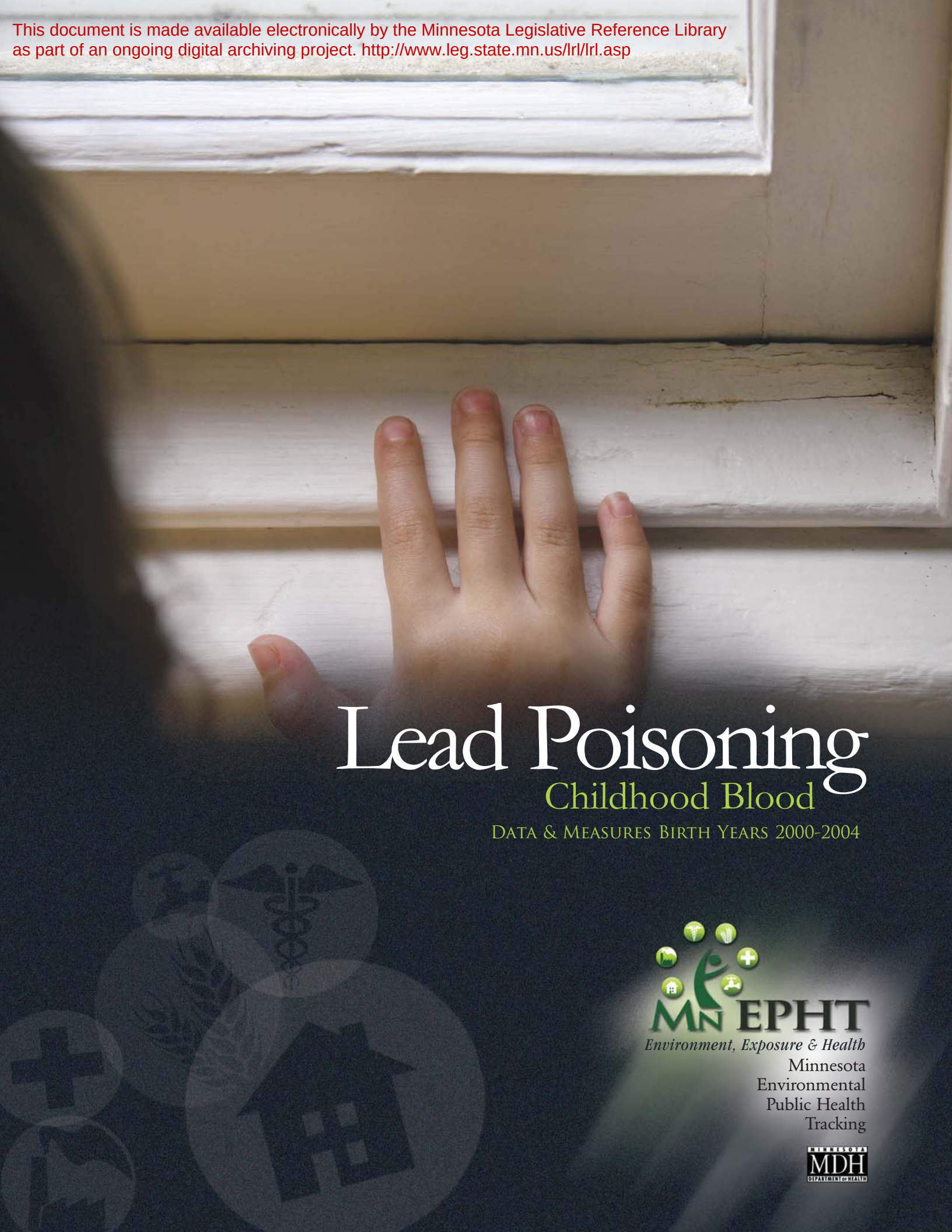

Lead Poisoning

Childhood Blood

DATA & MEASURES BIRTH YEARS 2000-2004

MN EPHT

Environment, Exposure & Health

Minnesota Environmental Public Health Tracking

MDH

Protecting, maintaining and improving the health of all Minnesotans

April 2010

Dear Colleague:

The Minnesota Department of Health (MDH) is pleased to present the first series of reports of the Minnesota Environmental Public Health Tracking (MN EPHT) program. The purpose of the report is to share environmental and health tracking data with the public, in accordance with Minnesota Statutes, section 144.996, Subdivision 1.2.

Environmental public health tracking is a public health tool that uses a variety of existing data sources to provide information about environmental hazards, chemical exposures and population health in our state, as well as what preventative actions can be taken to protect the public. The value of environmental public health tracking increases with each year of data collection.

In 2009 MN EPHT became part of the National Environmental Public Health Tracking Network (Tracking Network) under a cooperative agreement grant, joining New York City and 21 other states in the Tracking Network. This grant from the Centers for Disease Control and Prevention (CDC) will help support ongoing data collection and the development of a web-based information system for the public to access MN EPHT data in the years ahead. Improved public access to current, accurate information will help inform individual decisions as well as public policy to prevent disease and promote health.

An electronic version of this report is available on the MN EPHT website: http://www.health.state.mn.us/tracking/. For more information about this report, please contact MN EPHT at 651-201-4987 (toll free: 1-800-205-4987) or health.tracking@state.mn.us.

Sincerely,

Sanne Magnan, M.D., Ph.D.
Commissioner
P.O. Box 64975
St. Paul, MN 55164-0975

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Report on Childhood Blood Lead Poisoning Data & Measures:
BIRTH YEARS 2000-2004

MN EPHT Report | April 2010

Requests for more information about this report may be addressed to:

Minnesota Environmental Public Health Tracking
Minnesota Department of Health
651-201-5900
Toll Free: 1-800-205-4987
TDD phone number: 651-201-5797
health.tracking@state.mn.us

or

Jeannette Sample, MPH
Minnesota Environmental Public Health Tracking
Minnesota Department of Health
651-201-3532
jeannette.sample@state.mn.us

Requests for more information about the Childhood Blood Lead Poisoning data presented in this report may be addressed to:

Childhood Lead Poisoning Prevention Program (CLPPP)
Minnesota Department of Health
651-201-4899
health.lead@state.mn.us

Suggested Citation: Minnesota Environmental Public Health Tracking: Childhood Blood Lead Poisoning Data and Measures, Birth Years 2000-2004. Minnesota Department of Health, St. Paul, MN. April 2010.

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Table of Contents

Introduction to MN EPHT

The environment can mean many things to many people. For Environmental Public Health Tracking (EPHT), the environment is defined as our air, our water, our food, and our surroundings. The environment plays an important role in health and human development. The Minnesota Environmental Public Health Tracking (MN EPHT) system brings together existing data in the state about environmental hazards, population exposure, and health outcomes.

EPHT data may be used to:

- Recognize patterns and evaluate trends in environmental conditions, population exposure and rates of disease
- Measure impacts of public health interventions
- Identify populations most affected or most vulnerable
- Identify opportunities for research and/or public health interventions to reduce exposures to potential environmental health hazards and prevent disease

Minnesota Statutes, section 144.996, directs the Minnesota Department of Health (MDH) to establish an environmental health tracking program. The goal of MN EPHT is to provide information that can be used to plan and evaluate actions to prevent diseases and promote healthy environments in Minnesota. By making data on environmental hazards, exposures and health available in one place and by systematically monitoring those data, an environmental public health tracking program can create new opportunities for learning about the risks of environmental exposures and for understanding the relationships between the environment and health.

National Tracking Network Data and Measures

MN EPHT works in partnership with other states as part of the Centers for Disease Control and Prevention's (CDC) National Environmental Public Health Tracking Network (Tracking Network). Since MN EPHT began in 2007, the program has been collecting and analyzing data in 8 content areas that the Tracking Network has identified as priorities; these content areas are shown in the table below.

Tracking Network Content Areas 2007		
Environmental Hazards Air quality Drinking water quality	Exposures Childhood blood lead exposure	Health Outcomes Hospitalizations Cancer Carbon monoxide poisoning Reproductive outcomes Birth defects

Within each content area, tracking measures are used as indicators of population health with respect to environmental factors. These measures are summary characteristics or a statistic, such as a sum, percentage, or rate. Tracking measures are used to assess health, or a factor associated with health, in a population through direct or indirect measures. For example, MN EPHT uses blood lead measurements in children in addition to the housing age to indicate both the lead paint hazard and the risk for childhood lead poisoning. Similarly, MN EPHT measures levels of a pollutant in the environment as an indicator of possible exposure.

Nationally consistent data and measures (NCDMs) were developed by CDC in collaboration with national, state, and local environmental health partners. NCDMs allow for data from any state's EPHT system to be integrated into the Tracking Network, a national database of environmental hazards, environmental exposures, and health effects. Except where noted, MN EPHT has prepared Minnesota data and measures according to the NCDM standards.

Healthy People 2010

Healthy People 2010 is a set of disease prevention and health promotion objectives for the United States to achieve by the year 2010. Healthy People 2010 has two goals: increase quality and years of healthy life, and eliminate health disparities. These two goals are supported by 467 objectives in 28 focus areas. Healthy People 2010 is an instrument to improve health and a valuable tool for those who work to improve health.[1]

Several of the Tracking Network's measures align with Healthy People 2010 objectives. Where applicable, Healthy People 2010 objectives are provided in order to provide context for how Minnesota compares in reaching national health targets.

MN EPHT Data and Measures Reports

This report is one in a series of first reports produced in 2009-2010 for MN EPHT and compiles available childhood blood lead data from 2000-2007. EPHT is a growing program, and the MN EPHT and the Tracking Network will be adding new content areas over time. Updates to the childhood blood lead content area as well as new content area data will be reported and made available on our website. For more information about MN EPHT or the CDC Tracking Network, please visit:

MN EPHT: http://www.health.state.mn.us/tracking
National Tracking Network: http://ephtracking.cdc.gov

Childhood Blood Lead Data Highlights

- Although there has been a decline in national blood lead levels over the past 25-30 years, childhood lead poisoning continues to be a real and preventable environmental health problem.
- The percent of Minnesota children tested prior to reaching 3 years of age increased from 44% among children born in 2000 (28,341 children tested) to 71% among children born in 2004 (48,237 children tested).
- Among Minnesota children born from 2000 to 2004 and tested prior to reaching 3 years of age, there has been a steady decrease in the number and percentage of elevated blood lead levels (exceeding 10 micrograms of lead per deciliter of whole blood) from 1.4% among children born in 2000 to 0.6% among children born in 2004.
- Among children born in 2004 and tested prior to 3 years of age, over half of the elevated blood lead level test results (154 of 288, or 53%) fall into the lowest elevated category (10 to 14 micrograms of lead per deciliter of whole blood).
- Children living at or below the poverty line who live in older housing are at greatest risk for lead poisoning.
- More than 80% of all homes built before 1978 in the U.S. have lead based paint. According to the 2000 U.S. Census, the overall percent of housing in Minnesota built prior to 1950 is 27.1% and the overall percent of housing in Minnesota built from 1950 to 1978 is 6.6%.
- In Minnesota, over 34,000 children under the age of 5 years were living in poverty in 1999, according to the 2000 U.S. Census; these children represented 10.4% of all children under 5 years living in Minnesota, which is less than the national average of 17.8% of children under 5 years living in poverty in the U.S. The majority of counties in Northern Minnesota have a higher percentage of children living in poverty compared to the Minnesota average.

Data Source Acknowledgement: The MN EPHT Program gratefully acknowledges the MDH Lead Program's Blood Lead Information System (BLIS) and the Childhood Lead Poisoning Prevention Program (CLPPP), for providing the data on childhood blood lead poisoning and prevention efforts in Minnesota presented in this Tracking Report.

Childhood Lead Poisoning, Health and the Environment

Although the toxicity of lead has been known for thousands of years, lead poisoning remains one of the most common environmental health threats to children. Elevated blood lead levels (EBLLs) in young children have been shown to result in adverse health effects, including learning impairment, behavioral problems, and death. Lead can be absorbed into the blood through ingestion or inhalation of lead dust or materials contaminated with lead. Lead poisoning is a special concern for children under the age of 6 years because their brains are developing, they easily absorb ingested lead, and they tend to put their hands or other objects, which may be contaminated with lead, into their mouths.[2]

Recognizing and treating lead poisoning can be difficult because it often occurs with no distinct symptoms. Because children may have elevated blood lead levels (EBLLs) and not have any specific symptoms, the Centers for Disease Control and Prevention (CDC) recommends blood lead testing for young children at risk for lead poisoning.

Elevated blood lead levels (EBLLs) in children is defined by the CDC and the MDH as a blood test result greater than or equal to 10 micrograms of lead per deciliter of whole blood (µg/dL) in a child. The two main types of blood specimens used in blood lead testing are capillary and venous:

- Capillary blood specimens are drawn from a finger stick and the blood is collected either in capillary tubes or on filter paper. They are considered "screening" tests because they are prone to falsely high results due to surface contamination when hands are not properly washed with soap and water. However, capillary tests tend to be more acceptable to parents and may be performed in a wider range of settings.

- Venous specimens are considered "diagnostic" tests because they are drawn directly from a vein, but they can be less acceptable to some parents due to discomfort for the child, and necessitate greater expertise in drawing the blood.

Minnesota Statutes, section 144.9504 mandates environmental intervention for venous blood lead levels of 15 µg/dL or greater in children less than six years old.[3] An environmental intervention includes a housing risk assessment and may also include an educational visit from a public health nurse, enforcement orders to ensure the child's safety, lead hazard reduction or remediation, and clearance testing.

Lead in paint of **housing built before 1950** is the most common high dose source of lead exposure for young children. Although residential lead paint wasn't banned until 1978, paint companies began reducing the amount of lead added to residential paint before the ban. Old properties that contain lead paint are the most common source of lead exposure and the focus of primary prevention strategies to protect young children.[4]

Children living at or below the poverty line who live in older housing are at greatest risk for lead poisoning.[5] National studies have shown that Medicaid-enrolled children are three times more likely to have EBLLs than non-enrolled children. Children enrolled in Medicaid or other medical assistance programs are more likely to live in older homes in poor condition, have poor nutrition, and live in urban areas that may contain lead contaminated soils. The MDH Lead Program found that children enrolled in Minnesota Health Care Programs (MHCP) had higher lead poisoning rates than non-MHCP children, from 2004 to 2007.[6]

Since not all Minnesota children have a high risk for lead exposure, targeted screening (testing children at high risk) is recommended for most areas of the state as of the time of this report (April 2010), rather than universal screening (testing all young children). However, it is likely that some clinics and some Minnesota counties employ universal screening.

Healthy People 2010

The Healthy People 2010 environmental health focus area contains one objective on childhood lead poisoning:

- Healthy People 2010 Objective 8-11. Eliminate elevated blood lead levels in children.

Although Minnesota has not yet met the Healthy People 2010 Objective of eliminating EBLLs in children, the number of EBLL cases in Minnesota children has been decreasing since 1995.[7] The number of children tested for lead in Minnesota has been increasing since 1998, with approximately 93,000 children tested in 2007.[7] Among children tested in 2007, there were 1,098 Minnesota children with blood lead levels of 10 µg/dL or greater, and 197 children had venous blood lead levels of 15 µg/dL or greater.[7]

Preventing Childhood Blood Lead Poisoning

Although there has been a decline in national blood lead levels over the past 25-30 years, childhood lead poisoning continues to be a real and preventable environmental health problem. Prevention efforts focus on stopping children from coming into contact with lead and ensuring early treatment of children poisoned by lead. Administering a blood lead test for young children, especially those in high risk populations, can identify children at risk for lead poisoning.

The MDH Lead Program is a leader for childhood lead poisoning prevention efforts statewide and implements the Childhood Lead Poisoning Prevention Program (CLPPP) cooperative agreement from CDC. MDH CLPPP, in collaboration with a wide range of partners, has coordinated the development of a plan, the "State of Minnesota Childhood Lead Poisoning Elimination Plan," to contribute to meeting the national Healthy People 2010 goal of eliminating childhood lead poisoning as a public health problem by 2010. The plan supports a collaborative, housing-based approach to promoting primary prevention of childhood lead exposure, while incorporating ongoing programs at both the state and local level.[7] For more information about the MDH Lead Program, go to http://www.health.state.mn.us/lead/.

The MDH Lead Program identifies the following most common sources of exposure to lead in children at http://www.health.state.mn.us/divs/eh/lead/sources.html:

- Lead-based paint on the inside and outside of homes
- Lead dust in the household from paint chips or soil
- Soil with lead contamination from buildings, remodeling, or traffic areas
- A water system with lead water pipes or copper water pipes joined with lead-based solder
- Other sources include: children's toys containing leaded paint or lead pieces, some home remedies, and some cosmetics

The CDC recommends the following measures to reduce children's exposure to lead and lead dust [8]:

- Damp-mop floors, damp-wipe surfaces, and frequently wash a child's hands, pacifiers, and toys to reduce exposure to lead.
- Use cold water from the tap for drinking, cooking, and for making baby formula. Hot water is more likely to contain higher levels of lead, and most of the lead in household water usually comes from the plumbing in your house, not from the local water supply.
- Avoid using home remedies and cosmetics that contain lead.
- Check children's toys for lead, especially imported toys or toys built in the U.S. before the use of lead was banned in children's toys in 1978.
- Although all houses built before 1978 are likely to contain some lead-based paint, it is the deterioration of this paint that causes a problem. If you are concerned, talk to your state or local public health department about testing paint and dust from your home for lead.
- If your work or hobbies involve working with lead-based products or if you remodel buildings built before 1978, take basic steps to decrease your family's exposure (for example, by showering and changing clothes after finishing the task).

Childhood Lead Poisoning Data and Measures

The Tracking Network's childhood lead poisoning Nationally Consistent Data and Measures (NCDMs) include: blood lead level testing coverage, blood lead level results, housing age, and children living in poverty.

The Tracking Network testing coverage measure provides information about blood lead testing among children born in the same year, known as a birth cohort. These measures are for children under the age of 6 for birth years 2000-2004 in all Minnesota counties. Residency for children being tested is determined by the address at time of testing, while residency for the population eligible to be tested is determined by the address at time of birth as listed on birth certificates. "Confirmed elevated blood lead levels" are defined as one venous test of 10+ µg/dL, or two capillary tests of 10+ µg/dL within 12 weeks of each other, for the purposes of NCDMs. The Tracking Network housing age measures use census data to provide information about the number of homes built before 1950 and from 1950 to 1979.

Childhood Lead Poisoning Nationally Consistent Data and Measures (NCDMs)	
A. Blood Lead Testing by Birth Cohort	– Number and percent of children born in the same year and tested for lead before age 36 months
B. Blood Lead Levels by Birth Cohort	– Number and percent of children born in the same year and tested before age 36 months in each blood lead level category – Number and percent of children born in the same year and tested before age 36 months with blood lead levels ≥ 10 µg/dL
C. Housing Age	– Number and percent of homes built before 1950 (as measured in the 2000 Census) – Number and percent of homes built from 1950 to 1979 (as measured in the 2000 Census)
D. Poverty	– Number and percent of children under 5 years of age living in poverty (as measured in the 2000 Census)

CDC switched from universal to targeted screening recommendations in 1998, which led to an increase in blood lead testing due to greater acceptance from health care providers. MDH published Minnesota-specific screening guidelines in 2000 which were publicized by multiple agencies in health care and public health. Case management guidelines, published in 2001, and clinical treatment guidelines, published in 2002, also helped focus attention of the state's providers on appropriate testing of children. The screening guidelines are revised annually by MDH. Both the case management and clinical guidelines were revised in 2006 to update procedures and incorporate recommendations for test results less than 10 µg/dL

Testing and blood lead level measures use data collected by the MDH Blood Lead Information System (BLIS). In Minnesota, healthcare providers test for lead poisoning in children by drawing blood and submitting the specimen to a laboratory for analysis. Laboratories conducting the blood lead analysis are required by state statute to report the lead level and additional demographic information to the MDH BLIS. Because testing is not conducted in a random manner, these measures of children tested with blood lead levels above 10 µg/dL cannot be interpreted as prevalence or incidence for the overall population.

Denominator data for the Tracking Network testing and blood lead level measures are from birth certificates filed with the MDH Office of the Registrar for calendar year 2000-2004. Denominator data for the MN EPHT blood lead level measures are from MDH BLIS. Housing age and poverty data are from the US Census Bureau's 2000 Census summary file 3.

Children with a missing county of residence were excluded from the county analyses, but included in the state analyses.

A. Blood Lead Testing by Birth Cohort

Children less than six years old, and especially ages one to three years, are most vulnerable to lead's toxicity due to their growing bodies, nutritional needs, mouthing behavior and spending time on the floor.[6] Using a birth cohort, the number of children born in a specific year tested before the age of 36 months can be determined. This measure can help measure trends in blood lead testing, identify populations that are not being tested adequately and improve testing.

Table 1 and Figure 1 show the number and percent of children born in the same year that were tested for elevated blood lead levels (EBLLs) prior to 36 months of age in Minnesota for birth cohort years 2000-2004. The percent of children tested in Minnesota increased from 43.6% among the birth cohort born in 2000 (28,341 children tested) to 70.8% among the birth cohort born in 2004 (48,237 children tested).

Table 1: *Number and percent of children born in the same year tested prior to 36 months of age, Minnesota, 2000-2004.*

Birth Year	Total Births	Number Tested	Percent Tested
2000	65072	28341	43.6%
2001	64288	32409	50.4%
2002	65658	38063	58.0%
2003	67624	43928	65.0%
2004	68098	48237	70.8%

Figure 1: *Number of children born in the same year tested prior to 36 months of age, Minnesota, 2000-2004.*

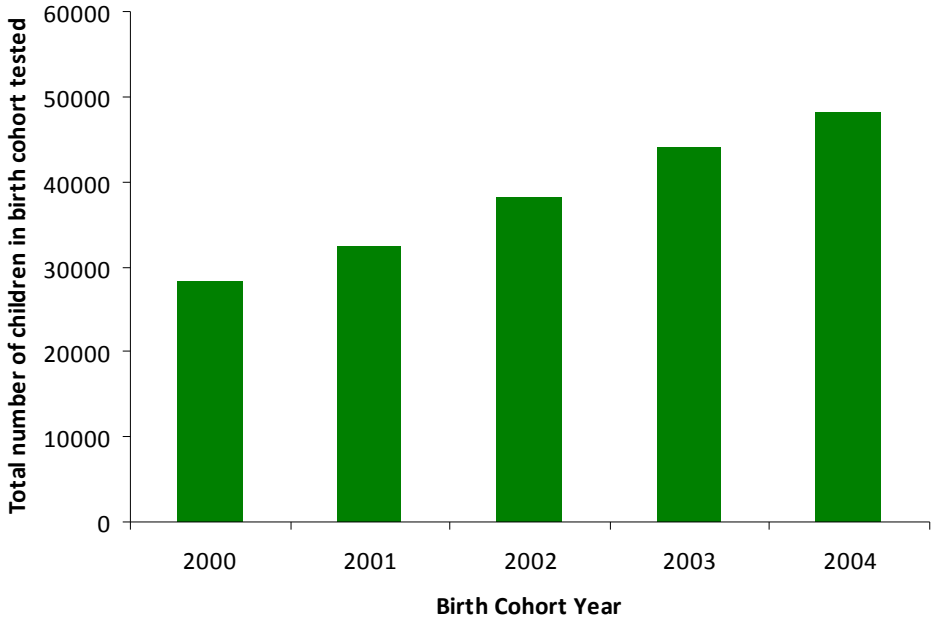


Table 2 and Figure 2 show the number and percent of children born in the same year and tested for EBLLs prior to 36 months of age in Minnesota by county for birth cohort years 2000-2004. Hennepin and Ramsey Counties are among the highest percent tested, likely due to the high proportion of low-income children living in at-risk housing (built prior to 1950). Children living in suburban counties often do not fall under targeted screening recommendations due to newer housing in these counties.

Although rural counties often have lower percentages of children tested, many rural areas have a relatively high percentage of pre-1950 housing (around 50%). An MDH lead prevalence study, collecting blood lead level data in three rural counties of Western Minnesota, found a percentage of EBLLs that was very similar to the overall rate for the state surveillance data.[9]

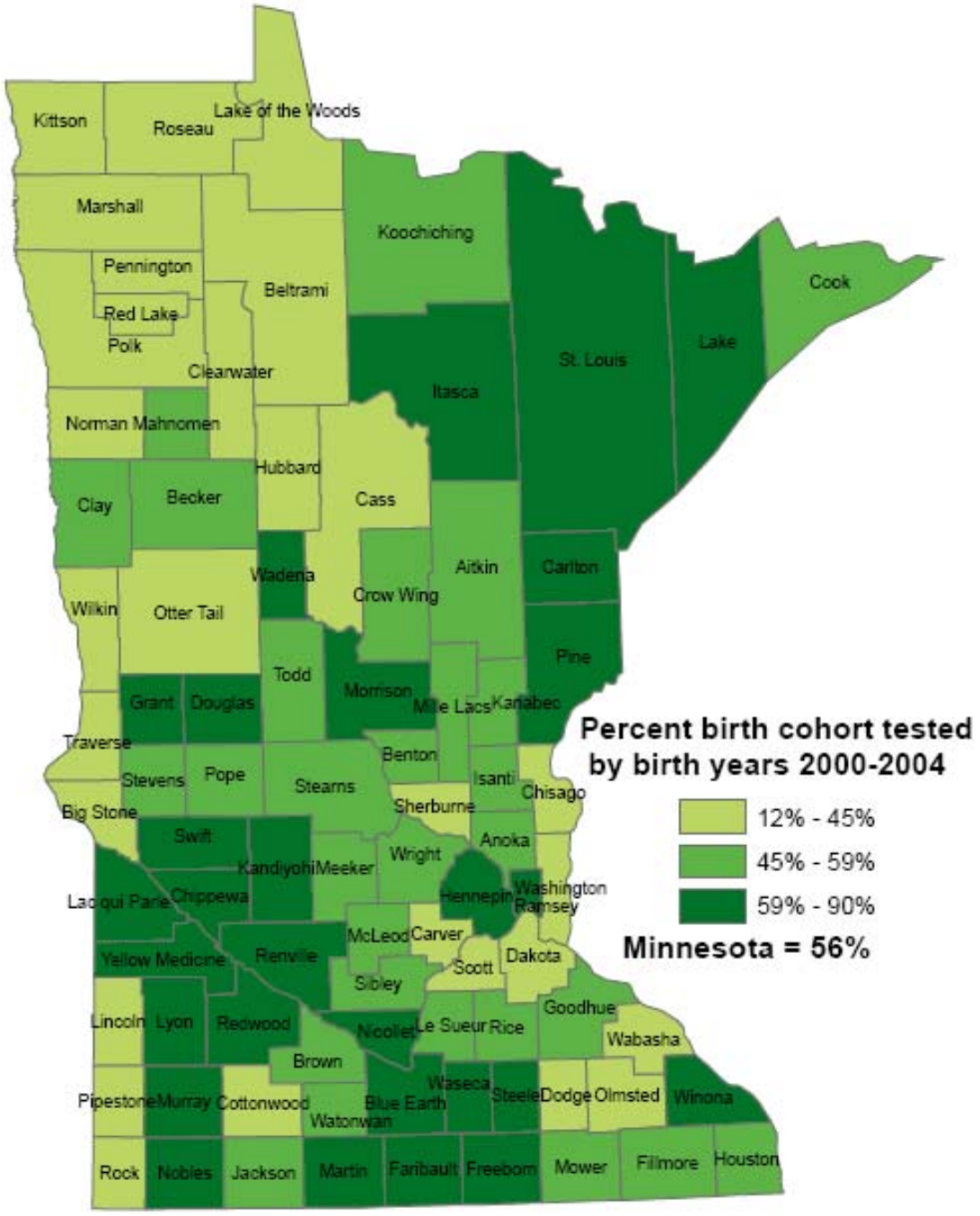
Table 2: *Number and percent of children born in the same year and tested prior to 36 months of age by county, Minnesota, 2000-2004.*

	2000			2001			2002			2003			2004		
	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%
Minnesota	**65072**	**28341**	***43.6%***	**64288**	**32409**	***50.4%***	**65658**	**38063**	***58.0%***	**67624**	**43928**	***65.0%***	**68098**	**48237**	***70.8%***
Aitkin	134	40	*29.9*	138	63	*45.7*	145	91	*62.8*	140	102	*72.9*	161	123	*76.4*
Anoka	4155	1322	*31.8*	4169	1752	*42.0*	4080	2286	*56.0*	4171	2521	*60.4*	4280	2629	*61.4*
Becker	356	168	*47.2*	338	176	*52.1*	365	204	*55.9*	407	199	*48.9*	422	253	*60.0*
Beltrami	571	136	*23.8*	552	112	*20.3*	585	91	*15.6*	611	94	*15.4*	616	169	*27.4*
Benton	553	105	*19.0*	512	156	*30.5*	572	282	*49.3*	560	403	*72.0*	556	449	*80.8*
Big Stone	49	17	*34.7*	53	15	*28.3*	61	21	*34.4*	43	21	*48.8*	51	33	*64.7*
Blue Earth	652	318	*48.8*	645	351	*54.4*	645	426	*66.0*	678	494	*72.9*	652	491	*75.3*
Brown	305	112	*36.7*	237	133	*56.1*	285	188	*66.0*	268	146	*54.5*	295	176	*59.7*
Carlton	354	134	*37.9*	354	156	*44.1*	376	292	*77.7*	372	330	*88.7*	394	344	*87.3*
Carver	1096	166	*15.1*	1120	224	*20.0*	1113	288	*25.9*	1130	370	*32.7*	1177	521	*44.3*
Cass	295	83	*28.1*	306	99	*32.4*	327	138	*42.2*	297	123	*41.4*	351	171	*48.7*
Chippewa	131	107	*81.7*	118	90	*76.3*	121	106	*87.6*	159	117	*73.6*	143	109	*76.2*
Chisago	627	137	*21.9*	621	152	*24.5*	728	219	*30.1*	684	307	*44.9*	669	372	*55.6*
Clay	497	174	*35.0*	400	254	*63.5*	572	246	*43.0*	670	337	*50.3*	647	334	*51.6*
Clearwater	99	25	*25.3*	117	25	*21.4*	93	33	*35.5*	127	44	*34.6*	123	37	*30.1*
Cook	34	9	*26.5*	43	22	*51.2*	40	34	*85.0*	44	26	*59.1*	28	17	*60.7*
Cottonwood	148	35	*23.6*	144	38	*26.4*	134	61	*45.5*	128	70	*54.7*	148	74	*50.0*
Crow Wing	621	216	*34.8*	696	325	*46.7*	703	409	*58.2*	700	474	*67.7*	731	595	*81.4*
Dakota	5101	1268	*24.9*	4929	1610	*32.7*	5136	2216	*43.1*	5180	2784	*53.7*	5325	3166	*59.5*
Dodge	241	57	*23.7*	239	78	*32.6*	273	85	*31.1*	301	87	*28.9*	270	123	*45.6*
Douglas	350	206	*58.9*	339	211	*62.2*	349	212	*60.7*	363	275	*75.8*	390	308	*79.0*
Faribault	155	76	*49.0*	149	108	*72.5*	148	110	*74.3*	157	146	*93.0*	159	139	*87.4*
Fillmore	241	122	*50.6*	239	132	*55.2*	248	140	*56.5*	277	141	*50.9*	251	124	*49.4*
Freeborn	384	188	*49.0*	316	270	*85.4*	363	299	*82.4*	366	285	*77.9*	367	321	*87.5*
Goodhue	498	189	*38.0*	504	243	*48.2*	504	268	*53.2*	539	312	*57.9*	555	376	*67.7*
Grant	56	32	*57.1*	52	29	*55.8*	66	43	*65.2*	70	50	*71.4*	61	43	*70.5*
Hennepin	15920	8281	*52.0*	15723	9041	*57.5*	15523	9582	*61.7*	15827	10642	*67.2*	16053	10622	*66.2*
Houston	213	87	*40.8*	198	84	*42.4*	177	94	*53.1*	199	123	*61.8*	205	127	*62.0*
Hubbard	177	42	*23.7*	184	47	*25.5*	180	57	*31.7*	206	69	*33.5*	206	73	*35.4*

	2000			2001			2002			2003			2004		
	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%
Minnesota	**65072**	**28341**	***43.6%***	**64288**	**32409**	***50.4%***	**65658**	**38063**	***58.0%***	**67624**	**43928**	***65.0%***	**68098**	**48237**	***70.8%***
Isanti	373	121	*32.4*	389	126	*32.4*	429	185	*43.1*	451	242	*53.7*	454	289	*63.7*
Itasca	451	329	*72.9*	410	290	*70.7*	442	322	*72.9*	476	361	*75.8*	493	435	*88.2*
Jackson	119	42	*35.3*	98	51	*52.0*	105	49	*46.7*	108	61	*56.5*	110	70	*63.6*
Kanabec	147	42	*28.6*	181	71	*39.2*	168	101	*60.1*	162	84	*51.9*	180	112	*62.2*
Kandiyohi	516	339	*65.7*	512	393	*76.8*	533	443	*83.1*	562	452	*80.4*	577	513	*88.9*
Kittson	61	14	*23.0*	44	13	*29.5*	38	18	*47.4*	34	18	*52.9*	49	22	*44.9*
Koochiching	133	12	*9.0*	138	36	*26.1*	123	65	*52.8*	126	108	*85.7*	124	95	*76.6*
Lac qui Parle	80	51	*63.8*	61	39	*63.9*	68	51	*75.0*	55	47	*85.5*	67	57	*85.1*
Lake	102	59	*57.8*	85	60	*70.6*	101	88	*87.1*	97	81	*83.5*	73	79	*108.2*
Lake of the Woods	35	4	*11.4*	32	7	*21.9*	29	17	*58.6*	50	6	*12.0*	41	12	*29.3*
Le Sueur	300	100	*33.3*	325	121	*37.2*	300	141	*47.0*	309	165	*53.4*	344	220	*64.0*
Lincoln	68	19	*27.9*	54	26	*48.1*	62	28	*45.2*	73	34	*46.6*	70	36	*51.4*
Lyon	338	227	*67.2*	317	286	*90.2*	322	291	*90.4*	291	283	*97.3*	310	328	*105.8*
Mahnomen	72	35	*48.6*	80	51	*63.8*	76	40	*52.6*	87	43	*49.4*	77	49	*63.6*
Marshall	96	21	*21.9*	93	32	*34.4*	107	30	*28.0*	111	43	*38.7*	121	44	*36.4*
Martin	206	56	*27.2*	242	116	*47.9*	201	134	*66.7*	223	169	*75.8*	209	167	*79.9*
McLeod	459	194	*42.3*	515	253	*49.1*	496	290	*58.5*	505	337	*66.7*	534	382	*71.5*
Meeker	276	97	*35.1*	288	160	*55.6*	272	162	*59.6*	301	178	*59.1*	283	187	*66.1*
Mille Lacs	281	60	*21.4*	241	90	*37.3*	326	173	*53.1*	321	193	*60.1*	318	202	*63.5*
Morrison	383	150	*39.2*	434	249	*57.4*	389	278	*71.5*	394	307	*77.9*	423	350	*82.7*
Mower	503	194	*38.6*	518	209	*40.3*	525	209	*39.8*	512	251	*49.0*	489	309	*63.2*
Murray	74	38	*51.4*	92	56	*60.9*	99	66	*66.7*	78	56	*71.8*	95	59	*62.1*
Nicollet	368	146	*39.7*	365	171	*46.8*	366	258	*70.5*	358	250	*69.8*	393	312	*79.4*
Nobles	251	180	*71.7*	308	221	*71.8*	288	253	*87.8*	312	255	*81.7*	327	282	*86.2*
Norman	69	20	*29.0*	55	23	*41.8*	74	25	*33.8*	72	28	*38.9*	73	25	*34.2*
Olmsted	1837	446	*24.3*	1797	522	*29.0*	1926	488	*25.3*	2007	606	*30.2*	2059	638	*31.0*
Otter Tail	534	196	*36.7*	543	234	*43.1*	575	255	*44.3*	598	269	*45.0*	561	245	*43.7*
Pennington	165	42	*25.5*	164	73	*44.5*	152	76	*50.0*	194	81	*41.8*	183	108	*59.0*
Pine	314	148	*47.1*	280	170	*60.7*	294	193	*65.6*	318	202	*63.5*	315	216	*68.6*
Pipestone	114	14	*12.3*	121	17	*14.0*	104	24	*23.1*	105	23	*21.9*	125	33	*26.4*
Polk	334	42	*12.6*	259	63	*24.3*	367	91	*24.8*	365	129	*35.3*	369	175	*47.4*
Pope	95	47	*49.5*	106	50	*47.2*	109	50	*45.9*	126	86	*68.3*	96	68	*70.8*

	2000			2001			2002			2003			2004		
	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%	Total Births	# Tested	%
Minnesota	**65072**	**28341**	***43.6%***	**64288**	**32409**	***50.4%***	**65658**	**38063**	***58.0%***	**67624**	**43928**	***65.0%***	**68098**	**48237**	***70.8%***
Ramsey	7372	4419	*59.9*	7158	4742	*66.2*	7151	5144	*71.9*	7162	5199	*72.6*	7047	4916	*69.8*
Red Lake	56	14	*25.0*	47	13	*27.7*	36	6	*16.7*	54	27	*50.0*	54	23	*42.6*
Redwood	178	87	*48.9*	173	135	*78.0*	218	161	*73.9*	209	151	*72.2*	170	141	*82.9*
Renville	214	135	*63.1*	184	148	*80.4*	189	160	*84.7*	206	155	*75.2*	195	155	*79.5*
Rice	645	242	*37.5*	692	313	*45.2*	688	367	*53.3*	675	485	*71.9*	775	600	*77.4*
Rock	124	7	*5.6*	105	8	*7.6*	133	21	*15.8*	120	29	*24.2*	121	28	*23.1*
Roseau	206	16	*7.8*	197	15	*7.6*	199	14	*7.0*	241	38	*15.8*	199	39	*19.6*
Scott	1604	271	*16.9*	1706	350	*20.5*	1871	540	*28.9*	1977	948	*48.0*	2023	1152	*56.9*
Sherburne	1023	168	*16.4*	1097	335	*30.5*	1190	587	*49.3*	1161	695	*59.9*	1199	724	*60.4*
Sibley	202	84	*41.6*	168	100	*59.5*	192	107	*55.7*	193	130	*67.4*	194	129	*66.5*
Stearns	1668	418	*25.1*	1683	528	*31.4*	1710	912	*53.3*	1775	1256	*70.8*	1784	1465	*82.1*
Steele	436	247	*56.7*	469	306	*65.2*	459	386	*84.1*	522	447	*85.6*	476	463	*97.3*
Stevens	117	27	*23.1*	93	40	*43.0*	97	47	*48.5*	102	72	*70.6*	98	78	*79.6*
St. Louis	1974	898	*45.5*	1894	1194	*63.0*	1947	1548	*79.5*	2068	1815	*87.8*	2024	1891	*93.4*
Swift	129	96	*74.4*	100	94	*94.0*	118	96	*81.4*	130	87	*66.9*	114	71	*62.3*
Todd	256	113	*44.1*	264	140	*53.0*	285	143	*50.2*	296	140	*47.3*	266	161	*60.5*
Traverse	35	8	*22.9*	28	11	*39.3*	32	19	*59.4*	36	14	*38.9*	37	24	*64.9*
Wabasha	239	71	*29.7*	251	122	*48.6*	234	100	*42.7*	250	113	*45.2*	256	145	*56.6*
Wadena	156	81	*51.9*	152	113	*74.3*	146	121	*82.9*	197	115	*58.4*	151	109	*72.2*
Waseca	243	96	*39.5*	242	133	*55.0*	217	157	*72.4*	248	202	*81.5*	262	222	*84.7*
Washington	2726	663	*24.3*	2677	834	*31.2*	2747	1036	*37.7*	2813	1110	*39.5*	2745	1297	*47.2*
Watonwan	174	74	*42.5*	170	100	*58.8*	126	84	*66.7*	160	98	*61.3*	133	97	*72.9*
Wilkin	73	13	*17.8*	68	19	*27.9*	61	30	*49.2*	80	37	*46.3*	80	41	*51.3*
Winona	531	282	*53.1*	520	302	*58.1*	494	288	*58.3*	484	345	*71.3*	534	383	*71.7*
Wright	1378	323	*23.4*	1457	531	*36.4*	1620	792	*48.9*	1880	1008	*53.6*	1825	1059	*58.0*
Yellow Medicine	146	100	*68.5*	111	84	*75.7*	114	91	*79.8*	129	100	*77.5*	108	84	*77.8*
Unknown		2051			1424			1691			2572			4302	

Figure 2: *Percent of children born in the same year and tested prior to 36 months of age by county, Minnesota, aggregated from 2000 to 2004.*



B. Blood Lead Levels by Birth Cohort

Table 3 and Figure 3 show the number and percentage of children born in the same year and tested prior to 36 months of age for each confirmed EBLL category in Minnesota for birth cohort years 2000-2004. Among Minnesota children born from 2000 to 2004 and tested prior to reaching 3 years of age, there has been a steady decrease in the number and percentage of elevated blood lead levels (exceeding 10 µg/dL) from 1.4% among children born in 2000 to 0.6% among children born in 2004. Over half of the elevated blood lead level test results (154 of 288, or 53%) fall into the lowest elevated category (10 to 14 µg/dL). Because testing is not conducted in a random manner, these measures of children tested with blood lead levels above 10 µg/dL cannot be interpreted as prevalence or incidence for the overall population.

The decrease in number and percentage of EBLLs mirrors what has been seen across the U.S. Much of the decrease may be due to ongoing reduction in lead exposure. Housing rehab programs, such as those funded by the U.S. Department of Housing and Urban Development (HUD), have focused on making homes lead-safe. Lead has also been eliminated from many other consumer products and children's toys. Lead-related manufacturing has introduced greater controls to reduce environmental exposures to lead.

Table 3: *Number of children born in the same year and tested prior to 36 months of age with confirmed EBLLs by test result category, Minnesota, 2000-2004.*

		Number and percent of children with confirmed EBLLs by test result category in µg/dL												Total	
		10-14 µg/dL		15-19 µg/dL		20-24 µg/dL		25-44 µg/dL		45-69 µg/dL		70+ µg/dL		≥ 10 µg/dL	
	Number Tested	# EBLL	%	# EBLL	%	# EBLL	%	# EBLL	%	# EBLL	%	# EBLL	%	# EBLL	%
2000	28341	214	0.8%	81	0.3%	39	0.1%	49	0.2%	5	<0.1%	2	<0.1%	390	1.4%
2001	32409	223	0.7%	87	0.3%	29	0.1%	56	0.2%	4	<0.1%	2	<0.1%	401	1.2%
2002	38063	234	0.6%	75	0.2%	38	0.1%	42	0.1%	5	<0.1%	4	<0.1%	398	1.0%
2003	43928	172	0.4%	84	0.2%	34	0.1%	31	0.1%	5	<0.1%	1	<0.1%	327	0.7%
2004	48237	154	0.3%	69	0.1%	28	0.1%	33	0.1%	3	<0.1%	1	<0.1%	288	0.6%

Figure 3: *Percent of children born in the same year and tested prior to 36 months of age with confirmed EBLLs by test result category, Minnesota, 2000-2004.*

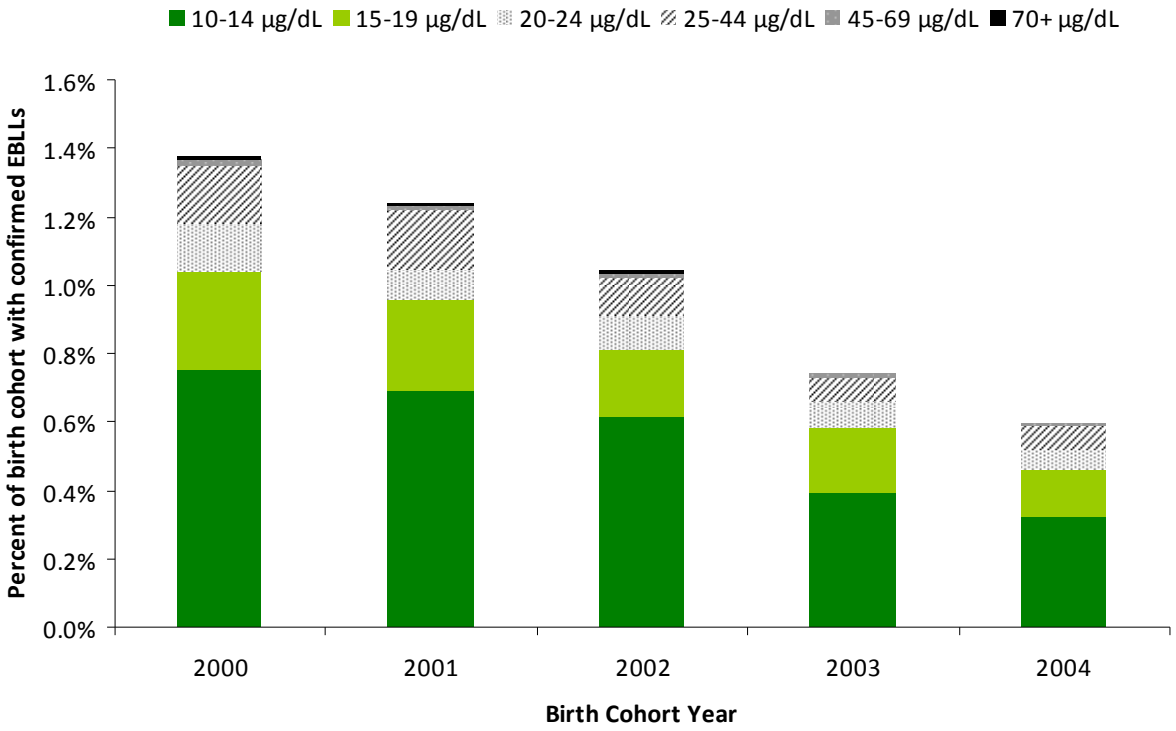


Table 4 and Figure 4 show the number and percent of children born in the same year with confirmed EBLLs among children born that year in Minnesota by county. It is difficult to compare EBLLs across counties because the testing is not random and the percent of children tested varies by county, as shown in Table 2 and Figure 2.

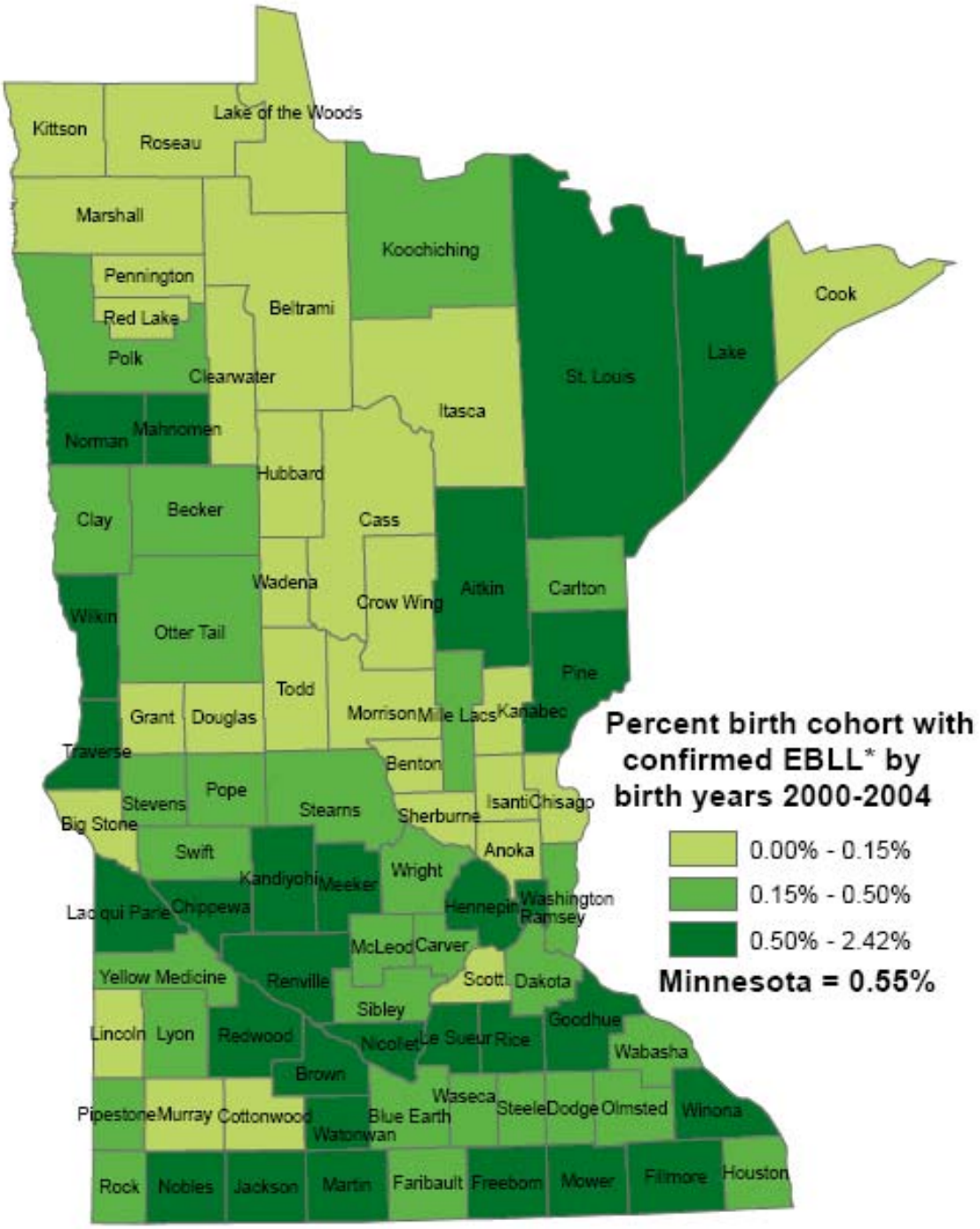
Table 4: *Number and percent of children born in the same year and tested prior to 36 months of age with confirmed EBLLs ≥ 10 µg/dL among children born that year by county, Minnesota, 2000-2004.*

	2000			2001			2002			2003			2004		
	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%
Minnesota	**28341**	**390**	**1.38**	**32409**	**401**	**1.24**	**38063**	**398**	**1.05**	**43928**	**327**	**0.74**	**48237**	**288**	**0.60**
Aitkin	40	0	0.00	63	2	3.17	91	0	0.00	102	0	0.00	123	2	1.63
Anoka	1322	2	0.15	1752	6	0.34	2286	4	0.17	2521	4	0.16	2629	6	0.23
Becker	168	1	0.60	176	0	0.00	204	0	0.00	199	2	1.01	253	2	0.79
Beltrami	136	0	0.00	112	2	1.79	91	2	2.20	94	0	0.00	169	0	0.00
Benton	105	0	0.00	156	1	0.64	282	0	0.00	403	1	0.25	449	1	0.22
Big Stone	17	0	0.00	15	0	0.00	21	0	0.00	21	0	0.00	33	0	0.00
Blue Earth	318	2	0.63	351	3	0.85	426	2	0.47	494	1	0.20	491	0	0.00
Brown	112	2	1.79	133	1	0.75	188	3	1.60	146	1	0.68	176	0	0.00
Carlton	134	1	0.75	156	2	1.28	292	0	0.00	330	3	0.91	344	1	0.29
Carver	166	3	1.81	224	3	1.34	288	2	0.69	370	1	0.27	521	2	0.38
Cass	83	0	0.00	99	0	0.00	138	1	0.72	123	0	0.00	171	0	0.00
Chippewa	107	3	2.80	90	0	0.00	106	1	0.94	117	2	1.71	109	0	0.00
Chisago	137	0	0.00	152	1	0.66	219	2	0.91	307	1	0.33	372	0	0.00
Clay	174	0	0.00	254	2	0.79	246	0	0.00	337	2	0.59	334	1	0.30
Clearwater	25	0	0.00	25	0	0.00	33	0	0.00	44	0	0.00	37	0	0.00
Cook	9	0	0.00	22	0	0.00	34	0	0.00	26	0	0.00	17	0	0.00
Cottonwood	35	0	0.00	38	0	0.00	61	1	1.64	70	0	0.00	74	0	0.00
Crow Wing	216	3	1.39	325	0	0.00	409	0	0.00	474	0	0.00	595	2	0.34
Dakota	1268	11	0.87	1610	7	0.43	2216	3	0.14	2784	9	0.32	3166	10	0.32
Dodge	57	0	0.00	78	1	1.28	85	0	0.00	87	1	1.15	123	0	0.00
Douglas	206	0	0.00	211	1	0.47	212	0	0.00	275	0	0.00	308	0	0.00
Faribault	76	1	1.32	108	1	0.93	110	1	0.91	146	0	0.00	139	0	0.00
Fillmore	122	1	0.82	132	3	2.27	140	2	1.43	141	3	2.13	124	3	2.42
Freeborn	188	8	4.26	270	7	2.59	299	5	1.67	285	4	1.40	321	2	0.62
Goodhue	189	5	2.65	243	2	0.82	268	5	1.87	312	1	0.32	376	0	0.00
Grant	32	0	0.00	29	0	0.00	43	0	0.00	50	0	0.00	43	0	0.00
Hennepin	8281	177	2.14	9041	155	1.71	9582	154	1.61	10642	120	1.13	10622	103	0.97
Houston	87	1	1.15	84	0	0.00	94	1	1.06	123	1	0.81	127	0	0.00
Hubbard	42	0	0.00	47	0	0.00	57	0	0.00	69	1	1.45	73	0	0.00

	2000			2001			2002			2003			2004		
	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%
Minnesota	**28341**	**390**	**1.38**	**32409**	**401**	**1.24**	**38063**	**398**	**1.05**	**43928**	**327**	**0.74**	**48237**	**288**	**0.60**
Isanti	121	1	0.83	126	1	0.79	185	1	0.54	242	0	0.00	289	0	0.00
Itasca	329	0	0.00	290	0	0.00	322	0	0.00	361	2	0.55	435	0	0.00
Jackson	42	0	0.00	51	0	0.00	49	0	0.00	61	0	0.00	70	3	4.29
Kanabec	42	0	0.00	71	0	0.00	101	0	0.00	84	0	0.00	112	0	0.00
Kandiyohi	339	3	0.88	393	4	1.02	443	8	1.81	452	2	0.44	513	3	0.58
Kittson	14	0	0.00	13	0	0.00	18	0	0.00	18	0	0.00	22	0	0.00
Koochiching	12	0	0.00	36	0	0.00	65	0	0.00	108	0	0.00	95	1	1.05
Lac qui Parle	51	1	1.96	39	0	0.00	51	4	7.84	47	2	4.26	57	1	1.75
Lake	59	2	3.39	60	1	1.67	88	2	2.27	81	0	0.00	79	0	0.00
Lake of the Woods	4	0	0.00	7	0	0.00	17	0	0.00	6	0	0.00	12	0	0.00
Le Sueur	100	1	1.00	121	2	1.65	141	1	0.71	165	2	1.21	220	2	0.91
Lincoln	19	0	0.00	26	0	0.00	28	0	0.00	34	0	0.00	36	0	0.00
Lyon	227	1	0.44	286	1	0.35	291	3	1.03	283	1	0.35	328	0	0.00
Mahnomen	35	0	0.00	51	0	0.00	40	0	0.00	43	0	0.00	49	2	4.08
Marshall	21	0	0.00	32	0	0.00	30	0	0.00	43	0	0.00	44	0	0.00
Martin	56	1	1.79	116	1	0.86	134	1	0.75	169	2	1.18	167	4	2.40
McLeod	194	3	1.55	253	1	0.40	290	2	0.69	337	1	0.30	382	2	0.52
Meeker	97	0	0.00	160	1	0.63	162	4	2.47	178	2	1.12	187	1	0.53
Mille Lacs	60	1	1.67	90	0	0.00	173	1	0.58	193	1	0.52	202	0	0.00
Morrison	150	0	0.00	249	1	0.40	278	1	0.36	307	0	0.00	350	0	0.00
Mower	194	6	3.09	209	5	2.39	209	4	1.91	251	0	0.00	309	3	0.97
Murray	38	0	0.00	56	0	0.00	66	0	0.00	56	0	0.00	59	0	0.00
Nicollet	146	2	1.37	171	1	0.58	258	2	0.78	250	0	0.00	312	5	1.60
Nobles	180	5	2.78	221	4	1.81	253	5	1.98	255	2	0.78	282	0	0.00
Norman	20	0	0.00	23	2	8.70	25	1	4.00	28	1	3.57	25	0	0.00
Olmsted	446	7	1.57	522	5	0.96	488	4	0.82	606	3	0.50	638	2	0.31
Otter Tail	196	1	0.51	234	1	0.43	255	4	1.57	269	1	0.37	245	3	1.22
Pennington	42	0	0.00	73	0	0.00	76	0	0.00	81	0	0.00	108	0	0.00
Pine	148	3	2.03	170	1	0.59	193	3	1.55	202	1	0.50	216	1	0.46
Pipestone	14	0	0.00	17	0	0.00	24	0	0.00	23	1	4.35	33	0	0.00
Polk	42	2	4.76	63	0	0.00	91	1	1.10	129	0	0.00	175	2	1.14
Pope	47	0	0.00	50	1	2.00	50	1	2.00	86	0	0.00	68	0	0.00

	2000			2001			2002			2003			2004		
	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%	Total Tested	# EBLL	%
Minnesota	**28341**	**390**	**1.38**	**32409**	**401**	**1.24**	**38063**	**398**	**1.05**	**43928**	**327**	**0.74**	**48237**	**288**	**0.60**
Ramsey	4419	94	2.13	4742	107	2.26	5144	98	1.91	5199	102	1.96	4916	63	1.28
Red Lake	14	0	0.00	13	0	0.00	6	0	0.00	27	0	0.00	23	0	0.00
Redwood	87	1	1.15	135	2	1.48	161	0	0.00	151	1	0.66	141	3	2.13
Renville	135	5	3.70	148	5	3.38	160	2	1.25	155	2	1.29	155	2	1.29
Rice	242	7	2.89	313	5	1.60	367	3	0.82	485	1	0.21	600	4	0.67
Rock	7	0	0.00	8	0	0.00	21	2	9.52	29	1	3.45	28	0	0.00
Roseau	16	0	0.00	15	0	0.00	14	0	0.00	38	0	0.00	39	0	0.00
Scott	271	2	0.74	350	1	0.29	540	2	0.37	948	0	0.00	1152	1	0.09
Sherburne	168	0	0.00	335	1	0.30	587	1	0.17	695	0	0.00	724	3	0.41
Sibley	84	1	1.19	100	0	0.00	107	0	0.00	130	1	0.77	129	0	0.00
Stearns	418	1	0.24	528	4	0.76	912	3	0.33	1256	5	0.40	1465	6	0.41
Steele	247	0	0.00	306	3	0.98	386	3	0.78	447	4	0.89	463	0	0.00
Stevens	27	0	0.00	40	0	0.00	47	0	0.00	72	0	0.00	78	1	1.28
St. Louis	898	9	1.00	1194	21	1.76	1548	22	1.42	1815	15	0.83	1891	15	0.79
Swift	96	0	0.00	94	0	0.00	96	0	0.00	87	0	0.00	71	1	1.41
Todd	113	1	0.88	140	1	0.71	143	0	0.00	140	0	0.00	161	0	0.00
Traverse	8	0	0.00	11	0	0.00	19	0	0.00	14	0	0.00	24	1	4.17
Wabasha	71	1	1.41	122	0	0.00	100	0	0.00	113	1	0.88	145	0	0.00
Wadena	81	0	0.00	113	0	0.00	121	0	0.00	115	0	0.00	109	0	0.00
Waseca	96	1	1.04	133	1	0.75	157	0	0.00	202	0	0.00	222	0	0.00
Washington	663	1	0.15	834	4	0.48	1036	6	0.58	1110	3	0.27	1297	7	0.54
Watonwan	74	3	4.05	100	5	5.00	84	3	3.57	98	0	0.00	97	1	1.03
Wilkin	13	0	0.00	19	0	0.00	30	2	6.67	37	1	2.70	41	0	0.00
Winona	282	1	0.35	302	4	1.32	288	7	2.43	345	4	1.16	383	7	1.83
Wright	323	0	0.00	531	4	0.75	792	2	0.25	1008	4	0.40	1059	2	0.19
Yellow Medicine	100	1	1.00	84	0	0.00	91	0	0.00	100	0	0.00	84	0	0.00
Unknown	2051	0		1424	0		1691	0	0.00	2572	0		4302	1	

Figure 4: *Percent of children born in the same year and tested prior to 36 months of age with confirmed EBLLs ≥ 10 µg/dL among children born that year by county, Minnesota, aggregated from 2000 to 2004.*



* For the purpose of this NCDM, a "confirmed elevated blood lead level" is defined as one venous test ≥ 10 µg/dL or two capillary tests ≥ 10 µg/dL within 12 weeks.

C. Housing Age

More than 80 % of all homes built in the U.S. before 1978 contain lead based paint.[10] The "Housing Age" measure identifies communities that may be at greater risk of exposing children to lead due to older housing. Lead paint may deteriorate as visible paint chips, but is more commonly found as fine dust, identical in appearance to ordinary house dust. Lead-painted windows are a special problem because the action of raising and lowering the window creates lead paint dust that settles on floors and window wells, even when new paint is put over the old lead paint. Remodeling activities in old homes can create large quantities of lead dust that may be inhaled or ingested by all family members.[11]

Table 5 shows the number and percent of housing built before 1950 and housing built from 1950 to 1979 in Minnesota by county, among all housing in that county. It is evident that the rural southern areas of Minnesota still have a high percentage of old homes, built before 1980. However, it is not clear if the amount of lead in those houses in rural southern areas of Minnesota is as high as the houses in the Metro areas. As expected, the suburban counties have a higher percentage of new construction homes built after 1979.

Table 5: *Number and percent of pre-1950 housing and 1950 to 1979 housing by county, Minnesota, 2000 U.S. Census*

	Pre-1950 housing		1950-1979 housing	
	Number of Houses	Percent of Housing	Number of Houses	Percent of Housing
Minnesota	**560322**	**27.1%**	**136340**	**6.6%**
Aitkin	3250	22.9	1286	9.1
Anoka	6726	6.2	10462	9.7
Becker	4095	24.7	1193	7.2
Beltrami	3278	19.3	1652	9.7
Benton	2773	20.6	1112	8.3
Big Stone	1516	47.8	89	2.8
Blue Earth	7376	33.6	1080	4.9
Brown	4872	43.6	537	4.8
Carlton	4420	32.2	841	6.1
Carver	3839	15.4	3516	14.1
Cass	3691	17.3	1913	9.0
Chippewa	2669	45.6	387	6.6
Chisago	2893	18.6	2321	14.9
Clay	4147	21.0	989	5.0
Clearwater	1258	30.6	262	6.4
Cook	849	18.0	638	13.6
Cottonwood	2559	47.6	184	3.4
Crow Wing	6786	20.3	3300	9.9
Dakota	9271	6.9	14802	11.1
Dodge	2356	35.5	414	6.2
Douglas	4289	25.7	1429	8.6
Faribault	4088	56.4	127	1.8
Fillmore	4796	53.8	364	4.1
Freeborn	6114	43.7	343	2.5

	Pre-1950 housing		1950-1979 housing	
	Number of Houses	Percent of Housing	Number of Houses	Percent of Housing
Minnesota	**560322**	**27.1%**	**136340**	**6.6%**
Goodhue	6549	36.6	1107	6.2
Grant	1490	48.1	124	4.0
Hennepin	134969	28.8	17381	3.7
Houston	2995	36.7	538	6.6
Hubbard	2663	21.8	1219	10.0
Isanti	2567	21.3	1083	9.0
Itasca	5726	23.3	1894	7.7
Jackson	2582	50.7	114	2.2
Kanabec	1735	25.3	661	9.7
Kandiyohi	4978	27.0	1114	6.0
Kittson	1170	43.0	97	3.6
Koochiching	2265	29.3	311	4.0
Lac qui Parle	2194	58.1	86	2.3
Lake	1918	28.0	327	4.8
Lake of the Woods	654	20.2	262	8.1
Le Sueur	4002	36.9	669	6.2
Lincoln	1531	50.3	83	2.7
Lyon	3695	35.9	514	5.0
Mahnomen	1045	38.7	144	5.3
Marshall	1915	40.0	175	3.7
Martin	4522	46.1	233	2.4
McLeod	4121	29.3	1238	8.8
Meeker	3597	36.6	639	6.5
Mille Lacs	2941	28.1	963	9.2
Morrison	4347	31.3	968	7.0
Mower	7469	46.0	629	3.9
Murray	2125	48.8	178	4.1
Nicollet	3314	29.5	688	6.1
Nobles	3586	42.4	246	2.9
Norman	1651	47.8	78	2.3
Olmsted	8883	18.0	3468	7.0
Otter Tail	10372	30.6	2415	7.1
Pennington	2102	34.8	428	7.1
Pine	3736	24.3	1550	10.1
Pipestone	2140	48.3	156	3.5
Polk	5117	36.5	727	5.2
Pope	2369	40.7	253	4.3
Ramsey	72654	35.2	5128	2.5
Red Lake	809	43.0	86	4.6
Redwood	3367	46.6	285	3.9
Renville	3576	48.2	223	3.0
Rice	6245	31.1	1453	7.2
Rock	1958	47.3	213	5.1
Roseau	1619	22.8	597	8.4
Scott	3236	10.2	5182	16.4
Sherburne	2046	9.0	3963	17.4
Sibley	2896	48.1	223	3.7

	Pre-1950 housing		1950-1979 housing	
	Number of Houses	Percent of Housing	Number of Houses	Percent of Housing
Minnesota	**560322**	**27.1%**	**136340**	**6.6%**
Stearns	11510	22.9	4196	8.3
Steele	4402	33.1	885	6.7
Stevens	1578	38.7	202	5.0
St. Louis	42088	43.9	3420	3.6
Swift	2387	49.5	192	4.0
Todd	4399	37.0	626	5.3
Traverse	1104	50.2	91	4.1
Wabasha	3327	36.7	602	6.6
Wadena	2137	33.7	293	4.6
Waseca	2926	39.4	322	4.3
Washington	8254	11.2	9864	13.4
Watonwan	2523	50.1	171	3.4
Wilkin	1343	43.3	176	5.7
Winona	8332	42.6	1193	6.1
Wright	6118	17.8	4653	13.5
Yellow Medicine	2542	52.2	100	2.1

Figure 5 shows a map of the prevalence of pre-1950 housing according to the 2000 U.S. Census. The overall state percent of housing built prior to 1950 is 27.1%.

Figure 5: *Percent of housing built pre-1950 by county, Minnesota, 2000 U.S. Census*

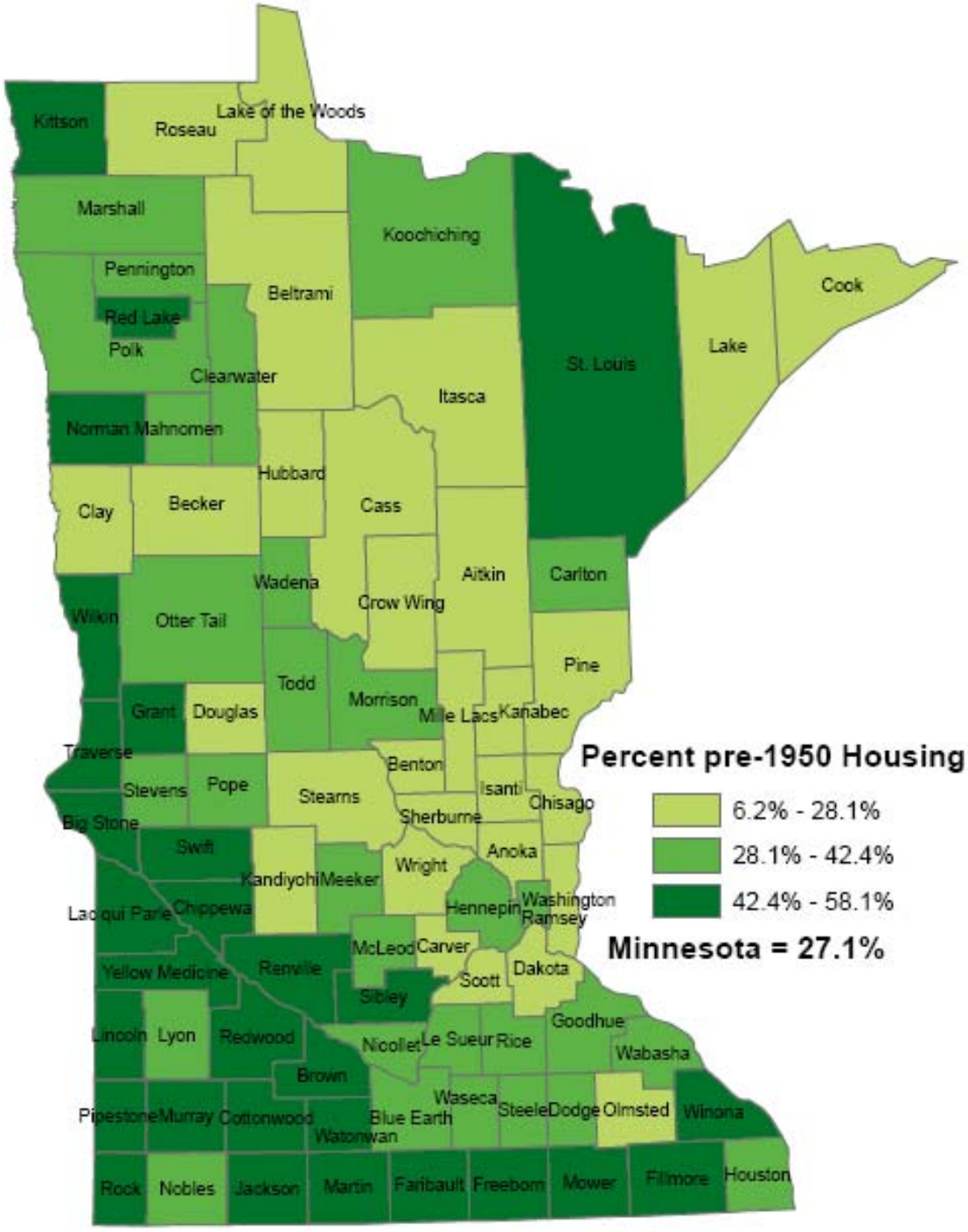
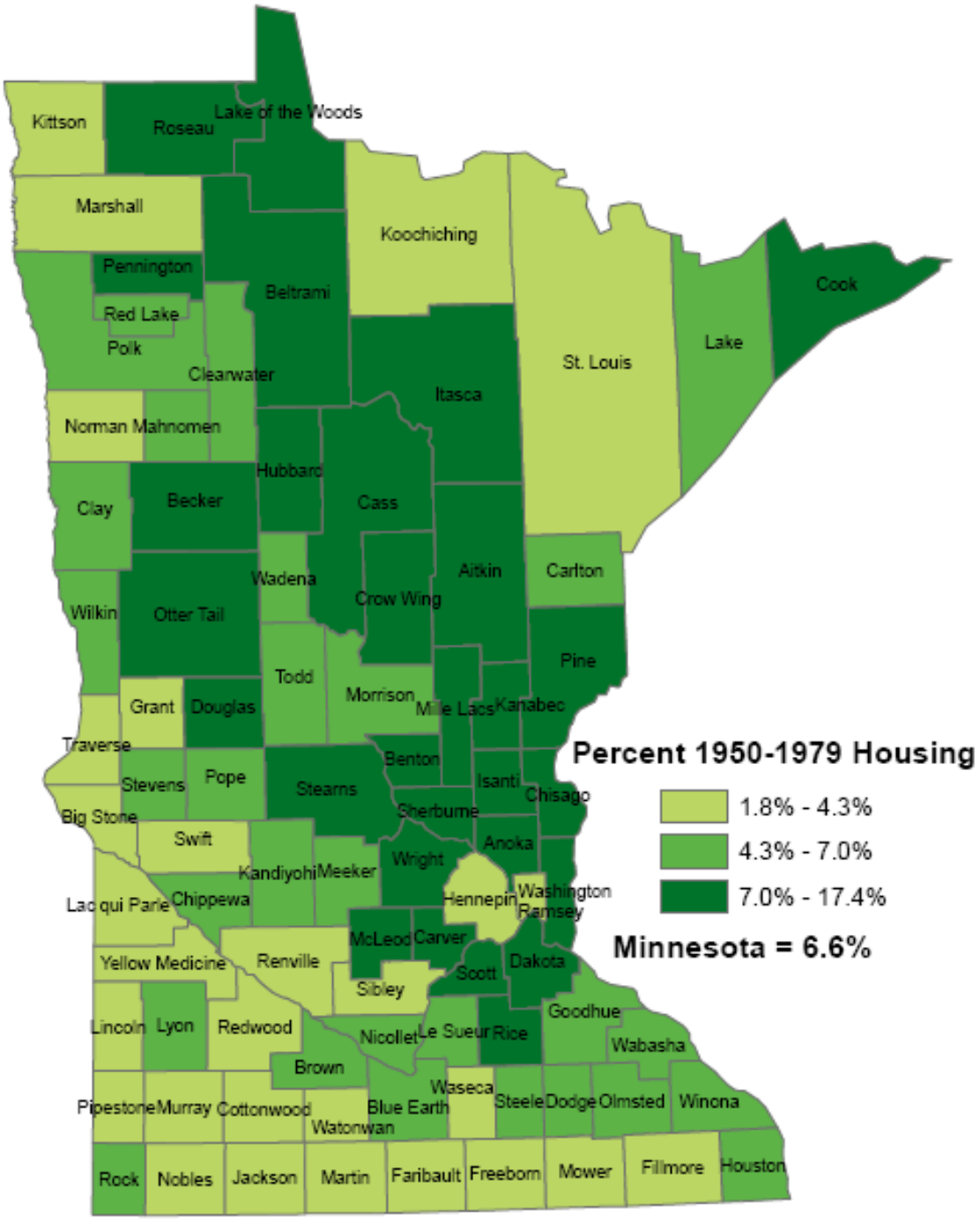


Figure 6 shows a map of the prevalence of 1950 to 1979 housing according to the 2000 U.S. Census. The overall state percent of housing built from 1950 to 1978 is 6.6%.

Figure 6: *Percent of housing built from 1950 to 1979 by county, Minnesota, 2000 U.S. Census*



D. Poverty

Young children living at or below the poverty line who live in older housing are at greatest risk for lead poisoning.[5] Figure 7 shows the percent and Table 6 shows the number and percent of children under the age of 5 years that were living in poverty in 1999, as measured by the 2000 U.S. Census, for Minnesota counties. In Minnesota, over 34,000 children under the age of 5 years were living in poverty in 1999; this represented 10.4% of all children under 5 years living in Minnesota. The percent of children under 5 years living in poverty in Minnesota is lower than the national average: 17.8% of all children under 5 years in the U.S.[12]

The majority of counties in Northern Minnesota have a higher percentage of children living in poverty, compared to the Minnesota average of 10.4%. Suburban counties generally have a lower percentage of children living in poverty, compared to Minnesota. Hennepin and Ramsey Counties both have a higher percentage of children living in poverty compared to the Minnesota average.

Table 6: *Number and percent of children under 5 years of age living in poverty among the total population of children under 5 years of age in Minnesota, by county, 2000 U.S. Census.*

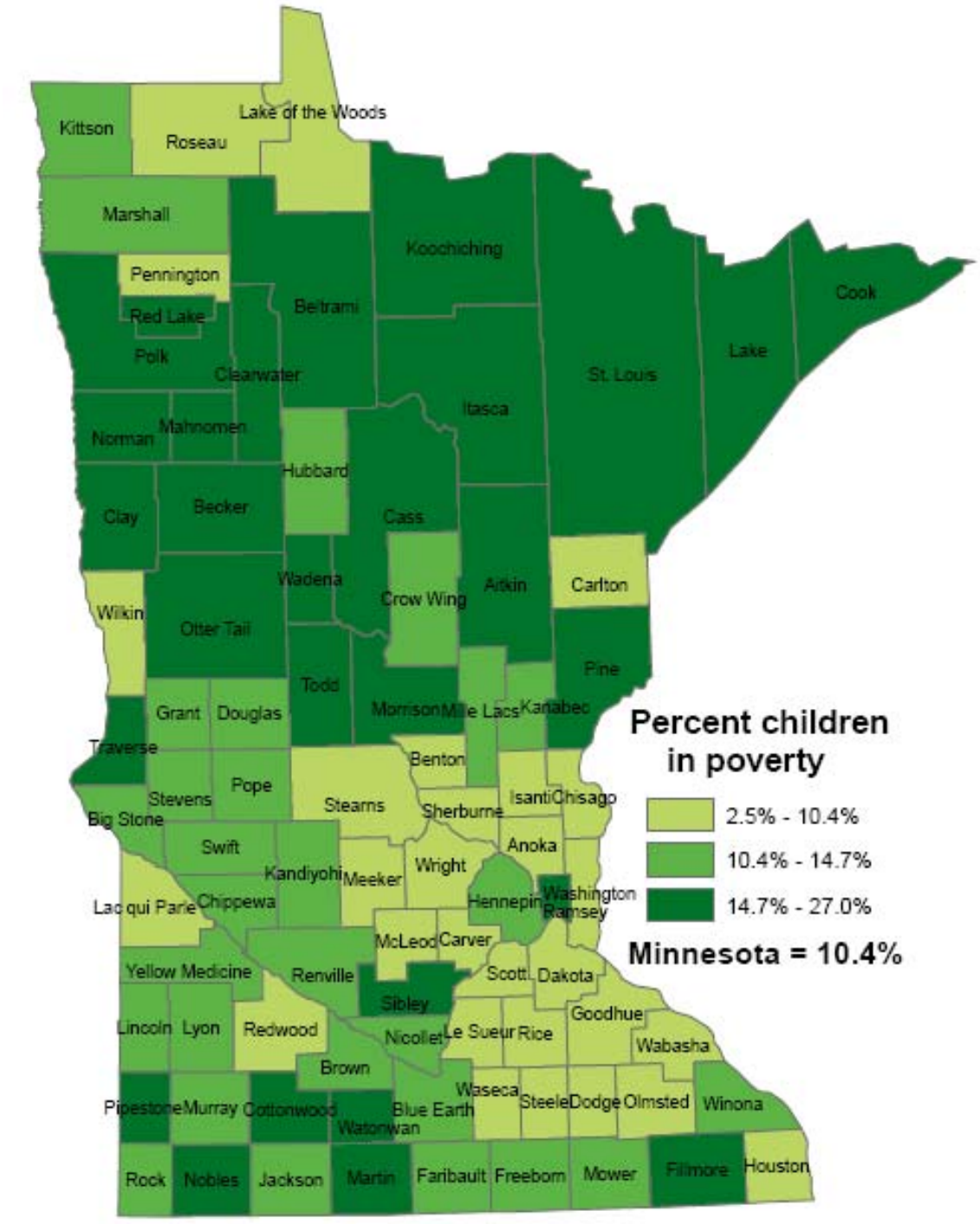
	Total Number Children Under 5 Years	Number Children Under 5 Years in Poverty	*Percent Children Under 5 Years in Poverty*
Minnesota	**329594**	**34352**	***10.4%***
Aitkin	688	128	*18.6*
Anoka	22622	1144	*5.1*
Becker	1884	345	*18.3*
Beltrami	2825	763	*27.0*
Benton	2474	242	*9.8*
Big Stone	277	37	*13.4*
Blue Earth	3122	436	*14.0*
Brown	1449	155	*10.7*
Carlton	1862	187	*10.0*
Carver	6170	325	*5.3*
Cass	1376	281	*20.4*
Chippewa	770	98	*12.7*
Chisago	3118	260	*8.3*
Clay	3167	539	*17.0*
Clearwater	491	121	*24.6*
Cook	231	54	*23.4*
Cottonwood	705	181	*25.7*
Crow Wing	3346	485	*14.5*
Dakota	27585	1221	*4.4*
Dodge	1342	105	*7.8*
Douglas	1808	226	*12.5*
Faribault	841	124	*14.7*
Fillmore	1210	224	*18.5*
Freeborn	1867	237	*12.7*
Goodhue	2691	167	*6.2*
Grant	312	42	*13.5*

	Total Number Children Under 5 Years	Number Children Under 5 Years in Poverty	*Percent Children Under 5 Years in Poverty*
Minnesota	**329594**	**34352**	***10.4%***
Hennepin	73261	8044	*11.0*
Houston	1142	93	*8.1*
Hubbard	997	140	*14.0*
Isanti	2058	122	*5.9*
Itasca	2325	432	*18.6*
Jackson	581	85	*14.6*
Kanabec	901	102	*11.3*
Kandiyohi	2572	349	*13.6*
Kittson	336	42	*12.5*
Koochiching	779	132	*16.9*
Lac qui Parle	401	39	*9.7*
Lake	565	100	*17.7*
Lake of the Woods	188	17	*9.0*
Le Sueur	1587	114	*7.2*
Lincoln	354	38	*10.7*
Lyon	1672	204	*12.2*
Mahnomen	366	89	*24.3*
Marshall	583	83	*14.2*
Martin	1196	186	*15.6*
McLeod	2436	116	*4.8*
Meeker	1460	117	*8.0*
Mille Lacs	1384	183	*13.2*
Morrison	2105	384	*18.2*
Mower	2364	298	*12.6*
Murray	483	57	*11.8*
Nicollet	1773	216	*12.2*
Nobles	1447	242	*16.7*
Norman	453	79	*17.4*
Olmsted	8890	621	*7.0*
Otter Tail	3127	512	*16.4*
Pennington	824	83	*10.1*
Pine	1453	299	*20.6*
Pipestone	571	104	*18.2*
Polk	1868	341	*18.3*
Pope	552	61	*11.1*
Ramsey	34956	5486	*15.7*
Red Lake	240	38	*15.8*
Redwood	1031	102	*9.9*
Renville	1029	145	*14.1*
Rice	3469	271	*7.8*
Rock	578	66	*11.4*
Roseau	1185	94	*7.9*
Scott	8296	205	*2.5*
Sherburne	5410	225	*4.2*
Sibley	1020	151	*14.8*
Stearns	8509	753	*8.8*
Steele	2321	214	*9.2*

	Total Number Children Under 5 Years	Number Children Under 5 Years in Poverty	*Percent Children Under 5 Years in Poverty*
Minnesota	**329594**	**34352**	***10.4%***
Stevens	535	73	*13.6*
St. Louis	10455	1839	*17.6*
Swift	642	68	*10.6*
Todd	1446	239	*16.5*
Traverse	223	40	*17.9*
Wabasha	1226	99	*8.1*
Wadena	871	167	*19.2*
Waseca	1314	102	*7.8*
Washington	15346	585	*3.8*
Watonwan	852	139	*16.3*
Wilkin	450	47	*10.4*
Winona	2811	379	*13.5*
Wright	7455	496	*6.7*
Yellow Medicine	637	78	*12.2*

Source: U.S. Census Bureau's 2000 Census, Summary Files 1 and 3, using "American FactFinder"

Figure 7: *Percent of children under 5 years of age living in poverty in Minnesota, by county, based on the 2000 U.S. Census.*



Source: U.S. Census Bureau's 2000 Census, Summary Files 1 and 3, using "American FactFinder"

Strengths and Limitations of Data Source and Measures

Minnesota's Blood Lead Information System (BLIS) has several strengths as a data source for the lead poisoning measures. BLIS receives and enters data lead tests reported by laboratories in a timely manner. The median total time between specimen date and entry date was 10 days, with a median of 21 days for paper records and 7 days for electronic records. Data completeness is an important component of any surveillance system, and MDH Lead Program staff make extensive efforts to ensure the most complete data possible. However, even after efforts to find missing information, addresses are still the most frequently missing component of data in blood lead tests reported to BLIS. In 2007, both city and zip code were missing 6.3% of the time, and the street address was missing 6.9% of the time.

Although Minnesota has mandatory reporting from all facilities analyzing blood lead levels, blood lead testing is not universal or randomly sampled, and the data collected by the surveillance system are not representative of all Minnesota children. The MDH Childhood Blood Lead Screening Guidelines direct physicians to order blood lead tests for certain populations at higher risk for lead poisoning: 1) children residing in specific geographic areas that have a high rate of cases of elevated blood lead; and 2) children matching specific demographic groups that have a high rate of elevated blood lead. Universal screening is recommended for children residing in Minneapolis and St. Paul and those recently arriving from other major metropolitan areas or other countries. Screening is also recommended for children enrolled in Medicaid. The blood lead test is typically performed when the child is one and two years old, but may be done at any time if the parent is concerned or if a high-risk activity (e.g. remodeling a home built before 1950) has recently occurred. In addition, the residential address in BLIS may not be where the child was poisoned.

Because old properties that contain lead paint are the most common source of lead exposure for young children, census data on the number of pre-1979 housing provides a population-based proxy for exposure to lead paint, especially housing built before 1950. However, census data has some limitations. The condition of the paint within the home is an important factor in possible exposure to lead, and census housing data does not contain information on the condition of housing; this data is found in the American Housing Survey done by the Census Bureau. Housing that is remodeled or demolished in an unsafe manner can increase the risk for lead exposure while houses that have had lead removed safely reduce the risk for lead exposure. In addition, census data are only available every 10 years.

Vital statistics data from the MDH Office of the Registrar provide high quality information on all Minnesota births. However, there are problems that occur when using vital statistics data or total births as denominator data for the birth cohort lead testing measure. A child's address on a birth certificate may be different than the child's address at the time of the lead test. In addition, using the number of children born in an area does not include children who have moved in or out of the area since birth. Therefore, using total births as a denominator may lead to an under- or over-estimation of the number and percent of children born in a given year that are tested.

Acronyms

BRFSS	Behavior Risk Factor Surveillance System
BLL	Blood lead level
BLIS	Blood Lead Information System
CDC	Centers for Disease Control and Prevention
CLPPP	Childhood Lead Poisoning Prevention Program
EBLL	Elevated blood lead level
EPA	U.S. Environmental Protection Agency
EPHT	Environmental Public Health Tracking
FDA	U.S. Food and Drug Administration
HUD	U.S. Department of Housing and Urban Development
ICD-9	International Classification of Disease, 9th Revision
MDH	Minnesota Department of Health
µg/dL	Micrograms per deciliter of whole blood
MHA	Minnesota Hospital Association
MN EPHT	Minnesota Environmental Public Health Tracking
NCDM	Nationally Consistent Data and Measures

Glossary

Age-adjusted rate: a measure of some event, disease, or condition with some specification of time with age adjustment, used to compare risks of two or more age categories of the population; age-adjusted rates are typically presented per 100,000 people and calculated by a direct method using a standard age distribution (typically the 2000 U.S. population in MN EPHT materials); an age-adjusted rate is a weighted average of the age-specific rates for an age group

Age-specific rate: a measure of some event, disease, or condition with some specification of time within an age category; similar to a crude rate but is calculated within an age category

Blood lead level (BLL): the level of lead that has accumulated in the blood, often given in micrograms of lead per deciliter of whole blood (µg/dL), and used to determine whether the level of lead in the blood is elevated to an unsafe level

Birth cohort: a group of children born in the same year, usually identified by birth year

CDC: the Centers for Disease Control and Prevention, a part of the U.S. Department of Health and Human Services, is the nation's public health agency that works to ensure health protection through promotion, prevention, and preparedness

Confirmed EBLL: for the purpose of NCDMs for childhood blood lead poisoning, a confirmed elevated blood lead level is defined as one venous test ≥ 10 µg/dL, or two capillary tests of ≥ 10 µg/dL within 12 weeks of each other. This definition is different than that used for medical case management of a child or hazard reduction enforcement.

Crude rate: a measure of some event, disease, or condition in relation to a unit of population, along with some specification of time without respect to age category, often presented per 1,000, per 10,000 or per 100,000 people

Denominator: the larger base population on which percents are calculated; it is the lower part of a fraction used to calculate rates and ratios in epidemiology

Elevated blood lead level (EBLL): a blood lead level above 10 micrograms of lead per deciliter of whole blood (µg/dL), indicating the level of lead in the blood is elevated to an unsafe level

Environmental intervention: an action performed upon the blood lead test result of 15 micrograms per deciliter of whole blood (µg/dL) or higher in a child; as defined by CDC, interventions should reduce lead exposure, including abatement of lead-based paint in the housing, working with other relevant agencies (e.g. housing and environmental agencies) to ensure a speedy and effective approach to remediate the environments of the lead poisoned child or children

Environmental Public Health Tracking (EPHT): the ongoing collection, integration, analysis, interpretation, and dissemination of data from environmental hazard monitoring, and from human exposure and health effects surveillance

Epidemiology: the study of human populations to identify causes of disease; such studies often compare the health status of a group of persons who have been exposed to a suspect agent with that of a comparable non-exposed group

Healthy People 2010: launched by the Department of Health and Human Services in January 2000 as a comprehensive, nationwide health promotion and disease prevention agenda; contains 467 objectives within 28 focus areas designed to serve as a framework for improving the health of all people in the U.S. during the first decade of the 21st century

Hospitalization: a subject is admitted to a hospital for treatment of a disease or condition

Incidence: the number of new cases of a condition, symptom, death, or injury that arise during a specific period of time, often expressed as a percentage of a population; shows the likelihood that a person in that population will be affected by the condition

International Classification of Disease 9th Revision (ICD-9): the 9th revision of the international classification of diseases, covering 1979-1998; designed to promote international comparability in the collection, processing, classification, and presentation of mortality statistics

Lead solder: a material used once during the food packaging process to create a strong, leak-proof can, using a pot of molten solder; sometimes resulting in lead-contaminated food; lead-based solder for use in sealing food cans was banned by the FDA in 1995

Measure: for tracking, a measure is a specific way to calculate a value from the data describing population health, hazard or exposure; measures should be clearly and uniquely defined such that, given the appropriate data, the value of the measure could be calculated in a consistent fashion (like a statistic)

Minnesota Department of Health (MDH): an organization focusing on protecting, maintaining and improving the health of all Minnesotans; consists of seven major divisions, including Community and Family Health, Compliance Monitoring, Environmental Health, Health Policy, Health Promotion and Chronic Disease, Infectious Disease Epidemiology Prevention and Control, and Public Health Laboratory

Minnesota Environmental Public Health Tracking Program (MN EPHT): As defined in Minnesota Statutes, section 144.995, a state program for the ongoing collection, integration, interpretation, and dissemination of environmental hazard, exposure, and health effects data. MN EPHT produces a network or system of integrated data in the state about environmental hazards, population exposure, and health outcomes; MN EPHT works in partnership with other states as part of CDC's National Environmental Public Health Tracking Network (Tracking Network)

National Environmental Public Health Tracking Network (Tracking Network): a web-based, secure network of standardized health and environmental data; the Tracking Network is a product of CDC's National Environmental Public Tracking Program, drawing data and information from state and local tracking networks as well as national-level and other data systems; it provides the means to identify, access, and organize hazard, exposure, and health data from these various sources and to examine and analyze those data on the basis of their spatial and temporal characteristics: (http://ephtracking.cdc.gov/)

Nationally Consistent Data and Measures (NCDM): adaptation of a single set of national standards for data collection, analysis and reporting to enable CDC to compile a core set of nationally consistent data and measures across multiple states

Prevalence: the number of new and pre-existing cases of a condition, symptom, death, or injury among persons alive on a certain date in a given population; a function of both the incidence of the condition and survival

Primary prevention: preventing the risk before exposure occurs; in the case of childhood exposure to lead, an example of primary prevention would mean preventing exposure of children to lead in old housing to prevent the risk of childhood blood lead poisoning

Poverty: the U.S. Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. These official poverty thresholds do not vary geographically, but are updated for inflation. Therefore, children under the age of 5 years living in poverty are part of a family living in poverty.

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NIH: http://www.nhlbi.nih.gov/ and http://www.nlm.nih.gov/
MDH's Childhood Lead Poisoning Prevention Program: http://www.health.state.mn.us/divs/eh/lead/index.html
U.S. Census Bureau: http://www.census.gov/

Childhood Blood Lead Poisoning Resources

Minnesota Department of Health, Childhood Lead Poisoning Prevention Program (CLPPP)
http://www.health.state.mn.us/divs/eh/lead/index.html

The Minnesota Department of Health does not endorse any opinion, report, product or service described in the following links.

U.S. Department of Housing and Urban Development (HUD)
http://www.hud.gov

HUD: Office of Healthy Homes and Lead Hazard Control
http://www.hud.gov/offices/lead/

CDC Childhood Lead Poisoning Prevention Program
http://www.cdc.gov/nceh/lead/about/program.htm

EPA: Lead in Paint, Dust, and Soil
http://www.epa.gov/lead/

Alliance for Health Homes
http://www.afhh.org/

U.S. Consumer Product Safety Commission – Lead Recalls
http://www.cpsc.gov/

National Center for Healthy Housing
http://www.nchh.org/

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