



Lead Poisoning in Minnesota Medicaid Children, 1999-2003

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Executive Summary

This report presents data on blood lead testing in Minnesota children from 1999 through 2003 as an update to the 2002 "Elevated Blood Lead Levels in Minnesota and the Medicaid Population," which covered the period of 1994 - 1998. The number of Minnesota children under age 6 who were tested for blood lead increased from approximately 38,000 in 1999 to 61,000 in 2003. The rate of blood lead testing in the total population of 9- to 30-month-old children enrolled in Minnesota Health Care Programs (MHCP) increased from 17% to 29% between 1999 and 2003. The rate of elevated blood lead levels (EBLLs) (10 ug/dl or greater) 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.

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Background

National data indicate that children receiving assistance through the Medicaid program are at increased risk for lead poisoning. The Third National Health and Nutrition Examination Survey (NHANES III) found that Medicaid enrollees accounted for 83% of U.S. children aged 1-5 years who had blood lead levels of 20 µg/dL or greater.¹ Regional and local studies have observed similar results however the absolute risk for each geographic area depends on characteristics such as the percentage of old housing and the presence of lead industries. A study in western Minnesota observed a 1.6 fold higher risk of EBLs in Medicaid children compared with children not enrolled in Medicaid.² Because of the increased risk of EBLs in Medicaid-enrolled children, federal Medicaid law requires testing of all children receiving Medicaid EPSDT services during well-child visits at 1 and 2 years of age, and any visit thereafter through age 5 if the child has not previously been tested.

Analysis of Minnesota blood lead and Medicaid enrollment data from 1995-1998 showed that only 13% of all Medicaid enrolled children aged 9-30 months were tested in 1998.³ The study also found that of Medicaid enrolled children aged 9-30 months who were seen for a well-child visit only 23% were tested. This low rate represented a decline from the 1995 testing rate of 26%, but still was above the national rate of 19% estimated by NHANES.¹ The 2002 report also observed a two-fold higher risk of EBLs in Medicaid children. The current analysis sought to determine whether this downward testing trend has continued or has improved due to efforts by the Minnesota Department of Health (MDH), the Minnesota Department of Human Services (DHS), and others to improve the rate of lead testing for Medicaid children.

Methods

Data Preparation

Laboratories performing blood lead analyses on Minnesotans are required by statute to report their results to the Environmental Health Division of MDH. These reports constitute the blood lead surveillance system for Minnesota. Because DHS separately maintains files on Medicaid enrollment, a matching process was necessary to link children's enrollment and lead test information. Children with enrollment in Medicaid for at least one month between January 1, 1993 and December 31, 2003 were selected from DHS data. For the purposes of this report, being a Medicaid-enrolled child is defined as enrollment in either the Medical Assistance or MinnesotaCare Programs at the time of a blood lead test. Collectively these programs are referred to as Minnesota Health Care Programs (MHCP). Corresponding data on blood lead tests were selected from the MDH lead surveillance database by choosing individuals with a lead test date of January 1, 1999 through December 31, 2003 who were under 6 years old at the time of the test. Age was calculated as the difference between the date of blood lead sample draw and birth date. DHS service billing data provided the number of MHCP children seen for well-child visits. An iterative eight-step matching process similar to that used by Castellano et al. (2002) and Gyllstrom et al. (2002) was used to link children in the DHS database with children in the MDH lead database.^{3,4}

Race and Ethnicity Data

Racial and ethnic information was available from MHCP enrollment files for children enrolled in MHCP. The race categories were Asian, Pacific Islander/Native Hawaiian, Black or African-American, American Indian/Alaskan Native, and White. Due to the extremely small numbers of children in the Pacific Islander/Native Hawaiian category, the categories of Asian and Pacific Islander/Native Hawaiian were combined into one category called Asian/Pacific Islander. Hispanic ethnicity was also separately available. For the purpose of analysis, Hispanic ethnicity superseded any other category for each child. The number of children enrolled in MHCP with unknown or missing race/ethnicity information increased from 4.7% in 1999 to 8.4% in 2003. Children with unknown or missing race/ethnicity data were combined into a separate category labeled “unknown” for analysis.

Age Categories

Two different age groups of children were used in analyses, less than 72 months of age and 9-30 months of age. The age group of all children under 72 months old was used because this is the group of children covered by both CDC and MDH blood lead screening and treatment guidelines and was therefore used when describing EBLL and follow-up testing rates. The age group of children 9-30 months old was used when describing blood lead testing rates because this age range captures children who should be tested according to Medicaid requirements (at age 1 and 2 year well-child visits) and reflects the higher risk of elevated blood lead levels in younger children. These two age groups allowed a direct comparison with the previous report covering 1995 through 1998 data.³

Results and Discussion

Linking Process

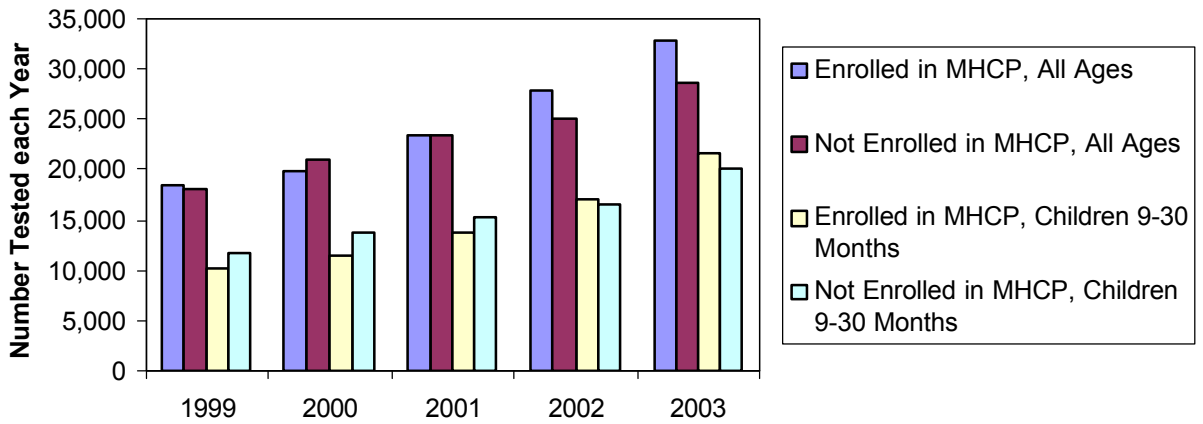
The MDH Lead Surveillance Database contained 213,663 children who were less than 6 years old at the time of their lead test between January 1, 1999 and December 31, 2003. The DHS MHCP enrollment dataset contained 307,677 children with birth dates between January 1, 1993 and December 31, 2003. For 1999-2003, a total of 107,649 children matched between the two databases.

Approximately 12% of the children for whom DHS has a record of a lead test based on claims information did not have a blood lead test received by the MDH lead program. These records were not used in the analysis described here. It is unknown whether the presence of lead test claims at DHS without corresponding lead test results at MDH is due to claims entered for tests that were never conducted, or is due to tests that were conducted but never reported to MDH. However, based on medical record review at several clinics, MDH believes that the Lead Program receives 99% or more of lead tests conducted on Minnesota citizens.

Rate of Testing

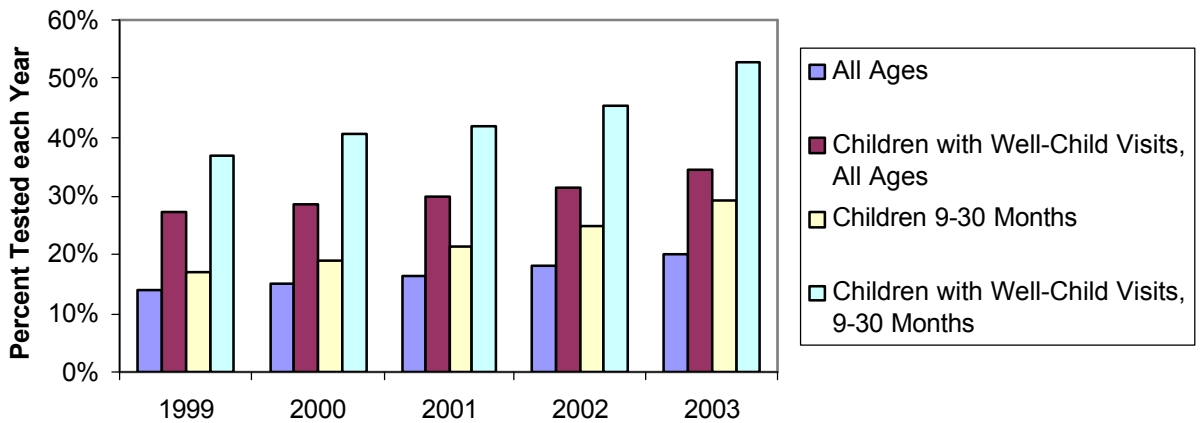
The rate of testing in MHCP children was calculated using two different denominator populations: the total number of enrolled children and children seen for well-child visits. For both methods the number of children tested for lead increased from 1999 to 2003 (Figure 1), both for all children under 72 months and for children 9-30 months.

Figure 1. Number of Minnesota Children Tested for Blood Lead



The rate of blood lead testing in the MHCP population was primarily calculated as the number of children with blood lead tests during their MHCP enrollment period divided by the total number of children enrolled in MHCP for each calendar year. The percent of MHCP children 9-30 months old tested for lead rose throughout the period analyzed, from 16% in 1999 to 29% in 2003 (Figure 2). A similar rise was seen for all children less than 72 months of age, from 14% to 20%.

Figure 2. Percent of Children Tested for Blood Lead

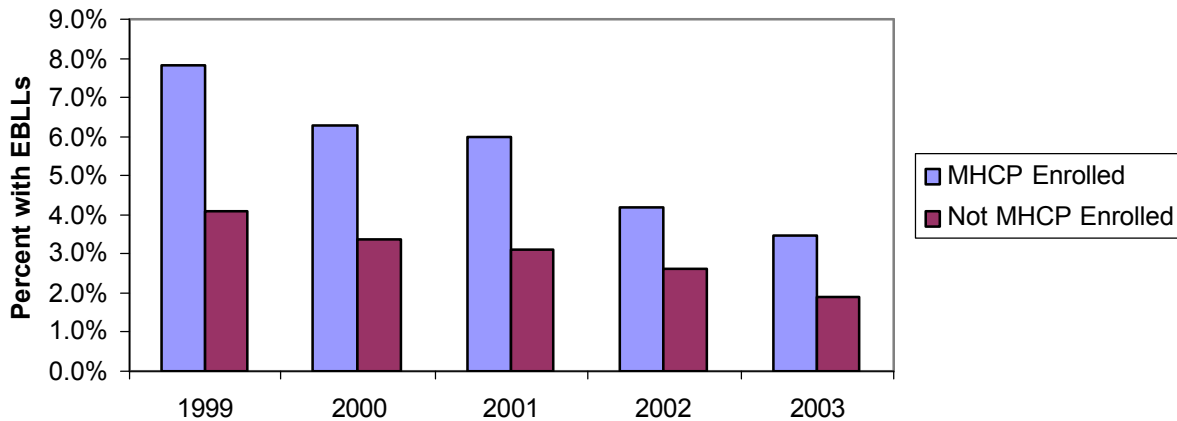


Providers cannot test children who are not seen for routine care. To look at only the MHCP children seen for preventative visits, we calculated the blood lead testing rate in children seen for well-child visits, according to DHS billing records. The percentage of children with well-child visits who were tested for lead increased from 1999 to 2003, with a higher percentage of children 9-30 months of age tested (37% – 53%) compared with children less than 72 months of age (27% – 34%).

Rate of EBLs

The percentage of tested children with EBLs dropped throughout the period analyzed, from 5.8% in 1999 to 2.7% in 2003 (Figure 3) for all children less than 72 months, and from 5.2% to 2.6% for children 9-30 months. The percentage of children with elevated blood lead levels may be diluted by the substantial increase in testing of Minnesota children since 1998. However, the decline in elevated blood lead levels appears to be a real phenomenon because the absolute number of children with EBLs also dropped during the same time period.

Figure 3. Percentage of Tested Children with EBLs

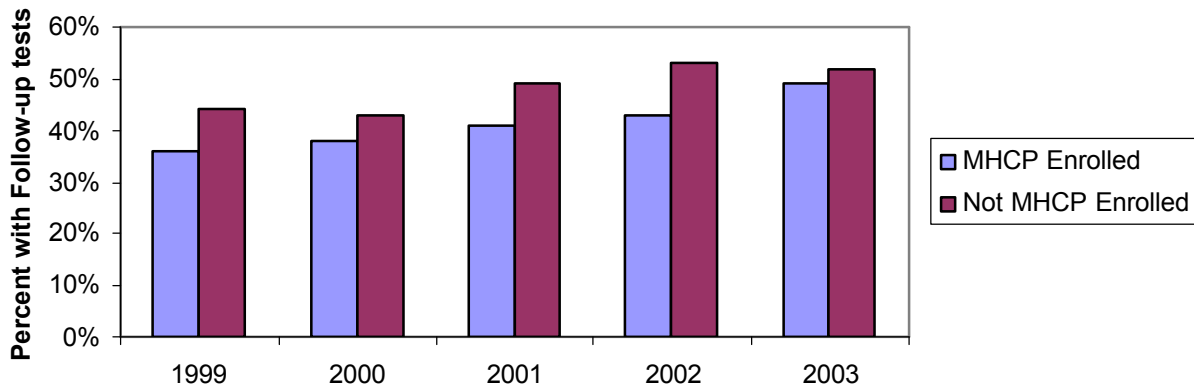


The rate of EBLs in MHCP children remained approximately twice that in non-MHCP children (3.5% and 1.9%, respectively, in 2003, for all children less than 72 months, and 3.3% and 1.7%, respectively, for children 9-30 months of age). This is very similar to the increased risk that has been observed in national studies¹ and in previous analysis of Minnesota blood lead surveillance data².

Rate of Three-Month Follow-up Testing

The percentage of children with EBLs who were retested within the recommended three months showed an increase from 1999 to 2003 for both MHCP and non-MHCP children (Figure 4), and remained slightly higher in non-MHCP children. The follow-up rate was slightly higher in children less than 72 months of age compared with 9-30 months. However, the percentage of children retested within three months remained low at approximately 50-60% for all groups. Even though the mobility and lower use of health care resources by the MHCP population pose a challenge, improving the rate of follow-up testing should be an important goal of future childhood lead poisoning prevention efforts.

Figure 4. Percent of Children with EBLs with Follow-up Tests within 3 Months



Race/Ethnicity Analysis

As with the total population of MHCP and non-MHCP children, the percentage of children with EBLs dropped for all race/ethnicity groups between 1999 and 2003. This occurred for both children 9-30 months old and all children less than 72 months old. Based on total enrollment (Figure 5) or children with well-child visits (Figure 6), the rate of testing increased consistently for all race/ethnicity groups except American Indian/Alaskan Native. The percentage of children with well-child visits also increased for all groups. Blood lead testing rates in 2003 were highest in the Unknown race/ethnicity category (40%), followed by Black or African-American (36%), Asian/Pacific Islander (34%), White (30%), Hispanic (25%), and American Indian/Alaskan Native (24%).

Figure 5. MHCP Children Tested Divided by Total Enrollment by Race/Ethnicity (9-30 Months Old)

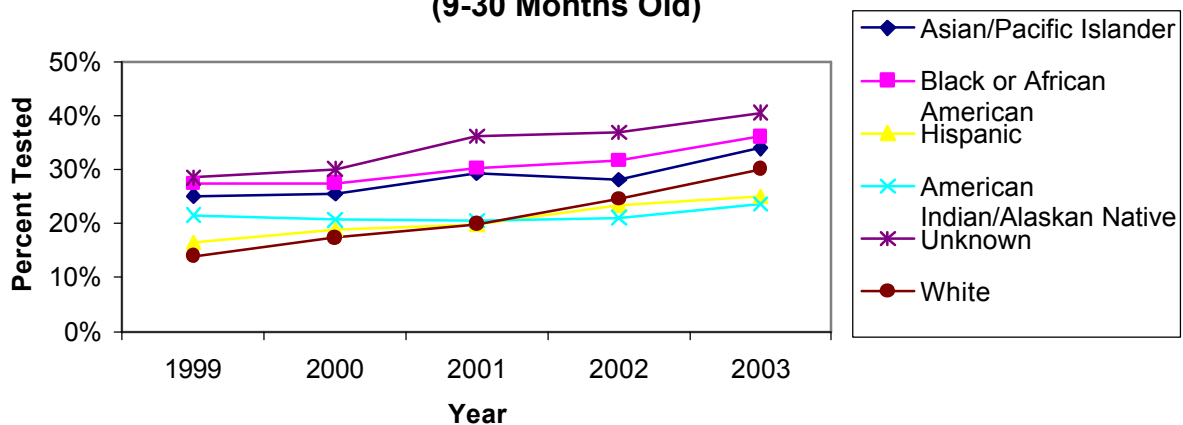
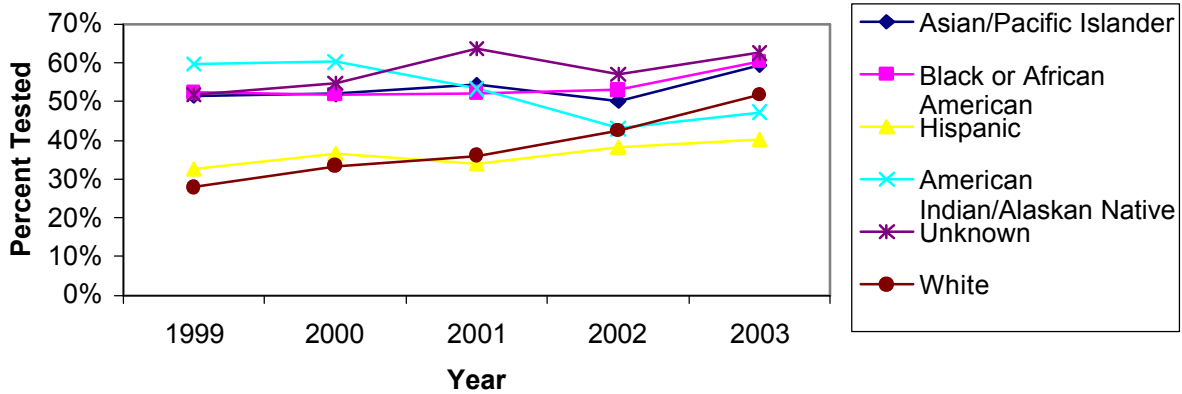
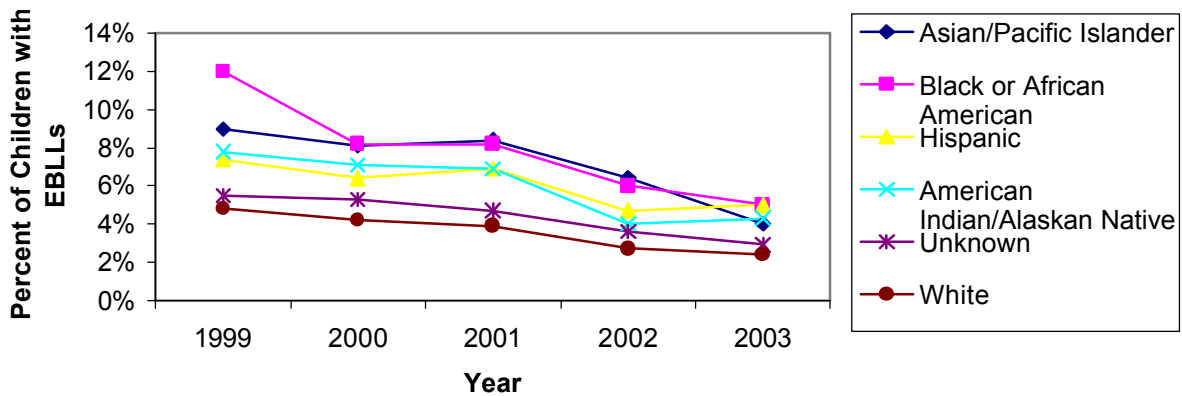


Figure 6. MHCP Children with Well-Child Visits Tested by Race/Ethnicity (9-30 Months Old)



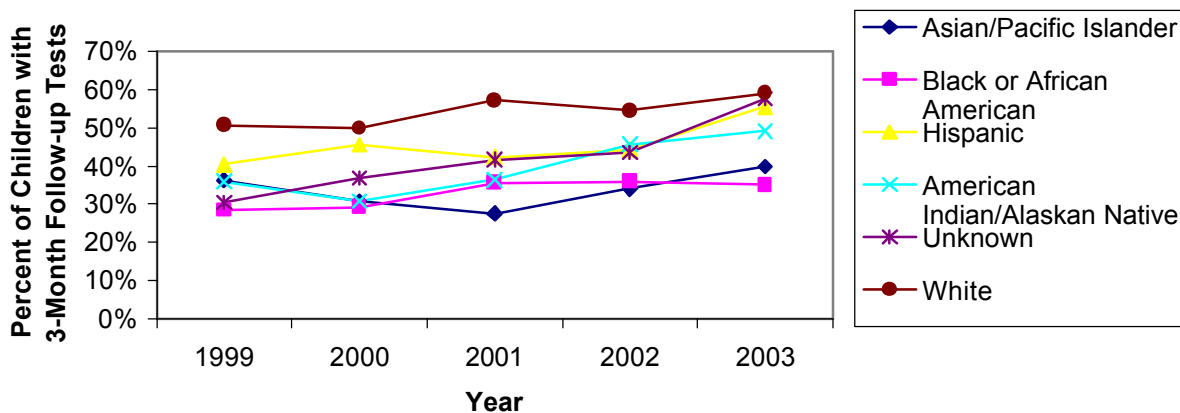
EBLLs declined for all race/ethnicity groups from 1999 to 2003. The rate of EBLLs in 2003 was highest in Black or African-American (5.0%), Asian/Pacific Islander (4.0%), Hispanic (5.0%), and American Indian/Alaskan Native children (4.3%), with lower rates in the White (2.4%) and Unknown (2.9%) categories (Figure 7). This correlates with previous studies showing higher risk for lead poisoning in minority populations. This is likely due to the greater likelihood of minority children to live in poverty, which in turn is related to living in substandard rental housing and living in urban areas with higher soil lead concentrations.^{5,6}

Figure 7. Rate of EBLLs by Race/Ethnicity (All MHCP Children)



Follow-up testing increased for all race/ethnicity groups from 1999 to 2003 (Figure 8). The rate of three-month follow-up testing in 2003 was highest in White (59%), Unknown (58%) and Hispanic (55%) groups, with lower rates of follow-up in American Indian/Alaskan Native (49%), Black or African-American (35%), and Asian/Pacific Islander (40%) children.

**Figure 8. Rate of 3-Months Follow-up Tests by Race/Ethnicity
(All MHCP Children)**



Limitations

Use of the data in this report to describe the overall Minnesota population is limited. First, surveillance data are not a random sample of Minnesota children. Providers and parents make the decision to test each child, and they have a variety of reasons for doing so. Second, the race and ethnicity data used in this report are for MHCP children only. The differences between race/ethnicity groups may not be similar in non-MHCP children. Also, race and ethnicity data were missing or unknown for some children (8% in 2003). This may lead to inaccurate analysis by race/ethnicity. Finally, there may be error in matching between databases even though attempts were made to search for non-identical but similar names and birthdates.

Summary

The number of children tested for lead in Minnesota increased from 1999-2003, for both MHCP and non-MHCP children, in contrast to the decline observed for 1995-1998. The release of statewide screening guidelines in 2000 and ongoing efforts to increase screening in high-risk populations are likely to be reasons for this increase. However, more testing needs to be done in MHCP children due to the higher risk of lead poisoning in MHCP children and federal Medicaid law requiring all Medicaid children to be tested at both one and two-year well-child visits.

The rate of elevated blood lead levels in tested children continued to decline in both MHCP and non-MHCP children. This is likely due to two main factors, an increase in testing for all children and ongoing efforts to reduce lead sources for children. However, the rate of elevated blood lead levels remained approximately twice as high in MHCP children compared with non-MHCP children. The rate of follow-up testing in children with elevated blood lead levels remained low and improving follow-up should be a focus of efforts in childhood lead poisoning prevention.

Continuing analysis of blood lead surveillance data for both MHCP and non-MHCP children will help track Minnesota's progress toward elimination of childhood lead poisoning by 2010. For more information on Blood Lead Screening Guidelines and other lead information, visit the

MDH Lead Program website at www.health.state.mn.us/divs/eh/lead. For guidelines specific to MHCP or Medicaid-enrolled children see pages C-19 and C-20 in the Child and Teen Checkups Provider Manual at: www.dhs.state.mn.us/main/groups/county_access/documents/pub/dhs_id_000307.hcsp.

References

1. US General Accounting Office. Medicaid: elevated blood lead levels in children. 1998; GAO Publication No. GAO/HEHS-98-78.
2. Zabel, E.W., Falken, M.C., Sonnabend, M., Alms, M., Symonik, D. 2005. Prevalence of elevated blood lead levels and evaluation of a lead risk screening questionnaire in rural Minnesota. *J. Env. Health*. In Press.
3. Castellano SE, Boler MJ, Falken M, Zabel E, Michael A, Virnig D. Elevated Blood Lead Levels in Minnesota and the Medicaid Population. Minnesota Department of Human Services and Minnesota Department of Health. 2002. Available at <http://www.health.state.mn.us/divs/eh/lead/reports/medicaidleadrpt.pdf>. Accessed June 10, 2003.
4. Gyllstrom ME, Jensen JL, Vaughan JN, Castellano SE, Oswald JW. 2002. Linking birth certificates with Medicaid data to enhance population health assessment: methodological issues addressed. *J. Pub. Health Manag. Pract.*; 8:38-44.
5. Pirkle JL, Brody DJ, Gunter EW, Kramer RA, Paschal DC, Flegal KM, Matte TD. (1994). The decline in blood lead levels in the United States. *The National Health and Nutrition Examination Surveys (NHANES)*. *JAMA*; 272:284-291.
6. Pirkle JL, Kaufmann RB, Brody DJ, Hickman T, Gunter EW, Paschal DC. (1998). Exposure of the U.S. population to lead, 1991-1994. *Env. Health Persp.*; 106:745-750.