

## **Childhood Lead Poisoning**

### **About**

Lead poisoning is a medical condition caused by increased levels of the heavy metal lead in the body. When ingested or inhaled, lead is absorbed into the bloodstream and transported to all parts of the body. Most is deposited in the bones, where it is slowly released over a period of 20 to 25 years. Some goes directly to the brain, where it inhibits the release of neurotransmitters associated with learning. Lead that remains in the blood inhibits the absorption of essential nutrients such as calcium or iron. Lead interferes with a variety of body processes and is toxic to many organs and tissues including the heart, bones, intestines, kidneys, and reproductive and nervous systems. The neurological effects of lead poisoning may include short-term memory deficits, decreased concentration, irritability, slurred speech and loss of coordination. Other symptoms can include nausea, abdominal pain, numbness, headaches and anemia. In severe cases seizures, coma, and death may occur.

Lead poisoning has been recorded throughout history. In the 19th-century, the Industrial Revolution dramatically expanded the use of lead-based products in the home. These included lead pipes in plumbing, lead-based paint and lead solder in food cans. Starting in the 1920s, tetraethyl lead was used as a gasoline additive to increase its octane rating. As a result, environmental lead poisoning was very common until the 1970s. The use of lead-based paint has been restricted in the United States since 1978, and lead gasoline was phased out from the 1970s until its complete ban in 1996. The National Health and Nutrition and Examination Survey (NHANES) found that the two most significant risk factors for lead exposure are older housing and living in poverty. In homes with lead-based paint, the risk can be minimized if the paint is well maintained (no chipping or peeling) and renovations are properly managed. Other sources of lead exposure include drinking water from lead pipes, participating in hobbies that use lead materials (i.e., pottery, stained glass, hunting, fishing), lead in spices, toys and pottery and occupational exposure in lead-intensive industries such as home remodeling and automobile battery recycling.

Lead is toxic to people of all ages, but young children are the most susceptible to exposure. The normal behaviors of children under 3 years of age - crawling, exploring and putting objects in their mouths - put them in contact with lead in their environment. Children also absorb more lead into their bones when exposed than do adults. Lead poisoning has neurological effects that are most damaging when the brain is developing rapidly in early childhood. It can cause potentially permanent learning and behavior disorders. Before lead was restricted, 88% of preschool children in the United States had blood lead levels high enough to potentially cause serious health effects. Today, children in at least 4 million U.S. households are exposed to high levels of lead. There are approximately half a million U.S. children ages 1-5 with blood lead levels about 5

micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), the level at which the Centers for Disease Control and Prevention (CDC) recommends action be initiated.

### **About the Measures**

Measures of childhood lead poisoning were developed following the CDC Standards of Nationally Consistent Data and Measures (NCDMs) within the Environmental Public Health Tracking Network. The purpose of NCDMs is to ensure compatibility and comparability of data and measures across and within states, and for the US. They allow for consistency in data use, quality, and interpretation. Applying common data standards makes it possible to find associations and explore trends that may be present in the data, which is useful for better understanding the impact of our environment on our health.

**Blood Lead Levels by Birth Cohort:** Children less than 3 years of age

**Annual Blood Lead Levels:** Stratified into children 1) less than 3 years of age, 2) aged at least 3 years but less than 6 years of age, 3) less than 6 years of age.

For both blood lead levels by birth cohort and annual blood lead levels measures, data reported are:

1. Total number and percent of children tested by state and parish
2. Number and percent of tests where blood lead levels were between 5 and 10  $\mu\text{g}/\text{dL}$  (micrograms per deciliter) by state and parish
3. Number and percent of confirmed tests where blood lead levels were higher than 10  $\mu\text{g}/\text{dL}$ ; these elevated measures are shown by state and parish.
4. Number and percent of confirmed tests where lead levels were higher than 10  $\mu\text{g}/\text{dL}$  by blood lead level category (10 - < 15  $\mu\text{g}/\text{dL}$ , 15 - < 20  $\mu\text{g}/\text{dL}$ , etc.); these measures are shown by state.

The current blood lead reference level is 5  $\mu\text{g}/\text{dL}$ , based on National Health and Nutrition Examination Survey (NHANES) 2007-2008 and 2009-2010 data published in the Fourth National Report on Human Exposure to Environmental Chemicals, and updated in 2012.

### **Geocoded Data procedure**

Please click [here](#)

### **Data Considerations**

- The preliminary data is from 2011 to 2017.
- For the blood lead levels by birth cohort measures: the denominator for the percent of children tested is the total number of live births by parish and state. The number of children born in a given year has not been adjusted for those who have moved in or out of the area since birth. Therefore, it may under or overestimate the number of children in the area in any given year.

- For the percent of children tested by age groups by parish and state in the annual blood lead levels measures: The 2002-2009 denominator is the bridged-race intercensal population estimates for those years. The 2010-2017 denominator is the postcensal population estimates for those years.
- For both blood lead levels by birth cohort and annual blood lead levels measures, the denominator for the percentage of tests with a particular level of lead in the blood is the total number of children tested.
- For both measures, the records with non-Louisiana resident or no geocode result were not included in the measures. Some of the records were lacking age in months of child at time of test; these records will be recorded as “unknown age”.
- Non-zero counts less than five are suppressed (excluding number of children tested, which is not suppressed). Suppressed values are not shown in tables; they are indicated with an asterisk (\*).
- The LHHCLPPP has operated the Childhood Blood Lead Surveillance System (CBLSS) since July 2003. The number of records in 2002 were less than in other years and records were not presented for all of the 65 parishes in Louisiana.
- In Louisiana, targeted blood lead screening occurred before year 2009 and screening tests were conducted at 1 year of age and again at 2 years of age, regardless of initial blood lead levels. Currently, children under 3 are recognized to be most at risk. Age of screening can range from 6 months to 6 years.
- The universal screening rule was passed in December 2008 to mandate blood lead testing in children 6 years of age in all parishes (64 parishes).
- Before year 2012 all health providers were required to report blood lead levels that were 10 µg/dL within 24 business hours (instead of 48 hours).
- Children with blood lead levels  $\geq 5$  µg/dL are selected based on confirmatory results. Beginning in 2012, Louisiana began requiring reporting of elevated blood lead levels of at least 5 µg/dL but less than 10 µg/dL to be classified as confirmed or unconfirmed; therefore, data before 2012 may have a larger number of counts in the unconfirmed status than in the confirmed status. Blood lead tests are confirmed by either one venous test, two capillary tests and/ or two tests of unknown type collected at least 1 day but less than 12 weeks apart.
- Issues may be caused by the quality of the data collection process at the individual level, including records with missing or invalid test results recorded as  $< 3.3$  µg/dL; lack of information when the quantity of blood drawn was insufficient for analysis or the sample clotted; lack of provider information in the HHLPSS data; or any information entered incorrectly or codes incorrectly assigned in the data.
- Unique ID numbers were not available in the childhood lead data, which contained five datasets. Each tested child was assigned a unique ID number based on child’s first name, last name, date of birth in the HHLPSS, Tamarac, Excel and Hold patient data, then using the state ID and child’s date of birth to match the same child in the previous, HHLPSS, Tamarac, Excel and Hold patient data. Complete information is not available for all children tested; child’s

name, date of birth, addresses, gender, race, and so on may not be listed in the data, or information or codes may be entered incorrectly. Any incorrect or missing information could result in over- or underestimates in assigning the unique ID numbers for each child.

- Complete residential addresses are not available for all children tested. Some of the addresses of the providers or another address from a different source may be listed as the child's address. As a result, the number of children in the area in any given year may be under- or overestimated. Also, if the algorithms identify empty fields in the parish field, then the aforementioned fields are populated with the appropriate parish level data only if the records include municipal level data such as city/ town or contain zip code data. If the records lack municipal level data or zip code data that can be cross referenced to assign the appropriate parish then these records are recorded as "no geocode".
- Residential addresses are not available for all children tested. Therefore, the records may be assigned to inappropriate parish, including those lacking address information such as a missing street address, only a post office (PO) Box address, or the address from the provider. The records assigned to a parish based only by zip code may be inaccurate because some zip codes cross parish boundaries. Any misclassification could result in over or underestimation of number and percent of children tested in the parishes.
- Because assessment and testing practices vary widely across the state and over time, these measures cannot be interpreted as being representative of the general population in a county or the state. Even when parish of residence at the time of testing is known, it may not correspond to where the exposure occurred. Comparisons with other states must be made with extreme caution because, in addition to these limitations, some states require all children to be tested while others only require "at-risk" children to be targeted for testing.
- The analysis uses the child's parish of residence at the time of the test, which may be different from the parish where the child was exposed to lead.
- Parishes are not homogenous with respect to the distribution of lead hazards or risk factors for lead exposure.
- Number and percent of blood lead levels cannot be interpreted as prevalence or incidence for the population.
- Comparisons with other states must be made with extreme caution and require additional information about the states' testing practices, confirmatory testing practices, and reporting laws.
- The measures of elevated blood lead levels include only confirmed tests (either one elevated venous test, two elevated capillary tests, or two tests of unknown type less than 12 weeks apart). The capillary test is subject to contamination, which can result in a false positive, so the number and percent of elevated blood lead levels may be overestimated when non-venous test results are used.
- Reporting percentages at the state and/or parish level does not enable linkage of data with environmental data.
- Reporting percentages at the state and/or parish level will not show the true burden at a more local level (i.e., neighborhood).

- Records for persons in Louisiana may not be included if the testing occurred out of state.
- Surveillance data are not randomly sampled or representative of the population.
- Vital Statistics data for the number of children born does not include children who may have moved in or out of the area since birth. Therefore, as a denominator, it may under- or over-estimate the number of children in a birth cohort.

### **Disclaimer**

Data are intended to spur further research and should be used only as a starting point to understanding how the environment and other contributing factors may be connected to disease. Datasets presented on this site are intended to answer some basic questions, but should ultimately lead to further inquiry and more detailed study.

Data limitations should be noted if conducting exploratory ecological studies with these data. Limitations may include data gaps, reporting discrepancies (for example, a disruption of reporting or instrument recording following hurricanes) and insufficient data on all potentially confounding factors. There are numerous additional factors which may contribute to disease onset. These include genetics, access to health care, existing health conditions, medicines, other chemical substances we come into contact with or ingest, nutrition, route and duration of exposure, level of activity, level of stress, and many others.

Responsible use of this data therefore requires exercising caution when drawing conclusions based solely on views of the limited available data. Any perceived relationship, trend, or pattern apparent in the data should not be interpreted to imply causation; may in fact be unrelated; and should be regarded as preliminary, and potentially erroneous, until more in-depth study and, if applicable, statistical evaluation, can be applied. The LDH Bureau of Health Informatics and Environmental Public Health Tracking Program cannot guarantee the completeness of the information contained in these datasets and expressly disclaims liability for errors and omissions in their content.

### **Data Sources**

Louisiana Department of Health- LA Healthy Homes and Childhood Lead Poisoning Prevention Program (LHHCLPPP)  
<http://ldh.la.gov/index.cfm/page/466>

Louisiana Department of Health- State Registrar and Vital Records  
<http://ldh.la.gov/index.cfm/subhome/21>

Louisiana Department of Health-Bureau of Family Health  
<http://ldh.la.gov/index.cfm/subhome/45>

Louisiana Department of Health-Bureau of Health Informatics  
<http://ldh.la.gov/index.cfm/subhome/46>

U.S. Census Bureau – Vintage Bridged-Race Postcensal Population Estimates  
[https://www.cdc.gov/nchs/nvss/bridged\\_race/data\\_documentation.htm](https://www.cdc.gov/nchs/nvss/bridged_race/data_documentation.htm)

### **Additional Information**

Agency for Toxic Substances and Disease Registry – Lead  
[https://www.atsdr.cdc.gov/sites/toxzine/lead\\_toxzine.html](https://www.atsdr.cdc.gov/sites/toxzine/lead_toxzine.html)

Centers for Disease Control and Prevention – Childhood Lead Poisoning Prevention Program  
<https://www.cdc.gov/nceh/lead/default.htm>

Environmental Protection Agency – Lead  
<https://www.epa.gov/lead>

Louisiana Department of Health- LA Healthy Homes and Childhood Lead Poisoning Prevention Program (LHHCLPPP)  
<http://ldh.la.gov/index.cfm/page/466>

### **Questions**

- Email: [tracking@la.gov](mailto:tracking@la.gov)