1 Childhood Lead Poisoning in the United States

The problem of childhood lead poisoning. Childhood lead poisoning is a major, preventable environmental health problem in the United States. Blood lead levels (BLLs) as low as 10 μg/dL are associated with harmful effects on children's ability to learn. Very high BLLs (≥70 μg/dL) can cause devastating health consequences, including seizures, coma, and death. It is currently estimated that some 890,000 U.S. children have BLLs ≥10 μg/dL (CDC, 1997).

Lead exposure. Children can be exposed to lead in many ways. Sources of exposure include lead-based paint and industrial sites and smelters that use or produce lead-containing materials. Lead-contaminated dust, soil, and water; lead-containing materials used in parental occupations or hobbies; and lead-containing ceramicware and traditional remedies all contribute to childhood lead exposure. Lead-contaminated house dust, ingested in the course of normal hand-to-mouth activity, is of major significance. House dust is most often contaminated by lead-based paint in the home, when such paint is peeling, deteriorating, or scattered about during home renovation or preparation of painted surfaces for repainting.

Housing with lead-based paint. Lead-based paint in homes is the most important remaining source of lead exposure for U.S. children. Substantial progress has been made in reducing other environmental sources of lead exposure, especially from gasoline and food. But 83% of all homes built in the United States before 1978 still contain some lead-

based paint at a concentration of at least one mg/cm^2 (U.S. Environmental Protection Agency, 1995). The older the house, the more likely it is to contain lead-based paint and to have a higher concentration of lead in the paint. Housing built before 1950 poses the greatest risk of exposure to children. Such housing is present in every state. (Table 1.1.) Even states with low overall rates of older housing have areas that contain predominately older housing.

Temporal trend of elevated BLLs in children. Average BLLs for the population as a whole have declined dramatically since the 1970s. As shown in Figure 1.1., the geometric mean BLLs for children ages 1-5 years declined from 15.0 μg/dL during 1976-1980 (Mahaffey et al., 1982) to 2.7 μg/dL during 1991-1994 (CDC, 1997).

Table 1.1. Quantity and percentage of U.S. housing built before 1950, by state

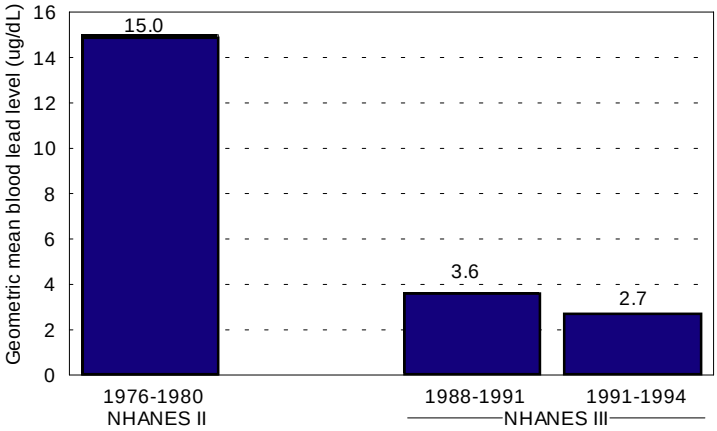
State	Total Housing Units	Housing Units Built Before 1950	Built Before 1950 (%)
Alabama	1,670,379	298,303	17.9
Alaska	232,608	16,248	7.0
Arizona	1,659,430	110,746	6.7
Arkansas	1,000,667	176,662	17.7
California	11,182,882	2,211,243	19.8
Colorado	1,477,349	270,562	18.3
Connecticut	1,320,850	462,808	35.0
Delaware	289,919	64,704	22.3
Dist. of Columbia	278,489	155,194	55.7
Florida	6,100,262	472,481	7.7
Georgia	2,638,418	381,827	14.5
Hawaii	389,810	52,347	13.4
Idaho	413,327	100,738	24.4
Illinois	4,506,275	1,662,888	36.9
Indiana	2,246,046	756,843	33.7
Iowa	1,143,669	490,394	42.9
Kansas	1,044,112	345,564	33.1
Kentucky	1,506,845	364,678	24.2
Louisiana	1,716,241	333,965	19.5
Maine	587,045	242,858	41.1
Maryland	1,891,917	473,984	25.1
Massachusetts	2,472,711	1,157,737	46.8
Michigan	3,847,926	1,228,635	31.9
Minnesota	1,848,445	585,539	31.7
Mississippi	1,010,423	167,685	16.6
Missouri	2,199,129	629,868	28.6

Table 1.1. (Continued)

State	Total Housing Units	Housing Units Built Before 1950	Built Before 1950 (%)
Montana	361,155	108,805	30.1
Nebraska	660,621	249,631	37.8
Nevada	518,858	31,044	6.0
New Hampshire	503,904	162,201	32.2
New Jersey	3,075,310	1,082,081	35.2
New Mexico	632,058	97,750	15.5
New York	7,226,891	3,401,416	47.1
North Carolina	2,818,193	494,675	17.6
North Dakota	276,340	85,128	30.8
Ohio	4,371,945	1,561,695	35.7
Oklahoma	1,406,499	298,347	21.2
Oregon	1,193,567	316,648	26.5
Pennsylvania	4,938,140	2,213,386	44.8
Rhode Island	414,572	181,215	43.7
South Carolina	1,424,155	218,781	15.4
South Dakota	292,436	107,374	36.7
Tennessee	2,026,067	380,068	18.8
Texas	7,008,999	1,008,475	14.4
Utah	598,388	127,266	21.3
Vermont	271,214	109,780	40.5
Virginia	2,496,334	481,679	19.3
Washington	2,032,378	500,808	24.6
West Virginia	781,295	270,441	34.6
Wisconsin	2,055,774	757,204	36.8
Wyoming	203,411	48,254	23.7
United States	**102,263,678**	**27,508,653**	**26.9**

Source: 1990 U.S. census

Figure 1.1. Geometric mean blood lead levels of children ages 1-5 years in the United States: NHANES II and III



Distribution of elevated BLLs among children. Some populations of children are heavily exposed to lead while others are not. For example, a recent national estimate (CDC, 1997) showed that 21.9% of black children living in housing built before 1946 had elevated BLLs (≥10 μg/dL). Studies of other groups of children have shown quite low prevalence of elevated BLLs. For example, a 1994 survey of 967 poor children in Alaska found that none had a BLL above 11 μg/dL (Robin et al., 1997).

Blood-lead screening of children. If we are to eliminate childhood lead poisoning, a comprehensive approach is necessary. (See Chapter 2.) Blood lead screening is an important element of such an approach. The goal of screening is to identify children who need individual interventions to reduce their BLLs. The 1991 edition of *Preventing Lead Poisoning in Young Children* called for virtually universal screening of children 12-72 months of age. Nonetheless, a 1994 national survey showed that many children who are at risk for lead exposure are not being screened (Binder et al., 1996). According to the survey, only about 24% of young children had been screened; fewer than one-third of those at increased risk for lead exposure because of poverty or residence in older housing had been screened.

Current situation. Many children, especially those living in older housing or who are poor, are still being harmed by the effects of lead exposure. These children need screening and, if necessary, appropriate interventions to lower their BLLs. At the same time, children in places with populations that are known to be at extremely low risk for lead exposure do not all need to be screened. The task for public health agencies, parents, and health-care providers is to identify

those children who will benefit from screening and to ensure that they receive the services they need.

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