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Health, Education, and
Human Services Division

B-280017

May 18, 1998

Honorable Henry A. Waxman
Ranking Minority Member
Committee on Government Reform and Oversight
House of Representatives

Subject: Children's Health: Elevated Blood Lead Levels in Medicaid and Hispanic Children

Dear Mr. Waxman:

In February 1998, we reported to you our initial analysis of recently released data from a Department of Health and Human Services (HHS) health survey.[1] This database contains nationally representative information on blood lead levels in children. Our report focused on the prevalence of elevated blood lead levels associated with harmful health effects in children aged 1 through 5 and particularly in children who receive their health care coverage through Medicaid.[2] You asked that we provide you with additional information on several subgroups of these children, as follows:

- Medicaid children aged 1 through 2. CDC has reported that 1- and 2-year-old children are particularly susceptible to elevated blood lead levels because of normal hand-to-mouth activity and increasing mobility during the second year of life, resulting in more exposure to lead hazards.

- Hispanic children aged 1 through 5 compared with other children. While the risk of elevated blood lead levels is higher among children living in poverty or in pre-1950 housing (which tends to have lead-based paint), or in

[1]Medicaid: Elevated Blood Lead Levels in Children (GAO/HEHS-98-78, Feb. 20, 1998).

[2]The Centers for Disease Control and Prevention (CDC) considers blood lead levels of 10 or more micrograms of lead per deciliter of blood (µg/dl) to be "elevated" since these levels have been associated with harmful health effects in children.

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both, CDC and others have identified potential nonpaint sources of lead exposure, such as traditional folk medicines or pottery that are often associated with Hispanic cultures.[3]

- Immigrant children aged 1 through 5. Concerns that some immigrant children may be exposed to nonpaint sources of lead–such as traditional customs and medications or other sources found outside the United States–are similar to those raised for Hispanic children.[4]

SUMMARY

Nearly 10 percent of Medicaid children aged 1 through 2 had elevated levels of lead in their blood. This was more than double the mean prevalence rate for non-Medicaid 1- and 2-year-olds and slightly higher than the rate for the larger group of Medicaid children aged 1 through 5. Although Medicaid policy requires that early and periodic screening, treatment, and diagnostic services include lead screening for all Medicaid children aged 1 through 2, only about 21 percent of Medicaid children in that age group had been screened.[5] For nearly 80 percent of the Medicaid children aged 1 and 2 identified through survey blood tests as having elevated blood lead levels, this was the first screening for lead they had ever received. Projected to the entire Medicaid population of 1- and 2-year-olds, this represents about 206,000 of the estimated 262,000 Medicaid children aged 1 through 2 with elevated blood lead levels who have not been screened.

The prevalence of elevated blood lead levels in Hispanic children aged 1 through 5 was 4.8 percent, compared with 11.2 percent for black non-Hispanic children and 2.3 percent for white non-Hispanic children. When comparing the risk of elevated blood lead levels by poverty status and age of housing, we found differences in how Hispanic, black, and white children were affected. In particular, while residing in older housing was associated with an increased risk for children in each racial and ethnic group, poverty status was associated with an increased risk among black and white children but not Hispanic children. The data from HHS's survey are not sufficiently detailed to determine the specific reasons why these differences exist. However, the results add support to the concern that lead exposures may vary between different racial and ethnic groups.

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[3]Measuring Lead Exposure in Infants, Children, and Other Sensitive Populations, National Research Council, 1993.

[4]The National Research Council report states that various traditional customs and medications can result in high lead exposures and that reports of such exposures come from various regions including China, the Indian-Pakistani subcontinent, Arab countries, and Latin America.

[5]For this purpose, "screening" is defined as a laboratory test for lead in blood.

A statistically reliable estimate of the number of immigrant children with elevated blood levels could not be developed, because the survey sampled a relatively small number of children who were born outside the United States.

METHODOLOGY

Our analysis is based on data from HHS's most recently released segment of the National Health and Nutrition Examination Survey (NHANES), conducted between 1991 and 1994.[6] This survey contains nationally representative information on the health and nutritional status of the U.S. population. The survey involves direct physical examinations, including a test for blood lead, and interviews that included questions on demographic and other factors such as Medicaid coverage and whether the participant had been previously screened for lead toxicity. The most recent segment of NHANES was based on a national sample of 15,427 persons 2 months old and older. The NHANES oversampled selected subpopulations to increase the reliability of the estimates, including children aged 2 months through 5 years, blacks, and Mexican Americans.

This segment of the NHANES identified persons of Hispanic origin by only two categories: Mexican Americans and "other Hispanics." Because the sample sizes were not sufficiently large to allow a separate analysis for the "other Hispanic" population, for this analysis we combined the Mexican American and "other Hispanic" categories. The NHANES survey included 827 Mexican American children aged 1 to 5 and 110 "other Hispanic" children aged 1 to 5 for whom blood lead levels were obtained. Because the NHANES oversampled Mexican Americans, we adjusted the sample weights to reflect the proper proportions of Mexican Americans and "other Hispanics" in the U.S. population. The NHANES did not identify immigration status. To identify potential immigrants, we identified children who had been born outside the United States.[7] Sample sizes and upper and lower limits for the estimates are found in the enclosure. We conducted this work from February 1998 to May 1998 in accordance with generally accepted government auditing standards.[8]

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[6]The NHANES has been conducted many times since 1960. This analysis is from the Third NHANES, Phase 2 (1991-94). HHS, CDC, National Center for Health Statistics, Third National Health and Nutrition Examination Survey, 1988-94, NHANES III Laboratory and Youth Data Files (CD-ROM), Hyattsville, Md., 1996.

[7]The NHANES defined these children as those born outside of the 50 U.S. states.

[8]We reviewed the NHANES design, data reliability checks, and reporting guidelines before using these data. We also compared the NHANES-computed estimates with Bureau of Census population estimates and Health Care Financing Administration (HCFA) reports on the Medicaid population. From these reviews and comparisons, we conclude that NHANES data are sufficiently reliable to be used in meeting our objectives.

BACKGROUND

Childhood lead poisoning has long been considered to be the most serious environmental health threat to children in the United States and is estimated to cost society billions of dollars. Even at low levels, lead can have harmful effects on a child's intelligence and ability to learn. Young children are more susceptible than adults to lead poisoning because their developing nervous systems are more vulnerable to injury and they absorb more lead.

While deteriorating lead-based paint in older housing is considered to be the most important source of lead exposure, other lesser known sources exist. The National Research Council, CDC, and others have reported lead toxicity cases from sources such as traditional folk remedies, lead-glazed cooking pots and ceramicware, candies in leaded wrappers or containers, and certain cosmetics containing lead that have been associated with Hispanic and other cultures. The extent to which these nonpaint sources contribute to elevated blood lead levels nationally is unknown because many states do not report information on the source of elevated blood lead levels. However, nonpaint sources have been found to be significant potential sources of exposure. For example, the Childhood Lead Poisoning Prevention Branch of the California Department of Health Services has reported that up to 12 percent of lead-poisoned children in the state may have been poisoned from traditional folk remedies.[9] Another 8 percent of cases may have been linked to lead-glazed pottery, often from Mexico.

TEN PERCENT OF MEDICAID 1- AND 2-YEAR-OLDS HAVE ELEVATED BLOOD LEAD LEVELS, BUT MOST HAVE NOT BEEN SCREENED

As shown in table 1, 1- and 2-year-old Medicaid children had a higher prevalence of elevated blood lead levels than non-Medicaid children of the same age. On the basis of the survey percentages, we estimate that 262,000 1- and 2-year-old Medicaid children had elevated blood lead levels.

[9]This number represents the percentage of all children with lead poisoning exposed to the source. Since children are often exposed to more than one lead source, this represents the upper end of the number of children who may have been poisoned from these sources.

Table 1: Prevalence of Elevated Blood Lead Levels Among Medicaid Children Aged 1-2, Non-Medicaid Children Aged 1-2, and Medicaid Children Aged 1-5

	Children with elevated blood lead levels	
	Percent	Estimated number
Medicaid children aged 1-2	9.7	262,000
Non-Medicaid children aged 1-2	4.0	224,000
Medicaid children aged 1-5	8.5	535,000

Note: Our estimates represent the means. The enclosure shows the sample sizes and upper and lower limits of these estimates.

Medicaid 1- and 2-year-olds were screened for lead toxicity at a greater rate than non-Medicaid children of comparable ages, but most remain unscreened. Since 1992, HCFA has required that Early and Periodic Screening, Diagnostic, and Treatment program (EPSDT) services include lead screening for Medicaid children at least at age 1 and age 2.[10] However, only about 21 percent of Medicaid 1- and 2-year-olds had been screened prior to their participation in the NHANES. By comparison, about 19 percent of the larger group of Medicaid 1- through 5-year-olds had been screened. About 10 percent of non-Medicaid children aged 1 through 2 had been screened.

The NHANES data further indicate that most Medicaid 1- and 2-year-olds with elevated blood lead levels are not being identified. We analyzed the screening rates for the population of 1- and 2-year-old Medicaid children found through NHANES blood tests to have elevated blood lead levels. These children were screened prior to their participation in the survey at about the same rate as those without elevated blood lead levels–about 21 percent. From these results, we estimate that 206,000 of the 262,000 Medicaid 1- and 2-year-olds with elevated blood lead levels have not been screened.

PREVALENCE OF ELEVATED BLOOD LEAD LEVELS FOR HISPANICS DOES NOT CHANGE WITH POVERTY STATUS

When comparing the prevalence of elevated blood lead levels among children aged 1 to 5 in the three racial and ethnic groups, we found Hispanic children had

[10]Federal Medicaid policy for screening children for lead toxicity was established by the Omnibus Budget Reconciliation Act of 1989, which required that Medicaid's early and periodic screening, diagnostic, and treatment services include blood lead level laboratory tests appropriate for age and risk factors.

a higher prevalence of elevated blood lead levels than white non-Hispanic children and a lower prevalence than black non-Hispanic children (see table 2).[11]

Table 2: Prevalence of Elevated Blood Lead Levels Among Hispanic, Black Non-Hispanic, and White Non-Hispanic Children, Aged 1-5

	Children with elevated blood lead levels	
	Percent	Estimated number
Hispanic children aged 1-5	4.8	131,000
Black, non-Hispanic children aged 1-5	11.2	427,000
White, non-Hispanic children aged 1-5	2.3	296,000

Note: Our estimates represent the means. The enclosure shows the sample sizes and upper and lower limits of these estimates.

When we examined the risk factors of housing age and poverty status for each racial and ethnic group, we found Hispanic children were at higher risk–as were black and white children–when living in older housing. However, in examining the data by poverty status–children in families below 130 percent of the federal poverty level versus those in families at or above this level–we found that the prevalence of elevated blood lead levels did not appreciably change for Hispanic children with changes in poverty status as it did for other children.

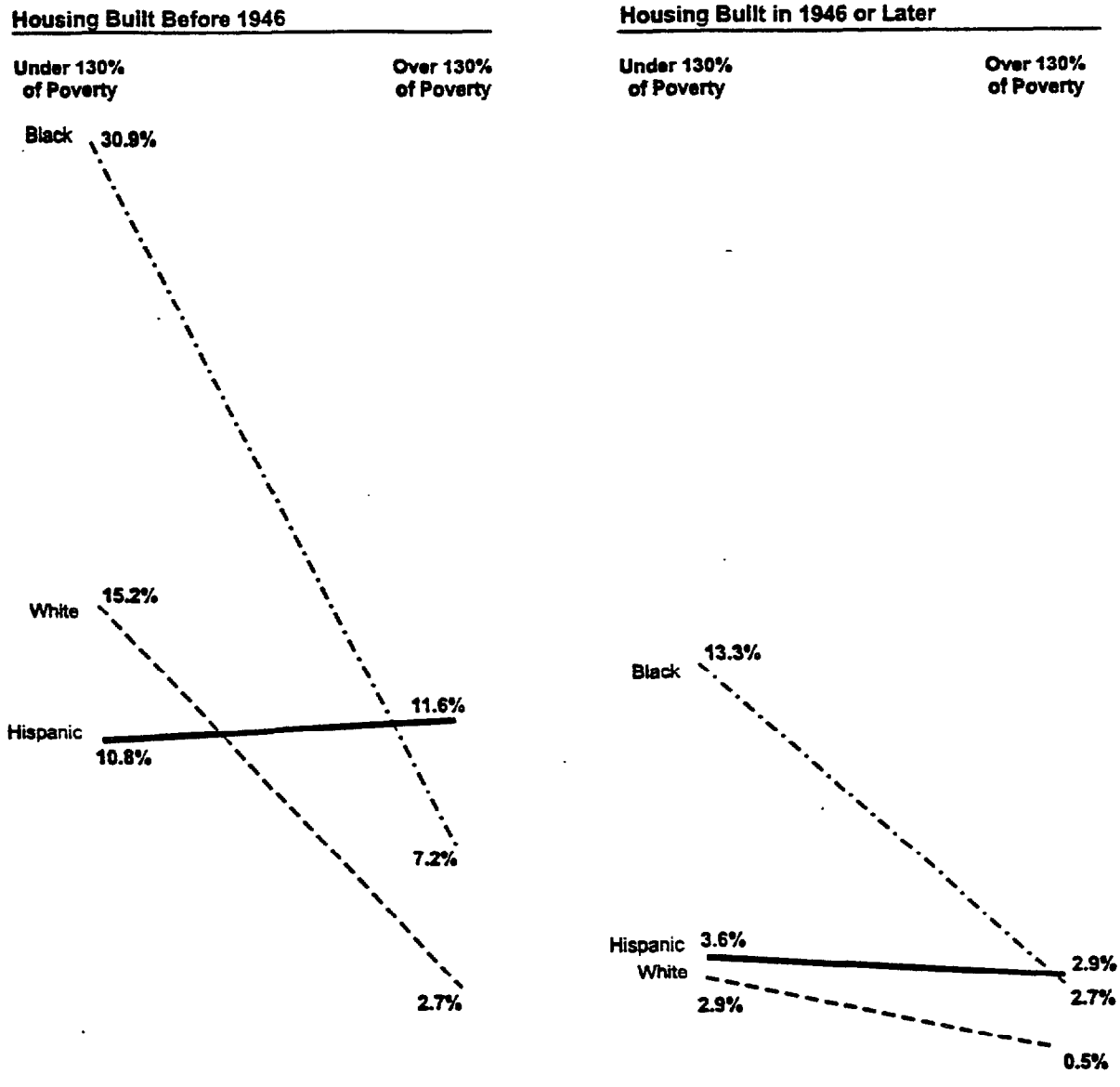
Consequently, while Hispanic children in pre-1946 housing had a higher prevalence of elevated blood lead levels than those in newer housing, in either setting the risk of elevated blood lead levels was not appreciably changed by

[11]CDC reported the prevalence of elevated blood lead levels in the Hispanic subgroup of Mexican American children aged 1 to 5 as 4.0 percent. (See "Update: Blood Lead Levels–United States, 1991-1994," Morbidity and Mortality Weekly Report, Vol. 46 (1997), pp. 141-46.) A CDC analysis of data from the Hispanic Health and Nutrition Examination Survey, conducted during 1982-84 and showing blood lead levels for three groups of Hispanic children (Cuban, Mexican American and Puerto Rican), showed that Puerto Rican children had the highest mean blood lead levels, followed by Mexican American children and Cuban children. (See "Blood Lead Levels of 4-11-year-old Mexican American, Puerto Rican, and Cuban Children," Public Health Reports, Vol. 105 (July 1990), pp. 388-93.)

poverty status.[12] In contrast, the prevalence of elevated blood lead levels for black and white non-Hispanic children changed dramatically with poverty status in either older or newer housing, as shown in figure 1.

[12]We performed a multivariate logistic regression analysis to determine the significance of age of housing and poverty status on prevalence of elevated blood lead levels by race and ethnicity. NHANES housing data are broken out in three categories–pre-1946, 1946-73, and post-1973. CDC has reported that pre-1950 housing poses the greatest risk of exposure to children. We analyzed data for pre- and post-1946 housing rather than all three NHANES categories in order to ensure sufficient sample sizes. We used 130 percent of the federal poverty level for our analysis because CDC in prior NHANES analyses defined incomes lower than this level as low-income. (See Morbidity and Mortality Weekly Report, Vol. 46, No. 7 (Feb. 21, 1997).

Figure 1: Prevalence of Elevated Blood Lead Levels for Hispanic, Black, and White Non-Hispanic Children Living in Older and Newer Homes, by Poverty Status



The NHANES data alone are not sufficient to determine the reasons for these differences in risk factors by racial and ethnic group. A better understanding of these relationships would require more research on sources of lead exposure in children of different races and ethnicities, by income level, which has not been a part of the NHANES survey.[13] However, the results do provide some indication that the risk factors for elevated blood lead levels may vary by race or ethnicity.

We were unable to conduct a similar analysis for children born outside the United States. The NHANES had sufficient survey data for only 124 children aged 1 to 5 who were born outside the United States. This sample size was too small to allow us to develop statistically reliable estimates on the prevalence of elevated blood lead levels for this subgroup of children.

We are continuing our analysis of screening efforts and followup treatment of children with elevated blood lead levels and plan to issue our final report to you later this year.

AGENCY COMMENTS

We did not obtain formal agency comments from HHS on this letter because it was limited to a technical analysis of specific elements in the HHS survey. Accordingly, we obtained technical comments from CDC on the methodology used for our analysis. CDC's comments largely addressed the potential overrepresentation of Mexican American children in the analysis of the Hispanic population, since these children were oversampled as part of NHANES. As agreed with CDC, we readjusted the weighting factors for the Hispanic children to address this issue. Other CDC comments were also incorporated as appropriate.

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As agreed with your office, unless you publicly announce its contents earlier, we plan no further distribution of this letter for 7 days. At that time, we will send copies to interested parties. We will also make copies available to others on request.

The information contained in this letter was developed by Frank Pasquier, Assistant Director, Tim Clouse, Katherine Iritani, and Stan Stenersen. Please

[13]A CDC NHANES researcher told us that plans for future NHANES were to include gathering data on dust samples for lead content in participating children's homes.

contact me at (202) 512-6543 or Frank Pasquier at (206) 287-4861 if you or your staff have any questions.

Sincerely yours,

Bernice Steinhardt
Director, Health Services Quality
and Public Health Issues

Enclosure

UPPER AND LOWER LIMITS FOR ESTIMATES

The tables in this enclosure show the estimates made from the National Health and Nutrition Examination Survey (NHANES) data, together with the sample sizes and confidence intervals for these estimates. There is a 5-percent chance that the actual number is outside these limits.[14] While the comparatively small sample size of some subpopulation categories results in a relatively wide range between the high and low estimates, the numbers of children at the low ends of these estimates remain substantial.

Table 1: Estimated Number of Children Aged 1 Through 2

		Estimate		
Number	Sample size[a]	Mean	Lower limit	Upper limit
All children	1,187	8,263,000[b]	6,826,000	9,699,000
Medicaid children	507	2,690,000	2,306,000	3,074,000
Non-Medicaid children	676	5,563,000	5,176,000	5,950,000

[a]Sample sizes do not total because some of the data elements needed to perform the analysis were missing for some children.

[b]NHANES benchmarked the means to those used by the Bureau of Census 1993 undercount adjusted Current Population Survey.

[14]Means, proportions, and standard errors were obtained by using Software for Survey Data Analysis (SUDAAN), as suggested in the NHANES III Analytic and Reporting Guidelines.

Table 2: Estimated Number of Children Aged 1 Through 2 With Elevated Blood Lead Levels

		Estimate		
Number with elevated blood lead levels	Sample size[a]	Mean	Lower limit	Upper limit
All children	987	486,000	267,000	704,000
Medicaid children	425	262,000	139,000	385,000
Non-Medicaid children	559	224,000	91,000	357,000

Note: The Centers for Disease Control and Prevention (CDC) defines elevated blood lead levels to be 10 µg/dl of lead in the blood or greater.

[a]Sample sizes do not total because some of the data elements needed to perform the analysis were missing for some children.

Table 3: Estimated Number of Children Aged 1 Through 2 With Undetected Elevated Blood Lead Levels

		Estimate		
Number with elevated blood lead levels and not previously screened	Sample size[a]	Mean	Lower limit	Upper limit
All children	848	364,000	309,000	418,000
Medicaid children	341	206,000	173,000	239,000
Non-Medicaid children	504	158,000	116,000	199,000

[a]Sample sizes do not total because some of the data elements needed to perform the analysis were missing for some children.

Table 4: Estimated Number of Children Aged 1 Through 5 With Elevated Blood Lead Levels, by Ethnicity

		Estimate		
Number with elevated blood lead levels	Sample size[a]	Mean	Lower limit	Upper limit
All children	2,392	890,000[b]	526,000	1,254,000
Hispanic children	937	131,000	63,000	199,000
Non-Hispanic black children	783	427,000	210,000	646,000
Non-Hispanic white children	631	296,000	64,000	528,000

[a]Sample sizes do not total because some of the data elements needed to perform the analysis were missing for some children.

[b]Includes other racial and ethnic groups besides those listed separately.

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