2006

Annual Report on Blood Lead Levels on Adults and Children in Michigan

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A Joint Report

of

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INTRODUCTION

The Childhood Lead Poisoning Prevention Program (CLPPP), located in the Michigan Department of Community Health (MDCH), focuses its activities on children younger than six years of age and their families, pregnant women, health care providers, and child health advocates in Michigan communities.

The Centers for Disease Control and Prevention (CDC) has provided funding for lead poisoning related activities in Michigan since 1992. The State of Michigan provides a small amount of funding from General Funds, and the federal Maternal Child Health Block Grant, Title V. Beginning in mid-2005, one million dollars from the Healthy Michigan Fund (tobacco tax funds) was made available to the two childhood lead programs (CLPPP and the Lead and Healthy Homes Section, formerly the Lead Hazard Remediation Program) by the Governor and legislature. A description of activities and deliverables enabled by that funding follows in this report.

The Lead and Healthy Homes Section (LHHS) in the Division of Epidemiology within MDCH is funded by the U.S. Department of Housing and Urban Development/ Office of Healthy Homes and Lead Hazard Control (HUD), the Environmental Protection Agency (EPA) and the aforementioned Healthy Michigan Fund. Chief among the program's responsibilities are: abatement of lead hazards in eligible pre-1978 homes; certification of lead inspectors, risk assessors, abatement workers, supervisors, clearance technicians, abatement contractors and the accreditation of training providers; and enforcement of certification, accreditation and work practice standards established by the Lead Abatement Act of 1998 and associated Administrative Rules.

The two MDCH programs (CLPPP and LHHS) work closely together on a comprehensive response to the complex issue of housing which has an impact on the health of young children and their families. See Appendix A for the organizational structure.

Sources of Exposure

The State of Michigan has the sixth largest number of children who are lead poisoned in the United States. The primary source of lead exposure for Michigan children is lead-based paint in pre-1978 housing. Deteriorating lead-based paint—dust from multiple coats of paint on impact or water-damaged surfaces, or flaking, chipping, peeling lead-based paint—creates a hazard on windowsills, floors, porches, and in the "drip-lines" around the outside of a home that may be invisible. Soil in driveways and yards adjacent to streets and highways may also be a source of invisible lead exposure. This lead results from tailpipe exhaust falling to the side of roadways during the 20 years of leaded gasoline; a secondary source would be lead tire weights, which are lost during heavy truck traffic and crushed by successive road traffic. Two additional sources in Michigan are (1) farm equipment which may still use leaded gasoline and (2) high performance engine fuel such as is used at Michigan International Speedway and other NASCAR-type venues.

The Lansing Board of Water and Light has embarked on a large, phased effort to replace more than 10,000 service lines that are partially or entirely made of lead for their customers in Ingham County.

Another increasingly observed source of exposure for children has been repair and renovation done in pre-1978 (often pre-1950) homes where the child resides or visits frequently. Failure to

recognize the need for and to follow lead-safe work practices during renovation has resulted in significant household exposure. In several Michigan cases, the work on the home which resulted in exposure was being accomplished by the parent(s); the parent has in some circumstances been a building/construction professional doing his/her own work.

Although CLPPP is not able at this point to document lead poisoning directly tied to this category of sources, there has been an alarming increase in product recalls and product alerts for child-oriented consumer products: toys, inexpensive jewelry, clothing zippers, vinyl lunchboxes among others that are imported with lead in them after manufacture in another country. Lead included in these products makes them more substantial/heavier, more durable, and the lead included in the paint used makes colors brighter and enduring. In 2006, there were nineteen child-oriented products recalled by the Consumer Product Safety Commission for lead hazards. In 2006, there was also a child death in the United States (Minneapolis, MN) following his ingestion of a leaded charm that was included in a box of athletic shoes as a promotional item.

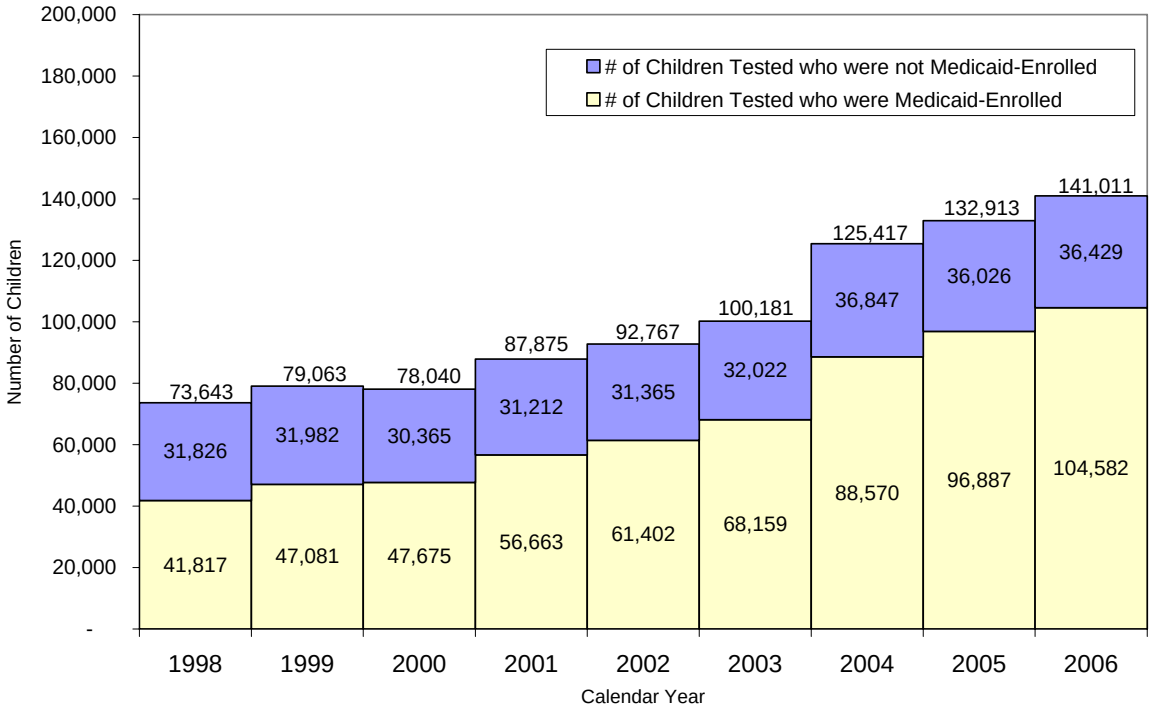
Young children ingest lead dust and lead fragments from toys, jewelry, paint through developmentally appropriate hand-to-mouth behaviors. As the central nervous system is undergoing a period of rapid and critical growth in early childhood, and because children, as compared with adults, absorb a greater proportion of the lead that they consume, the effects on a child's nervous system, hearing, vision, cognitive development and behavior can be devastating. For the most part it is also irreversible. Long-term effects of lead poisoning reduce a child's potential in school, work, health and human relationships due to the negative effects on behavior, including aggression, inattentiveness and distractibility. Thus long-term effects of lead poisoning impact the whole community.

Testing and Surveillance

A statewide surveillance system is the basis for the Statewide Lead Testing/Lead Screening Plan. The plan is reviewed by the CLPPP staff and approved by the Lead Advisory Committee on an annual basis, incorporating surveillance data from the prior year. Since 1997, the CLPPP has maintained a registry of all individuals with a Michigan address who have received a blood lead test. Participation in reporting of test results to the registry is mandatory, as required by Michigan Administrative Rules 333.5111 and 325.78 and 330.3101 of the Michigan Compiled Laws. The registry forms the "backbone" of the statewide surveillance system. See Appendix B: Michigan Administrative Rules.

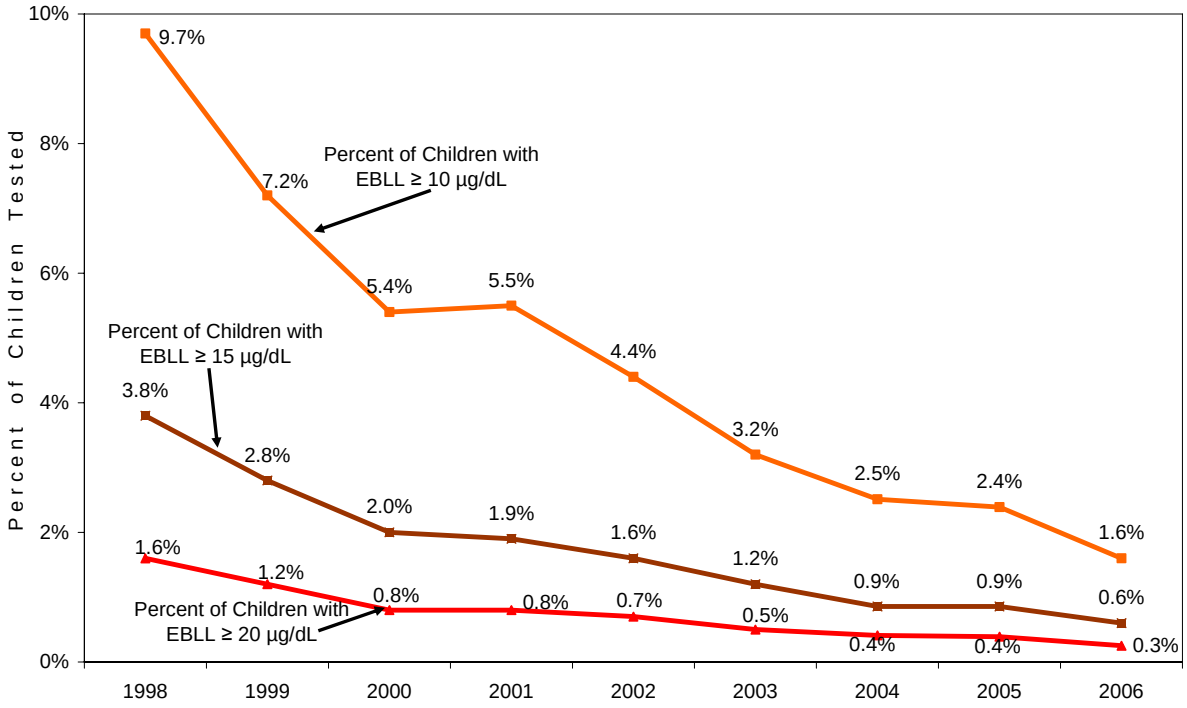
Although the State of Michigan has mandatory reporting for all blood lead levels for individuals with a Michigan address, it is important to recognize that blood lead testing is not universal, and that testing data are not representative of all Michigan children. The data include only children for whom a provider has requisitioned a test and the test completed, or for whom the parent has insisted on and then completed a blood lead test. Therefore it is impossible to draw specific conclusions regarding the actual rates of lead poisoning in Michigan based upon these data. Additionally, comparison of numbers of children with elevated blood lead levels (EBLL) in various counties does not reflect the true prevalence of lead poisoning as testing is not conducted randomly, and the rate of testing varies from county to county. However, it is possible to use the testing data to identify trends in testing practices from year to year, compare the total number of EBLLs reported to MDCH over time, and characterize the population currently being tested. See Figures 1 and 2.

FIGURE 1
Blood Lead Testing in Michigan, 1998-2006
Children less than Six Years of Age



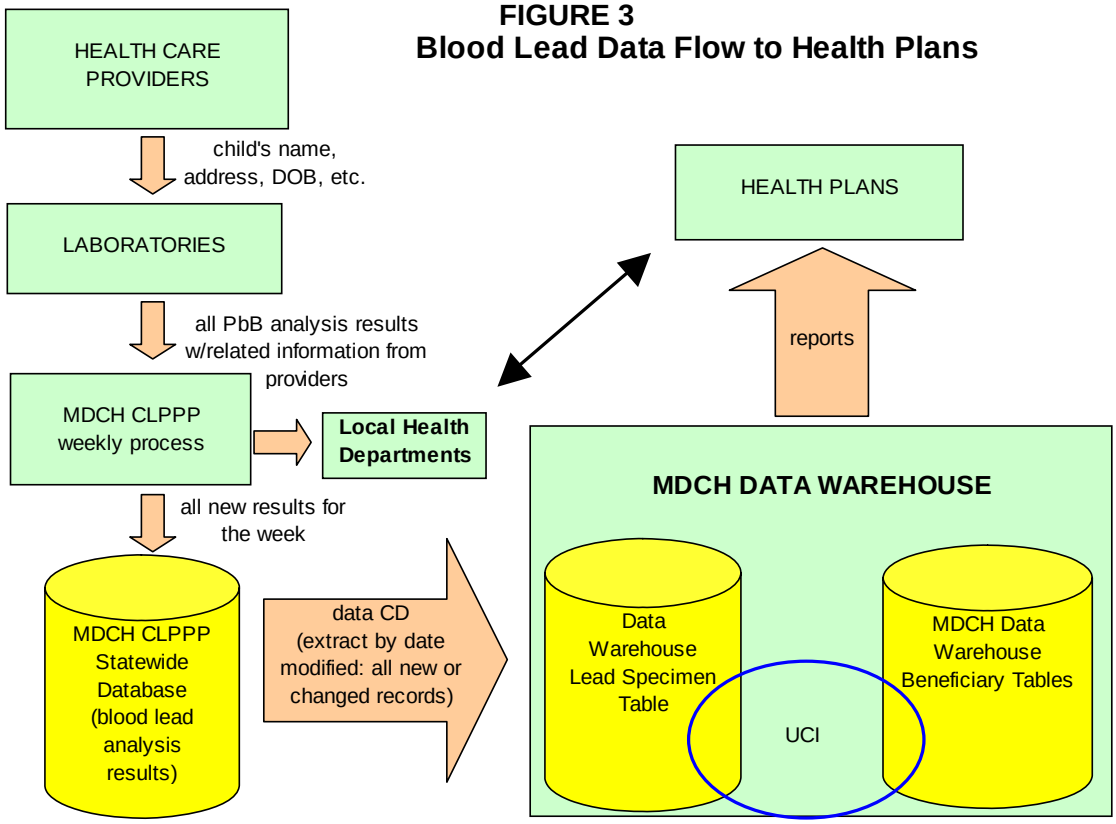
June 2007 Source: MDCH Data Warehouse

FIGURE 2
Elevated Blood Lead Levels (EBLL) in Michigan, 1998-2006
Children less than Six Years of Age



June 2007 Source: MDCH Childhood Lead Poisoning Prevention Program statewide database

FIGURE 3
Blood Lead Data Flow to Health Plans



The CLPPP assures that the health care provider of record for each child tested as well as the local public health agency for the child's jurisdiction of residency is notified of all blood lead test results. See Figure 3 for the graphic depicting the flow of information. This initiates management of the child's lead exposure. Local health departments (LHDs) vary in their capacity to provide either public health nurse home visits for health assessment and family education and/or environmental investigations, a critical component for identifying all sources of exposure in a child's environment and assuring clearance of lead hazards.

Elevated blood lead level investigations must be conducted by a state-certified Lead Inspector/ Risk Assessor who has received the additional "EBLL endorsement" in order to be fully-credentialed to perform this function. Although the environmental investigation completed for a Medicaid-enrolled child can be billed to Michigan Medicaid as a covered service, commercial insurances do not cover environmental investigations, nor do they reimburse the local public health agency for home visits by a public health nurse.

Commercial insurances, with few exceptions, do not include blood lead testing as a covered service. None of the Medicaid managed care health plans pay for lead hazard identification in homes or other sites which present lead hazards. The reimbursement rate for local public health agencies, as well as competition for the environmental health staff time, is not sufficient to cover costs for the LHDs to pursue lead professional training for their staff members. The outcome: only 314 EBLL investigations were reported by Lead Inspectors/Risk Assessors to LHHS in 2006, compared to 2,307 children with confirmed elevated blood lead levels who would have received benefit from early identification of their exposure source(s). Assuming that a small number of those EBLLs were not Medicaid-insured children, it can be deduced that more than 1,900 children who have had significant lead exposure were not recipients of environmental

investigation services. This underscores two serious barriers to elimination of childhood lead poisoning from housing-based sources: (1) failure to address sources of exposure in the lead-poisoned child's environment means that exposure/poisoning continues and (2) that hazards affect the next generations of residents due to real estate/rental turnover of a dwelling, perpetuating "lead houses" in a community.

Education and Outreach

Providing professional education and training, current health education materials as well as education for the general public are other regular CLPPP and HHS activities. In 2006, CLPPP, working in collaboration with Michigan Public Health Institute (MPHI) and an Instructional Designer (RWD Technologies) began development of a package of web-based provider education modules, which will be CME- and CEU-granting, and should be available in the fall of 2007. CLPPP staff also provide annual medical and nursing student instruction for lead poisoning and the public health response to the child and family at Michigan State University and at Madonna University.

Responses to both internal and external requests for data and targeted maps to direct local plans and activities represents a significant demand for the time and skills of the data staff. CLPPP staff also continue to monitor policy development both internal and external to the Department that potentially affects the lead program, is occasionally invited to comment on pending legislation, and collaborates with housing authorities, rental property owners and other community groups with the goal of providing safe housing for children.

Partnerships

Partners in these efforts include the MDCH Trace Metals Laboratory, local public health departments, and other agencies throughout the state with shared interests: Department of Education, Department of Labor and Economic Growth, Michigan State Housing Development Authority, Department of Environmental Quality, Department of Human Services, WIC (Special Supplemental Nutrition Program for Women, Infants and Children), Early On, which is Part C of the Individuals with Disabilities Education Act, Head Start and Early Head Start.

CLPPP also provides funding to nine local public health agencies with "target communities" in the state. This represents a strategy to accomplish three major program goals within their respective jurisdictions: 1) to increase blood lead testing, with particular emphasis on targeted communities and children ages one and two years; 2) to assure that case management occurs for all children with venous blood lead levels $\geq$ 20 µg/dL; and 3) to encourage and promote primary prevention of childhood lead poisoning, with emphasis, once again, on reaching families in pre-1978 housing where young children or pregnant women reside.

- ✓ Why target communities?

  While childhood lead poisoning is a significant health problem throughout Michigan, due to the industrial past and general age of homes (more than a million built before 1950), the magnitude of the exposure problem is greatest where population is dense: in Michigan's urban areas. As the percentage of Michigan children with elevated blood lead levels (EBLLs) has decreased, we are required to focus our grant funding on the geographic areas and populations where the exposure problem is greatest. (See Tables 1-3.)

TABLE 1
Target Community Summary

Type of Need	Battle Creek	Benton Harbor	Detroit	Flint	Grand Rapids	Hamtramck	Highland Park	Jackson	Kalamazoo	Lansing	Muskegon	Pontiac	Saginaw	Totals / Avgs for TCs	Statewide
% pre-1950 housing	42.3	47.8	56.1	40.9	48.9	75.8	62.4	65.9	40.0	35.8	50.0	35.2	54.4	51.0	27.0
% pre-1978 housing	83.2	88.8	95.2	93.7	84.9	97.6	89.8	92.6	81.5	85.1	89.2	84.3	95.4	89.3	74.7
% rental property	65.9 / 34.1	37.8 / 62.2	54.9 / 45.1	58.9 / 41.1	18.8 / 81.2	50.0 / 50.0	38.6 / 61.4	57.6 / 42.4	47.8 / 52.2	57.4 / 42.6	57.0 / 43.0	52.8 / 47.52	63.6 / 36.4	50.9 / 49.2	74.9 / 25.1
% adults who are unemployed	6.6	16.3	13.8	12.9	6.3	6.3	19.7	8.1	12.5	6.4	7.1	10.3	13.1	10.7	5.8
% adults w/o high school education	17.6	39.5	30.4	25.5	22.0	37.8	36.1	22.7	15.8	17.6	22.3	31.1	26.9	26.6	15.7
# children 1 & 2 yrs of age	1,563	458	27,058	3,685	6,743	732	511	1,321	1,669	4,181	1,245	2,114	2,206	53,486	258,777
% of young children living in poverty	18.8	62.6	36.9	40.4	20.8	39.6	47.2	31.1	26.7	25.5	30.4	30.4	47.8	34.0	15.6
Children 1 & 2 yrs, Medicaid enrolled	1,154	418	20,660	3,291	4,522	665	367	1,014	1,358	2,486	956	1,877	1,567	40,335	125,776
Average # births per year (2001-2004)	1,310	601	13,921	3,037	4,920	403	209	1,458	2,078	2,684	1,550	1,232	1,961	35,364	131,204
Is there local CDBG/HUD funding?	N	N	Y	Y	Y	N	N	Y	N	N	Y	N	Y	N/A	N/A
Is there a local coalition?	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N/A	N/A
LHD offers blood lead testing in clinic?	N	N	Y	Y	N	Y	Y	N	Y	N	N	N	N	N/A	N/A
LHD offers blood lead testing in WIC?	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	N	Y	N/A	N/A
LHD offers nurse home visit? At what BLL?	Y ≥ 15	Y ≥ 15	Y ≥ 10	Y ≥10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	Y ≥ 10	N/A	N/A
LHD offers environmental health inspection? At what BLL?	N	Y ≥20	Y ≥ 10	Y ≥20	Y ≥ 20	Y ≥ 10	Y ≥ 10	Y ≥ 20 (twice	Y ≥ 10	Y ≥ 20	Y ≥ 10	Y ≥ 10	Y ≥ 15	N/A	N/A
Children 1 & 2 yrs of age, tested in 2006 (# / %)	965 / 61.7	249 / 54.4	14396 / 53.2	1906 / 51.7	3985 / 59.1	498 / 68.0	260 / 50.9	602 / 45.6	801 / 48.0	1,486 / 35.5	718 / 57.7	1,239 / 58.6	999 / 45.3	28,104 / 52.5	80,037 / 30.9
Of children 1 & 2 yrs of age tested in 2006, % w/elevated BLLs	9 / 0.9	22 / 9.1	673 / 4.7	20 / 1.1	141 / 3.6	14 / 2.9	43 / 16.9	7 / 1.2	21 / 2.7	12 / 0.8	26 / 3.7	9 / 0.7	17 / 1.7	1,014 / 3.7	1,264 / 1.6
Of children 1 & 2 yrs of age tested in 2006, % w/BLLs ≥ 5 µg/dL	10.6	41.8	30.2	15.4	23.8	30.5	50.8	28.2	22.8	13.4	24.7	11.9	20.5	25.5	14.3
% children 1 & 2 yrs, Medicaid enrolled, tested in 2006 (# / %)	635 / 55.0	234 / 56.0	12,819 / 62.0	1,587 / 48.2	3,313 / 73.3	445 / 66.9	232 / 63.2	484 / 47.7	676 / 49.8	1,257 / 50.6	614 / 64.2	1,055 / 56.2	913 / 58.3	24,264 / 60.2	50,232 / 39.9
Of children 1 & 2 yrs, Medicaid enrolled, tested in 2006, % w/elevated BLLs	7 / 1.1	17 / 7.3	659 / 5.1	22 / 1.4	111 / 3.4	15 / 3.4	28 / 12.1	5 / 1.0	14 / 2.1	9 / 0.7	19 / 3.1	9 / 0.9	16 / 1.8	931 / 3.8	1,080 / 2.2

BLL: blood lead levels

June 2007

TABLE 2
13 Target Communities
Testing Rates and Elevated Blood Lead Levels – Children Less than Six Years of Age
Calendar Years 2001 - 2006

	2001				2002				2003				2004				2005				2006			
Place	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL
Battle Creek	680	14.5	40	5.9	782	16.7	35	4.5	781	16.6	31	4.0	1,298	27.7	27	2.1	1,472	31.4	23	1.6	1,491	31.8	21	1.4
Benton Harbor	670	47.7	94	14.0	553	39.3	83	15.0	540	38.4	63	11.7	598	42.5	45	7.5	497	35.3	49	9.9	543	38.6	38	7.2
Detroit	30,496	32.7	3,236	10.6	32,256	34.5	2,822	8.7	32,466	34.8	2,040	6.3	32,873	43.2	1,964	6.0	32,704	43.0	1,955	6.0	33,190	44.0	1,341	4.1
Flint	1,419	10.5	64	4.5	1,554	11.5	60	3.9	1,775	13.2	46	2.6	2,310	17.2	58	2.5	3,076	22.9	84	2.7	3,207	28.8	42	1.3
Grand Rapids	6,718	34.7	475	7.1	6,584	34.0	362	5.5	6,647	34.3	277	4.2	7,054	36.4	242	3.4	5,530	28.6	235	4.2	5,334	26.7	208	3.9
Hamtramck	501	23.3	40	8.0	535	24.8	30	5.6	636	29.5	30	4.7	808	37.5	46	5.7	907	42.1	33	3.6	1,017	47.2	23	2.3
Highland Park	517	32.9	82	15.9	533	33.9	73	13.7	539	34.3	74	13.7	645	41.0	91	14.1	666	42.4	90	13.5	584	37.2	66	11.4
Jackson	143	3.6	17	11.9	167	4.3	10	6.0	278	7.1	20	7.2	791	20.2	27	3.4	996	25.4	29	2.9	921	23.5	14	1.6
Kalamazoo	600	10.6	39	6.5	499	8.8	31	6.2	689	12.2	32	4.6	998	17.6	35	3.5	859	15.2	29	3.4	1,220	25.1	32	2.7
Lansing	1,729	14.9	32	1.9	1,818	15.7	31	1.7	1,517	13.1	25	1.6	1,765	15.3	31	1.8	1,934	16.7	29	1.5	2,512	20.7	16	0.6
Muskegon	638	17.5	54	8.5	665	18.2	68	10.2	817	22.4	52	6.4	1,147	31.4	65	5.7	1,379	37.8	64	4.6	1,293	35.4	48	3.8
Pontiac	815	11.4	25	3.1	873	12.3	19	2.2	1,151	16.2	27	2.3	1,946	27.3	29	1.5	2,006	28.2	24	1.2	1,986	31.7	17	0.9
Saginaw	963	15.0	65	6.7	1,226	19.0	62	5.1	1,196	18.6	54	4.5	1,834	28.5	50	2.7	1,762	27.4	46	2.6	1,721	26.7	33	1.9
subtotal	45,889	26.3	4,263	9.3	48,045	27.6	3,686	7.7	49,032	28.1	2,771	5.7	54,067	34.4	2,710	5.0	53,788	34.2	2,690	5.0	55,019	35.8	1,899	3.5
Michigan total	87,875	10.8	4,771	5.4	92,767	11.4	4,083	4.4	100,181	12.3	3,141	3.1	125,417	15.8	3,126	2.5	132,913	16.7	3137	2.4	141,011	18.0	2,309	1.6

Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statew ide database. June 2007
Note: Each child tested is counted only once per year, but may be counted in more than one year.

TABLE 3
13 Target Communities
Elevated Blood Lead Levels - Both Confirmed and Unconfirmed – Calendar Year 2006

			Children < Age 6, Tested for Lead during 2006				Children with Low-Level Exposure	Children with **Confirmed** Elevated Blood Lead Levels					Children with Elevated Capillary Tests **Not Confirmed** by Venous				
Target Community	% Pre-1950 Housing*	Children Under Age 6**	Number of Children Tested	% Tested	% with BLL ≥ 5 ug/dL	**% EBLL (≥ 10 ug/dL venous only)*** **	5 to 9 ug/dL (capillary, venous or unknown)	10-14 ug/dL (venous only)	15-19 ug/dL (venous only)	20-44 ug/dL (venous only)	≥45 ug/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	Capillary 10-14, not confirmed by venous	Capillary 15-19, not confirmed by venous	Capillary 20-44, not confirmed by venous	Capillary ≥ 45, not confirmed by venous	Total Elevated Capillary, not confirmed by venous
Battle Creek	42.3	4,694	1,491	**31.8**	12.0	**1.4**	150	16	4	1	0	**21**	6	2	0	0	**8**
Benton Harbor	47.8	1,406	543	**38.6**	37.9	**7.2**	152	23	12	3	0	**38**	13	2	1	0	**16**
Detroit	56.1	75,502	33,190	**44.0**	27.2	**4.1**	7,395	878	283	168	12	**1,341**	188	54	39	2	**283**
Flint	40.9	11,152	3,207	**28.8**	15.2	**1.3**	423	21	12	7	2	**42**	16	6	1	0	**23**
Grand Rapids	48.9	19,954	5,334	**26.7**	24.4	**3.9**	1,051	113	53	40	2	**208**	29	7	4	0	**40**
Hamtramck	75.8	2,153	1,017	**47.2**	29.2	**2.3**	255	17	5	1	0	**23**	14	3	2	0	**19**
Highland Park	62.4	1,572	584	**37.2**	46.2	**11.4**	198	39	22	5	0	**66**	5	1	0	0	**6**
Jackson	65.9	3,920	921	**23.5**	29.1	**1.6**	230	6	4	4	0	**14**	20	2	2	0	**24**
Kalamazoo	40.0	4,867	1,220	**25.1**	24.3	**2.7**	235	14	8	9	1	**32**	26	1	2	0	**29**
Lansing	35.8	12,116	2,512	**20.7**	11.6	**0.6**	255	6	5	4	1	**16**	14	5	1	0	**20**
Muskegon	50.0	3,648	1,293	**35.4**	24.1	**3.8**	241	35	6	7	0	**48**	19	3	0	0	**22**
Pontiac	35.2	6,269	1,986	**31.7**	11.4	**0.9**	201	10	4	3	0	**17**	5	2	1	0	**8**
Saginaw	54.4	6,437	1,721	**26.7**	19.1	**1.9**	279	23	4	6	0	**33**	12	4	1	0	**17**
Subtotal	51.0	153,690	55,019	**35.8**	24.5	**3.5**	11,065	1,201	422	258	18	**1,899**	367	92	54	2	**515**
Michigan	27.0	781,759	141,011	**18.0**	14.2	**1.6**	16,968	1,465	492	332	20	**2,309**	585	133	65	3	**786**

*U.S. Census Bureau, Census 2000
**Detroit and Michigan: Kidscount.org (census.org);
Flint, Grand Rapids, Kalamazoo, Lansing & Pontiac: U.S. Census Bureau, American Community Survey 2005;
Battle Creek, Benton Harbor, Hamtramck, Highland Park, Jackson, Muskegon & Saginaw: U.S. Census Bureau, Census 2000.
Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statewide database. June 25, 2007

The federal Centers for Medicare and Medicaid Services (CMS) requires blood lead testing of all Medicaid-eligible children at the ages of one and two years. That federal requirement cannot be waived. If a Medicaid-eligible child is between the ages of three and six years and has never had a blood lead test, he/she is required to have at least one test during those years. The CDC, utilizing data collected in the national Childhood Blood Lead Surveillance System, has reported that more than 80% of children with blood lead levels ≥ 20 µg/dL (significantly lead poisoned) are Medicaid-insured children. Of all children with blood lead levels of 10 µg/dL or greater, more than half are Medicaid-insured.

Most commercial insurance companies do not cover the cost of blood lead testing for their insured clients. This lack of coverage for laboratory testing is a deterrent to testing for commercially-insured as well as uninsured children.

- ✓ Why focus on the children who are Medicaid-insured?

  The following data for 2006 testing gives support to this federal and state requirement. **In 2006, 2,124 of the 2,309 children** with elevated blood lead levels (EBLLs) in Michigan were Medicaid-insured (92% of all EBLLs). This tells us that in Michigan these are, indeed, the right children to test and to focus outreach efforts upon. (See Tables 4 and 5.)

TABLE 4
Blood Lead Testing Among Medicaid-Insured Children – All Michigan Counties

	Children age < 6 years, Insured by Medicaid						Children age 1 & 2 years, Insured by Medicaid				
County	# of Children, age < 6 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL		# of Children, age 1-2 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL
Alcona	294	72	24.5	1	1.4		94	47	50.0	0	0.0
Alger	267	81	30.3	0	0.0		84	66	78.6	0	0.0
Allegan	4,101	936	22.8	4	0.4		1,432	604	42.2	1	0.2
Alpena	1099	287	26.1	1	0.3		367	200	54.5	0	0.0
Antrim	926	284	30.7	0	0.0		313	182	58.1	0	0.0
Arenac	668	166	24.9	0	0.0		241	98	40.7	0	0.0
Baraga	307	108	35.2	0	0.0		115	64	55.7	0	0.0
Barry	1,859	504	27.1	4	0.8		662	396	59.8	1	0.3
Bay	3,889	1,046	26.9	17	1.6		1,329	719	54.1	15	2.1
Benzie	652	149	22.9	0	0.0		224	112	50.0	0	0.0
Berrien	7,471	2,169	29.0	59	2.7		2,558	1,182	46.2	31	2.6
Branch	2,028	447	22.0	4	0.9		661	194	29.3	3	1.5
Calhoun	6,525	1,921	29.4	32	1.7		2,263	1,183	52.3	16	1.4
Cass	2,134	472	22.1	1	0.2		734	289	39.4	1	0.3
Charlevoix	846	266	31.4	2	0.8		264	180	68.2	1	0.6
Cheboygan	1,078	277	25.7	0	0.0		371	200	53.9	0	0.0
Chippewa	1,399	357	25.5	1	0.3		477	221	46.3	1	0.5
Clare	1,339	217	16.2	0	0.0		479	112	23.4	0	0.0
Clinton	1,568	352	22.4	1	0.3		536	210	39.2	0	0.0
Crawford	519	78	15.0	0	0.0		170	55	32.4	0	0.0
Delta	1,393	395	28.4	1	0.3		472	338	71.6	1	0.3
Dickinson	995	162	16.3	0	0.0		356	106	29.8	0	0.0
Eaton	3,150	882	28.0	3	0.3		1,113	622	55.9	1	0.2
Emmet	1,287	224	17.4	1	0.4		447	144	32.2	0	0.0
Genesee	20,775	5,691	27.4	52	0.9		7,005	3,400	48.5	29	0.9
con't							con't				

TABLE 4 (con't)
Blood Lead Testing Among Medicaid-Insured Children – All Michigan Counties

County	Children age < 6 years, Insured by Medicaid					Children age 1 & 2 years, Insured by Medicaid				
	# of Children, age < 6 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL	# of Children, age 1-2 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL
Gladwin	923	168	18.2	0	0.0	286	64	22.4	0	0.0
Gogebic	560	141	25.2	0	0.0	201	90	44.8	0	0.0
Grand Traverse	2,840	300	10.6	0	0.0	963	154	16.0	0	0.0
Gratiot	1,729	394	22.8	0	0.0	574	308	53.7	0	0.0
Hillsdale	1,882	363	19.3	5	1.4	680	237	34.9	4	1.7
Houghton	1,250	345	27.6	0	0.0	439	224	51.0	0	0.0
Huron	1,135	271	23.9	0	0.0	371	167	45.0	0	0.0
Ingham	10,657	2,910	27.3	17	0.6	3,774	1,799	47.7	9	0.5
Ionia	2,347	394	16.8	5	1.3	859	272	31.7	5	1.8
Iosco	990	211	21.3	0	0.0	336	116	34.5	0	0.0
Iron	403	53	13.2	0	0.0	146	32	21.9	0	0.0
Isabella	2,072	233	11.2	1	0.4	740	140	18.9	1	0.7
Jackson	6,380	1,703	26.7	18	1.1	2,291	1,176	51.3	11	0.9
Kalamazoo	8,843	2,192	24.8	37	1.7	3,157	1,521	48.2	23	1.5
Kalkaska	901	134	14.9	0	0.0	323	96	29.7	0	0.0
Kent	25,825	7,961	30.8	221	2.8	9,226	6,172	66.9	147	2.4
Keweenaw	60	17	28.3	0	0.0	17	6	35.3	0	0.0
Lake	470	141	30.0	0	0.0	156	67	42.9	0	0.0
Lapeer	2,738	664	24.3	1	0.2	981	395	40.3	0	0.0
Leelanau	358	80	22.3	0	0.0	122	59	48.4	0	0.0
Lenawee	3,516	765	21.8	8	1.0	1,208	464	38.4	4	0.9
Livingston	2,743	531	19.4	3	0.6	985	359	36.4	1	0.3
Luce	245	67	27.3	0	0.0	98	60	61.2	0	0.0
Mackinac	343	116	33.8	0	0.0	120	95	79.2	0	0.0
Macomb	20,456	3,880	19.0	14	0.4	7,029	2,329	33.1	10	0.4
Manistee	876	270	30.8	3	1.1	288	165	57.3	1	0.6
Marquette	1,848	625	33.8	4	0.6	638	402	63.0	3	0.7
Mason	1,139	219	19.2	1	0.5	409	128	31.3	0	0.0
Mecosta	1,603	353	22.0	1	0.3	547	239	43.7	0	0.0
Menominee	818	214	26.2	1	0.5	267	175	65.5	1	0.6
Midland	2,465	257	10.4	4	1.6	848	145	17.1	3	2.1
Missaukee	514	99	19.3	0	0.0	168	69	41.1	0	0.0
Monroe	4,171	770	18.5	2	0.3	1,397	477	34.1	1	0.2
Montcalm	2,640	483	18.3	4	0.8	928	334	36.0	4	1.2
Montmorency	324	47	14.5	0	0.0	103	25	24.3	0	0.0
Muskegon	8,495	3,098	36.5	71	2.3	2,899	1,765	60.9	35	2.0
Newaygo	2,186	592	27.1	1	0.2	771	365	47.3	1	0.3
Oakland	23,133	5,933	25.6	30	0.5	7,980	3,471	43.5	17	0.5
Oceana	1,635	398	24.3	0	0.0	569	244	42.9	0	0.0
Ogemaw	904	203	22.5	0	0.0	309	115	37.2	0	0.0
Ontonagon	174	60	34.5	0	0.0	58	44	75.9	0	0.0
Osceola	883	196	22.2	1	0.5	300	116	38.7	1	0.9
Oscoda	314	51	16.2	0	0.0	110	24	21.8	0	0.0
Otsego	1,041	181	17.4	0	0.0	374	105	28.1	0	0.0
Ottawa	7,193	1,415	19.7	5	0.4	2,449	918	37.5	4	0.4
Presque Isle	373	69	18.5	0	0.0	127	47	37.0	0	0.0
Roscommon	902	122	13.5	0	0.0	319	58	18.2	0	0.0
Saginaw	9,082	2,822	31.1	36	1.3	3,067	1,721	56.1	22	1.3
St Clair	5,661	1,098	19.4	10	0.9	1,980	748	37.8	7	0.9
St Joseph	3,298	665	20.2	9	1.4	1,175	453	38.6	4	0.9
	con't					con't				

TABLE 4 (con't)
Blood Lead Testing Among Medicaid-Insured Children – All Michigan Counties

County	Children age < 6 years, Insured by Medicaid					Children age 1 & 2 years, Insured by Medicaid				
	# of Children, age < 6 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL	# of Children, age 1-2 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed w/EBLL*	% EBLL
Sanilac	1,745	614	35.2	3	0.5	611	383	62.7	3	0.8
Schoolcraft	332	98	29.5	0	0.0	115	83	72.2	0	0.0
Shiawassee	2,730	884	32.4	5	0.6	914	559	61.2	2	0.4
Tuscola	2,193	716	32.6	5	0.7	739	454	61.4	5	1.1
Van Buren	3,771	953	25.3	6	0.6	1,341	561	41.8	3	0.5
Washtenaw	7,500	1,539	20.5	8	0.5	2,670	911	34.1	5	0.5
Wayne ex Det	35,703	10,662	29.9	146	1.4	12,201	5,573	45.7	91	1.6
Wexford	1,711	249	14.6	4	1.6	596	185	31.0	0	0.0
Detroit, City of	61,266	27,050	44.2	1,250	4.6	20,660	12,093	58.5	633	5.2
MICHIGAN	**364,858**	**104,582**	**28.7**	**2,124**	**2.0**	**125,776**	**60,481**	**48.1**	**1,163**	**1.9**

*EBLL: elevated blood lead level--i.e., ≥ 10 µ/dL
Source: MDCH Data Warehouse

June 2007

TABLE 5
13 Target Communities
Blood Lead Testing Among Children Who are Insured by Medicaid

Place	Children age < 6 years, Insured by Medicaid					Children age 1 & 2 years, Insured by Medicaid				
	# of Children, age < 6 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed to have EBLL*	% EBLL	# of Children, age 1 & 2 yrs, Insured by Medicaid during 2006	# of Children Tested for Lead Poisoning in 2006	% Tested	# of Children Confirmed to have EBLL*	% EBLL
Battle Creek	3,240	1,020	31.5	20	2.0	1,154	628	54.4	9	1.4
Benton Harbor	1,286	519	40.4	37	7.1	418	235	56.2	20	8.5
Detroit	61,266	27,050	44.2	1,250	4.6	20,660	12,093	58.5	633	5.2
Flint	9,668	2,882	29.8	40	1.4	3,291	1,702	51.7	20	1.2
Grand Rapids	12,555	4,514	36.0	202	4.5	4,522	3,412	75.5	137	4.0
Hamtramck	2,055	809	39.4	21	2.6	665	413	62.1	14	3.4
Highland Park	1,041	493	47.4	64	13.0	367	227	61.9	42	18.5
Jackson	2,900	808	27.9	14	1.7	1,014	526	51.9	7	1.3
Kalamazoo	3,891	1,014	26.1	31	3.1	1,358	665	49.0	20	3.0
Lansing	7,069	2,141	30.3	13	0.6	2,486	1,276	51.3	9	0.7
Muskegon	2,882	1,132	39.3	46	4.1	956	647	67.7	23	3.6
Pontiac	5,462	1,694	31.0	17	1.0	1,877	1,098	58.5	9	0.8
Saginaw	4,646	1,547	33.3	32	2.1	1,567	909	58.0	18	2.0
Subtotal	117,961	45,623	38.7	1,787	3.9	40,335	23,831	59.1	961	4.0
Michigan	364,858	104,582	28.7	2,124	2.0	125,776	60,481	48.1	1,163	1.9

Source: MDCH Data Warehouse
*EBLL: Elevated blood lead level--i.e., ≥ 10 µg/dL

June 2007

- ✓ Why focus on children who are one and two years of age?

  Babies beginning to creep around on hands and knees at the end of their first year are on the floor, where lead-based paint dust collects. The dust gets on their clothes and hands and is transferred by hands to their mouths, where it is ingested. Even babies whose blood lead level is below the "level of concern" at one year of age experience the peak of hand-to-mouth, normal developmental behavior between eighteen and twenty four months. Hands, toys and other non-food items, contaminated by lead-based paint dust, all go into the mouth. If lead is available in their environment, this is when blood lead levels peak.

A test at one year of age identifies exposure to lead triggered by early creeping/crawling behavior or possibly even prenatal exposure. The second test, at approximately two years of age, reflects exposure occurring during appropriate hand-to-mouth behavior that accompanies exploration of the child's environment. Both tests are necessary to discern child exposure. **In 2006, 11 of the 20** Michigan children with blood lead levels at the chelation therapy level were two years of age or younger. (See Tables 6 and 7 and Figures 4 and 5.)

In 2006, CLPPP acquired an interactive, storybook display that tells about and illustrates ways to avoid Pb poisoning (both English and Spanish). Several health plans, local health agencies and coalitions have borrowed this display for health fairs and outreach activities where children are expected. All report that this display with its interactive Dusty the Dog is very popular with children. This was purchased with CDC grant monies.

TABLE 6
13 Target Communities
Testing Rates and Elevated Blood Lead Levels – Children One and Two Years Old
Calendar Years 2001 - 2006

Place	2001				2002				2003				2004				2005				2006			
	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL	Number of Children Tested	% Tested	Children with EBLL	% EBLL
Battle Creek	215	13.8	14	6.5	251	16.1	9	3.6	321	20.5	15	4.7	664	42.5	18	2.7	868	55.5	13	1.5	958	61.3	9	0.9
Benton Harbor	267	58.3	51	19.1	213	46.5	38	17.8	209	45.6	32	15.3	241	52.6	19	7.9	225	49.1	23	10.3	244	53.3	21	8.9
Detroit	12,326	40.7	1,452	11.8	13,071	43.1	1,291	9.9	13,403	44.2	1,006	7.5	14,064	46.4	1,005	7.2	14,228	57.0	999	7.2	14,409	53.3	675	4.7
Flint	712	16.0	29	4.1	751	16.9	31	4.1	858	19.3	19	2.2	1,207	27.1	19	1.6	1,624	36.5	45	2.8	1,878	51.0	20	1.1
Grand Rapids	4,232	64.7	325	7.7	4,148	63.4	217	5.2	4,040	61.8	178	4.4	4,274	65.4	159	3.9	3,850	58.9	163	4.3	3,967	58.8	142	3.6
Hamtramck	180	24.6	17	9.4	201	27.5	13	6.5	272	37.2	11	4.0	374	51.1	23	6.2	431	58.9	14	3.3	502	68.6	14	2.9
Highland Park	185	36.2	31	16.8	194	38.0	32	16.5	208	40.7	36	17.3	270	52.8	56	21.2	306	59.9	47	15.5	257	50.3	43	17.1
Jackson	68	5.1	5	7.4	66	5.0	4	6.1	167	12.6	8	4.8	474	35.9	20	4.3	575	43.5	21	3.7	587	44.4	7	1.2
Kalamazoo	301	15.5	16	5.3	243	12.5	15	6.2	334	17.2	21	6.3	558	28.7	23	4.2	575	29.6	15	2.6	808	48.4	21	2.7
Lansing	855	21.4	17	2.0	916	23.0	16	1.7	736	18.5	11	1.5	937	23.5	17	1.8	1,178	29.5	18	1.5	1,497	35.8	12	0.8
Muskegon	335	26.9	25	7.5	324	26.0	31	9.6	348	28.0	25	7.2	582	46.7	36	6.3	709	56.9	32	4.5	722	58.0	25	3.5
Pontiac	219	9.1	9	4.1	271	11.3	3	1.1	492	20.5	16	3.3	992	41.3	13	1.3	1,089	45.4	10	0.9	1,247	59.0	9	0.7
Saginaw	426	19.3	33	7.7	477	21.6	33	6.9	578	26.2	27	4.7	955	43.3	30	3.2	1,026	46.5	21	2.1	1,011	45.8	18	1.8
subtotal	20,321	35.2	2024	10.0	21,126	36.6	1,733	8.2	21,966	38.1	1,405	6.4	25,592	44.4	1,438	5.7	26,684	51.0	1,421	5.4	28,087	52.5	1,016	3.7
Michigan total	44,961	16.8	2,361	5.4	47,288	17.7	2,017	4.3	51,450	19.2	1,687	3.3	66,669	24.9	1,695	2.9	72,242	27.7	1703	2.4	80,076	30.9	1,263	1.6

Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statewide database. June 2007
Note: Each child tested is counted only once per year, but may be counted in more than one year.

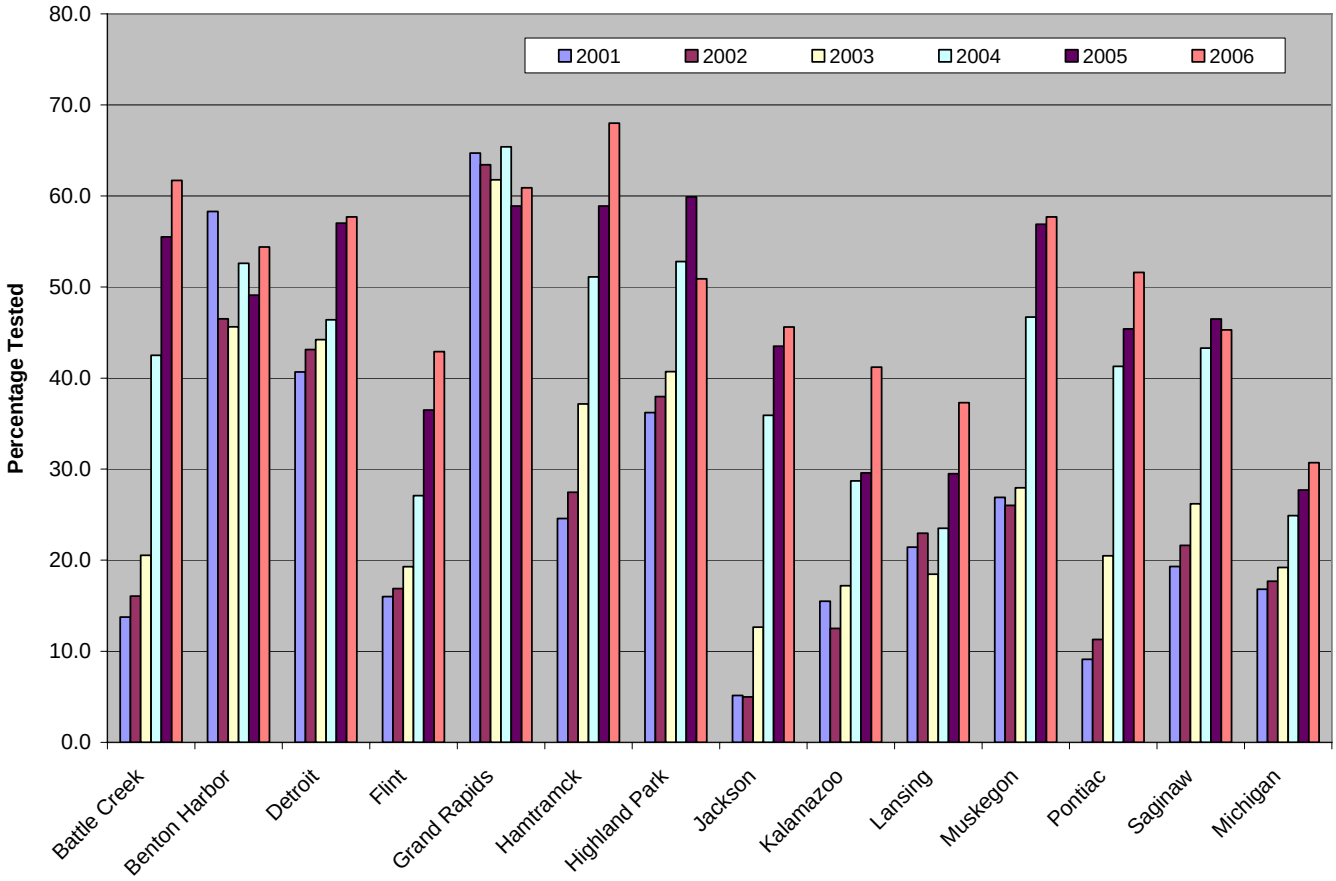
☠ lead ☠ Pb ☠ lead ☠ Pb ☠

TABLE 7
13 Target Communities
Elevated Blood Lead Levels - Both Confirmed and Unconfirmed – Calendar Year 2006

			Children Age 1 & 2, Tested for Lead during 2006				Children with Low-Level Exposure	Children with **Confirmed** Elevated Blood Lead Levels					Children with Elevated Capillary Tests **Not Confirmed** by Venous				
Target Community	%Pre-1950 Housing*	Children Age 1 & 2**	Number of Children Tested	% Tested	% with BLL ≥ 5 µg/dL	**% EBLL (≥ 10 µg/dL venous only)*** **	5 to 9 µg/dL (capillary, venous or unknown)	10-14 µg/dL (venous only)	15-19 µg/dL (venous only)	20-44 µg/dL (venous only)	≥45 µg/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	Capillary 10-14, not confirmed by venous	Capillary 15-19, not confirmed by venous	Capillary 20-44, not confirmed by venous	Capillary ≥ 45, not confirmed by venous	Total Elevated Capillary, not confirmed by venous
Battle Creek	42.3	1,563	958	**61.3**	10.8	**0.9**	88	6	2	1	0	**9**	4	2	0	0	6
Benton Harbor	47.8	458	244	**53.3**	41.4	**8.9**	73	11	8	2	0	**21**	4	2	1	0	7
Detroit	56.1	27,058	14,409	**53.3**	30.9	**4.7**	3,609	416	154	98	7	**675**	109	36	24	1	170
Flint	40.9	3,685	1,878	**51.0**	15.5	**1.1**	258	7	8	4	1	**20**	8	4	1	0	13
Grand Rapids	48.9	6,743	3,967	**58.8**	23.8	**3.6**	770	73	44	25	0	**142**	23	7	4	0	34
Hamtramck	75.8	732	502	**68.6**	30.9	**2.9**	128	10	4	0	0	**14**	8	3	2	0	13
Highland Park	62.4	511	257	**50.3**	51.0	**17.1**	83	23	16	4	0	**43**	4	1	0	0	5
Jackson	65.9	1,321	587	**44.4**	29.1	**1.2**	154	4	3	0	0	**7**	9	1	0	0	10
Kalamazoo	40.0	1,669	808	**48.4**	23.0	**2.7**	146	7	5	8	1	**21**	18	1	0	0	19
Lansing	35.8	4,181	1,497	**35.8**	13.1	**0.8**	170	4	4	3	1	**12**	9	4	1	0	14
Muskegon	50.0	1,245	722	**58.0**	24.9	**3.5**	139	15	5	5	0	**25**	13	3	0	0	16
Pontiac	35.2	2,114	1,247	**59.0**	12.0	**0.7**	134	5	3	1	0	**9**	5	1	1	0	7
Saginaw	54.4	2,206	1,011	**45.8**	20.7	**1.8**	182	13	2	3	0	**18**	7	2	0	0	9
Subtotal	51.0	53,486	28,087	**52.5**	25.9	**3.7**	5,934	594	258	154	10	**1,016**	221	67	34	1	323
Michigan	27.0	258,777	80,076	**30.9**	14.3	**1.6**	9,676	749	303	200	11	**1,263**	372	96	43	1	512

*U.S. Census Bureau, Census 2000
**Detroit and Michigan: Kidscount.org (census.org);
Flint, Grand Rapids, Kalamazoo, Lansing & Pontiac: U.S. Census Bureau, American Community Survey 2005;
Battle Creek, Benton Harbor, Hamtramck, Highland Park, Jackson, Muskegon & Saginaw: U.S. Census Bureau, Census 2000.
Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statewide database. June 25, 2007

FIGURE 4
13 Target Communities
Percentage of Children 1 and 2 Years of Age Tested in Calendar Years 2001 - 2006

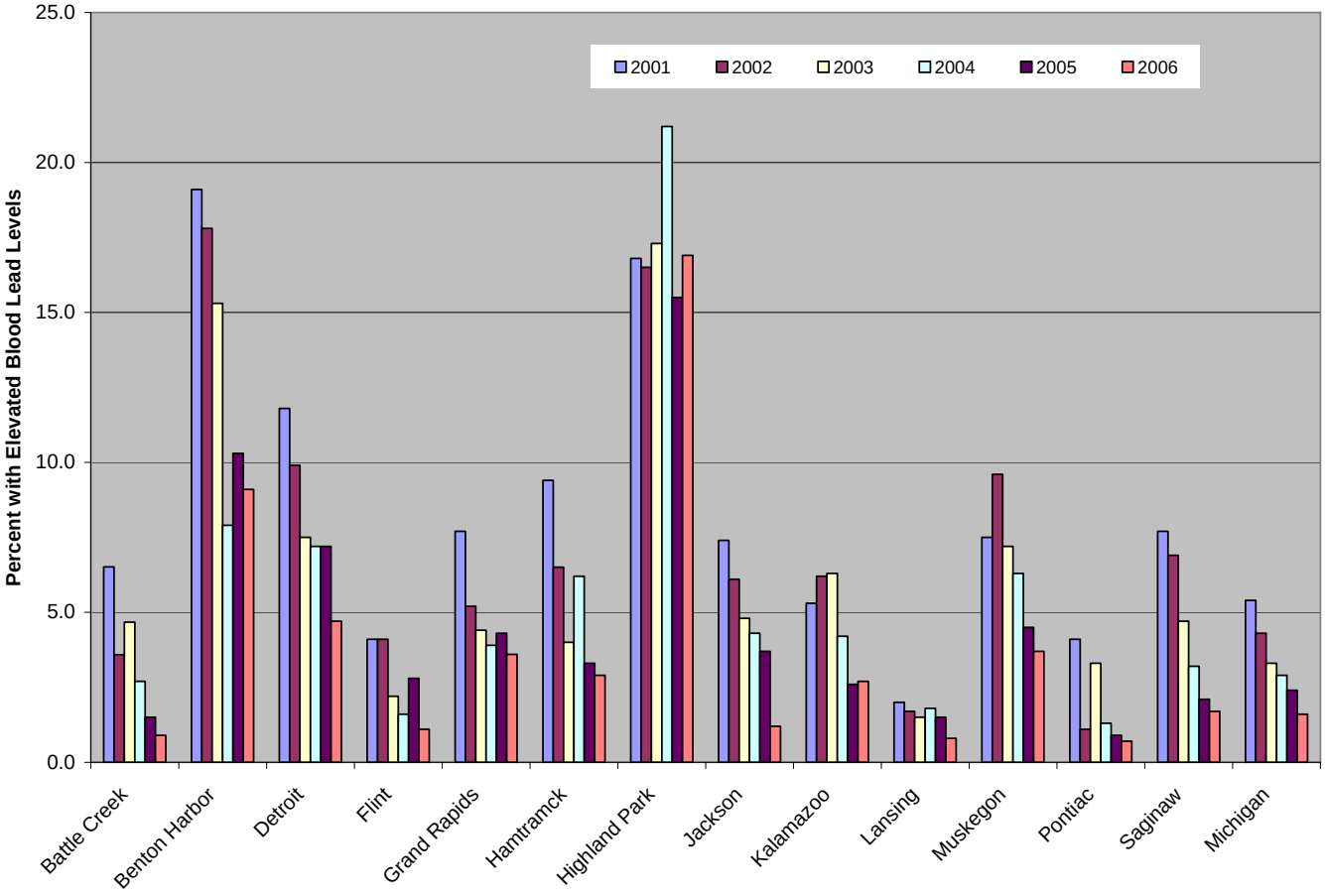


In Saginaw County, CLPPP provided funding support for an obstetrician/gynecologist who is collecting and analyzing cord blood specimens from uncomplicated births for the presence of lead and mercury in the cord blood. The fact is that lead crosses the placenta at maternal levels of five micrograms, providing intrauterine exposure to the neurodevelopmental effects of lead. The physician and CLPPP would like to determine a population-based frequency for this finding.

In Wayne, Oakland, and Macomb counties, as well as in the city of Detroit, CLPPP and LHHS both have developed contractual relationships with CLEARCorps/LEAP Detroit. CLEARCorps (Community Lead Education and Reduction Corps) is an AmeriCorps program, the goal of which is reduction of childhood lead poisoning in urban neighborhoods. In the six U.S. cities in which they operate, CLEARCorps provides community outreach and education about lead poisoning, lead hazard reduction using interim controls and light carpentry, specialized cleaning, and follow-up with residents of the home in which services have been provided for a year.

CLEARCorps and their cadre of risk assessors provided their full range of services for LHHS and CLPPP, extending them to families in which pregnant women or children younger than six years who are at risk due to age and condition of housing resided. This true primary prevention outreach is not reimbursable to local health departments, which offers explanation as to the non-involvement of those agencies. Primary prevention such as this—the “final solution” for avoiding lead poisoning of children and adults—is not a reimbursable service by Medicaid or any commercial insurance carrier.

FIGURE 5
Percent of Children 1 and 2 Years of Age
with Confirmed Elevated Blood Lead Levels – Calendar Years 2001 – 2006



During the year ending December 31, 2006, 141,011 children in Michigan received initial blood lead tests. This represents an increase in testing of approximately 9,000 children (as compared with the previous year); nonetheless, that testing number accounts for only 18% of Michigan children younger than age six years. (See Figure 1.) To put this number in perspective: slightly less than half of Michigan children under six years of age are Medicaid-insured, and the federal Centers for Medicare and Medicaid requires that all of their insured be tested at the ages of one and two years. The under-testing by health care providers, while improving, remains apparent. Increasing testing numbers, especially in target communities, remains one of CLPPP's primary goals for the last five years of program funding by CDC. The state and federal goals of elimination of childhood lead poisoning by 2010 means that there will no longer be funding for state CLPP programs through the CDC.

The Medical Services Administration (MSA, or Michigan Medicaid) has worked diligently with their enrolled providers to increase their blood lead testing compliance. They have been most effective with their providers in managed care plans; success lags with the fee-for-service Medicaid providers. Since 2005, Medicaid has published a monthly *Medicaid Blood Lead Testing Report*, identifying, by health plan, attempts to fully comply with Public Act 55 of 2004 by October 1, 2007. The monthly report is posted on the MDCH website and also distributed

electronically to local public health officers and others by CLPPP; Medicaid also distributes the data electronically to their network of health plans and providers. (See Appendix C.)

Missed Opportunities

Testing data analysis as reported by Michigan Medicaid identifies that if Medicaid-enrolled health care providers ordered and completed a blood lead test on all appropriate-aged children with whom they actually have a physical encounter in their office, the legislative mandate (Public Act 55) requiring that more than 80% of Medicaid-enrolled children receiving a blood lead test would already be reached. Medicaid providers are required to have achieved blood lead testing on at least 80% of their enrolled children by October 2007 or face sanctions by Medicaid. CLPPP's informal data reveals an array of provider testing issues: provider remains unconvinced that testing is warranted/required; provider/provider's office staff "forget" to requisition a blood lead test when a child encounter occurs; provider requisitions a blood lead level (BLL), but collection is off-site or at a draw station, and parent(s) fail to follow-up.

Blood lead testing is not offered at all local public health agencies, though most do provide this service. While Medicaid reimbursement is available for specimen collection and analysis for children who are enrolled in either Medicaid or MI Child, there is no identified source of funding for uninsured children.

Legislation enacted in October 2006 (Public Act 286) requires that all children who receive WIC nutrition services be lead-tested. WIC is not required to provide the test, although blood lead testing concurrent with standard USDA-required hemoglobin testing provides a one-stop-shopping-type opportunity for families. A review of the existing data comparing blood lead levels of WIC-enrolled children reveals an EBLL rate that is twice that of the general population of children. While more than half of the WIC clinics had previously begun offering blood lead tests in conjunction with the hemoglobin testing required at certification/re-certification visits for their participating children, testing for 100% of children who are WIC-enrolled is the goal of this legislation. Lead poisoning is an automatic referral indicator for WIC evaluation, but families must also meet other WIC eligibility criteria.

Among all children tested in 2006, there were 2,309 with elevated blood lead levels; this is an EBLL rate for the state of Michigan of 1.6%. The national EBLL rate is now **1.2%**. (See Table 8 and Figure 6.) As compared with 2005 testing data, 800 **fewer** children had elevated blood lead levels statewide in 2006.

While children younger than six years of age are CLPPP's focus, special emphasis is placed on testing appropriate children at the ages of one and two years, when creeping and hand-to-mouth behaviors begin, and then peak. Slightly more than half (80,076) of children tested in 2006 were in that age group. This number represents 30.9% of one and two year olds. Among this cohort, 1,263 children had elevated blood lead levels ($\geq$ 10 µg/dL). This represents an EBLL rate of 1.6% for this cohort of tested children. (See Figure 7 and Table 9.)

The number of children with dangerously high blood lead levels ($\geq$ 40 µg/dL) in 2006 was 33; of those children, 22 had BLLs $\geq$ 45 and received chelation therapy. Children with blood lead levels in this range require hospital treatment, usually multiple times, to begin to lower their BLLs, and then to reduce their total body burden of lead. Except in the situation of a single, near-catastrophic, exposure to lead (e.g., child drank pottery glaze), children with BLLs in this range have had chronic, low level exposure to a lead source over a lengthy period of time. Reducing the child's BLL is a process that takes place over more than a year. The damage is **irreversible**.

FIGURE 6
Children Less than Six Years of Age with Confirmed Elevated Blood Lead Levels - 2006

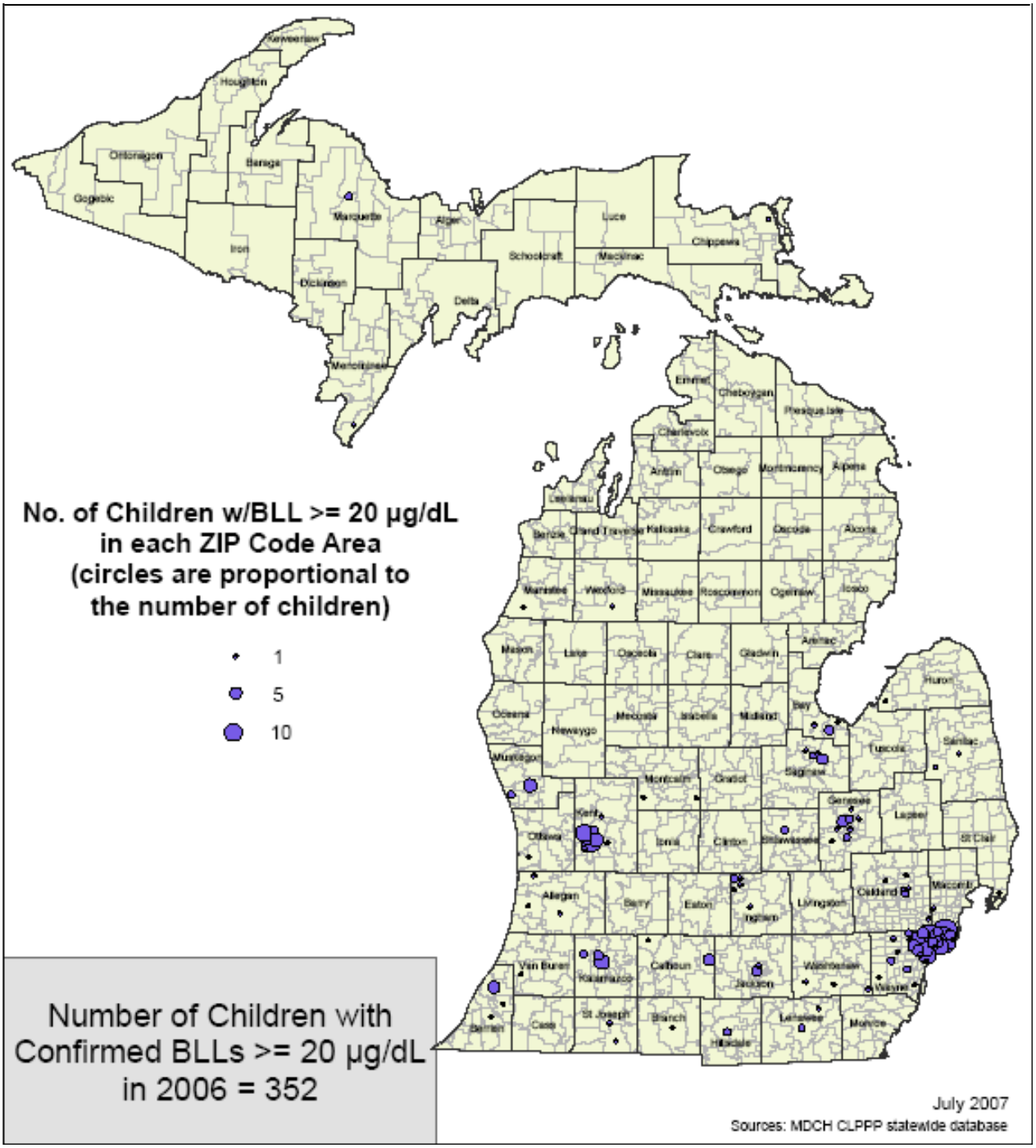


FIGURE 7
Percent of Children One and Two Years of Age Tested for Lead Poisoning – 2006

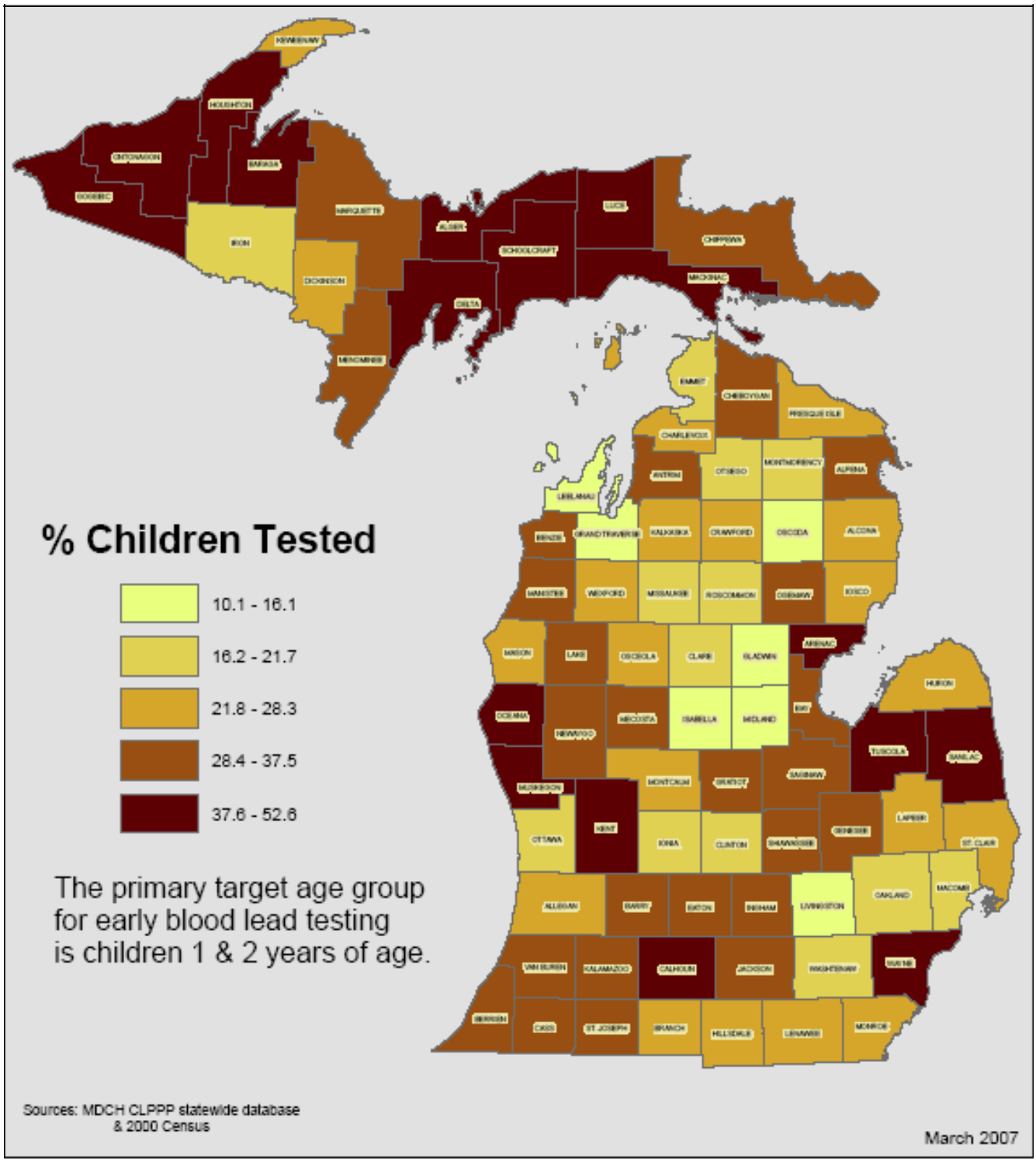


TABLE 8

Children Less than Six Years of Age – Lead Poisoning Data Facts
All Michigan Counties and Detroit – 2006

			Children < Age 6, Tested for Lead during 2006				Children with Low-Level Exposure	Children with **CONFIRMED** Elevated Blood Lead Levels					Children with Elevated Capillary Tests **NOT CONFIRMED** by Venous Tests				
County	%Pre-1950 Housing*	Children Under Age 6**	Number of Children Tested	% Tested	% with BLL ≥ 5 ug/dL	% EBLL (≥ 10 ug/dL venous only)***	5-9 ug/dL (capillary, venous or unknown)	10-14 ug/dL (venous only)	15-19 ug/dL (venous only)	20-44 ug/dL (venous only)	≥45 ug/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	capillary 10-14 ug/dL	capillary 15-19 ug/dL	capillary 20-44 ug/dL	capillary ≥ 45 ug/dL	Total Elevated Capillary
Alcona	21.0	430	100	**23.3**	13.0	**1.0**	10	1	0	0	0	**1**	2	0	0	0	2
Alger	32.6	444	96	**21.6**	6.3	**0.0**	5	0	0	0	0	**0**	1	0	0	0	1
Allegan	27.4	8,809	1,248	**14.2**	12.6	**0.4**	132	3	0	2	0	**5**	16	4	0	0	20
Alpena	28.6	1,769	391	**22.1**	12.3	**0.3**	46	1	0	0	0	**1**	1	0	0	0	1
Antrim	22.6	1,435	304	**21.2**	8.9	**0.0**	27	0	0	0	0	**0**	0	0	0	0	0
Arenac	20.6	979	233	**23.8**	8.6	**0.0**	20	0	0	0	0	**0**	0	0	0	0	0
Baraga	34.9	514	159	**30.9**	5.7	**0.0**	9	0	0	0	0	**0**	0	0	0	0	0
Barry	29.4	4,279	680	**15.9**	10.0	**0.7**	58	3	2	0	0	**5**	3	2	0	0	5
Bay	37.1	7,551	1,341	**17.8**	14.2	**1.4**	164	11	3	5	0	**19**	5	2	0	0	7
Benzie	27.3	1,185	163	**13.8**	9.2	**0.0**	14	0	0	0	0	**0**	1	0	0	0	1
Berrien	32.7	12,913	2,538	**19.7**	19.1	**2.6**	394	40	19	7	0	**66**	22	2	1	0	25
Branch	36.5	3,473	653	**18.8**	17.5	**0.8**	92	2	2	1	0	**5**	15	2	0	0	17
Calhoun	36.4	11,258	2,946	**26.2**	10.4	**1.1**	262	21	7	5	0	**33**	8	2	0	0	10
Cass	30.4	3,382	599	**17.7**	15.0	**0.2**	86	1	0	0	0	**1**	2	0	1	0	3
Charlevoix	25.7	1,786	277	**15.5**	11.2	**1.1**	25	3	0	0	0	**3**	3	0	0	0	3
Cheboygan	21.7	1,678	305	**18.2**	6.9	**0.0**	20	0	0	0	0	**0**	1	0	0	0	1
Chippewa	28.4	2,168	433	**20.0**	4.2	**0.2**	16	0	0	1	0	**1**	0	1	0	0	1
Clare	13.1	1,979	245	**12.4**	3.7	**0.0**	8	0	0	0	0	**0**	1	0	0	0	1
Clinton	28.7	4,752	584	**12.3**	6.2	**0.2**	35	1	0	0	0	**1**	0	0	0	0	0
Crawford	19.6	822	104	**12.7**	7.7	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Delta	37.7	2,448	455	**18.6**	9.2	**0.2**	39	1	0	0	0	**1**	1	0	1	0	2
Dickinson	41.6	1,631	238	**14.6**	4.2	**0.0**	10	0	0	0	0	**0**	0	0	0	0	0
Eaton	23.4	7,502	1,137	**15.2**	8.4	**0.4**	85	4	1	0	0	**5**	2	2	1	0	5
Emmet	27.7	2,329	249	**10.7**	8.0	**0.4**	16	1	0	0	0	**1**	3	0	0	0	3
Genesee	22.8	37,070	7,619	**20.6**	9.3	**0.8**	624	29	15	11	2	**57**	20	6	1	0	27
Gladwin	13.7	1,636	206	**12.6**	9.7	**0.0**	20	0	0	0	0	**0**	0	0	0	0	0
Gogebic	54.1	763	185	**24.2**	1.1	**0.0**	2	0	0	0	0	**0**	0	0	0	0	0
Grand Traverse	17.8	5,658	380	**6.7**	4.2	**0.3**	15	1	0	0	0	**1**	0	0	0	0	0
Gratiot	39.8	2,826	474	**16.8**	8.4	**0.0**	39	0	0	0	0	**0**	1	0	0	0	1
Hillsdale	39.0	3,469	608	**17.5**	9.2	**1.2**	46	5	0	2	0	**7**	2	1	0	0	3
Houghton	54.8	2,282	576	**25.2**	4.5	**0.0**	25	0	0	0	0	**0**	0	1	0	0	1
Huron	33.5	2,057	339	**16.5**	10.0	**0.3**	33	0	0	1	0	**1**	0	0	0	0	0
Ingham	25.9	21,618	3,635	**16.8**	9.8	**0.6**	312	8	6	5	1	**20**	17	5	1	0	23
Ionia	37.9	4,851	537	**11.1**	10.2	**0.9**	47	4	1	0	0	**5**	1	2	0	0	3
Iosco	19.8	1,433	262	**18.3**	13.7	**0.0**	34	0	0	0	0	**0**	1	1	0	0	2
Iron	44.5	558	64	**11.5**	1.6	**0.0**	0	0	0	0	0	**0**	1	0	0	0	1
Isabella	19.2	3,983	338	**8.5**	1.8	**0.3**	5	1	0	0	0	**1**	0	0	0	0	0
Jackson	35.7	12,331	2,024	**16.4**	20.0	**0.9**	352	8	6	4	0	**18**	28	4	3	0	35
Kalamazoo	24.6	18,619	2,862	**15.4**	15.4	**1.4**	364	19	8	11	1	**39**	33	3	2	0	38
Kalkaska	15.2	1,315	144	**11.0**	13.2	**0.0**	18	0	0	0	0	**0**	1	0	0	0	1
Kent	26.8	55,828	9,859	**17.7**	16.4	**2.4**	1,331	133	55	43	2	**233**	38	9	5	0	52
Keweenaw	54.9	123	27	**22.0**	7.4	**0.0**	2	0	0	0	0	**0**	0	0	0	0	0
Lake	15.1	669	153	**22.9**	8.5	**0.0**	13	0	0	0	0	**0**	0	0	0	0	0
Lapeer	22.2	6,281	943	**15.0**	7.7	**0.1**	71	1	0	0	0	**1**	1	0	0	0	1
Leelanau	22.0	1,157	92	**8.0**	3.3	**0.0**	3	0	0	0	0	**0**	0	0	0	0	0
Lenawee	38.6	7,456	1,123	**15.1**	11.8	**0.9**	116	5	2	2	1	**10**	7	0	0	0	7
Livingston	13.7	12,437	772	**6.2**	3.6	**0.6**	23	3	2	0	0	**5**	0	0	0	0	0
Luce	30.0	361	74	**20.5**	10.8	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Mackinac	28.1	628	143	**22.8**	8.4	**0.0**	11	0	0	0	0	**0**	0	0	1	0	1
Macomb	10.9	61,493	6,475	**10.5**	6.0	**0.3**	364	14	3	1	0	**18**	4	0	0	0	4

(con't)

TABLE 8 (con't)
Children Less than Six Years of Age – Lead Poisoning Data Facts
All Michigan Counties and Detroit – 2006

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County	%Pre-1950 Housing*	Children Under Age 6**	Number of Children Tested	% Tested	% with BLL ≥ 5 ug/dL	% EBLL (≥ 10 ug/dL venous only)***	5-9 ug/dL (capillary, venous or unknown)	10-14 ug/dL (venous only)	15-19 ug/dL (venous only)	20-44 ug/dL (venous only)	≥45 ug/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	capillary 10-14 ug/dL	capillary 15-19 ug/dL	capillary 20-44 ug/dL	capillary ≥ 45 ug/dL	Total Elevated Capillary
Manistee	35.9	1,569	304	**19.4**	12.5	**1.0**	34	2	0	1	0	**3**	1	0	0	0	1
Marquette	32.6	3,597	754	**21.0**	8.8	**0.7**	59	2	1	2	0	**5**	1	0	1	0	2
Mason	31.1	1,832	247	**13.5**	12.6	**0.4**	30	1	0	0	0	**1**	0	0	0	0	0
Mecosta	22.0	2,725	482	**17.7**	5.8	**0.2**	25	0	1	0	0	**1**	1	1	0	0	2
Menominee	38.4	1,561	282	**18.1**	16.0	**0.7**	37	1	0	1	0	**2**	5	1	0	0	6
Midland	16.9	5,863	385	**6.6**	5.2	**1.0**	16	4	0	0	0	**4**	0	0	0	0	0
Missaukee	20.6	1,012	120	**11.9**	6.7	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Monroe	28.3	10,550	1,428	**13.5**	6.8	**0.3**	92	3	1	0	0	**4**	1	0	0	0	1
Montcalm	28.1	4,895	629	**12.8**	9.9	**0.6**	54	2	0	2	0	**4**	3	0	1	0	4
Montmorency	18.4	515	62	**12.0**	11.3	**0.0**	6	0	0	0	0	**0**	1	0	0	0	1
Muskegon	29.8	14,248	4,012	**28.2**	15.1	**1.9**	495	56	10	8	0	**74**	31	4	0	0	35
Newaygo	22.7	3,716	765	**20.6**	6.1	**0.1**	45	1	0	0	0	**1**	1	0	0	0	1
Oakland	15.9	92,500	10,277	**11.1**	5.9	**0.4**	547	27	6	7	0	**40**	13	4	1	1	19
Oceana	26.8	2,230	497	**22.3**	6.8	**0.0**	33	0	0	0	0	**0**	1	0	0	0	1
Ogemaw	18.3	1,247	272	**21.8**	7.7	**0.0**	19	0	0	0	0	**0**	2	0	0	0	2
Ontonagon	43.4	333	76	**22.8**	9.2	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Osceola	24.2	1,761	251	**14.3**	7.2	**0.4**	16	1	0	0	0	**1**	1	0	0	0	1
Oscoda	18.3	542	58	**10.7**	12.1	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Otsego	12.6	1,695	210	**12.4**	4.8	**0.0**	10	0	0	0	0	**0**	0	0	0	0	0
Ottawa	18.0	21,138	2,255	**10.7**	7.1	**0.4**	146	6	1	2	0	**9**	5	0	0	0	5
Presque Isle	27.6	782	96	**12.3**	8.3	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Roscommon	16.1	1,222	149	**12.2**	5.4	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Saginaw	29.3	15,982	3,495	**21.9**	13.4	**1.1**	408	24	5	8	0	**37**	17	4	1	0	22
St Clair	29.6	12,484	1,496	**12.0**	9.9	**0.8**	130	8	3	1	0	**12**	4	2	0	0	6
St Joseph	34.8	5,539	892	**16.1**	13.1	**1.2**	105	6	3	2	0	**11**	0	1	0	0	1
Sanilac	34.7	3,178	708	**22.3**	8.8	**0.6**	56	1	1	2	0	**4**	1	1	0	0	2
Schoolcraft	33.1	461	108	**23.4**	7.4	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Shiawassee	35.9	5,208	1,113	**21.4**	7.5	**0.5**	75	4	0	1	1	**6**	3	0	0	0	3
Tuscola	32.8	4,030	920	**22.8**	9.2	**0.5**	75	4	1	0	0	**5**	4	1	0	0	5
Van Buren	29.4	6,264	1,176	**18.8**	11.5	**0.5**	123	2	3	1	0	**6**	5	1	0	0	6
Washtenaw	19.3	24,941	2,282	**9.1**	4.4	**0.5**	87	7	2	3	0	**12**	1	0	0	0	1
Wayne ex Det	24.0	97,904	16,353	**16.7**	9.5	**1.0**	1,328	98	39	21	0	**158**	49	10	5	0	64
Wexford	26.2	2,315	271	**11.7**	9.2	**1.5**	17	3	0	1	0	**4**	4	0	0	0	4
Detroit, City of	56.0	75,502	33,190	**44.0**	27.2	**4.1**	7,395	878	283	168	12	**1,341**	188	54	39	2	283
MICHIGAN	27.0	781,759	141,011	**18.0**	14.2	**1.6**	16,968	1,465	492	332	20	**2,309**	585	133	65	3	786

* U.S. Census Bureau, Census 2000. **Source: 2005 population estimates, Kidscount.org (census.org)

*** %EBLL is calculated as follows: Number of Children w/EBLL divided by (Number of Children Tested minus Children w/elevated capillary tests, not confirmed by venous) June 2007

Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statewide database.

A Child Should Not Be Used as a Lead Detector

TABLE 9

Children One and Two Years of Age – Lead Poisoning Data Facts
All Michigan Counties and Detroit – 2006

			Children < Age 6, Tested for Lead during 2006				Children with Low-Level Exposure	Children with **CONFIRMED** Elevated Blood Lead Levels					Children with Elevated Capillary Tests **NOT CONFIRMED** by Venous Tests				
County	%Pre-1950 Housing *	Children Age 1 & 2**	Number of Children Tested	% Tested	% with BLL ≥ 5 ug/dL	% EBLL (≥ 10 ug/dL venous only)***	5-9 ug/dL (capillary, venous or unknown)	10-14 ug/dL (venous only)	15-19 ug/dL (venous only)	20-44 ug/dL (venous only)	≥45 ug/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	capillary 10-14 ug/dL	capillary 15-19 ug/dL	capillary 20-44 ug/dL	capillary ≥ 45 ug/dL	Total Elevated Capillary
Alcona	21.0	142	55	**38.7**	9.1	**0.0**	5	0	0	0	0	**0**	0	0	0	0	0
Alger	32.6	144	75	**52.1**	8.0	**0.0**	5	0	0	0	0	**0**	1	0	0	0	1
Allegan	27.4	2,889	790	**27.3**	12.7	**0.1**	83	1	0	0	0	**1**	12	4	0	0	16
Alpena	28.6	552	244	**44.2**	13.9	**0.4**	32	1	0	0	0	**1**	1	0	0	0	1
Antrim	22.6	471	193	**41.0**	8.8	**0.0**	17	0	0	0	0	**0**	0	0	0	0	0
Arenac	20.6	308	142	**46.1**	7.0	**0.0**	10	0	0	0	0	**0**	0	0	0	0	0
Baraga	34.9	170	89	**52.4**	10.1	**0.0**	9	0	0	0	0	**0**	0	0	0	0	0
Barry	29.4	1,384	504	**36.4**	10.7	**0.4**	48	1	1	0	0	**2**	2	2	0	0	4
Bay	37.1	2,426	925	**38.1**	14.7	**1.8**	115	10	2	5	0	**17**	2	2	0	0	4
Benzie	27.3	416	119	**28.6**	10.9	**0.0**	12	0	0	0	0	**0**	1	0	0	0	1
Berrien	32.7	4,334	1,339	**30.9**	18.8	**2.8**	205	20	12	5	0	**37**	7	2	1	0	10
Branch	36.5	1,180	285	**24.2**	19.3	**1.4**	44	1	2	1	0	**4**	7	0	0	0	7
Calhoun	36.4	3,868	1,862	**48.1**	10.0	**0.9**	163	9	3	4	0	**16**	6	2	0	0	8
Cass	30.4	1,052	344	**32.7**	18.0	**0.3**	59	1	0	0	0	**1**	1	0	1	0	2
Charlevoix	25.7	581	185	**31.8**	13.5	**0.5**	21	1	0	0	0	**1**	3	0	0	0	3
Cheboygan	21.7	544	211	**38.8**	7.6	**0.0**	16	0	0	0	0	**0**	0	0	0	0	0
Chippewa	28.4	718	262	**36.5**	5.3	**0.4**	12	0	0	1	0	**1**	0	1	0	0	1
Clare	13.1	638	124	**19.4**	5.6	**0.0**	6	0	0	0	0	**0**	1	0	0	0	1
Clinton	28.7	1,574	339	**21.5**	7.1	**0.0**	24	0	0	0	0	**0**	0	0	0	0	0
Crawford	19.6	272	67	**24.6**	10.4	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Delta	37.7	762	382	**50.1**	9.7	**0.3**	34	1	0	0	0	**1**	1	0	1	0	2
Dickinson	41.6	539	160	**29.7**	4.4	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Eaton	23.4	2,456	769	**31.3**	10.3	**0.3**	73	1	1	0	0	**2**	3	1	0	0	4
Emmet	27.7	768	162	**21.1**	8.0	**0.6**	9	1	0	0	0	**1**	3	0	0	0	3
Genesee	22.8	12,433	4,506	**36.2**	9.5	**0.7**	383	12	11	6	1	**30**	11	4	1	0	16
Gladwin	13.7	516	77	**14.9**	9.1	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Gogebic	54.1	243	119	**49.0**	1.7	**0.0**	2	0	0	0	0	**0**	0	0	0	0	0
Grand Traverse	17.8	1,894	209	**11.0**	5.3	**0.5**	10	1	0	0	0	**1**	0	0	0	0	0
Gratiot	39.8	898	369	**41.1**	9.2	**0.0**	33	0	0	0	0	**0**	1	0	0	0	1
Hillsdale	39.0	1,093	318	**29.1**	9.4	**1.6**	25	3	0	2	0	**5**	0	0	0	0	0
Houghton	54.8	773	351	**45.4**	2.8	**0.0**	9	0	0	0	0	**0**	0	1	0	0	1
Huron	33.5	695	197	**28.3**	10.7	**0.5**	20	0	0	1	0	**1**	0	0	0	0	0
Ingham	25.9	7,341	2,184	**29.8**	10.9	**0.6**	210	4	3	4	1	**12**	12	4	1	0	17
Ionia	37.9	1,587	361	**22.7**	10.2	**1.4**	31	4	1	0	0	**5**	0	1	0	0	1
Iosco	19.8	445	135	**30.3**	15.6	**0.0**	19	0	0	0	0	**0**	1	1	0	0	2
Iron	44.5	181	40	**22.1**	2.5	**0.0**	0	0	0	0	0	**0**	1	0	0	0	1
Isabella	19.2	1,310	197	**15.0**	3.0	**0.5**	5	1	0	0	0	**1**	0	0	0	0	0
Jackson	35.7	4,172	1,347	**32.3**	20.0	**0.8**	241	6	5	0	0	**11**	13	3	1	0	17
Kalamazoo	24.6	6,256	2,019	**32.3**	13.8	**1.3**	230	11	5	8	1	**25**	22	2	0	0	24
Kalkaska	15.2	445	101	**22.7**	12.9	**0.0**	12	0	0	0	0	**0**	1	0	0	0	1
Kent	26.8	18,612	7,491	**40.2**	15.7	**2.1**	977	83	45	27	0	**155**	30	9	5	0	44
Keweenaw	54.9	38	10	**26.3**	0.0	**0.0**	0	0	0	0	0	**0**	0	0	0	0	0
Lake	15.1	235	75	**31.9**	6.7	**0.0**	5	0	0	0	0	**0**	0	0	0	0	0
Lapeer	22.2	2,023	531	**26.2**	6.6	**0.0**	34	0	0	0	0	**0**	1	0	0	0	1
Leelanau	22.0	395	68	**17.2**	4.4	**0.0**	3	0	0	0	0	**0**	0	0	0	0	0
Lenawee	38.6	2,497	650	**26.0**	12.8	**0.9**	72	3	2	0	1	**6**	5	0	0	0	5
Livingston	13.7	3,960	485	**12.2**	4.3	**0.4**	19	1	1	0	0	**2**	0	0	0	0	0
Luce	30.0	115	64	**55.7**	12.5	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Mackinac	28.1	201	101	**50.2**	7.9	**0.0**	7	0	0	0	0	**0**	0	0	1	0	1
Macomb	10.9	20,388	4,034	**19.8**	6.3	**0.3**	240	9	3	1	0	**13**	2	0	0	0	2

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TABLE 9 (con't)
Children One and Two Years of Age – Lead Poisoning Data Facts
All Michigan Counties and Detroit – 2006

			Children < Age 6, Tested for Lead during 2006				Children with Low-Level Exposure	Children with **CONFIRMED** Elevated Blood Lead Levels					Children with Elevated Capillary Tests **NOT CONFIRMED** by Venous Tests				
County	%Pre-1950 Housing *	Children Age 1 & 2**	Number of Children Tested	% Tested	% with BLL ≥ 5 ug/dL	% EBLL (≥ 10 ug/dL venous only)***	5-9 ug/dL (capillary, venous or unknown)	10-14 ug/dL (venous only)	15-19 ug/dL (venous only)	20-44 ug/dL (venous only)	≥45 ug/dL (venous only)	**Total EBLL (≥ 10 µg/dL)**	capillary 10-14 ug/dL	capillary 15-19 ug/dL	capillary 20-44 ug/dL	capillary ≥ 45 ug/dL	Total Elevated Capillary
Manistee	35.9	545	175	**32.1**	12.6	**0.6**	20	1	0	0	0	**1**	1	0	0	0	1
Marquette	32.6	1,220	482	**39.5**	10.2	**0.8**	43	2	1	1	0	**4**	1	0	1	0	2
Mason	31.1	597	138	**23.1**	11.6	**0.0**	16	0	0	0	0	**0**	0	0	0	0	0
Mecosta	22.0	852	322	**37.8**	5.9	**0.0**	18	0	0	0	0	**0**	1	0	0	0	1
Menominee	38.4	501	223	**44.5**	16.6	**0.9**	31	1	0	1	0	**2**	4	0	0	0	4
Midland	16.9	1,898	218	**11.5**	6.9	**1.4**	12	3	0	0	0	**3**	0	0	0	0	0
Missaukee	20.6	322	76	**23.6**	7.9	**0.0**	6	0	0	0	0	**0**	0	0	0	0	0
Monroe	28.3	3,471	913	**26.3**	6.9	**0.3**	59	2	1	0	0	**3**	1	0	0	0	1
Montcalm	28.1	1,631	435	**26.7**	12.0	**0.9**	46	2	0	2	0	**4**	2	0	0	0	2
Montmorency	18.4	180	31	**17.2**	9.7	**0.0**	2	0	0	0	0	**0**	1	0	0	0	1
Muskegon	29.8	4,685	2,271	**48.5**	15.5	**1.7**	286	25	7	6	0	**38**	23	4	0	0	27
Newaygo	22.7	1,216	479	**39.4**	7.5	**0.2**	34	1	0	0	0	**1**	1	0	0	0	1
Oakland	15.9	30,478	5,792	**19.0**	6.6	**0.4**	348	15	5	2	0	**22**	10	4	1	0	15
Oceana	26.8	747	294	**39.4**	8.2	**0.0**	23	0	0	0	0	**0**	1	0	0	0	1
Ogemaw	18.3	405	147	**36.3**	5.4	**0.0**	7	0	0	0	0	**0**	1	0	0	0	1
Ontonagon	43.4	110	53	**48.2**	9.4	**0.0**	5	0	0	0	0	**0**	0	0	0	0	0
Osceola	24.2	606	147	**24.3**	7.5	**0.7**	9	1	0	0	0	**1**	1	0	0	0	1
Oscoda	18.3	171	27	**15.8**	22.2	**0.0**	6	0	0	0	0	**0**	0	0	0	0	0
Otsego	12.6	570	107	**18.8**	6.5	**0.0**	7	0	0	0	0	**0**	0	0	0	0	0
Ottawa	18.0	6,857	1,418	**20.7**	6.9	**0.5**	87	5	0	2	0	**7**	4	0	0	0	4
Presque Isle	27.6	266	69	**25.9**	8.7	**0.0**	6	0	0	0	0	**0**	0	0	0	0	0
Roscommon	16.1	416	76	**18.3**	6.6	**0.0**	5	0	0	0	0	**0**	0	0	0	0	0
Saginaw	29.3	5,263	2,107	**40.0**	14.3	**1.1**	265	14	3	5	0	**22**	12	2	0	0	14
St Clair	29.6	4,174	981	**23.5**	10.6	**0.8**	92	5	3	0	0	**8**	3	1	0	0	4
St Joseph	34.8	1,860	604	**32.5**	13.2	**0.8**	75	4	0	1	0	**5**	0	0	0	0	0
Sanilac	34.7	1,013	440	**43.4**	11.1	**0.9**	43	1	1	2	0	**4**	1	1	0	0	2
Schoolcraft	33.1	133	88	**66.2**	9.1	**0.0**	8	0	0	0	0	**0**	0	0	0	0	0
Shiawassee	35.9	1,642	705	**42.9**	8.4	**0.4**	54	3	0	0	0	**3**	2	0	0	0	2
Tuscola	32.8	1,362	558	**41.0**	10.6	**0.9**	50	4	1	0	0	**5**	3	1	0	0	4
Van Buren	29.4	2,010	701	**34.9**	11.6	**0.4**	75	0	2	1	0	**3**	3	0	0	0	3
Washtenaw	19.3	8,422	1,338	**15.9**	5.1	**0.4**	61	3	2	1	0	**6**	1	0	0	0	1
Wayne ex Det	24.0	30,400	8,391	**27.6**	9.3	**1.1**	637	55	26	14	0	**95**	32	8	5	0	45
Wexford	26.2	762	195	**25.6**	8.2	**0.0**	13	0	0	0	0	**0**	3	0	0	0	3
Detroit, City of	56.0	27,058	14,409	**53.3**	30.9	**4.7**	3,609	416	154	98	7	**675**	109	36	24	1	170
MICHIGAN	27.0	258,777	80,076	**30.9**	14.3	**1.6**	9,676	749	303	200	11	**1,263**	372	96	43	1	512

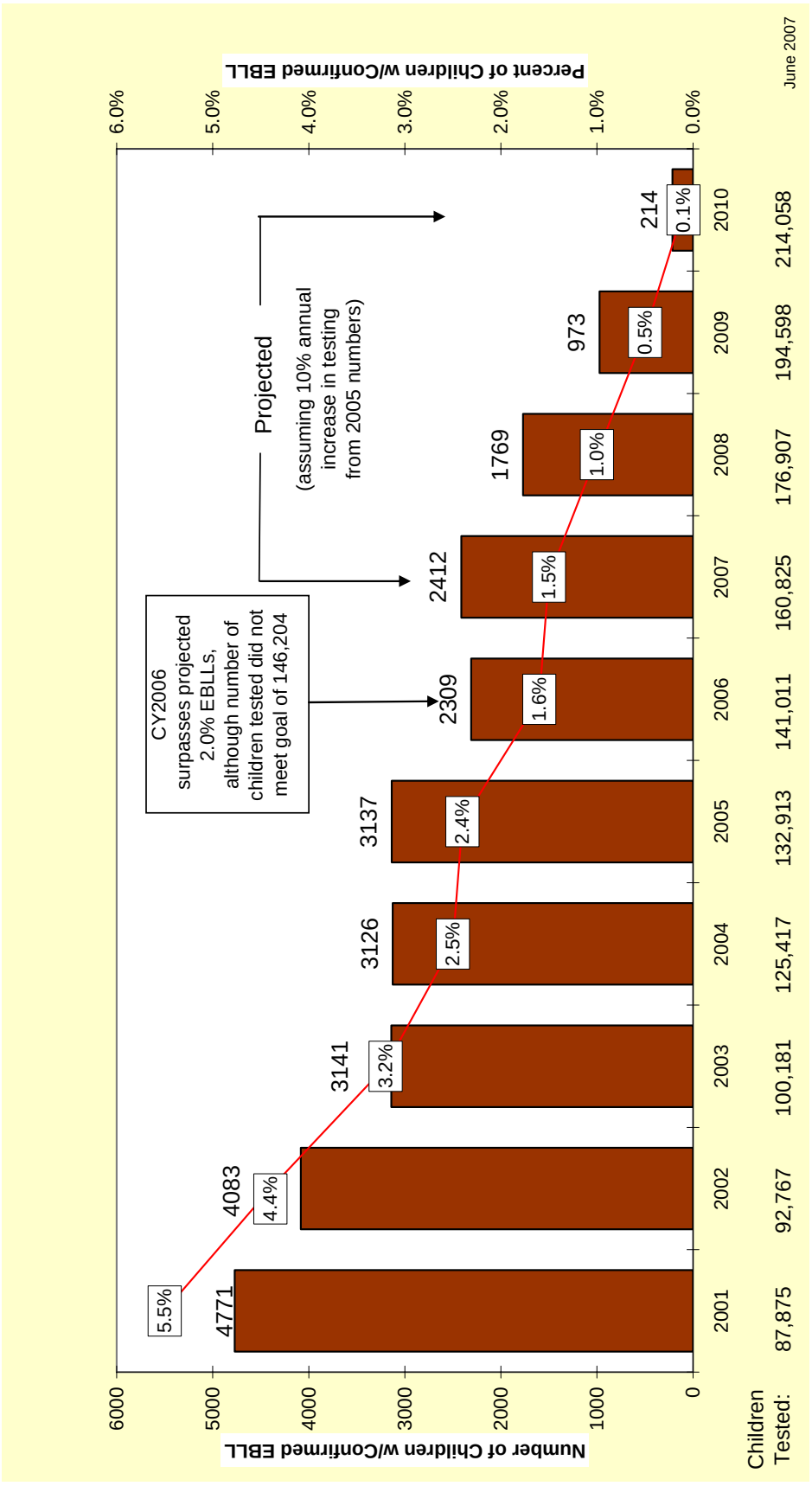
* U.S. Census Bureau, Census 2000. **Source: 2005 population estimates, Kidscount.org (census.org)

*** %EBLL is calculated as follows: Number of Children w/EBLL divided by (Number of Children Tested minus Children w/elevated capillary tests, not confirmed by venous) June 2007

Note: Counts of children tested and blood lead levels are reported from Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program statewide database.

MDCH CLPPP, along with their colleagues in the MSA, closely monitor provider compliance with testing requirements. Beginning in March 2004, enhanced monitoring of testing performance by the Medicaid managed care organizations and fee-for-service providers resulted in a monthly data report to all Medicaid providers depicting testing numbers for the prior month by age of child, by plan, by provider type, i.e., fee-for-service vs. health plan; all reports are also available at www.michigan.gov/leadsafe. When tabulated, results indicate that all providers regularly "miss opportunities" for lead testing when conducting child health visits. (Note: Children who are enrolled in managed care plans are covered with a capitated rate; meaning that the health plan contracts to cover all the health care that the child requires annually for a set per child amount. Fee-for-service health care providers bill for each separate visit, versus a package of services. The rate reimbursed for each is a rate negotiated by Medicaid with the health care provider.

FIGURE 8
Childhood Lead Poisoning in Michigan
Statewide Progress Toward Reaching the 2010 Elimination Goal



The Governor and the Michigan Legislature passed six "lead laws" in 2004, resulting in significant visibility and tools for use by lead poisoning professionals and communities. The progress and outcomes for this legislation includes:

1. **P.A. 54 of 2004**, requiring all laboratories reporting blood lead results to MDCH to report electronically. This was achieved in 2005, thereby expediting and enhancing the completeness and accuracy of test results. By early 2006, virtually 100% of test results were reported electronically.

2. **P.A. 55 of 2004**, requiring providers of health care services to children who are Medicaid-enrolled to have achieved an 80% testing rate by October 1, 2007. Significant testing progress has been made. Medicaid reports that, if all Medicaid-insured children for whom there was evidence of a face-to-face visit was submitted had received a blood lead test at age-appropriate times, Medicaid providers would currently be in compliance with P.A. 55 of 2004 at 85% testing.

   MSA has implemented a number of financial incentives for providers, for provider office staff, for the local health departments, and even for plan participants personally.

3. **P.A. 400 of 2004**, established a commission to study lead poisoning and to review and evaluate the state's lead poisoning prevention programs and

4. **P.A. 431 of 2004**, established membership of the commission. Outcome: The Governor's Childhood Lead Poisoning Prevention and Control Commission The Commission's first annual report, released to the Governor and the public in April 2006, is available in its entirety at www.michigan.gov/leadsafe. The report includes recommendations to the Governor and the public based on study, testimony offered at the hearings and prior published documents. Gaps in service, statute and cooperation by state agencies were identified, and recommendations made, on behalf of the Commission.

5. **P.A. 432 of 2004** requires development and maintenance of a voluntary Lead-Safe Housing Registry for rental properties built before 1978. Outcome: LHHS and the Michigan Department of Information Technology began work on an on-line housing registry as soon as funding to cover its development became available. As 2006 closed, the registry was still not sufficiently complete and ready for public release. Initially, it was populated by homes made leadsafe by LHHS and partner contractors and community action agencies including CLEARCorps Detroit. Review by MDCH legal staff, however, noted that the legislation, as written, limits the registry to rental property. Consequently, the year ended with address-cleaning still to be accomplished before release of the registry to the public. A 2007 release date is anticipated, after the registry is fully compliant with the legislation as passed.

   In addition, the Legislative office and HHS are collaborating on language to amend the public act, so that owner-occupied dwellings and all those made lead-safe using federal and/or local funds must be included in the registry.

6. **P.A. 434 of 2004** identifies violations and penalties for rental property owners who "knowingly rent" housing with lead hazards to families with minor children. To knowingly rent, two things must occur: (1) a child with an elevated blood lead level (≥ 10) is identified as residing in the property and (2) a lead inspector/risk assessor must perform an EBLL investigation and find existing lead hazards in the dwelling. Outcome: By the end of 2006,

only the Wayne County Prosecutor's Office had begun, to pursue the rental property owner of record when a child with an elevated blood lead level was identified in his/her property.

The goal of P.A. 434 is remediation/abatement of a residence so that the affected child, as well as future residents, are no longer exposed to lead hazards. The process depends upon prompt and thorough professional assessment of lead hazards, usually accomplished by the certified lead inspector/risk assessor in the local public health agency, and the personal attention from the prosecutor's office. In Wayne County, the prosecuting attorney has offered a diversion agreement to the rental property owner, stipulating that if the hazards are controlled within 90 days, the case will be dismissed; the individual (or management company) is also provided with financing information, if needed. When the local public health risk assessor clears the address of lead hazards after the appropriate hazard controls occur, criminal charges against the rental property owner are dismissed.

By the end of 2006, **83 properties have been, or are in the process of being, remediated in Wayne County as a direct result of the Landlord Penalty Law**. Frequently, rental property owners have voluntarily made all of their child-occupied properties lead-safe, thereby effecting true primary prevention of lead poisoning.

- A new "lead law" enacted in late 2006 is Public Act 286, introduced by a state senator from Detroit to identify blood lead testing requirements for another group of children: those who receive WIC services. Children eligible for WIC due to nutritional risk factors, as well as income, receive foods to supplement their nutrition and nutrition education up to age five. P.A. 286 addresses case finding for this group of children whose EBLL rate, determined from existing CLPPP data, is twice that of the general population of Michigan children younger than six years of age who have been tested. Approximately 80% of children included in this group are insured by Medicaid and are consequently expected to receive testing for EBLL in their respective "medical homes."

  Families with many challenges to their day-to-day living are less focused on pursuing well-child care after immunizations required during the first year of life are completed, however, so visits for health maintenance and health screening, such as well-child visits, are less likely to occur than visits for WIC, when coupons for supplemental food are distributed. The "prompt" to secure BLLs for children receiving WIC services is an effort to assure that WIC clinic staff encourages and monitors that the testing occurs. More than half of the WIC clinic sites were providing blood lead testing for their clients even before P.A. 286 was enacted.

  A workgroup from WIC and the CLPP Program began investigating potential barriers to testing assurance for WIC staff and attempting to circumvent them. Two large barriers were immediately identified: (1) no funding was appropriated to pay for staff time for specimen collection and the costs associated with analysis of blood lead levels and (2) the Department of Agriculture's prohibition against WIC funds being applied to support this requirement.

  Several guidance letters to WIC providers were developed by the WIC and CLPPP work group described earlier in this report in an effort to support the staff in the local health departments who were tasked with implementing P.A. 286.

2006 CLPPP Accomplishments

- Worked in collaboration with the MDCH Lead Initiative Steering Committee in the ongoing activities specific to the CLPPP in the Lead Initiative Master Work Plan.

- Published and distributed the first ABLES/CLPPP Annual Report to meet the state's annual reporting requirement. This was accomplished in collaboration with colleagues in ABLES. As a condition for ongoing funding, the CDC requires an annual report to all Michigan stakeholders in the childhood lead poisoning elimination plan. The annual report was distributed to all state Department Directors, the Governor and the Lt. Governor, mayors and city council/commission in each of the target communities, and each Michigan legislator.

- Communicated with the family of each adult with lead poisoning who was interviewed by ABLES and determined to have children younger than six years of age who reside in/frequently visit the adult's home through another collaborative effort with ABLES. The goal of CLPPP's contact with the adult is to encourage lead testing of the potentially exposed children. Children become exposed when the worker/hobbyist "takes home" lead dust on his/her person or clothing. Informational literature in the family's native language is included in the mailing.

- Wrote and submitted a competitive grant proposal for funding from the CDC for childhood lead poisoning related activities in the state. This is the last competitive cycle; funding is anticipated to cease after the 2010 elimination date is reached.

- Worked with and through CLPPP's Lead Initiative Coordinators in target communities to:

- Monitor case management services for children in all Michigan counties/communities with BLLs $\geq$ 20 micrograms per deciliter.

- Encouraged and supported local efforts to increase blood lead testing rates, with primary focus on the targeted communities. Encouragement and support included identification of and monitoring local testing goals, offering provider consultation in order to identify and eliminate barriers to testing, identification of target populations as well as specific children in a given community who should be tested, development and printing of community-specific maps of the neighborhoods where old homes exist, and/or where numbers of children have previously been identified with EBLL, so that testing outreach can be provided by the local public health agency.

  - ✓ Provided and encouraged primary prevention activities in all Michigan counties, with special emphasis on the targeted communities; also in Michigan day care facilities, etc.

  - ✓ Observed a modest increase in number of children lead-tested, as reported to our registry. In some areas of the state, providers have implemented the use of alternate collection and/or testing strategies to make testing accessible to the children/families in their practices. Use of a microanalyzer (LeadCare portable analyzer), as well as utilizing special filter paper for collection with atomic furnace for analysis are alternatives that are in practice. Regardless of collection method, all blood lead tests completed on an individual with a Michigan address are still required to be reported to the lead registry.

In 2006, there were 16,931 children tested in Michigan whose blood lead level (5-9 µg/dL) indicated that an exposure to lead had taken place, but the blood lead level was not yet at the CDC's "level of concern." This number identifies that we have an appropriate opportunity for early intervention/primary prevention of childhood lead poisoning on a very large scale. When

both environmental and health information are given to the affected family, exposure can be controlled and/or eliminated before the child's blood lead level reaches the level of concern. (See Fig. 7)

Ongoing research indicates that blood lead levels < 10 µg/dL have a measurable impact on the I.Q. of a child. In addition to the effects on an exposed child's I.Q., lead has the potential to provide a deleterious effect on that child's behavior, distractibility and propensity for aggression. These findings reinforce the assertion that there is **NO** safe blood lead level for children.

In summary, the main focus areas for the Childhood Lead Poisoning Prevention Program and the Lead and Healthy Homes Section at the State of Michigan in 2006 have been:

- Increasing numbers of children tested, at the appropriate ages, and particularly in the "target communities", annually; (See Fig. 5, 6)

- Assuring that comprehensive case management for children with BLLs ≥ 20 µg/dL occurs throughout the state.

- Provided funding for and worked with a team of consultants from National Center for Healthy Housing/Healthy Housing Solutions, to develop a local coalition in Kalamazoo. In the cities of Flint, Hamtramck, and Highland Park, community coalitions varied in their levels and amounts of activity and community engagement. The organization and capacity required by HUD before a community can successfully compete for a funding award was not developed as predicted and desired. The long-term goal with HUD funding is to build local capacity for home repair so that primary prevention of lead poisoning occurs, and children are not poisoned.

- Continuing collaboration with MDCH Department of Information Technology (DIT), the LHHS worked to prepare a Lead-Safe Housing Registry for public release and use.

- Providing an LHHS staff position for a Remediation Ombudsman to consult with individuals and communities attempting to identify funding sources for remediation or interim controls, as appropriate (based on funding availability).

- Providing staff and logistical support for the State Lead Commission. The Commission met two times during the year and prepared and released an Annual Report in March 2006. (See www.michigan.gov/leadsafe>Childhood Lead Poisoning and Control Commission for the full report.)

- Providing a continuing public awareness campaign for parents (comparable to the very effective immunization public awareness campaign) targeted to the most at-risk communities, in print, radio and television using previously developed materials.

- Using Healthy Michigan funding appropriated for lead activities, CLPPP/LHHS provided funding for grant writing consultants to assist the City of Lansing with writing a HUD grant. Competition was successful, resulting in a large award for the city.

- Enhancing capacity in Ingham County, Kalamazoo County and Oakland County for comprehensive case management of children with blood lead levels ≥ 20 micrograms

per deciliter by applying Healthy Michigan funding, matched with federal Medicaid funds, for case management services delivered by staff in those local public health agencies.

- Collaborating with DIT to enhance the Michigan Care Improvement Registry (MCIR) so that child health care providers now receive a prompt to provide blood lead testing to the appropriate children at the appropriate ages, and are able to access their patient's blood lead test results, dates of test(s), and information describing recommended health and environmental follow-up using the guidelines of the CDC. This capacity was requested by the providers since the 2004 introduction of the MCIR "prompt" for testing; it was hampered by restrictive legislation concerning the MCIR, which required change in Michigan Administrative Rules. The financial support for the information technology changes that were required was provided by Michigan Medicaid. In late fall 2006, the enhanced MCIR was "live" for providers/provider offices, and received enthusiastically.

- Providing primary prevention outreach for children younger than six years of age. This occurred for children who were tested and had blood lead levels in the 5-9 micrograms per deciliter range, which is less than the CDC's "level of concern." Primary prevention outreach was provided as well for children at risk who had not been tested. Both of these outreach efforts offered family and community awareness regarding potential sources of exposure and options for prevention and hazard control.

- Investigating the literature as background for development of a position statement from the program regarding lead poisoning and women of childbearing age also began in 2006.

FUTURE PLANS

The lead programs based in the Department of Community Health are strategically focused on the plan to eliminate lead poisoning as a child health threat in Michigan by 2010.

Encouraging trends include: significantly increased numbers of children are tested annually for lead exposure; participation in testing has increased among Medicaid-enrolled health care providers; the percentage of children statewide with an elevated blood lead level has decreased from 9.7% (2001) to 1.6% (2006), or 2,309 children, as depicted in Figure 2. The total number of children with lead poisoning still ranks Michigan sixth in the fifty states for number of affected children. The number of children with blood lead levels ≥ 45 micrograms per deciliter, an emergency level for children, fell from 30 in 2005 to 20 children in 2006 (see Figure 9); the projected numbers of children affected at this level must decline as seen in Figure 9 in order to reach the goal of zero children in this state identified by 2010.

MDCH CLPPP is charged with assuring comprehensive, coordinated, family-centered case management services for all Michigan children with blood lead levels of 20 micrograms per deciliter or greater. In 2006, 352 Michigan children were identified with blood lead levels in this range. This represents a decrease in cases of 165 children from the 2005 number of 517 cases (see Figure 10). The projected goal of zero cases at this level by 2010 will require continued significant decreasing numbers of new cases. Children with blood lead levels at 20 micrograms or greater typically require two years or more of health monitoring and specialized interventions until reaching two blood lead levels less than 10 micrograms per deciliter in a six- month period of time, which is the CDC's protocol for case closure. Michigan cases continue to be heavily concentrated in urban areas, but as can be seen on Figure 11, rural and out-state cases continue to be identified, reflecting the age of housing stock throughout the state. For years

after new case identification ends, the state will be responding to the sequelae of this environmental toxicant.

1. LHHS will release the Lead Safe Housing Registry in 2007 immediately upon completion of final touches by DIT, and CLPPP will be an active partner in communicating its availability and how to use it effectively. It is anticipated that the registry can be used by families and social service and housing support agencies such as local housing authorities and MSHDA to direct and encourage housing selection for both renters and those families pursuing purchase of safe housing.

2. CLPPP will complete developmental work for an on-line professional education series of modules. It is planned that application for continuing medical education (CME) credits for physicians and advanced practiced nurses will be pursued through the University of Michigan. CLPPP will also submit the module content to Michigan Nurses' Association for continuing education units (CEUs) required for nursing license renewal.

3. CLPPP, working with a contractor provided by the CDC, will update the Michigan Case Management Protocol and provide case management training for local public health staff throughout the state. Another work product from this collaboration will be a set of standardized forms available at no charge to users who are managing a child with lead poisoning. The forms will support individualized, comprehensive, family-centered nursing care using the nursing process; they will support and encourage communication and information-sharing for all health care team members throughout the process of identifying the child with lead poisoning, identifying the source of exposure, managing the exposure source and thereby supporting the return of the affected child's blood lead level to less than 10 micrograms per deciliter of blood for a six-month period of time.

4. CLPPP will continue to monitor case management of children throughout all Michigan counties, following up with local health departments, health care providers, housing agencies and families when necessary to assure that all the requirements for child recovery from lead poisoning are in place.

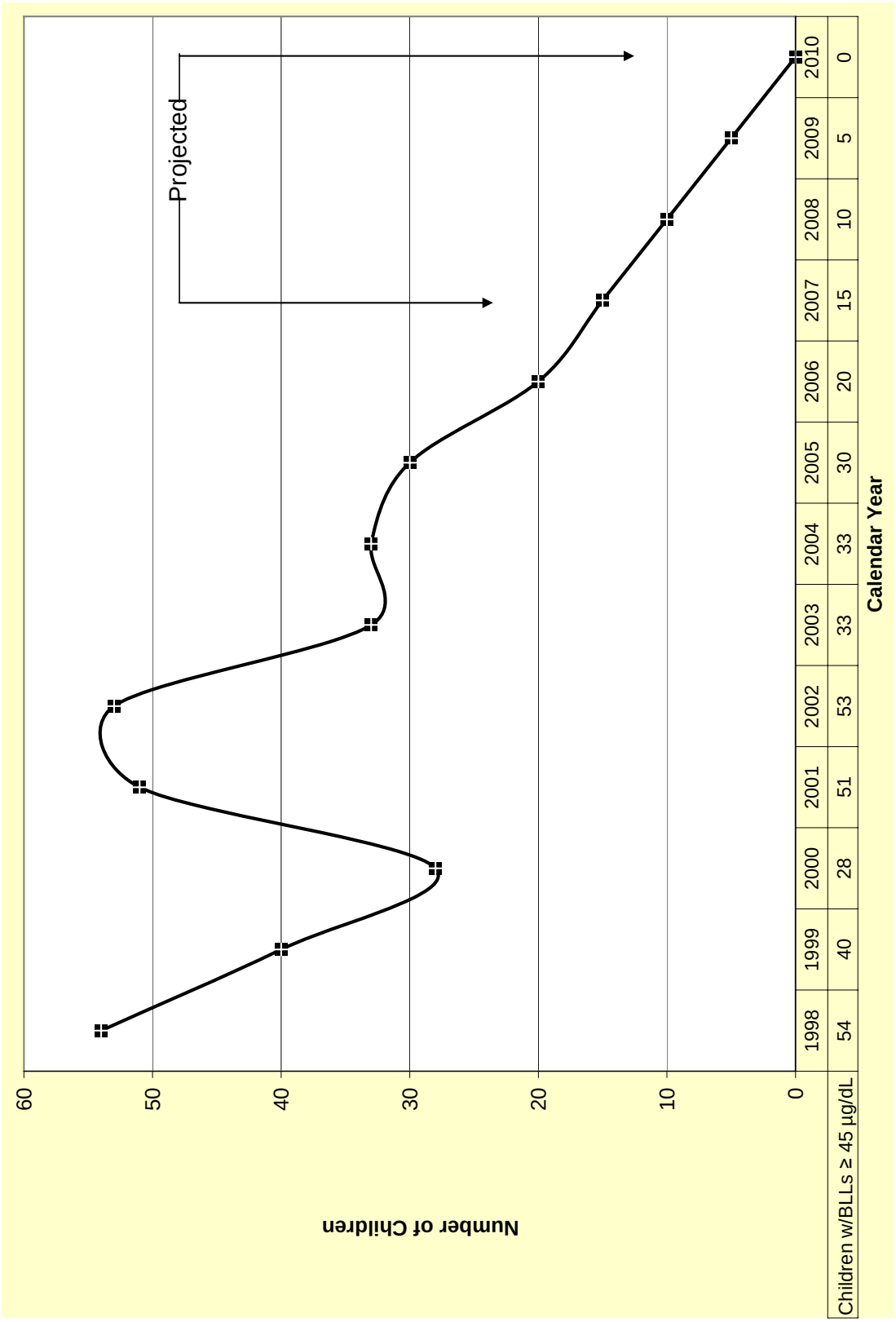
5. In addition, CLPPP will provide training in specimen collection as needed in health departments, WIC sites, provider offices, etc.

6. As always, CLPPP will continue with outreach to a number of groups on a variety of lead poisoning related topics: for teachers and school systems, for early childhood and day care settings and providers, for health care providers and social service agencies, for students in pre-service educational programs such as medical and nursing students.

7. Contingent upon continuation of Healthy Michigan fund allocation for lead activities, CLPPP and LHHS will maintain the housing ombudsman position, offer families more than $300,000 for hazard abatement, fund public health nurses for case management in target community health departments, and support coalition development/growth in target communities.

8. In ongoing collaboration with MSA, the CLPPP will champion compliance with testing requirements for the children who are Medicaid-insured and for all those other children in vulnerable situations in the state.

FIGURE 9
Number of Children in Michigan Identified with Blood Lead Levels ≥ 45 µg/dL



Children w/BLLs ≥ 45 µg/dL	54	40	28	51	53	33	33	30	20	15	10	5	0
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010

FIGURE 10
Number of Children in Michigan Identified with Blood Lead Levels ≥ 20 µg/dL

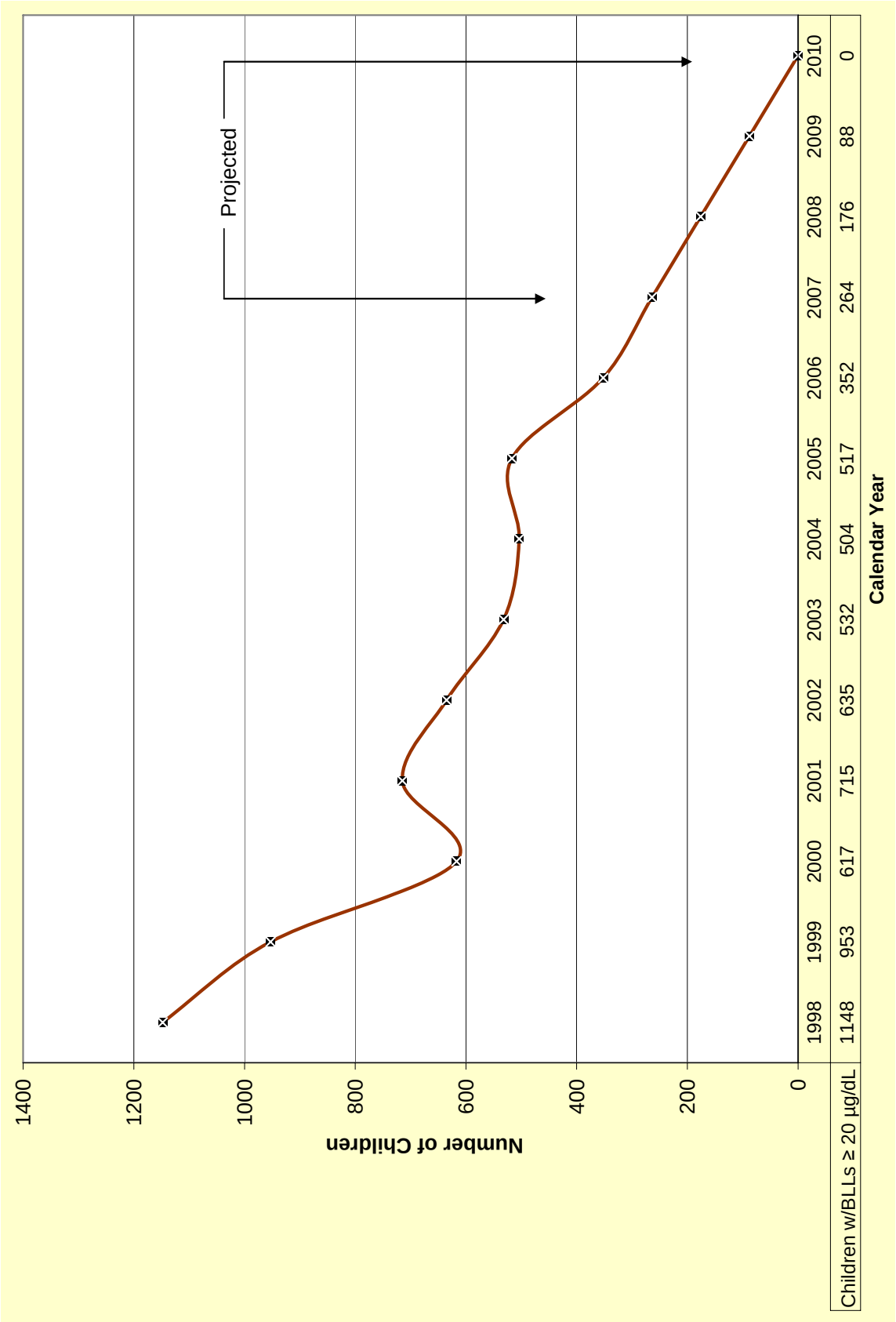
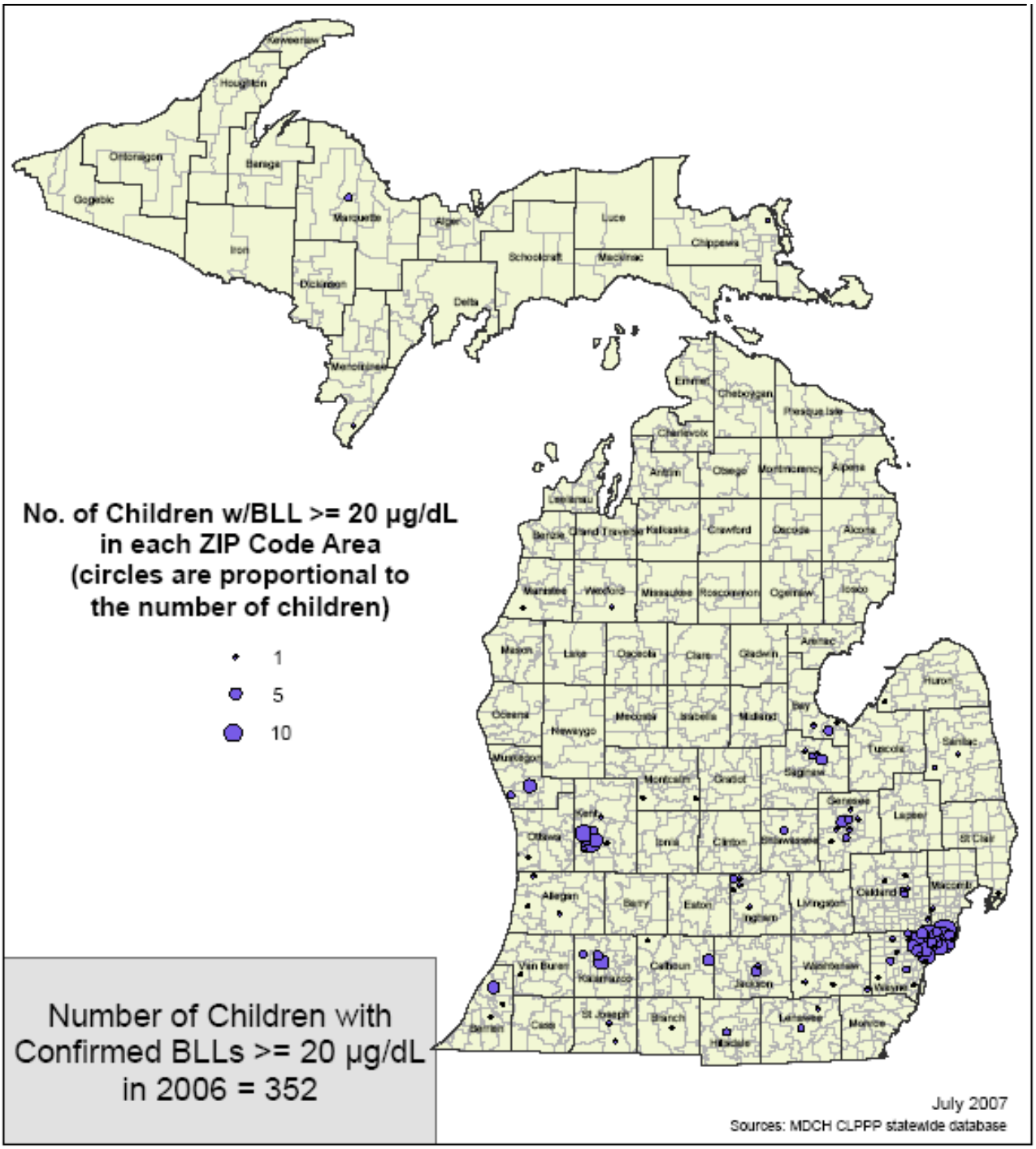


FIGURE 11

Children Less than Six Years of Age with
Confirmed Blood Lead Levels ≥ 20 µg/dL – Case Management Level



2006 CASES OF INTEREST

Interesting cases/sources of childhood lead poisoning in 2006 include the following:

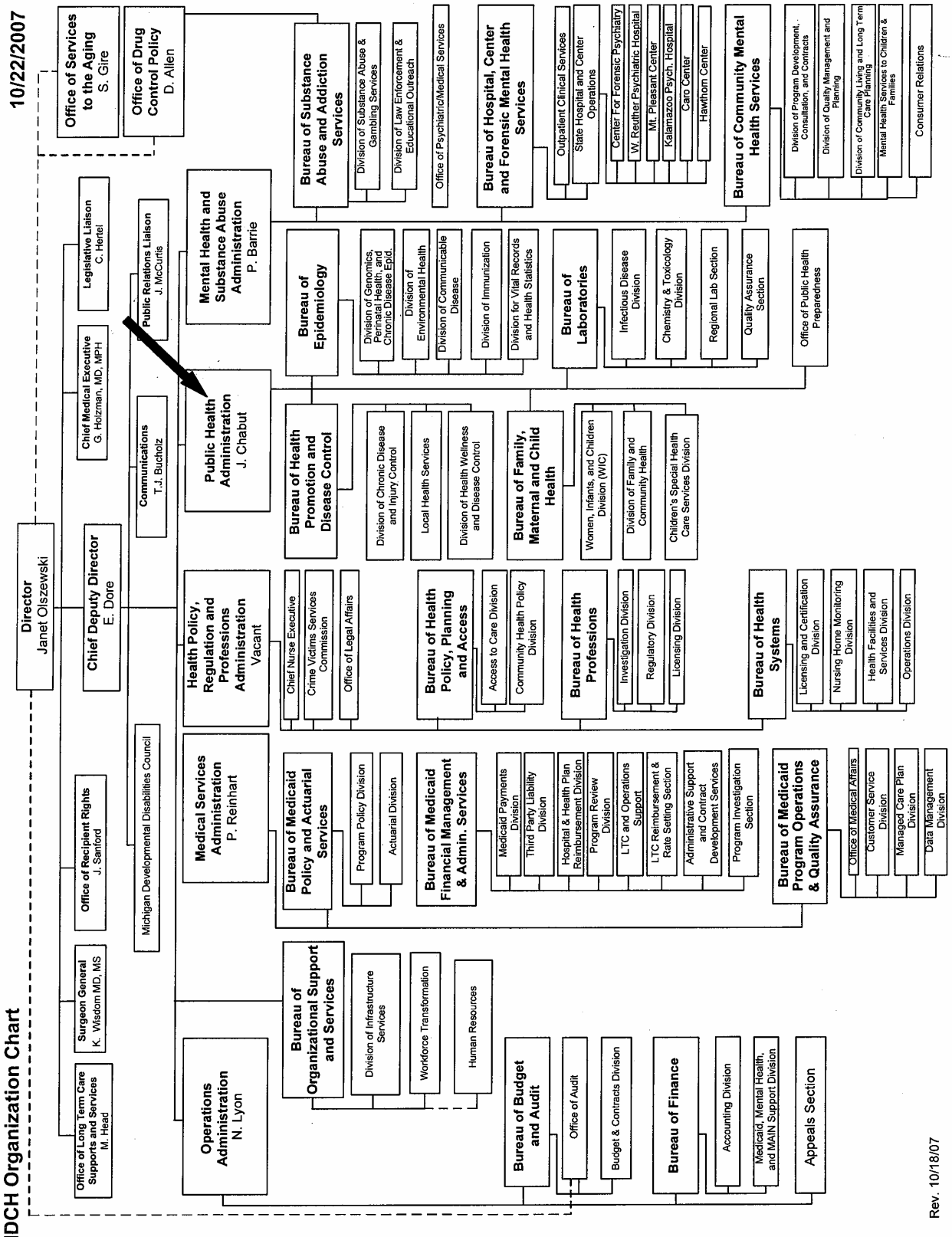
- Twin children living in Washtenaw County had been identified as lead-poisoned while living in Lenawee County, but were lost prior to follow-up when they could no longer be located in that county. They returned to monitoring and related environmental services when they were placed with a foster parent in the new county.

- A four-month-old baby was poisoned in Washtenaw County when his parents began restoration work in the old library that they had purchased for residential use. The baby was hospitalized and treated with chelation therapy at Children's Hospital in Detroit.

- In another renovation-related exposure situation, five children living in the Upper Peninsula were lead-exposed and the youngest one lead-poisoned during the period when the historic home that the family had purchased was under renovation by a professional contractor. The family was inhabiting the home during its renovation. Unfortunately, the family has not pursued follow-up blood lead levels for the children in subsequent months, including re-testing for the one-year-old who was confirmed to have a blood lead level of 20 micrograms per deciliter.

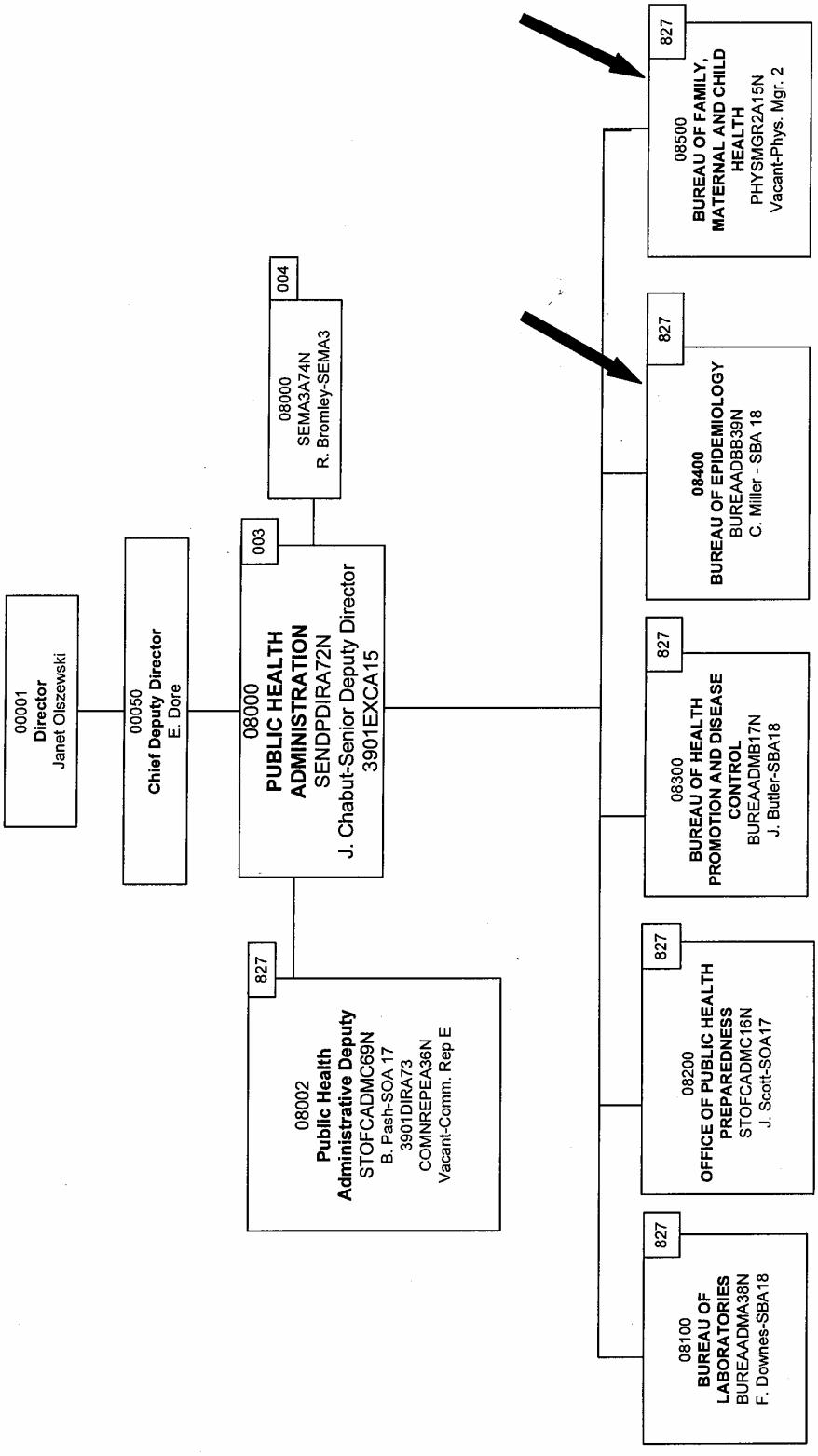
- Twin toddlers were lead-poisoned in Kalamazoo County with the exposure sources being identified as the vintage bath tub, the windows and the front porch in the property that they were renting. An out-patient attempt at chelation was not successful; thereafter, the children were admitted to DeVos Children's Hospital for in-patient chelation therapy.

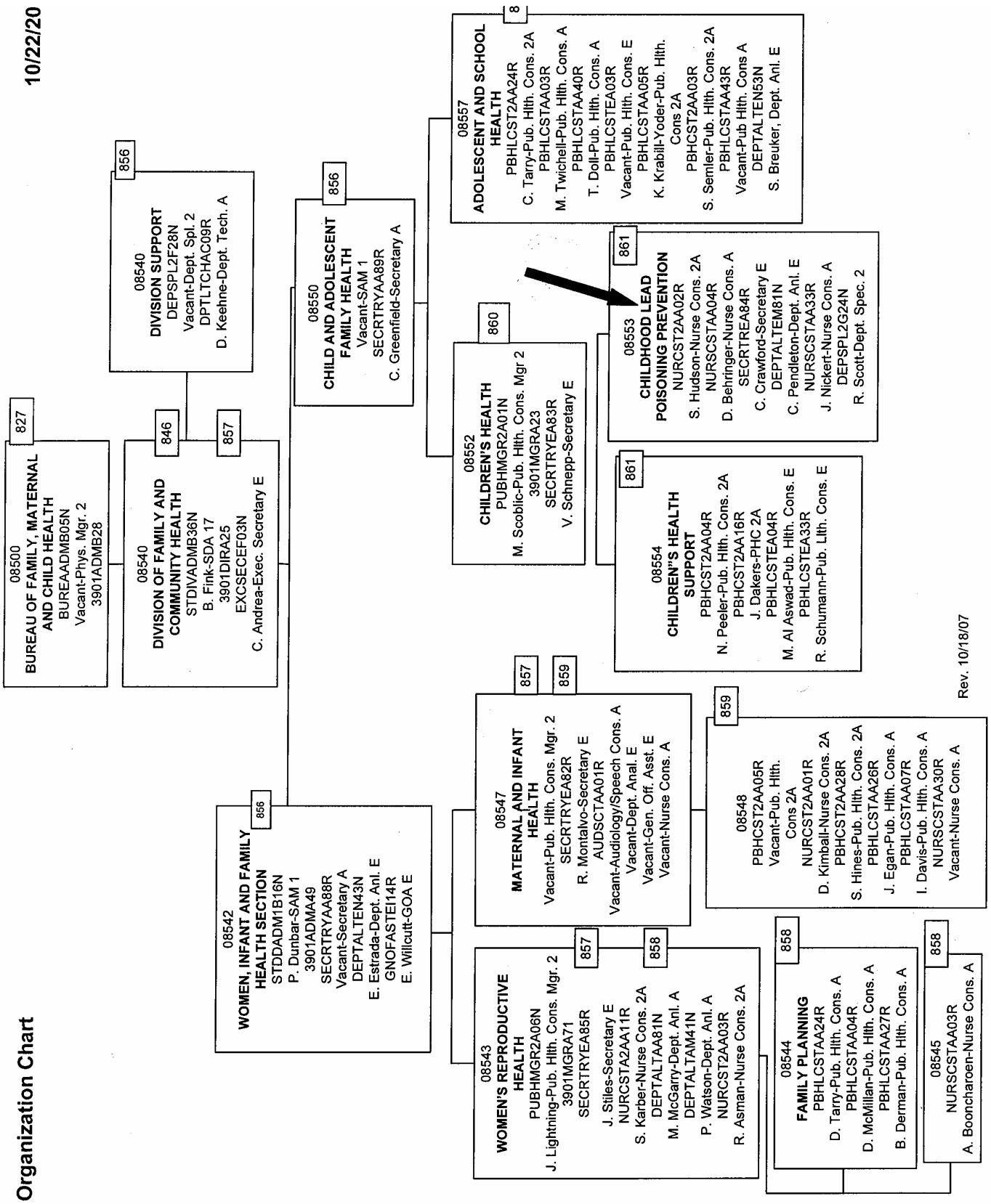
- A child from Detroit who received in-patient chelation therapy eight times in 2005 continues to have venous blood lead levels in the 30-40 micrograms per deciliter range. His peak blood lead levels, beginning in January 2005, were as high as 126 µg/dL. This child provides illustration of the chronicity of lead poisoning and its effects when a child has a significant body burden of lead. CLPPP is following a number of children from various Michigan counties who are in their late second year of monitoring and still have not reached two blood lead levels less than 10 micrograms in a six-month period, which is the CDC's definition for case closure.


MDCH Organization Chart
10/22/2007
Director
Janet Olszewski
Office of Services to the Aging
S. Gire
Office of Drug Control Policy
D. Allen
Chief Deputy Director
E. Dore
Chief Medical Executive
G. Hoizman, MD, MPH
Legislative Liaison
C. Hertel
Public Relations Liaison
J. McCurtis
Communications
T.J. Bucholz
Public Health Administration
J. Chabut
Mental Health and Substance Abuse Administration
P. Barrie
Bureau of Substance Abuse and Addiction Services
Division of Substance Abuse & Gambling Services
Division of Law Enforcement & Educational Outreach
Office of Psychiatric/Medical Services
Bureau of Hospital, Center and Forensic Mental Health Services
Outpatient Clinical Services
State Hospital and Center Operations
Center For Forensic Psychiatry
W. Reuther Psychiatric Hospital
Mt. Pleasant Center
Kalamazoo Psych. Hospital
Caro Center
Hawthorn Center
Bureau of Community Mental Health Services
Division of Program Development, Consultation, and Contracts
Division of Quality Management and Planning
Division of Community Living and Long Term Care Planning
Mental Health Services to Children & Families
Consumer Relations
Bureau of Epidemiology
Division of Genomics, Perinatal Health, and Chronic Disease Epid.
Division of Environmental Health
Division of Communicable Disease
Division of Immunization
Division for Vital Records and Health Statistics
Bureau of Laboratories
Infectious Disease Division
Chemistry & Toxicology Division
Regional Lab Section
Quality Assurance Section
Office of Public Health Preparedness
Bureau of Health Promotion and Disease Control
Division of Chronic Disease and Injury Control
Local Health Services
Division of Health Wellness and Disease Control
Bureau of Family, Maternal and Child Health
Women, Infants, and Children Division (WIC)
Division of Family and Community Health
Children's Special Health Care Services Division
Health Policy, Regulation and Professions Administration
Vacant
Chief Nurse Executive
Crime Victims Services Commission
Office of Legal Affairs
Bureau of Health Policy, Planning and Access
Access to Care Division
Community Health Policy Division
Bureau of Health Professions
Investigation Division
Regulatory Division
Licensing Division
Bureau of Health Systems
Licensing and Certification Division
Nursing Home Monitoring Division
Health Facilities and Services Division
Operations Division
Medical Services Administration
P. Reinhart
Bureau of Medicaid Policy and Actuarial Services
Program Policy Division
Actuarial Division
Bureau of Medicaid Financial Management & Admin. Services
Medicaid Payments Division
Third Party Liability Division
Hospital & Health Plan Reimbursement Division
Program Review Division
LTC and Operations Support
LTC Reimbursement & Rate Setting Section
Administrative Support and Contract Development Services
Program Investigation Section
Bureau of Medicaid Program Operations & Quality Assurance
Office of Medical Affairs
Customer Service Division
Managed Care Plan Division
Data Management Division
Michigan Developmental Disabilities Council
Office of Recipient Rights
J. Sanford
Surgeon General
K. Wisdom MD, MS
Office of Long Term Care Supports and Services
M. Head
Operations Administration
N. Lyon
Bureau of Organizational Support and Services
Division of Infrastructure Services
Workforce Transformation
Human Resources
Bureau of Budget and Audit
Office of Audit
Budget & Contracts Division
Bureau of Finance
Accounting Division
Medicaid, Mental Health, and MAIN Support Division
Appeals Section
Rev. 10/18/07

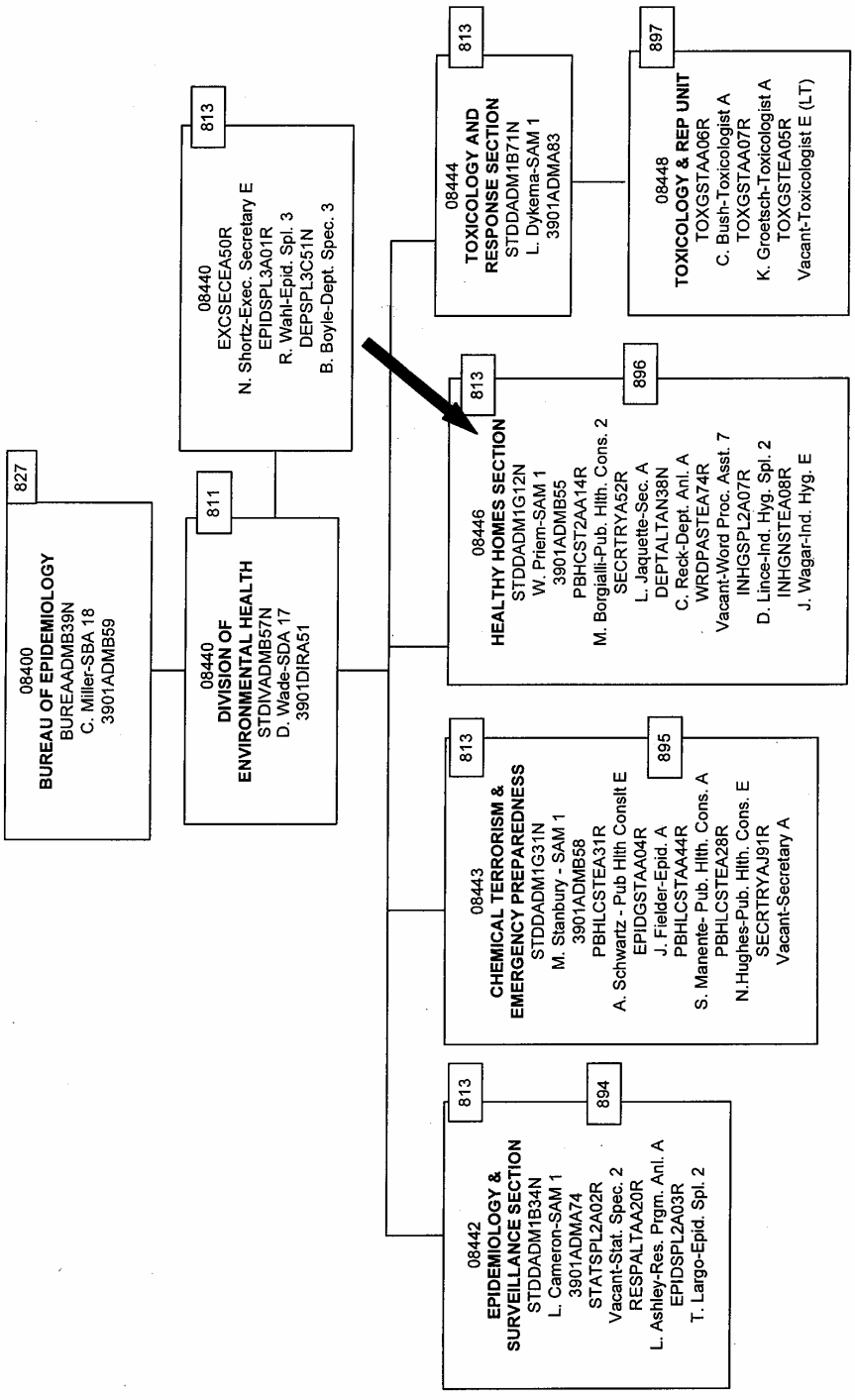
MDCH Organization Chart

10/22/2007




MDCH Organization Chart
10/22/20
08500
BUREAU OF FAMILY, MATERNAL AND CHILD HEALTH
BUREAADMB05N
Vacant-Phys. Mgr. 2
3901ADMB28
827
08540
DIVISION OF FAMILY AND COMMUNITY HEALTH
STDIVADMB36N
B. Fink-SDA 17
3901DIRA25
EXCSECEF03N
C. Andrea-Exec. Secretary E
846
857
08540
DIVISION SUPPORT
DEPSPL2F28N
Vacant-Dept. Spl. 2
DPTLTCHAC09R
D. Keehne-Dept. Tech. A
856
08550
CHILD AND ADOLESCENT FAMILY HEALTH
Vacant-SAM 1
SECRTRYAA89R
C. Greenfield-Secretary A
856
08557
ADOLESCENT AND SCHOOL HEALTH
PBHLCST2AA24R
C. Tarry-Pub. Hlth. Cons. 2A
PBHLCSTAA03R
M. Twichell-Pub. Hlth. Cons. A
PBHLCSTAA40R
T. Doll-Pub. Hlth. Cons. A
PBHLCSTEA03R
Vacant-Pub. Hlth. Cons. E
PBHLCSTAA05R
K. Krabill-Yoder-Pub. Hlth. Cons 2A
PBHCST2AA03R
S. Semler-Pub. Hlth. Cons. 2A
PBHLCSTAA43R
Vacant-Pub Hlth. Cons A
DEPTALTEN53N
S. Breuker, Dept. Anl. E
8
08552
CHILDREN'S HEALTH
PUBHMGR2A01N
M. Scoblic-Pub. Hlth. Cons. Mgr 2
3901MGRA23
SECRTRYEA83R
V. Schnepp-Secretary E
860
08553
CHILDHOOD LEAD POISONING PREVENTION
NURCST2AA02R
S. Hudson-Nurse Cons. 2A
NURSCSTAA04R
D. Behringer-Nurse Cons. A
SECRTREA84R
C. Crawford-Secretary E
DEPTALTEM81N
C. Pendleton-Dept. Anl. E
NURSCSTAA33R
J. Nickert-Nurse Cons. A
DEPSPL2G24N
R. Scott-Dept. Spec. 2
861
08554
CHILDREN"S HEALTH SUPPORT
PBHCST2AA04R
N. Peeler-Pub. Hlth. Cons. 2A
PBHCST2AA16R
J. Dakers-PHC 2A
PBHLCSTEA04R
M. Al Aswad-Pub. Hlth. Cons. E
PBHLCSTEA33R
R. Schumann-Pub. Lth. Cons. E
861
08542
WOMEN, INFANT AND FAMILY HEALTH SECTION
STDDADM1B16N
P. Dunbar-SAM 1
3901ADMA49
SECRTRYAA88R
Vacant-Secretary A
DEPTALTEN43N
E. Estrada-Dept. Anl. E
GNOFASTEI14R
E. Willcutt-GOA E
856
08547
MATERNAL AND INFANT HEALTH
Vacant-Pub. Hlth. Cons. Mgr. 2
SECRTRYEA82R
R. Montalvo-Secretary E
AUDSCTAA01R
Vacant-Audiology/Speech Cons. A
Vacant-Dept. Anal. E
Vacant-Gen. Off. Asst. E
Vacant-Nurse Cons. A
857
859
08548
PBHCST2AA05R
Vacant-Pub. Hlth. Cons 2A
NURCST2AA01R
D. Kimball-Nurse Cons. 2A
PBHCST2AA28R
S. Hines-Pub. Hlth. Cons. 2A
PBHLCSTAA26R
J. Egan-Pub. Hlth. Cons. A
PBHLCSTAA07R
I. Davis-Pub. Hlth. Cons. A
NURSCSTAA30R
Vacant-Nurse Cons. A
859
08543
WOMEN'S REPRODUCTIVE HEALTH
PUBHMGR2A06N
J. Lightning-Pub. Hlth. Cons. Mgr. 2
3901MGRA71
SECRTRYEA85R
J. Stiles-Secretary E
NURCSTA2AA11R
S. Karber-Nurse Cons. 2A
DEPTALTAA81N
M. McGarry-Dept. Anl. A
DEPTALTAM41N
P. Watson-Dept. Anl. A
NURCST2AA03R
R. Asman-Nurse Cons. 2A
857
858
08544
FAMILY PLANNING
PBHLCSTAA24R
D. Tarry-Pub. Hlth. Cons. A
PBHLCSTAA04R
D. McMillan-Pub. Hlth. Cons. A
PBHLCSTAA27R
B. Derman-Pub. Hlth. Cons. A
858
08545
NURSCSTAA03R
A. Booncharoen-Nurse Cons. A
858
Rev. 10/18/07

MDCH Organization Chart



DEPARTMENT OF COMMUNITY HEALTH

BUREAU OF COMMUNITY LIVING, CHILDREN AND FAMILIES

BLOOD LEAD ANALYSIS REPORTING

(By authority conferred on the department of community health by 1978 PA 368, MCL 333.5111, 333.5474(1)(c), and 333.20531, 1978 PA 312, MCL 325.78, and Executive Reorganization Order No. 1996-1, MCL 330.3101)

R 325.9081 Definitions.

Rule 1. (1) As used in these rules:

(a) "Blood lead analysis report form" means the form used to report the required reportable information for blood that has been analyzed for lead.

(b) "Agency" means the community public health agency.

(c) "Physician/provider" means a licensed professional who provides health care services and who is authorized to request the analysis of blood specimens. For this purpose, provider may also mean the local health department.

(2) The term "local health department," as defined in Act No. 368 of the Public Acts of 1978, as amended, being §333.1101 et seq. of the Michigan Compiled Laws, has the same meaning when used in these rules.

History: 1997 MR 9, Eff. Sep. 30, 1997

R 325.9082 Reportable information.

Rule 2. (1) Reportable information is specifically related to blood samples submitted to clinical laboratories for lead analysis.

(2) Upon initiating a request for blood lead analysis, the physician/provider ordering the blood lead analysis shall complete the client information (section I) and the physician/provider information (section II) of a blood lead analysis report form designated by the agency or shall complete another similar form that ensures the inclusion of the same required data and shall provide all of the following information:

(a) All of the following information with respect to the individual tested:

(i) Name.

(ii) Sex

(iii) Racial/ethnic group.

(iv) Birthdate.

(v) Address, including county.

(vi) Telephone number.

(vii) Social security number and medicaid number, if applicable.

(viii) If the individual is a minor, the name of a parent or guardian and social security number of the parent or guardian.

(ix) If the individual is an adult, the name of his or her employer.

(b) The date of the sample collection.

(c) The type of sample (capillary or venous).

(3) The blood lead analysis report form or a document with the same data shall be submitted with the sample for analysis to a clinical laboratory that performs blood lead analysis.

(4) Upon receipt of the blood sample for lead analysis, the clinical laboratory shall complete the laboratory information (section III) and provide all of the information required and/or submitted by the

physician/provider and the following:
(a) The name, address, and phone number of the laboratory.
(b) The date of analysis.
(c) The results of the blood lead analysis in micrograms of lead per deciliter of whole blood rounded to the nearest whole number.

History: 1997 MR 9, Eff. Sep. 30, 1997.

R 325.9083 Reporting responsibilities.
Rule 3. (1) All clinical laboratories doing business in this state that analyze blood samples for lead shall report all blood lead results, rounded to the nearest whole number, for adults and children to the Community Public Health Agency, Childhood Lead Poisoning Prevention Program (CPHA/CLPPP), 3423 N.M.L. King Jr. Blvd., Lansing, MI 48909. reports shall be made within 5 working days after test completion.
(2) Nothing in this rule shall be construed to relieve a laboratory from reporting results of a blood lead analysis to the physician or other health care provider who ordered the test or to any other entity as required by state, federal, or local statutes or regulations or in accordance with accepted standard of practice, except that reporting in compliance with this rule satisfies the blood lead reporting requirements of Act No. 368 of the Public Acts of 1978, as amended, being §333.1101 et seq. of the Michigan Compiled Laws.

History: 1997 MR 9, Eff. Sep. 30, 1997.

R 325.9084 Electronic communications.
Rule 4. (1) A clinical laboratory shall submit the data required in R 325.9083 electronically to the agency.
(2) For electronic reporting, upon mutual agreement between the reporting laboratory and the agency, the reporting shall utilize the data format specifications provided by the agency.

History: 1997 MR 9, Eff. Sep. 30, 1997; 2006 MR 4, Eff. Feb. 22, 2006.

R 325.9085 Quality assurance.
Rule 5. For purposes of assuring the quality of submitted data, each reporting entity shall allow the agency to inspect copies of the medical records that will be submitted by the reporting entity to verify the accuracy of the submitted data. Only the portion of the medical record that pertains to the blood lead testing shall be submitted. The copies of the medical records shall not be recopied by the agency and shall be kept in a locked file cabinet when not being used. After verification of submitted data, the agency shall promptly destroy the copies of the medical records.

History: 1997 MR 9, Eff. Sep. 30, 1997.

R 325.9086 Confidentiality of reports.
Rule 6. (1) Except as provided in subrule (2) of this rule, the agency shall maintain the confidentiality of all reports of blood lead tests

submitted to the agency and shall not release reports or information that may be used to directly link the information to a particular individual.

(2) The agency may release reports or information, otherwise protected under subrule (1) of this rule under 1 of the following conditions:

(a) If the agency has received written consent from the individual, or from the individual's parent or legal guardian, requesting the release of information.

(b) If necessary for law enforcement investigation or prosecution of a property manager, housing commission, or owner of a rental unit under 2004 PA 434, MCL 333.5475a.

(c) If the director of the department determines that release is crucial to protect the public health against imminent threat or danger.

(3) Medical and epidemiological information that is released to a legislative body shall not contain information that identifies a specific individual. Aggregate epidemiological information concerning the public health that is released to the public for informational purposes only shall not contain information that identifies a specific individual.

History: 1997 MR 9, Eff. Sep. 30, 1997; 2006 MR 4, Eff. Feb. 22, 2006.

R 325.9087 Blood lead analysis report form.

Rule 7. The blood lead analysis report form reads as follows:

MICHIGAN DEPARTMENT OF COMMUNITY HEALTH
BLOOD LEAD ANALYSIS REPORT
DATA/INFORMATION REQUIRED BY ADMINISTRATIVE RULES R 325.9082 and R 325.9083

I. CLIENT INFORMATION

_____ _____ ___ _____
Last Name First Name M.I. Birth Date

_____ _____ _____ _____ _____
Mailing Address City State Zip Code County

_____ _____
Area Code and Phone Number Client's Social Security Number

_____ _____
If Client is an adult, list Employer If an adult, list Occupation

_____
Medicaid Number

Sex
- Male
- Female

Race Ethnic Group
- White
- Black
- Hispanic
- Native American
- Middle Eastern
- Asian/Pacific

Sample Collection Date _____

Type of Sample
• Capillary • Venous

_____ _____
Parent/Guardian Name Parent/Guardian SS Number

II.PHYSICIAN/PROVIDER INFORMATION

Mail Report to:

Physician/Provider

_____ _____ _____ _____
Mailing Address City State Zip Code

_____
Area Code and Phone Number

III.LABORATORY INFORMATION

Completion required by testing laboratory

_____ _____
Laboratory Name Area Code and Phone Number

_____ _____ _____ _____
Mailing Address City State Zip Code

_____ _____
Specimen Number Date of Analysis

BLOOD LEAD LEVEL_____MICROGRAMS PER DECILITER

MDCH - Childhood Lead Poisoning Prevention Program,
3423 N. M.L.King, Jr. Blvd.,
Lansing, MI 48909
517) 335-8885 Fax Number (517) 335-8509

APPENDIX C
Medicaid Blood Lead Testing Monthly Report

Medical Services Administration
Bureau of Medicaid Program Operations & Quality Assurance

MEDICAID BLOOD LEAD TESTING

Michigan Department of Community Health

MDCH

DECEMBER 2006

Produced by Data Analysis & Quality Assurance Section
John Spitzley, Manager

APPENDIX C

Medicaid Blood Lead Testing Monthly Report

Blood Lead Testing Methodology

- Children must have been eligible for one of the following programs in December 2006
  - Medicaid Managed Care (MC)
    - enrolled in a Medicaid Health Plan (MHP)
  - Medicaid Fee-for-Service (FFS)
    - eligible for Medicaid Only FFS coverage
  - Medicaid and CSHCS Dual Eligible (Duals)
    - dually eligible for both Medicaid and CSHCS
- Blood lead testing results include children tested:
  - on or before indicated birthday for 2 and 3 year olds
  - at any time between ages 1 to 6
- Unique Client Identifier (UCI) used to establish link between Medicaid and lead databases.

Questions should be directed to Lori Tarpoff at (517) 241-0258, or tarpoffl@michigan.gov

December 2006 1

APPENDIX C

Medicaid Blood Lead Testing Monthly Report

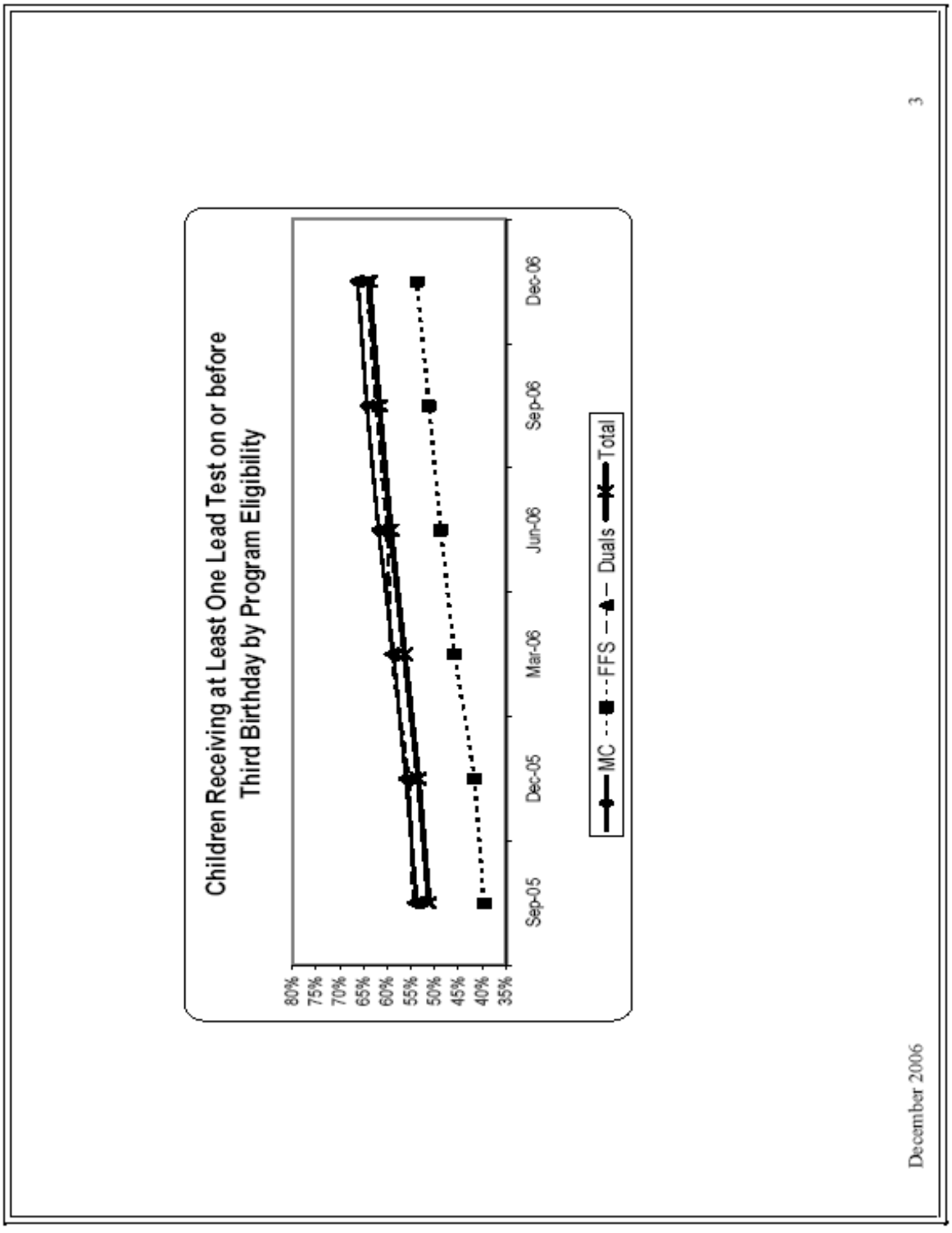
Blood Lead Testing Summary

- 2 year old children tested on or before their 2nd birthday
  - 58% Statewide
  - 66% City of Detroit
  - 60% Statewide for Medicaid MC
  - 48% Statewide for Medicaid Only FFS Eligibles
  - 60% Statewide for CSHCS Duals

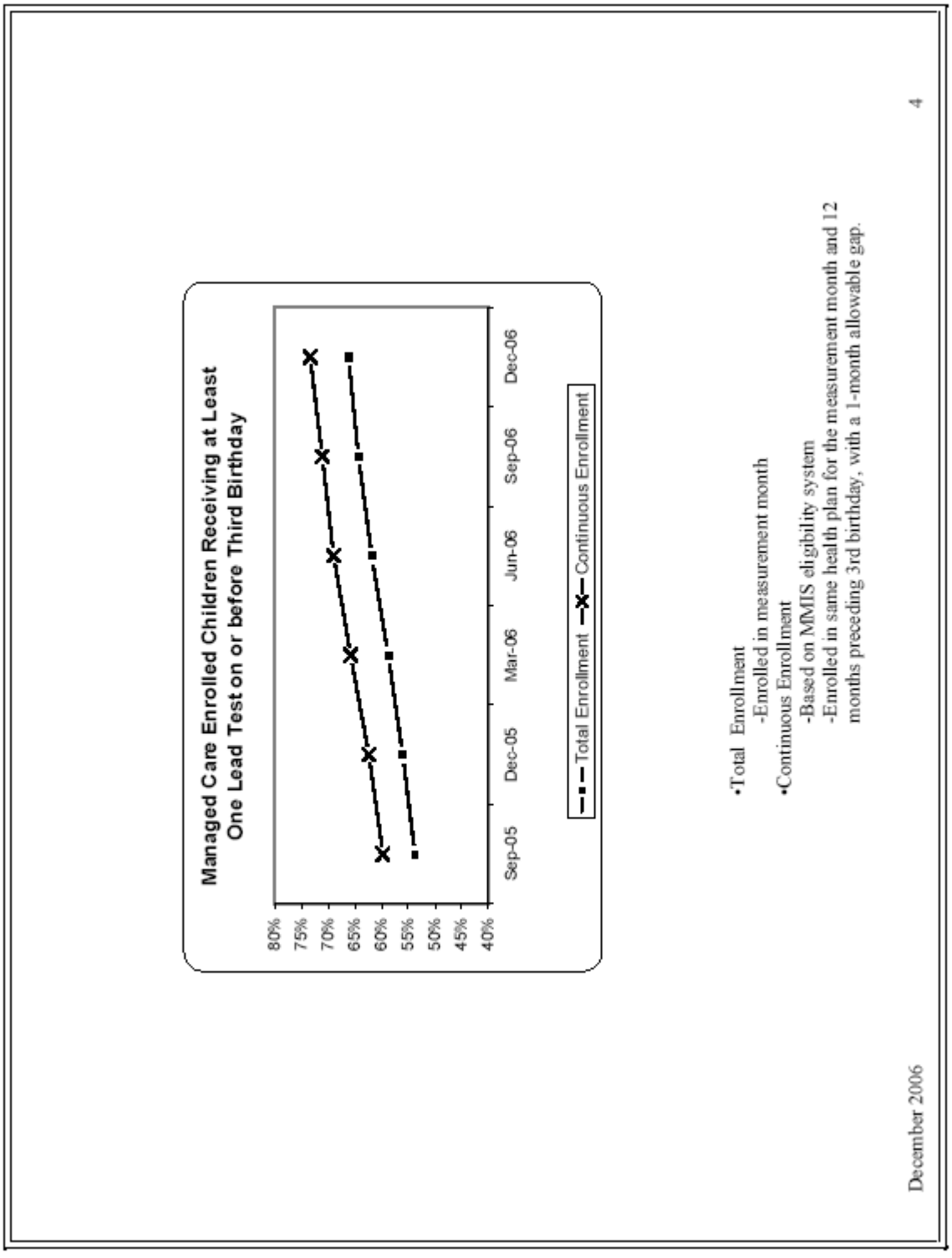
- 3 year old children tested on or before their 3rd birthday
  - 64% Statewide
  - 77% City of Detroit
  - 66% Statewide for Medicaid MC
    - 73% Statewide for Medicaid MC with 12-Month Continuous Enrollment
  - 54% Statewide for Medicaid Only FFS Eligibles
  - 64% Statewide for CSHCS Duals

December 2006 2

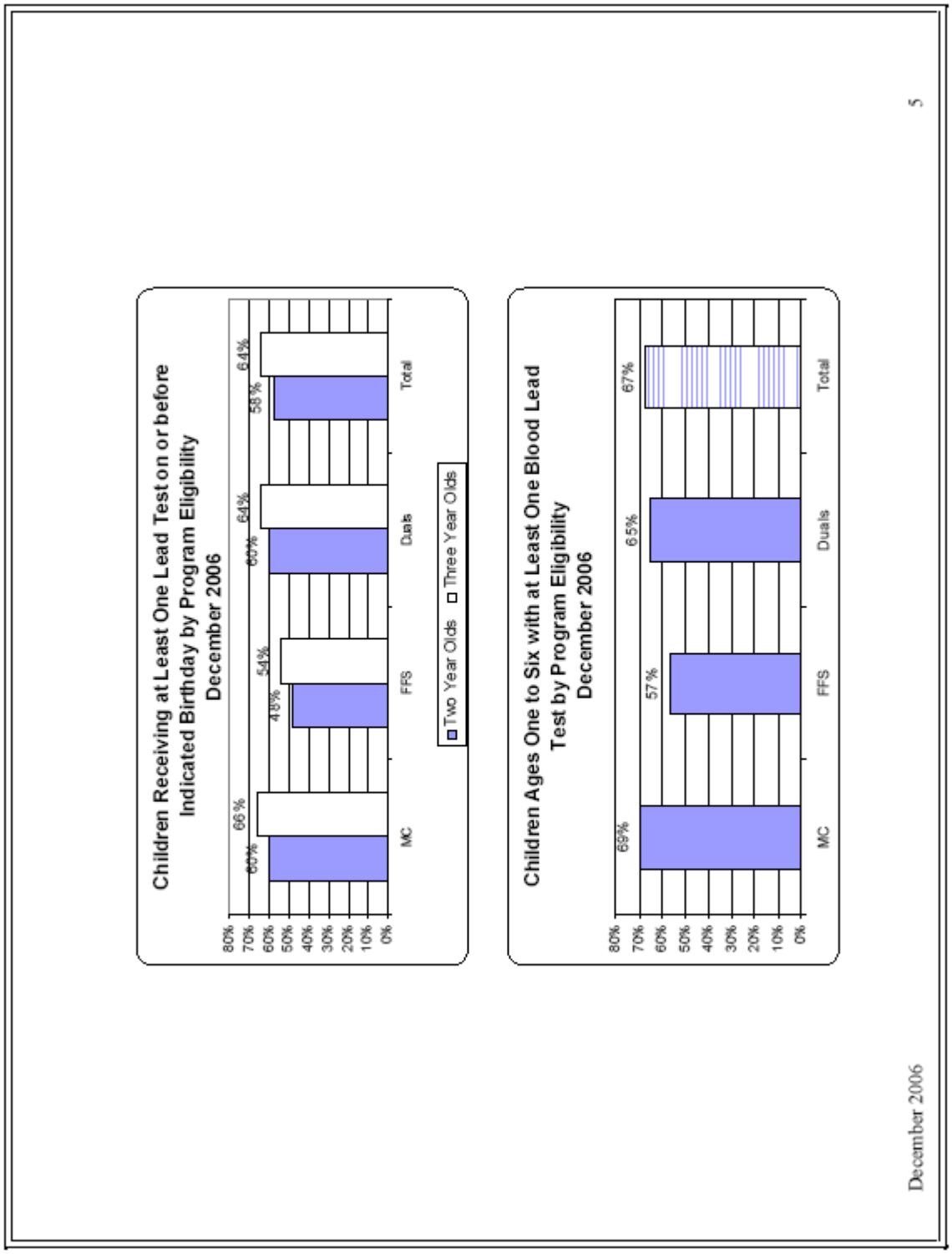
APPENDIX C
Medicaid Blood Lead Testing Monthly Report



APPENDIX C
Medicaid Blood Lead Testing Monthly Report



APPENDIX C
Medicaid Blood Lead Testing Monthly Report



APPENDIX C

Medicaid Blood Lead Testing Monthly Report

Table 1. Percent of Children with at Least One Blood Lead Test on or Before their Second Birthday

Program	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
MC	51.8%	52.6%	53.3%	54.0%	54.8%	55.5%	56.0%	56.4%	57.2%	58.0%	58.5%	59.4%	60.0%
FFS	40.2%	41.5%	43.0%	43.2%	44.3%	44.6%	45.4%	45.3%	45.8%	46.4%	46.5%	47.6%	48.4%
Duals	52.1%	52.3%	52.5%	54.4%	54.2%	56.1%	55.6%	56.7%	57.8%	59.1%	59.1%	59.5%	59.8%
Total	**49.7%**	**50.6%**	**51.4%**	**52.0%**	**52.8%**	**53.5%**	**53.9%**	**54.4%**	**55.1%**	**55.8%**	**56.3%**	**57.2%**	**57.9%**

Table 2. Percent of Children with at Least One Blood Lead Test on or Before their Third Birthday

Program	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
MC	56.1%	56.7%	57.7%	58.7%	59.7%	60.9%	61.8%	62.5%	63.4%	64.3%	65.1%	65.7%	66.2%
FFS	41.6%	43.3%	44.2%	45.8%	46.2%	46.6%	48.7%	49.6%	50.0%	51.2%	52.0%	53.0%	53.8%
Duals	55.5%	56.0%	57.1%	59.2%	60.5%	59.6%	60.0%	61.2%	60.7%	62.3%	63.6%	64.1%	64.3%
Total	**53.4%**	**54.2%**	**55.2%**	**56.3%**	**57.2%**	**58.2%**	**59.3%**	**60.1%**	**60.8%**	**61.7%**	**62.5%**	**63.2%**	**63.9%**

Table 3. Percent of Children Ages One to Six with at Least One Blood Lead Test

Program	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-06	Aug-06	Sep-06	Oct-06	Nov-06	Dec-06
MC	62.9%	63.7%	64.1%	64.1%	64.9%	65.1%	65.5%	65.9%	66.3%	67.4%	68.0%	68.5%	69.1%
FFS	47.9%	49.2%	50.1%	50.9%	51.7%	51.8%	52.6%	52.8%	53.3%	54.1%	55.0%	56.2%	56.8%
Duals	59.0%	59.9%	59.6%	59.8%	61.2%	61.6%	62.3%	62.5%	62.7%	63.9%	64.3%	65.0%	65.4%
Total	**60.1%**	**60.9%**	**61.3%**	**61.6%**	**62.4%**	**62.6%**	**63.0%**	**63.4%**	**63.8%**	**64.7%**	**65.5%**	**66.2%**	**66.8%**

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Table 4. Statewide Blood Lead Testing of Two and Three Year Old Children for All Programs

December 2006

County	2 Years of Age			3 Years of Age		
	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Alcona	47	23	49%	39	26	67%
Alger	40	30	75%	27	24	89%
Allegan	564	329	58%	516	313	61%
Alpena	195	97	63%	144	104	72%
Antrim	129	78	60%	126	67	52%
Arenac	104	52	50%	78	38	49%
Baraga	52	32	62%	35	20	57%
Barry	255	172	67%	267	206	77%
Bay	597	369	62%	515	348	68%
Benzie	76	42	55%	102	56	55%
Berrien	1,016	628	62%	967	647	67%
Branch	271	104	38%	267	129	48%
Calhoun	936	624	67%	964	697	72%
Cass	287	151	53%	279	154	55%
Charlevoix	104	67	64%	117	63	54%
Cheboygan	155	70	45%	147	82	56%
Chippewa	201	128	64%	179	132	74%
Clare	196	91	46%	168	76	45%
Clinton	219	108	49%	195	94	48%
Crawford	67	38	44%	70	25	36%
Delta	207	164	79%	184	148	80%
Dickinson	136	39	29%	129	41	32%
Eaton	447	289	65%	396	253	64%
Emmet	178	106	60%	185	94	51%
Genesee	3,001	1,754	58%	2,875	1,817	63%
Gladwin	111	30	27%	102	40	39%
Gogebic	84	36	46%	65	34	52%
Grand Traverse	397	71	18%	356	82	23%
Gratiot	253	116	46%	222	104	47%
Hillsdale	261	120	43%	244	139	57%
Houghton	188	110	59%	164	85	52%
Huron	144	74	51%	169	86	51%
Ingham	1,521	751	49%	1,441	834	58%
Ionia	358	179	50%	311	155	50%
Iosco	149	65	44%	133	65	49%
Iron	62	24	39%	51	18	35%
Isabella	315	82	26%	276	92	33%
Jackson	943	617	65%	827	589	67%
Kalamazoo	1,276	747	59%	1,207	775	64%
Kalkaska	99	46	46%	127	54	43%
Kent	3,636	2,836	78%	3,287	2,674	81%
Keweenaw	7	2	29%	6	3	50%
Lake	74	45	61%	61	43	70%
Lapeer	370	153	41%	414	195	48%
Leelanau	39	18	46%	46	25	54%
Lenawee	452	230	51%	452	263	58%
Livingston	383	157	41%	296	109	37%
Luce	43	29	67%	29	19	66%
Mackinac	41	24	59%	48	40	83%
Macomb	2,850	1,264	44%	2,713	1,427	53%
Manistee	99	69	70%	132	89	67%
Marquette	270	155	57%	245	156	64%
Mason	167	102	61%	181	113	62%
Mecosta	215	140	65%	198	126	65%
Menominee	91	64	70%	100	72	72%
Midland	333	122	37%	339	136	40%
Missaukee	60	24	40%	61	12	20%
Monroe	543	244	45%	529	306	58%
Montcalm	399	240	60%	377	222	59%
Montmorency	55	29	53%	52	31	60%
Muskegon	1,193	857	72%	1,161	875	75%
Newaygo	305	200	66%	281	183	65%
Oakland	3,057	1,630	53%	2,842	1,710	60%
Oceana	230	174	76%	207	153	74%
Ogemaw	143	60	42%	123	52	42%
Ontonagon	21	12	57%	26	14	54%
Osceola	136	59	43%	137	74	54%
Oscoda	47	14	30%	43	16	37%
Otsego	129	56	43%	140	71	51%
Ottawa	968	501	52%	875	455	52%
Presque Isle	58	27	47%	56	41	73%
Roscommon	132	34	26%	125	32	26%
Saginaw	1,345	923	69%	1,224	916	75%
St Clair	796	372	47%	789	430	54%
St Joseph	463	280	60%	434	279	64%
Sanilac	256	150	59%	243	150	62%
Schoolcraft	47	38	81%	41	36	88%
Shiawassee	375	236	63%	345	199	58%
Tuscola	306	172	56%	315	198	63%
Van Buren	506	279	55%	448	237	53%
Washtenaw	1,053	525	50%	899	466	52%
Wayne ex Detroit	4,216	2,131	51%	4,157	2,432	59%
Detroit, City of	9,401	6,227	66%	9,239	7,116	77%
Wexford	222	93	42%	241	107	44%
MICHIGAN	51,183	29,643	58%	48,707	31,105	64%

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Table 5. Statewide Blood Lead Testing of Two and Three Year Old Children Enrolled in Managed Care

December 2006

County	2 Years of Age			3 Years of Age		
	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Alcona	35	16	46%	32	24	75%
Alger	30	21	70%	23	20	87%
Allegan	457	287	63%	388	248	64%
Alpena	96	64	67%	77	59	77%
Antrim	50	31	62%	51	28	55%
Arenac	90	45	50%	57	28	49%
Baraga	29	18	62%	15	10	67%
Barry	142	103	73%	136	108	79%
Bay	504	316	63%	425	288	70%
Benzie	53	29	55%	74	48	65%
Berrien	845	500	60%	819	563	69%
Branch	218	86	39%	214	103	48%
Calhoun	803	542	67%	811	597	74%
Cass	229	125	55%	215	125	58%
Charlevoix	53	38	72%	60	32	53%
Cheboygan	1	0	0%	1	1	100%
Chippewa	101	60	59%	109	78	72%
Clare	1	0	0%	5	2	40%
Clinton	183	94	51%	158	80	51%
Crawford	65	29	45%	58	19	33%
Delta	170	135	79%	146	118	81%
Dickinson	103	28	28%	96	29	30%
Eaton	348	229	66%	313	204	65%
Emmet	2	2	100%	3	1	33%
Genesee	2,544	1,524	60%	2,416	1,557	64%
Gladwin	86	21	24%	104	30	29%
Gogebic	65	31	48%	52	28	54%
Grand Traverse	150	27	18%	129	30	23%
Gratiot	194	88	46%	179	83	46%
Hillsdale	220	97	44%	196	113	58%
Houghton	158	93	59%	132	68	52%
Huron	112	59	53%	127	72	57%
Ingham	1,255	630	50%	1,188	721	61%
Ionia	269	134	50%	223	109	49%
Iosco	121	56	46%	105	53	50%
Iron	56	22	39%	44	14	32%
Isabella	111	28	25%	101	28	28%
Jackson	780	528	68%	707	489	69%
Kalamazoo	1,071	638	60%	982	644	66%
Kalkaska	7	3	43%	8	5	63%
Kent	2,974	2,380	80%	2,741	2,274	83%
Keweenaw	4	1	25%	4	2	50%
Lake	54	34	63%	48	36	75%
Lapeer	285	131	46%	316	161	51%
Leelanau	22	11	50%	21	12	57%
Lenawee	367	197	54%	366	214	58%
Livingston	290	129	44%	229	88	38%
Luce	30	18	60%	25	16	64%
Mackinac	21	8	38%	30	26	87%
Macomb	2,345	1,075	46%	2,251	1,244	55%
Manistee	81	60	74%	98	70	71%
Marquette	220	128	58%	208	134	64%
Mason	5	4	80%	6	3	50%
Mecosta	172	112	65%	146	92	63%
Menominee	68	49	72%	75	55	73%
Midland	8	2	25%	16	5	31%
Missaukee	49	21	43%	43	8	19%
Monroe	440	211	48%	419	256	61%
Montcalm	308	190	62%	289	170	59%
Montmorency	43	23	53%	43	27	63%
Muskegon	970	710	73%	941	721	77%
Newaygo	251	166	66%	290	199	69%
Oakland	2,568	1,387	54%	2,368	1,472	62%
Oceana	180	136	76%	154	118	77%
Ogemaw	118	50	42%	100	43	43%
Ontonagon	18	11	61%	21	12	57%
Osceola	98	45	46%	100	57	57%
Oscoda	41	13	32%	37	16	43%
Otsego	64	30	47%	70	40	57%
Ottawa	714	390	55%	657	363	55%
Presque Isle	47	25	53%	42	32	76%
Roscommon	109	28	26%	106	29	27%
Saginaw	1,117	791	71%	1,043	709	68%
St Clair	641	300	47%	627	346	55%
St Joseph	378	233	62%	338	226	67%
Sanilac	207	121	58%	188	122	65%
Schoolcraft	40	32	80%	30	25	83%
Shiawassee	296	192	65%	273	169	62%
Tuscola	244	140	57%	236	148	63%
Van Buren	415	235	57%	366	193	53%
Washtenaw	928	472	52%	760	402	53%
Wayne ex Detroit	3,602	1,878	52%	3,509	2,106	60%
Detroit, City of	8,206	5,532	67%	8,077	6,248	77%
Wexford	90	33	37%	88	36	40%
MICHIGAN	40,963	24,573	60%	38,733	25,633	66%

Table 6. Statewide Blood Lead Testing of Two and Three Year Old Children Eligible for Medicaid Only Fee-for-Service Coverage

December 2006

	2 Years of Age			3 Years of Age		
County	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Alcona	10	7	70%	6	2	33%
Alger	10	7	70%	4	4	100%
Allegan	88	37	42%	113	59	52%
Alpena	54	30	56%	63	43	68%
Antrim	79	47	59%	75	39	52%
Arenac	10	3	30%	16	7	44%
Baraga	22	13	59%	20	10	50%
Barry	107	63	59%	126	93	74%
Bay	88	49	56%	83	45	54%
Benzie	18	10	56%	24	6	25%
Berrien	151	66	44%	130	69	53%
Branch	50	16	32%	46	21	46%
Calhoun	113	66	58%	138	92	67%
Cass	51	24	47%	54	22	41%
Charlevoix	46	25	54%	51	28	55%
Cheboygan	152	69	45%	143	79	55%
Chippewa	92	61	66%	66	52	79%
Clare	192	90	47%	156	72	46%
Clinton	30	10	33%	32	13	41%
Crawford	22	9	41%	12	6	50%
Delta	32	25	78%	34	28	82%
Dickinson	31	9	29%	29	11	38%
Eaton	90	52	58%	75	44	59%
Emmet	170	100	59%	178	91	51%
Genesee	414	200	48%	409	221	54%
Gladwin	22	8	36%	24	10	42%
Gogebic	16	5	31%	12	6	50%
Grand Traverse	243	44	18%	218	48	22%
Gratiot	51	23	45%	38	20	53%
Hillsdale	50	14	28%	41	22	54%
Houghton	27	15	56%	31	17	55%
Huron	28	14	50%	41	14	34%
Ingham	229	103	45%	212	95	45%
Ionia	85	45	53%	82	41	50%
Iosco	26	9	35%	25	11	44%
Iron	6	2	33%	6	3	50%
Isabella	197	53	27%	167	60	36%
Jackson	138	76	55%	145	86	59%
Kalamazoo	163	81	50%	197	108	55%
Kalkaska	89	42	47%	116	47	41%
Kent	587	402	68%	492	357	73%
Keweenaw	2	0	0%	2	1	50%

	2 Years of Age			3 Years of Age		
County	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Lake	17	9	53%	12	6	50%
Lapeer	75	19	25%	88	34	39%
Leelanau	17	7	41%	25	13	52%
Lenawee	72	30	42%	81	37	46%
Livingston	86	23	27%	59	20	34%
Luce	13	11	85%	4	3	75%
Mackinac	18	15	83%	18	14	78%
Macomb	458	171	37%	408	161	39%
Manistee	16	7	44%	31	17	55%
Marquette	45	24	53%	33	21	64%
Mason	160	96	60%	171	108	63%
Mecosta	38	25	66%	49	33	67%
Menominee	21	13	62%	25	17	68%
Midland	314	114	36%	310	124	40%
Missaukee	10	3	30%	15	3	20%
Monroe	88	28	32%	92	38	41%
Montcalm	77	40	52%	80	45	56%
Montmorency	10	5	50%	9	4	44%
Muskegon	191	126	66%	195	133	68%
Newaygo	48	28	58%	46	21	46%
Oakland	431	185	43%	419	207	49%
Oceana	47	36	77%	50	32	64%
Ogemaw	23	9	39%	21	8	38%
Ontonagon	3	1	33%	3	1	33%
Osceola	29	12	41%	34	15	44%
Oscoda	5	1	20%	6	0	0%
Otsego	62	24	39%	62	27	44%
Ottawa	228	95	42%	203	86	42%
Presque Isle	7	2	29%	13	8	62%
Roscommon	19	6	32%	17	3	18%
Saginaw	193	107	55%	149	99	66%
St Clair	134	65	49%	141	72	51%
St Joseph	79	46	58%	87	49	56%
Sanilac	46	27	59%	50	24	48%
Schoolcraft	7	6	86%	9	9	100%
Shiawassee	71	37	52%	69	27	39%
Tuscola	52	24	46%	71	44	62%
Van Buren	73	33	45%	74	39	53%
Washtenaw	133	47	35%	122	57	47%
Wayne ex Detroit	546	213	39%	556	267	48%
Detroit, City of	981	579	59%	982	723	74%
Wexford	128	59	46%	150	72	48%
MICHIGAN	9,153	4,432	48%	8,971	4,827	54%

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Table 6. Statewide Blood Lead Testing of Two and Three Year Old Children Eligible for Medicaid Only Fee-for-Service Coverage

December 2006

County	2 Years of Age			3 Years of Age		
	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Alcona	10	7	70%	6	2	33%
Alger	10	7	70%	4	4	100%
Allegan	86	37	43%	113	59	52%
Alpena	54	30	56%	63	43	68%
Antrim	78	47	59%	75	39	52%
Arenac	10	3	30%	16	7	44%
Baraga	22	13	59%	20	10	50%
Barry	107	63	59%	126	93	74%
Bay	88	49	56%	83	45	54%
Benzie	18	10	56%	24	6	25%
Berrien	151	66	44%	130	69	53%
Branch	80	16	32%	46	21	46%
Calhoun	113	66	58%	138	92	67%
Cass	51	24	47%	54	22	41%
Charlevoix	46	25	54%	51	28	55%
Cheboygan	152	69	45%	143	75	55%
Chippewa	92	61	66%	66	52	79%
Clare	192	90	47%	156	72	46%
Clinton	30	10	33%	32	13	41%
Crawford	22	9	41%	12	6	50%
Delta	33	25	76%	34	28	82%
Dickinson	31	9	29%	29	11	38%
Eaton	90	52	58%	75	44	59%
Emmet	170	100	59%	178	91	51%
Genesee	414	200	48%	409	221	54%
Gladwin	22	8	36%	24	10	42%
Gogebic	16	5	31%	12	6	50%
Grand Traverse	243	44	18%	218	48	22%
Gratiot	51	23	45%	38	20	53%
Hillsdale	50	14	28%	41	22	54%
Houghton	27	15	56%	31	17	55%
Huron	28	14	50%	41	14	34%
Ingham	229	103	45%	212	95	45%
Ionia	86	45	53%	82	41	50%
Iosco	36	9	33%	25	11	44%
Iron	6	2	33%	6	3	50%
Isabella	197	53	27%	167	60	36%
Jackson	138	76	55%	145	86	59%
Kalamazoo	163	81	50%	187	103	55%
Kalkaska	89	42	47%	116	47	41%
Kent	567	402	68%	492	357	73%
Keweenaw	2	0	0%	2	1	50%

County	2 Years of Age			3 Years of Age		
	Eligibles	Eligibles with at least 1 test on or before their 2nd birthday	Percent of Eligibles with at least 1 test on or before their 2nd birthday	Eligibles	Eligibles with at least 1 test on or before their 3rd birthday	Percent of Eligibles with at least 1 test on or before their 3rd birthday
Lake	17	9	53%	12	6	50%
Lapeer	75	19	25%	88	34	39%
Leelanau	17	7	41%	25	13	52%
Lenawee	72	30	42%	81	37	46%
Livingston	85	23	27%	58	20	34%
Luce	13	11	85%	4	3	75%
Mackinac	18	15	83%	18	14	78%
Macomb	458	171	37%	408	161	39%
Manistee	16	7	44%	31	17	55%
Marquette	45	24	53%	33	21	64%
Mason	160	96	60%	171	103	63%
Mecosta	36	25	69%	49	33	67%
Menominee	21	13	62%	25	17	68%
Midland	314	114	36%	310	126	40%
Missaukee	10	3	30%	15	3	20%
Monroe	88	28	32%	92	38	41%
Montcalm	77	40	52%	80	45	56%
Montmorency	10	5	50%	9	4	44%
Muskegon	191	126	66%	195	133	68%
Newaygo	46	28	58%	46	21	46%
Oakland	431	185	43%	419	207	49%
Oceana	47	36	77%	50	32	64%
Ogemaw	28	9	32%	21	8	38%
Ontonagon	3	1	33%	3	1	33%
Osceola	29	12	41%	34	15	44%
Oscoda	5	1	20%	6	0	0%
Otsego	62	24	39%	62	27	44%
Ottawa	228	95	42%	203	85	42%
Presque Isle	7	2	29%	13	8	62%
Roscommon	19	6	32%	17	3	18%
Saginaw	193	107	55%	149	99	66%
St Clair	134	65	49%	141	72	51%
St Joseph	75	46	58%	67	45	56%
Sanilac	46	27	59%	50	24	48%
Schoolcraft	7	6	86%	9	9	100%
Shiawassee	71	37	52%	69	27	39%
Tuscola	55	24	44%	71	44	62%
Van Buren	73	33	45%	74	35	53%
Washtenaw	133	47	35%	122	57	47%
Wayne ex Detroit	546	213	39%	556	267	48%
Detroit, City of	961	575	59%	982	723	74%
Wexford	126	58	46%	150	72	48%
MICHIGAN	9,153	4,432	48%	8,971	4,827	54%

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Table 7. Blood Lead Testing of Three Year Old Children by Length of Enrollment

December 2006

Health Plan Name	Total Enrollment			Continuous Enrollment			
	Eligibles	Eligibles with at least one lead test on or before 3rd birthday	Percent of Eligibles with at least one lead test on or before 3rd birthday	Eligibles	Eligibles with at least one lead test on or before 3rd birthday	Percent of Eligibles with at least one lead test on or before 3rd birthday	Percentage Point Difference with Continuous Enrollment
CAPE Health Plan	3,845	2,512	65%	2,264	1,636	72%	7
Community Choice Michigan	1,804	1,138	63%	996	710	71%	8
Great Lakes Health Plan, Inc.	5,777	3,762	65%	2,522	1,779	71%	5
Health Plan Of Michigan, Inc.	5,582	3,644	65%	2,839	2,129	75%	10
HealthPlus Partners, Inc.	2,565	1,781	69%	1,660	1,273	77%	7
M-Caid	762	386	51%	387	245	63%	13
McLaren Health Plan	2,395	1370	57%	1,358	889	65%	8
Midwest Health Plan	2,604	1,852	71%	1,534	1,212	79%	8
Molina Healthcare of Michigan	5,377	3,568	66%	3,295	2,364	72%	5
OmniCare Health Plan	1,946	1,464	75%	1,293	1,012	78%	3
PHP-MM Family Care	724	442	61%	451	310	69%	8
Priority Health Government Programs, Inc.	2,339	1,726	74%	1,328	1,096	83%	9
Total Health Care	2,001	1,352	68%	1,189	864	73%	5
Upper Peninsula Health Plan	1,012	636	63%	674	472	70%	7
Managed Care Totals/Percent	**38,733**	**25,633**	**66%**	**21,790**	**15,991**	**73%**	**7**
Current Performance Monitoring Standard			**65%**			**70%**	
FFS (Title XIX only)	8,972	4,828	54%	3,086	1,740	56%	3
FFS (Title V/XIX)	1,001	643	64%	893	585	66%	1
FFS Totals (Title XIX and V/XIX)	9,973	5,471	55%	3,979	2,325	58%	4

Total Enrollment:

- Based on MMIS eligibility system
- Enrolled in plan (health plan or FFS) for the measurement month

Continuous Enrollment:

- Based on MMIS eligibility system
- Enrolled in same plan (health plan or FFS) for the measurement month and 12 months preceding 3rd birthday, with 1-month allowable gap

SUMMARY

This is the ninth annual report on surveillance of blood lead levels in Michigan citizens. It is based on regulations that went into effect on October 11, 1997 that require laboratories to report all blood lead levels analyzed. Part I of this report summarizes the results of blood lead tests in children under the age of six and Part II of this report summarizes blood lead levels in adults (16 years and older).

In 2006, 15,752 blood lead tests were received for 13,832 individuals ≥16 years of age. Seven hundred thirty (5.3%) individuals had blood lead levels greater than or equal to 10 µg/dL; 108 of those 730 had lead levels greater than or equal to 25 µg/dL and 6 of the 108 had blood lead levels greater than or equal to 50 µg/dL.

There were 1,541 more blood lead tests and 710 more individuals reported in 2006 compared to 2005. The number and percent of individuals with blood lead levels ≥10 µg/dL was similar in 2005 and 2006, 725 (5.5%) and 730 (5.3%), respectively. The number and percent of individuals with blood lead levels greater than or equal to 25 µg/dL decreased, from 133 (1.0%) in 2005 to 108 (0.8%) in 2006. The number of individuals with blood lead levels ≥50 µg/dL decreased from 13 (0.1%) in 2005 to 6 (0.04%) in 2006. This is the eighth consecutive year that blood lead levels ≥25 µg/dL decreased from the previous year. This overall decrease was secondary to a decrease in elevated blood leads from occupational exposure. For non-occupational exposure, the decrease did not begin to occur until 2004.

Individuals with blood lead levels ≥10 µg/dL were likely to be men (94.5%) and white (92.2%). Their mean age was 45. They were most likely to live in Wayne (13.6%), St. Clair (12.8%) and Montcalm (8.2%) counties.

Occupational exposure remains the predominant source of lead exposure in Michigan adults (83% of all individuals with elevated blood lead, ≥10 µg/dL). These exposures typically occurred where individuals were performing abrasive blasting on outdoor metal structures such as bridges, overpasses or water towers; casting brass or bronze fixtures; fabricating metal products; or exposed to lead fumes from guns at firing ranges. Individuals with elevated blood lead from exposure at firing ranges were exposed not only as part of work, but also from their involvement in the activity as recreation. This included individuals using commercial ranges and members of private clubs. This is the most common cause of non-occupational exposure (12.5% of all cases with blood lead ≥10 µg/dL and 74.3% of all cases with blood lead ≥10 µg/dL from non-occupational causes).

The ninth year of operation of an adult blood lead surveillance system in Michigan proved successful in continuing to identify individuals with elevated blood lead levels and sources of exposures that could be remediated to reduce lead exposure. Outreach activities that were continued this past year included distributing resources on diagnosis and management of lead exposure to health care providers with patients with elevated blood lead levels and distributing a "how to" guide for home renovation. Two educational brochures for individuals exposed to lead were distributed this past year: one on the toxicity of lead and the second on controlling lead exposure in firing ranges. Copies of these brochures and diagnosis management plan for health care providers are available at www.oem.msu.edu under resources for lead.

Average blood lead in the general population has dropped to 1.45 µg/dL (2) and health effects are documented at levels considerably below the allowable OSHA blood lead level of 50 µg/dL

(3-6). OSHA should revaluate the adequacy of its standard given medical evidence of health effects at levels as low as 5 µg/dL (3-6).

Ongoing surveillance in future years will determine if the favorable trend in lower blood lead levels found from 1998-2006 will continue.

BACKGROUND

This is the ninth annual report on surveillance of blood lead levels in Michigan residents. Blood lead levels of Michigan residents, including children, have been monitored by the state since 1992. From 1992 to 1995, laboratories performing analyses of blood lead levels, primarily of children, were voluntarily submitting reports to the Michigan Department of Public Health and then beginning in 1996 to the Michigan Department of Community Health (MDCH). The Michigan Department of Community Health promulgated regulations effective October 11, 1997, that require laboratories to submit reports of both children and adults to the MDCH for any blood testing for lead. Coincident with this, the Michigan Occupational Safety and Health Administration (MIOSHA) in the Michigan Department of Labor and Economic Growth (MDLEG) (formerly called the Occupational Health Division within the Michigan Department of Consumer and Industry Services (MDCIS); which formerly had been part of the Michigan Department of Public Health) received federal funding in 1997 from the Centers for Disease Control and Prevention (CDC) to monitor adult blood lead levels as part of the Adult Blood Lead Epidemiology and Surveillance (ABLES) Program. Beginning this past year the funds have been provided directly to Michigan State University. Currently 38 states have established lead registries through the ABLES Program for surveillance of adult lead absorption, primarily based on reports of elevated blood lead levels (BLL) from clinical laboratories.

THE MICHIGAN ADULT BLOOD LEAD REGISTRY

Reporting Regulations and Mechanism

Since October 11, 1997, laboratories performing blood lead analyses of Michigan residents are required to report the results of all blood lead level (BLL) tests to the Michigan Department of Community Health (R325.9081-.9087). Prior to these new regulations, few reports of elevated lead levels among adults were received.

The laboratories are required to report blood sample analysis results, patient demographics, and employer information on a standard Michigan Department of Community Health Lead Reporting Form (Appendix A). The physician or health provider ordering the blood lead analysis is responsible for completing the patient information, the physician/provider information and the specimen collection information. Upon receipt of the blood sample for lead analysis, the clinical laboratory is responsible for completion of the laboratory information. All clinical laboratories conducting business in Michigan that analyze blood samples for lead must report all adult and child blood lead results to the Michigan Department of Community Health, Childhood Lead Poisoning Prevention Program (MDCH/CLPPP) within five working days.

All blood lead results on individuals 16 years or older are forwarded to the Michigan Occupational Safety and Health Administration (MIOSHA) in the Michigan Department of Labor and Economic Growth (MDLEG) for potential follow-up. A summary of blood lead results from 2006 on children less than six years old is in Part I of this report.

Laboratories

Employers providing blood lead analysis on their employees as required by the Michigan Occupational Safety and Health Administration (MIOSHA) are required to use a laboratory approved by OSHA to be in compliance with the lead standard. Appendix B lists the ten approved laboratories in Michigan. This number is down from eleven in the previous year.

Data Management

When BLL reports are received at the MDCH, they are reviewed for completeness. For those reports where information is missing, copies are returned to the physician/provider to complete. Lead Registry staff code the information on the lead reporting form using a standard coding scheme and enter this information into a computerized database. Each record entered into the database is visually checked for any data entry errors, duplicate entries, missing data, and illogical data. These quality control checks are performed monthly.

Case Follow-Up

Adults whose BLL is 25 µg/dL or greater are contacted for an interview. Interviews of individuals with blood lead levels ranging from 10 to 24 µg/dL are conducted if we cannot identify the source of their lead exposure from the reporting form. A letter is sent to individuals explaining Michigan's lead surveillance program and inviting them to answer a 15-20 minute telephone questionnaire about their exposures to lead and any symptoms they may be experiencing. The questionnaire collects patient demographic data, work exposure and history information, symptoms related to lead exposure, information on potential lead-using hobbies and non-work related activities, and the presence of young children in the household to assess possible take-home lead exposures among these children. Trained interviewers administer the questionnaire.

MICHIGAN OSHA (MIOSHA) REQUIREMENTS FOR MEDICAL MONITORING AND MEDICAL REMOVAL

MIOSHA requirements for medical surveillance (i.e., biological monitoring) and medical removal are identical to Federal OSHA's. The requirements for medical removal differ for general industry and construction. For general industry, an individual must have two consecutive blood lead levels above 60 µg/dL or an average of three blood lead levels greater than 50 µg/dL before being removed (i.e., taken pursuant to the standard or the average of all blood tests conducted over the previous six months, whichever is longer). For construction, an individual needs to have only two consecutive blood lead level measurements taken pursuant to the standard above 50 µg/dL. However, an employee shall not be required to be removed if the last blood-sampling test indicates a blood lead level at or below 40 µg/dL. See Appendix C for a more detailed description of the requirements.

In the absence of a specific exposure to lead, blood lead levels in the general population are typically below 5 µg/dL (7).

Dissemination of Surveillance Data

Quarterly data summaries, without personal identifiers, are forwarded to the Program's funding agency, the National Institute for Occupational Safety and Health (NIOSH). NIOSH compiles

quarterly reports from all states that require reporting of BLLs and publishes them in the Morbidity and Mortality Weekly Report (MMWR) (3). See Appendix D for the most recent publication.

RESULTS

2006 is the ninth year with complete laboratory reporting in Michigan since the lead regulations became effective on October 11, 1997. Accordingly, this report provides a summary of all the reports of adult blood lead levels received in 2006 as well as more detailed information from interviews of those adults with BLLs 25 µg/dL and greater and the sample of individuals interviewed who had blood lead levels ranging 10-24 µg/dL. It also describes the Michigan Occupational Safety and Health Administration (MIOSHA) inspections at the work sites where these individuals were exposed to lead.

BLOOD LEAD LEVELS REPORTED IN 2006

Number of Reports and Individuals

Between January 1 and December 31, 2006, the State of Michigan received 15,752 blood lead level reports for individuals 16 years of age or older. Because an individual may be tested more than once each year, the 15,752 reports received were for 13,832 individuals (Table 1). The overall trend for number of individuals tested for blood lead each year has been a gradual increase (Figure 1). The initial steeper increase in 1999 and 2000 probably was secondary to better compliance with the new regulation. The increase in more recent years is assumed secondary to increased testing.

The following descriptive statistics are based on the 13,832 individuals reported in 2006, and are based on the highest BLL reported for each of these adults.

Distribution of Blood Lead Levels

In 2006, 730 (5.3%) of the 13,832 adults reported had blood lead levels greater than or equal to 10 µg/dL; 108 of those 730 had blood lead levels greater than or equal to 25 µg/dL and 6 of those 108 had blood lead levels greater than or equal to 50 µg/dL (Table 1). A total of 13,102 (94.7%) of the adults reported in 2006 had BLLs less than 10 µg/dL. Among those individuals whose blood lead was 10 µg/dL – 24 µg/dL, the percentage of individuals whose source of lead was work exposure was 85% as compared to individuals with higher blood leads ≥ 25µg/dL where work exposure was the source for 74%. There were 106 individuals whose source of elevated blood still needed to be determined (Table 1).

There has been a gradual decline in the overall number of individuals with elevated blood lead because of a reduction in elevated blood leads from occupational exposure since 2000 (Figure 2). For non-work exposures elevated blood lead increased from 1998 until 2003 and then has decreased in 2004, 2005, and 2006 (Figure 3).

GENDER AND AGE DISTRIBUTION

All Blood Lead Levels

Fifty-five percent of the adults reported to the Registry were male, and 45 percent were females (Table 2). The age distribution is shown in Table 3. The mean age was 42.

Blood Lead Levels ≥10 µg/dL

For the 730 adults reported to the Registry with blood lead levels ≥10 µg/dL, 690 (94.5%) were men and 40 (5.5%) were women (Table 2). The age distribution for these adults is shown in Table 3. The mean age was 45.

RACE DISTRIBUTION

All Blood Lead Levels

Although laboratories are required to report the patients' race, this information is frequently not provided. Race was missing for 8,408 (60.8%) of the 13,832 adults reported. Where race was known, 4,583 (84.5%) were reported as Caucasian, 701 (12.9%) were reported as African American, 62 (1.1%) were reported as Native American, 43 (0.8%) were reported as Asian/ Pacific Islander, and 35 (0.6%) were reported as Multiracial/Other (Table 4).

Blood Lead Levels ≥10 µg/dL

For adults with blood lead levels greater than or equal to 10 µg/dL where race was indicated, 494 (92.2%) were reported as Caucasian, 29 (5.4%) were reported as African American, 6 (1.1%) were reported as Multiracial/Other, 4 (0.7%) were reported as Native American, and 3 (0.6%) were reported as Asian/Pacific Islander, (Table 4). The percentage of African-Americans with blood leads levels ≥10µg/dL was decreased as compared to all blood lead levels.

GEOGRAPHIC DISTRIBUTION

County of residence was determined for 11,505 of the 13,832 adults reported to the Registry. They lived in all of Michigan's 83 counties. The largest number of adults reported in 2006 lived in Wayne County (2,134, 18.6%), followed by Kent County (1,426, 12.4%) and Oakland County (821, 7.1%). The county was unknown for 2,327 adults (Figure 4 and Table 5).

Figure 5 and Table 5 show the county of residence of the 625 adults with blood lead levels greater than or equal to 10 µg/dL where county of residence could be determined. The largest number of adults reported with a BLL of 10 µg/dL and greater were from Wayne County (85, 13.6%), followed by St. Clair County (80, 12.8%) and Montcalm County (51, 8.2%). The county was unknown for 105 adults.

Figure 6 and Table 5 show the county of residence for the 98 adults with blood lead levels greater than or equal to 25 µg/dL where county of residence could be determined. The largest number of adults reported with a BLL of 25 µg/dL and above were from St. Clair County (11, 11.2%), followed by Kalamazoo County (8, 8.16%). The county was unknown for 10 adults.

Figure 7 and Table 5 show the percentage of adults tested for blood lead within each county with BLLs of 10 µg/dL or greater. Montcalm (51, 35.2%), Benzie (3, 33.3%), and St. Clair (80, 25.4%) counties had the highest percentages of adults with BLLs of 10 µg/dL or greater.

Figure 8 and Table 5 show the percentage of adults tested for blood lead within each county with BLLs of 25 µg/dL or greater. Huron (1, 6.3%), Osceola (1, 6.3%) and Roscommon (2, 4.9%) counties had the highest percentage of adults with BLLs of 25 µg/dL or greater.

Figure 9 and Table 6 show the incidence rates of BLLs of 10 µg/dL and above, by county, for women. There were 38 women reported in 2006 with a BLL of 10 µg/dL or greater where county of residence could be determined. Benzie (14/100,000), St. Joseph (8/100,000) and Wexford (8/100,000) had the three highest incidence rates. With source of exposure known, women with elevated blood lead had their exposure from work (9, 42.9%), mostly in special trade construction (9.5%), construction (9.5%), and transportation services (9.5%). Women with elevated blood leads also had non-work exposures mostly from firearms (6, 28.6%), remodeling performed in their homes (9.5%), and ceramics (9.5%). Source of exposure was unknown for 19 of the 40.

Figure 10 and Table 7 show the incidence rates of BLLs of 10 µg/dL and above, by county, for men. There were 587 men reported in 2006 with a BLL of 10 µg/dL or greater where county of residence could be determined. Montcalm (200/100,000), St. Clair (121/100,000) and Clinton, (101/100,000) had the highest incidence rates. The elevated rates in these counties were secondary to individuals exposed to lead while working in brass/bronze foundries. The overall incidence rate for men was 15 times higher than that for women (15/100,000 vs. 1/100,000).

SOURCE OF EXPOSURE

Table 8 shows the source of exposure of lead for individuals with blood lead levels greater than 10 µg/dL reported in 2006. For 519 (83.2%) individuals, work was the identified source. For 105 (16.8%) additional individuals non-occupational activities were identified as the source of exposure. Of those 105, 78 (74.3%) individuals were exposed from a hobby related to guns and 10 (9.5%) were exposed during home remodeling. For an additional 106 individuals, we are still investigating the source.

Table 9 shows the occupational sources of lead for individuals reported in 2006. The most frequent reports were on individuals in the manufacturing sector (57.6%), and construction (28.9%).

Figure 11 shows the distribution of the twenty non-construction companies that reported at least one adult with a BLL of 25 µg/dL or greater in Michigan during 2006. For eight additional companies we were unable to determine county. These twenty-eight companies included brass/bronze casting operations, radiator repair facilities and indoor firing ranges. Of the 495 individuals with blood lead ≥ 10 µg/dL, exposure occurred at work, and industry was known, 352 (71%) were from these twenty-eight companies. Of the 74 individuals with blood lead ≥ 25µg/dL and exposure occurred at work 54 (73%) were also from these twenty-eight companies.

Blood leads have generally been decreasing across all types of industry, although a slight increase in non-ferrous foundries occurred in 2006 (Figure 12).

Summary of Industrial Hygiene Inspections

Since the 2005 report, the statewide surveillance system identified three companies where MIOSHA had not performed a recent inspection for lead. These three companies were inspected in 2006.

The first company inspected was a commercial painting operation that typically worked on water towers. The inspection revealed that the company did have a written program to control lead exposure. No citations were issued as there was no physical work site in the state to investigate.

The second company inspected was a lead acid battery machine manufacturing facility. The company received seven citations, three of which were lead-related.

The third company inspected was an automotive bearing manufacturing plant. The company received eight citations, one of which was lead-related.

Of the three companies identified, all three were identified by an elevated blood lead report collected because of the company's medical surveillance program. Seventy three percent of the individuals with blood leads greater than 25 µg/dL were from 28 companies. This indicates a highly focused effort on a relatively small number of companies could potentially reduce the majority of the highest blood leads.

CASE NARRATIVES

Appendix E contains brief narratives about individuals with blood lead greater than or equal to 50 µg/dL.

INTERVIEWS OF ADULTS WITH BLOOD LEAD LEVELS OF 10 µg/dL OR GREATER

Between October 15, 1997, and December 31, 2006, there were 1,351 reports received on adults with blood lead levels ≥10 µg/dL that completed an interview by telephone. The following summary of interview data is based on the 1,351 questionnaires completed by telephone.

Table 10 lists the demographic characteristics of the 1,351 adults with completed questionnaires by highest lead level reported. Most of the completed questionnaires were of males (90.5%), which parallels the gender distribution of the number of lead level reports >10 µg/dL. There was no difference in gender by highest blood lead level. Although based on small numbers the percentage of African-Americans was greater among adults with the highest blood lead levels (≥60 µg/dL). The percentage of ever or current smokers was higher among adults with the higher blood lead levels. The group with the highest lead levels had the youngest mean age.

The higher blood leads were most common in high school graduates without any college education and high school graduates with 1-3 years of college or technical school than in those who had not graduated high school or had completed college (Table 11).

Table 12 presents the types of lead-related symptoms reported during the interviews, by lead level. Only individuals who had daily or weekly symptoms were included in this table. Loss of 10+ pounds without dieting, continued loss of appetite, frequent pain/soreness, headache, being tired, feeling nervous, waking up at night, and being irritable were associated with a statistically significant increasingly higher levels of blood lead. Having any gastro-intestinal, musculoskeletal, nervous, or reproductive system symptom was associated with statistically significant increasingly higher levels of blood lead. Table 13 shows the reporting of anemia, kidney disease, high blood pressure and hearing loss by lead level category.

Table 14 presents the type of industry by lead level reported among those interviewed. Overall, 33.9% worked in special trade construction, followed by 23.1% who worked in the primary metals industry. Among individuals with the higher blood leads (≥40 µg/dL), the most common exposure was the same as for all elevated blood lead levels with construction followed by the primary metals industry (non-ferrous foundries). Table 15 presents the number of years worked by highest lead level reported for the adults who completed a questionnaire. Higher blood lead

level results were more likely to occur in shorter-term workers (i.e., worked in a lead exposed job for five or fewer years).

Table 16 lists the types of working conditions reported by the interviewed adults, again by highest lead level reported. Workers with lower lead levels were more likely to report having their work clothing laundered at work, having a showering facility and having a separate lunch room. They also were more likely to report eating in the lunch room. As expected, workers with higher blood lead levels were more likely to have been removed from the job.

Figures 13 and 14 depict the trend of percent of working conditions, and personal habits reported by the interviewed adults, by interview year, for the last nine years of surveillance. There is no clear cut change over the years.

The questionnaire also asks about children in the household, in order to document the potential for and extent of take-home lead. Twenty-seven percent of the adults interviewed reported children age 6 and younger living or spending time in the home (Table 17). Children from 105 of the 365 (31.6%) households where an adult had an elevated lead level and young children lived or frequently visited were tested for blood lead. Among the 105 households where the adult interviewed reported the child's blood test results, 36 (36.7%) households had a child with an elevated blood lead level (≥10 µg/dL). A letter was sent to all adults encouraging them to test any children age 6 and younger who lived or frequently visited their house for lead.

Figure 15 depicts the percent of households with children being tested for blood lead reported by the interviewed adults, by interview year, for the last nine years of surveillance. In 1999 and 2002, there were peaks of percent of households with children with elevated blood lead, which then decreased and in 2006 was at lowest value of 17% in 2006. In 2004, there was a peak of the percent of households with children tested for lead, which then decreased and remained unchanged from 2005 to 2006.

DISCUSSION

An individual may have a blood lead test performed as part of an employer medical-screening program or as part of a diagnostic evaluation by their personal physician. Whatever the reason for testing, the results are then sent by the testing laboratories to the MDCH as required by law. If the individual reported is an adult, the report is then forwarded to the MDLEG and maintained in the ABLES Program Lead Registry. Individuals with a blood lead level of 25 µg/dL or greater, and a sample of individuals with blood lead levels of 10-24 µg/dL, are interviewed by a trained interviewer by telephone. The interview details demographic information, exposure history and the presence and nature of lead related symptoms. A MIOSHA enforcement inspection is conducted to assess the company's compliance with the lead standard when an individual from a company is identified with a blood lead value of 25 µg/dL or greater.

Michigan is one of 38 states conducting surveillance of elevated blood lead levels. Michigan requires the reporting of <u>all</u> blood lead level results. Major benefits for reporting all blood lead levels are: the ability to calculate the rates of elevated blood lead levels in specific groups of interest, the ability to monitor compliance with the testing requirements of the lead standard, and facilitating the tracking of reports from particular employers to monitor their progress in reducing workers' exposures to lead.

Data from the state surveillance systems shows that elevated lead levels from occupational exposures are an important public health problem in the United States (7). It is well-documented

that exposure to lead may cause serious health effects in adults, including injury to the nervous system, kidneys, and blood-forming and reproductive systems in men and women. The level of lead in the blood is a direct index of a worker's recent exposure to lead as well as an indication of the potential for adverse effects from that exposure (8). A further problem is that workers can bring lead home on their clothes and expose children to lead. Thirty-seven percent of households with children under the age of six where the adult had an elevated blood lead level and the child was tested had an elevated blood level (Table 17). Children can experience serious adverse effects on neurological and intellectual development from lead exposure.

Symptoms involving the gastrointestinal, musculoskeletal and nervous systems occurred at levels within the allowable MIOSHA and OSHA standards (Table 12). The presence of these symptoms supports the need to lower the blood lead level that mandates medical removal. The current allowable level is up to 50 µg/dL. Ninety-six percent of individuals with blood lead below this level had daily or weekly symptoms consistent with lead toxicity.

A recent mini-monograph of articles in Environmental Health Perspectives (EHP) has documented the inadequacy of the current OSHA standard to protect against the health effects of lead (5). Articles in this mini-symposium included a systemic review of lead exposure and cardiovascular disease (4) and lead exposure and cognitive function in adults (5). It also included a useful guide for management of individuals with blood lead levels above the population average of 1.45 µg/dL (6). A letter was sent to the ten Michigan approved laboratories by OSHA to perform blood lead analysis recommending the laboratories change the interpretative language on their laboratory reports to confirm with table 3 of one of recent articles in EHP (6).

In 2006, there were 730 adults reported in Michigan with blood lead levels ≥10 µg/dL. Approximately ninety-five percent were men. The mean age was 45. They were predominately white (92.2%) and lived in a band of counties stretching across the state from Muskegon and Oceana to Wayne and Macomb. The counties with the highest percentage of elevated blood lead levels were counties with non-ferrous metal foundries (Figure 11). In addition to the non-ferrous metal foundries, the source of exposure to lead was predominately occupational in origin. Exposure occurred during the abrasive blasting to remove paint from outdoor metal structures, during the fabricating of metal products, during the repair of car radiators or during work in indoor firing ranges.

Individuals with the highest blood leads were more likely to be younger (Table 11). We attribute this finding to a higher percentage of younger workers in construction doing abrasive blasting on metal structures. Also younger, less experienced workers may be given the dirtier, less desirable tasks.

Based on the experience in other states we presume that the number of reports of elevated blood lead levels we receive is an underestimate of the true number of Michigan citizens with elevated blood leads (9, 10). For example, in a study in California in the early 90's reported that while 95% of lead battery employees had blood leads performed by their employers, only 8% of employees from radiator repair facilities and 34% of employees from secondary smelters of non-ferrous metal had blood leads performed by their employer (9). Overall it was estimated that less than 3% of employees in California exposed to lead were provided blood lead testing by their employer (10). On a national basis it was estimated that less than 12% of companies using lead provided blood lead testing for their employees (9). Our survey performed 15 years later on 28 Michigan radiator repair facilities showed only slightly better results with 25% were performing blood testing for lead. MIOSHA inspected 11 radiator repair facilities which were not

performing blood tests and found that 7 (64%) were required by OSHA regulations to be performing such testing.

Six adults had blood lead levels above 50 µg/dL, which is the maximum blood lead level allowed in the workplace. All six adults were exposed to lead at work (two from foundries, one from wrecking\demolition, one from metal working machinery and equipment, one from sanitary services, and one from metal finishing).

In its ninth year of operation, the surveillance system for lead proved successful in continuing to identify large numbers of adults with elevated lead levels and sources of exposure that could be remediated to reduce exposures. Continued outreach is planned to the medical community on the recognition and management of individuals with potential lead-related medical problems. Reevaluation of the current occupational lead standard is needed as health effects have been documented at levels allowed within the current standard. Finally, we continue to be encouraged both by the continued compliance with the reporting law and by the reduction in elevated blood lead levels, particularly from occupational exposures (Figure 3). We will continue to monitor for these trends in 2007.

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APPENDICES

Appendix A	Blood Lead Analysis Reporting
Appendix B	OSHA Blood Lead Laboratories: Michigan
Appendix C	Summary of Michigan's Lead Standards
Appendix D	Morbidity and Mortality Weekly Report (MMWR): Adult Blood Lead Epidemiology and Surveillance-United States, 2003-2004.
Appendix E	Case Narratives

FIGURE 1
Number of Adults Tested for Blood Lead, Michigan: 1998-2006

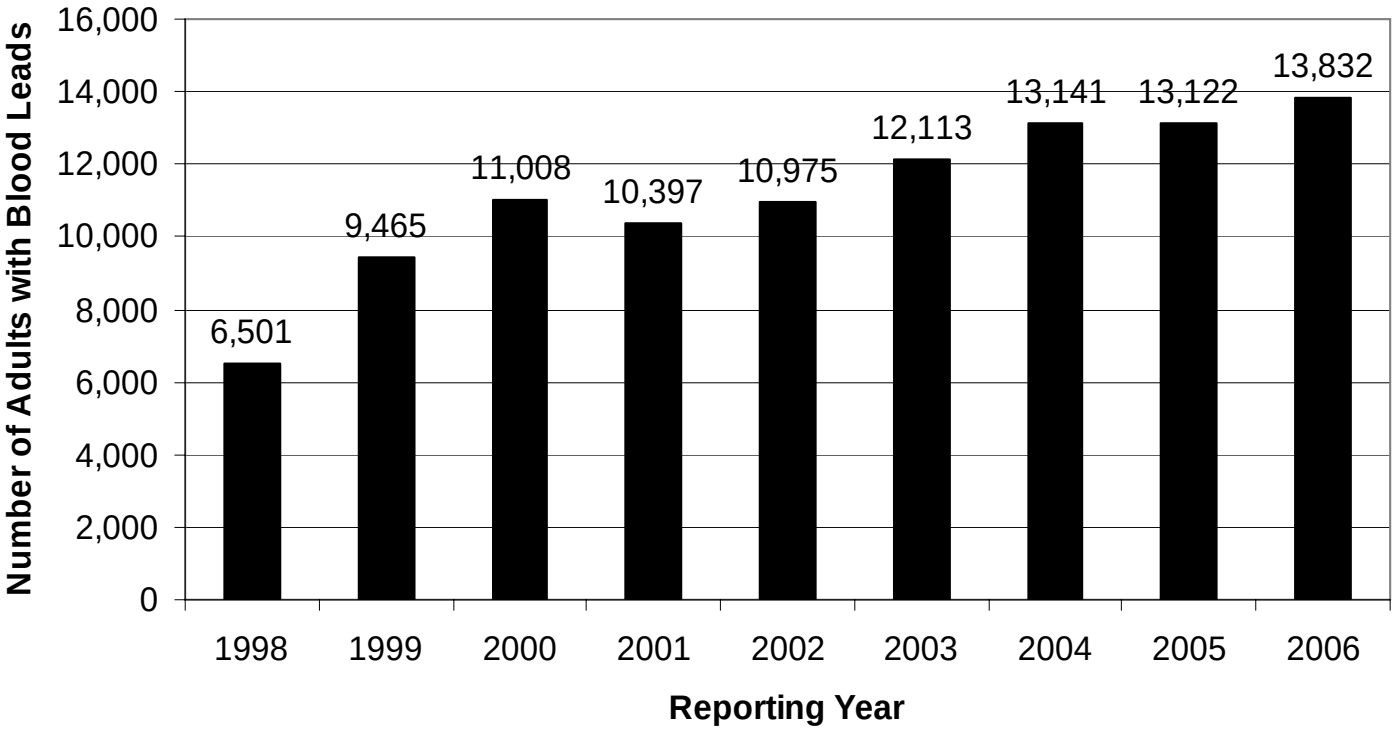


FIGURE 2
Number of Adults with Blood Lead Levels ≥10 µg/dL, ≥25g/dL, and ≥50µg/dL Exposed to Lead at Work, Michigan: 1998-2006

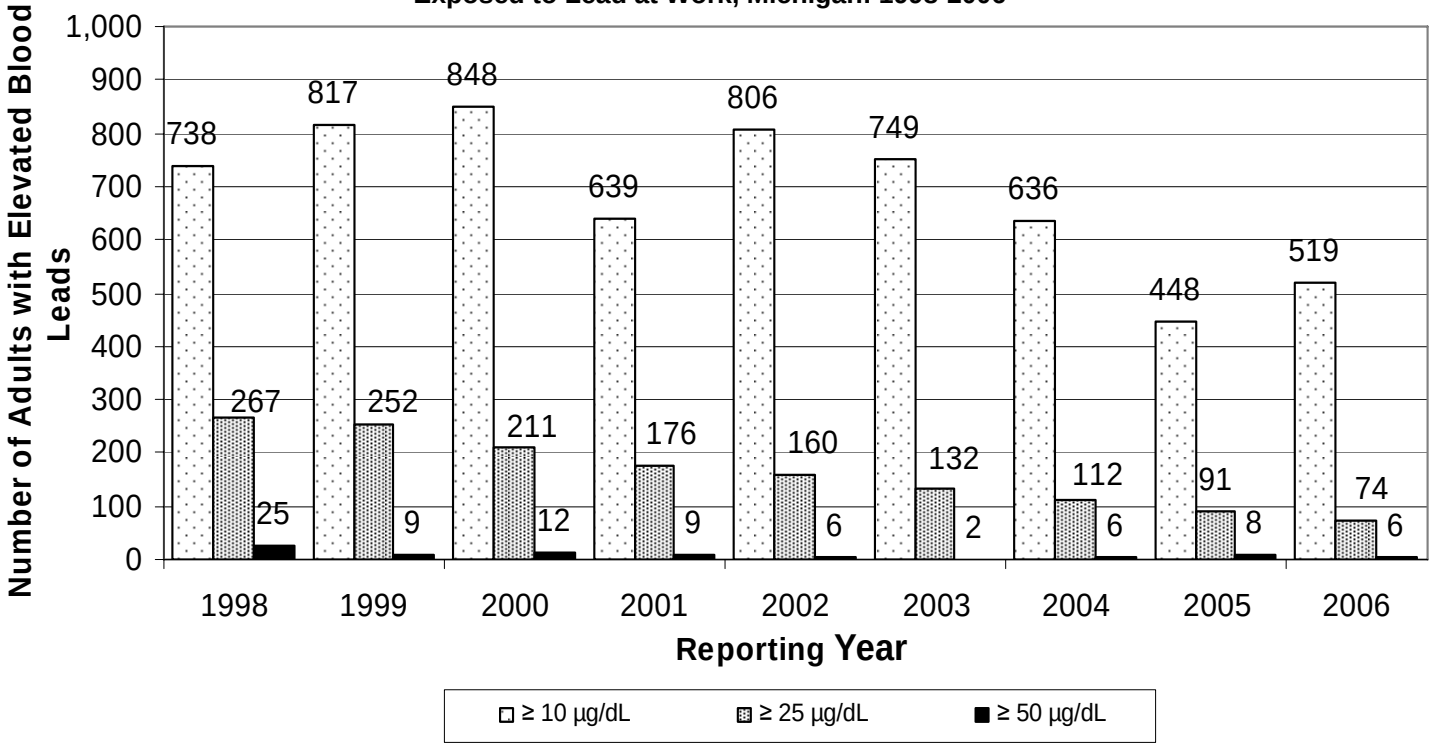


FIGURE 3
Number of Adults Tested with Blood Lead Levels
≥10 µg/dL, ≥25 µg/dL, and ≥50 µg/dL, Exposed to Lead Not at Work, Michigan: 1998-2006

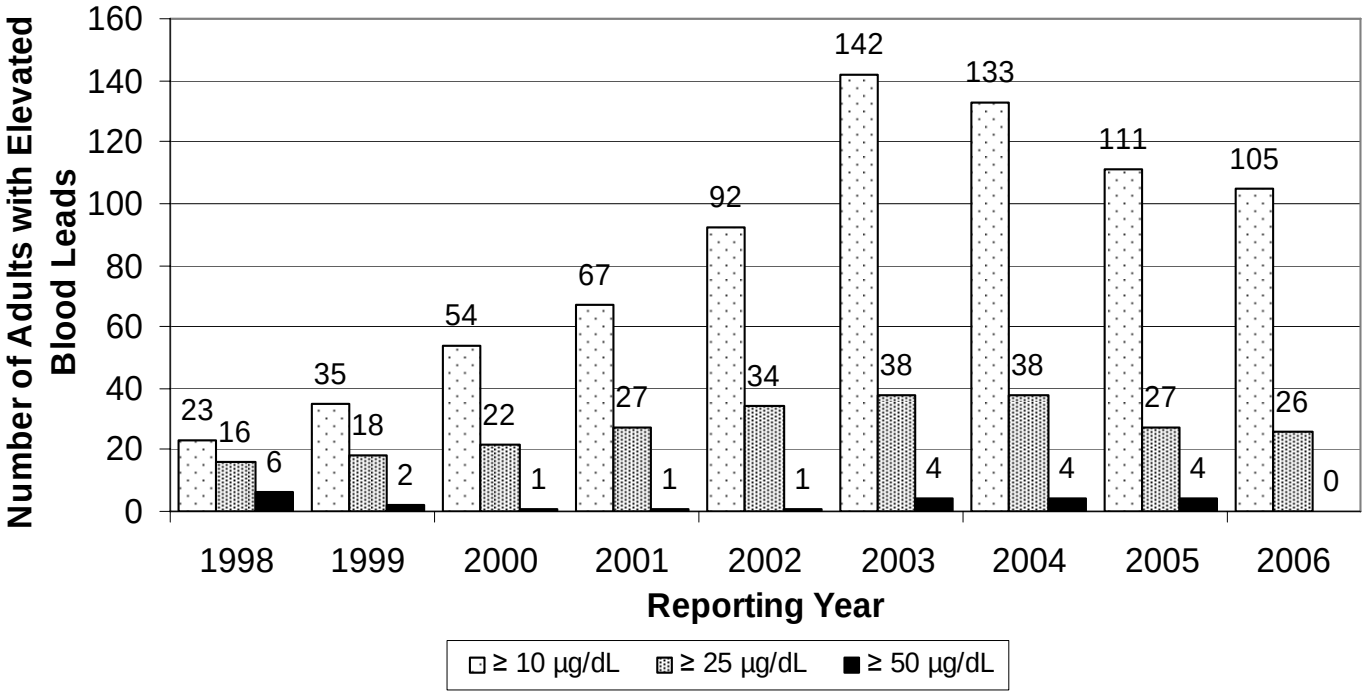
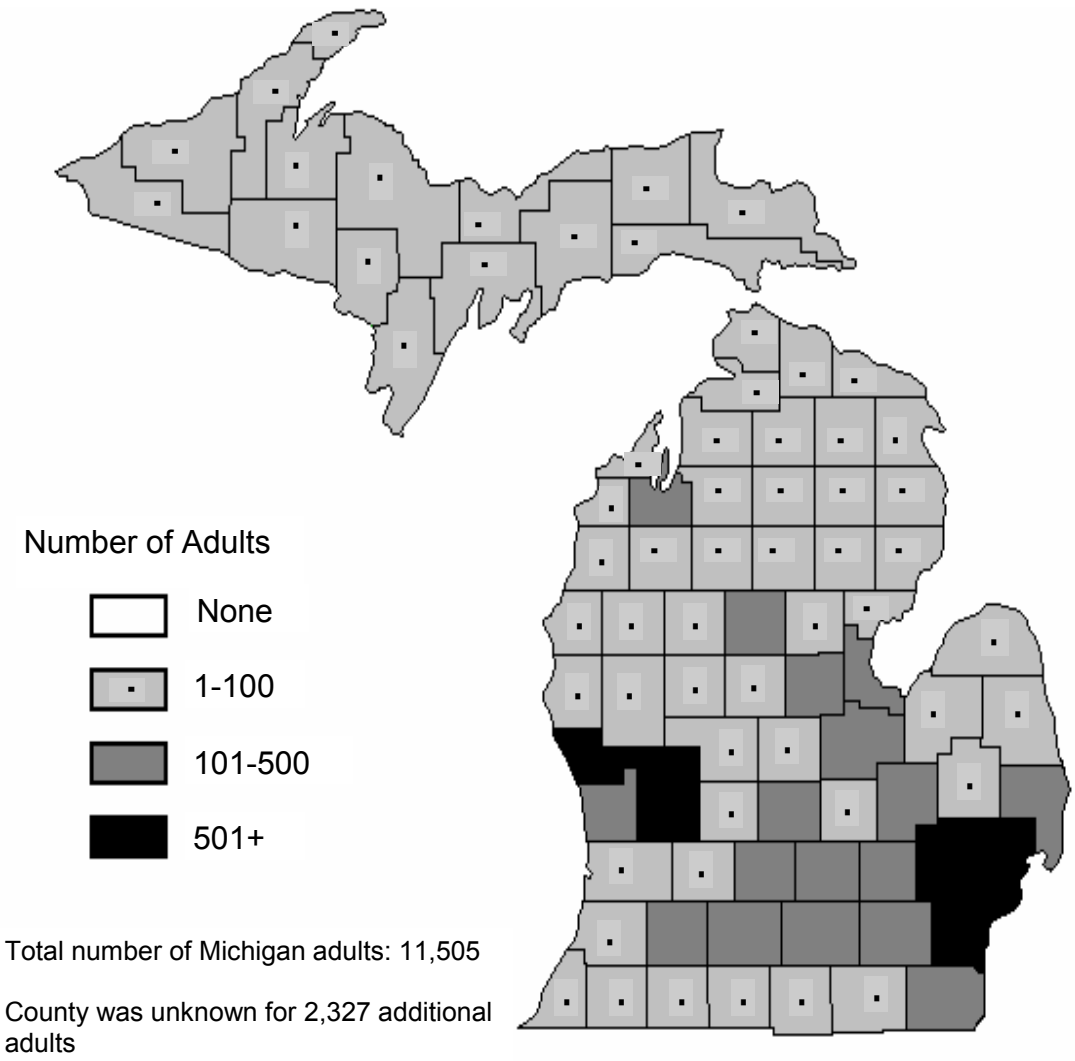


FIGURE 4
Distribution of Adults Tested for Blood Lead in Michigan by County of Residence: 2006

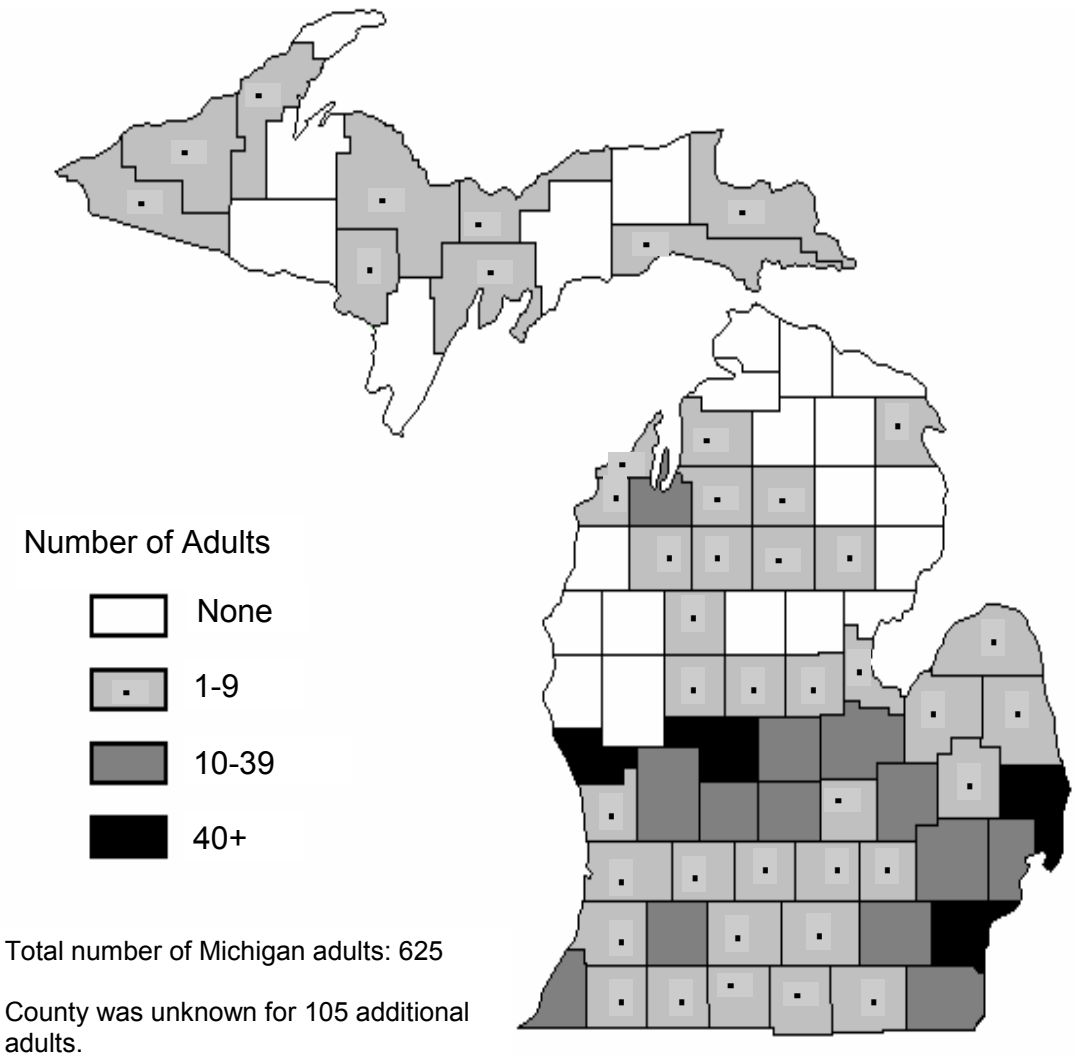


Total number of Michigan adults: 11,505

County was unknown for 2,327 additional adults

Kent and **Wayne** counties had the highest number of adults reported, with 1,426 and 2,134, respectively.

FIGURE 5
Distribution of Adults with Blood Lead Levels (BLLs) ≥10 µg/dL in Michigan by County of Residence: 2006

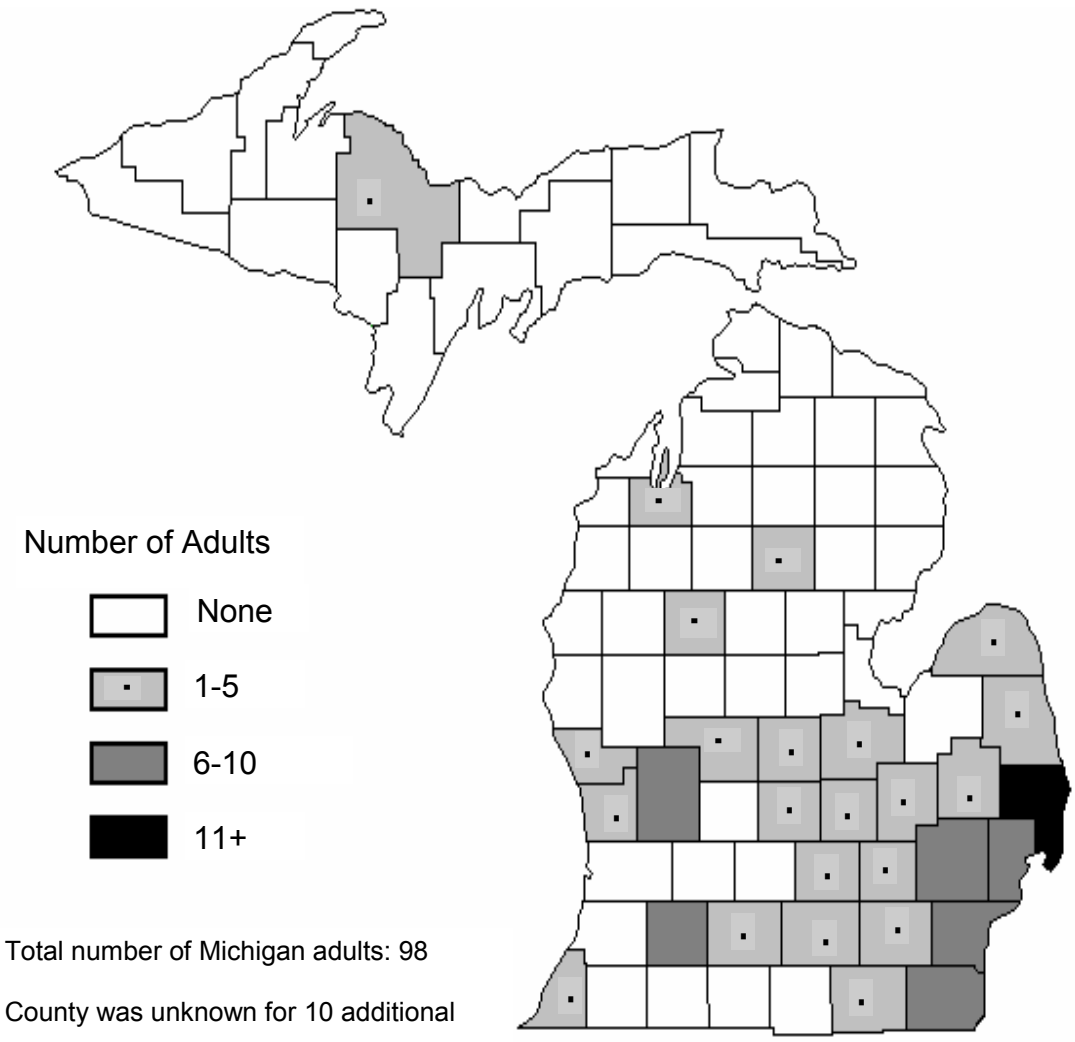


Total number of Michigan adults: 625

County was unknown for 105 additional adults.

St. Clair and **Wayne** counties had the highest number of adults with blood lead levels of 10 µg/dL or greater reported, with 80 and 85, respectively.

FIGURE 6
Distribution of Adults with Blood Lead Levels (BLLs) ≥25 µg/dL in Michigan by County of Residence: 2006

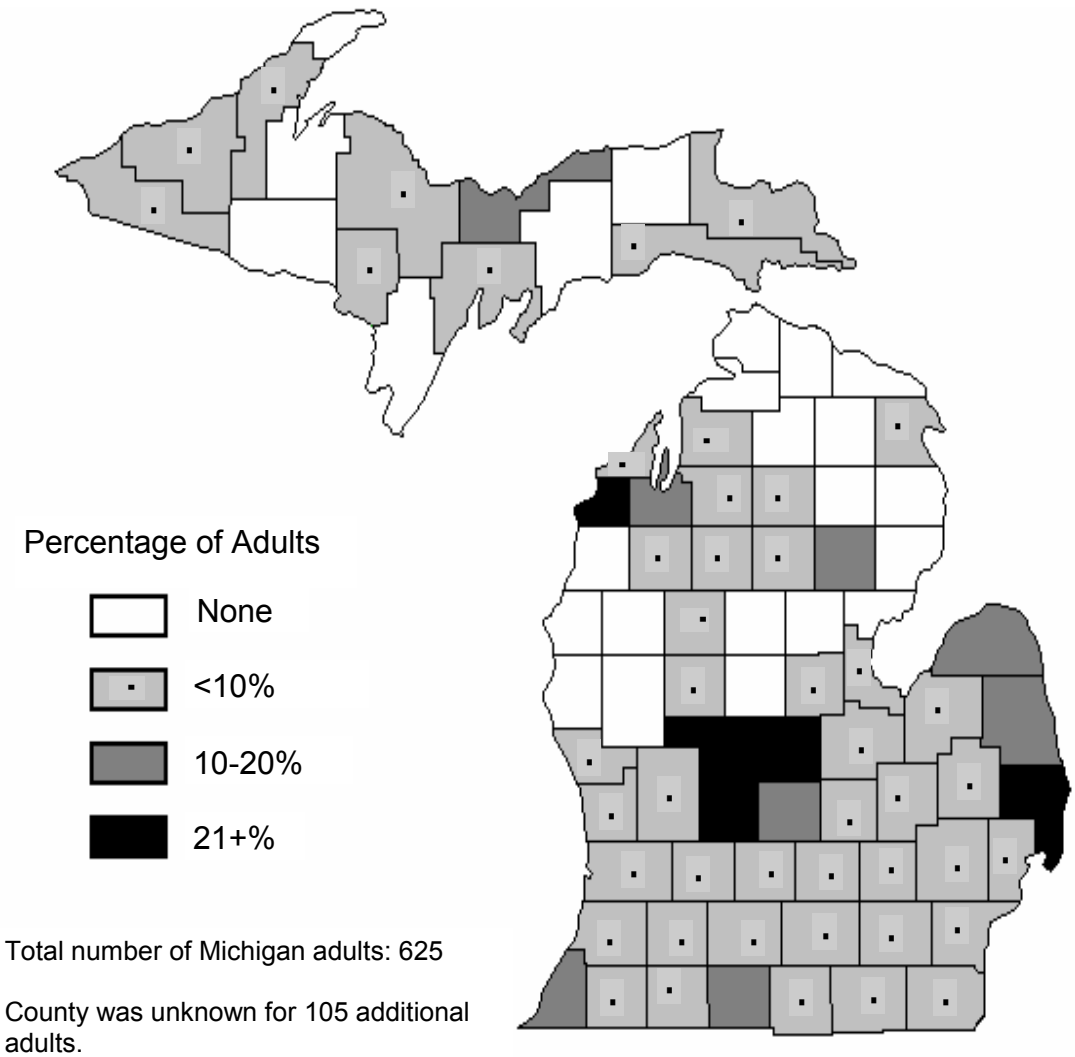


Total number of Michigan adults: 98

County was unknown for 10 additional

St. Clair and **Kalamazoo** counties had the highest number of adults with blood lead levels of 25 µg/dL or greater reported, with 11 and 8 adults, respectively.

FIGURE 7
Percentage of Adults with Blood Lead Levels (BLLs) ≥10 µg/dL in Michigan by County of Residence: 2006*

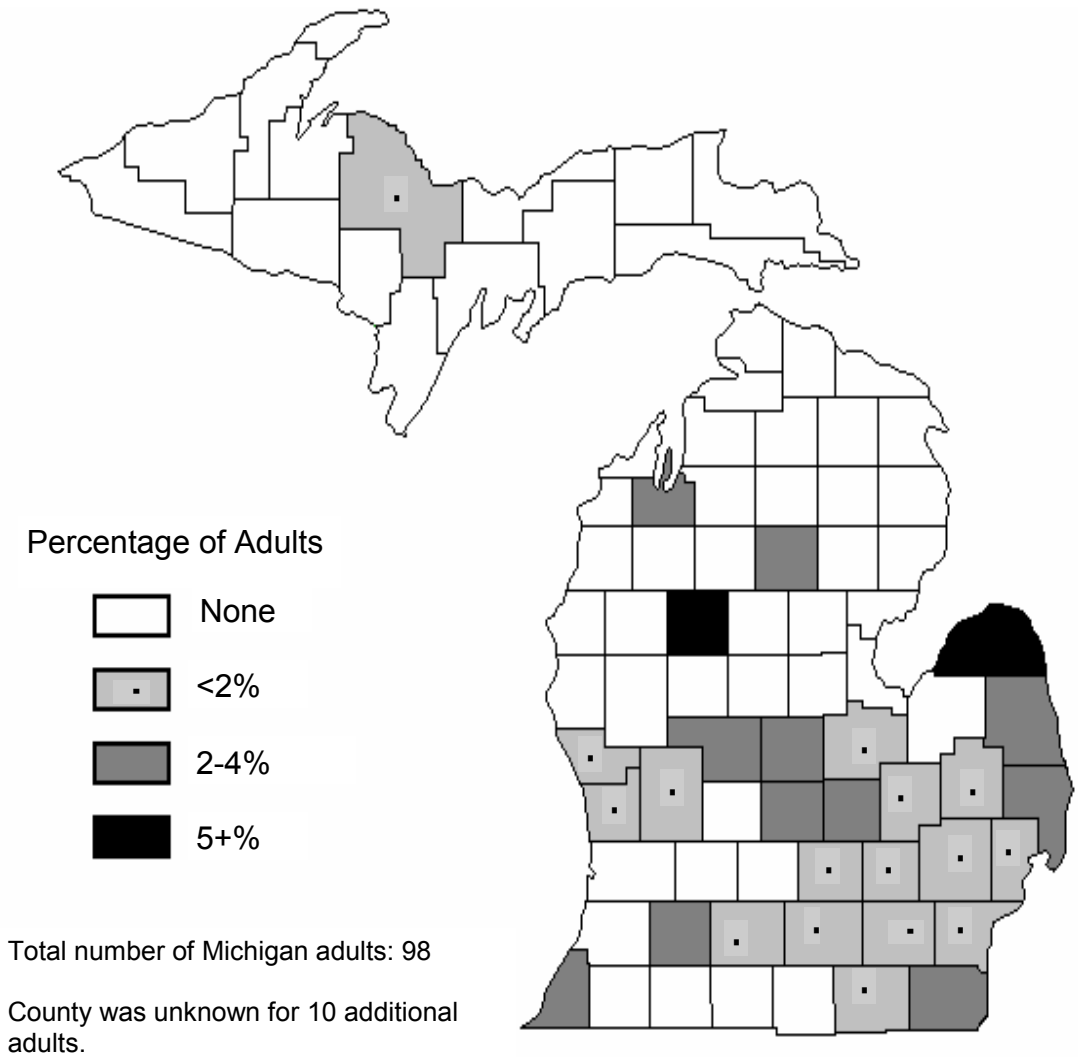


Total number of Michigan adults: 625

County was unknown for 105 additional adults.

* Denominator used was the total number of adults tested for blood lead within each county.

FIGURE 8
Percentage of Adults with Blood Lead Levels (BLLs) ≥25 µg/dL in Michigan by County of Residence: 2006*

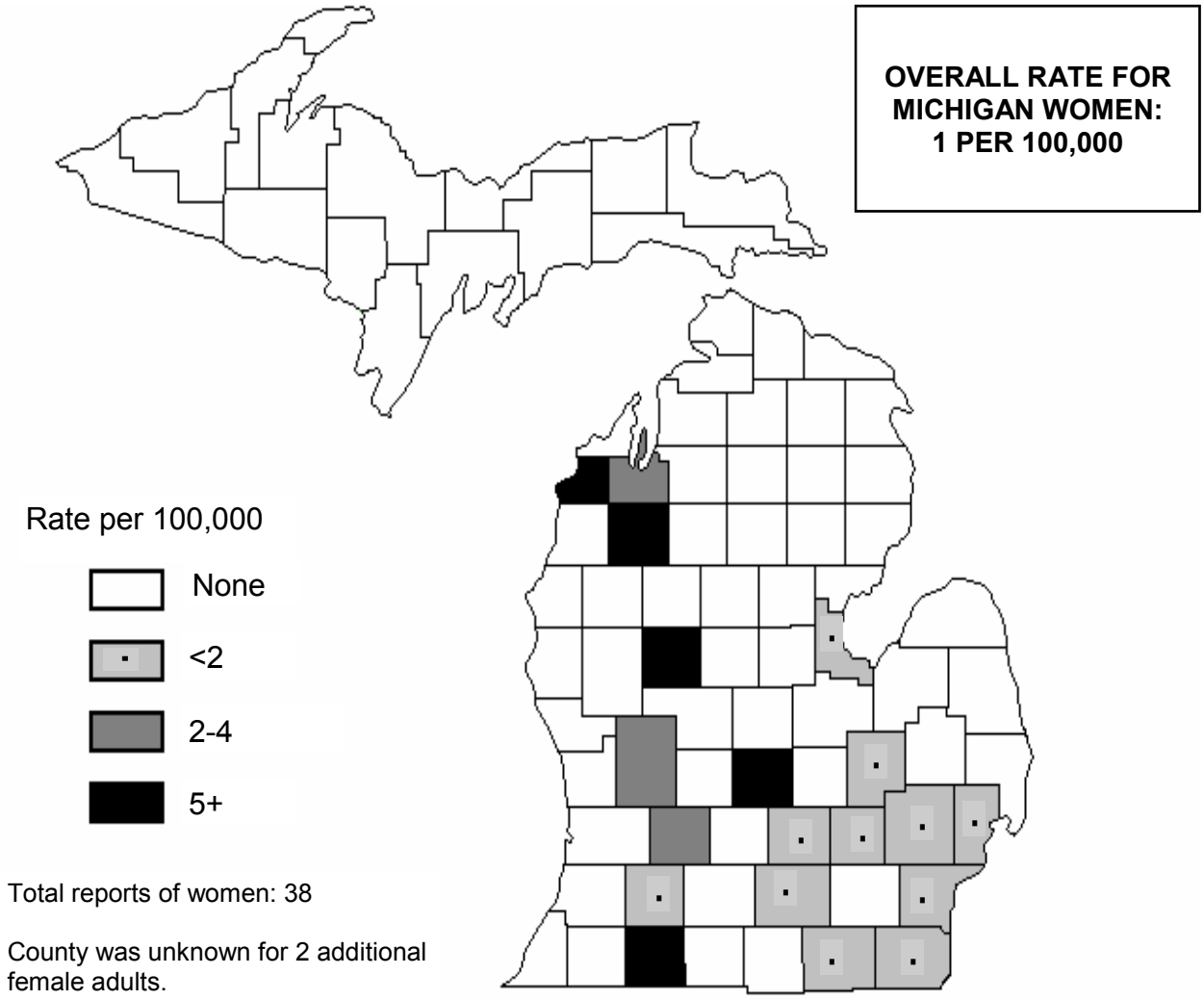


Total number of Michigan adults: 98

County was unknown for 10 additional adults.

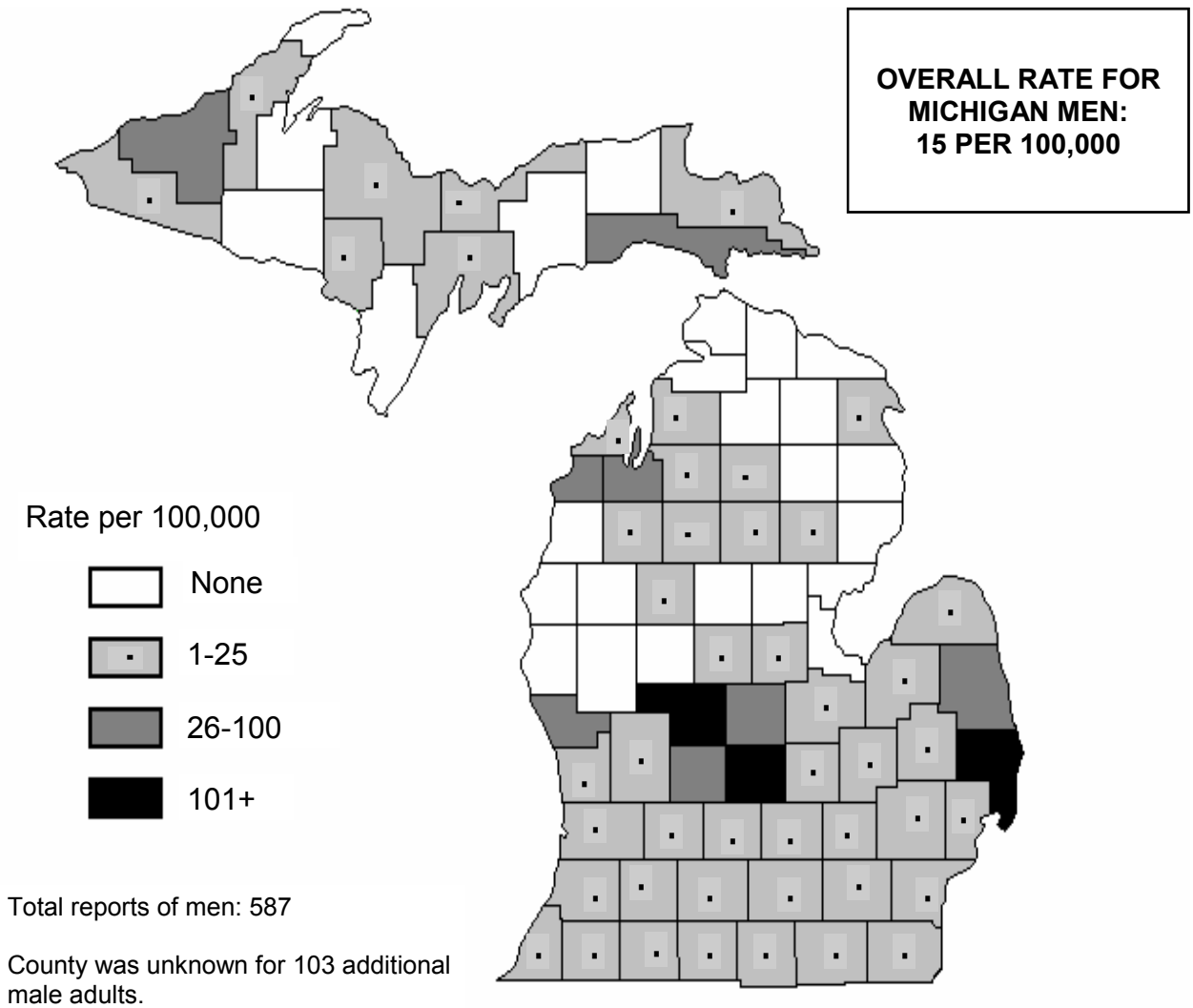
* Denominator used was the total number of adults tested for blood lead within each county.

FIGURE 9
Annual Incidence of Blood Lead Levels (BLLs) ≥10 µg/dL Among Women in Michigan by County of Residence: 2006*



*Rate per 100,000 women age 16+; denominator is the Census County Population Estimates: April 1, 2000 to July 1, 2005.

FIGURE 10
Annual Incidence of Blood Lead Levels (BLLs) ≥10 µg/dL Among Men in Michigan by County of Residence: 2006*

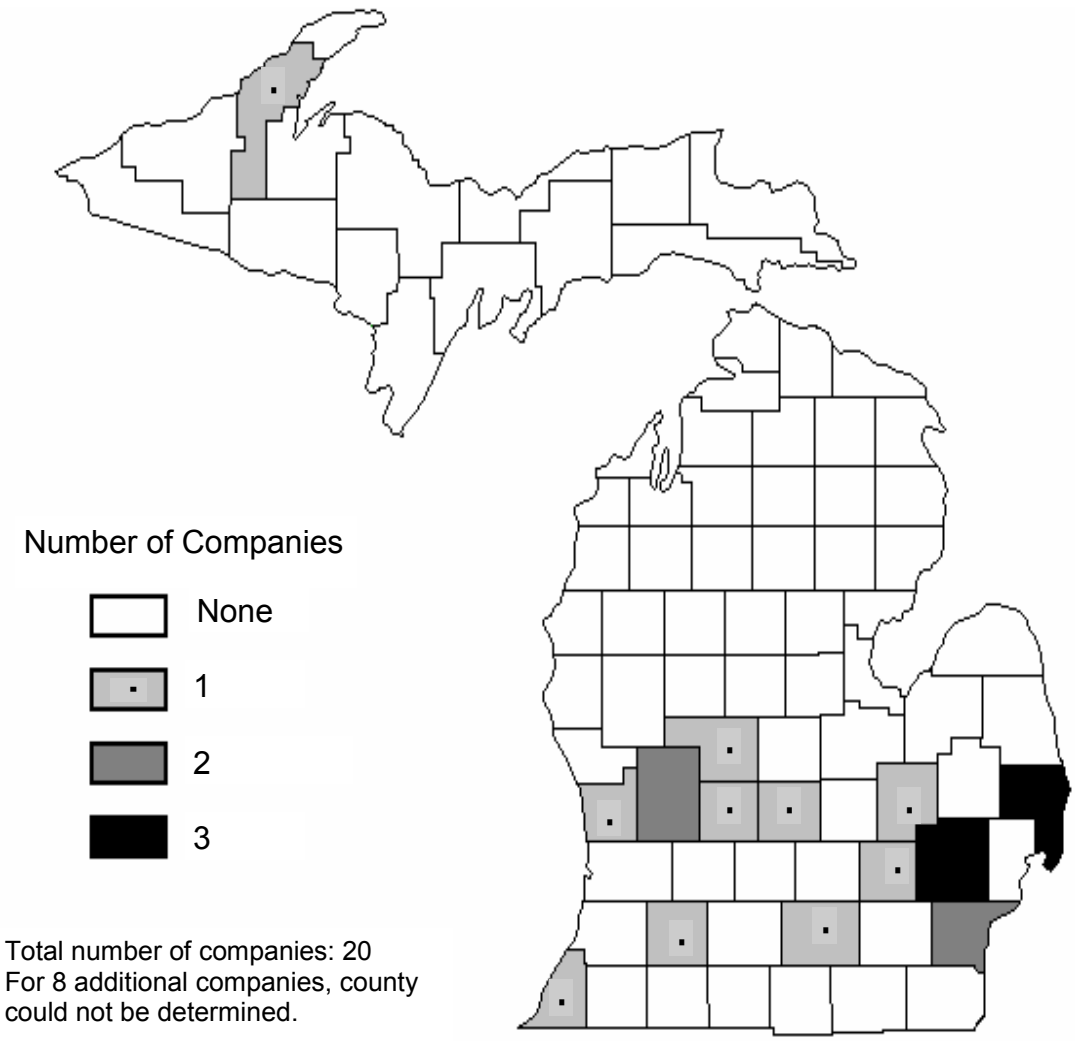


Total reports of men: 587

County was unknown for 103 additional male adults.

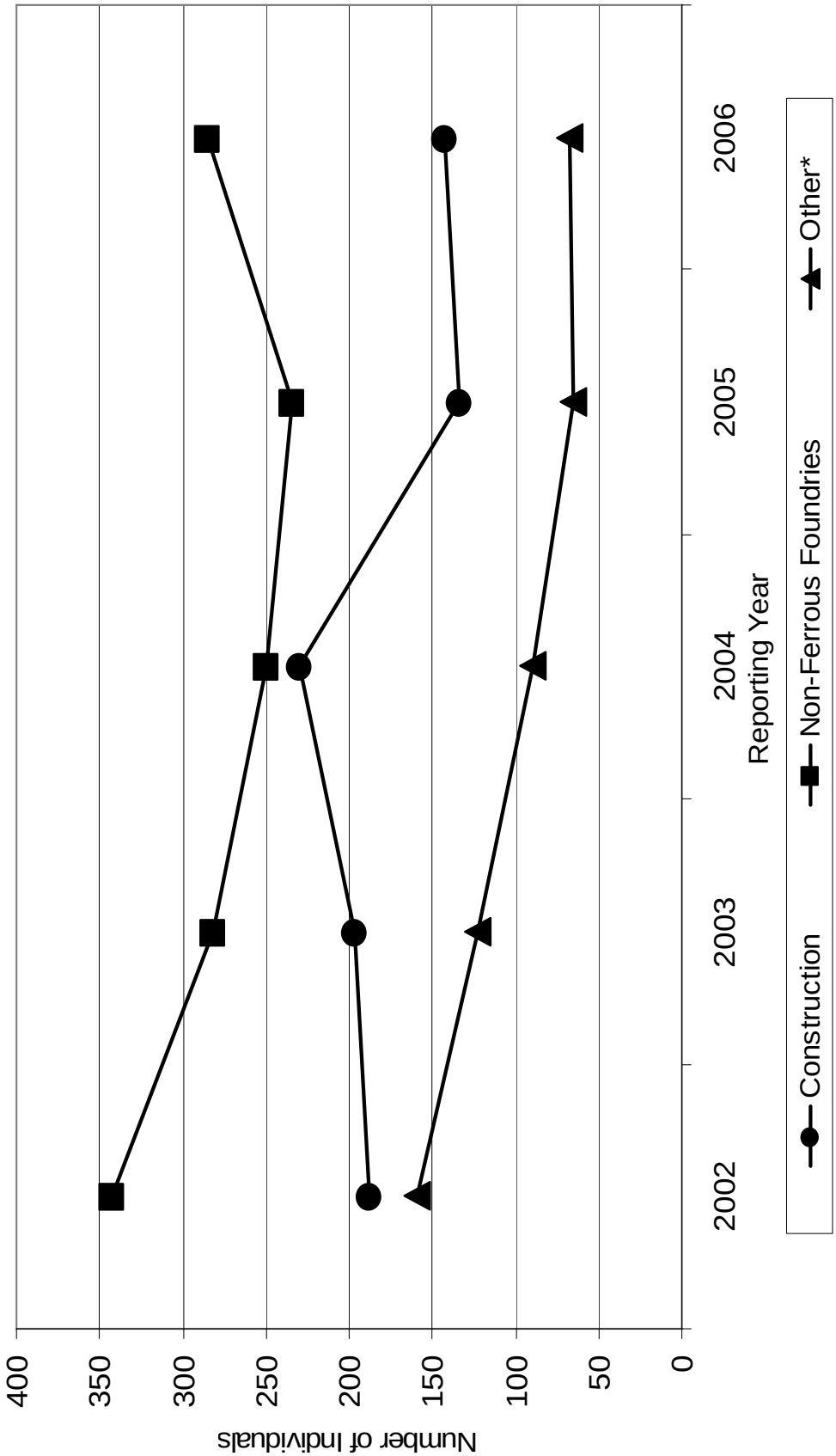
*Rate per 100,000 men age 16+; denominator is the Census County Population Estimates:

FIGURE 11
Geographic Distribution of Non-Construction Companies Reporting Adults with Blood Lead Levels (BLLs) ≥25 µg/dL in Michigan: 2006



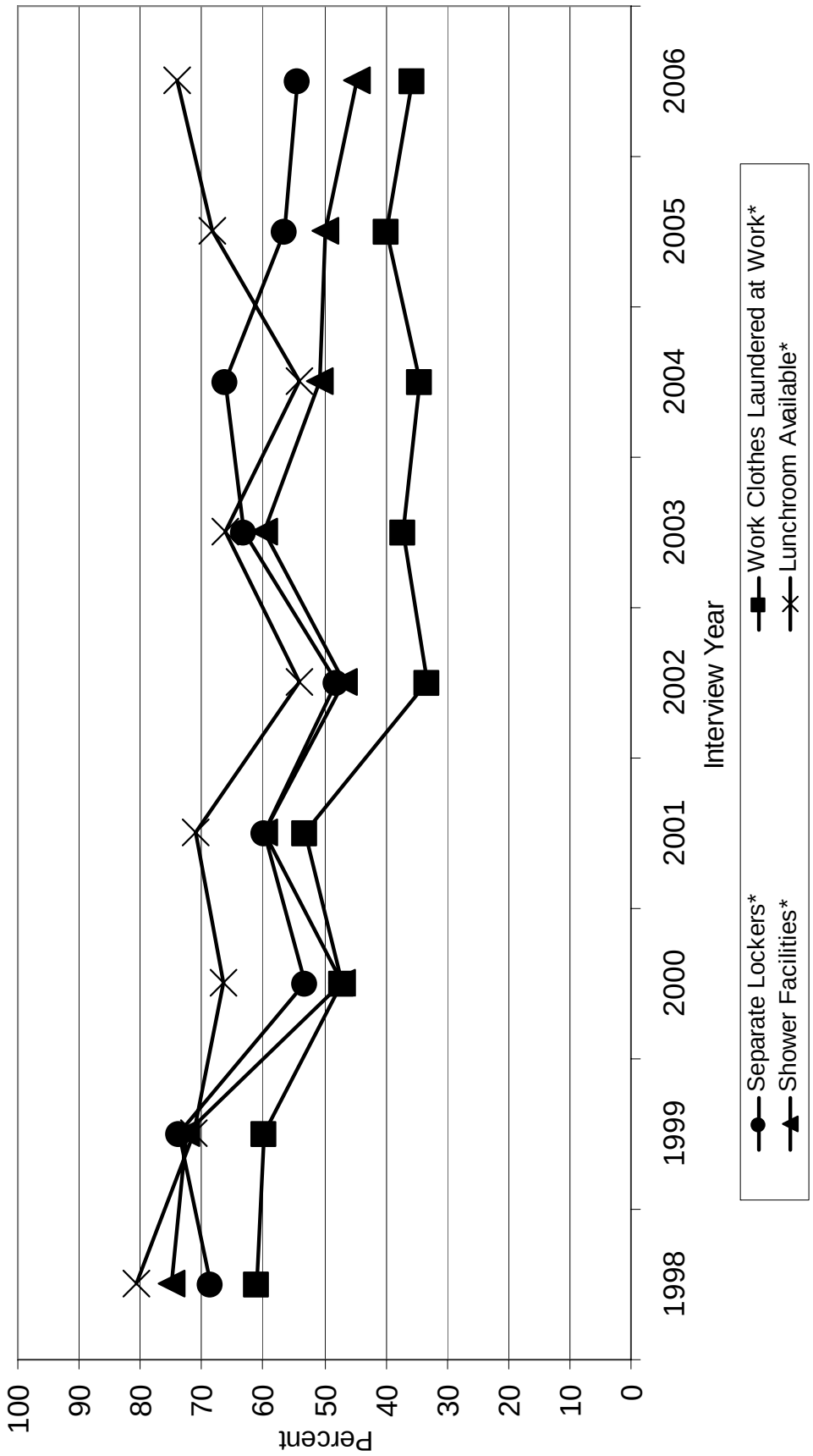
Total number of companies: 20
For 8 additional companies, county could not be determined.

FIGURE 12
Number of Individuals with Blood Lead Levels ≥10 µg/dL by Industry, Where Exposed to Lead in Michigan: 2002-2006



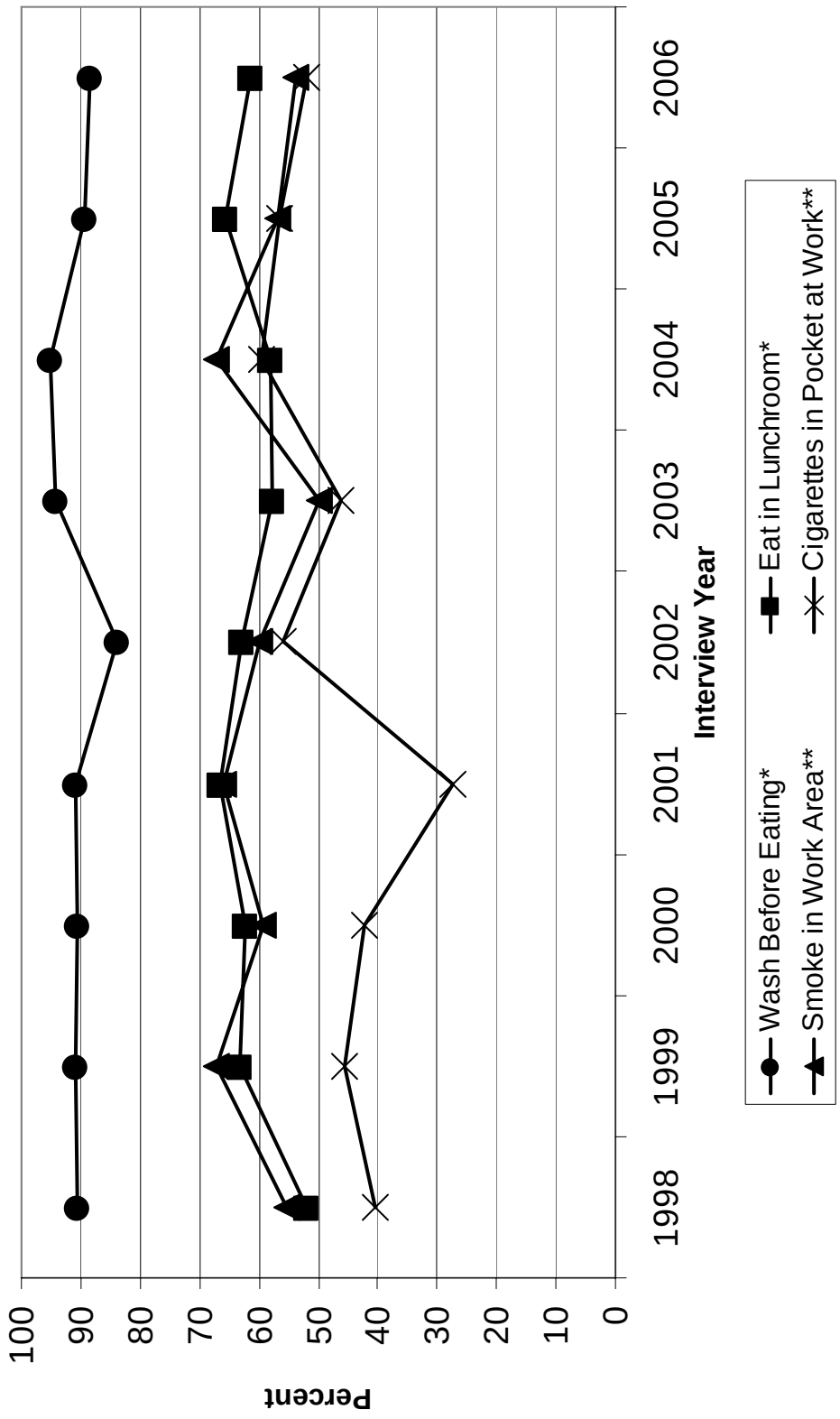
* Including radiator repair, police and retail firing ranges.

FIGURE 13
Percent of Individuals with Blood Lead Levels ≥10 µgdL by Interview Year, Trend of Working Conditions, Michigan: 2002-2006



* Based on positive questionnaire response.

FIGURE 14
Percent of Individuals with Blood Lead Levels ≥10 µg/dL by Interview Year, Trend of Personal Habits, Michigan: 1998-2006



* Based on positive questionnaire responses.
** Based on negative questionnaire responses.

FIGURE 15
Percent of Individuals with Blood Lead Levels ≥10 µg/dL by Interview Year, Trend of Children Being Tested for Blood Lead, Michigan: 1998-2006

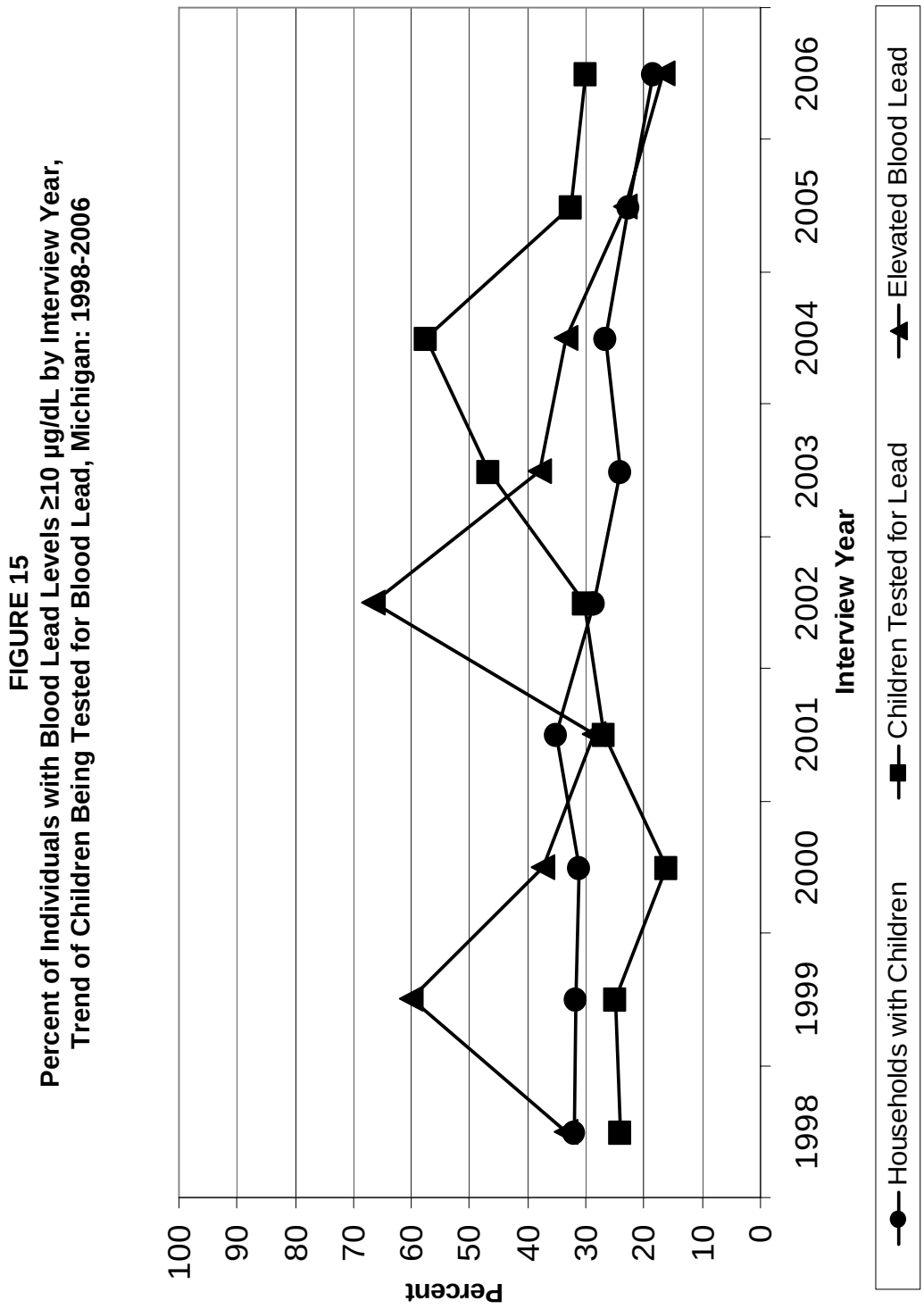


TABLE 1
Distribution of Highest Blood Lead Levels (BLLs) Among Adults and Source of Exposure in Michigan: 2006

	Work BLLs		Non-Work BLLs		Source Not Yet Identified		All BLLs	
BLLs (µg/dL)	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<10	*	*	*	*	*	*	13,102	94.7
10-24	445	85.7	79	75.2	98	92.5	622	4.5
25-29	34	6.6	9	8.6	4	3.8	47	0.3
30-39	22	4.2	13	12.4	4	3.8	39	0.3
40-49	12	2.3	4	3.8	0	0.0	16	0.1
50-59	3	0.6	0	0.0	0	0.0	3	0.0
≥ 60	3	0.6	0	0.0	0	0.0	3	0.0
TOTAL	**519**	**100.0**	**105**	**100.0**	**106**	**100.0**	**13,832 ****	**100.0**

*No follow-up is conducted of individuals with blood leads < 10 ug/dL.
**In 2006, 15,752 BLL reports were received for 13,832 individuals.

TABLE 2
Distribution of Gender Among Adults Tested for Blood Lead in Michigan: 2006

	All Blood Lead Level Tests		Blood Lead Levels ≥10 µg/dL	
Gender	**Number**	**Percent**	**Number**	**Percent**
Male	7,577	54.8	690	94.5
Female	6,253	45.2	40	5.5
Total	**13,830 ***	**100.0**	**730**	**100.0**

*Gender was unknown for 2 additional individuals.

TABLE 3
Distribution of Age Among Adults Tested for Blood Lead in Michigan: 2006

	All Blood Lead Level Tests		Blood Lead Levels ≥10 µg/dL	
Age Range	**Number**	**Percent**	**Number**	**Percent**
16-19	1,347	9.7	10	1.4
20-29	2,590	18.7	103	14.1
30-39	2,427	17.5	133	18.2
40-49	2,898	21.0	211	28.9
50-59	2,416	17.5	189	25.9
60-69	1,072	7.8	65	8.9
70-79	668	4.8	13	1.8
80-89	359	2.6	5	0.7
90-99	52	0.4	1	0.1
100+	3	0.0	0	0.0
TOTAL	**13,832**	**100.0**	**730**	**100.0**

TABLE 4
Distribution of Race Among Adults Tested for Blood Lead in Michigan: 2006

	All Blood Lead Level Tests		Blood Lead Levels ≥10 µg/dL	
Race	**Number**	**Percent**	**Number**	**Percent**
Caucasian	4,583	84.5	494	92.2
African American	701	12.9	29	5.4
Native American	62	1.1	4	0.7
Asian/Pacific Islander	43	0.8	3	0.6
Multiracial/Other	35	0.6	6	1.1
TOTAL	**5,424 ***	**100.0**	**536 ****	**100.0**

*Race was unknown for 8,408 additional individuals.
**Race was unknown for 194 additional individuals.

TABLE 5
Number and Percent of Adults with
All Blood Lead Levels (BLLs), BLLs ≥10 µg/dL and BLLs ≥25 µg/dL,
by County of Residence and
Percent of Adults with BLLs ≥10 µg/dL and BLLs ≥25 µg/dL
Among All Adults Tested for BLLs in Each County of Residence in Michigan: 2006

	All BLLs		BLLs ≥10 µg/dL			BLLs ≥25 µg/dL		
County	Number	Percent	Number	Percent of all BLLs in State	Percent of all BLLs in County	Number	Percent of all BLLs in State	Percent of all BLLs in County
Alcona	11	0.10	0	0.00	0.00	0	0.00	0.00
Alger	10	0.09	1	0.16	10.00	0	0.00	0.00
Allegan	80	0.70	1	0.16	1.25	0	0.00	0.00
Alpena	28	0.24	1	0.16	3.57	0	0.00	0.00
Antrim	23	0.20	1	0.16	4.35	0	0.00	0.00
Arenac	15	0.13	0	0.00	0.00	0	0.00	0.00
Baraga	21	0.18	0	0.00	0.00	0	0.00	0.00
Barry	54	0.47	4	0.64	7.41	0	0.00	0.00
Bay	173	1.50	1	0.16	0.58	0	0.00	0.00
Benzie	9	0.08	3	0.48	33.33	0	0.00	0.00
Berrien	94	0.82	10	1.60	10.64	2	2.04	2.13
Branch	27	0.23	3	0.48	11.11	0	0.00	0.00
Calhoun	153	1.33	2	0.32	1.31	1	1.02	0.65
Cass	12	0.10	1	0.16	8.33	0	0.00	0.00
Charlevoix	23	0.20	0	0.00	0.00	0	0.00	0.00
Cheboygan	25	0.22	0	0.00	0.00	0	0.00	0.00
Chippewa	79	0.69	3	0.48	3.80	0	0.00	0.00
Clare	116	1.01	0	0.00	0.00	0	0.00	0.00
Clinton	158	1.37	29	4.64	18.35	5	5.10	3.16
Crawford	44	0.38	1	0.16	2.27	0	0.00	0.00
Delta	56	0.49	1	0.16	1.79	0	0.00	0.00
Dickinson	26	0.23	1	0.16	3.85	0	0.00	0.00
Eaton	115	1.00	2	0.32	1.74	0	0.00	0.00
Emmet	12	0.10	0	0.00	0.00	0	0.00	0.00
Genesee	435	3.78	22	3.52	5.06	4	4.08	0.92
Gladwin	50	0.43	0	0.00	0.00	0	0.00	0.00
Gogebic	24	0.21	1	0.16	4.17	0	0.00	0.00
Grand Traverse	105	0.91	21	3.36	20.00	3	3.06	2.86
Gratiot	70	0.61	17	2.72	24.29	3	3.06	4.29
Hillsdale	27	0.23	2	0.32	7.41	0	0.00	0.00
Houghton	43	0.37	1	0.16	2.33	0	0.00	0.00
Huron	16	0.14	3	0.48	18.75	1	1.02	6.25
Ingham	367	3.19	9	1.44	2.45	3	3.06	0.82
Ionia	78	0.68	17	2.72	21.79	0	0.00	0.00
Iosco	12	0.10	0	0.00	0.00	0	0.00	0.00
Iron	14	0.12	0	0.00	0.00	0	0.00	0.00
Isabella	60	0.52	2	0.32	3.33	0	0.00	0.00
Jackson	114	0.99	4	0.64	3.51	1	1.02	0.88
Kalamazoo	269	2.34	19	3.04	7.06	8	8.16	2.97
Kalkaska	13	0.11	1	0.16	7.69	0	0.00	0.00
Kent	1,426	12.39	30	4.80	2.10	7	7.14	0.49
Keweenaw	4	0.03	0	0.00	0.00	0	0.00	0.00
Lake	9	0.08	0	0.00	0.00	0	0.00	0.00
Lapeer	62	0.54	2	0.32	3.23	1	1.02	1.61

Continued

TABLE 5 (con't)
Number and Percent of Adults with
All Blood Lead Levels (BLLs), BLLs ≥10 µg/dL and BLLs ≥25 µg/dL,
by County of Residence and
Percent of Adults with BLLs ≥10 µg/dL and BLLs ≥25 µg/dL
Among All Adults Tested for BLLs in Each County of Residence in Michigan: 2006

	All BLLs		BLLs ≥10 µg/dL			BLLs ≥25 µg/dL		
County	Number	Percent	Number	Percent of all BLLs in State	Percent of all BLLs in County	Number	Percent of all BLLs in State	Percent of all BLLs in County
Leelanau	18	0.16	1	0.16	5.56	0	0.00	0.00
Lenawee	85	0.74	6	0.96	7.06	1	1.02	1.18
Livingston	214	1.86	7	1.12	3.27	3	3.06	1.40
Luce	9	0.08	0	0.00	0.00	0	0.00	0.00
Mackinac	42	0.37	4	0.64	9.52	0	0.00	0.00
Macomb	820	7.13	33	5.28	4.02	6	6.12	0.73
Manistee	20	0.17	0	0.00	0.00	0	0.00	0.00
Marquette	51	0.44	1	0.16	1.96	1	1.02	1.96
Mason	17	0.15	0	0.00	0.00	0	0.00	0.00
Mecosta	29	0.25	1	0.16	3.45	0	0.00	0.00
Menominee	13	0.11	0	0.00	0.00	0	0.00	0.00
Midland	113	0.98	3	0.48	2.65	0	0.00	0.00
Missaukee	12	0.10	1	0.16	8.33	0	0.00	0.00
Monroe	263	2.29	13	2.08	4.94	6	6.12	2.28
Montcalm	145	1.26	51	8.16	35.17	4	4.08	2.76
Montmorency	14	0.12	0	0.00	0.00	0	0.00	0.00
Muskegon	670	5.82	41	6.56	6.12	3	3.06	0.45
Newaygo	28	0.24	0	0.00	0.00	0	0.00	0.00
Oakland	821	7.14	26	4.16	3.17	7	7.14	0.85
Oceana	25	0.22	0	0.00	0.00	0	0.00	0.00
Ogemaw	8	0.07	1	0.16	12.50	0	0.00	0.00
Ontonagon	13	0.11	1	0.16	7.69	0	0.00	0.00
Osceola	16	0.14	1	0.16	6.25	1	1.02	6.25
Oscoda	11	0.10	0	0.00	0.00	0	0.00	0.00
Otsego	23	0.20	0	0.00	0.00	0	0.00	0.00
Ottawa	153	1.33	9	1.44	5.88	2	2.04	1.31
Presque Isle	10	0.09	0	0.00	0.00	0	0.00	0.00
Roscommon	41	0.36	2	0.32	4.88	2	2.04	4.88
Saginaw	115	1.00	10	1.60	8.70	1	1.02	0.87
Saint Clair	315	2.74	80	12.80	25.40	11	11.22	3.49
Saint Joseph	33	0.29	3	0.48	9.09	0	0.00	0.00
Sanilac	42	0.37	6	0.96	14.29	1	1.02	2.38
Schoolcraft	13	0.11	0	0.00	0.00	0	0.00	0.00
Shiawassee	99	0.86	7	1.12	7.07	2	2.04	2.02
Tuscola	39	0.34	1	0.16	2.56	0	0.00	0.00
Van Buren	72	0.63	1	0.16	1.39	0	0.00	0.00
Washtenaw	352	3.06	11	1.76	3.13	1	1.02	0.28
Wayne	2,134	18.55	85	13.60	3.98	7	7.14	0.33
Wexford	45	0.39	3	0.48	6.67	0	0.00	0.00
TOTAL	**11,505 ***	**100.00**	**625 ****	**100.00**	**5.43**	**98 *****	**100.00**	**0.85**

* County was unknown for 2,327 additional adults.
** County was unknown for 105 additional adults.
*** County was unknown for 10 additional adults.

TABLE 6
Annual Incidence of Blood Lead Levels ≥ 10µg/dL Among Women in Michigan
By County of Residence: 2006

County	Number Reported	Michigan Population Women	Rate per 100,000 women
Barry	1	23,697	4
Bay	1	45,225	2
Benzie	1	7,266	14
Clinton	2	27,545	7
Genesee	4	179,213	2
Grand Traverse	1	34,448	3
Ingham	2	116,409	2
Jackson	1	62,933	2
Kalamazoo	1	99,760	1
Kent	7	229,839	3
Lenawee	1	40,471	2
Livingston	1	70,534	1
Macomb	1	337,575	0
Mecosta	1	17,148	6
Monroe	1	61,270	2
Oakland	2	489,491	0
St Joseph	2	24,434	8
Wayne	7	795,715	1
Wexford	1	12,829	8
TOTAL	**38***	**4,059,476 ****	1 ***

* County was unknown for 2 additional female adults.
** Total number of women in all 83 counties of Michigan age 16+ years; Census County Population Estimates: April 1, 2000 to July 1, 2005.
*** Rate per 100,000 women, age 16+ years.

TABLE 7
Annual Incidence of Blood Lead Levels ≥10 µg/dL Among Men in Michigan by County of Residence: 2006

County	Number Reported	Michigan Population Men	Rate per 100,000 Men
Alcona	0	4,977	0
Alger	1	4,443	23
Allegan	1	43,379	2
Alpena	1	12,022	8
Antrim	1	9,811	10
Arenac	0	7,236	0
Baraga	0	3,901	0
Barry	3	23,335	13
Bay	0	41,843	0
Benzie	2	7,008	29
Berrien	10	60,327	17
Branch	3	18,680	16
Calhoun	2	51,893	4
Cass	1	20,583	5
Charlevoix	0	10,398	0
Cheboygan	0	10,991	0
Chippewa	3	18,205	16
Clare	0	12,399	0
Clinton	27	26,685	101
Crawford	1	6,317	16
Delta	1	15,302	7
Dickinson	1	10,903	9
Eaton	2	41,245	5
Emmet	0	12,965	0
Genesee	18	160,097	11
Gladwin	0	10,872	0
Gogebic	1	7,516	13
Grand Traverse	20	32,999	61
Gratiot	17	18,031	94
Hillsdale	2	18,362	11
Houghton	1	16,188	6
Huron	3	13,809	22
Ingham	7	106,099	7
Ionia	17	27,750	61
Iosco	0	10,821	0
Iron	0	5,115	0
Isabella	2	25,664	8
Jackson	3	65,455	5
Kalamazoo	18	90,835	20
Kalkaska	1	6,771	15
Kent	23	220,077	10
Keweenaw	0	944	0
Lake	0	5,298	0
Lapeer	2	37,124	5
Leelanau	1	9,028	11
Lenawee	5	40,164	12
Livingston	6	71,219	8
Luce	0	3,220	0
Mackinac	4	4,674	86
Macomb	32	318,356	10
Manistee	0	10,484	0
Marquette	1	26,925	4
Mason	0	11,358	0
Mecosta	0	17,559	0
Menominee	0	10,005	0
Midland	3	32,027	9
Missaukee	1	5,963	17
Monroe	12	59,603	20
Montcalm	51	25,517	200
Montmorency	0	4,295	0
Muskegon	41	66,467	62
Newaygo	0	19,148	0
Oakland	24	461,409	5
Oceana	0	11,065	0
Ogemaw	1	8,787	11
Ontonagon	1	3,157	32
Osceola	1	9,132	11
Oscoda	0	3,692	0
Otsego	0	9,625	0
Ottawa	9	95,398	9
Presque Isle	0	5,921	0
Roscommon	2	10,685	19
Saginaw	10	76,517	13
Saint Clair	80	65,894	121
Saint Joseph	1	23,755	4
Sanilac	6	17,243	35
Schoolcraft	0	3,632	0
Shiawassee	7	27,786	25
Tuscola	1	22,682	4
Van Buren	1	29,925	3
Washtenaw	11	136,787	8
Wayne	78	708,851	11
Wexford	2	12,371	16
TOTAL	**587 ***	**3,835,001 ****	15 ***

* County was unknown for 103 additional male adults.

** Total number of men in all 83 counties of Michigan age 16+ years; Census County Population Estimates: April 1, 2000 to July 1, 2005.

*** Rate per 100,000 men, age 16+ years.

TABLE 8
Source of Exposure Among Adults with Blood Lead Levels ≥10 µg/dL in Michigan: 2006

Exposure Source Description	Number	Percent
Work-Related	519	83.2
Hobby: Firearms, Reloading, Casting	78	12.5
Remodeling	10	1.6
Gun Shot Wound	4	0.6
Hobby: Leather Tooling, Radios, Car Racing, Sculpture	4	0.6
Hobby: Sinkers	3	0.5
Hobby: Stained Glass	2	0.3
Food	2	0.3
Lead Paint Ingestion	2	0.3
TOTAL	**624 ***	**100.0**

*Patient interviews were attempted on 515 individuals; no patient interviews were attempted with 109 individuals, instead source was obtained from laboratory reporting form. For 60 additional adults source is pending an interview; for 22 additional adults source is pending medical records review; for 23 additional adults source was inconclusive based on interview; for 1 additional adult source was inconclusive and no patient interview was attempted.

TABLE 9
Industries Where Individuals with Blood Lead Levels ≥10 µg/dL Were Exposed to Lead in Michigan: 2006

	Work-Exposed Individuals (BLL ≥ 10 µg/dL)	
Industry (SIC Code)*	**Number**	**Percent**
Construction (15-17)	***143***	***28.9***
Painting (17)	119	
Manufacturing (20-39)	***285***	***57.6***
Fabricated and Primary Metals (33-34)	257	
Transportation and Public Utilities (40-49)	***24***	***4.8***
Wholesale and Retail Trade (50-59)	***10***	***2.0***
Services (70-89)	***25***	***5.1***
Automotive Repair Services (75)	12	
Public Administration (91-97)	***8***	***1.6***
Justice, Public Order, Safety (92)	6	
TOTAL	**495****	***100.0***

*Standard Industrial Classification.
**Another 24 were work-related, however, the industry was unknown.

TABLE 10
Demographic Characteristics of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, by Highest Reported Blood Lead Level (µg/dL)

Demographic Characteristics	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Male	639	(87.8)	194	(92.4)	260	(94.9)	83	(92.2)	33	(97.1)	14	(93.3)	1223	(90.5)
Female	89	(12.2)	16	(7.6)	14	(5.1)	7	(7.8)	1	(2.9)	1	(6.7)	128	(9.5)
Hispanic Origin	40	(5.7)	8	(4.1)	9	(3.4)	12	(13.8)	1	(3.0)	0	--	70	(5.4)
Caucasian	617	(86.1)	184	(88.9)	237	(87.5)	78	(86.7)	31	(91.2)	12	(80.0)	1159	(86.9)
African American	62	(8.6)	10	(4.8)	19	(7.0)	6	(6.7)	3	(8.8)	3	(20.0)	103	(7.7)
Asian/Pacific Islander	3	(0.4)	1	(0.5)	2	(0.7)	0	--	0	--	0	--	6	(0.4)
Native American/Alaskan	6	(0.8)	4	(1.9)	8	(3.0)	0	--	0	--	0	--	18	(1.3)
Other	29	(4.0)	8	(3.9)	5	(1.8)	6	(6.7)	0	--	0	--	48	(3.6)
Average Age	48	n=728	47	n=210	48	n=274	50	n=90	50	n=34	42	n=15	48	n=1351
Ever Smoked	460	(64.8)	149	(73.8)	184	(72.4)	61	(72.6)	25	(83.3)	8	(66.7)	887	(68.7)*
Now Smoke**	227	(48.6)	81	(54.0)	129	(69.4)	43	(69.4)	20	(80.0)	6	(75.0)	506	(56.3)*

* P = <0.05 for linear trend.

** The percentages of *now smoke* are calculated using the denominator of those who *ever smoked*.

TABLE 11
Highest Education Level of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Highest Education Level	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		≥40 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
7th Grade or Less	15	(2.3)	3	(2.2)	3	(2.3)	3	(4.8)	24	(2.4)
8th-11th Grade	86	(13.0)	6	(4.3)	18	(13.6)	12	(19.0)	122	(12.3)
High School Graduate	222	(33.6)	52	(37.7)	50	(37.9)	16	(25.4)	340	(34.2)
1-3 Years College/Technical School	214	(32.4)	56	(40.6)	37	(28.0)	20	(31.7)	327	(32.9)
4 or more years College/Technical School	123	(18.6)	21	(15.2)	24	(18.2)	12	(19.0)	180	(18.1)
TOTAL	660	(99.9*)	138	(100)	132	(100)	63	(99.9*)	993	(99.9*)

*Percentages do not add to 100 due to rounding.

TABLE 12
Symptoms of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Symptoms	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
GASTRO-INTESTINAL														
Lost 10+ lbs without diet	72	(10.1)	14	(6.9)	32	(11.9)	20	(22.5)	6	(18.8)	3	(23.1)	147	(11.2)*
Continued loss of appetite	79	(11.0)	19	(9.3)	38	(14.0)	19	(21.3)	7	(21.2)	3	(21.4)	165	(12.4)*
Pains in belly	122	(16.9)	21	(10.2)	44	(16.4)	23	(25.6)	9	(27.3)	3	(21.4)	222	(16.7)
MUSCULOSKELETAL														
Frequent pain/soreness	254	(35.5)	69	(33.8)	101	(37.4)	44	(50.6)	14	(42.4)	7	(50.0)	489	(37.0)*
Muscle weakness	173	(24.3)	27	(13.2)	51	(19.2)	31	(35.2)	12	(36.4)	7	(50.0)	301	(22.9)
NERVOUS														
Headaches	118	(16.3)	27	(13.0)	58	(21.3)	24	(26.7)	10	(29.4)	5	(35.7)	242	(18.1)*
Dizziness	74	(10.3)	14	(6.8)	16	(6.0)	12	(13.5)	4	(12.1)	5	(35.7)	125	(9.4)
Depressed	112	(15.7)	21	(10.3)	40	(15.0)	14	(15.9)	10	(29.4)	6	(42.9)	203	(15.4)
Tired	281	(39.3)	66	(32.0)	129	(47.8)	51	(57.3)	20	(58.8)	8	(57.1)	555	(41.8)*
Nervous	103	(14.4)	21	(10.3)	44	(16.6)	20	(22.2)	10	(30.3)	6	(42.9)	204	(15.5)*
Waking up at night	214	(29.8)	42	(20.4)	91	(33.8)	32	(36.0)	15	(44.1)	5	(38.5)	399	(30.0)*
Nightmares	49	(6.8)	4	(2.0)	12	(4.5)	5	(5.7)	4	(12.1)	3	(21.4)	77	(5.8)
Irritable	145	(20.3)	45	(22.2)	74	(27.6)	29	(32.6)	14	(42.4)	7	(50.0)	314	(23.8)*
Unable to concentrate	119	(16.7)	23	(11.3)	55	(20.3)	16	(18.4)	9	(26.5)	4	(28.6)	226	(17.1)
REPRODUCTIVE														
Unable to have an erection	8	(17.8)	5	(8.2)	10	(8.1)	5	(12.8)	7	(36.8)	0	--	35	(11.9)
Trouble having a child	29	(4.1)	13	(6.5)	13	(5.0)	1	(1.2)	0	--	1	(8.3)	57	(4.4)
Gastro-Intestinal Symptoms	180	(24.9)	36	(17.4)	70	(25.6)	35	(38.9)	14	(41.2)	6	(42.9)	341	(25.4)*
Musculoskeletal Symptoms	289	(40.2)	72	(35.1)	109	(40.4)	49	(55.1)	16	(48.5)	8	(57.1)	543	(40.8)*
Nervous Symptoms	410	(56.8)	101	(48.8)	174	(64.0)	59	(65.6)	25	(73.5)	8	(57.1)	777	(58.0)*
Reproductive Symptoms	33	(45.8)	15	(21.4)	20	(15.4)	4	(10.0)	2	(10.5)	1	(14.3)	75	(22.2)*
Any Symptoms	482	(66.6)	127	(61.4)	186	(68.1)	68	(75.6)	28	(82.4)	9	(64.3)	900	(67.1)
Average Number Symptoms	2.7	n=724	2.1	n=207	2.9	n=273	3.8	n=90	4.3	n=34	5.2	n=14	2.8	n=1342

*P= < 0.05 for linear trend.

TABLE 13
Lead Related Health Conditions of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Lead Related Disease	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Anemia	43	(6.1)	4	(2.0)	11	(4.2)	7	(8.1)	2	(6.1)	1	(8.3)	68	(5.3)
Kidney Disease	20	(2.8)	1	(0.5)	5	(1.9)	2	(2.2)	1	(3.1)	0	--	29	(2.2)
High Blood Pressure	36	(5.1)	11	(5.4)	28	(10.5)	13	(15.5)	4	(12.5)	1	(7.7)	93	(7.1)*
Hearing Loss	127	(24.5)	23	(31.9)	20	(29.0)	5	(21.7)	1	(16.7)	1	(25.0)	177	(25.6)

*P= < 0.05 for linear trend.

TABLE 14
Industry of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Standard Industrial Classification	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Construction, Building (15)	6	(1.5)	1	(0.6)	0	--	0	--	0	--	0	--	7	(0.8)
Construction, Heavy (16)	13	(3.2)	1	(0.6)	2	(0.9)	0	--	0	--	0	--	16	(1.8)
Special Trade Construction (17)	145	(35.2)	39	(24.4)	73	(33.2)	29	(43.9)	13	(44.8)	6	(46.2)	305	(33.9)
Food and Kindred Products (20)	0	--	1	(0.6)	0	--	0	--	0	--	0	--	1	(0.1)
Lumber and Wood (24)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Furniture and Fixtures (25)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Printing and Publishing (27)	1	(0.2)	0	--	1	(0.5)	0	--	0	--	0	--	2	(0.2)
Stone/Clay/Glass (32)	8	(1.9)	3	(1.9)	4	(1.8)	3	(3.0)	0	--	0	--	17	(1.9)
Primary Metals Industry (33)	39	(9.5)	51	(31.9)	84	(38.2)	22	(33.3)	8	(27.6)	4	(30.8)	208	(23.1)
Fabricated Metal Products (34)	30	(7.3)	18	(11.3)	18	(8.2)	5	(7.6)	0	--	0	--	71	(7.9)
Industrial, Commercial Machinery (35)	10	(2.4)	3	(1.9)	5	(2.3)	1	(1.5)	2	(6.9)	1	(7.7)	22	(2.4)
Electronics (36)	12	(2.9)	1	(0.6)	0	--	0	--	0	--	0	--	13	(1.4)
Transportation Equipment (37)	13	(3.2)	3	(1.9)	5	(2.3)	2	(3.0)	1	(3.4)	0	--	24	(2.7)
Measuring, Analyzing, Crtl Instr. (38)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Misc. Manufacturing Industries (39)	2	(0.5)	1	(0.6)	0	--	0	--	0	--	0	--	3	(0.3)
Railroad Transportation (40)	1	(0.2)	3	(1.9)	3	(1.4)	0	--	0	--	0	--	7	(0.8)
Motor Freight Trans, Warehousing (42)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Water Transportation (44)	2	(0.5)	0	--	0	--	0	--	0	--	0	--	2	(0.2)
Trans., Electric, Gas & San. Svcs. (49)	16	(3.9)	4	(2.5)	2	(0.9)	1	(1.5)	0	--	0	--	23	(2.6)
Wholesale-Durable Goods (50)	8	(1.9)	1	(0.6)	1	(0.5)	0	--	0	--	0	--	10	(1.1)
Building Materials, Hardware (52)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Automotive Dealers, Gas (55)	1	(0.2)	3	(1.9)	1	(0.5)	0	--	0	--	0	--	5	(0.6)
Other Retail Trade (59)	3	(0.7)	0	--	1	(0.5)	0	--	0	--	0	--	4	(0.4)
Depository Institutions (60)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Finance, Insurance, Real Estate (65)	2	(0.5)	0	--	0	--	0	--	0	--	0	--	2	(0.2)
Business Services (73)	6	(1.5)	0	--	0	--	0	--	0	--	0	--	6	(0.7)
Automotive Repair Services (75)	18	(4.4)	7	(4.4)	5	(2.3)	4	(6.1)	2	(6.9)	0	--	36	(4.0)
Misc. Repair Services (76)	5	(1.2)	1	(0.6)	3	(1.4)	0	--	0	--	0	--	9	(1.0)
Amusement and Recreation (79)	12	(2.9)	5	(3.1)	3	(1.4)	0	--	3	(10.3)	2	(15.4)	25	(2.8)
Health Services (80)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Educational Services (82)	9	(2.2)	3	(1.9)	1	(0.5)	0	--	0	--	0	--	13	(1.4)
Museum, Art Galleries (84)	1	(0.2)	1	(0.6)	0	--	0	--	0	--	0	--	2	(0.2)
Engineering Services (87)	11	(2.7)	2	(1.3)	2	(0.9)	0	--	0	--	0	--	15	(1.7)
Services, NEC (89)	2	(0.5)	0	--	0	--	0	--	0	--	0	--	2	(0.2)
General Government (91)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Justice, Public Order, Safety (92)	21	(5.1)	7	(4.4)	5	(2.3)	0	--	0	--	0	--	33	(3.7)
Human Resources (94)	0	--	0	--	1	(0.5)	0	--	0	--	0	--	1	(0.1)
Admin Of Environmental Quality (95)	1	(0.2)	0	--	0	--	0	--	0	--	0	--	1	(0.1)
Admin Of Economic Programs (96)	4	(1.0)	1	(0.6)	0	--	0	--	0	--	0	--	5	(0.6)
National Security, Int'l Affairs (97)	2	(0.5)	0	--	0	--	0	--	0	--	0	--	2	(0.2)
TOTAL	412	(100)	160	(100)	220	(100)	66	(100)	29	(100)	13	(100)	900	(100)

TABLE 15
Number of Years Worked of Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Number of Years Worked	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
≥ 5	238	(57.9)	98	(63.2)	120	(53.8)	38	(57.6)	15	(53.6)	7	(58.3)	516	(57.7)
6 – 10	60	(14.6)	27	(17.4)	35	(15.7)	8	(12.1)	8	(28.6)	2	(16.7)	140	(15.6)
11 – 20	63	(15.3)	20	(12.9)	36	(16.1)	10	(15.2)	3	(10.7)	2	(16.7)	134	(15.0)
21 – 30	33	(8.0)	9	(5.8)	27	(12.1)	2	(3.0)	1	(3.6)	1	(8.3)	73	(8.2)
≥ 31	17	(4.1)	1	(0.6)	5	(2.2)	8	(12.1)	1	(3.6)	0	--	32	(3.6)

TABLE 16
Working Conditions Reported by Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Working Conditions	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Separate lockers: dirty and clean*	222	(55.4)	110	(71.0)	149	(69.0)	35	(53.8)	18	(60.0)	3	(27.3)	537	(61.2)
Work clothes laundered: work*	142	(36.0)	92	(60.5)	126	(57.8)	28	(43.1)	12	(40.0)	3	(27.3)	403	(46.3)*
Shower facility*	201	(50.0)	99	(64.3)	157	(72.0)	31	(47.0)	13	(44.8)	5	(45.5)	506	(57.5)
Lunch room*	258	(65.2)	109	(71.2)	172	(79.3)	36	(54.5)	15	(51.7)	5	(45.5)	595	(68.2)
Clean off dust and wash hands before eating*	369	(92.7)	137	(89.0)	202	(91.8)	55	(85.9)	26	(86.7)	9	(81.8)	798	(91.0)
Eat in lunchroom*	178	(61.2)	85	(69.1)	114	(62.0)	28	(49.1)	9	(37.5)	4	(44.4)	418	(60.8)*
Wear respirator*	254	(62.9)	107	(69.5)	167	(75.6)	51	(78.5)	19	(63.3)	9	(81.8)	607	(68.6)*
Smoke in work area**	134	(59.3)	50	(61.7)	82	(65.1)	16	(38.1)	10	(50.0)	4	(66.7)	296	(59.1)
Keep cigarettes in pocket while working**	107	(48.6)	32	(39.0)	66	(53.2)	17	(40.5)	7	(35.0)	3	(50.0)	232	(47.0)
Exposed to Lead now*	226	(57.1)	92	(61.3)	144	(67.0)	34	(55.7)	17	(65.4)	3	(27.3)	516	(60.1)
Removal from job*	19	(4.7)	12	(7.7)	30	(13.6)	15	(23.4)	8	(26.7)	4	(36.4)	88	(9.9)*

* Based on positive questionnaire responses.
** Based on negative questionnaire responses

TABLE 17
Number of Households with Children (6 or under) Potentially Exposed to Take-Home Lead from Michigan Adults with Blood Lead Levels of ≥10 µg/dL, Interviewed from 10/15/1997 to 12/31/2006, By Highest Reported Blood Lead Level (µg/dL)

Description of Households	10-24 µg/dL		25-29 µg/dL		30-39 µg/dL		40-49 µg/dL		50-59 µg/dL		≥60 µg/dL		TOTAL	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Households with Children living or spending time in house	184	(25.7)*	60	(29.1)	81	(29.8)	26	(29.2)	11	(32.4)	3	(21.4)	365	(27.4)
Households with Children tested for Lead	59	(36.2)**	12	(21.1)	17	(22.4)	11	(50.0)	4	(36.4)	2	(66.7)	105	(31.6)
Households where Children had elevated Lead levels	19	(35.8)***	3	(27.3)	8	(42.1)	4	(40.0)	1	(33.3)	1	(50.0)	36	(36.7)

* Among individuals within blood lead category, percentage of their households with children living or spending time in house.

** Among individuals within blood lead category, percentage of households with children living or spending time in house where the children were tested for lead. Because of missing data the denominator may be less than the number with children living or spending time in house in the first row of the table.

*** Among individuals within blood lead category, percentage of households with children living or spending time in house where children, who had blood lead tests, had blood lead levels ≥10 µg/dL. Because of missing data, the denominator may be less then the number tested for lead in the second row of the table.

DEPARTMENT OF COMMUNITY HEALTH

HEALTH LEGISLATION AND POLICY DEVELOPMENT

BLOOD LEAD ANALYSIS REPORTING

Filed with the Secretary of State on September 25, 1997. These rules take effect 15 days after filing with the Secretary of State.

(By authority conferred on the community public health agency by section 5111 of Act No. 368 of the Public Acts of 1978, as amended, section 8 of Act No. 312 of the Public Acts of 1978, and Executive Reorganization Order No. 1996-1, being §§333.5111 and 325.78, and 330.3101 of the Michigan Compiled Laws)

R 325.9081 Definitions.

Rule 1. (1) As used in these rules:

(a) "Blood lead analysis report form" means the form used to report the required reportable information for blood that has been analyzed for lead.

(b) "Agency" means the community public health agency.

(c) "Physician/provider" means a licensed professional who provides health care services and who is authorized to request the analysis of blood specimens. For this purpose, provider may also mean the local health department.

(2) The term "local health department," as defined in Act No. 368 of the Public Acts of 1978, as amended, being §333.1101 et seq. of the Michigan Compiled Laws, has the same meaning when used in these rules.

R 325.9082 Reportable information.

Rule 2. (1) Reportable information is specifically related to blood samples submitted to clinical laboratories for lead analysis.

(2) Upon initiating a request for blood lead analysis, the physician/provider ordering the blood lead analysis shall complete the client information (section I) and the physician/provider information (section II) of a blood lead analysis report form designated by the agency or shall complete another similar form that ensures the inclusion of the same required data and shall provide all of the following information:

(a) All of the following information with respect to the individual tested:
(i) Name.
(ii) Sex.
(iii) Racial/ethnic group.
(iv) Birthdate.
(v) Address, including county.
(vi) Telephone number.
(vii) Social security number and medicaid number, if applicable.
(viii) If the individual is a minor, the name of a parent or guardian and social security number of the parent or guardian.
(ix) If the individual is an adult, the name of his or her employer.
(b) The date of the sample collection.
(c) The type of sample (capillary or venous).
(3) The blood lead analysis report form or a document with the same data shall be submitted with the sample for analysis to a clinical laboratory that performs blood lead analysis.
(4) Upon receipt of the blood sample for lead analysis, the clinical laboratory shall complete the laboratory information (section III) and provide all of the information required and/or submitted by the physician/provider and the following:
(a) The name, address, and phone number of the laboratory.
(b) The date of analysis.
(c) The results of the blood lead analysis in micrograms of lead per deciliter of whole blood rounded to the nearest whole number.

R 325.9083 Reporting responsibilities.
Rule 3. (1) All clinical laboratories doing business in this state that analyze blood samples for lead shall report all blood lead results, rounded to the nearest whole number, for adults and children to the Community Public Health Agency, Childhood Lead Poisoning Prevention Program (CPHA/CLPPP), 3423 N.M.L. King Jr. Blvd., Lansing , MI 48909. Reports shall be made within 5 working days after test completion.
(2) Nothing in this rule shall be construed to relieve a laboratory from reporting results of a blood lead analysis to the physician or other health care provider who ordered the test or to any other entity as required by state, federal, or local statutes or regulations or in accordance with accepted standard of practice, except that reporting in compliance with this rule satisfies the blood lead reporting requirements of

Act No. 368 of the Public Acts of 1978, as amended, being §333.1101 et seq. of the Michigan Compiled Laws.

R 325.9084 Electronic communications.

Rule 4. (1) A clinical laboratory may submit the data required in R 325.9083 electronically to the agency.

(2) For electronic reporting, upon mutual agreement between the reporting laboratory and the agency, the reporting shall utilize the data format specifications provided by the agency.

R 325.9085 Quality assurance.

Rule 5. For purposes of assuring the quality of submitted data, each reporting entity shall allow the agency to inspect copies of the medical records that will be submitted by the reporting entity to verify the accuracy of the submitted data. Only the portion of the medical record that pertains to the blood lead testing shall be submitted. The copies of the medical records shall not be recopied by the agency and shall be kept in a locked file cabinet when not being used. After verification of submitted data, the agency shall promptly destroy the copies of the medical records.

R 325.9086 Confidentiality of reports.

Rule 6. (1) The agency shall maintain the confidentiality of all reports of blood lead tests submitted to the agency and shall not release reports or any information that may be used to directly link the information to a particular individual, unless the agency has received written consent from the individual, or from the individual's parent or legal guardian, requesting the release of information.

(2) Medical and epidemiological information that is released to a legislative body shall not contain information that identifies a specific individual. Aggregate epidemiological information concerning the public health that is released to the public for informational purposes only shall not contain information that identifies a specific individual.

R 325.9087 Blood lead analysis report form.

Rule 7. The blood lead analysis report form reads as follows:

MICHIGAN DEPARTMENT OF COMMUNITY HEALTH
BLOOD LEAD ANALYSIS REPORT
DATA/INFORMATION REQUIRED BY ADMINISTRATIVE RULE # R325.9082 AND R 325.9083

PATIENT INFORMATION
To be completed by Parent/Guardian or Patient
PLEASE PRINT

Last Name _____ First Name _____ M. Initial _____

Address – No PO Boxes, please _____ Apt. # _____ City _____ State MI Zip _____

( ) _____ Area Code and Phone Number
Birthdate (month/day/year) _____
Parent/Guardian Name (please print) _____

Race (Check all that apply):
- ☐ American Indian or Alaskan Native
- ☐ Asian
- ☐ Black or African American
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Hispanic or Latino
- ☐ Middle Eastern or Arabic

Sex:
- ☐ Male
- ☐ Female

Funding Sources:
- ☐ Self Pay/Insurance
- ☐ Medicaid

ID# (Medicaid only): _____

If Patient is an adult (≥ 16 years):
Employer: _____
Social Security #: _____

PROVIDER/PHYSICIAN INFORMATION
To be completed by provider's office

Clinic, Hospital or Agency Name _____ Physician name _____

Mailing Address _____ City _____ State _____ Zip _____

( ) _____ Area Code and Phone Number
Fax Number _____

SPECIMEN COLLECTION INFORMATION
To be completed by person who draws specimen

Specimen Collection Date _____

Source of Specimen ☐ Capillary ☐ Venous ☐ Filter Paper

LABORATORY INFORMATION
To be completed by testing laboratory

Laboratory Name _____ Specimen ID Number _____

( ) _____ Area Code and Phone Number
Analysis Date _____

BLOOD LEAD LEVEL in Micrograms per Deciliter _____ (round to nearest whole number, please)

MDCH – Childhood Lead Poisoning Prevention Project, 3423 N. MLK Jr. Blvd, PO Box 30195, Lansing, MI 48909 (517) 335-8885
DCH-0395 (March 2004) Authority: Act 368, PA 1978 Fax (517) 335-8509

OSHA BLOOD LEAD LABORATORIES*: MICHIGAN

Laboratory Name	City	County
Detroit Health Department	Detroit	Wayne
DMC University Laboratories	Detroit	Wayne
Hackley Hospital Laboratory	Muskegon	Muskegon
Marquette General Health Systems	Marquette	Marquette
Michigan Department of Community Health	Lansing	Ingham
Mount Clemens General Hospital	Mount Clemens	Macomb
Quest Diagnostics	Auburn Hills	Oakland
Regional Medical Laboratories	Battle Creek	Calhoun
Sparrow Regional Laboratories	Lansing	Ingham
Warde Medical Laboratory	Ann Arbor	Washtenaw

*OSHA-approved blood lead laboratories as of July 11, 2007. For a complete listing of OSHA approved blood lead laboratories, visit the OSHA website at: http://www.osha.gov/SLTC/bloodlead/program.html

SUMMARY OF MICHIGAN'S LEAD STANDARDS

In 1981, under the authority of the Michigan Occupational Safety and Health Act (MIOSHA), Michigan promulgated a comprehensive standard to protect workers exposed to lead in general industry (i.e., R325.51901 - 325.51958). That standard was most recently amended in October, 2000. In October 1993, MIOSHA adopted by reference the federal Occupational Safety and Health Administration's (OSHA) Lead Standard for Construction (i.e., 29 CFR 1926.62). That standard was most recently amended October 18, 1999. Both the MIOSHA Lead Exposure in Construction Standard (Part 603) and the Lead Exposure in General Industry Standard (Part 310) establish an "action level" (30 micrograms of lead per cubic meter of air [ug/m^3] averaged over an eight-hour period) and a permissible exposure limit (50 ug/m^3 averaged over an eight hour period) for employees. Both standards require employers to conduct initial exposure monitoring and to provide employees written notification of these monitoring results. If employee exposure levels exceed the permissible exposure limit (PEL), employers are required to develop a written compliance program that addresses the implementation of feasible engineering and/or work practice controls to reduce and maintain employee exposures below the PEL. The Lead Exposure in Construction Standard (Part 603) also allows the use of administrative controls to achieve this objective. An employer's obligations concerning hygiene facilities, protective work clothing and equipment, respiratory protection, medical surveillance and training under the Lead Exposure in Construction Standard (Part 603) are triggered initially by job tasks and secondarily by actual employee exposure level to lead. Under the Lead Exposure in General Industry Standard (Part 310), these potential obligations are triggered by actual employee exposure levels to lead. Medical surveillance and training are triggered by exposures above the action level (AL), whereas protective clothing and equipment, respiratory protection and hygiene facilities are triggered by exposures above the PEL.

The medical surveillance program requirements for Michigan's Lead Exposure in General Industry Standard (Part 310) versus those required in Lead Exposure in Construction Standard (Part 603) do vary. Under the Lead Exposure in General Industry Standard (Part 310), a medical surveillance program must be implemented which includes periodic biological monitoring (blood tests for lead and zinc protoporphyrin [ZPP] levels), and medical exams/consultation for all workers exposed more than 30 days per year to lead levels exceeding the AL. Under the Lead Exposure in Construction Standard (Part 603), a distinction is made between "initial medical surveillance" (consisting of biological monitoring in the form of blood sampling and analysis for lead and ZPP levels) and secondary medical surveillance (consisting of follow-up biological monitoring and a medical examination/consultation). The initial medical exam is triggered by employee exposure to lead on any day at or above the AL. The secondary medical exam is triggered by employee exposures to lead at or above the AL for more than 30 days in any 12 consecutive months period.

Michigan's Lead Exposure in General Industry Standard (Part 310) mandates that employees exposed at or above the AL must be removed from the lead exposure when:

- A periodic blood test and follow-up blood test indicate that the blood lead level (BLL) is at or above 60 micrograms per deciliter (µg/dL) of whole blood.
- Medical removal is also triggered if the average of the last three BLL or the average of all blood sampling tests conducted over the previous six months, whichever is longer, indicates the employees blood lead level is at or above 50 µg/dL. Medical removal is not required however, if the last blood sampling test indicates a blood lead level at or below 40 ug/dL of whole blood.
- When a final medical determination reveals that an employee has a detected medical condition which places that employee at an increased risk of material impairment to health from the lead exposure.

The Lead Exposure in Construction Standard (Part 603) mandates removal of an employee from a lead exposure at or above the AL when:

- A periodic and follow-up blood test indicates that an employee's BLL is at or above 50 µg/dL; or

- There is a final medical determination that an employee has a detected medical condition which places that employee at an increased risk of material impairment to health from the lead exposure.

When an employee can return to work at their former job also differs by standard. The Lead Exposure in General Industry Standard (Part 310) allows an employee to return to his or her former job status under any of the following circumstances:

- If the employee's BLL was at or above 70 µg/dL, then two consecutive blood tests must have the BLL at or below 50 µg/dL.

- If the employee's BLL was at or above 60 µg/dL or due to an average BLL at or above 50 µg/dL, then two consecutive BLL must be at or below 40 µg/dL.

- For an employee removed due to a final medical determination, when a subsequent medical determination no longer detects a medical condition which places the employee at an increased risk of material impairment to health from exposure to lead.

The Lead Exposure in Construction Standard (Part 603) allows the employer to return an employee to their former job status under these circumstances:

- If the employee's BLL was at or above 50 µg/dL, then two consecutive blood tests must have the employee's BLL at or below 40 µg/dL.

- For an employee removed due to a final medical determination, when a subsequent medical determination no longer has a detected medical condition which places the employee at an increased risk of material impairment to health from exposure to lead.

Both the Lead Exposure in General Industry (Part 310) and Lead Exposure in Construction (Part 603) Standards have a medical removal protection benefits provision. This provision requires employers maintain full earnings, seniority and other employment rights and benefits of temporarily removed employees up to 18 months on each occasion that an employee is removed from exposure to lead. This includes the right to their former job status as though the employee had not been medically removed from the job or otherwise medically limited.

Provisions of Lead Exposure in General Industry (Part 310) and Lead Exposure in Construction (Part 603) Standards

Workers exposed to lead have a right to: an exposure assessment, respiratory protection, protective clothing and equipment, hygiene facilities, medical surveillance, medical removal and training. The triggering mechanisms that activate these rights are primarily based upon employee lead exposure levels. However, under the Lead Exposure in Construction Standard (Part 603), many of these rights are initially triggered by the specific work activity being performed.

Exposure Assessment

Air monitoring must be conducted to determine employee airborne lead exposure levels when a potential lead exposure exists. Under the Lead Exposure in Construction Standard (Part 603), however, specific work activities are identified/categorized that require "interim protection" (i.e., respiratory protection, personal protective clothing and equipment, work clothes change areas, hand washing facilities, biological monitoring and training) until air monitoring has been performed that establishes that these lead exposure levels are within the acceptable limits (AL or PEL).

Respiratory Protection

Respiratory protection is required whenever employee exposure levels exceed the PEL and as an interim control measure under the Lead Exposure in Construction Standard (Part 603). The level of respiratory protection required is dependent upon the actual employee exposure level or by the job activities identified in the Lead Exposure in Construction Standard (Part 603).

Protective Clothing/Equipment

Protective clothing/equipment (i.e., coveralls or similar full body clothing; gloves, hats, shoes or disposable shoe coverlets; and face shield, vented goggles, or other applicable equipment) is required whenever employee exposure levels exceed the PEL and as an interim protection measure under the Lead Exposure in Construction Standard (Part 603).

Hygiene Facilities

Hygiene facilities (i.e., clothing change areas, showers, eating facilities) are required whenever employee exposures to lead exceed the PEL. Except for shower facilities, these same hygiene facilities must be provided as interim protection under the Lead Exposure in Construction Standard (Part 603). The construction employer must, however, provide hand washing facilities in lieu of the shower facility as an interim protection.

Medical Surveillance

Medical surveillance (i.e., medical exam and consultation) is required when workers are exposed to lead at or exceeding the AL for more than 30 days a year. Biological blood sampling and analysis to determine lead and ZPP levels is required initially under the Lead Exposure in Construction Standard (Part 603) when employee lead exposure is at or exceeds the AL on any single day. Under the Lead Exposure in General Industry Standard (Part 310), it is required when employees are exposed to concentrations of airborne lead greater than the A.L. for more than 30 days per year.

Medical Removal

Workers covered by the Lead Exposure in General Industry (Part 310) Standard have the right to be removed from airborne lead exposures at or above the AL when their periodic and follow-up blood lead level is at or above 60 µg/dL or when an average of the last three blood lead levels or the average of all blood sampling tests conducted over the previous six months, whichever is longer, indicates the employee blood lead level is at or above 50 µg/dL. However, under this later removal criteria, they are not required to be removed if the last blood sampling test indicates a blood lead level at or below 40 µg/dL.

Workers covered by the Lead Exposure in Construction Standard (Part 603) have the right to be removed from airborne lead exposures at or above the AL on each occasion that a periodic and follow-up blood sample test indicate that the employee's blood lead level is at or above 50 µg/dL.

Under both the Lead Exposure in General Industry (Part 310) and Lead Exposure in Construction (Part 603) Standards, workers also have the right to be removed from airborne lead exposures at or above the AL whenever there is a final medical determination that has detected that they have a medical condition that places them at an increased risk of material impairment to health from exposure to lead.

Training

Under the Lead Exposure in General Industry Standard (Part 310) and Lead Exposure in Construction (Part 603), employees exposed to any level of airborne lead must be informed of the contents of appendices A and B from that standard.

Under both the Lead Exposure in General Industry (Part 310) and Lead Exposure in Construction (Part 603) Standards, employees who are exposed at or above the AL on any day or who are subject to exposure to lead compounds which may cause skin or eye irritation must be provided comprehensive training covering all topics specified in those standards.

Also, under the Lead Exposure in Construction Standard (Part 603), employees involved in any of the specified work activities requiring interim controls, must receive training prior to initiating those activities that addresses the recognition and avoidance of unsafe conditions involving lead and the specific regulations applicable to the worksite that have been established to control or eliminate the hazards associated with exposure to lead.

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MMWR

Weekly

August 18, 2006 / 55(32);876-879

Adult Blood Lead Epidemiology and Surveillance --- United States, 2003--2004

Since 1994, CDC's state-based Adult Blood Lead Epidemiology and Surveillance (ABLES) program has been tracking laboratory-reported blood lead levels (BLLs) in U.S. adults. A national public health objective for 2010 (objective 20-7) is to reduce the prevalence of BLLs ≥25 μg/dL among employed adults to zero (*1*). A second key ABLES measurement level is a BLL ≥40 μg/dL, the level at which the Occupational Safety and Health Administration (OSHA) requires workers to have an annual medical evaluation of health effects related to lead exposure (*2,3*). A previously published ABLES report provided data collected from 35 states during 2002 (*4*). This report summarizes ABLES data collected from 37 states* during 2003--2004 and compares them with annual data collected since 1994. The findings indicated that the national rate of adults with elevated BLLs (i.e., ≥25 μg/dL) declined from 2002 to 2003 and declined further in 2004. Projections using 1994--2004 ABLES data trends indicate that the national prevalence rate of adults with BLLs ≥25 μg/dL will be approximately 5.7 per 100,000 employed adults in 2010. Increased prevention measures, particularly in work environments, will be necessary to achieve the 2010 objective of reducing this rate to zero.

Changes in Methods

This report reflects three changes in ABLES analytic methods. First, state rates for persons with elevated BLLs now focus on residents of the states reporting them; previously, state rates were for state residents and nonresidents combined. Second, the annual national prevalence rate was calculated using the combined number of persons with elevated BLLs from all 37 states divided by the combined employed populations of those states; previously, the average state rate was presented as the national rate. Third, the denominators used in state and national rate calculations were determined using updated Bureau of Labor Statistics estimates† for employed populations aged ≥16 years in the reporting states during 1994--2004.

National Magnitude and Trend

During 2003 and 2004, totals of 9,884 and 9,170 resident adults, respectively, were reported with BLLs ≥25 μg/dL from 37 states. During 2002, a total of 9,915 resident adults had been reported with BLLs ≥25 μg/dL from 35 states. To compare yearly state rates, the numbers of resident adults with elevated BLLs from each state were divided by the state's annual resident employed population aged ≥16 years. The combined state numerators and denominators were then used to calculate the national prevalence rate. The national rate in 2003 for resident adults was 8.2 per 100,000 employed population aged ≥16 years and, in 2004, it declined to 7.5 per 100,000 (Figure 1). The rate in 2003 was 4% lower than in 2002 (8.5 per 100,000); the 2004 rate was 9% lower than in 2003. A total of 1,649 resident adults (1.4 per 100,000) with BLLs ≥40 μg/dL were reported in 2003, and 1,425 (1.2 per 100,000) were reported in 2004. This rate represents a 7% decrease from 2002 (1.5 per 100,000) to 2003 and a further decrease of 14% from 2003 to 2004.

Occupational Sources of Exposure

During 2003--2004, a total of 32§ of the 37 states reporting through ABLES provided North American Industry Classification System or Standard Industrial Classification (SIC) codes for 6,640 (67%) and 6,686 (73%) resident

adults with BLLs ≥25 μg/dL, respectively, who were identified as exposed to lead via occupational sources. Ninety-four percent of adults with identified lead-exposure sources were exposed via occupational sources. During 2003--2004, the industry sectors with the highest annual average numbers of resident adults with elevated BLLs were manufacturing, 4,622 (69%); construction, 1,252 (19%); and mining, 488 (7%). The specific industries with the highest numbers were manufacture of storage batteries, 2,499; painting, paperhanging, and decorating, 626; and mining of lead ores, 482 (Table).

Nonoccupational Sources of Exposure

The same 32 states that provided industry codes also provided sources for 442 and 400 resident adults with BLLs ≥25 μg/dL in 2003 and 2004, respectively, who were identified as exposed to lead via nonoccupational sources. During 2003--2004, nonoccupational sources represented 6% of the annual average of 7,084 resident adults with BLLs ≥25 μg/dL and identified sources of exposure. Among those exposed to nonoccupational sources, an annual average of 23% were exposed from shooting firearms, 13% from remodeling or renovation activities, 11% from hobbies (e.g., casting, ceramics, or stained glass), 5% from retained bullets or gunshot wounds, and 3% from pica (i.e., an abnormal craving or appetite for nonfood substances such as dirt, paint, or clay), ingesting lead-contaminated food or liquids, or ingesting traditional or folk medicines; another 3% were retired (and probably were former lead workers), and 36% were determined to have nonoccupational exposure from unknown sources.

Distribution by State

For resident adults with BLLs ≥25 μg/dL, 29 of 37 states reported average prevalence rates of <10 per 100,000 employed population aged ≥16 years during 2003--2004 (Figure 2). Rates ranged from 0.4 per 100,000 in Hawaii to 36.6 in Kansas. Twenty-six of the 35 states that reported BLLs both in 2002 and during 2003--2004 reported the same or lower rates during 2003--2004; nine reported higher rates. For resident adults with BLLs ≥40 μg/dL, 23 of 35 states reported the same or lower rates during 2003--2004; 12 reported higher rates. State rates ranged from zero cases per 100,000 in Alaska and Hawaii to 9.1 in Alabama.

Reported by: *RJ Roscoe, MS, JR Graydon, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CDC.*

Editorial Note:

ABLES data for 2003 and 2004 indicate that the national prevalence rate of elevated BLLs in adults continued to decrease, as it has overall since 1994 (Figure 1). Part of this decrease likely is the result of improved prevention measures, but the decrease also might have resulted partly from a decline in the number of high-risk manufacturing jobs or decreased employer compliance with testing or reporting requirements.

Changes in methods since the previous ABLES report have resulted in differences in certain national prevalence rates reported previously (*4*). For state rates, numerators now include only state residents because only resident employed adults aged ≥16 years are counted in the denominators. During 1994--2001, ABLES data were not reported separately for residents and nonresidents. Annual national rates now consist of the combined numerators and denominators for all states that reported to ABLES in the respective years. This method weights data from states reporting many adults with elevated BLLs and large employed populations more heavily than small states reporting few adults. Previously, the national rate was the average of state rates, which weighted the rate from each state equally. Differences occurred between the lower rates for residents and the higher rates for residents and nonresidents combined during 2002--2004 (Figure 1). The difference between the lower rates for combined numerators and denominators and the higher rates for the average state averaged 8.6% during 1994--2004.¶

The findings in this report are subject to at least three limitations. First, the number of adults with elevated BLLs reported by ABLES is underreported because not all employers provide BLL testing to all lead-exposed workers as required by OSHA regulations and because some laboratories might not report all tests as required by state regulations. In addition, these factors likely vary among the 37 participating states. This limitation might be especially important with regard to the storage battery industry, which appears to be more thorough in BLL testing and reporting of its lead-exposed workers than other industries with lead-exposure risk such as the construction

industry. Kansas had the highest rate of adults with BLLs ≥25 μg/dL, which might indicate a more severe problem with lead exposures but more likely reflects a substantial number of workers in the storage battery industry in Kansas and the standards for BLL reporting in that industry. Second, using the employed population aged ≥16 years as the denominator excludes unemployed adults; however, most of these persons have little or no risk for lead exposure, according to state ABLES reports. Finally, because the distribution of jobs that include lead exposure varies among ABLES states, caution should be exercised in comparing state rates.

Despite improvements, exposure to lead remains a substantial (largely occupational) health problem in the United States. The ABLES program continues to enhance surveillance for BLLs by increasing the number of participating states, identifying the sources of persistent exposures, and helping states focus their intervention, education, and prevention activities. To assist states in decreasing elevated BLLs, OSHA has a national program** to reduce workplace lead exposures among all U.S. workers. If the 2010 national health objective for adult lead exposures is to be met, current activities should continue, the ABLES states should implement more effective intervention activities, and employers in the lead industry should do all that is feasible to reduce workplace exposures to lead.

Acknowledgments

This report is based, in part, on data contributed by ABLES state coordinators.

References

1. US Department of Health and Human Services. Healthy people 2010, 2nd ed. Washington, DC: U.S. Government Printing Office; 2000. Available at http://www.healthypeople.gov.
2. US Department of Labor, Occupational Safety and Health Administration. Final standard; occupational exposure to lead. Federal Register 1978;43:52952--3014 [29 CFR § 1910.1025].
3. US Department of Labor, Occupational Safety and Health Administration. Lead exposure in construction--- interim rule. Federal Register 1993;58:26590--26649 [29 CFR § 1926.62].
4. CDC. Adult blood lead epidemiology and surveillance---United States, 2002. MMWR 2004;53:578--82.

* Alabama, Alaska, Arizona, California, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Washington, Wisconsin, and Wyoming.

† Available at http://www.bls.gov/data.

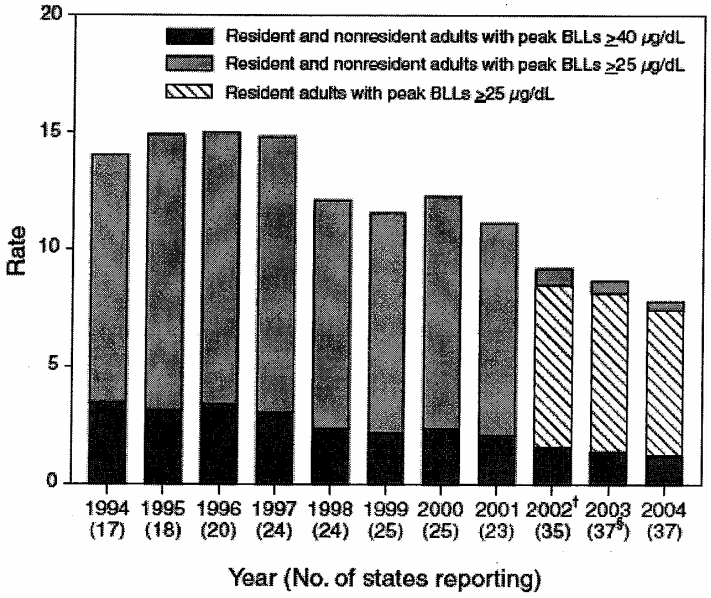
§ Alaska, Arizona, California, Connecticut, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Utah, Washington, and Wisconsin.

¶ Additional information regarding interpretation of specific state ABLES data, definitions, and rate calculations is available at http://www.cdc.gov/niosh/topics/ABLES/ables.html.

** Information available at http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=2572.

Figure 1

FIGURE 1. Prevalence rates* of adult elevated blood lead levels (BLLs), by year — Adult Blood Lead Epidemiology and Surveillance (ABLES) program, United States, 1994–2004



*Per 100,000 workers aged ≥16 years. Estimates based on 2005 U.S. Department of Labor, Bureau of Labor Statistics Current Population Survey (available at http://www.bls.gov/data).

†During 1994–2001, ABLES states did not report residents and nonresidents separately; thus, only combined rates are available. During 2002–2004, ABLES states did report residents and nonresidents separately; thus, both the resident rate and resident plus nonresident rate are indicated for those years. The resident plus nonresident rate is included for comparison with the earlier years.

§Alabama, Alaska, Arizona, California, Connecticut, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Washington, Wisconsin, and Wyoming.

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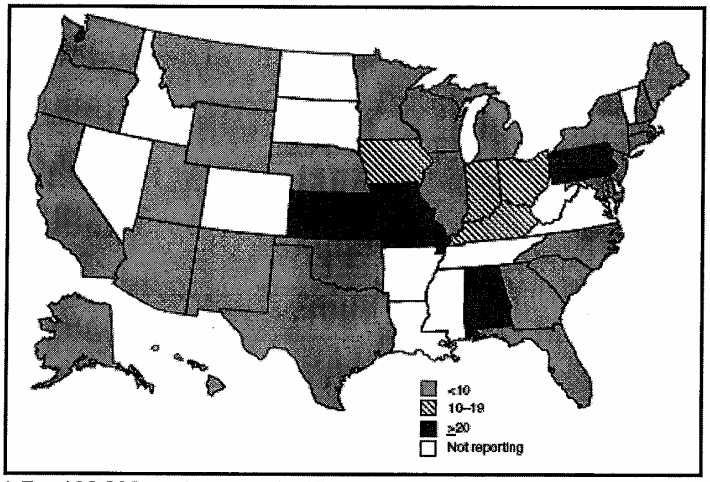
Figure 2

FIGURE 2. Prevalence rates* for resident adults with peak blood lead levels ≥25 µg/dL, by state — Adult Blood Lead Epidemiology and Surveillance program, United States, 2003–2004 annual average



* Per 100,000 workers aged ≥16 years. Estimates based on 2005 U.S. Department of Labor, Bureau of Labor Statistics Current Population Survey (available at http://www.bls.gov/data).

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Table

TABLE. Industries reporting the highest number of resident workers aged ≥16 years with elevated blood lead levels (BLLs) — Adult Blood Lead Epidemiology and Surveillance program, United States, 2003–2004 annual average*

Industry	Total no. of workers with elevated BLLs (≥25 µg/dL)	No. of workers with BLLs ≥40 µg/dL (% of total with elevated BLLs)
Manufacture of storage batteries (SIC† 3691, NAICS§ 335911)	2,499	147 (6)
Painting, paperhanging, and decorating (SIC 1721, NAICS 238320)	626	156 (25)
Mining of lead ores (SIC 1031, NAICS 212231)	482	94 (20)
Secondary smelting (SIC 3341, NAICS 331492)	300	39 (13)
Bridge and tunnel construction (SIC 1622, NAICS 237310)	211	45 (21)
Manufacture of primary batteries (SIC 3692, NAICS 335912)	210	39 (19)
Primary smelting (SIC 3339, NAICS 331419)	200	26 (13)
Lead paint removal (SIC 1799, NAICS 562910)	160	40 (25)
Copper foundries (SIC 3366, NAICS 331525)	114	21 (18)
Roll and draw nonferrous metals (SIC 3356, NAICS 331491)	90	16 (18)

*Based on 32 states reporting (Alaska, Arizona, California, Connecticut, Florida, Georgia, Hawaii, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Utah, Washington, and Wisconsin).
†Standard Industrial Classification.
§North American Industry Classification System.

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**Questions or messages regarding errors in formatting should be addressed to mmwrq@cdc.gov.

Date last reviewed: 8/16/2006

NARRATIVES OF SIX INDIVIDUALS WITH A BLOOD LEAD LEVEL OF ≥50 µg/dL IN 2006

Work-Related (5)

Wrecking and Demolition (SIC 1795) (1)

A male in his 40s had blood lead testing performed as part of a company medical screening during 2006. His blood lead levels ranged from 40 to 56 µg/dL. He also had elevated blood lead levels in 1997 and 1998. He worked for a contractor on demolition projects.

Non-Ferrous Foundries (SIC 3366) (2)

A male in his 40s had blood lead testing as part of a company medical screening, which was begun after a MIOSHA inspection that had been initiated by his elevated blood lead two years earlier. His results in 2006 ranged from 53 µg/dL to 59 µg/dL. Blood lead results in 2005 ranged from 58 to 71 µg/dL. His initial blood lead result was 65 µg/dL in 2004, which was ordered by his personal physician. When interviewed in 2004 he denied having any of the symptoms seen in individuals with lead toxicity. He was not re-interviewed after the high blood leads in 2005 or 2006. He had no lead-related recreational activities. He worked at a small foundry pouring brass/bronze (5-9% lead) for the past eighteen years. He was a non-smoker. Eight-hour time-weighted average (TWA) results for lead in 2005 indicated levels of 130, 200, 780, 500 and 380 mg/m^3 of air compared to the MIOSHA allowable limit of 50 mg/m^3.

A male in his 30s had blood lead testing performed as part of a company medical screening, which was begun after a MIOSHA inspection initiated by the elevated blood lead found in Case #1. His levels in 2006 ranged from 45 to 50 µg/dL. Blood lead results in 2005 ranged from 36 to 61 µg/dL. He worked for the same foundry as the previous case. To date, he has not been interviewed.

Metalworking Machinery and Equipment (SIC 354) (1)

A male in his 20s had blood lead testing as part of a company medical screening. During 2006 his blood leads ranged from 26 to 60 µg/dL. He had an elevated blood lead of 17 µg/dL in 2005. His employer manufactured lead acid battery machines. After a machine is built and before installation, it is tested. A runoff test is done whereby lead grids are manufactured and then pasted with lead oxide. The runoff procedure is performed between one and six times per year and typically lasts more than one day. After testing is completed, the employee travels to the customer's site to install and retest the equipment. Lead exposure can occur during initial testing at the manufacturer's facility or at the site of installation.

Sanitary Services (SIC 495) (1)

A male in his 40s had multiple blood lead tests in 2006. The results early in 2006 were 62 and 65 µg/dL. A result from the end of 2006 was 11 µg/dL. To date, we have been unable to contact him. The company is located out-of-state and is contracted to clean up environmental spills.

Unknown Source (1)

A non-English speaking immigrant male in his 40s had a blood lead test after presenting to an emergency room with complaints of headache, sharp abdominal pain, nausea, and vomiting. He also complained of constipation, decreased appetite, and approximately a thirty pound weight loss over the last four months. He had an elevated blood lead of 148 µg/dL. Basophilic stippling was noted on an examination of his red blood cells. All interviews with the patient were through an interpreter. He denied any occupational or non-occupational sources of lead exposure. Inpatient chelation therapy was initiated and repeat blood lead was 124 µg/dL. After five days of treatment the chelation therapy was stopped and the patient was discharged in stable condition and a follow-up blood lead was 66 µg/dL. A home inspection by the county health department was negative for environmental sources of lead exposure. During the home inspection, it was revealed that the patient had worked for one to two years painting car parts at a repair shop. However, the patient had not worked in the two years prior to his initial blood lead test.