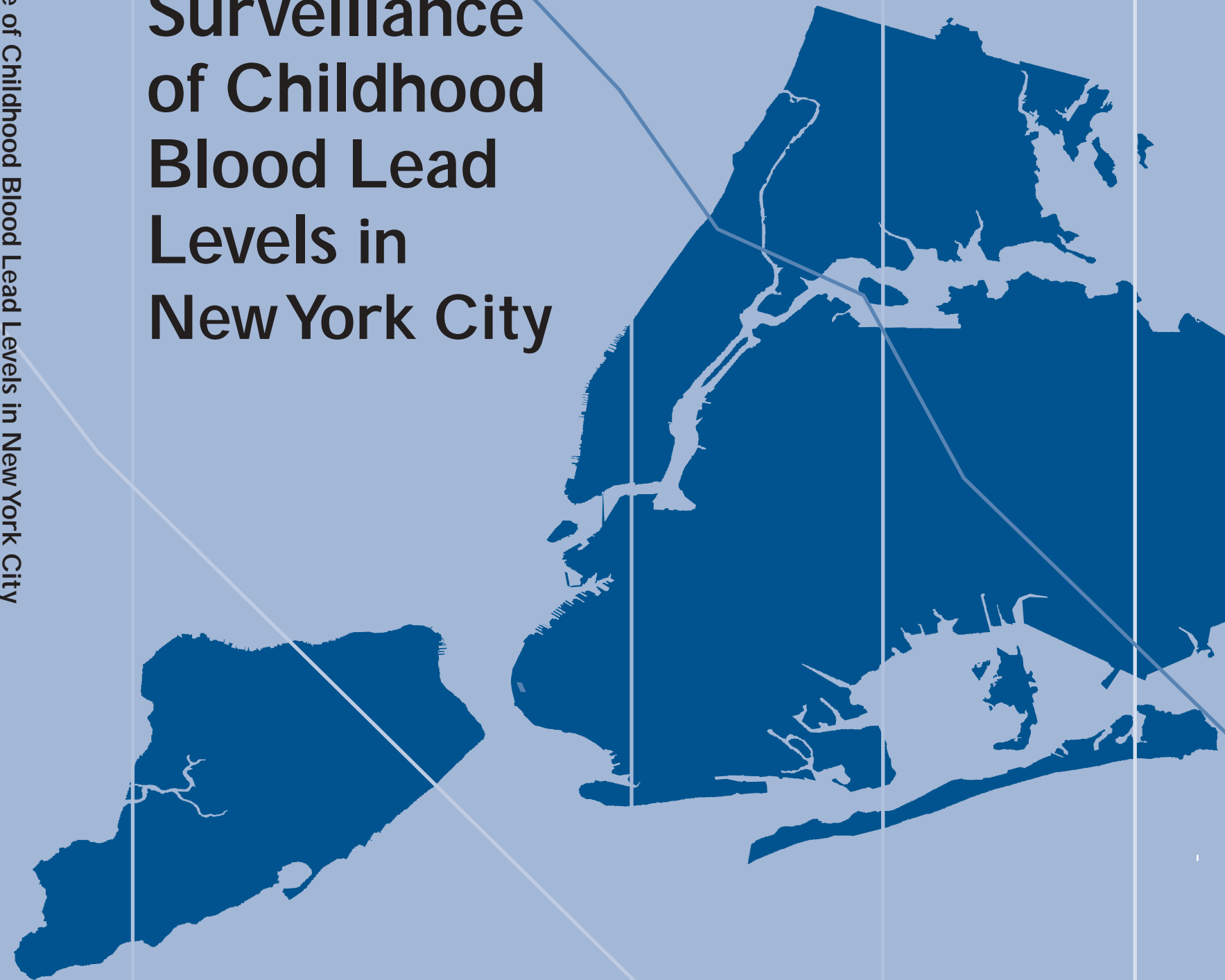


Surveillance of Childhood Blood Lead Levels in New York City

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THE CITY OF NEW YORK DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Michael R. Bloomberg, Mayor Thomas R. Frieden, MD, Commissioner MPH
nyc.gov/health

New York City Department of Health and Mental Hygiene
Lead Poisoning Prevention Program

July 2002

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Lead Poisoning Prevention Program

The New York City Lead Poisoning Prevention Program (LPPP) was established in 1970. Our mission is to prevent childhood lead poisoning in New York City children. To achieve this goal, we have developed a comprehensive program that includes:

- Education and outreach to families and medical providers, to educate them about lead poisoning prevention and the importance of medical screening
- Targeted intervention efforts for high risk populations;
- Environmental assessment and enforcement;
- Care coordination of children with elevated blood lead levels;
- Enforcement of safe work practices during lead abatement;
- Education to contractors, landlords, and maintenance staff about lead safe work practices;
- Research and surveillance to identify trends in lead poisoning and focus LPPP's prevention efforts;
- A computerized surveillance and tracking system; and
- Policy development to support continued improvement in lead poisoning prevention.

LPPP is funded by local, state and federal sources.

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ACKNOWLEDGEMENTS

This report was compiled by staff at the New York City Department of Health, Lead Poisoning Prevention Program Surveillance and Evaluation Unit: Jessica Leighton, Amy Auchincloss, Karen Gurnitz, Carla Rodriguez, Andrew Faciano, Diana Puccerella, and Slavenka Sedlar. Additional editorial review was provided by Deborah Nagin. Muhammad Ghani and Jorge Guengue provided data review and computer programming assistance. Sharlene Brown provided administrative assistance. Other personnel at the New York City Department of Health reviewed the report and provided valuable suggestions. Graphic support and layout were provided by Vanguard Direct Inc..

Suggested citation for data in this publication:

Surveillance of Childhood Blood Lead Levels in New York City. New York: New York City Department of Health and Mental Hygiene, 2002.

Requests for copies of this report and for more information about the New York City Department of Health and Mental Hygiene Lead Poisoning Prevention Program (LPPP), should be directed to the LPPP Education Unit:
212-BAN-LEAD (212-226-5323) or FAX inquiries to (212) 442-3156.
The report can be downloaded from www.nyc.gov/health.

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Over the last thirty years, there has been a dramatic nationwide decline in childhood lead poisoning. Between the late 1970s and early 1990s, national estimates indicated that the percentage of children ages 1 through 5 years with high (≥ 20 $\mu\text{g}/\text{dL}$) blood lead levels declined 96%.¹ New York City has largely mirrored the national declines in blood lead levels. During a similar time period, the number of children newly identified with very high (≥ 60 $\mu\text{g}/\text{dL}$) blood lead levels declined 94%.²

Children are exposed to lead from different sources (paint, solder in old pipes, glazed ceramic dishware, etc.), through different pathways (ingestion, inhalation, or prenatal), and different media (dust, air, soil, water/food, blood to a fetus, and breast milk to an infant). Currently, the primary source of childhood lead exposure is leaded paint. Lead-based paint hazards result from deteriorated leaded paint and unsafe work practices during renovation/removal of leaded paint. Lead poisoning affects the developing brain and nervous system, as well as impairs a child's learning and behavior. Conditions associated with elevated blood lead levels range from decreased performance on IQ tests, impaired neurocognitive development/growth, to coma, convulsions and death.

Declines in blood lead levels can be attributed largely to government regulations instituted throughout the 1960s, 1970s and 1980s that banned or limited the use of lead in gasoline, household paint, water pipes, solder for food cans, and other consumer products. Abatement and remediation of lead-based paint in housing and increased consumer awareness of lead hazards have also contributed to lowering blood lead levels.

The dramatic decline in blood lead levels is a public health success story, yet the prevention, early detection, and monitoring of childhood lead poisoning continues to be a national challenge. Medical evidence suggests that elevated (≥ 10 $\mu\text{g}/\text{dL}$) blood lead levels are associated with decreased performance on IQ tests and impaired neurocognitive development and growth. National health targets

formulated in Healthy People National Health Promotion and Disease Prevention Objectives³, state that by year 2010, no children (ages 1 year through 6 years) will have blood lead levels of ≥ 10 $\mu\text{g}/\text{dL}$. Attaining this goal will be a challenge. In NYC in 2000, there were over 7,600 children ages 6 months to less than 6 years with elevated blood lead levels (see Figure 9).

Compared to other areas of the nation, NYC's children have higher risks for lead poisoning, primarily due to the prevalence of poverty and the associated deterioration of older housing.⁴ NYC has over 2,000,000 dwelling units built before 1960, many in deteriorated condition. Many property owners lack sufficient revenue to cover the costs of proper maintenance and repair. Much of the public including parents, property owners, and health care providers remain unaware of lead hazards and necessary steps to prevent lead poisoning. Additionally, with the large immigrant population in NYC, there is concern that exposure to lead from sources unrelated to interior paint may be increasingly important to consider.

ABOUT THE REPORT

This report is intended to be a standard reference for legislators, community-based organizations, city and state agencies, and health researchers who seek information on trends and distributions of childhood blood lead levels for New York City children. The report is divided into three chapters: (1) Testing for lead poisoning, (2) Testing with Elevated (≥ 10 $\mu\text{g}/\text{dL}$) blood lead test results, and (3) Environmental intervention blood lead levels.⁵ Demographic characteristics, time trends and neighborhood risks are compared according to different blood lead levels (elevated levels of ≥ 10 $\mu\text{g}/\text{dL}$ and environmental intervention blood lead levels).

The report summarizes the first six (full) years of mandatory reporting of all blood lead levels 1995-2000, showing changes that occurred between 1995 and 2000 in testing and numbers of children with elevated blood lead levels and providing a description of the population of lead poi-

¹According to NHANES, the prevalence of children with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$ declined from 25.7% during the period 1976-1980 to 1.1% during the period 1988-1991. (Pirkle JL, Brody DJ, Gunter EW, et al. The decline in blood lead levels in the United States: the National Health and Nutrition Examination Surveys (NHANES). *JAMA*. 1994;272(4):284-91.)

²Between 1974 and 1991, children aged less than 18 years newly identified with blood lead levels ≥ 60 $\mu\text{g}/\text{dL}$ declined from 494 to 28 (see Figure 18). Limitations with NYC's historic data prevent calculation of prevalence rates and stratification of children with blood levels ≥ 20 $\mu\text{g}/\text{dL}$ by age. (For more discussion, see Technical Notes: Blood lead levels, environmental intervention blood lead levels (EIBLL).)

³Healthy People National Health Promotion and Disease Prevention Objectives goals were developed/coordinated by U.S. Department of Health and Human Services (the Office of Disease Prevention and Health Promotion). Healthy People 2010, released in 2000, set goals and objectives to be reached by 2010.

⁴Nationally, 27% of United States housing units were built before 1950 and 20% of children under age six lived below the poverty line. In NYC 55% of housing units were built before 1950 and the child poverty rate was 30% (Census 1990).

⁵Currently defined as ≥ 20 $\mu\text{g}/\text{dL}$ or two 15-19 $\mu\text{g}/\text{dL}$ at least 3 months apart.

soned children in New York City. Historic data for 1970-1994 are also presented.

The data in this report are representative of the data the New York City Department of Health Lead Poisoning Prevention Program uses to plan and evaluate strategies to prevent childhood lead poisoning and to improve children's health in general. Neighborhoods with high rates of childhood lead poisoning tend to be located in communities with poor child health outcomes (asthma, infant mortality, and missing immunizations). In response to data, DOH has developed partnerships with community organizations and other government agencies to target neighborhoods at high risk for preventable childhood illnesses, including lead poisoning.

DATA HIGHLIGHTS

TESTING FOR LEAD POISONING

Testing for lead poisoning is a key component of childhood lead poisoning prevention. Most children with elevated blood lead levels exhibit no symptoms. Early detection of a child's elevated blood lead level permits timely identification of possible lead hazards in order to prevent further elevation of the child's blood lead level. Since 1993, New York State law has mandated that medical providers screen all children for lead poisoning at one and two years of age, and assess risks (at least annually) to determine the need for a blood lead screen for any child between the ages of six months and six years.

- A large proportion of children (approximately 80% of children) were tested for lead poisoning before their third birthday (see Figure 1). However, each calendar year, just over half (56%) of one and two year old children receive blood lead tests. (see Figure 5)
- Testing rates were above average in the majority of neighborhoods with above average case rates, however, some neighborhoods with high case rates had below average testing rates. (see Figure 28)
- NYC had higher rates of testing than the rest of New York State (see Table 1b).

ELEVATED BLOOD LEAD LEVELS (≥ 10 $\mu\text{g}/\text{dL}$)

In 1991, the CDC began referring to children with blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ as "elevated" and recommended that these children be monitored and retested.

- Between 1995 and 2000, the rate of children ages 6 months to less than 6 years newly identified with blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ (per 1,000 tested)

declined from 53.4 to 19.4. (See Figure 10)

- NYC had lower rates of children with elevated blood lead levels than New York State. Some of the reasons for this may be NYC's early ban on leaded paint and initiation of a lead poisoning prevention program prior to other jurisdictions in New York State. (See Figure 11)
- Large numbers of children with elevated blood lead levels persist in NYC. In 2000, 7,657 children ages 6 months to less than 6 years had blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ and 19% of these children had had an elevated blood lead level in a previous year. (See Figure 9)

ENVIRONMENTAL INTERVENTION BLOOD LEAD LEVELS

This report uses the term "environmental intervention blood lead level" (EIBLL) in order to differentiate the children for whom the CDC recommends environmental assessment and medical evaluation. Substantial progress has been made in reducing the number of children with blood lead levels at or above the EIBLL; this occurred even as the EIBLL threshold was lowered.

- In 1970, the year that the New York City Department of Health's Lead Poisoning Prevention Program was established, there were 2,649 children (ages 0 to less than 18 years) identified at the EIBLL (60 $\mu\text{g}/\text{dL}$). In 2000, there were 817 children newly identified at the EIBLL (20 $\mu\text{g}/\text{dL}$ or two blood lead levels 15-19 $\mu\text{g}/\text{dL}$). (See Figure 16)
- In the 16 years for which electronic data are available (1983-2000), the number of children newly identified with blood lead levels requiring immediate medical intervention (≥ 45 $\mu\text{g}/\text{dL}$) declined 92%. (See Figure 18)
- There appears to be a seasonal pattern to the number of children tested and the rate of children newly identified with blood lead levels at or above the EIBLL. Testing numbers and case rates both appear to be higher in late summer/early fall. (See Figure 20)

RISK FACTORS FOR LEAD POISONING Age

Lead poisoning primarily affects children ages 6 months to less than 6 years of age. Children 6 months to less than 3 years of age are particularly susceptible to lead poisoning and its effects - due to frequent hand-to-mouth activity and their developing neurological system.

EXECUTIVE SUMMARY

- The numbers of children with blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ and with blood lead levels at or above the EIBLL peaked for children between 12 and 29 months of age. (See Figures 12 and 22)
- Most neighborhoods with high rates of children with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$ had testing rates that were above the citywide average. However, some neighborhoods with high case rates had below average testing rates. (See Figure 28)

Neighborhood - poverty

Childhood lead poisoning remains a pressing health concern in low-income neighborhoods.

- Children with high blood lead levels in 1998-2000 were concentrated in areas that were poor. This pattern was particularly evident in parts of Brooklyn, Upper Manhattan, and the Bronx. (See Figure 31)
- Relative to its population, Brooklyn has had a disproportionate share of the percent of children with high (≥ 20 $\mu\text{g}/\text{dL}$) blood lead levels. (See Figure 24)
- Brooklyn neighborhoods⁶ such as East New York, Bedford Stuyvesant-Crown Heights, Downtown-Heights-Park Slope, Williamsburg-Bushwick, and East Flatbush-Flatbush have been particularly affected. Some areas in Queens also have been affected, namely Jamaica and Southwest Queens.⁷ These neighborhoods all had a disproportionate share of children with high (≥ 20 $\mu\text{g}/\text{dL}$) blood lead levels, relative to their populations. Looking at sheer numbers -- in 2000, 45% percent of all children with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$ resided in these seven neighborhoods (231 children out of a total of 519). (See Figures 26 and 27)
- In ZIP codes with above-average concentrations of non-white and/or Hispanic persons, there was a clustering of children with high blood lead levels. (See Figure 29)
- Over two-thirds of children newly identified with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$ were Hispanic or non-Hispanic black. (See Figure 23)
- Relative to the population in 2000, non-Hispanic black children and Asian children (including South Asian children) represented a disproportionate share of the children newly identified with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$. (See Figure 23)

Race/ethnicity

Lead poisoning has affected children in some racial and ethnic groups more than others.

⁶In this report, neighborhoods are defined according to aggregations of ZIP codes by the United Hospital Fund. For more discussion, see Appendix, Technical Notes: Geocodes - United Hospital Fund neighborhood.

⁷Between 1995 and 2000, these seven communities in Brooklyn and Queens persisted in having the top-ten highest rates of children (ages 6 months to less than 6 years) with blood lead levels ≥ 20 $\mu\text{g}/\text{dL}$.

CONTENT AND ORGANIZATION OF THIS REPORT

The main body of this report is divided into three sections: (1) children tested for lead poisoning, (2) children with elevated (≥ 10 $\mu\text{g}/\text{dL}$) blood lead test results, and (3) children with lead poisoning defined at or above the NYC environmental intervention blood lead level (currently defined ≥ 20 $\mu\text{g}/\text{dL}$ or two 15-19 $\mu\text{g}/\text{dL}$). Each chapter begins with an introduction and then presents descriptive data in the form of figures and accompanying text. Each chapter analyzes childhood blood lead levels according to demographic characteristics, time trends, and neighborhood.

Demographic characteristics of the child

In order to assess risks for lead poisoning according to children's demographic characteristics, data are presented by age, gender, race/ethnicity.⁸ Lead poisoning primarily affects children ages 6 months⁹ to less than 6 years of age. Thus, these children are the focus of this report.

Descriptions of a sub-group of this age group, children 6 months to less than 3 years of age, are also presented since these children are highly susceptible to lead poisoning and its effects due to frequent hand-to-mouth activity and their developing neurological system. Data on a broader age group, ages 0 to less than 18 years, are presented in selected charts since the NYC Department of Health Lead Poisoning Prevention Program (LPPP) provides care coordination and environmental assessment/management to children up to age 18.

Time trends

This report focuses on children tested for lead poisoning between calendar years 1995 and 2000. In a few instances, historic data are presented for 1970-1994. We concentrate on years 1995 onward because 1995 was the first complete year that all blood lead levels were reported.

Neighborhood

Data in this report are presented at various levels of geography (citywide, borough, neighborhood, ZIP code). This allows the reader to identify testing rates and blood lead levels for specific communities of interest and then facilitates comparisons of community rates to citywide rates. In

this report, "neighborhood" areas are groups of ZIP codes as defined by the United Hospital Fund (see Appendix, Technical Notes: Geocodes - United Hospital Fund neighborhood). ZIP code level socio-demographic data are presented in order to further identify communities that are at particular risk for lead poisoning.

Appendix

In order to enhance the use of this publication as a standard reference source, technical notes and tables are included in the Appendix. The technical notes define terms, define methods used (for the calculation of rates, etc.), and provide information on the limitations of the data presented in this report. The data tables complement the data presented in the main body of the report and cover the following topics: (1) neighborhood numbers and rates of children tested for lead poisoning by a given age, (2) numbers and rates of tests, elevated blood lead levels, and cases by age, (3) numbers and rates of tests, elevated blood lead levels, and cases by neighborhood, (4) historic trends of children with blood lead levels at or above the environmental intervention blood lead levels, and (5) demographic trends for children with blood lead levels at or above the environmental intervention blood lead level.

The numbers in this report vary somewhat from previously reported numbers and may change slightly in the future. LPPP's database is 'live;' new information the LPPP obtains can change case status information and/or identify duplicate records. This report represents the LPPP's database as of July 2001.

Data sources

Except where noted, the data in this report represent lead poisoning test results for children residing in NYC, as reported to the LPPP. Other data used (and noted) are vital records from the New York State Department of Health Bureau of Biometrics, vital records from the New York City Department of Health Office of Vital Statistics, and Census 1990 socio-demographic data from the United States Bureau of the Census. (See discussion in Appendix, Technical Notes: Calculation of rates)

⁸Data by gender and race/ethnicity are presented only for children with blood lead levels at or above the environmental intervention blood lead level (see Appendix, Technical Notes: race/ethnicity).

⁹Unless a newborn has been exposed to high maternal blood lead levels, infants (ages 0 to less than 6 months) are not routinely tested for lead poisoning because they are not mobile enough to come into contact with lead-based paint or dust.