2006 Blood Lead Surveillance Report

Environmental Health Division
Environmental Surveillance and Assessment Section
Environmental Impacts Analysis Unit
Childhood Lead Poisoning Prevention Program
P.O. Box 64975
St. Paul, Minnesota 55164-0975

For more information about lead, contact the Lead Program at (651) 201-4610

If you require this document in another format, such as large print, Braille, or cassette tape, call: (651) 201-5000 ♦ 1-800-657-3908 ♦ MDH TTY (651) 201-5797 or the Minnesota Relay Service TTY 1-800-627-3529

Table of Contents

Introduction

This 2006 Blood Lead Surveillance Report describes the activities of the Minnesota Department of Health (MDH) Childhood Lead Poisoning Prevention Program (CLPPP) and the data resulting from the MDH Blood Lead Information System (BLIS). The report contains a description of the trends in lead testing and elevated blood lead levels in Minnesota, and summarizes activities taking place in Minnesota to prevent childhood lead poisoning. It seeks to provide information for lead poisoning prevention stakeholders in Minnesota, document activities of the CLPPP, and assist local efforts to prevent childhood lead poisoning. This report is a companion to the State of Minnesota plan to eliminate childhood lead poisoning by 2010, and covers the 2006 calendar year.

Lead poisoning

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. There are many sources of lead, such as soil contaminated from years of leaded gasoline, lead dust accidentally brought home from parents' workplaces and hobby areas, and imported candies, traditional remedies, pottery, and toys. However, deteriorated lead paint in homes is the primary source of lead for U.S. children today.

Lead paint is most often found in homes built before 1950, but may be found in any home built before 1978, the year lead paint was banned for residential use. More than 80 % of all homes built before 1978 in the U.S. have lead based paint. This correlates to nearly one million homes in Minnesota. Old homes with lead paint may be found in both urban and rural areas. 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.

Children less than six years old, and especially ages one to three years, are most vulnerable to lead due to their growing bodies, nutritional needs, mouthing behavior and spending time on the floor. Pregnant women and the developing fetus are also at risk because lead easily passes through the placenta to the fetus, and the changing nutritional needs of the mother cause release of lead stored in bone. The Centers for Disease Control and Prevention (CDC) and the Minnesota Department of Health (MDH) consider children and pregnant women to have elevated blood lead levels (EBLLs) if their blood test results are greater than or equal to 10 micrograms of lead per deciliter whole blood (μg/dL).

Certain populations of children are at increased risk of lead poisoning. For example, 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. Refugees and immigrants are also at increased risk. They are likely to have

lead exposure in their home countries, may have poor nutritional status, and may live in substandard housing once in the U.S.

Recognizing and treating lead poisoning can be difficult because it often occurs with no distinct symptoms. In young children, the effects of low levels of lead may not appear until the children enter school and display learning difficulties, reduction in IQ, or behavior problems. At that point it is too late for prevention of lead poisoning and the effects are likely to be permanent.

Minnesota statute 144.9504 mandates environmental interventions for venous blood lead levels of 15 µg/dL or greater in children less than six years old. For levels of 10 µg/dL or greater, local public health nurses work with families to bring down elevated lead levels. For most children and adults with lead poisoning, identification and elimination of the source of lead is the main treatment. Chelation to quickly reduce the blood lead level is advised only for blood lead levels of 45 µg/dL or greater. Research has shown no benefit in long-term outcome for chelation of blood lead levels less than 45 µg/dL. For this reason, primary prevention, or preventing lead poisoning before it can start, is crucial.

2010 Lead Poisoning Elimination Plan

In 2004 a workgroup consisting of partners from federal, state, and local governments, community based organizations, housing, real estate, landlord, and tenant organizations, and many other disciplines, created the State of Minnesota 2010 Childhood Lead Poisoning Elimination Plan. The stated goal of the plan is: "To create a lead-safe Minnesota where all children have blood lead levels below 10 µg/dL by the year 2010." The plan advocates for a collaborative, housing-based approach to promoting primary prevention of childhood lead exposure, while incorporating ongoing programs at both the state and local level. This is consistent with the federal strategy to act before children are poisoned, identify and care for lead poisoned children, conduct research, and measure progress to refine lead poisoning prevention strategies. Further information and the full plan are available at the MDH Lead Program website: www.health.state.mn.us/divs/eh/lead.

The CLPPP organized five subsets of the planning advisory work group during 2005 and 2006 to determine the feasibility of proposed activities for years three, four, and five of the plan, and to monitor the progress of ongoing activities. The groups consisted of ten or fewer representatives of organizations involved in each focal area. The work groups met in fall 2005 and winter and spring 2006 to monitor the elimination plan and to produce an updated plan. The updated plan incorporated the new environmental intervention blood lead level of 15 µg/dL passed during the 2005 state legislative session. The 2010 plan was also reviewed and discussed at the April 3, 2006 and October 4, 2006 meetings of the MDH-sponsored Minnesota Collaborative Lead Education and Assessment Network (MCLEAN). Future meetings will allow collaborators to provide updates on the progress towards specific goals in the 2010 Elimination Plan.

A progress report for 2006 ("2010 Plan Year Two Progress Report, June 2006") is available from CLPPP. There has been substantial progress in achieving the strategies laid out in the original

Plan and in incorporating new ideas into the current Plan. This progress is evident in the following facts:

- Of the 154 strategies listed in the 2004 version of the plan, implementation is now underway in all but 24.
- There are 11 new strategies or initiatives in the 2006 version of the Plan that support overall lead elimination goals, but were not included in the 2004 version.
- Those projects successful in one jurisdiction have begun to be implemented in others.
- Cooperation among partners continues to build, with several joint or team projects underway, many of which link government agencies with nonprofits or geographically distinct agencies with one another.
- Initiatives among housing partners, such as the Minnesota Housing Finance Agency's lead paint assessment policy and reimbursement for lead risk assessments, contribute to primary prevention in ways that are long-lasting.

The MN Blood Lead Information System (BLIS)

MDH maintains a blood lead information system (BLIS) for the purpose of monitoring trends in blood lead levels in adults and children in Minnesota. Analyzing laboratories submit results to the MDH lead program, as mandated by Minnesota Statute 144.9502. The data are maintained in an Oracle platform, which allows for high data security, and is compatible with other current state agency systems for data transfer. As of January 1, 2007 the blood lead database contained 855,009 records of blood lead test results from 578,814 individual Minnesota residents dating back to 1992. The data are used to help identify populations at risk for elevated blood lead levels (EBLLs), to help ensure that screening services are provided to groups identified as having the highest risk of lead poisoning and to ensure that environmental and medical follow up are provided to children with EBLLs.

It can often take months for these data to be reported and processed into the MDH surveillance database. The Lead Program is addressing this issue by promoting use of electronic reporting formats, which allow for greater efficiency in handling large numbers of records. With the addition of Mayo Clinic in 2006 MDH now receives approximately 67 % of reports electronically, up from 27 % in 1997.

Statewide surveillance data

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. Legislation passed in the

2007 session requires MDH to conduct a study to examine the false positive rate of capillary tests, current protocols for capillary testing, and guidelines from other states regarding lead testing, and directs MDH to make recommendations regarding the use of capillary tests to initiate environmental or medical interventions and make recommendations regarding reducing the state mandatory intervention level to 10 µg/dL. The CLPPP will complete this study January 15, 2008.

Blood Lead Levels in Children

Since not all Minnesota children have a high risk for lead exposure, targeted screening is currently recommended for most areas of the state, rather than universal screening. The goal is to test all children at risk for exposure to lead. Therefore, because not all Minnesota children are exposed to lead risk factors, the optimal level of screening will be less than 100 %.

The number of children tested for lead in Minnesota has been increasing since 1998, with approximately 85,000 children tested in 2006 (Figure 1).

The trends in the number of EBLL cases in Minnesota children may also be compared across years (Figure 2). Fortunately the number of EBLL cases has continued to decrease. In 2006 there were 1,290 Minnesota children with blood lead levels of 10 µg/dL or greater, and 224 children had venous blood lead levels of 15 µg/dL or greater. Numbers are also shown for venous blood lead levels greater than or equal to 15 µg/dL, which is the level at which an environmental assessment is required to identify and mitigate lead exposure. The values shown are different from those presented in past reports, which used 20 µg/dL as the environmental assessment threshold.

Figure 1: Number of Children Tested

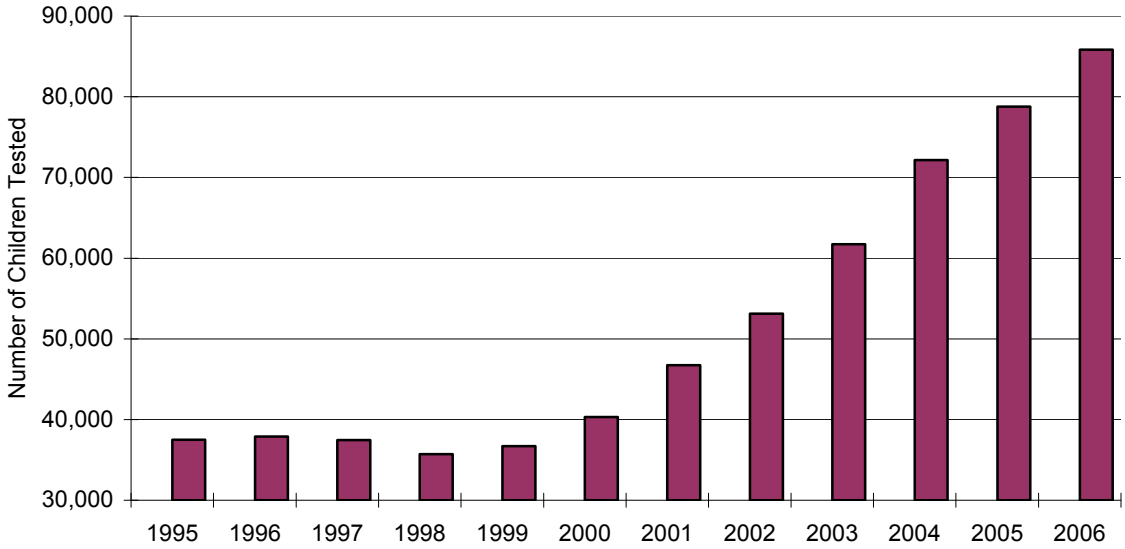
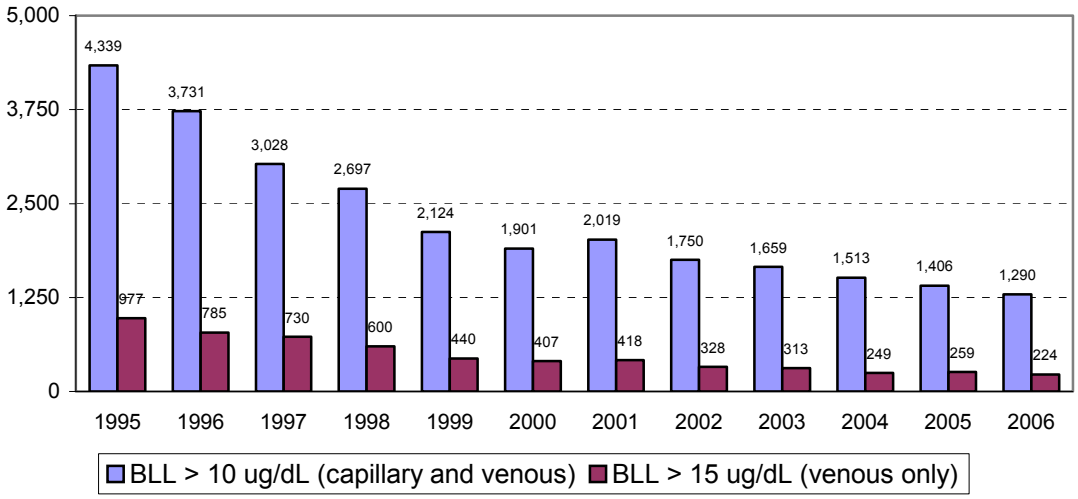


Figure 2: Number of Children With Elevated Blood Lead Levels



Approximately 65% of the reports above 15 µg/dL in Minnesota come from Minneapolis and St. Paul, indicating that in specific areas of the state lead poisoning continues to be a major public health problem. For this reason, the MDH Childhood Blood Lead screening guidelines recommend universal testing in the cities of Minneapolis and St. Paul.

Blood lead testing and EBLL data have been summarized for each county in Minnesota, and are presented at the end of this report.

Case Management

The CLPPP provides technical assistance to all local public health agencies in the state of Minnesota to ensure case management services for children with elevated blood lead. These activities include:

- Assuring case management activities and follow-up testing for children and pregnant women that have EBLLS above 10 µg/dL are performed consistent with MDH guidelines;
- Communicating regularly with the Asbestos and Lead Compliance Unit to assess progress on open lead cases and facilitate communication between the Asbestos and Lead Compliance Unit and local lead case managers; and
- Holding educational workshops to educate medical professionals about the Minnesota guidelines for Screening, Treatment, and Case Management.

Case monitoring activities have helped clinicians improve their adherence to Minnesota Guideline procedures. One key issue resolved was the timely reporting back to local agencies when the follow-up test to an elevated capillary test is non-elevated (e.g. venous result less than 10 µg/dL). In addition, the process for sending notice letters to local agencies when an EBLL

case occurs in their jurisdiction was automated in 2006. These steps assist in reducing caseloads and helped give the local agencies the most current information available.

Follow-up Testing

MDH guidelines recommend follow-up blood lead tests for children with elevated blood lead levels. The period of time recommended for re-testing varies according to the initial blood level (see case management guidelines below), but the maximum time is 90 days for any child with a blood lead level of 10 µg/dL or greater. Of the 1,290 Minnesota children identified with EBLLs in 2006, 763 (59%) received a follow-up test. Of these, 612 (47% of the total children with EBLLs) were retested within 90 days of their initial EBLL. Working to improve this low follow-up rate would best serve children with EBLLs by reducing and mitigating the effects of their lead exposure. This will take the combined efforts of providers, case managers and the MDH Lead Program.

Blood Lead Testing by County

County-specific data on blood lead testing and EBLL rates are provided at the end of this report in Table 4.

Fatal Lead Poisoning Case

A four-year-old Minneapolis child died in February 2006 of lead poisoning after swallowing a metal charm containing very high levels of lead. This is the first documented death of a child from lead poisoning in Minnesota. This is a very rare occurrence, not only in Minnesota but nationwide. The child was first brought to the hospital with vomiting and sent home. The child was again brought to the emergency room two days later and was hospitalized. The child was tested for lead only after a metal object was seen on abdominal x-ray. The child's blood lead level was 180 µg/dL. MDH guidelines specify a blood lead of 60 µg/dL or greater to be a medical emergency.

Laboratory testing showed that the heart-shaped charm found in the child's stomach contained 99 % lead. A similar heart-shaped charm attached to a bracelet sold with children's shoes obtained and tested by the Minneapolis Department of Regulatory Services contained 67 % lead. The Consumer Products Safety Commission (CPSC) allows no more than 0.06 % lead in children's jewelry sold in the United States. The CPSC and manufacturer issued a voluntary recall of the charms. Health care providers should consider lead poisoning as a possible diagnosis if young children present with symptoms of increased intracranial pressure, unexplained gastric symptoms, and a history of eating or mouthing non-food objects.

Lead poisoning resulting from consumer products is rarely reported. However, the CPSC has issued previous product recalls for several types of children's products that have been manufactured with high lead content. The CPSC has also established a policy on lead in

children's metal jewelry. Information on the CPSC lead in children's jewelry policy and recalls are available at the MDH Web site, www.health.state.mn.us/divs/eh/lead.

Special populations

Medicaid Children

National studies have shown that Medicaid-enrolled children are three times more likely to have elevated blood lead levels than non-enrolled children. Medicaid's Early and Periodic Screening Diagnosis and Treatment (EPSDT) program requires that well-child visits include blood lead testing at both 12 and 24 months. Despite the testing requirement, nationally only about 19% of Medicaid-enrolled children ages one to five are tested.

A joint study between the MDH Lead Program and Minnesota Department of Human Services (DHS) released in 2002 showed that children enrolled in Minnesota Health Care Programs (MHCP) had higher lead poisoning rates. Of those tested between 1995 and 1998 and found to have EBLLs, 72% were enrolled in MHCP. MHCP children were nearly twice as likely as non-MHCP children to have EBLLs (9.8% compared to 5%). However, despite their high-risk status, only 13.3% of MHCP children were tested for blood lead in 1998.

The 9-30 month age group is used in analysis since this captures children tested around their one and two-year well-child visit as recommended in both DHS and MDH guidelines. Analysis of 1999-2003 data for Minnesota children enrolled in Medicaid funded programs provided good news about testing in the Medicaid-enrolled population, and was published in *Minnesota Medicine* in May 2006. Unlike the 1995-1998 period, the rate of blood lead testing in the total population of 9- to 30-month-old children enrolled in MHCP increased from 17% to 29% between 1999 and 2003. The rate of elevated blood lead levels EBLLs in tested children declined from 6% in 1999 to 2.7% in 2003. However, there remained a two-fold higher rate of elevated blood lead levels in MHCP children in 2003 (3.4% and 1.5% for MHCP and non- MHCP children, respectively). The percentage of children with elevated blood lead levels who were re-tested within three months increased from 39% in 1999 to 50% in 2003. To help sustain these gains, DHS continues to include provisions in their managed care contracts which encourage blood lead testing. A $30 incentive is provided for every child above the previous year's level of testing. DHS also includes a blood lead screening among the performance goals that must be met for health plans to receive the 5% of their contract amount that is withheld at the beginning of each contract year. The Minnesota Medicine article is also available at www.mmaonline.net/publications/MNMed2006/May/clinical-zabel.htm in the May 2006, Volume 86 issue.

When combined with data from the report described above, the data for 2004 through 2006 also show a continuing trend toward higher rates of testing in MHCP-enrolled children (Figure 3), along with declining rates of EBLLs in both MHCP-enrolled and non-enrolled children (Figure 4).

Figure 3. Children Enrolled in MHCP Tested for Blood Lead

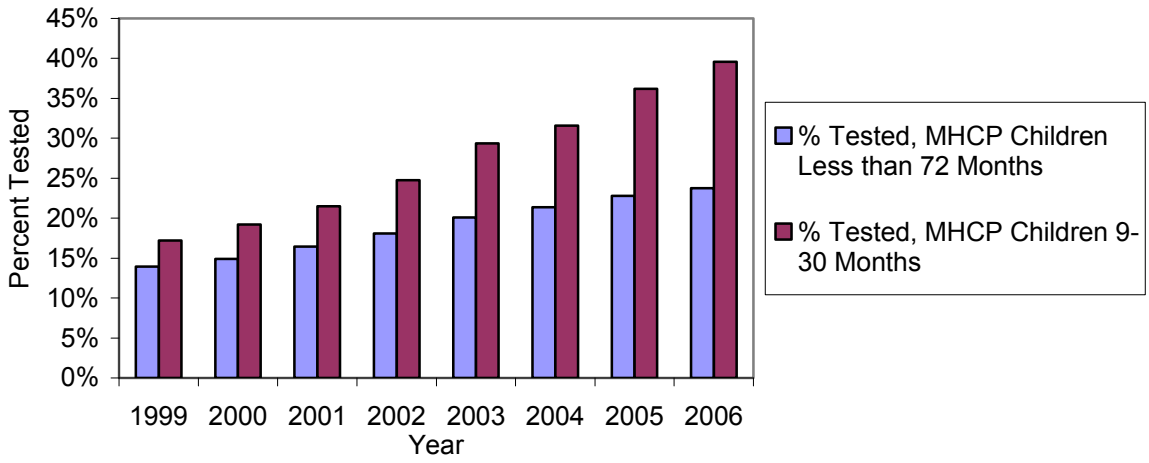
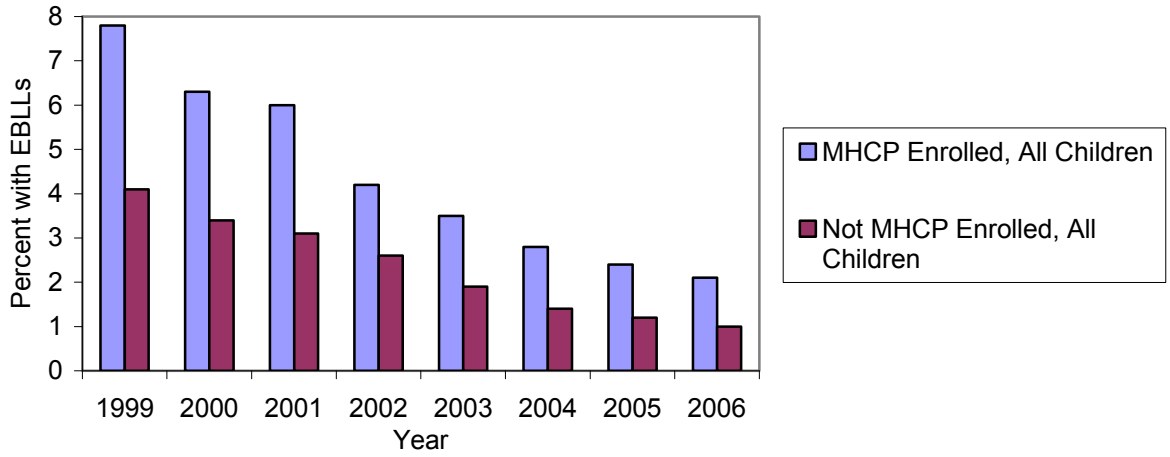


Figure 4. Percentage of Tested Children Less than 72 Months Old with EBLLs



Refugee Children

Refugees are a population at high risk for lead poisoning. Refugees may have lead exposure in their countries of origin, such as use of leaded gasoline, herbal remedies, cosmetics or spices that contain lead, cottage industries that use lead in an unsafe manner, and limited regulation of emissions from larger industries. Once they are in the U.S., refugees frequently move into older, inner city housing, with potential for exposure to lead-based paint. The Division of Infectious Disease Epidemiology, Prevention, and Control at MDH collects demographic data on all refugees entering the state who receive an initial health screening. The 2006 refugee data were linked with the blood lead test results from BLIS to describe lead testing and EBLL rates in refugees. Refugee children in Minnesota comprise a wide range of ethnic origins, as shown in Table 1. Of all refugee children entering Minnesota in 2006, 89 % received health screening.

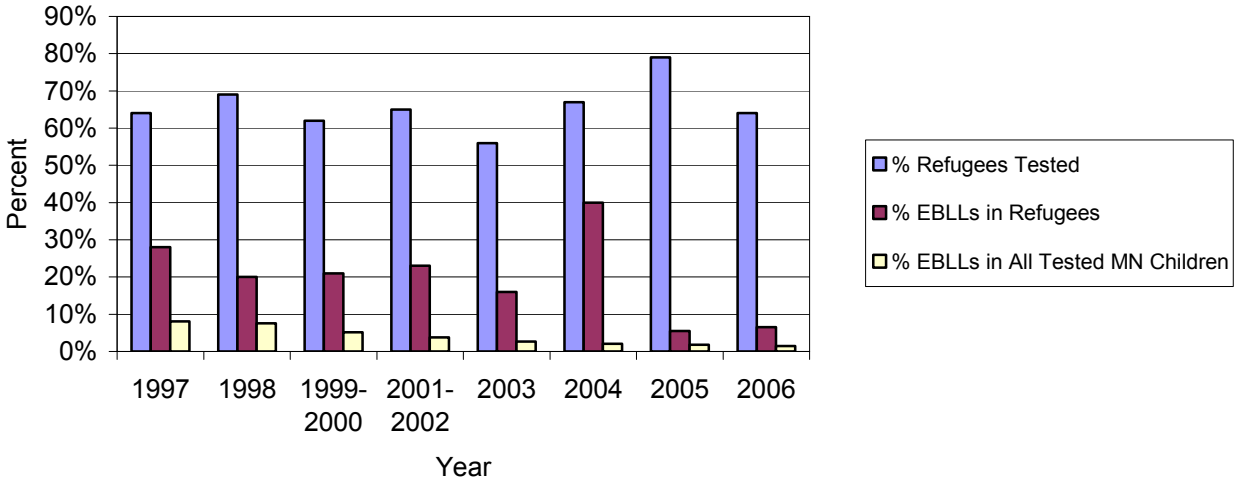
Table 1. Number and Percent of Refugee Children (0-72 Months) Tested and with Elevated Blood Lead Levels in 2006 by Country of Origin

Ethnicity/ Region of Origin	# of Refugee Children*	# of Children Tested for Lead		Of Children Tested for Lead, # Tested Within Three Months of Arrival		Children w/Elevated Level (10 µg/dL)	
Burma	33	18	55%	18	100%	4	22%
Ethiopia	20	10	50%	9	90%	0	0%
Former USSR	13	7	54%	5	71%	0	0%
Hmong/Laos	49	38	78%	37	97%	1	2.6%
Liberia	30	21	70%	20	95%	3	14%
Somalia	183	121	66%	114	94%	6	5.0%
Sudan	11	9	82%	9	100%	0	0%
Rest of Africa	2	1	50%	1	100%	1	100%
Tibet	3	0	0%	0	NA	0	0%
Togo	11	3	27%	2	67%	0	0%
Vietnam	2	1	50%	1	100%	0	0%
Total	**357**	**229**	**64%**	**216**	**94%**	**15**	**6.5%**

*Data obtained from MDH Infectious Disease Epidemiology, Prevention and Control Division

Blood lead tests were also matched to refugee information in past years (Fig. 5). The rate of testing in refugee children remained between 56% and 69% from 1998 through 2004. This percentage increased to 79% in 2005, but decreased again in 2006 to 64%. Of the children seen for an initial health screen in 2006, 70% were tested for blood lead. The rate of elevated blood lead levels for refugees has dropped in the past two years, but was still approximately four times the rate for blood lead tests statewide in 2006 (1.5%).

Figure 5. Lead Testing and EBLLs in Refugee Children



In early 2005, CDC issued new guidelines for blood lead testing in refugee children. These guidelines include lead testing for refugee children up through age 15, a repeat blood lead test after three to six months in the U.S., blood chemistry for iron status, use of pediatric multivitamins, and educational efforts for providers and families. These new guidelines were issued in response to a number of lead poisoning cases, including one death, in refugees in New Hampshire. In many of those cases, the children arrived with low lead levels, but were exposed to lead in the old homes in which they resided and absorbed this lead easily due to their poor nutritional status.

In response to these new guidelines, MDH Lead Program staff met with MDH Refugee Health Program staff to determine the feasibility of updating the recommendations for blood lead testing in refugees and to help raise awareness of educational materials in Somali. As a result of these meetings, MDH staff (both Refugee Health and CLPPP) decided to collaborate with the refugee health screening clinic at the St. Paul – Ramsey County Department of Public Health to conduct a pilot study to determine the feasibility of these recommendations. Some of the specific activities that occurred through this project were: testing blood lead levels in new refugee children aged 6 months through 15 years, performing complete blood count and blood chemistry for iron status, and obtaining follow-up lead tests on refugee children after three to six months in the U.S., even though their initial test was below the level of concern. This was to make sure their lead levels did not rise due to poor nutritional status when entering the country combined with lead exposure in the U.S. St. Paul - Ramsey Department of Public Health nurses followed up with parents and physicians on any test results that were of concern. Of the 150 children seen at the clinic, all received initial blood lead testing and 140 were tested a second time after living in the U.S. Initial EBLLs were observed in five of the children screened (3.3%), and only one child (0.7%) had a low initial test with an elevated second test. A full report has been submitted for publication and should be available late in 2007.

The CLPPP, in collaboration with the MDH Refugee Health Program, has recently become involved with a national study to assess lead exposure and lead poisoning risk for new refugees in the U.S. The study is directed by Dr. Paul Geltman of the Massachusetts Department of Health. Minnesota is serving as one of the study areas in which families of 30 refugee children will answer a lead risk survey and have a home lead hazard assessment performed. Minnesota data will combined with data from other states to assess the risk of lead poisoning faced by refugees across the nation.

WIC Children

In fall 2005 and winter 2006 the MN CLPPP collaborated with the St. Paul - Ramsey County Department of Public Health to complete an intensive screening project for high-risk children. The project targeted four WIC clinics that are home to a significant percentage of families eligible for Medicaid services. One of the clinics (La Clinica) contains a primarily Hispanic population. At these clinics, St. Paul - Ramsey County staff performed blood lead sampling and family education, worked with families to obtain follow-up services for children with EBLLs, and referred children to the HUD lead hazard reduction program (St. Paul - Ramsey County has

an ongoing HUD grant for lead hazard reduction). A total of 907 children were tested during the project. Only three children had BLLs of 10 µg/dL or greater, for an EBLL rate of 0.3%.

The MN CLPPP also collaborated with the Health Protection Division (HPD) of the Hennepin County Department of Human Services and Public Health in fall 2005 and winter 2006 to screen high-risk children in Hennepin County, including Minneapolis. HPD hired a bilingual staff member to draw capillary blood specimens at WIC clinics throughout the county. This staff member received training from the MDH State Case Monitor in use of filter paper blood lead testing, and also offered lead education directly to parents and guardians. Blood lead testing was performed at seven WIC clinics in Hennepin County, including four clinics in Minneapolis high-risk neighborhoods. A total of 1,358 children and pregnant women were tested. Four of those tested had BLLs of 10 µg/dL or greater, for an EBLL rate of 0.3%.

The WIC screening projects described above observed a lower rate of elevated blood lead levels in the children attending WIC clinics in St. Paul and Minneapolis compared with children statewide. In combination with previous findings from WIC screening projects in four counties of Greater Minnesota conducted in 2004 and 2005, the findings from the above projects suggest that the population of children attending WIC clinics in Minnesota is not at higher risk of elevated blood lead levels than the general population of Minnesota children. However, individual WIC clinics may wish to continue testing children for lead as a way to reach an underserved population.

Adults

CDC recommends a level of concern for adult exposure to lead of 25 µg/dL, while the Occupational Safety and Health Administration (OSHA) requires action in exposed workers at a level of 40 µg/dL. Minnesota's Adult Blood Lead Epidemiology and Surveillance (ABLES) program began identifying eligible adults on January 1, 1998. The total number of tests reported in 2006 for adults in Minnesota is presented in Table 2.

Table 2: Minnesota residents 16 years or older with a reported blood lead test in 2006

# of reports	# of individuals	Range of reported results
9,494	8,393	0.0 to 73.0 µg/dL

There were 133 adults with BLLs of 25 µg/dL or greater identified through the ABLES program in 2006 (four female), and there were 18 adults with reported levels greater than 40 µg/dL (all male). Occupations and hobbies contributing to lead exposure are listed in Table 3.

Table 3. Occupation/Exposure Categories for Adults with Elevated Blood Lead Levels

Occupation/Exposure	25+ µg/dL	40+ µg/dL
Painting	1	1
Construction and Demolition	2	0
Fishing Tackle Manufacturing	21	2
Lead Smelting	78	11
Brass Foundry	2	0
Radiation Machine Manufacturing	1	0
Stained Glass	3	1
Scientific Research	1	0
Remediation Services	2	0
Automotive Repair	1	0
Broke Open Car Batteries	1	1
Casting Fishing Sinkers	1	1
Retained Bullet from Gunshot	2	1
Stone Product Manufacturing	1	0
Unknown	16	0
Total	133	18

Evaluation of BLIS for 2006

In 2006 there were 105,103 total blood lead tests reported to the MDH BLIS. The tests were received from 43 separate laboratories; 35,634 (34%) received on paper through mail or fax and 69,469 (66%) received through electronic reporting (mailed disks, encrypted email, or secure website downloads). A total of 10,638 tests (10% of the total) were received from 20 clinics using ESA LeadCare analyzers. The tests received by MDH consisted of 74,152 capillary specimens (71%), 28,312 venous specimens (27%), and 2,639 tests of unknown type (2.5%). The median difference between specimen date (date the blood lead specimen was drawn) and date of analysis was one day. The difference between the date received at MDH and date of analysis had a median of 5 days, and this was not different between paper and electronic laboratories. The time between received date and date of entry into BLIS had a median of 3 days for all tests, with a median of 0 days for electronic records and 29 days for paper records. The median total time between specimen date and entry date was 18 days, with a median of 42 days for paper records and 7 days for electronic. These data help indicate the advantages of electronic reporting. Electronic transfer of medical data significantly improves timeliness, in addition to requiring less staff time for entry of record into BLIS.

Data completeness is an important component of any surveillance system, and MDH staff make extensive efforts to ensure the most complete data possible in BLIS. Even after efforts to find

missing addresses, they are still the most frequently missing component of data in blood lead tests reported to BLIS. Both city and zip code were missing 8.5% of the time, and street address was missing 8.8% of the time. The patient's date of birth was missing for 6 records, and these were all confirmed to be adult patients.

The BLIS was updated in fall 2006 by moving from Oracle Developer to Oracle PowerBuilder. This update included changes that improved the speed of the system, changes that allowed greater quality control of entered data, and full implementation of the case management function of the system.

State Blood Lead Guidelines

MDH has developed a set of four guidelines for lead: Childhood Blood Lead Screening, Childhood Blood Lead Case Management, Childhood Blood Lead Clinical Treatment, and Blood Lead Screening for Pregnant Women. These guidelines were developed by collaborative workgroups and have been endorsed by a range of professional health organizations. All four guidelines may be found at the MDH Web site at www.health.state.mn.us/divs/eh/lead. In addition to the guidelines from MDH, local public health agencies may review risk factors for elevated blood lead and the available blood lead screening data to assess concerns about lead poisoning in their areas. This will allow local agencies to develop treatment guidelines tailored to the risks in their areas. Factors to be considered locally are the age and condition of housing stock, the size of the population, screening practices of the area health care providers, occupational and community sources of lead, socio-economic status of the population and other unique risk factors in the community. The assessment should address the amount of screening that takes place relative to the size of the childhood population, the relative number of elevated cases that are found, and the use of other screening tools, such as questionnaires, to identify risk factors.

Childhood Blood Lead Screening Guidelines

The MDH Childhood Blood Lead Screening Guidelines direct physicians to order blood lead tests for 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. It is also recommended for children receiving Medicaid. The 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.

The screening guidelines were published in 2000. Since that time, EBLL rates have significantly dropped and primary prevention activities have increased in Minnesota. Therefore, the CLPPP plans to formally re-evaluate the Blood Lead Screening Guidelines during fall 2007. A workgroup of stakeholders will be assembled in a similar manner to the initial development of the guidelines in 2000.

Childhood Blood Lead Case Management Guidelines

The MDH Childhood Blood Lead Case Management Guidelines are intended to establish standardized, minimum levels of care for providing services to children with EBLLs. However, those counties that have greater resources available may wish to take a more rigorous approach to case management. The objective is to ensure that a qualified case manager is available to oversee the treatment and recovery of each child, and to ensure that steps are taken to prevent further exposure of the child to potential sources of lead. The Case Management Guidelines work in concert with the MDH Blood Lead Screening Guidelines for Minnesota to identify and manage lead exposure in children. Appropriate steps are presented for both capillary and venous test results.

In 2005, legislation was enacted to lower the environmental intervention blood lead level to 15 µg/dL from 20 µg/dL or two tests of 15-19 µg/dL. As a result the case management guidelines were not consistent because they recommend additional case management activities at a level of 20 µg/dL rather than 15. The CLPPP State Case Monitor led a meeting of local public health nurses and other stakeholders to perform a review of the MDH Blood Lead Case Management Guidelines. Recommendations from this meeting regarding childhood blood lead levels below 10 µg/dL and the new environmental intervention level of 15 µg/dL were incorporated into an evaluation and update of the case management guidelines. The revised guidelines were distributed to all local public health case managers and posted on MDH's website in June 2006.

Childhood Blood Lead Clinical Treatment Guidelines

The Childhood Blood Lead Clinical Treatment Guidelines were designed for physicians to assist them in treating a patient with an EBLL, thus ensuring that all EBLL cases in Minnesota receive a consistent level of care. Although the current "actionable" level for lead case management and clinical treatment activities in Minnesota is 10 µg/dL, the CLPPP strongly believes that families with documented lead exposures below this threshold should receive guidance from public health and medical professionals. Clinical treatment guidelines for blood lead levels less than 10 µg/dL were reviewed by a group of five physicians during 2005. Their consensus was that education should be provided and encouraged for children with blood lead levels of 5-10 µg/dL, but further clinical treatment is not required.

Blood Lead Screening Guidelines for Pregnant Women in Minnesota

In June 2004, MDH developed Blood Lead Screening Guidelines for Pregnant Women in Minnesota. They are designed for Ob/Gyn physicians, nurse practitioners, and midwives to assist them in screening and treating pregnant women for elevated blood lead levels, thus ensuring that both the women and their children receive intervention to reduce their lead exposure.

Prenatal lead exposure is of concern because it may have an effect on intellectual development. In addition to fetal risk, lead may be a risk to the mother; it has been shown to be related to cardiovascular disease. Lead is transferred from mother to the fetus because the placenta is a

weak barrier to the passage of lead. Therefore, it may be assumed that fetal blood contains the same concentration of lead as maternal blood. The CDC and MDH consider 10 µg/dL and above to be an elevated blood lead level for pregnant women as well as children.

In many cases, high levels of lead in pregnant women arise from maternal occupational exposure. However, other lead exposures may occur, such as: remodeling a home containing lead paint that allows lead dust to become airborne and inhaled; a family member's occupation or hobby resulting in "take-home" lead; using non-commercial home remedies or cosmetics that contain lead; using glazed pottery for cooking; and pica behavior of the mother, such as eating soil or pieces of clay pots. There may also be exposure of the fetus to lead coming out of the mother's bones. This may arise from long-term previous exposures of the mother even though lead exposure is not happening during the pregnancy. Lead may come out of maternal bones faster during pregnancy and lactation because of the mother and fetus's need for calcium. A diet rich in iron and calcium may help reduce absorption of lead during pregnancy.

Not every woman is at risk for lead exposure, so a risk screening questionnaire should be used to decide when to test a pregnant, or potentially pregnant, woman for lead.

Other information resources available from CLPPP

The Lead Program maintains a web page through the MDH Internet site that provides a number of lead education materials for providers, regulated parties, and the general public (www.health.state.mn.us/divs/eh/lead). It contains information on hot topics (including current data, projects and requirements), numerous fact sheets, a list of "frequently asked questions" and responses, all publications and reports (including guidelines for screening, case management, and clinical treatment in children, and screening of pregnant women), a downloadable version of a lead education workshop, and links to many external lead resources.

The Lead Program posts relevant information to the MCLEAN group email list and encourages other state groups or individuals to post and respond to information.

In September 2004, ECHO (Emergency and Community Health Outreach) launched a first-of-its-kind television series on Twin Cities Public Television (tpt) Channel 17. An estimated 1.2 million households in the Twin Cities Metro area and western Wisconsin are covered by the signal. Every month, tpt broadcasts a 20-minute segment (hosted by members from ethnic communities) in six languages: Hmong, Khmer, Lao, Somali, Spanish and Vietnamese. Since ECHO will broadcast live if a statewide crisis or emergency is underway, immigrant/refugee communities are familiar with the program and recognize its broadcasts as important to the health and safety of their families. ECHO is led by St. Paul-Ramsey County Public Health, Hennepin County Public Health, the Minnesota Department of Health, and other emergency preparedness agencies.

In late 2005, the CLPPP contracted with ECHO to get lead poisoning prevention messages out to non-English speaking populations. The shows about lead were taped in July 2006 and were broadcast in October 2006. DVDs of the production are available from CLPPP for use in education of non-English speaking populations. These productions are also available for viewing

on ECHO's website at www.echominnesota.org. To date, MDH has distributed nearly 1,700 copies of the DVD.

CLPPP Primary Prevention Efforts

Because primary prevention of lead exposure is the only way to ensure children are not lead poisoned, CLPPP maintains several efforts at primary prevention.

SRC Swab Team Project

The MN CLPPP contracted with Sustainable Resources Center (SRC) to provide visual assessment, cleaning and education services for 14 houses with lead hazard issues in late 2006 and early 2007. These services serve as a temporary measure to prevent children's lead exposure while arrangements can be made for more permanent lead hazard reduction activities.

St. Paul Prevention Project

In fall 2006, the CLPPP contracted with Saint Paul - Ramsey County Department of Public Health to provide Lead Supervisor Training for four small contractors working in two targeted census tracts with high risk factors for childhood lead poisoning. Lead-safe work practices training will be provided to at least 50 % of participating contractors' employees. Saint Paul – Ramsey County staff will mentor and support participating contractors during on-the-job implementation of lead-safe work in 16 homes with identified lead hazards. The experiences of these contractors will be documented and summarized on the MDH Lead Program Web site.

Small Cities Primary Prevention Project

A long-term, sustainable, and comprehensive plan for primary prevention will be necessary in Minnesota to continue gains made over recent years. To begin development of successful primary prevention strategies for Greater Minnesota, MN CLPPP and Lead Compliance staff have met with City and public health leaders representing the city of Worthington in southern Minnesota. This city was chosen based on relative high risk for EBLLs along with it's participation in the HUD/DEED small cities grant program. A comprehensive plan of providing lead education and primary prevention activities will be developed for the city. It is expected that resources to implement the plan will come from a variety of sources, including CLPPP funds, local health and housing funds, and HUD funds. The plan will include collaboration and integration of lead services into existing maternal-child health home visitation and housing inspections (including lead sampling technician training), enhanced cooperation and communication between local health and housing programs, development of model city ordinances dealing with lead hazards, and outreach to housing contractors, including lead-safe worker training.

Non-Toxic Shot Committee

In summer 2006, the CLPPP Principal Investigator served as the MDH representative on the Non-Toxic Shot Committee. This committee was formed by the Minnesota Department of Natural Resources to look at potential scenarios for restricting the use of lead shot for hunting in Minnesota. The committee consisted of representatives from government, conservation groups, hunter groups and private business stakeholders. The committee's report is available at: http://files.dnr.state.mn.us/outdoor_activities/hunting/nontoxic_shot_report.pdf.

Further Information

More information about lead poisoning prevention in Minnesota is available at the MDH Lead Program web site: www.health.state.mn.us/divs/eh/lead/ or by calling 651-201-4610.

Table 4: Blood Lead Testing by County

County	5 to 9.9 µg/dL		10 to 14.9 µg/dL		15 to 19.9 µg/dL		20 µg/dL or greater		Total Children Tested		
	Venous	Capillary	Venous	Capillary	Venous	Capillary	Venous	Capillary	All test types	Population (2000)	Percent Tested
Aitkin	0	19	1	2	0	0	0	0	209	858	24%
Anoka	31	209	6	25	1	4	1	6	4,721	27,287	17%
Becker	8	14	2	0	1	0	0	0	529	2,244	24%
Beltrami	1	18	0	2	0	0	0	0	296	3,394	9%
Benton	3	31	0	3	0	1	1	0	871	2,949	30%
Big Stone	0	13	0	0	0	0	0	0	73	336	22%
Blue Earth	2	60	1	5	0	2	0	0	813	3,709	22%
Brown	0	24	0	1	0	0	0	0	237	1,752	14%
Carlton	2	40	1	6	0	0	0	0	639	2,266	28%
Carver	4	52	2	4	0	0	0	1	803	7,493	11%
Cass	1	15	0	2	0	1	0	0	282	1,688	17%
Chippewa	3	13	2	1	0	0	0	1	188	922	20%
Chisago	3	15	1	2	0	0	0	0	662	3,750	18%
Clay	2	19	0	0	1	1	0	0	602	3,826	16%
Clearwater	0	1	0	0	0	0	0	0	61	594	10%
Cook	0	7	0	1	0	0	0	0	33	292	11%
Cottonwood	2	7	0	3	0	0	1	0	110	862	13%
Crow Wing	2	76	0	3	2	1	0	2	957	3,999	24%
Dakota	20	285	5	30	3	5	2	7	5,217	33,353	16%
Dodge	0	20	0	0	0	0	0	0	205	1,613	13%
Douglas	3	32	1	1	0	0	1	0	527	2,216	24%
Faribault	1	34	2	2	0	0	0	0	227	1,025	22%
Fillmore	8	18	0	5	1	0	0	0	216	1,458	15%
Freeborn	2	23	1	1	2	2	1	0	438	2,209	20%
Goodhue	4	34	0	1	0	1	0	0	500	3,258	15%
Grant	0	6	0	0	0	0	0	0	107	392	27%
Hennepin	618	1,425	154	137	48	44	53	30	20,982	88,005	24%
Houston	1	14	0	3	0	1	0	0	163	1,389	12%
Hubbard	1	3	0	0	0	0	0	0	111	1,232	9%
Isanti	2	36	0	2	2	0	0	0	512	2,497	21%

County	5 to 9.9 µg/dL		10 to 14.9 µg/dL		15 to 19.9 µg/dL		20 µg/dL or greater		Total Children Tested		
	Venous	Capillary	Venous	Capillary	Venous	Capillary	Venous	Capillary	All test types	Population (2000)	Percent Tested
Itasca	2	50	0	5	0	1	2	0	557	2,825	20%
Jackson	1	3	2	2	0	0	0	1	115	723	16%
Kanabec	1	11	0	1	0	0	0	0	196	1,116	18%
Kandiyohi	13	93	0	9	1	2	1	2	881	3,080	29%
Kittson	0	2	0	1	0	1	0	0	34	407	8%
Koochiching	1	17	0	3	0	0	0	0	170	958	18%
Lac Qui Parle	4	5	2	1	1	0	1	0	107	508	21%
Lake	0	14	0	1	0	0	0	0	174	670	26%
Lake of the Woods	0	5	0	1	0	0	0	0	31	244	13%
Le Sueur	1	31	0	1	0	0	1	0	335	1,923	17%
Lincoln	0	7	0	0	0	0	0	0	52	435	12%
Lyon	3	64	0	2	0	0	0	0	443	2,009	22%
McLeod	2	39	1	6	0	1	0	1	657	2,935	22%
Mahnomen	2	0	0	0	0	0	1	0	89	453	20%
Marshall	0	4	0	0	0	0	0	0	79	703	11%
Martin	5	28	0	2	0	0	0	1	305	1,449	21%
Meeker	0	29	1	1	1	0	1	2	395	1,760	22%
Mille Lacs	0	21	0	3	0	1	0	2	352	1,648	21%
Morrison	0	36	0	1	0	2	0	0	569	2,513	23%
Mower	9	27	6	1	0	0	2	0	549	2,860	19%
Murray	0	10	0	2	0	1	0	0	116	600	19%
Nicollet	3	22	3	1	0	0	1	0	424	2,143	20%
Nobles	0	35	3	2	0	0	0	2	490	1,736	28%
Norman	1	9	0	0	0	1	0	0	64	556	12%
Olmsted	5	66	0	6	2	2	0	0	1121	10,691	10%
Otter Tail	8	27	2	3	0	0	0	0	433	3,772	11%
Pennington	0	3	0	0	0	0	0	0	139	999	14%
Pine	2	35	2	3	1	1	0	2	367	1,784	21%
Pipestone	1	5	0	1	0	0	0	0	56	678	8%
Polk	10	16	2	1	1	0	0	0	366	2,261	16%
Pope	0	10	1	0	0	0	0	0	149	660	23%
Ramsey	337	890	86	126	38	26	19	24	9,880	41,990	24%

County	5 to 9.9 µg/dL		10 to 14.9 µg/dL		15 to 19.9 µg/dL		20 µg/dL or greater		Total Children Tested		
	Venous	Capillary	Venous	Capillary	Venous	Capillary	Venous	Capillary	All test types	Population (2000)	Percent Tested
Red Lake	0	2	0	0	0	0	0	0	26	289	9%
Redwood	9	15	0	1	1	0	0	0	239	1,252	19%
Renville	5	44	3	3	1	2	0	1	294	1,260	23%
Rice	2	78	2	4	2	0	0	1	937	4,206	22%
Rock	1	4	0	1	0	0	0	0	35	733	5%
Roseau	1	6	0	0	0	0	0	0	127	1,460	9%
St. Louis	21	348	13	23	3	4	6	4	3430	12,737	27%
Scott	9	92	2	7	1	3	0	4	1,735	10,001	14%
Sherburne	1	43	0	3	0	0	1	0	1,326	6,497	13%
Sibley	2	27	2	2	1	1	1	0	208	1,227	3%
Stearns	14	133	8	7	0	1	1	4	2,868	10,311	28%
Steele	3	40	0	2	0	1	1	0	729	2,832	26%
Stevens	0	12	1	3	0	0	0	0	110	631	17%
Swift	0	16	1	1	0	0	0	0	127	775	16%
Todd	2	31	0	3	0	2	0	0	338	1,743	19%
Traverse	0	6	0	1	0	0	0	0	55	277	20%
Wabasha	1	15	2	0	0	0	0	0	219	1,540	14%
Wadena	6	7	1	1	0	0	0	0	185	1,014	18%
Waseca	0	33	0	2	0	1	0	0	332	1,554	21%
Washington	16	100	2	3	2	2	5	1	2,186	18,636	12%
Watonwan	1	24	0	2	0	1	1	1	195	1,022	19%
Wilkin	0	7	0	0	0	0	0	1	93	548	17%
Winona	24	26	4	0	1	0	0	0	448	3,385	13%
Wright	2	77	4	1	0	0	1	2	1,679	8,947	19%
Yellow Medicine	2	16	1	4	0	1	0	0	173	757	23%
Unknown	66	554	1	2	0	0	0	1	6,666	N/A	N/A
Minnesota Totals	1323	5933	337	504	118	121	106	104	85,746	397,581	22%