dl} \) (Meyer et al., 2003).

**DIAGNOSIS**

The community diagnosis is: Increased risk of lead poisoning among children under age six, living in Detroit, Michigan, related to insufficient knowledge of lead sources, effects, and prevention among caregivers and children, residence in older housing with lead based paint, and exposure to contaminated soil, demonstrated by high rates of lead poisoning among children. The relevant Healthy People 2010 objective is
objective 8-11, which aims to “Eliminate elevated blood lead levels in children” (Healthy People 2010, 2000).

COMMUNITY RESOURCES

Local Resources

Local resources include Eastern Michigan University Nursing students, who visit the Detroit Public schools every semester to teach about health; Michigan Department of Community Health; Wayne County Community Health Department; and the Detroit Department of Health. Other local resources include Detroiter Working for Environmental Justice, a task force that studies the effects of lead contamination from soil and environment; and Detroit Lead Partnership, a group of community organizations, citizens, and government officials concerned about lead poisoning in Detroit (Fleming, 2003, Preventing Lead Poisoning).

State Resources

State resources include but are not limited to the Michigan Department of Community Health’s Child Lead Poisoning Prevention Program, Michigan Lead Safe Partnership, and Michigan Lead Hazard Remediation Program.

The Michigan Department of Community Health’s Child Lead Poisoning Prevention Program is a program that provides education, blood screening and testing, tracking, reporting, primary prevention activities, policy development, quality assurance, and evaluation (Michigan Department of Community Health, 2001-2004).

National Resources

National Resources for Lead Poisoning include but are not limited to the National Lead Information Center, the U.S. Environmental Protection Agency, the National Institute of Environmental Health Sciences, the Centers for Disease Control and
Prevention, Women, infants, and children's program (WIC), the Department of Housing and Urban Development's (HUD) Lead Hazard Control Grant Program, Health Care Financing Administration (HCFA), and the Food and Drug Administration (FDA),

The National Lead information Center (NLIC) provides information about lead hazards and their prevention and operates under the Environmental Protection Agency. The National Institute of Environmental Health Sciences (NIEHS) has studied the effects of lead for more than twenty years. The move to get lead out of gasoline came from a NIEHS study (Satcher, 2000).

The Center for Disease Control and Prevention (CDC) tracks children's blood lead levels in the U.S., describes children at risk, and measures trends in blood lead levels (Center for Disease Control, 2003). The CDC provided $42 million to fund programs to prevent lead poisoning in children through its Childhood Lead Poisoning Prevention Grant Program (Satcher, 2000). The Department of Housing and Urban Development (HUD) sets standards for evaluation and management of lead in federally assisted housing, and promotes reducing lead hazards in privately owned housing. HUD also provides grants to communities to reduce lead hazards in housing (Environmental Protection Agency, 2002).

The Health Care Financing Administration (HCFA) works with agencies to increase lead screening of children enrolled in the Medicaid program and other vulnerable children (Satcher, 2000). The Food and Drug Administration (FDA) monitors the levels of lead in food products. It banned lead solder in food and lead capsules in wine bottles (Satcher, 2000).
PLAN

My personal plan to aid in eliminating elevated blood lead levels among children was to provide education about lead poisoning and prevention. Since lead poisoning is completely preventable it is very important to educate children and their families on the sources of lead and ways to prevent lead exposure and poisoning. My original intervention included teaching two sessions on lead poisoning and prevention to two kindergarten classes at an elementary school in Detroit, Michigan. Fortunately I was able to teach a third kindergarten class upon arrival to the school. At the end of each lesson the children were given materials to take home and review with their parents. There were also information pamphlets left in the Parent education room at the school. See Appendix C for teaching objectives.

OUTCOME EVALUATION

Children of each class were able to meet all four objectives listed in Appendix C. As far as meeting the Healthy People 2010 Objective, it would be very difficult to measure if this teaching project made a difference in blood lead levels or lowered the number of new lead poisoning cases. Three kindergarten classes of one elementary school are a small portion of the children under age six in Detroit, Michigan. Even though my intervention was small scale, if one child in the Detroit area is positively affected and does not become a victim of lead poisoning, then this project was successful.

COMMUNITY PLAN

There are many laws and regulations in place to help eliminate lead exposure and lead poisoning. In 1978 lead was officially banned from all residential paint in the U.S. In 1980 The U.S. Food and Drug Administration eliminated the use of lead solder in cans
containing food or drink (Pueschal et al., 1996). Since the 1980’s the Environmental Protection Agency phased out lead in gasoline, reduced lead in drinking water and in industrial air pollution, and banned lead use in consumer products (U.S. Environmental Protection Agency, 2002). Residential Lead Based Paint Hazard Reduction Act of 1992 (Title X) is a federal strategy to decrease lead paint hazard exposure. Under Title X, disclosure of known lead hazards is required at time of sale or lease of homes built before 1978. Federal regulations also require timely identification and remediation of lead hazards in federally assisted housing (Center for Disease Control and Prevention, 2002).

Detroit as a community and its members are the stakeholders, therefore they are most affected by this community health problem. Governor Jennifer Granholm was quoted in the Detroit Free Press stating, “We have a duty to the children in this state to make sure their environmental conditions are not keeping them from succeeding” (Wendland-Boyer, 2003, January 25). Detroit and its members are responsible for educating other members about the effects of lead poisoning and preventative measures. According to McDiarmid and Shire (2003) parent and patient knowledge of lead poisoning is crucial because doctors don’t always diagnose lead poisoning. The community needs more publicity related to lead poisoning. Public service announcements should be made on television and radio and in public gathering areas such as church. Primary care physicians and schools should educate about lead poisoning and prevention.

Detroit needs to repair many high-risk homes in the community. The focus should be on the homes of those with the highest risk for lead poisoning, those with children.
Detroit has in the past applied for funds to renovate homes but has only made a small dent in the huge problem. According to the Detroit Free Press, state and local officials mismanaged millions of dollars, causing long delays in fixing dangerous homes (Askari et al., 2003, January 21). HUD has repeatedly turned down Michigan officials for grant money, citing poor performance on previous grants (Lam, 2003). Detroit needs to apply for more funds to provide lead abatement services where needed. They also need to develop an effective plan for grant use and follow through with it to ensure future grants. Detroit could also hold fundraisers to raise the needed money for renovations.

The Detroit City Council endorsed a $500,000 pilot program in January to help renters remove lead from homes. This program is to initially help fund the removal or containment of lead paint in rental buildings chosen by where lead poisoned children reside (Askari, 2003, January 30). Results from this pilot program will determine future money allotted for repairs.

COMMUNITY OUTCOME

A desired community outcome would be one of eliminating elevated blood lead levels among the children under age six. This would not only improve Detroit financially but also academically. Satcher (2000) stated,

“Reducing lead exposure not only benefits children’s health and development, but also yields economic benefits from avoiding health care and special education costs; from preventing reductions in children’s intelligence, academic achievement, future productivity; and from improvements to housing associated with controlling lead hazards”.

The number of children with blood lead levels ≥ 10 mcg/dl in the U.S. has decreased over the years from 130,512 in 1997 to 74,887 in 2001 (Meyer et al., 2003). This is definitely a beginning for the elimination of elevated blood lead levels. Detroit
certainly has a long road of needed repairs, but every intervention needs a starting point.

Lead poisoning is preventable and if Detroit can, at minimum, educate its members about lead poisoning sources, effects, and the importance of preventative measures there may be an even more significant decline in childhood lead poisoning in the future.
References


Centers for Disease Control and Prevention. (2002). Managing elevated blood lead levels among young children: Recommendations from the advisory committee on childhood lead poisoning prevention. Atlanta: CDC.


Lustberg, M. & Silbergeld, E. (2002). Blood lead levels and mortality. Archives of
Internal Medicine, 162 (21), 2443-9.


APPENDIX A

MICHIGAN'S POISONED CHILDREN

In 2001, 4,771 Michigan children younger than 6 were diagnosed with lead poisoning; 3,228 lived in Detroit. Those are just the children health officials know about. Most are never tested. State health officials estimate that 8,000 Detroit children and 14,000 kids elsewhere in the state actually have lead levels of 10 or more.

% of those tested with blood levels of 10 or more

State health officials estimate that 8,000 Detroit children and 14,000 kids elsewhere in the state actually have lead levels of 10 or more.

% of those tested with blood levels of 10 or more

% of children under 6 tested

<table>
<thead>
<tr>
<th>County</th>
<th>% of those tested</th>
<th>% of children under 6 tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcona</td>
<td>13% 0%</td>
<td>losco 10% 0%</td>
</tr>
<tr>
<td>Alger</td>
<td>18% 0%</td>
<td>Iron 4% 0%</td>
</tr>
<tr>
<td>Allegan</td>
<td>5% 0.7%</td>
<td>Isabella 7% 0%</td>
</tr>
<tr>
<td>Alpena</td>
<td>8% 2.3%</td>
<td>Jackson 2% 10.7%</td>
</tr>
<tr>
<td>Antrim</td>
<td>4% 1.5%</td>
<td>Kalamazoo 7% 3.4%</td>
</tr>
<tr>
<td>Annac</td>
<td>11% 0%</td>
<td>Kalkaska 4% 2.0%</td>
</tr>
<tr>
<td>Baraga</td>
<td>22% 0.8%</td>
<td>Kent 19% 5.4%</td>
</tr>
<tr>
<td>Barry</td>
<td>8% 1.4%</td>
<td>Keweenaw 16% 0%</td>
</tr>
<tr>
<td>Bay</td>
<td>6% 2.3%</td>
<td>Lake 10% 2.9%</td>
</tr>
<tr>
<td>Benzie</td>
<td>2% 3.7%</td>
<td>Lapeer 3% 0.5%</td>
</tr>
<tr>
<td>Berrien</td>
<td>16% 5.8%</td>
<td>Leelanau 2% 4.3%</td>
</tr>
<tr>
<td>Branch</td>
<td>3% 1.1%</td>
<td>Lenawee 5% 3.1%</td>
</tr>
<tr>
<td>Calhoun</td>
<td>11% 4.3%</td>
<td>Livingston 1% 0.5%</td>
</tr>
<tr>
<td>Cass</td>
<td>6% 2.1%</td>
<td>Luce 24% 1.0%</td>
</tr>
<tr>
<td>Charlevoix</td>
<td>4% 1.4%</td>
<td>Mackinac 21% 0%</td>
</tr>
<tr>
<td>Cheboygan</td>
<td>4% 0%</td>
<td>Macomb 5% 0.9%</td>
</tr>
<tr>
<td>Chippewa</td>
<td>16% 0.3%</td>
<td>Manistee 4% 7.7%</td>
</tr>
<tr>
<td>Clare</td>
<td>6% 0%</td>
<td>Marquette 8% 0.6%</td>
</tr>
<tr>
<td>Clinton</td>
<td>3% 1.2%</td>
<td>Mason 2% 2.6%</td>
</tr>
<tr>
<td>Crawford</td>
<td>2% 0%</td>
<td>Mecosta 11% 1.6%</td>
</tr>
<tr>
<td>Delta</td>
<td>17% 0.7%</td>
<td>Menominee 13% 1.4%</td>
</tr>
<tr>
<td>Dickinson</td>
<td>4% 1.2%</td>
<td>Midland 3% 0.9%</td>
</tr>
<tr>
<td>Eaton</td>
<td>6% 0.9%</td>
<td>Missaukee 3% 0%</td>
</tr>
<tr>
<td>Emmet</td>
<td>4% 0%</td>
<td>Monroe 10% 1.1%</td>
</tr>
<tr>
<td>Genesee</td>
<td>8% 2.6%</td>
<td>Montcalm 12% 1.0%</td>
</tr>
<tr>
<td>Gladwin</td>
<td>6% 0.9%</td>
<td>Montmorency 4% 0%</td>
</tr>
<tr>
<td>Gogebic</td>
<td>9% 2.3%</td>
<td>Muskegon 13% 4.9%</td>
</tr>
<tr>
<td>Grand Traversee</td>
<td>3% 0.6%</td>
<td>Muskegon 13% 4.9%</td>
</tr>
<tr>
<td>Gratiot</td>
<td>9% 1.1%</td>
<td>Newaygo 8% 0.9%</td>
</tr>
<tr>
<td>Hillsdale</td>
<td>7% 1.1%</td>
<td>Oakand 6% 1.1%</td>
</tr>
<tr>
<td>Houghton</td>
<td>16% 1.3%</td>
<td>Ogemaw 7% 0%</td>
</tr>
<tr>
<td>Huron</td>
<td>7% 0.6%</td>
<td>Onontagon 7% 0%</td>
</tr>
<tr>
<td>Ingham</td>
<td>12% 1.5%</td>
<td>Osceola 8% 2.1%</td>
</tr>
<tr>
<td>Ionia</td>
<td>8% 3.3%</td>
<td>Oscoda 6% 0%</td>
</tr>
<tr>
<td>Otsego</td>
<td>2% 2.6%</td>
<td>Shiawassee 8% 0.6%</td>
</tr>
<tr>
<td>Ottawa</td>
<td>5% 1.1%</td>
<td>Tuscola 7% 1.0%</td>
</tr>
<tr>
<td>Presque Isle</td>
<td>8% 0%</td>
<td>Van Buren 9% 0.9%</td>
</tr>
<tr>
<td>Roscommon</td>
<td>5% 0%</td>
<td>Washenaw 3% 0.8%</td>
</tr>
<tr>
<td>Saginaw</td>
<td>9% 4.7%</td>
<td>Wayne* 8% 2.5%</td>
</tr>
<tr>
<td>St. Clair</td>
<td>3% 2.3%</td>
<td>Wexford 5% 3.5%</td>
</tr>
<tr>
<td>St. Joseph</td>
<td>8% 3.0%</td>
<td>Detroit 33% 10.7%</td>
</tr>
<tr>
<td>Sanilac</td>
<td>6% 0.5%</td>
<td>Michigan 11% 5.5%</td>
</tr>
<tr>
<td>Schoolcraft</td>
<td>22% 0.7%</td>
<td>* Excluding Detroit</td>
</tr>
</tbody>
</table>

Source: Michigan Department of Community Health

JOHN W. FLEMING/Detroit Free Press
Blood levels measured in micrograms per deciliter of blood (mcg/dL):
- 5-9.9
- 10-19.9
- 20-144

EVERY DOT IS A DETROIT CHILD WITH LEAD POISONING

In 2001, there were 16,778 children younger than 6 tested in Detroit who had elevated levels of lead in their bodies. Most children in Detroit and across Michigan are never tested. The U.S. Centers for Disease Control and Prevention has set 10 micrograms of lead per deciliter of blood as the official level when a child suffers irreversible brain damage and other health problems. But many experts say damage happens at levels as low as 5. Some say there is no safe level of lead.

Sources: www.detroitleaddata.org
Michigan Department of Community Health

John W. Fleming/Detroit Free Press
APPENDIX C

Lead Poisoning Prevention Education

Objectives: (Kinden, 1993, and New York State Health Department)

1. Children will identify lead as a poison that can harm them.
2. Children will be able to identify three primary sources of lead in the environment.
3. Children will identify two ways to prevent lead poisoning.
4. Children will be able to identify three foods that are good for them to eat. (Foods that are rich in iron and calcium.)

Activities: (New York State Health Department, 1994, and N.D.; Bette, 2001)

1. Lead is a poison that can harm us
   a. Ask children what they know about poisons. Have children give examples of poisons and what poisons can do to us. Then incorporate lead as a poison.
   b. Teach the Lead Can Hurt Us song.
2. Three primary sources of lead
   a. Read Leo the Little Lion Learns How to Get Ahead of Lead
   b. Review where lead can be found
   c. Make Leo or Lena Lion face mask
3. Ways to prevent lead poisoning
   a. Read I Can Stay Safe Around Lead
   b. Review ways to prevent lead poisoning
   c. Teach importance of hand washing, when to wash hands, and proper technique.
   d. Discuss importance of not eating paint chips, chewing or sucking on window sills, and keeping hands and toys out of mouth.
4. Explain the need for proper nutrition. This also aids in preventing lead poisoning.
   a. Explain that we need iron and calcium to give us energy to grow and play.
   b. Show pictures of food and nonfood items, have children pick out which ones they should eat and which ones to avoid.

References