



# California's Progress in Preventing and Managing Childhood Lead Exposure

California Department of Public Health

Childhood Lead Poisoning Prevention Branch  
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## Executive Summary

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The California Department of Public Health's (CDPH) Childhood Lead Poisoning Prevention (CLPP) Program was established in 1986 to prevent environmental exposures to lead and identify and care for children with elevated blood lead levels (BLLs). The CLPP Program, consisting of the CDPH's CLPP Branch (CLPPB) in partnership with local childhood lead poisoning prevention programs (CLPPPs), carries out prevention activities including outreach, education, and surveillance; promotes lead screening for children at risk for lead exposure; and provides case management and follow-up for children with elevated BLLs.

This report provides an update on California's progress in preventing and managing childhood lead exposure.

### Key findings

- Twenty-eight percent fewer children under the age of six were tested in 2020 (n = 340,516) compared to 2019 (n = 473,396) due to the COVID-19 pandemic. Among the children tested under the age of six, the percentage of children with elevated BLLs was consistent with prior years (1.2 percent). CDPH took actions to pivot from the traditional in-person home visits to tele-visits and remote environmental assessment. In 2020, 84 percent of children (216 out of 257) receiving full case management received a home visit from a public health nurse (PHN), compared to 94 percent (396 out of 422) in 2019.
- Rates of childhood lead poisoning vary widely across the state of California. In 2020, the percentage of tested children under 6 years old with elevated BLLs ranged from 4.35 percent in Humboldt County, to 0.47 percent in Riverside County. In five out of 42 jurisdictions, more than 2.5 percent of the children tested had elevated BLLs (communities where more than 2.5% of children have elevated BLLs have a higher prevalence of childhood lead poisoning than the nation as a whole).
- Environmental lead hazards are pervasive throughout the state of California. CDPH developed geographic risk indicators and found that 99.2 percent of California's ZIP codes could be defined as being "at risk" for childhood lead exposure, supporting the development of expanded blood lead testing requirements. In addition, mapping the gradation of geographic risk can inform decisions on where to target interventions when resources are scarce.
- The Lead-Related Construction program launched an online certification application system which reduced application processing time from 60 days to one day on average. CDPH processed 9,000 applications in 2020, a 50 percent increase over 2019.
- CDPH and the Department of Health Care Services (DHCS) partnered to combine data from both departments' databases and identify Medi-Cal beneficiaries found in both

data sets in order to obtain a more accurate estimate of blood lead screening rates among children under the age of six receiving Medi-Cal services. In response to California State Audit [2019-105](#), DHCS produced the [Addendum to the 2020 Preventive Services Report](#) which contains DHCS-calculated blood lead testing rates for children under age six meeting Medi-Cal managed care enrollment criteria for the year 2019 using blood lead data from CDPH and encounter data from DHCS. Close to 90 percent of all children receiving health care through Medi-Cal are enrolled in a managed care plan. Therefore, DHCS incorporated reporting and quality improvement activities for blood lead screening into its existing quality improvement processes. DHCS works closely with its contracted managed care plans to share data, establish performance standards, and drive targeted improvement for plans in areas where blood lead screening rates are low.

- From January 1, 2019, through December 31, 2020:
  - a) The CLPP Program conducted provider outreach through approximately 2,370 office visits and presentations.
  - b) 1,400 retesting reminder letters were sent to health care providers throughout the state for children with BLLs  $\geq$  4.5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) identified from January through June 2020 as not receiving indicated follow-up testing.
  - c) Approximately 9,010 community outreach activities were conducted, reaching an estimated 380,780 families and individuals.
  - d) The CLPP Program provided training to an estimated 22,480 childcare providers and the families they serve through targeted lead-related training and education outreach activities.

Despite the COVID-19 pandemic, the CLPP Program was able to sustain activities geared toward achieving its vision of a healthy, lead-safe environment where all children can achieve their full potential. Progress continues to be made in both identifying and treating children with elevated BLLs and reducing exposures to lead. The CLPP Program's development of a new strategic plan and renewed focus on health equity sets a path for substantial programmatic improvements for years to come.

"The California Department of Public Health made significant progress in improving childhood lead poisoning prevention over the past two years. The Childhood Lead Poisoning Prevention Program, in partnership with local health jurisdictions and key stakeholders, is developing a strategic plan to focus on primary prevention, robust case management, and improved health equity outcomes across the state moving forward."

Tomás J. Aragón, MD, DrPH  
Director and State Public Health Officer  
California Department of Public Health

## Introduction

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When California's Childhood Lead Poisoning Prevention (CLPP) Program was established in 1986, lead exposure represented the most significant childhood environmental health problem in the state. Since then, the average blood lead level (BLL) in children has decreased significantly. Between 2010 and 2020, among California children under the age of six years old tested for lead, the percentage with elevated BLLs ( $\geq 4.5$   $\mu\text{g}/\text{dL}$ ) dropped by more than half, from 3.24 percent to 1.21 percent. At the same time, new information on negative health effects in children at progressively lower levels of lead exposure has led to a decrease in the threshold for BLLs considered to be elevated by the United States Centers for Disease Control and Prevention (CDC).<sup>1</sup>

Young children are considered most at risk for lead exposure because they have hand-to-mouth behaviors that introduce lead into the gastrointestinal tract where it is absorbed, and because their nervous systems and other organs are still developing.<sup>2,3</sup> Lead exposure causes a wide range of problems and can result in lifelong damaging effects.<sup>2,4</sup> At very high levels of exposure, lead can cause seizures, coma, and death.<sup>2,3</sup> Lower levels of lead affect the nervous system and cause lowered intelligence and learning deficits.<sup>4,5</sup> Lead can also affect the kidneys, decrease growth, decrease hearing acuity, cause anemia (low red blood count), and delay sexual maturation.<sup>2,6,7</sup> Prenatal and postnatal increased BLLs have been significantly associated with self-reported frequencies of antisocial and delinquent behaviors in adolescents.<sup>8</sup> Increased levels of bone lead have been associated with an increased risk for adolescent arrest and adjudication.<sup>9</sup> Lead compounds are also considered probable human carcinogens.<sup>10</sup>

In addition, lead poisoning does not impact all children equally. Children living in poverty, children enrolled in Medicaid, children living in older housing, and African American children, are found to have higher levels of lead exposure. Geographic disparities are also present: the percentage of tested children with elevated BLLs varies widely by jurisdiction. In 2020, the percentage of children tested with an elevated BLL ranged from 4.35 percent in Humboldt County, to 0.47 percent in Riverside County.

Thus, while considerable progress has been made in reducing lead exposure and decreasing the prevalence of children with elevated BLLs in the United States, elevated childhood BLLs remain a major preventable environmental health problem.<sup>2,3</sup> Preventing all childhood lead exposure in California would contribute an estimated additional \$8-11 billion in lifetime earnings for all children born in a single year.<sup>11</sup>

The CLPP Program is managed by the CLPP Branch (CLPPB) within the California Department of Public Health's (CDPH) Center for Healthy Communities. CLPPB partners with 49 contracted local childhood lead poisoning prevention programs (CLPPPs) across the state to provide prevention activities including outreach and education, surveillance, promote lead screening for all children at risk for lead exposure, and provide case management and follow-up for children identified with elevated BLLs. The purpose of this report is to provide an update on the status of childhood lead poisoning prevention in California. Chapter 1 of this report presents program progress through eight key indicators ranging from screening rates to maps of geographic risk to case management services. Chapter 2 provides an update on the program's activities on our commitments to strengthen the program. Chapter 3 looks to the future with a discussion of the state of childhood lead poisoning in California with an overview of the CLPP Program's new Strategic Plan. Appendix A provides CLPPB's legislative and regulatory background, including reporting mandates, and Appendix B describes the program's structure. Appendix C presents key terms and definitions used throughout the report, and Appendix D provides the number of children tested for lead by local health jurisdiction in 2020.

## Chapter 1: Key Data

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### 1) Universal Laboratory Reporting of Blood Lead Level Tests

Over 600,000 blood lead tests (involving over 500,000 individual children) are reported to CDPH each year by over 400 laboratories. Test results are stored in CDPH's web-based Response and Surveillance System for Childhood Lead Exposures (RASSCLE) data system and are accessible to CLPPPs in LHJs. Existing law requires laboratories to report patient information including name, birthdate, and address to CDPH. Enrollment in Medi-Cal or other publicly funded programs is not required to be reported to CDPH.

### 2) Rates of California Children with Elevated Blood Lead Levels

Twenty-nine percent fewer children were tested in 2020 compared to 2019 due to the COVID-19 pandemic; however, the percentage of children with elevated BLLs was relatively consistent (Table 1).

In 2019, among the 522,490 children < 21 old tested in California, 6,913 (1.32 percent) had BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$ . In 2020, among the 368,813 children < 21 years old tested, 4,930 (1.34 percent) had BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$ . Note: In California, BLLs of 5  $\mu\text{g}/\text{dL}$  (the 2012 CDC blood lead reference value) include BLLs of 4.5  $\mu\text{g}/\text{dL}$  as California rounds BLLs up to the next whole number. In 2020:

- Among children under the age of six years old, the percentage of children tested with BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$  increased slightly from 1.20 percent in 2019 to 1.21 percent.
- The percentage of tested children (< 6 years old) with elevated BLLs ( $\geq 4.5$   $\mu\text{g}/\text{dL}$ ) varied by county from 4.35 percent in Humboldt County to 0.47 percent in Riverside. Sacramento and Berkeley had the next highest rates of BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$ . (Map 1 and Table 2).
- The percentage of children (< 6 years old) with BLLs  $\geq 9.5$   $\mu\text{g}/\text{dL}$  varied from 0.66 percent in Sacramento County to 0 percent in Shasta County. Alameda County and the City of Berkeley had the next highest percentages of BLLs  $\geq 9.5$   $\mu\text{g}/\text{dL}$  (Map 2 and Table 3).
- In five out of the 42 jurisdictions that were able to be reported, more than 2.5 percent of the children tested had BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$  (communities where more than 2.5% of children have elevated BLLs have a higher prevalence of childhood lead poisoning than the nation as a whole) (Table 2).

Table 1. Number of Individual California Children Screened for Lead, by Highest Level

Year	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5% (row)	Totals
2019	Age < 6	467,693	98.80%	4,575	0.97%	1,128	0.24%	473,396
	Age 6 to < 21	47,884	97.54%	948	1.93%	262	0.53%	49,094
	Age < 21	515,577	98.68%	5,523	1.06%	1,390	0.27%	522,490
2020	Age < 6	336,386	98.79%	3,292	0.97%	838	0.25%	340,516
	Age 6 to < 21	27,497	97.17%	658	2.33%	142	0.50%	28,297
	Age < 21	363,883	98.66%	3,950	1.07%	980	0.27%	368,813

Table 1 Notes:

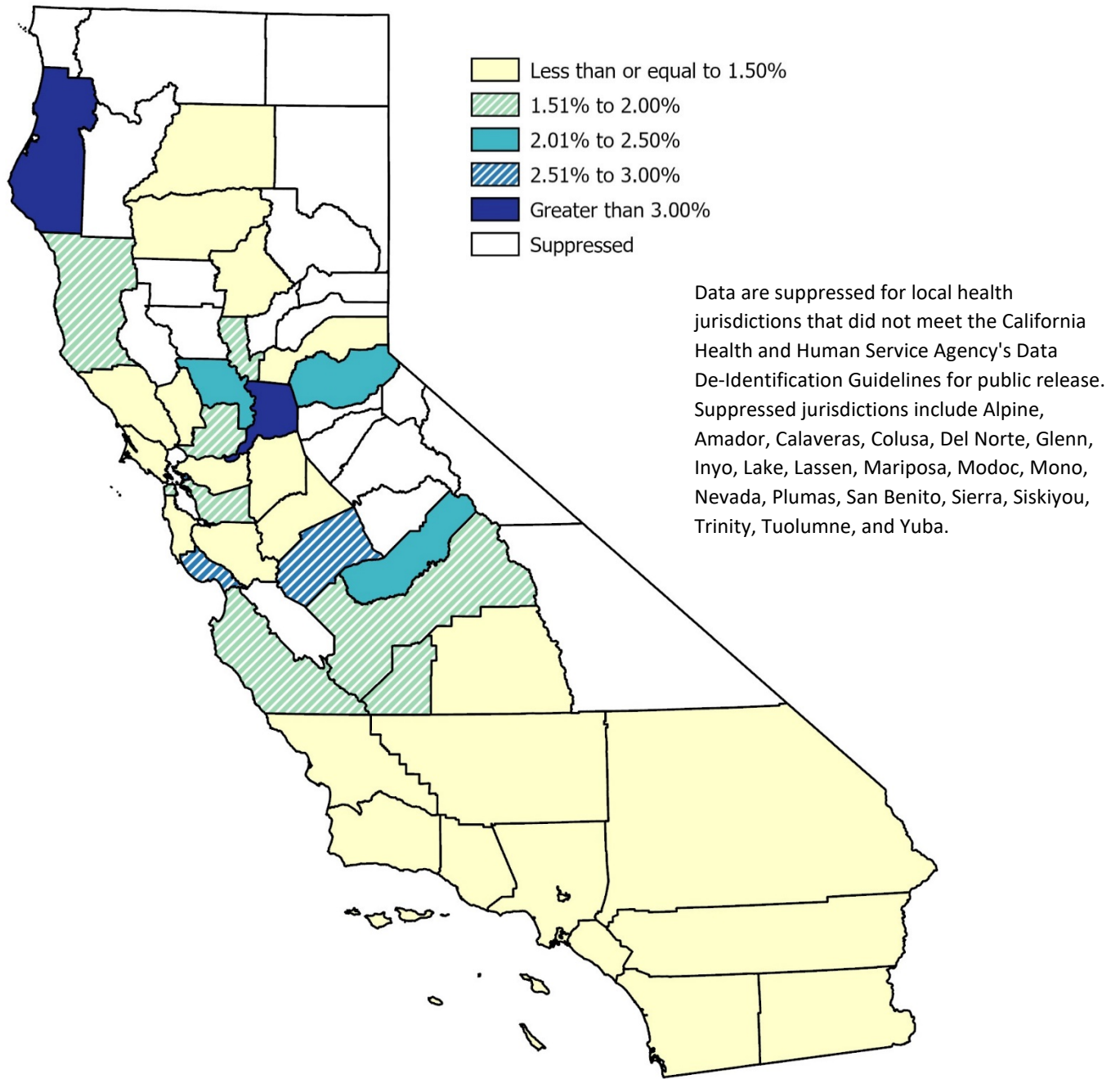
- Data for 2019 are from the RASSCLE surveillance database archive of 3/2/2021. Data for 2020 are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once per year, using their highest BLL.
- Measures are in µg/dL of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported as “< 5 µg/dL” from an analyzing laboratory that routinely reported “< 5 µg/dL” as their limit of detection in 2020 are included in the category “BLL < 4.5 µg/dL.”

Results by individual LHJs for 2020 are provided in Appendix D. It is not possible to report rates in some smaller LHJs because so few children were tested. The data are suppressed to meet the California Health and Human Services (CalHHS) Agency's Data De-Identification Guidelines (DDGs) for public release.<sup>12</sup> Aggregated data is reported for the LHJs whose individual data were suppressed (Table 2, Table 3, and Appendix D). CDPH shares all data with LHJs in a secure manner by sending quarterly and yearly blood lead test data to each jurisdiction. In addition, when a child is identified with an elevated BLL (≥ 4.5 µg/dL), CDPH refers the case directly to the LHJ as soon as the child is identified.

Maps and tables of children under 6 years old with BLLs of ≥ 4.5 µg/dL and ≥ 9.5 µg/dL for 2019 and BLLs for children of all ages (including children age 6 to < 21) by LHJ for 2019 can be found on the [CLPPB website](#). BLLs for children of all ages (including older children age 6 to < 21) are illustrated by LHJs for 2020 in Appendix D.



Figure 1. Percent of Children Under 6 Years Old with a Blood Lead Level of 4.5 µg/dL or Greater, by California Local Health Jurisdiction, 2020



Map 1 Notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2020.
- Measures are in micrograms per deciliter (µg/dL) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.

- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported as “< 5 µg/dL” from an analyzing laboratory that routinely reported “< 5 µg/dL” as their limit of detection in 2020 are included in the category “BLL < 4.5 µg/dL”.
- Patient jurisdiction is determined by geocoding the address associated with the child’s highest BLL using Esri’s StreetMap Premium North America locator.
- Data are suppressed for local health jurisdictions that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency’s Data De-Identification Guidelines for public release. Therefore, not all jurisdictions are shown in this map.
- Refer to Table 2 for data.

Table 2. California Local Health Jurisdictions, by Percent of Children Under 6 Years Old with a Blood Lead Level of 4.5 µg/dL or Greater, 2020

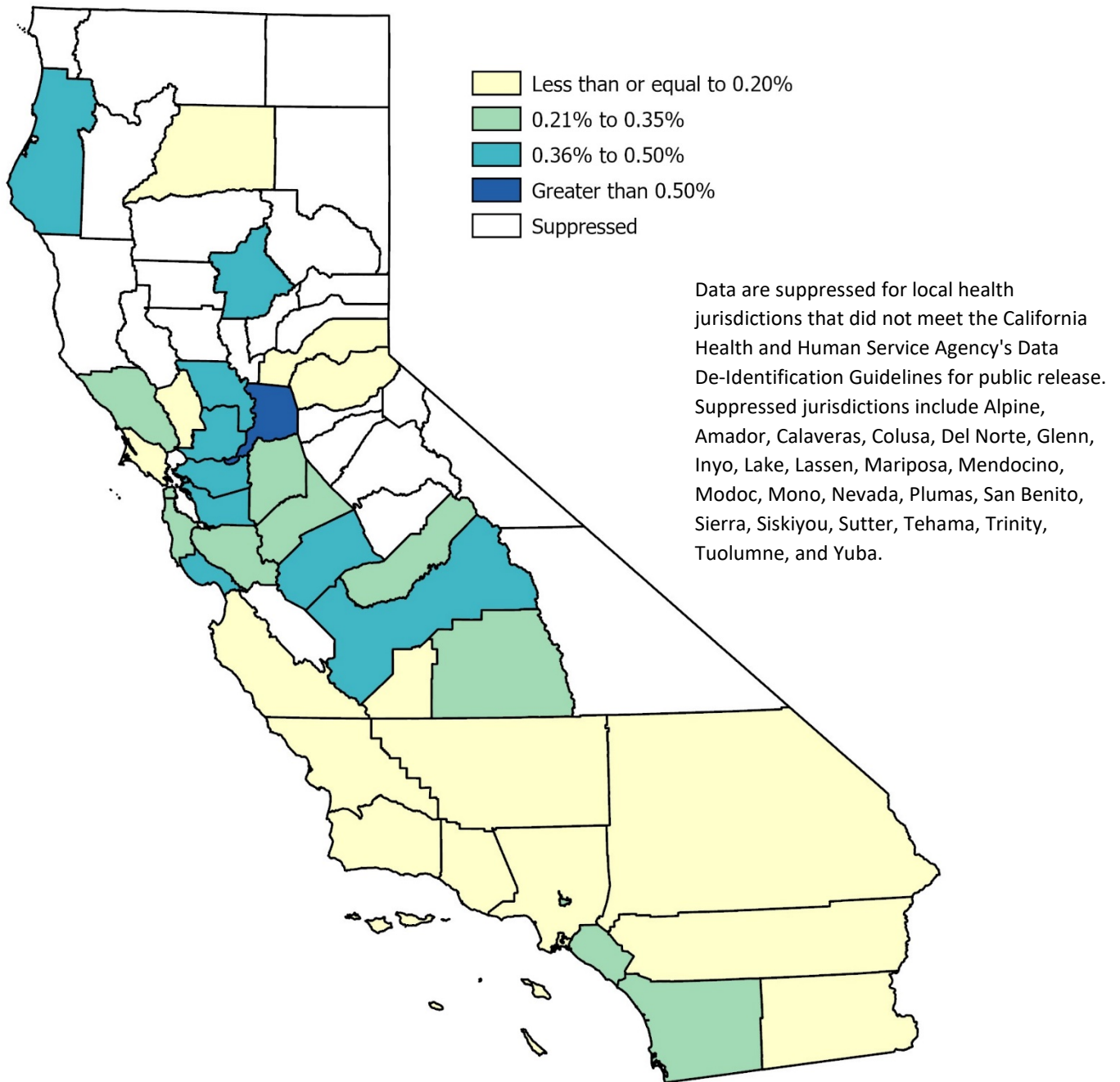
Local Health Jurisdiction	BLL < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 n	BLL ≥ 4.5 % (row)	Totals
Humboldt	1,629	95.65%	74	4.35%	1,703
Sacramento	11,684	96.91%	373	3.09%	12,057
Berkeley	396	97.06%	12	2.94%	408
Merced	2,606	97.38%	70	2.62%	2,676
Santa Cruz	1,680	97.39%	45	2.61%	1,725
Madera	3,341	97.63%	81	2.37%	3,422
El Dorado	420	97.67%	10	2.33%	430
Suppressed Jurisdictions	4,391	97.77%	100	2.23%	4,491
Yolo	1,639	97.91%	35	2.09%	1,674
Sutter	1,041	98.11%	20	1.89%	1,061
Fresno	11,785	98.13%	225	1.87%	12,010
Solano	3,522	98.16%	66	1.84%	3,588
Alameda	11,733	98.17%	219	1.83%	11,952
Kings	1,283	98.24%	23	1.76%	1,306
Mendocino	985	98.30%	17	1.70%	1,002
San Francisco	6,479	98.41%	105	1.59%	6,584
Monterey	5,896	98.45%	93	1.55%	5,989
Imperial	2,945	98.53%	44	1.47%	2,989
Butte	1,642	98.56%	24	1.44%	1,666
Tulare	4,521	98.56%	66	1.44%	4,587
Contra Costa	5,243	98.57%	76	1.43%	5,319
Pasadena	927	98.62%	13	1.38%	940
San Luis Obispo	1,054	98.69%	14	1.31%	1,068
San Joaquin	8,524	98.84%	100	1.16%	8,624
San Mateo	4,773	98.86%	55	1.14%	4,828

Local Health Jurisdiction	BLL < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 n	BLL ≥ 4.5 % (row)	Totals
Kern	12,623	98.87%	144	1.13%	12,767
Santa Clara	13,900	98.88%	158	1.12%	14,058
Orange	23,019	98.97%	240	1.03%	23,259
Placer	1,156	98.97%	12	1.03%	1,168
San Diego	31,402	98.97%	326	1.03%	31,728
Los Angeles	81,353	99.01%	811	0.99%	82,164
Shasta	416	99.05%	4	0.95%	420
Santa Barbara	4,765	99.13%	42	0.87%	4,807
Sonoma	1,596	99.13%	14	0.87%	1,610
Stanislaus	4,771	99.13%	42	0.87%	4,813
Tehama	1,066	99.16%	9	0.84%	1,075
San Bernardino	20,871	99.20%	168	0.80%	21,039
Marin	1,445	99.24%	11	0.76%	1,456
Napa	781	99.36%	5	0.64%	786
Long Beach	3,674	99.38%	23	0.62%	3,697
Ventura	7,618	99.49%	39	0.51%	7,657
Riverside	25,790	99.53%	122	0.47%	25,912
Tests with unknown jurisdictions	1	100.00%	0	0.00%	1
California Totals	336,386	98.79%	4,130	1.21%	340,516

Table 2 Notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2020.
- Measures are in micrograms per deciliter (µg/dL) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported as “< 5 µg/dL” from an analyzing laboratory that routinely reported “< 5 µg/dL” as their limit of detection in 2020 are included in the category “BLL < 4.5 µg/dL.”
- Patient jurisdiction is determined by geocoding the address associated with the child’s highest BLL using Esri’s StreetMap Premium North America locator.
- Data are suppressed for local health jurisdictions that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency’s Data De-Identification Guidelines for public release. Therefore, not all jurisdictions are shown in this table. Suppressed jurisdictions include Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lake, Lassen, Mariposa, Modoc, Mono, Nevada, Plumas, San Benito, Sierra, Siskiyou, Trinity, Tuolumne, and Yuba.

Figure 2. Percent of Children Under 6 Years Old with a Blood Lead Level of 9.5  $\mu\text{g}/\text{dL}$  or Greater, by California Local Health Jurisdiction, 2020



Map 2 notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2020.
- Measures are in micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.

- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Patient jurisdiction is determined by geocoding the address associated with the child’s highest BLL using Esri’s StreetMap Premium North America locator.
- Data are suppressed for jurisdictions that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency’s Data De-Identification Guidelines for public release. Therefore, not all jurisdictions are shown in this map.
- Refer to Table 3 for data table.

Table 3. California Local Health Jurisdictions, by Percent of Children Under 6 Years Old with a Blood Lead Level of 9.5 µg/dL or Greater, 2020

Local Health Jurisdiction	BLL < 9.5 n	BLL < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
Sacramento	11,978	99.34%	79	0.66%	12,057
Alameda	11,894	99.51%	58	0.49%	11,952
Berkeley	406	99.51%	2	0.49%	408
Merced	2,663	99.51%	13	0.49%	2,676
Butte	1,658	99.52%	8	0.48%	1,666
Contra Costa	5,294	99.53%	25	0.47%	5,319
Humboldt	1,695	99.53%	8	0.47%	1,703
Solano	3,573	99.58%	15	0.42%	3,588
Yolo	1,667	99.58%	7	0.42%	1,674
Santa Cruz	1,718	99.59%	7	0.41%	1,725
Fresno	11,967	99.64%	43	0.36%	12,010
Madera	3,411	99.68%	11	0.32%	3,422
Pasadena	937	99.68%	3	0.32%	940
Suppressed Jurisdictions	7,605	99.69%	24	0.31%	7,629
San Joaquin	8,597	99.69%	27	0.31%	8,624
Tulare	4,573	99.69%	14	0.31%	4,587
Santa Clara	14,016	99.70%	42	0.30%	14,058
San Francisco	6,567	99.74%	17	0.26%	6,584
San Mateo	4,816	99.75%	12	0.25%	4,828
Sonoma	1,606	99.75%	4	0.25%	1,610
Stanislaus	4,801	99.75%	12	0.25%	4,813
Orange	23,204	99.76%	55	0.24%	23,259
San Diego	31,659	99.78%	69	0.22%	31,728
Los Angeles	81,997	99.80%	167	0.20%	82,164
Monterey	5,977	99.80%	12	0.20%	5,989
San Luis Obispo	1,066	99.81%	2	0.19%	1,068
Santa Barbara	4,798	99.81%	9	0.19%	4,807

Local Health Jurisdiction	BLL < 9.5 n	BLL < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
Imperial	2,984	99.83%	5	0.17%	2,989
Placer	1,166	99.83%	2	0.17%	1,168
Kern	12,746	99.84%	21	0.16%	12,767
Long Beach	3,691	99.84%	6	0.16%	3,697
Kings	1,304	99.85%	2	0.15%	1,306
San Bernardino	21,013	99.88%	26	0.12%	21,039
Riverside	25,889	99.91%	23	0.09%	25,912
Ventura	7,650	99.91%	7	0.09%	7,657
Marin	1,455	99.93%	1	0.07%	1,456
El Dorado	430	100.00%	0	0.00%	430
Napa	786	100.00%	0	0.00%	786
Shasta	420	100.00%	0	0.00%	420
Tests with unknown jurisdictions	1	100.00%	0	0.00%	1
California Totals	339,678	99.75%	838	0.25%	340,516

Table 3 Notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2020.
- Measures are in micrograms per deciliter (µg/dL) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Patient jurisdiction is determined by geocoding the address associated with the child's highest BLL using Esri's StreetMap Premium North America locator.
- Data are suppressed for local health jurisdictions that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency's Data De-Identification Guidelines for public release. Therefore, not all jurisdictions are shown in this table. Suppressed jurisdictions include Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lake, Lassen, Mariposa, Mendocino, Modoc, Mono, Nevada, Plumas, San Benito, Sierra, Siskiyou, Sutter, Tehama, Trinity, Tuolumne, and Yuba.

### Disparities by Jurisdiction

When examining all LHJs by year, CDPH continues to see disparities by jurisdiction in the percentage of tested children with elevated BLLs (Table 4). The range in percentage of tested young children under 6 years old with BLLs ≥ 4.5 µg/dL decreased from 2019 to 2020, and the same trend is seen in for the variation in percentage of tested children with BLLs ≥ 9.5 µg/dL. However, the number of jurisdictions in which ≥ 2.5% percent of tested children had BLLs ≥ 4.5 mcg/dL increased from 2019 to 2020. Communities where more than 2.5% of children have

BLLs above the 2012 CDC reference value have a higher prevalence of childhood lead poisoning than the nation as a whole.

Table 4. Comparison of Elevated BLLs by Local Health Jurisdiction by Year

Comparisons	2019	2020
Range in percentage of tested young children (< 6 years old) with EBLLs ( $\geq 4.5 \mu\text{g/dL}$ )	0.0% - 4.74%	0.0% - 4.35%
Range in percentage of tested children with BLLs $\geq 9.5 \mu\text{g/dL}$	0.0% - 0.67%	0.0% - 0.66%
Number of jurisdictions in which $\geq 2.5\%$ of tested children had BLLs $\geq 4.5 \mu\text{g/dL}$	3 of 42 jurisdictions	5 of 42 jurisdictions

Table 4 Notes:

- Data for 2019 are from the RASSCLE surveillance database archive of 3/2/2021. Data for 2020 are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once per year, using their highest BLL.
- Measures are in  $\mu\text{g/dL}$  of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported as “ $< 5 \mu\text{g/dL}$ ” from an analyzing laboratory that routinely reported “ $< 5 \mu\text{g/dL}$ ” as their limit of detection in 2020 are included in the category “BLL  $< 4.5 \mu\text{g/dL}$ .”

### Smaller Geographic Area Analysis Unsuppressed ZIP Codes and Census Tracts, 2018

For reported BLL results for children  $< 6$  years old tested in 2020, ArcGIS geocoding software was used to assign test results to postal ZIP codes and determine the percentage of reported test results in the ZIP codes that were  $\geq 4.5 \mu\text{g/dL}$ . The CHHS DDGs were then applied to the results for each ZIP code to determine whether findings could be reported. BLL results for children  $< 6$  years old tested in 2020 were reported to CDPH from 1,504 of California’s 1,726 non-P.O. Box ZIP codes. For ZIP codes without reported results, there may be no at-risk children, no testing, or no reported results.

After applying the DDGs, data could only be reported for 58 (3.9 percent) of the 1,504 ZIP codes with reported BLLs. Data for unsuppressed ZIP codes is shown in Table 5, ranked by the percentage of reported BLLs  $\geq 4.5 \mu\text{g/dL}$ . Percentages range from 13.87 percent in ZIP code 95821 in the city of Sacramento to 0.18 percent in ZIP code 91331 in the city of Pacoima. Because the DDGs required suppression of data for 96.1 percent of California ZIP codes with reported BLLs, this publicly reportable data is of limited use for identifying geographic areas with high percentages of children with elevated BLLs. [Data for 2019 has been posted and is publicly available on the CDPH website.](#) With low testing rates in 2020 due to the COVID-19

pandemic, more ZIP codes are suppressed in 2020 compared to 2019 because there were fewer blood tests.

HSC Section 124125 mandates reporting of census tract information to the greatest extent possible. A similar analysis was conducted to determine the percentage of children (< 6 years old) in each census tract with BLLs  $\geq 4.5 \mu\text{g/dL}$ . After applying the DDGs, there was no census tract for which results could be reported.

While there are limitations on the level of detail that can be publicly reported without risking identification of individual children, state and local lead programs can use this information internally to guide programmatic decision making and to develop approaches to preventing lead exposure and identifying children with elevated BLLs.

Table 5. Percent of Children with a Blood Lead Level (BLL) of  $4.5 \mu\text{g/dL}$  or Greater, by ZIP Code, 2020

ZIP Code	Postal District Name	Number of children under 6 with a BLL of $4.5 \mu\text{g/dL}$ or greater	Percent of children under 6 with a BLL of $4.5 \mu\text{g/dL}$ or greater	Total number of children under 6 with a BLL
95821	Sacramento	101	13.87%	728
95608	Carmichael	51	9.64%	529
94536	Fremont	24	4.15%	579
94538	Fremont	23	4.01%	574
90037	Los Angeles	36	3.79%	950
95051	Santa Clara	19	3.61%	527
92021	El Cajon	30	3.08%	975
90042	Los Angeles	12	2.82%	426
93638	Madera	47	2.66%	1,769
90006	Los Angeles	18	2.62%	686
90026	Los Angeles	13	2.50%	520
95670	Rancho Cordova	11	2.44%	450
90002	Los Angeles	21	2.39%	877
95240	Lodi	12	2.39%	502
95823	Sacramento	22	2.38%	923
95035	Milpitas	16	2.38%	672
90011	Los Angeles	43	2.38%	1,809
95076	Watsonville	25	2.36%	1,059
92126	San Diego	11	2.33%	472
95350	Modesto	11	2.24%	492
90018	Los Angeles	12	2.22%	540



ZIP Code	Postal District Name	Number of children under 6 with a BLL of 4.5 µg/dL or greater	Percent of children under 6 with a BLL of 4.5 µg/dL or greater	Total number of children under 6 with a BLL
90044	Los Angeles	28	2.19%	1,276
91762	Ontario	16	2.12%	755
94110	San Francisco	14	2.11%	663
92410	San Bernardino	16	2.05%	782
92701	Santa Ana	15	1.99%	752
93436	Lompoc	13	1.97%	661
93308	Bakersfield	13	1.96%	663
92243	El Centro	13	1.82%	713
93230	Hanford	11	1.78%	618
92703	Santa Ana	17	1.77%	959
92020	El Cajon	17	1.77%	963
90063	Los Angeles	11	1.75%	627
94601	Oakland	11	1.70%	646
92804	Anaheim	16	1.65%	967
92707	Santa Ana	12	1.59%	757
92105	San Diego	17	1.57%	1,083
94533	Fairfield	12	1.50%	801
90022	Los Angeles	11	1.48%	742
94544	Hayward	13	1.47%	882
93274	Tulare	12	1.33%	899
93727	Fresno	15	1.27%	1,181
95206	Stockton	15	1.26%	1,190
91910	Chula Vista	13	1.25%	1,040
90001	Los Angeles	11	1.21%	911
90255	Huntington Park	11	1.13%	972
93906	Salinas	12	1.11%	1,082
93905	Salinas	14	1.10%	1,274
93307	Bakersfield	18	1.03%	1,752
90003	Los Angeles	12	1.00%	1,203
92113	San Diego	11	1.00%	1,103
93306	Bakersfield	11	1.00%	1,103
93458	Santa Maria	18	0.98%	1,841
90201	Bell Gardens	12	0.90%	1,326
92335	Fontana	8	0.59%	1,356
90650	Norwalk	7	0.55%	1,276

ZIP Code	Postal District Name	Number of children under 6 with a BLL of 4.5 µg/dL or greater	Percent of children under 6 with a BLL of 4.5 µg/dL or greater	Total number of children under 6 with a BLL
92336	Fontana	5	0.49%	1,016
91331	Pacoima	2	0.18%	1,115

Table 5 Notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level during 2020.
- Measures are in micrograms per deciliter (µg/dL) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positives and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting. Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported as “< 5 µg/dL” from an analyzing laboratory that routinely reported “< 5 µg/dL” as their limit of detection in 2020 are included in the category “BLL < 4.5 µg/dL.”
- Patient ZIP code is determined by geocoding patient address using Esri’s StreetMap Premium North America locator.
- Data are suppressed for ZIP codes that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency’s Data De-Identification Guidelines for public release. Therefore, not all ZIP codes are shown in this table.

### 3) Targeted Screening to Identify Children with Lead Exposure: Screening of Medi-Cal Population

CDPH and DHCS continue to collaborate in assessing screening rates of children who are enrolled in Medi-Cal. In 2020, CLPPB and DHCS partnered to combine data from both departments’ databases and identify Medi-Cal beneficiaries found in both data sets to obtain a more accurate estimate of blood lead screening rates among children under the age of 6 receiving Medi-Cal services. The DHCS [Addendum to the 2020 Preventive Services Report](#) contains DHCS-calculated blood lead testing rates for children who were under age 6 in 2019 and had been enrolled in a Medi-Cal managed care plan for 11 of 12 months during the measurement period using blood lead data from CDPH and encounter data from DHCS (Table 6).

Table 6. Department of Health Care Services Calculated Blood Lead Screening Measures for Managed Care Medi-Cal Children in 2019 by Race/Ethnicity, Primary Language, Gender, Delivery Type Model, Population Density, and County <sup>1</sup>

Stratification	Blood Lead Screening:12 Months of Age <sup>2</sup>	Blood Lead Screening: 24 Months of Age <sup>3</sup>	Two Tests by 24 Months of Age <sup>4</sup>	Catch Up Test by 6 Years of Age <sup>5</sup>	Lead Screening in Children <sup>6</sup>
Statewide Aggregate	53.25%	43.40%	30.51%	36.99%	60.81%
<b>Race/Ethnicity</b>					
American Indian or Alaska Native	40.31%	33.40%	20.50%	31.12%	52.22%
Asian	60.36%	46.43%	34.98%	44.58%	68.14%
Black or African American	35.12%	29.23%	15.26%	35.20%	44.68%
Hispanic or Latino	58.84%	48.79%	35.53%	41.86%	66.68%
Native Hawaiian or Other Pacific Islander	43.22%	28.27%	15.81%	28.85%	51.60%
White	43.72%	33.61%	21.31%	24.64%	48.73%
Other	50.19%	39.91%	27.28%	38.48%	56.62%
Unknown/Missing	47.69%	38.13%	25.41%	32.43%	55.14%
<b>Primary language</b>					
Arabic	69.51%	52.73%	40.09%	67.70%	73.59%
Armenian	54.21%	39.16%	28.57%	30.94%	63.76%
Cambodian	59.72%	51.52%	32.76%	48.78%	62.50%
Chinese	76.16%	59.83%	51.16%	57.23%	79.44%
English	47.83%	38.18%	24.72%	33.16%	55.32%
Farsi	60.65%	47.60%	30.72%	69.30%	71.04%
Hmong	62.92%	47.08%	32.34%	49.56%	65.23%
Korean	52.32%	32.86%	24.37%	25.00%	58.48%
Russian	44.96%	33.02%	19.41%	36.80%	50.71%
Spanish	68.24%	57.64%	45.74%	47.92%	75.39%
Tagalog	59.42%	46.67%	38.67%	52.00%	71.95%
Vietnamese	61.97%	45.81%	35.44%	63.13%	72.18%
Other	59.38%	49.30%	33.44%	65.81%	68.42%
Unknown/Missing	46.88%	25.32%	14.17%	15.07%	42.38%
<b>Gender</b>					
Female	53.32%	43.31%	30.52%	37.02%	60.97%

Stratification	Blood Lead Screening:12 Months of Age <sup>2</sup>	Blood Lead Screening: 24 Months of Age <sup>3</sup>	Two Tests by 24 Months of Age <sup>4</sup>	Catch Up Test by 6 Years of Age <sup>5</sup>	Lead Screening in Children <sup>6</sup>
Male	53.19%	43.49%	30.50%	36.95%	60.65%
<b>Delivery Type Model</b>					
County Organized Health Systems	58.86%	49.61%	38.82%	28.67%	64.12%
Geographic Managed Care	51.20%	41.66%	28.05%	41.28%	58.78%
Two-Plan (Local Initiative or Commercial Plan)	51.98%	41.92%	28.45%	39.84%	60.52%
Regional	43.86%	33.60%	20.66%	18.80%	45.99%
<b>Population Density</b>					
Rural	54.69%	45.41%	32.78%	29.46%	60.25%
Urban	53.08%	43.08%	30.14%	38.54%	61.02%
<b>County</b>					
Alameda	50.82%	39.88%	28.06%	33.23%	59.32%
Alpine	NA	NA	NA	NA	NA
Amador	45.74%	44.09%	37.27%	19.64%	66.15%
Butte	50.88%	41.25%	28.13%	14.86%	52.05%
Calaveras	43.03%	27.50%	19.10%	11.20%	38.50%
Colusa	57.87%	52.63%	36.55%	22.92%	70.44%
Contra Costa	44.30%	27.69%	17.68%	25.71%	53.63%
Del Norte	44.63%	29.03%	15.20%	20.69%	53.19%
El Dorado	24.29%	15.77%	7.93%	15.22%	28.11%
Fresno	52.55%	47.75%	30.92%	37.37%	60.88%
Glenn	71.25%	56.33%	44.83%	36.56%	72.24%
Humboldt	72.07%	57.82%	46.01%	38.74%	76.32%
Imperial	76.27%	67.99%	58.38%	47.27%	81.55%
Inyo	13.13%	12.82%	0.00%	17.39%	S
Kern	59.23%	46.41%	35.61%	50.30%	69.64%
Kings	64.65%	48.29%	35.62%	45.37%	71.26%
Lake	24.42%	24.25%	15.47%	32.60%	40.93%
Lassen	44.52%	17.61%	S	30.91%	37.23%
Los Angeles	54.06%	43.41%	29.71%	40.96%	62.59%
Madera	71.37%	66.11%	56.35%	31.54%	77.19%
Marin	73.97%	64.01%	56.50%	41.82%	76.56%
Mariposa	25.29%	20.99%	S	S	26.25%

Stratification	Blood Lead Screening:12 Months of Age <sup>2</sup>	Blood Lead Screening: 24 Months of Age <sup>3</sup>	Two Tests by 24 Months of Age <sup>4</sup>	Catch Up Test by 6 Years of Age <sup>5</sup>	Lead Screening in Children <sup>6</sup>
Mendocino	65.52%	59.57%	47.01%	31.31%	69.52%
Merced	49.17%	41.32%	26.02%	30.90%	53.99%
Modoc	38.18%	22.03%	S	NA	36.36%
Mono	S	S	0.00%	S	0.00%
Monterey	78.74%	66.55%	57.45%	24.34%	79.76%
Napa	51.00%	44.53%	21.50%	27.36%	54.51%
Nevada	38.37%	32.48%	10.06%	11.18%	31.70%
Orange	61.72%	54.57%	44.69%	30.60%	70.50%
Placer	30.73%	21.50%	9.28%	14.31%	29.14%
Plumas	12.77%	10.81%	S	22.97%	14.29%
Riverside	45.37%	35.76%	21.79%	44.54%	52.56%
Sacramento	36.48%	28.76%	14.47%	36.83%	43.94%
San Benito	62.17%	47.09%	35.47%	27.16%	71.81%
San Bernardino	46.73%	37.84%	23.32%	40.85%	55.23%
San Diego	62.16%	51.03%	38.12%	45.37%	69.55%
San Francisco	69.41%	55.84%	47.40%	38.86%	74.78%
San Joaquin	43.31%	34.80%	21.07%	36.86%	54.92%
San Luis Obispo	46.65%	38.49%	27.90%	11.89%	48.86%
San Mateo	67.00%	56.07%	48.11%	27.71%	72.67%
Santa Barbara	61.73%	51.44%	38.88%	26.06%	61.54%
Santa Clara	54.82%	43.25%	29.68%	40.02%	61.64%
Santa Cruz	73.28%	67.24%	61.81%	23.47%	75.60%
Shasta	15.95%	13.58%	4.13%	15.51%	18.33%
Sierra	NA	NA	NA	NA	NA
Siskiyou	18.84%	12.06%	S	10.16%	18.02%
Solano	47.33%	32.32%	17.78%	31.67%	49.81%
Sonoma	35.40%	27.31%	15.88%	31.37%	44.72%
Stanislaus	36.74%	30.18%	17.47%	34.52%	48.66%
Sutter	48.20%	37.06%	20.95%	30.77%	55.18%
Tehama	70.06%	52.83%	41.61%	34.97%	69.74%
Trinity	48.05%	34.78%	23.73%	S	34.92%
Tulare	64.75%	53.94%	40.27%	27.70%	71.20%
Tuolumne	59.12%	41.06%	21.16%	18.58%	64.81%
Ventura	62.79%	51.68%	41.61%	34.64%	69.40%
Yolo	60.79%	48.31%	33.21%	33.06%	64.27%
Yuba	40.07%	31.32%	15.07%	23.27%	49.91%

<sup>1</sup> Original tables can be found in the Department of Health Care Services' [Addendum to the 2020 Preventive Services Report](#). "NA" indicates the rate had a small denominator (i.e., less than 30). "S" indicates fewer than 11

cases exist in the numerator; therefore, the rate is suppressed to satisfy the Health Insurance Portability and Accountability Act of 1996 (HIPAA) Privacy Rule's de-identification standard.

<sup>2</sup> Blood Lead Screening: Test at 12 Months of Age is a California Title 17 indicator and defined as individuals who turned 1 year old during the measurement year, who had a screening within six months (before and after) their first birthday. Individuals must be continuously enrolled for 12 months (six months before and six months after first birthday) with no more than one gap in enrollment during the 12-month period where the gap is no longer than one month.

<sup>3</sup> Blood Lead Screening: Test at 24 Months of Age is a California Title 17 indicator and defined as individuals who turned 2 years old during the measurement year, who had a screening within six months (before and after) their second birthday. Individuals must be continuously enrolled for 12 months (six months before and six months after the second birthday) with no more than one gap in enrollment during the 12-month period where the gap is no longer than one month.<sup>4</sup> Blood Lead Screening: Two Tests by 24 Months of Age is a California Title 17 indicator and defined as individuals who turned 2 years old during the measurement year, who had a screening within six months (before and after) their second birthday and also had a screening within six months (before and after) their first birthday. Individuals must be continuously enrolled for 24 months (18 months before and six months after the second birthday) with no more than one gap in enrollment during the 24-month period where the gap is no longer than one month.

<sup>5</sup> Blood Lead Screening: Catch-Up Test by 6 Years of Age is a California Title 17 indicator and defined as individuals who turned 6 years old during the measurement year who were not screened at 1 or 2 years of age, to determine if they were screened between 31 months old and their sixth birthday. Individuals must be continuously enrolled for 12 months prior to their sixth birthday with no more than one gap in enrollment during the 12-month period where the gap is no longer than one month. Exclusion of individuals who had at least one lead blood test prior to 31 months of age. (Note: For this measure, DHCS assessed claims for Current Procedural Terminology [CPT] codes 83655 [lead blood test] and Z0334 [counseling and blood draw]; Z0334 was retired May 1, 2018).

<sup>6</sup> Lead Screening in Children is defined as individuals who turned 2 years old during the measurement year who had a screening by their second birthday. Individuals must be enrolled on their second birthday and continuously enrolled for 12 months prior to their second birthday (with no more than one gap in enrollment during the 12-month period where the gap is no longer than one month). The Lead Screening Indicator aligns with DHCS' value-based payment program specifications, which are based on the specifications for the Healthcare Effectiveness Data and Information Set (HEDIS) Lead Screening in Children measure. The Lead Screening in Children indicator does not meet California regulatory requirements; for those specifications, see the California Title 17 indicators listed above.

#### 4) CDPH Outreach to Health Care Providers to Increase Screening

CDPH provides extensive outreach to health care providers about sources of lead, the effects of lead exposure on the developing child, and state requirements for anticipatory guidance about lead and blood lead testing. This outreach is conducted by the state CLPPB and by the state supported local CLPPPs throughout the state.

To encourage health care provider compliance with mandated screening, a CLPPB public health medical officer provides in-person presentations to physicians and other health care providers throughout California. These presentations provide information on the effects of lead, lead screening and management of lead-exposed children, and inform health care providers about state regulations regarding childhood blood lead testing. The presentations are given at

meetings, conferences, in medical offices, to medical residency programs, and to hospital and clinic staff at department- and hospital-wide presentations throughout the state.

In 2019 and 2020, these presentations were attended by over 700 health care providers including physicians, mid-level practitioners, and other health care professionals. Due to COVID-19 pandemic restrictions, live webinars replaced in-person presentations during 2020. Written notes from attendees about how their current practice would change in response to the training included: “Screen for lead exposure, test at age one and two, test when at risk or symptoms indicate”; “Discuss importance of lead screening - why so important to actually go to the lab”; “Regularly check lead levels in kids 2-6 years with no history of testing”; “Anticipatory guidance”; “Educate more on avoiding lead sources”; “Address cultural practices”; and “Suspect lead poisoning in all patients, ask specific questions about sources of exposure, educate patients on sources of exposure.”

CDPH provides guidance documents for health care providers including:

- Standards of Care Guidelines on Childhood Lead Poisoning for California Health Care Providers (screening regulations)
- Potential Sources of Lead (information on lead exposure risks)
- Health Assessment Guidelines on childhood lead poisoning for health care providers (jointly issued by CDPH and DHCS)
- California Management Guidelines on Childhood Lead Poisoning for Health Care Providers (summary handout of Health Assessment Guidelines)
- Blood Lead Testing Guidance

These documents are available as both laminated handouts and printable documents as posted on the health care provider section of the CDPH CLPPB website. These documents are also mailed to health care providers throughout the state, and distributed at outreach presentations, conferences, and clinic and medical office outreach visits.

Articles regarding childhood lead poisoning prevention and blood lead testing requirements are published in the California Medical Board Newsletter. The Fall/Winter 2020 California Medical Board Newsletter included an article by CDPH titled, “Updates on the Childhood Lead Poisoning Prevention Program.” The article provided information for California physicians regarding childhood lead poisoning prevention, screening and management including mandated requirements, information updates, and resources. The article also notified physicians of an updated version of “Standard of Care Guidelines on Childhood Lead Poisoning for California Health Care Providers” and “Potential Sources of Lead: Educating Families to Prevent Childhood Lead Exposure,” which incorporated recent legislative changes

The Winter 2021 California Medical Board Newsletter included an article by CDPH titled, “Get the Lead Out: Are Your Patients Missing Mandated Blood Lead Testing Due to COVID-19?”

which included information on decreased lead screening due to COVID-19, testing mandates, lead risk factors, legislative and regulatory updates, and medical provider lead resources.

On July 15, 2021, the California Medical Board sent a communication on behalf of CDPH to California licensed physicians notifying them of an FDA Class I recall for Magellan LeadCare test kits and the CDC Health Alert Network notification of retesting recommendations for medical providers.

Outreach materials for families are available on the CDPH website and print versions are also available free of charge to health care providers. The materials are produced in Spanish, English, and 18 additional languages.

PHNs in local contracted CLPPPs provide direct outreach to health care providers by performing:

- Chart Reviews
- Fingerstick Trainings
- Trainings/Presentations for physicians
- Trainings/Presentations for other medical professionals (Registered Nurses, PHNs, nursing students) and office staff
- Patient materials distribution to provider offices
- Mailings, phone calls
- Electronic dissemination of CDPH newsletters
- Online surveys to gauge provider testing levels
- Email blasts

From January 1, 2019, through December 31, 2020, approximately 2,370 CLPPP health care provider office visits and presentations were conducted, some of which were in collaboration with CDPH CLPPB. Health care provider training presentations resulted in increased lead-related knowledge among health care providers, based on pre- and post-training test scores.

To help ensure appropriate follow-up testing, in September 2020 and February 2021, CDPH CLPPB sent over 1,400 retesting reminder letters to medical providers throughout the state for children with BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$  identified from January through June 2020 as not receiving indicated follow-up testing.

CDPH will continue to develop and improve educational materials, outreach methods, resources, curriculum and guidelines incorporating new scientific findings; information related to California lead sources, risk factors, and data; and national recommendations. Feedback collected from health care providers following in-person and online presentations will be used



to tailor the information to meet the needs of health care providers and ensure effective outreach.

## 5) Family and Community Outreach on Lead Poisoning Screening and Prevention

Primary prevention activities include participation in health fairs, educational mailings, presentations, newsletters, bus advertisements, and social media outreach. The CLPP Program expands the reach of its prevention work through partnerships with other state programs. CLPPB has more than 25 educational materials available that provide information about a variety of lead sources and recommendations for preventing lead exposure. All materials are available in English and Spanish, and many are available in 18 additional languages. These materials are located on the [CLPPB website](#).

Between January 1, 2019, and December 31, 2020, approximately 9,010 community outreach activities were performed by CLPPB and local CLPPPs. These activities reached an estimated 380,780 families and individuals. Community training presentations resulted in increased knowledge based on pre- and post-training test scores. During the same period, targeted lead-related training and education outreach activities reached an estimated 22,480 childcare providers and the families they serve.

CDPH has updated local CLPPPs' contract scope of work requirements for fiscal years 2020-23 to require evaluation of outreach activities for purposes of demonstrating effectiveness. CDPH will review local CLPPPs' evaluation results and assess whether outreach activities are effective in reducing the number of children exposed to lead.

## 6) Case Management Services

Direct services to children with elevated BLLs are provided by 50 local CLPPPs in 46 counties and 3 cities that contract with CLPPB for funding. CLPPB is responsible for PHN and environmental investigations and services in 12 non-contracted jurisdictions. Non-contracted jurisdictions may collaborate with CLPPB on individual CLPP activities, such as providing some assistance with PHN services or environmental investigations, but do not choose to formally contract. The CLPPB additionally currently provides environmental services in 18 contracted jurisdictions that do not have Environmental Professionals (EPs) trained to investigate the homes of lead-poisoned children. These services are free to the families regardless of Medicaid or insurance status.

### Basic Case Management

Children with BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$  receive, at a minimum, monitoring, outreach and education, and actions to encourage appropriate venous retesting (such as provider reminder letters). Services may also include other incremental responses such as visits by community workers and

modified home inspections, up to and including public health nursing and environmental investigation, as resources allow.

Information about the number of children with BLLs  $\geq 4.5$   $\mu\text{g}/\text{dL}$  receiving CLPP Program services (CLPPB and local contracted CLPPPs) provided during 2019 and 2020 is based on CLPPPs self-reporting in semi-annual progress reports. For counties without CLPPPs, data was obtained from CLPPB records.

- In 2019, services were reported for 7,953 children with elevated BLLs below full case-making criteria.
- In 2020, services were reported for 4,936 children with elevated BLLs below full case-making criteria.

### Full Case Management: Public Health Nurse Services

Two hundred and fifty-seven children received full case management services in 2020. PHN Services are central to full case management protocols. The PHN performs a home visit to collect information to assess and manage the case, identifying other at-risk children and family members, assessing the risk of take-home lead exposure, nutritional assessment and provision of nutritional information, educating the family, and providing educational materials for future reference. A developmental screening of the child is also included in most jurisdictions. The PHN also tests or gathers samples of personal property for laboratory testing for lead and advises the family of steps to take to eliminate any suspected sources of lead. The PHN makes health care, housing and social services referrals as indicated, and maintains contact with the family and the child's primary care provider (PCP) to monitor BLLs, ensure repeat BLL testing occurs, and to provide additional services and follow up as needed. Repeat home visits and secondary address investigations are provided when indicated. The PHN coordinates with the PCP and family to plan for developmental needs during case management and long-term developmental follow up after case closure. Children receive PHN follow up until the BLL has declined and remains below  $4.5$   $\mu\text{g}/\text{dL}$ . The vast majority of children receiving case management services see a decline in blood lead levels over time.

The COVID-19 pandemic presented a unique challenge to these full case management services, in particular the PHN home visits and the EP's environmental investigation (EI). Within two weeks of the shelter-in-place decree that halted PHN's abilities to conduct in-person home visits, CLPPB reached out to all 49 contracted and 1 non-contracted jurisdiction to conduct a capacity and capability assessment. This assessment provided information on local CLPP program case management coverage and redirection of staff, their fit test status, and personal protective equipment supplies. With this data, CLPPB was able to develop a CLPPB continuity plan which included a temporary guidance protocol to support CLPPP PHNs and EPs to pivot from the traditional in-person home visits to tele-visits and remote environmental assessments. To safeguard the health and safety of the EP, case, and family while preventing the spread of

COVID-19 when the in-person EI resumed in some jurisdictions, CLPPB collaborated with CDPH's Medical and Health Coordination Center (MHCC) and Occupational Health Branch (OHB) to develop a COVID-19 pre-visit screening and infection control protocol. Since many local CLPPP staff were redirected and did not have the capacity to conduct in-person EIs, CLPPB developed a CLPPB-to-CLPPP case consultation protocol to provide supportive consultation with the PHN to ensure that an in-person EI could be safely deferred. When an EI is safely deferred, the PHN maintains close contact with the case and family to reassess their BLL status while reinforcing teaching, anticipatory guidance, and other preventive measures to the family.

Table 7 shows the number of children eligible for and receiving full case management services from a PHN in 2019 and 2020 based on CLPPPs self-reporting in semi-annual progress reports. For counties without CLPPPs, PHN home visit data was obtained from other records and data from CLPPB. The decrease in full state cases in 2020 was due to the decrease in well-child visits; and therefore, opportunities for blood lead screening were greatly decreased in 2020 because of the pandemic. In addition, both PHNs and families became much less able to participate in case management activities, due to the pandemic as well.

**Table 7. Number of Children Eligible for and Receiving Full Case Management Services from a PHN 2019 and 2020**

Year	New Full Case Identified	Number and Percent of Full Cases (%) Receiving Public Health Nurse Home Visits
2019	422	396 (94%)
2020	257	216 (84%)

Every child meeting the full case definition is eligible to receive both PHN case management services and an EI by an EP. During an EI, the EP assesses the child's environment for lead exposure sources in paint, dust, soil, and water, and documents the results. The investigation focuses on areas the child frequents or may access, and includes both interior and exterior sampling. Residents are immediately advised of short-term steps they can take to reduce exposure to a hazard until long-term remediation is implemented. Identifying environmental lead hazards associated with the property is the EP's primary responsibility during an EI. In addition, the EP may assist the PHN to identify suspect non-housing items and may submit these items for laboratory analysis.

The COVID-19 pandemic presented challenges to provide these EIs in-person. CLPPB developed a temporary guidance protocol which included a remote environmental assessment (REA) into the EI protocols. REAs reduce time needed to collect samples and data onsite, limit EP's exposure in the field during the pandemic, and help determine if EIs can be deferred safely. If EIs were deferred, EPs were instructed to closely monitor the case for any significant changes. If circumstances changed, or the BLL did not decline, the deferral decision would be reviewed. As

COVID-19 restrictions are no longer in place and some jurisdictions resumed in-person services, an on-site EI was to be completed at that time for all deferred EIs.

Table 8 displays the number of referrals, environmental investigations, and properties with lead hazards in 2019 and 2020 that were reported by CLPPPs in semi-annual progress reports. For counties without CLPPPs, data was drawn from records of EIs performed by the state CLPPB. A decline in full cases, subsequent EI referrals, and clearances was noted in 2020 due to the pandemic.

**Table 8. Number of Referrals, Environmental Investigations, and Properties with a Lead Hazard in 2019 and 2020**

Year	2019	2020
Number of PHN referrals for an EI	404	249
Number of initial EIs performed	381	93
Number of properties identified as having a lead hazard using criteria	140	56

In non-pandemic years, certain factors inform the discrepancy between the number of EIs and the number of referrals: sometimes a referral is received near the end of a reporting period and the EI is performed during the subsequent reporting period. Additionally, families sometimes repeatedly refuse services or do not respond after multiple contact attempts. In other instances, families moved or were out of town shortly after the referral, which delayed services. Lastly, when sibling cases are identified within 30 days of the index case, the initial EI might be counted for both children, if the sampling pattern considers both children’s habits and mobility.

Additionally, there are several reasons contributing to the small variance in reported number of EI referrals and cases identified for PHN case management home visits. Home visits may have been reported at the end of the prior year, whereas the corresponding referral for the associated EI was not reported until the beginning of the following year. Two sibling cases who received one EI covering both children may have been reported as two identified cases for PHN home visits, but only one referral for an EI. Some families accept a PHN home visit but persistently refuse an EI, and, in some of these situations, the EI might not have been referred. Finally, there may be some barriers to data collection and reporting that CLPPB is currently working with local CLPPPs to identify.

During the pandemic, Environmental Professionals (EP) were asked to cease EI for the safety of EPs and to prevent the transmission of Covid-19 virus. In the meantime, Branch worked towards a policy to resume EI and home visits where environmental professionals were asked to be fit-tested and use N95 masks when in fields to protect them against Covid-19. In addition, Branch developed Remote Environmental Assessments (REA) which helped EPs assess the current environmental condition of residences of children with elevated blood lead levels and safely defer EIs if the environmental conditions of the homes were not an immediate threat to the EBL case. Non-availability of Respiratory Protect Program (RPP) in many jurisdictions also caused delays in resuming EI. Towards the end of 2020, many local health jurisdictions developed RPP in their respective departments and were able to provide full investigations or limited investigations when needed. These challenges lead to a decrease in EIs for the year 2020.

#### Remediation of Identified Lead Hazards.

When lead hazards are identified, EPs work with property owners to remediate them expediently. Properties remain open to follow up until the property passes a clearance inspection. A successful clearance inspection includes, at a minimum, a visual inspection to verify all required work was completed properly, as well as collection and analysis of dust wipe samples.

The numbers of EI properties passing clearance inspections self-reported by CLPPPs in biannual progress reports were 136 in 2019 and 42 in 2020. Reported clearance inspections may or may not be associated with the EIs reported during the same period.

## 7) Sources of Lead Exposure

CLPPB analyzed sources of lead exposure for children who were newly identified as full cases in FY 2018-19 and consented to full case management, including environmental services. Every child meeting the full case definition is eligible to receive both PHN case management services and an EI by an EP. During an EI, the EP assesses the child's environment for lead exposure sources in paint, dust, soil, and water, and documents the results. The PHN performs a home visit often at the same time as the EI, which includes collecting information to evaluate and coordinate the necessary services. The EP, with assistance from the PHN, identifies suspect non-housing items and may submit these items for laboratory analysis. "Non-housing sources" are sources of lead exposure other than housing-related paint, dust, soil, and water.

When housing-related lead sources are identified, EPs work with property owners to remediate them expediently. Properties remain open to follow up until the property passes a clearance inspection. A successful clearance inspection includes, at a minimum, a visual inspection to verify all required work was completed properly, as well as collection and analysis of dust wipe samples. For full cases where paint, dust, soil, and/or water were identified as a source, CLPPB reviewed whether the sources of lead exposure were removed, remediated, or abated.

## Methods

In this analysis, only children with BLLs meeting the full case criteria who received full case management, including environmental services, were included during FY 2018-2019. As of July 1, 2016, children meet full case criteria with either a single venous BLL at or above 14.5 micrograms/deciliter ( $\mu\text{g}/\text{dL}$ ) or persistent levels at or above 9.5  $\mu\text{g}/\text{dL}$ . Data on blood lead test results were gathered from the Response and Surveillance System for Childhood Lead Exposures database.

Exposure assessment data came from two sources:

(1) EPs collected samples and information about housing-related sources of lead exposure, such as paint, dust, soil, and water, as well as non-housing items. X-Ray Fluorescence (XRF) screening by EPs, and environmental health laboratories provided quantitative results.

(2) PHNs collected information about non-housing sources of lead exposure, such as the child's behavior, food, products used for cooking, and alternative medicines, using a structured questionnaire during the home visit.

Race/ethnicity data were also collected by the PHN during the home visit. CLPPB collects race/ethnicity data in a two-question format similar to the Federal Office of Management and Budget (OMB) race and Hispanic ethnicity categorization. Race/ethnicity data collection was based on a parent's report of the child's identity with the ability to select all applicable races and one applicable ethnicity. Race category choices were:

- Native American/Alaskan
- Black/African American
- White
- Asian
- Pacific Islander
- Other
- Decline to state

If a parent identified the child as Asian or Pacific Islander, they were asked to further select from more detailed categories of Asian and Pacific Islander races. If the parent identified the child as "Other" race, they were asked to specify. Ethnic background categories were:

- Not Hispanic/Spanish/Latino
- Yes, North American (Mexican, Mexican American)
- Yes, Central American
- Yes, South American

- Yes, other Spanish/Hispanic/Latino

Answers to 'Country of birth' question were also used to help race/ethnicity categorization for data analysis when needed. CLPPB followed the CDPH vital statistics reporting categories for race/ethnicity for the data analysis: Mutually exclusive race/ethnicity categories were:

- Non-Hispanic White
- Non-Hispanic Black
- Non-Hispanic Asian
- Non-Hispanic Hawaiian/Pacific islander
- Non-Hispanic Native American/Alaskan
- Multi-race (any ethnicity)
- Hispanic (single race)
- Declined or Unknow

If a parent identified the child's race only as 'Other' and chose any of the 'Yes' Hispanic ethnicity options, then the child was categorized as Hispanic (single race). If multiple race categories were checked, then regardless of Hispanic ethnicity status, the child was categorized as Multi-race (any ethnicity). For simplicity, Hispanic (single race) children will be described hereafter as Hispanic children, and non-Hispanic children will be described by their race category alone (e.g., non-Hispanic Asian children will be referred to as Asian children). In FY 2018-19, there were 40 children with Afghan origin. They mostly identified themselves as 'White' or 'Other' and specified as Afghan. In this analysis, Afghan and all other Middle Eastern/North African children were categorized as 'White' as OMB recommends. Of the 84 White children, 40 (47.6 percent) were Afghan, and the sources of lead exposure differed by Afghan origin. For this reason, the White race category was stratified as Afghan and non-Afghan. Similarly, the Asian race category was stratified as Asian Indian and other Asian.

CLPPB reviewed EI documentation to identify housing-related sources associated with full cases. For each investigation, CLPPB measured lead in deteriorated paint, dust, and bare soil. Results of first- and second-draw water samples from kitchen sinks were also recorded, as well as water draws from other frequent drinking water locations. Paint, dust, and soil were categorized as lead exposure sources based on regulatory levels found in Title 17, California Code of Regulations (CCR), beginning with Section 35001. The Los Angeles County local health jurisdiction also categorized housing-related sources with their own regulatory statutes (Los Angeles County Code Section 11.28.010). Water results were categorized as exposure sources based on the United States Environmental Protection Agency (US EPA) action level (40 Code of Federal Regulations [CFR] Section 141.80) (Table 9). EPs identified lead housing-related sources based on direct known exposure to lead-poisoned children, including media below current

regulatory standards but found to be significant based on a child’s specific behavior and activity (Table 10).

Table 9. Definitions of Housing-Related Sources of Lead Exposure

Type of housing related source	Current Regulatory Level	Lower “Actionable” Level
Paint	<p>Deteriorated lead-based paint tested at the state regulatory level of greater than or equal to 1.0 milligram of lead per square centimeter of surface area (<math>\geq 1.0 \text{ mg/cm}^2</math>). In addition, full cases were attributed to paint at local regulatory level in Los Angeles at <math>\geq 0.7 \text{ mg/cm}^2</math>. (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)</p> <p>Paint was considered a source in situations where paint was below the regulatory level but found to be nuisance that may result in persistent and quantifiable lead exposure (17 CCR Section 35037).</p>	<p>Paint with lead <math>\geq 600</math> parts per million (ppm) was used. In 1978, the federal Consumer Product Safety Commission (CPSC) restricted lead in newly manufactured paint to 600 ppm. Additionally, 600 ppm is the level petitioners to the US EPA have been seeking to lower the federal definition of lead-based paint. Since there is incongruence of unit equivalency between ppm and <math>\text{mg/cm}^2</math>, the level chosen for XRF instruments was <math>0.1 \text{ mg/cm}^2</math>, which is the lowest level detectable to the tenths place to be most health protective.</p>
Dust	<p>Lead-contaminated at greater than or equal to 40 micrograms of lead per square foot of surface area (<math>\geq 40 \text{ } \mu\text{g/ft}^2</math>) for interior floor surfaces, <math>\geq 250 \text{ } \mu\text{g/ft}^2</math> for interior horizontal surfaces, and <math>\geq 400 \text{ } \mu\text{g/ft}^2</math> for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)</p>	<p>Lead levels <math>\geq 10 \text{ } \mu\text{g/ft}^2</math> for interior floor surfaces, and <math>\geq 100 \text{ } \mu\text{g/ft}^2</math> for interior horizontal surfaces were selected to match changes in federal dust standards that took effect January 6, 2020 but were not in effect at the time of when the cases received services.</p>
Soil	<p>Lead-contaminated at greater than or equal to 400 parts per million (<math>\geq 400 \text{ ppm}</math>) in children’s play areas.</p> <p>Soil was considered a source in situations where soil was below the regulatory level but found to be a nuisance that may result in persistent and quantifiable lead exposure (17 CCR Section 35037).</p>	<p>Bare soil with <math>\geq 80 \text{ ppm}</math> was used to match California Human Health Screening Levels (CHHSLs) proposed by the California Office of Environmental Health Hazard Assessment. The current CHHSL for lead in soil for residential property is 80 ppm.</p>



Type of housing related source	Current Regulatory Level	Lower “Actionable” Level
Water	According to the US EPA Federal Lead and Copper Rule, greater than or equal to 0.015 milligrams of lead per liter of water ( $\geq 0.015$ mg/L) is above the action level. (40 CFR Section 141.80)	Drinking water $\geq 0.005$ mg/L was selected in light of the goal for water to show non-detect levels of lead. Since this level was the laboratory reporting limit, results below this level would not be available from laboratory reports used in the sample of cases selected.

Table 10. Categories and Examples of Non-housing Sources of Lead Exposure

Category	Examples
Cosmetics/ Spiritual Religious Products	Black powder (e.g., kohl, surma, tiro), ceremonial powder, sindoor
Food/Spices/Drink	Dried grasshoppers (chapulines), turmeric, khmeli suneli, lozena, imported candy
Take-home or Occupational	Exposed through either personal or parental work or hobby
Pottery & Utensils	Vintage/hand-made/imported pottery, leaded glassware, water dispenser/urn/samovar, food grinder
Other	Fishing weight, jewelry/charm/amulet, painted object, metal object, lead ammunition, deteriorated vinyl/plastic, game meat/fish (from leaded bullets/sinkers), lead batteries, and lead solder
Traditional Medicine/ Remedies	Azarcon, greta, ayurvedic remedy (e.g., Ghutti, Keasari Balguti), paylooah, traditional Chinese remedies
Retained bullet	
Perinatal exposures	Mother ate food high in lead content during pregnancy, mother took remedy high in lead during pregnancy

Any EI property found to have a lead housing-related source exceeding current regulatory levels must have it removed, remediated, or abated. Those properties remain open to EP follow-up until the completion of a clearance inspection. Passing a clearance inspection requires visual confirmation that lead housing-related sources have been corrected and quantifiable evidence through dust wipes that no lead-contaminated dust remains. CLPPB reviewed documentation from the corresponding EI properties to assess how many had passed clearance inspection. Acknowledging that children may still be exposed to lead below the current regulatory levels, CLPPB also analyzed housing-related lead exposure sources using lower “actionable” levels (Table 8). These lower levels reflect recommendations and proposals under consideration by regulatory agencies based on more stringent understanding of lead hazards and safety

standards. Lead exposure source categories were then compared by current regulatory levels versus lower “actionable” levels.

Information reported to CLPPB about non-housing sources (Table 9) was reviewed by a CLPPB physician to determine whether each potential source was a probable source of lead exposure for the child. Determination was based on quantitative XRF and/or laboratory results; results of testing the item with a qualitative method (chemical test kit lead swab); amount, timing, and length of the child’s access to the item; and whether there is a significant history of demonstrated high lead content for a given potential source. In addition, the physician considered information about whether removal of the item from the child’s environment was associated with a decline in BLL.

There may be several lead exposure sources identified for a child meeting full case criteria. When multiple exposure sources are identified, the exact contribution of each source to the child’s initial BLL cannot be verified. CLPPB counted each possible exposure source separately for the child; for example, if both dust and paint levels are found above the regulatory levels, then both dust and paint were counted as possible lead exposure sources.

CLPPB performed descriptive analyses of demographic characteristics, BLLs, and exposure sources. In addition to identifying the sources of lead exposure, CLPPB analyzed how sources of lead exposure differed by race and ethnicity of the child. To compare the groups, CLPPB used a chi-square test. Statistical significance was defined as  $p \leq 0.05$ . Analyses were done using SAS software, version 9.4 (Copyright © 2017, SAS Institute Inc., Cary, NC, USA).

## Results

In FY 2018-2019, there were 406 new children meeting full case criteria. Of those 406 new childhood lead cases, 364 received full case management services and 382 unique properties went through an EI. In some cases, there were multiple children with case-making BLLs living in the same property. In some cases, an EI was done on multiple properties because the case(s) spent considerable time in another property (e.g., grandparents, or daycare) or family moved to another property. There were several reasons for incomplete home visits and/or EIs: persistent refusal (n=27), unable to locate family (n= 3), moved out of state (n= 2), late BLL reporting (n= 1) or missing information (n= 8); these children are excluded from results.

The characteristics of children who received full case management services are described in Table 11. Most of the full cases were less than 6 years old (86 percent), male (52.8 percent), and Hispanic (50.8 percent) or Afghan (9.9 percent). Of the 364 children who received full services, 7 (1.9 percent) had a BLL higher than 44.4 µg/dL, 246 (67.6 percent) had a BLL between 14.5 and 44.4 µg/dL, and 111 (30.5 percent) had a BLL between 9.5 and 14.4 µg/dL.

Table 11. Demographic Characteristics of Full Cases<sup>1</sup>, Fiscal Year 2018-19 (n=364)

Characteristic	N 364	Percent (%)
<b>Age</b>		
Less than 6 years	313	86.0
Between 6 and 21 years	51	14.0
<b>Sex</b>		
Female	172	47.2
Male	192	52.8
<b>Race/Ethnicity</b>		
Non-Hispanic White (n=75)		
Afghan	36	9.9
Non-Afghan	39	10.7
Non-Hispanic Black	12	3.3
Non-Hispanic Native American/Alaskan	1	0.3
Non-Hispanic Asian (n=76) <sup>2</sup>		
Asian Indian	58	15.9
Cambodian	2	0.5
Chinese	1	0.3
Hmong	2	0.5
Laotian	1	0.3
Malaysian	1	0.3
Nepalese	1	0.3
Pakistani	5	1.4
Vietnamese	1	0.3
Unspecified/Other Asian	4	1.1
Non-Hispanic Hawaiian/ Pacific Islander (n=1) <sup>3</sup>		
Marshallese	1	0.3
Multi race (any Hispanic status)	7	1.9
Hispanic (Single race)	185	50.8
Declined, Unknown, or Non-Hispanic other	7	1.9

<sup>1</sup> As of July 1, 2016, the definition of a case eligible for full case management services is either a single venous BLL at or above 14.5 micrograms (µg)/deciliter (dL) or persistent 9.5 µg/dL.

<sup>2</sup> No full case was identified, specifically, as Bangladeshi, Filipino, Indonesian, Japanese, Korean, Sri Lankan, or Thai as an Asian sub-group within the Non-Hispanic Asian category.

<sup>3</sup> No full case was identified, specifically, as Hawaiian, Guamanian, Samoan, or Tongan as a Pacific Islander sub-group within the Non-Hispanic Hawaiian/Pacific Islander category.

Based on current regulatory levels, 87 children (23.9 percent) had an unknown exposure. Non-housing sources were identified in 135 children (37.1 percent) as the only source of lead exposure. Housing-related sources were identified in 103 children (28.3 percent) as the only source of lead exposure. Both housing-related and non-housing sources of lead exposure were

identified in 39 children (10.7 percent) (Table 12). Therefore, a total of 142 children (39 percent) had a housing-related source identified as a source of lead exposure. When lower “actionable” levels were used, housing-related sources were identified in 143 children (39.3 percent) as the only source and both housing-related and non-housing sources of lead exposure were identified in 81 children (22.3 percent). Hence, a total of 224 children (61.6 percent) had a housing-related source identified as a source of lead exposure when the lower “actionable” levels were applied. The difference in identifying sources of lead exposure by current regulatory levels versus lower “actionable” levels was statistically significant ( $p < 0.001$ , Table 12).

Table 12. Sources of Lead Exposure Among Full Cases, Fiscal Year 2018-19 (n=364)

Exposure source	Current Regulatory Level <sup>1</sup>	Lower “Actionable” Level <sup>2</sup>
	n (%)	n (%)
Only Housing source	103 (28.3%)	143 (39.3%)
Both Housing and Non-Housing	39 (10.7%)	81 (22.2%)
Only Non-Housing source	135 (37.1%)	93 (25.6%)
Unknown	87 (23.9%)	47 (12.9%)

<sup>1</sup>Current regulatory level for housing-related sources of lead exposure:

- Paint is considered a source when the presence of deteriorated lead-based paint tested at the state regulatory level of  $\geq 1.0 \text{ mg/cm}^2$ . In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at  $\geq 0.7 \text{ mg/cm}^2$ . (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)
- Dust is considered a source when it is lead contaminated at  $\geq 40 \text{ } \mu\text{g/ft}^2$  for interior floor surfaces,  $\geq 250 \text{ } \mu\text{g/ft}^2$  for interior horizontal surfaces, and  $\geq 400 \text{ } \mu\text{g/ft}^2$  for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at  $\geq 400 \text{ ppm}$  in children’s play areas.
- Water levels are categorized by an action level; according to the US EPA Federal Lead and Copper Rule,  $\geq 0.015 \text{ mg/L}$  is above the action level (40 CFR Section 141.80). Four water samples above the action level were found to be potential exposure sources to lead. One exterior faucet water sample was found above the action level; however, it was not found to be a potential exposure source to lead as it was not a primary drinking source. Follow-up steps were taken to prevent all possible exposure by removing the faucet and capping the pipe. Drinking water sources at this residence measured non-detect lead levels.

<sup>2</sup>Lower “actionable” level for housing-related sources of lead exposure:

- Paint with lead  $\geq 600 \text{ ppm}$  was used. In 1978 the federal Consumer Product Safety Commission restricted lead in newly manufactured paint to 600 ppm. Additionally, 600 ppm is the level petitioners to the US EPA have been seeking to lower the federal definition of lead-based paint. Since there is incongruence of unit equivalency between ppm and  $\text{mg/cm}^2$ , the level used for XRF instruments was  $0.1 \text{ mg/cm}^2$ , which is the lowest level detectable to the tenths place in order to be most health protective.
- Dust lead levels  $\geq 10 \text{ } \mu\text{g/ft}^2$  for interior floor surfaces, and  $\geq 100 \text{ } \mu\text{g/ft}^2$  for interior horizontal surfaces were used in order to match changes in federal dust standards effective in 2020.

- Bare soil with  $\geq 80$  ppm was used in order to match California Human Health Screening Levels (CHHSL) proposed by the California Office of Environmental Health Hazard Assessment. The current CHHSL for lead in soil for residential property is 80 ppm.
- Drinking water  $\geq 0.005$  mg/L was selected considering the goal for water to show non-detect levels of lead. Since this level was the laboratory reporting limit, results below this level would not be available from laboratory reports used in the sample of cases selected.

The exposure source of lead differed by race/ethnicity ( $p < 0.001$ , Table 13). Housing-related sources of lead were identified as the most common source of lead exposure among multi-race children (85.7 percent), race/ethnicity unknown children (57.1 percent) and Hispanic children (36.8 percent) and while non-housing sources of lead exposure were identified as the most common source among Asian children (64.5 percent), and Afghan children (69.4 percent). Similarly, the exposure source of lead differed by age group with housing-related exposure more common among children less than six years compared to children ages between 6 to 21 years ( $p = 0.0001$ , Table 13).

Table 13. Source of Lead Exposure at Current Regulatory Levels<sup>1</sup> by Demographic Characteristics Among Full Cases, Fiscal Year 2018-19 (n=364)

Characteristic	Only Housing (n=104)	Both Housing and Non Housing (n=39)	Only Non Housing (n=135)	Unknown (n=86)	<i>p</i> value
<b>Age</b>					<0.001
Less than 6 years (n=74)	102 (32.6%)	30 (9.6%)	107 (34.2%)	74 (23.6%)	
Between 6 and 21 years (n=12)	2 (3.9%)	9 (17.7%)	28 (54.9%)	12 (23.5%)	
<b>Sex</b>					0.2
Female (n=172)	42 (24.4%)	17 (9.9%)	72 (41.9%)	41 (23.8%)	
Male (n=192)	62 (32.3%)	22 (11.5%)	63 (32.8%)	45 (23.4%)	
<b>Race/Ethnicity</b>					<0.001
Non-Hispanic White (n=75)					
Afghan (n=36)	2 (5.6%)	0 (0.0%)	25 (69.4%)	9 (25.0%)	
Non-Afghan (n=39)	13 (33.3%)	4 (10.3%)	12 (30.8%)	10 (25.6%)	
Non-Hispanic Black (n=12)	4 (33.3%)	0 (0.0%)	3 (25.0%)	5 (41.7%)	

Characteristic	Only Housing (n=104)	Both Housing and Non Housing (n=39)	Only Non Housing (n=135)	Unknown (n=86)	<i>p value</i>
Non-Hispanic Native American/Alaskan (n=1)	1 (100%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Non-Hispanic Asian (n=76)					
Asian Indian (n=58)	2 (3.5%)	6 (10.3%)	39 (67.2%)	11 (19.0%)	
All Other Asian (n=18)	3 (16.6%)	0 (0.0%)	10 (55.6%)	5 (27.8%)	
Non-Hispanic Hawaiian/Pacific Islander (n=1)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (100%)	
Multi race (any Hispanic status, n=7)	6 (85.7%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	
Hispanic (Single race, n=185)	68 (36.8%)	28 (15.1%)	45 (24.3%)	44 (23.8%)	
Declined or Unknown (n=7)	4 (57.1%)	1 (14.3%)	0 (0.0%)	2 (28.6%)	

<sup>1</sup> Housing-related sources of lead exposure include:

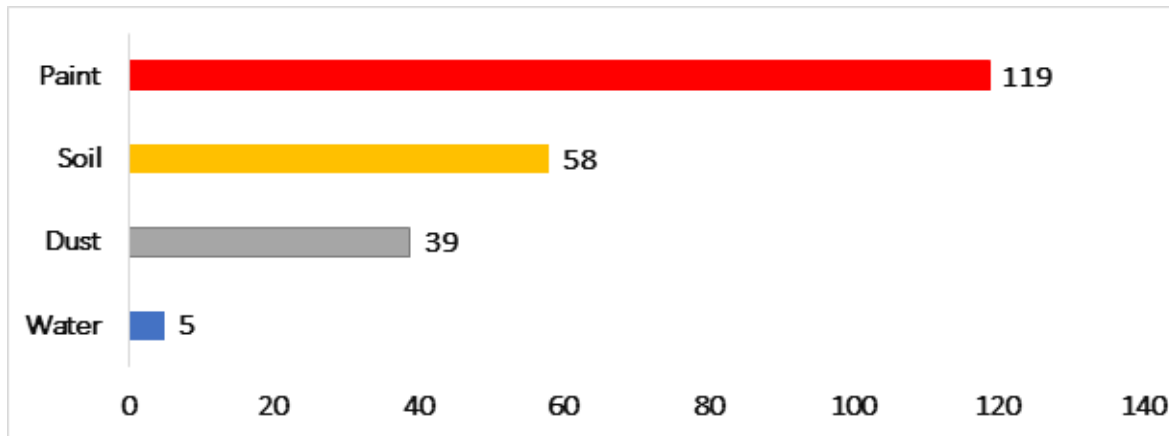
- Paint is considered a source when the presence of deteriorated lead-based paint tested at the state regulatory level of  $\geq 1.0 \text{ mg/cm}^2$ . In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at  $\geq 0.7 \text{ mg/cm}^2$ . (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)
- Dust is considered a source when it is lead contaminated at  $\geq 40 \text{ } \mu\text{g/ft}^2$  for interior floor surfaces,  $\geq 250 \text{ } \mu\text{g/ft}^2$  for interior horizontal surfaces, and  $\geq 400 \text{ } \mu\text{g/ft}^2$  for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at  $\geq 400 \text{ ppm}$  in children’s play areas.
- Water was not identified as source of lead exposure in any case. Water levels are categorized by an action level; according to the US EPA Federal Lead and Copper Rule,  $\geq 0.015 \text{ mg/L}$  is above the action level (40 CFR Section 141.80). One exterior faucet water sample was found above the action level; however, it was not found to be a potential exposure source to lead as it was not a primary drinking source. Follow-up steps were taken to prevent all possible exposure by removing the faucet and capping the pipe. Drinking water sources at this residence measured non-detect lead levels.

### Distribution of Housing-Related Sources of Lead Exposure

Figure 3 shows the distribution of housing-related sources of lead exposure at current regulatory levels during FY 2018-19. Paint was the most common housing-related source of lead exposure, followed by soil, dust, and water. Table 14 depicts the distribution of housing-related lead exposure sources by race/ethnicity and the pattern of paint being the most common

housing-related source of lead exposure persisted. The main source of lead exposure was housing-related among Hispanic, Black, and multi-race children.

Figure 3. Total Occurrences<sup>1</sup> of Housing-Related Sources of Lead Exposure<sup>2</sup> Among Full Cases, Fiscal Year 2018-19 (n=142)



<sup>1</sup>A child may have more than one type of housing-related source of lead exposure and therefore, the total occurrences of housing-related sources will be greater than the number of children (n=142) identified with a housing-related source of lead exposure.

<sup>2</sup>Housing-related sources of lead exposure include:

- Paint is considered a source when the presence of deteriorated lead-based paint tested at the state regulatory level of  $\geq 1.0 \text{ mg/cm}^2$ . In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at  $\geq 0.7 \text{ mg/cm}^2$ . (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)
- Dust is considered a source when it is lead contaminated at  $\geq 40 \text{ } \mu\text{g/ft}^2$  for interior floor surfaces,  $\geq 250 \text{ } \mu\text{g/ft}^2$  for interior horizontal surfaces, and  $\geq 400 \text{ } \mu\text{g/ft}^2$  for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at  $\geq 400 \text{ ppm}$  in children's play areas.
- Water was not identified as source of lead exposure in any case. Water levels are categorized by an action level; according to the US EPA Federal Lead and Copper Rule,  $\geq 0.015 \text{ mg/L}$  is above the action level (40 CFR Section 141.80). One exterior faucet water sample was found above the action level; however, it was not found to be a potential exposure source to lead as it was not a primary drinking source. Follow-up steps were taken to prevent all possible exposure by removing the faucet and capping the pipe. Drinking water sources at this residence measured non-detectable lead levels.

Table 14. Total Occurrences<sup>1</sup> of Housing-Related Sources of Lead Exposure<sup>2</sup> by Race/Ethnicity Among Full Cases, Fiscal Year 2018-19 (n=142)

Housing related Lead Sources	Non Hispanic White Afghan	Non Hispanic White Non Afghan	Non Hispanic Black	Non Hispanic Native American /Alaskan	Non Hispanic Asian Indian	Non Hispanic All Other Asian	Non Hispanic Hawaiian/Pacific Islander	Multi race (any Hispanic status)	Hispanic (Single race)	Declined or Unknown
Paint (n=129)	1 (0.8%)	14 (11.7%)	4 (3.4%)	1 (0.8%)	4 (3.4%)	2 (1.7%)	0 (0%)	4 (3.4%)	84 (70.6%)	5 (4.2%)
Soil (n=58)	1 (1.7%)	8 (13.8%)	1 (1.7%)	0 (0.0%)	3 (5.2%)	1 (1.7%)	0 (0%)	4 (7%)	38(65.5%)	2 (3.4)
Dust (n=39)	0 (0%)	4 (10.3%)	4 (10.3%)	0 (0%)	2 (5.1%)	2 (5.1%)	0 (0%)	3 (7.6%)	20 (51.3%)	4 (10.3%)
Water (n=5)	0 (0%)	0 (0%)	1 (20)	0 (0%)	2 (40%)	0 (0%)	0 (0%)	0 (0%)	2 (40%)	0 (0%)

<sup>1</sup>A child may have more than one type of housing-related source of lead exposure and therefore, the total occurrences of housing-related sources will be greater than the number of children (n=142) identified with a housing-related source of lead exposure.

<sup>2</sup>Housing-related sources of lead exposure include:

- Paint is considered a source when the presence of deteriorated lead-based paint tested at the state regulatory level of  $\geq 1.0$  mg/cm<sup>2</sup>. In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at  $\geq 0.7$  mg/cm<sup>2</sup>. (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)
- Dust is considered a source when it is lead contaminated at  $\geq 40$   $\mu$ g/ft<sup>2</sup> for interior floor surfaces,  $\geq 250$   $\mu$ g/ft<sup>2</sup> for interior horizontal surfaces, and  $\geq 400$   $\mu$ g/ft<sup>2</sup> for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at  $\geq 400$  ppm in children’s play areas.
- Water was not identified as source of lead exposure in any case. Water levels are categorized by an action level; according to the US EPA Federal Lead and Copper Rule,  $\geq 0.015$  mg/L is above the action level (40 CFR Section 141.80). One exterior faucet water sample was found above the action level; however, it was not found to be a potential exposure source to lead as it was not a primary drinking source. Follow-up steps were taken to prevent all possible exposure by removing the faucet and capping the pipe. Drinking water sources at this residence measured non-detect lead levels.



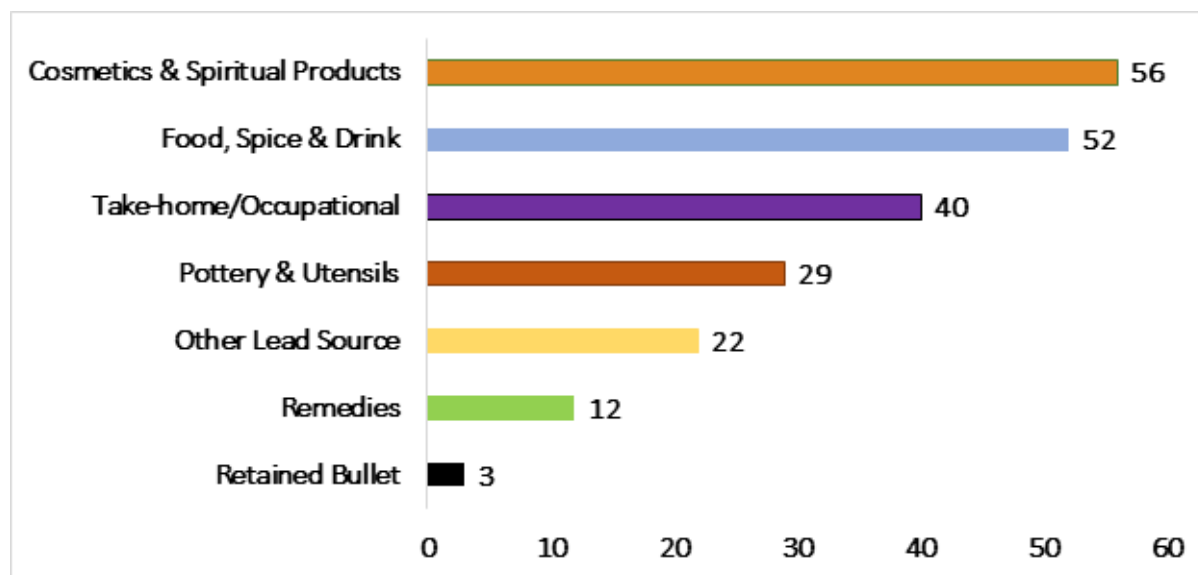
## Removal, Remediation, or Abatement of Identified Housing-Related Sources of Lead Exposure

Of the 364 full cases in our analysis, housing-related sources of lead exposure were identified at current regulatory levels in properties of 142 children. Since multiple children may be living at the same property, there were a total of 140 properties that needed housing-related sources of lead exposure removed, remediated, or abated and required clearance. Of those 140 properties, 100 (71.4 percent) had their housing-related source of lead exposure removed, remediated, or abated while 40 properties (28.6 percent) are still in process.

## Distribution of Non-Housing Sources of Lead Exposure

For FY 2018-19, the main non-housing sources identified were ‘cosmetics/ spiritual products,’ followed by ‘food, spice, and drink items’ and ‘take-home/occupational’ exposures (Figure 4).

Figure 4. Total Occurrences<sup>1</sup> of Non-Housing Sources of Lead Exposure Among Full Cases, Fiscal Year 2018-19 (n=174)



<sup>1</sup>A child may have more than one type of non-housing lead hazard and therefore, the total occurrences of non-housing lead hazards will be greater than the number of children (n=174) identified with a non-housing lead hazard.

Non-housing sources of lead exposure differed by race/ethnicity ( $p < 0.0001$ , Table 14). When aggregated, non-housing sources appeared to be the most common source of lead exposure among White children. However, when stratifying White children by having Afghan origin or not, major sources of lead exposure differed between the two. The major exposure sources for children with Afghan origin were non-housing while the major exposure sources for White children without Afghan origin were housing related. The major non-housing sources for White children with Afghan origin were ‘cosmetics and spiritual products,’ ‘food, spice and drink,’ and ‘remedies.’ For White children without Afghan origin, ‘other sources of lead,’ and ‘take-

home/occupational' were among the major non-housing sources in addition to 'cosmetics and spiritual products.'

Table 15. Total Occurrences<sup>1</sup> of Non-Housing Sources of Lead Exposure by Race/Ethnicity Among Full Cases, Fiscal Year 2018-19 (n=174)

Non Housing Exposure Source of Lead	Non Hispanic White Afghan	Non Hispanic White Non Afghan	Non Hispanic Black	Non Hispanic Native American /Alaskan	Non Hispanic Asian Indian	Non Hispanic All Other Asian	Non Hispanic Hawaiian/ Pacific Islander	Multi race (any Hispanic status)	Hispanic (Single race)	Declined or Unknown
Cosmetics & Spiritual Products (n=56)	20 (35.7%)	7 (12.5%)	0 (0%)	0 (0%)	22 (39.3%)	5 (8.9%)	0 (0%)	0 (0%)	2 (3.6%)	0 (0%)
Food, Spice & Drink (n=52)	9 (17.3%)	4 (7.7%)	0 (0%)	0 (0%)	25 (48.1%)	1 (1.9%)	0 (0%)	0 (0%)	13 (25%)	0 (0%)
Take-home/ Occupational (n=40)	0 (0%)	2 (5%)	1 (2.5%)	0 (0%)	0 (0%)	3 (7.5%)	0 (0%)	1 (2.5%)	32 (80%)	1 (2.5%)
Pottery & Utensils (n=29)	1 (3.4%)	1 (3.4%)	0 (0%)	0 (0%)	4 (13.8%)	0 (0%)	0 (0%)	1 (3.4%)	22 (76%)	0 (0%)
Other Source (n=22)	0 (0%)	3 (13.6%)	1 (4.5%)	0 (0%)	6 (27.3%)	2 (9.1%)	0 (0%)	0 (0%)	10 (45.5%)	0 (0%)
Remedies (n=12)	2 (16.7%)	1 (8.3%)	0 (0%)	0 (0%)	7 (58.4%)	1 (8.3%)	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)
Retained Bullet (n=3)	0 (0%)	0 (0%)	1 (33.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (66.7%)	0 (0%)

<sup>1</sup>A child may have more than one type of non-housing source of lead exposure and therefore, the total occurrences of non-housing sources will be greater than the number of children (n=174) identified with a non-housing source of lead exposure.

Non-housing sources of lead, specifically ‘food, spice, and drink’, and ‘cosmetics and spiritual religious products’ were the main source of lead exposure among Asian children. However, when stratifying Asian children as ‘Asian Indian (n=58)’ and ‘Other Asian (n=18)’, major sources of non-housing source differed between the two groups. Of the 26 Asian children where ‘food, spice, and drink’ were identified as source of lead exposure, 25 were Asian Indian. ‘Cosmetics and spiritual religious products’ were significant non-housing source for both groups. ‘Take-home/occupational’ exposures were identified only among ‘other Asian’ children (16.7 percent vs. 0 percent).

Non-housing sources of lead were identified among 3 of the 12 Black children (25 percent). Major non-housing sources of lead exposure for Black children were ‘retained bullet’, ‘take-home/occupational’, and other sources of lead.

No non-housing source of lead was identified for the one Native American/Alaskan child who received full case management services (n= 1). Similarly, for the one Hawaiian/Pacific Islander child who received full case management services, no non-housing source of lead was identified.

Non-housing source of lead was identified in only one of the seven multi-race children. ‘Pottery and utensils’ as well as ‘take-home/occupational’ exposures were identified as a source for the child.

Of the 29 children where ‘pottery/utensils’ were identified as source of lead exposure, 22 (75.9 percent) were Hispanic children. ‘Take-home/occupational’ exposures were also common among Hispanic children. Of the 40 children where ‘take-home/occupational’ exposures were identified as sources of lead exposure, 32 (80 percent) were Hispanic. Of the three children where ‘retained bullet’ was identified as source of exposure, 2 (66.7 percent) were Hispanic (Table 15).

Non-housing sources of lead exposure were identified in one child with unknown race/ethnicity, and the source of lead exposure was ‘take-home/occupational’ exposure.

Among the 40 take-home/occupational exposures, the most common sectors were fishing/hunting (n=8), auto repair (n= 7), metal work/soldering (n= 7), and construction (n= 6), (data not shown).

Although unconfirmed, exposures from previous residence/travel outside of California were suspected in 15 children with the top countries where previous residence/travel outside of California included Afghanistan (n= 3), Mexico (n= 7), and India (n= 2) (data not shown).

## 8) Identification of Populations at Risk by Geography

To improve the identification of geographic areas with increased lead exposure risk, CLPPB layers multiple sources of data. The results are used to inform screening regulations and target interventions and outreach when resources are limited. The table by ZIP code and map by

census tract that follow present the same underlying data. They have minor changes from those previously posted by CDPH as the underlying data have been updated where appropriate and available, and the methodology improved.

### Identifying At-Risk ZIP Codes for Blood Lead Screening

Existing law requires CDPH to develop regulations that take into account factors including but not limited to: a child's time spent in a school, home, or building built before 1978, a child's proximity to industrial facilities that currently or historically emitted lead, proximity to a freeway or heavily traveled roadway, and other potential or known risk factors for lead exposure. In 2016, the American Academy of Pediatrics (AAP) recommended universal screening of children 12-24 months of age living in geographic areas where at least 25 percent of houses were built before 1960, or 5 percent or more of tested children had BLLs  $\geq 5 \mu\text{g}/\text{dL}$ .<sup>16</sup> Using the criteria listed above, CDPH mapped these risk indicators by ZIP code to identify ZIP codes where children might be at an increased risk for lead exposure. Some ZIP codes are not associated with residences, such as ZIP codes associated with specific post offices. In the Esri GIS layer of ZIP codes from July 2020, California had a total of 1,726 ZIP codes associated with places such as schools, homes, or buildings.

As additional lead exposure risk factors are identified by CDPH and as additional information about environmental risk indicators becomes available through research studies, literature reviews, and analysis of California-specific data, this analysis will be updated to reflect geospatial risk indicators for children exposed to lead in California. This information will be incorporated into future reports to the extent possible while protecting children's privacy. These risk factors may also be used to inform targeting of screening (blood lead testing).

As illustrated in Table 16 below, based on the AAP recommendation to screen children living in ZIP codes where more than 25 percent of homes were built before 1960, children living in 888 (51.4 percent) of the 1,726 ZIP codes would be considered at risk for lead exposure. Applying the same 25 percent criteria to homes built from 1960 through 1977 adds an additional 500 ZIP codes, bringing the cumulative number of targeted ZIP codes to 80.4 percent. While there were 83 ZIP codes meeting the AAP criteria of having at least 5 percent of children with BLLs at least  $5 \mu\text{g}/\text{dL}$ , adding this criterion only added eight ZIP Codes to the cumulative list of ZIP codes because many of the ZIP codes had already been included based on the previous two criteria. The 207 ZIP codes where 2.5 percent of children had BLLs  $4.5 \mu\text{g}/\text{dL}$  or greater adds 12 additional ZIP codes to the cumulative list. Taking into account the 854 ZIP codes within 1.7 miles of a known current or historic lead emitting facility adds an additional 164 ZIP codes to the cumulative list. Including the 1,512 ZIP codes for which a portion of the ZIP code was within 1,000 feet of a major highway adds 127 ZIP codes to the cumulative list. The 232 ZIP codes for cities with a former smelter adds 4 ZIP codes to the cumulative risk. The 328 ZIP codes where a portion of the ZIP code was within 1 kilometer (km) of a small craft airport (where leaded aviation fuel [avgas] continues to be used) adds 1 ZIP code. The 993 ZIP codes where a portion

of the ZIP code is within 1 km of railroad tracks adds 8 ZIP codes to the cumulative list. All 84 ZIP codes that were within 1,000 feet of a speedway were already covered by previous criteria. One hundred and seventy-five ZIP codes overlapped with a water district with at least one known leaded service line or fitting, adding 1 ZIP code.

Taking into account all eleven geospatial risk indicators, 99.2 percent of California’s ZIP codes present increased risk for lead exposure. Only 13 California ZIP codes do not have a geospatial risk indicator. See Appendix E for the lists of covered and remaining ZIP codes.

**Table 16. Geospatial Indictors of Risk for Childhood Lead Exposure for California ZIP Codes**

Criteria <sup>A</sup>	ZIP Codes <sup>B,C</sup>	Additional ZIP Codes <sup>D</sup>	Cumulative ZIP Codes <sup>E</sup>	Percent of ZIP Codes Covered <sup>F</sup>
AAP - 25% pre-1960 <sup>G</sup>	888	888	888	51.4%
25% pre-1978 <sup>H</sup>	1,388	500	1,388	80.4%
AAP - 5% BLLs 4.5+ <sup>I</sup>	83	8	1,396	80.9%
2.5% BLLs 4.5+ <sup>J</sup>	207	12	1,408	81.6%
1.7mi current or historic lead emitting facility <sup>K</sup>	854	164	1,572	91.1%
1,000 feet SHN <sup>L</sup>	1,512	127	1,699	98.4%
City with a smelter <sup>M</sup>	232	4	1,703	98.7%
1km airport <sup>N</sup>	328	1	1,704	98.7%
1km railroad <sup>O</sup>	993	8	1,712	99.2%
1,000 feet speedway <sup>P</sup>	84	0	1,712	99.2%
In water district with at least one known leaded user service line or fitting <sup>Q</sup>	175	1	1,713	99.2%
Remaining <sup>R</sup>	--	13	1,726	100.0%
<b>Total</b>	--	<b>1,726</b>	--	--

<sup>A</sup> These criteria were compiled from existing recommendations by the American Academy of Pediatrics, mandated by the legislature (pre-1978 buildings, air emitters, highways, and smelters), and by literature (airports, railroads, speedways, lead water user service lines or fittings).

<sup>B</sup> The United States Postal Service uses ZIP codes to deliver mail quickly and efficiently. They routinely update the number of ZIP codes and their boundaries in response to changing geographic population distribution. Esri produces a shapefile of ZIP codes for use in mapping. For this reason, P.O. Box ZIP codes are excluded. There were 1,758 ZIP codes in the July 2020 shapefile, 32 of which begin with "000" and represent large unpopulated government lands. These 32 ZIP codes have been excluded from this analysis, leaving 1,726 ZIP codes.<sup>17</sup>

<sup>C</sup> The values in this column represent the total number of ZIP codes that fall into the row's criterion. For those related to a point source, a ZIP code is counted if any part of it intersects that point source's buffer.

<sup>D</sup> The values in this column represent the additional ZIP codes that are covered beyond the criteria in the rows above. The top row is the baseline. For example, 127 of the 1,512 ZIP codes that at least partially intersected 1,000 feet of a state highway were not already represented in the five rows above.

<sup>E</sup> The values in this column represent the cumulative number of ZIP codes that are covered by that row's criterion or any criteria in the rows above. For example, 1,699 ZIP codes were covered by at least partially intersecting 1,000 feet of a state highway or meeting any of the criteria in the five rows above.

<sup>F</sup> The values in this column represent the cumulative percent of all ZIP codes that are covered by that row's criterion or any criteria above. For example, 98.4% of ZIP codes are covered by at least partially intersecting 1,000 feet of a state highway or meeting any of the criteria in the five rows above.

<sup>G</sup> The AAP recommends blood lead testing for children ages 12 to 24 months living in communities where at least 25% of the housing stock was built before 1960. A ZIP code met this criterion if at least 25% of its residential housing, based on Digital Map Product's parcel data from July 2020, was built before 1960. Residential parcels with a missing year built were excluded from these calculations.<sup>16, 18, 19</sup>

<sup>H</sup> To acknowledge the risk of lead hazards in all houses built before 1978, the AAP criterion was repeated using 1978 instead of 1960.

<sup>I</sup> The AAP recommends blood lead testing for children ages 12 to 24 months living in communities where at least 5% of blood lead tests are  $> 5 \mu\text{g}/\text{dL}$ . The State rounds and considers a level of  $4.5 \mu\text{g}/\text{dL}$  a 5. The blood lead data are for calendar year 2020 from the RASSCLE surveillance database archive of July 30, 2021. Those BLLs reported as " $< 5 \mu\text{g}/\text{dL}$ " from an analyzing laboratory that routinely reported " $< 5 \mu\text{g}/\text{dL}$ " as their limit of detection in 2020 are included in the category " $\text{BLL} < 4.5 \mu\text{g}/\text{dL}$ ". Despite uncharacteristically low testing rates in calendar year 2020 because of the COVID-19 pandemic, none of the 13 remaining ZIP codes would have been covered had 2019 BLLs been used.<sup>16, 19</sup>

<sup>J</sup> The CDC reference value for childhood blood lead is obtained from the 97.5th percentile of BLLs in children less than 6 years old in the two most recent NHANES surveys. Communities where more than 2.5% of children have BLLs above the reference value have a higher prevalence of childhood lead poisoning than the nation as a whole. The CDC updated the reference value from the 2012 blood lead level of  $5 \mu\text{g}/\text{dL}$  in October 2021; data in this report were produced prior to the update and reflect the 2012 reference value of  $4.5 \mu\text{g}/\text{dL}$  (The State rounds and considers a level of  $4.5 \mu\text{g}/\text{dL}$  a 5).<sup>1</sup>

<sup>K</sup> AB 1316 requires that the state consider a child's proximity to a facility that historically or currently emits lead. A list of sites from the EPA Toxic Release Inventory that emitted lead since 1988 (extracted on April 12, 2021) was mapped and a 1.7-mile buffer was drawn. The 1.7-mile buffer was chosen in accordance with literature on the lead contamination from two major emitters, Exide and Quemetco.<sup>20, 21, 22</sup>

<sup>L</sup> AB 1316 requires that the state consider a child's proximity to a freeway or heavily trafficked roadway. A layer for the California State Highway Network from a December 31, 2017 extraction from the Transportation System Network database maintained by the California Department of Transportation was used with a 1,000-foot buffer. The 1,000-foot buffer was determined based on a California Air Resources Board Technical Advisory about air pollution around freeways.<sup>23, 24</sup>

<sup>M</sup> AB 1316 requires that the state consider a child's proximity to a former lead or steel smelter. A list was compiled of the location and activities of iron and steel plants, metal foundries, lead smelters, storage battery manufacturing plants, scrap metal plants, mines that may have mined lead along with zinc, iron, or copper, metal rolling, stamping and metal powder producers, brass and copper smelters, and babbitt and solder manufacturers in California. Some of the texts used were rare and required special handling. Many of the locations were not specific (only the name of the city or town was given) and in two cases, references were only found in older newspapers. Due to the lack of an address and site size for most sites, all ZIP codes within a city listed as having one of these facilities are included.

<sup>N</sup> Lead continues to be used in avgas for small-craft airplanes. A list of 183 airports where leaded fuel is recorded as being used in the Federal Aviation Administration's Airport Data and Information Portal (extracted on March 21,

2021) were mapped and a 1 km buffer was drawn.<sup>25</sup> An article by Miranda found lead soil contamination up to 1 km away from airports where planes use avgas.<sup>25, 26</sup>

<sup>o</sup> Trains carrying coal are often uncovered, allowing coal dust to travel into the areas surrounding the tracks. Coal has historically and is currently being transported in this manner in California. A layer of railroads in California from Caltrans (last updated on January 27, 2020) was used with a 1 km buffer. A study by Li found lead-contaminated dust up to 1 km away from railroad tracks.<sup>27, 28</sup>

<sup>p</sup> While leaded fuel for on-road vehicles was banned in the 1990s, the ban did not cover race car fuel, which continued to be used into the 2000s. The US EPA noted in their 2006 report on sources of lead that populations living in the vicinity of racetracks were at an increased risk of lead exposure. A list of speedways in California was extracted from a racing website on April 11, 2019. A 1,000-foot buffer was used with the assumption that on-road vehicles on highways and race cars on speedways will emit lead particles in a similar manner.<sup>29, 30</sup>

<sup>q</sup> Water service lines and fittings that contain lead pose a risk of drinking water contamination. A list of water service areas with at least one known lead service line or fitting in calendar year 2019 was extracted from the California Water Board's Lead Service Line Replacement Inventory Status database (updated February 3, 2021) and was joined to California Water Resources Control Board's Drinking Water Service Area Boundaries layer updated on March 16, 2021.<sup>31, 32</sup>

<sup>r</sup> The "remaining" ZIP codes are those that did not fall into any of the above criteria.

## Identifying At-Risk Census Tracts for Targeted Interventions and Outreach

The table of geospatial indicators of risk by ZIP code above informs the development of expanded blood lead testing requirements to ensure all children at risk of elevated BLLs receive screening. The map presented here enables a visualization of the distribution of geospatial risk factors for lead exposure throughout the state and can inform decisions on where to target interventions when resources are limited. The map is by census tract for a more granular perspective of the state.

Census tract boundaries are driven by population; for this reason, the census tracts of densely populated areas are hard to view on the statewide map and appear black. To address this, zoomed-in maps of three of California's major population centers (the Los Angeles area, the Bay Area, and the Sacramento area) are provided.

Areas in the darkest blue are defined as having at least five of the following eight geospatial indicators: high percent of pre-1978 housing; proximity to a current or historic lead emitting facility, highway, smelter, small-craft airport, railroad, or speedway; or service by a water district with at least one known lead user service line or fitting. The eight indicators included here are only indicative of the potential for soil contamination, water contamination, and lead-based paint. Non-housing sources such as home remedies, imported spices, and jewelry are important sources of lead exposure that are not included in these maps.

The underlying data is publicly available and can be used to assist local health jurisdictions needing to focus on a specific geospatial risk factor for lead exposure relevant to a targeted intervention or outreach effort. The data table can be joined to external data sources such as the [United States Census Bureau's American Community Survey](#) or the [Public Health Alliance of Southern California's Healthy Places Index](#) for a more complete picture of the census tracts.



[Download the Excel table of underlying data in the maps and metadata.](#)

Figure 5: California census tracts<sup>A</sup> by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing<sup>B</sup>; proximity to a current or historic lead emitting facility<sup>C</sup>, state highway<sup>D</sup>, smelter<sup>E</sup>, small-craft airport<sup>F</sup>, railroad<sup>G</sup>, and speedway<sup>H</sup>; and served by at least one known lead water user service line or fitting<sup>I</sup>

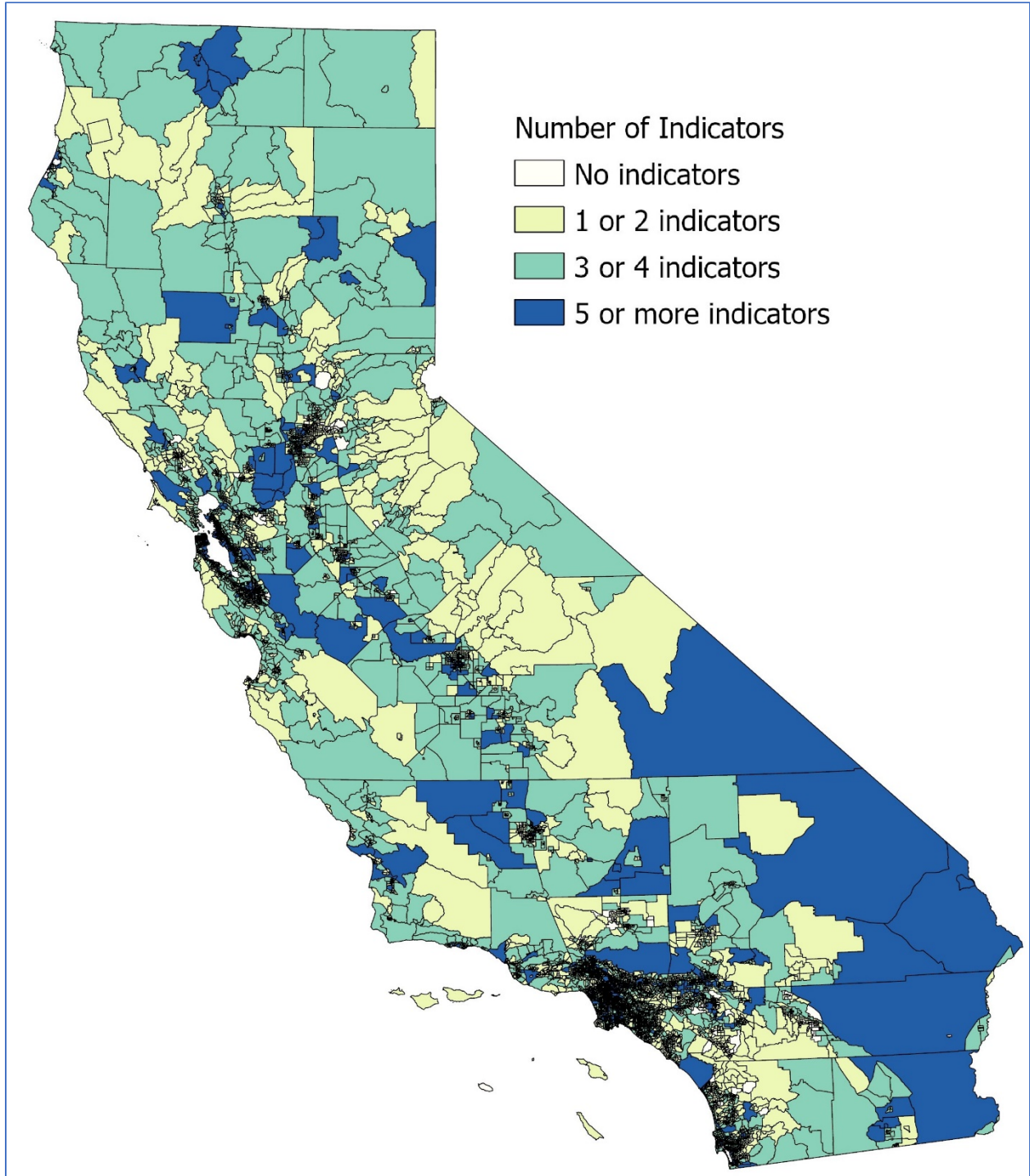


Figure 6: Los Angeles area local health jurisdictions' census tracts<sup>A</sup> by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing<sup>B</sup>; proximity to a current or historic lead emitting facility<sup>C</sup>, state highway<sup>D</sup>, smelter<sup>E</sup>, small-craft airport<sup>F</sup>, railroad<sup>G</sup>, and speedway<sup>H</sup>; and served by at least one known lead water user service line or fitting<sup>I</sup>

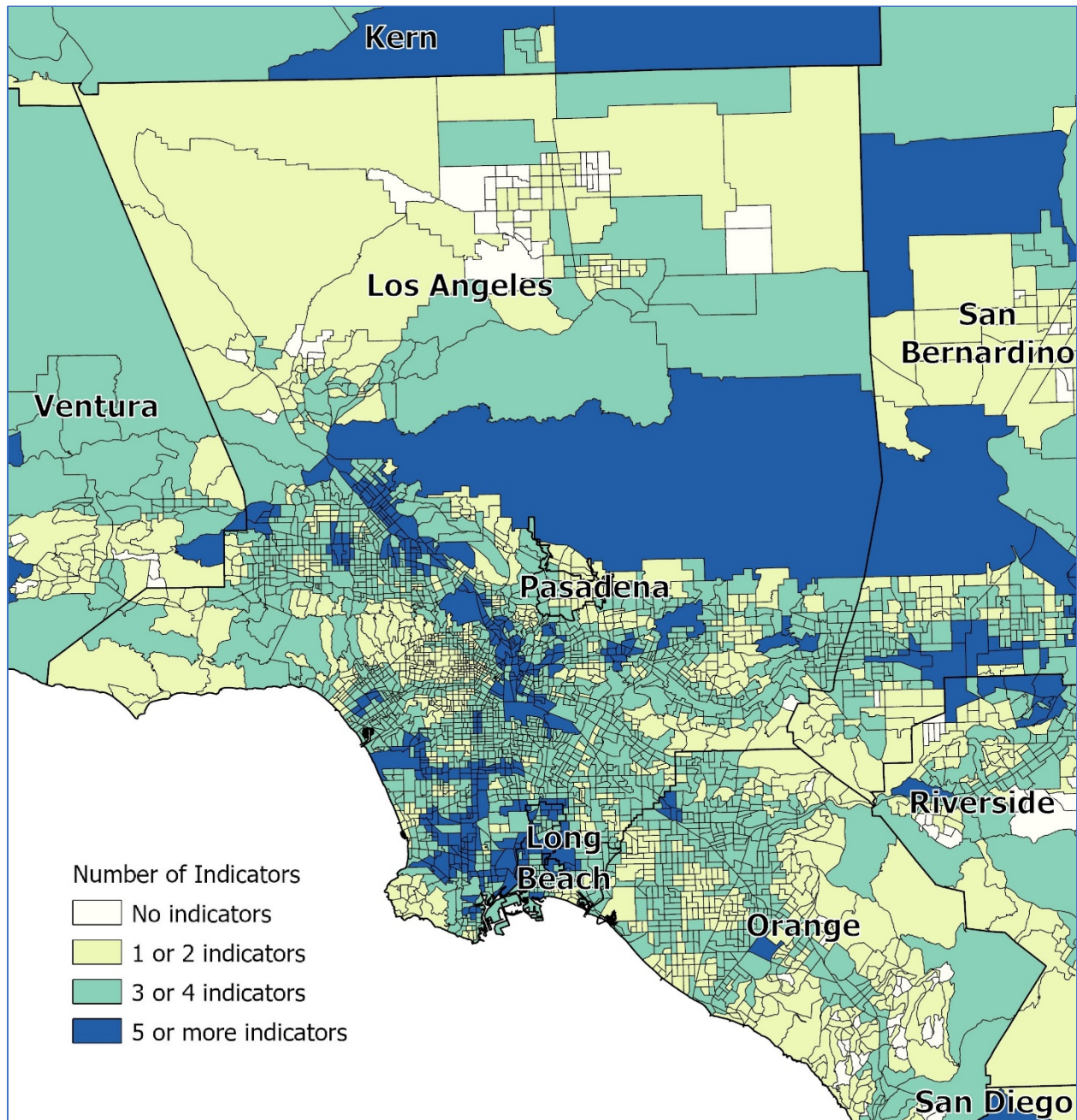


Figure 7: Bay Area local health jurisdictions' census tracts<sup>A</sup> by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing<sup>B</sup>; proximity to a current or historic lead emitting facility<sup>C</sup>, state highway<sup>D</sup>, smelter<sup>E</sup>, small-craft airport<sup>F</sup>, railroad<sup>G</sup>, and speedway<sup>H</sup>; and served by at least one known lead water user service line or fitting<sup>I</sup>

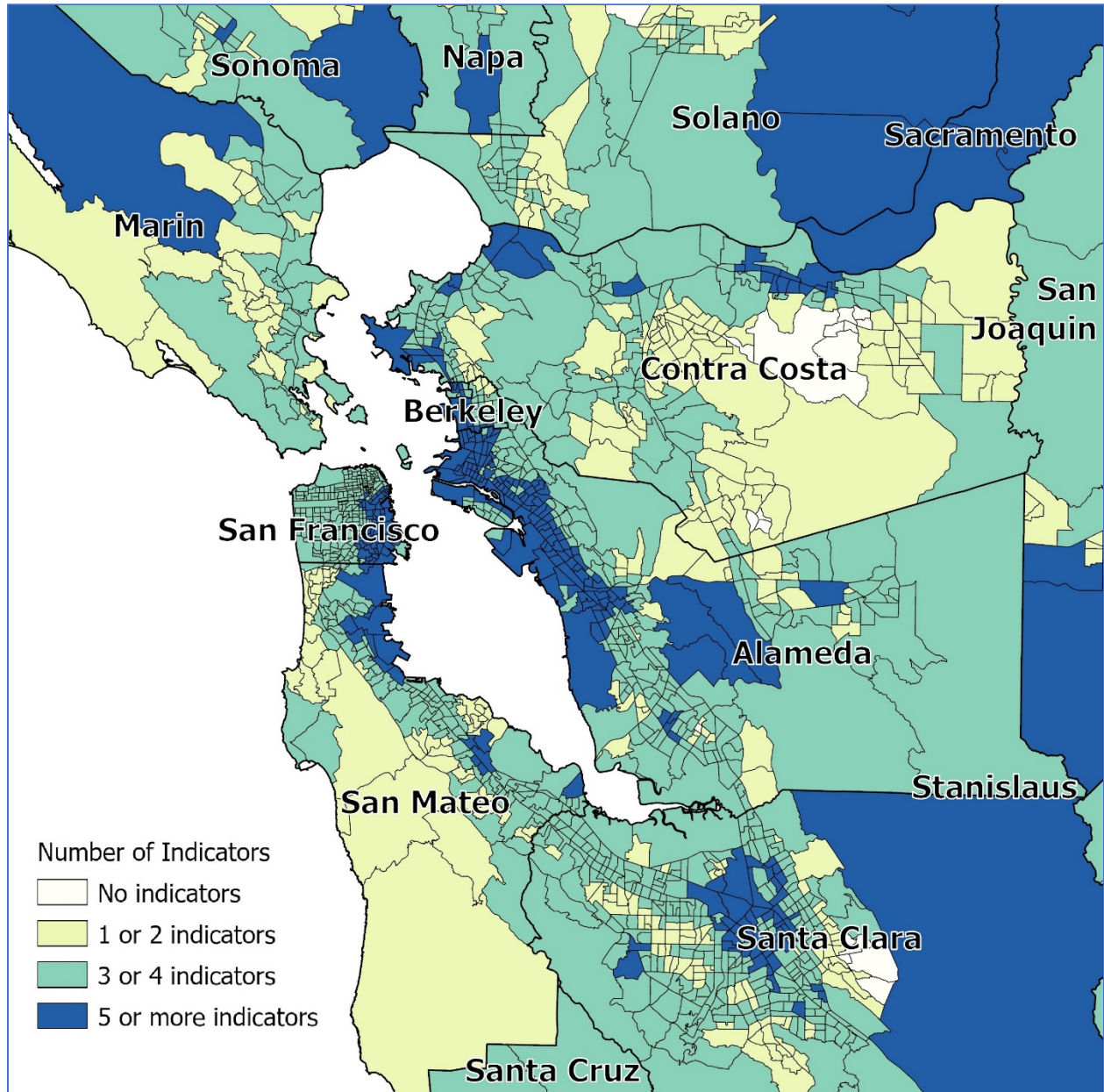
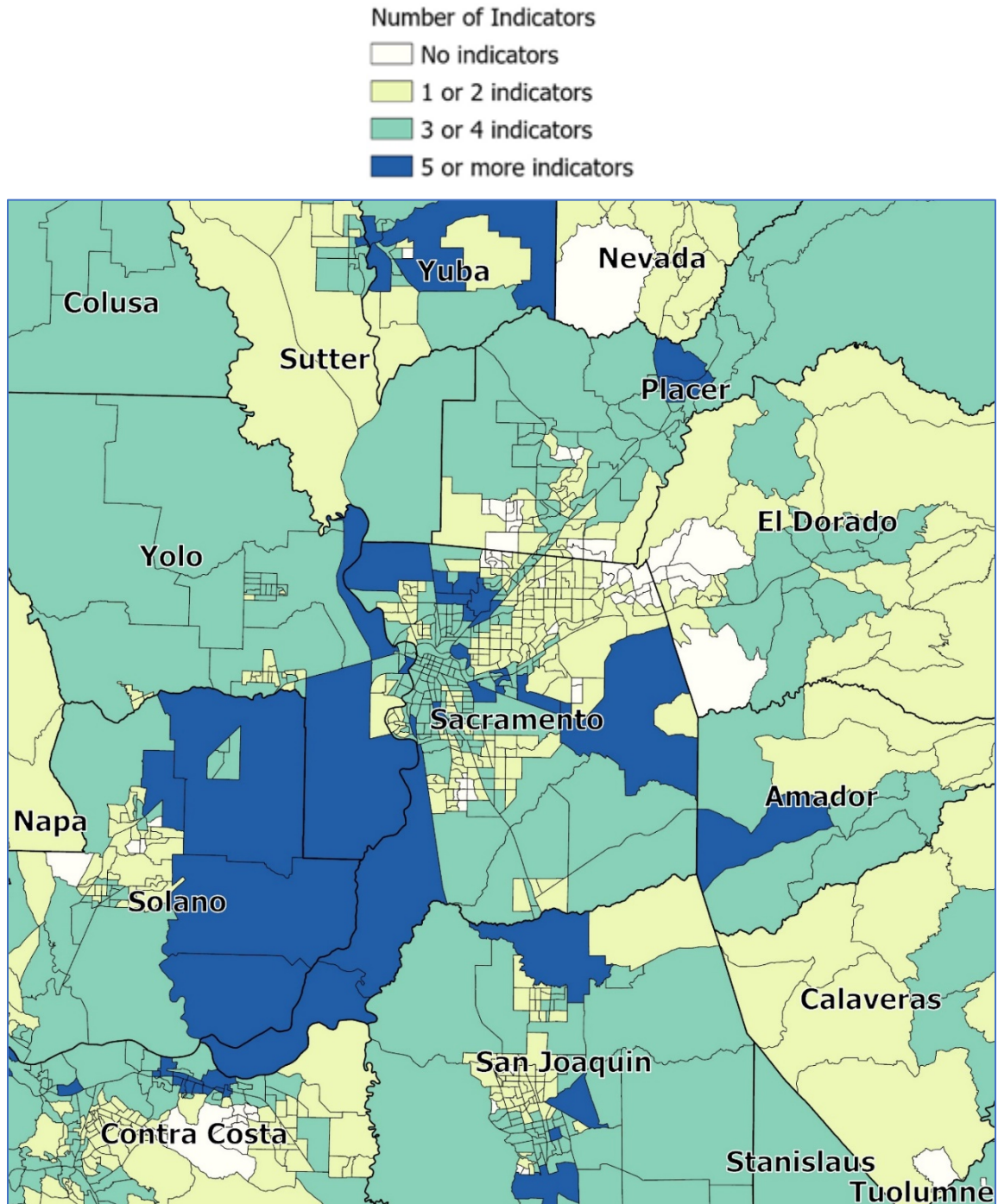


Figure 8: Sacramento area local health jurisdictions' census tracts<sup>A</sup> by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing<sup>B</sup>; proximity to a current or historic lead emitting facility<sup>C</sup>, state highway<sup>D</sup>, smelter<sup>E</sup>, small-craft airport<sup>F</sup>, railroad<sup>G</sup>, and speedway<sup>H</sup>; and served by at least one known lead water user service line or fitting<sup>I</sup>



<sup>A</sup> Census tracts with no land area are excluded, leaving 9,107 of California's 9,129 census tracts.<sup>33</sup>

<sup>B</sup> At least 25% of the residential parcels were built before 1978. The American Academy of Pediatrics recommends blood lead testing for children ages 12 to 24 months living in communities where at least 25% of the housing stock was built before 1960. To acknowledge the risk of lead-based paint in houses built between 1960 and 1978, the criterion was applied using 1978 instead of 1960. A census tract met this criterion if at least 25% of its residential housing, based on Digital Map Product's parcel data from July 2020, was built before 1978. Residential parcels with a missing year built were included as pre-1978 parcels in these calculations to be protective.<sup>16, 18, 19</sup>

<sup>C</sup> Census tract is within 1.7 miles of a current or historic lead emitting facility. A list of sites from the US EPA Toxic Release Inventory that emitted lead since 1988 (extracted on April 12, 2021) was mapped and a 1.7-mile buffer was drawn. The 1.7-mile buffer was chosen in accordance with literature on the lead contamination from two major emitters, Exide and Quemetco.<sup>20, 21, 22</sup>

<sup>D</sup> Census tract is within 1,000 feet of a state highway. A layer for the California State Highway Network from a December 31, 2017 extraction from the Transportation System Network database maintained by the California Department of Transportation (Caltrans) was used with a 1,000-foot buffer. The 1,000-foot buffer was determined based on a California Air Resources Board Technical Advisory about air pollution around freeways.<sup>23, 24</sup>

<sup>E</sup> Census tract is within the city of a known current or historic smelter. A list was compiled of the location and activities of iron and steel plants, metal foundries, lead smelters, storage battery manufacturing plants, scrap metal plants, mines that may have mined lead along with zinc, iron, or copper, metal rolling, stamping and metal powder producers, brass and copper smelters, and babbitt and solder manufacturers in California. Some of the texts used were rare and required special handling. Many of the locations were not specific (only the name of the city or town was given) and in two instances, references were only found in older newspapers. Due to the lack of an address and site size for most sites, all census tracts within a city listed as having one of these facilities are included.

<sup>F</sup> Census tract is within 1 km of an airport using leaded avgas. Lead continues to be used in avgas for small-craft airplanes. A list of 183 airports where leaded fuel is recorded as being used in the Airport Data and Information Portal from the Federal Aviation Administration (extracted on March 21, 2021) was mapped and a 1 km buffer was drawn. An article by Miranda found lead soil contamination up to 1 km away from airports where planes use avgas.<sup>25, 26</sup>

<sup>G</sup> Census tract is within 1 km of a railroad. Trains carrying coal are often uncovered, allowing coal dust to travel into the areas surrounding the tracks. Coal has historically and is currently being transported in this manner in California. A layer of railroads in California from Caltrans (last updated on January 27, 2020) was used with a 1 km buffer. A study by Li found lead-contaminated dust up to 1 km away from railroad tracks.<sup>27, 28</sup>

<sup>H</sup> Census tract is within 1,000 feet of a speedway. While leaded fuel for on-road vehicles was banned in the 1990s, the ban did not cover race car fuel, which continued to be used into the 2000s. The United States Environmental Protection Agency noted in their 2006 report on sources of lead that populations living in the vicinity of racetracks were at an increased risk of lead exposure. A list of speedways in California was extracted from a racing website on April 11, 2019. A 1,000-foot buffer was used with the assumption that on-road vehicles on highways and race cars on speedways will emit lead particles in a similar manner.<sup>29, 30</sup>

<sup>I</sup> Census tract is served by a water district with at least one known leaded user service line or fitting. Water service lines and fittings that contain lead pose a risk of drinking water contamination. A list of water service areas with at least one known leaded user service line or fitting in calendar year 2019 was extracted from the California Water Board's Lead Service Line Replacement Inventory Status database (updated February 3, 2021) and was joined to California Water Resources Control Board's Drinking Water Service Area Boundaries layer updated on March 16, 2021.<sup>31, 32</sup>

## Chapter 2: Progress on CDPH's Commitment to Strengthen the CLPP Program

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In 2020, CDPH committed to strengthening the CLPP Program through four primary objectives in the report, "[California's Progress in Preventing and Managing Childhood Lead Exposure](#)." These objectives included strategies to respond to the 2020 California State Auditor (CSA) report. This chapter provides an update on CDPH's progress to implement these strategies to strengthen the program.

### Objective 1: Increase blood lead testing of at-risk children

#### Strategies:

- Collaborate with DHCS to ensure that all children enrolled in Medi-Cal receive recommended blood lead testing.
- Publish data identifying geographic areas that may be at high risk for lead contamination for state intervention and assisting in application for funding for remediation.
- Promulgate developed regulations to enhance health care providers' ability to identify children at risk for lead exposure.
- Increase CDPH outreach to providers and parents to ensure they are aware of the dangers of childhood lead exposure, the criteria for identifying children at risk for lead exposure, and the importance of screening and follow-up blood lead testing.

#### Progress:

- Worked with DHCS to identify Medi-Cal children who did not receive screening and to understand barriers to receiving appropriate screening. Co-developed a protocol for identifying and improving practices among providers with low rates of performing mandated screenings. CDPH and DHCS will continue to conduct data matches to identify children who have not been screened.
- Published a map and data table on geospatial indicators of risk by census tract for use by local health jurisdictions and the public. Identified areas of the state to target increased blood lead screening outreach and lead exposure reduction education projects utilizing blood lead data, poverty data, housing data and social vulnerability data. CDPH will continue to target high-risk geographic areas for more funding and focused interventions and publish data identifying geographic areas of concern.
- Advanced in the rulemaking process to expand the lead risk factor criteria for children and completed extensive fact finding and analysis considering lead exposure risk associated with a child's proximity to historical or current lead emitting industrial

facilities, freeways and heavily traveled roadways, other potential risk factors for lead exposure, and known sources of lead contamination.

- Published and disseminated information about mandated screening requirements, exposure risk factors, and information about free patient educational materials available for provider offices.
- Assessed screening barriers via a survey of medical providers during provider presentations given by CLPPB medical officers to inform development of interventions to increase screening rates. CDPH is also conducting further analysis to better understand why testing of children for blood lead has declined in some locations despite widespread public education about the hazards of lead exposure. Future investigations will focus on determining whether there are demographic or behavioral characteristics that lead some children to be less likely to receive screening and testing than other children.

## Objective 2: Provide appropriate case management services to all children with identified elevated BLLs so that sources of lead exposure are removed and BLLs decline

### Strategies:

- Develop a robust database to better track data to allow timely identification of potential issues with blood lead testing or case management.
- Provide increased oversight of, and technical assistance to, local CLPPBs to ensure children with elevated BLLs receive all follow-up services in a timely manner.

### Progress:

- As of April 2021, CLPPB completed site reviews of all 50 contracted LHJs for contract cycle 2017-2020. CDPH will continue to conduct site reviews to review work activities for each new contract cycle. To improve the effectiveness of site reviews, CLPPB completed a comparative analysis to eliminate data collection redundancies between site reviews and progress reports. Based on this analysis, site review tools were streamlined and enhanced. As part of the improved site review process, CLPPB now provides 'Recommendations for Program Improvement' that require long-term planning from LHJs. By having a process in place to continually track and monitor implementation of suggested long-term improvements, CLPPB will continue to provide LHJs with ongoing support and feedback to meet expectations.
- Assessed Program performance statewide by cross-walking progress report data against contract Scope of Work requirements. To help facilitate this analysis, CDPH has developed and implemented Excel templates for biannual Program reporting that correspond to each area of the Scope of Work (i.e., Administration, Outreach, Case

Management, Environmental). To increase accountability, Excel templates are also utilized to provide performance measures data and feedback to contracted LHJs on strengths and weaknesses with respect to Scope of Work requirements. LHJs will be required to respond to any requested actions within 30 days and report progress biannually on any long-term program improvements requested as a result of a CLPPB site review.

- Implemented a protocol to adjust funding allocations to local prevention programs. This ensures equitable distribution of funding based on;(1) the population of children under six years of age who are Medi-Cal eligible beneficiaries, (2) number of children living in housing built prior to 1979, (3) and number of children with elevated and case-making blood lead levels (BLLs). All local allocations shall be subject to the constraints of achievable regulatory fee revenue pursuant to Health and Safety Code Section 105310(f).

### Objective 3: Decrease sources of lead in the environment to prevent childhood lead exposure

#### Strategies:

- Assist local agencies to identify and apply for federal funding to remediate identified sources of lead.
- Strengthen the CDPH Lead-Related Construction (LRC) program to increase workforce trained to conduct lead abatement work. The LRC Program provides training to lead construction workers to ensure safe practices when eliminating sources of lead in buildings.

#### Progress:

- Successfully continued to manage the US EPA grant and was awarded funding from the US EPA for the 2020-22 grant cycle.
- Launched a Lead Hazard Mapping Tool to provide guidance to local CLPPPs and code enforcement agencies. This guidance will assist in the identification and reduction of lead hazards in high-risk areas statewide through proactive inspections.
- Approximately 9,000 applications were processed in 2020, a 50 percent increase over 2019. Created an online certification application data system enabling individuals to apply for lead certification and pay the associated fees online. The new system dramatically improved application processing turnaround time, which went from approximately 60 days to one day per application, for all application types. Fully transitioning lead certification applications to the LRC online system is part of CDPH's ongoing effort to improve data consistency, data reporting, and ensure security and back-up capabilities.



- Continued to maintain and improve the communication of lead certification and accreditation information to stakeholders via various channels, including periodically updating online resources provided in both English and Spanish, holding annual training provider meetings, sending updates to lead professionals and training providers, constant monitoring and responding to inquiries received via the hotline and web inquiries channels. Implemented a process change to administer lead certification exams online to increase applicant and trainee access to classes and exams during the COVID-19 pandemic. Additionally, training providers were granted approval to teach portions of the courses online.

#### Objective 4: Increase partnerships with stakeholders to strengthen multi-disciplinary approaches to decreasing childhood lead exposure

##### Strategies:

- Partner with governmental programs, such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), Child Health and Disability Prevention (CHDP), and Head Start, to educate parents about the dangers of childhood lead exposure and the need for blood lead screening.
- Increase partnerships with schools to address sources of lead exposure within schools, and state and local environmental health agencies to identify and prioritize geographic areas most in need of lead abatement.

##### Progress:

- Increased partnerships with public health programs, health and human services agencies, schools, environmental agencies, and other stakeholders, including those outside the government, to strengthen a multi-disciplinary approach to decreasing lead exposure in children.
- Outreached to a diverse group of stakeholders to receive feedback on CLPP Program strategic planning.
- Launched a newsletter geared towards external stakeholders to create a new channel of communication and provide regular updates on CLPPB activities, data posting, and engagement opportunities.

#### COVID-19 Response

The COVID-19 pandemic created new barriers to providing essential childhood lead poisoning prevention services. CDPH adapted protocols and processes and created new products in response to the following impacts:

- Decline in blood lead testing

- Reduced capacity due to pandemic response work
- Pandemic safety requirements

CDPH's strategies to maintain blood lead testing during the pandemic included developing an outreach toolkit for local health jurisdictions to promote lead safety and blood lead testing; creating a new web page with resources for staying lead safe during the pandemic for key target populations; and outreach to health care providers through a Medical Board of California newsletter, live webinars, and provider fact sheet.

In response to reduced capacity due to redirected staff and pandemic safety requirements, CDPH took the following measures: assessed local health jurisdictions' capacity; implemented temporary remote home visits; and transitioned to virtual Lead-Related Construction exams. The Lead-Related Construction Unit, for example, held virtual annual Training Provider meetings in 2020 and 2021, with the same level of participation as in the past. CLPPB further published a pandemic-related [fact sheet](#) and built a [landing page for COVID-19 related information](#) on the CLPPB website.

## Chapter 3: Moving Forward

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### Development of a Statewide CLPP Program Strategic Plan

Since 2019, CLPPB has made significant improvements to address the California State Auditor's findings, improve processes and enhance communication within the statewide CLPP Program, and develop tools to measure and evaluate program performance. Additional improvements are needed in all areas of the program to prevent environmental exposures to lead, improve health equity, reduce health disparities, and work toward the elimination of childhood lead poisoning in California. CLPPB has identified the need for a robust forward-looking strategic plan to identify actionable objectives to improve services within our statewide program.

The CLPP Program's strategic plan sets a path for substantial programmatic improvements on primary prevention, robust case management and strengthened partnership with community organizations and local programs. The strategic plan builds on a strong existing infrastructure across the state and the expertise of well-established local programs. In its strategic planning initiatives, CLPPB identified, engaged, and informed internal and external partners about the planning process. CLPPB interviewed subject matter experts from public health programs across the state and the country to solicit input from the field and use best practices in public health. CLPPB collaborated with local health departments to incorporate local knowledge and input into the strategic plan and identify how to best improve the health outcomes of California's diverse populations most effectively. The CLPP Program's strategic plan process communicated priorities and direction to multidisciplinary stakeholders inside and outside of the organization to ensure support for long-term partnership. This effort ensures enhanced coordination across state agencies, the development of interdisciplinary strategies, improved engagement with community-based organizations, and a prioritization of an equity-centered approach to eliminate health disparities.

The Strategic Plan is built around six key goals:

1. Establish and support a successfully administered and equity-centered childhood lead poisoning prevention program in every local health jurisdiction.
2. Develop and engage in multi-level transdisciplinary partnerships to leverage strategies for lead poisoning prevention.
3. Create lead-safe environments by identifying and eliminating all lead hazards where children live, play, learn and spend time.
4. Advance public health best practices, policies, and interventions through data driven research.
5. Timely detection of all children who are lead burdened through universal evaluation and risk-appropriate blood lead testing.

6. Provide equitable and child-centered care for families who are lead poisoned through integrated case management and environmental services.

## Next Steps

California statutes mandate that all children in California at risk of lead exposure receive blood lead screening tests, and for the CLPP Program to continue to take steps that it determines necessary to reduce the incidence of childhood lead exposure in California.

California's decades-long commitment to prevent and treat children's lead exposure has resulted in substantial health benefits, though there is still more work to be done to ensure all at-risk children are tested across the state, and to advance lead hazard reduction efforts. With continued support, sustained screening and case management activities, and a renewed focus on health equity and primary prevention, we can expect to continue to see declines in children's exposure to lead and the lifelong burden caused by lead poisoning in the State of California.

With the finding that out of California's 1,726 zip codes, all but 13 present environmental lead hazards, it is clear comprehensive and continued efforts are necessary to protect California's children. Broad disparities by race and ethnicity, socioeconomic status, and geographic location require renewed attention. While the major sources of lead contamination of the 20<sup>th</sup> century have been banned, lead's permanence in the environment and the remaining sources of lead contamination present ongoing challenges. To meet these challenges, CLPPB will continue to evaluate the need for additional capacity in the coming years to advance stakeholder engagement, improve surveillance, act on new legislative mandates, and expand primary prevention of lead poisoning. Furthermore, CLPPB also aims to develop additional mechanisms for training and technical assistance to support local CLPPs and establish an institutional commitment to advancing health equity.

In October 2021, the CDC updated from 5 µg/dL to 3.5 µg/dL the reference value that physicians should use to consider a child's BLL elevated. The 2021 CDC reference value for childhood blood lead of 3.5 µg/dL was obtained from the 97.5th percentile of BLLs in children less than 6 years old in the two most recent NHANES surveys. Communities where more than 2.5% of children have BLLs above the reference value have a higher prevalence of childhood lead poisoning than the nation as a whole. This reference value is the basis of CDPH's definition of elevated BLLs and is used in CDPH care management protocols. CDPH will work to ensure the updated reference level is applied appropriately across all services and departments within the CLPP Program. This more stringent threshold will ensure childhood lead poisoning cases are identified earlier and steps are taken to prevent further poisoning of lead-burdened children. This is an important step forward for achieving reduced rates of elevated BLLs across the State.

Despite extensive CDPH efforts to educate families about lead exposure, and the widespread media publicity about the hazards of lead exposure, rates of blood lead testing in young

California children have been dropping. While this report has focused on CDPH's role in preventing and treating childhood lead exposures, many other state and federal agencies play an important role in protecting Californians from the toxic effects of lead. For example, the Water Resources Control Board in CalEPA is charged with ensuring that public water supplies do not expose children to lead. Similarly, the California Department of Social Services (CDSS) has responsibility for ensuring that licensed childcare facilities are lead-free. The California Department of Education is charged with ensuring that water supplied in schools is free of lead. CDPH will expand efforts to collaborate and coordinate with partner agencies on lead poisoning prevention efforts to protect California's children.

Children from refugee communities have twice the prevalence rates of elevated BLLs than children born in the United States.<sup>34</sup> In addition, these children are often resettled in communities with a high rate of lead hazard risk and, due to language barriers, low health literacy, and lack of access to healthcare, less likely to receive appropriate screening and follow-up health care. CLPPB is partnering with the CDPH Office of Refugee Health to serve the children with EBLLs coming from Afghanistan. Primary prevention efforts are needed to prevent exposure and address risks to improve the health of all children locally, including newly resettled refugees.

CDPH recognizes the importance of partnering with and for communities to co-develop and implement effective and equitable strategies that are needs-based and informed by partners. CDPH seeks to partner with all relevant stakeholders, including from communities who are at highest risk, academic institutions, and from the private sector, to not only work toward eliminating lead poisoning, but also support and empower partners in the process as well. Achieving the goal of lead-safe environments across the entire state where all children can achieve their full potential is possible with continued dedication, partnership, and innovation.

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## Appendix A: Legislative Mandates and Reporting Requirements for the Childhood Lead Poisoning Prevention Program

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The CLPP Act of 1991 (AB 2038, Connelly, Chapter 799, Statutes of 1991) charged the Department of Health Services (now the CDPH), with collecting and analyzing information on lead testing; developing protocols for screening for lead; identifying children with elevated BLLs, ensuring that children with elevated BLLs receive appropriate case management; and reducing exposure to lead and the consequences of that exposure.

### Section 1: Broad categories of program requirements.

#### 1) Universal Laboratory Reporting of Blood Lead Level Tests

California Health and Safety Code (HSC) Section 124130 requires that all results of lead tests performed on blood drawn in California be reported to CDPH. Universal laboratory reporting of blood lead tests to the State began January 1, 2003, and full electronic reporting began in 2007.

#### 2) Geographic Distribution of California Children with Elevated Blood Lead Levels

HSC Section 105295 requires CDPH to include information in a report available to local health departments and the general public about the total number of children tested for lead and the results of blood lead testing by ranges of lead levels for each county.

HSC Section 124125 requires CDPH to post information online that evaluates the department's progress in meeting the goals of the Childhood Lead Poisoning Prevention Act. The information is required, to the extent possible, to include a list of the census tracts in which children test positive at a rate higher than the national average for blood lead in exceedance of the CDC's reference level for elevated blood lead. The posted information is required to comply with all applicable state and federal laws for the protection of the privacy and security of data.

#### 3) Targeted Screening to Identify Children with Lead Exposure

California's blood lead screening regulations focus on children believed to be at greatest risk for lead poisoning.<sup>12,13,14</sup> Currently, these include children under age 6 years who receive services through a publicly funded health program for low-income children. These programs include: Medi Cal, CHDP, and WIC. This also includes any federally funded or State of California-funded program that provides medical services or preventive health care to children in families whose income is equal to or less than the maximum qualifying income level for participation in any of the specified programs.

Children not in publicly funded health programs are targeted and considered at increased risk for elevated BLLs if they are exposed to a place built before 1978 that has peeling or chipped paint, or that has recently been renovated.

Children in the targeted at-risk groups are required by California regulations to receive a blood lead test.<sup>14</sup> Testing is to be carried out at ages 12 months, 24 months, and any time up to 6 years old, if testing was previously missed.

#### Screening of Medi-Cal Population

Because poverty places children at high risk for lead exposure, both state and federal regulations require that children served by Medicaid be screened for lead with a blood lead screening test at ages 12 and 24 months, and up to 6 years old, if not previously tested.<sup>14,15</sup>

HSC Section 105295 requires reporting on Medi-Cal blood lead testing to ensure children enrolled in Medi-Cal are receiving mandated testing and follow up. CDPH is required to report the total number of children enrolled in Medi Cal, broken down by county and by year of age, who have received and who have not received blood lead screening tests. CDPH must also include the number of children not enrolled in Medi-Cal who have received blood lead screening tests.

#### 4) CDPH Outreach to Health Care Providers to Increase Screening

HSC Section 105286 requires CDPH to notify health care providers who perform periodic health assessments for children about the risks and effects of childhood lead exposure, and the blood lead testing requirements for children enrolled in Medi-Cal and children not enrolled in Medi-Cal with a high risk of exposure to lead. It also requires those health care providers to provide the same information to parents and guardians of children.

#### 5) Family and Community Outreach on Lead Poisoning Screening and Prevention

Current regulations require that medical providers provide anticipatory guidance on lead exposure to parents or guardians of children, and that they conduct blood lead screening of targeted at-risk children.<sup>14</sup> These regulations specify:

- For all children, anticipatory guidance on lead exposure and preventing lead poisoning be given to a parent or guardian at each periodic health assessment from the time the child begins to crawl (age 6 months) to 72 months. This guidance must include at a minimum, the information that children can be harmed by exposure to lead, especially deteriorating or disturbed lead-based paint and the dust from it, and are particularly at risk of lead poisoning from the time the child begins to crawl until 72 months of age;
- Children receiving services from a publicly funded health program are to be screened for lead poisoning by blood lead testing at 12 months and 24 months of age and, if tests are missed, children are to be screened up to age 72 months;
- Children not in publicly funded programs are to be assessed for risk of lead exposure by the provider asking, "Does your child live in, or spend a lot of time in, a place built before 1978 that has peeling or chipped paint or that has been recently renovated?" A blood lead test is done if the answer is "yes" or "don't know" and, screening by blood

lead testing is to be conducted whenever a health care provider performing an assessment of a child 12 months to 72 months of age becomes aware that a change in circumstances has put the child at risk of lead poisoning.

## 6) Case Management Services

HSC Section 105290 requires when a child is identified with lead poisoning, the department shall ensure appropriate case management.

HSC Section 105295 requires reporting the number of children, by BLL range, who were referred for case management and environmental services and who received a home visit, an environmental investigation, family education, provision of educational materials, a nutrition assessment, and nutritional education.

## 7) Sources of Lead Exposure

HSC Section 105295 requires analysis and reporting on identified sources of exposure for lead-exposed children and whether these lead hazards have been addressed by being removed, ameliorated, or abated.

## 8) Identification of Populations at Risk

HSC Section 105285 requires CDPH to adopt regulations establishing an expanded standard of care to determine whether a child is at risk for lead poisoning by considering additional environmental risk factors for lead exposure that consider:

- A child's time spent in a home, school, or building built before 1978.
- A child's proximity to a former lead or steel smelter or an industrial facility that historically emitted or currently emits lead.
- A child's proximity to a freeway or heavily traveled roadway.
- Other potential risk factors for lead exposure, and known sources of lead contamination.
- A child's residency in or visit to a foreign country.
- A child's residency in a high-risk ZIP code.
- A child who has a sibling or playmate with lead poisoning.
- The likelihood of a child placing nonfood items in the mouth.
- A child's proximity to current or former lead-producing facilities.
- The likelihood of a child using food, medicine, or dishes from other countries.

## 9) Equitable and Commensurate Funding of Local Jurisdictions

HSC Section 105301 requires CDPH to update its formula for allocating funds to local agencies which contract with the Department to ensure that funding for each jurisdiction is commensurate with the level of services required to be provided in a local jurisdiction based on need and burden.

### Section 2: Full List of Legislative Mandates

#### Childhood Lead Poisoning Prevention Act of 1986

[\(California Health and Safety Code Sections 124125 to 124165\)](#)

Declared childhood lead exposure as the most significant childhood environmental health problem in the state. Established the CLPP Program and instructed it to continue to take steps necessary to reduce the incidence of childhood lead exposure in California.

#### Childhood Lead Poisoning Prevention Act of 1991

[\(California Health and Safety Code Sections 105275 to 105310\)](#)

Reaffirmed California's commitment to lead poisoning prevention activities; provided CDPH with broad mandates on blood lead screening protocols, laboratory quality assurance, identification and management of lead-exposed children, and reducing lead exposures.

#### Laboratory Blood Lead Reporting Requirements

[\(California Health and Safety Code Section 124130\)](#)

Requires laboratories analyzing human blood drawn in California for lead to report all blood lead test results, on persons of any age, to the state. Analyzing laboratories must also report specific information on the person tested, the ordering physician, the analyzing laboratory, and the test performed. Information must be reported electronically.

#### Accreditation of Training Providers and Certification of Individuals

[\(California Health and Safety Code Section 105250\)](#)

Establishes a program to accredit lead-related construction training providers and certify individuals to conduct lead-related construction activities.

#### Lead-Safe Housing and Lead Hazards

[\(California Civil Code Section 1941.1; California Health and Safety Code Sections 17961, 17980, 124130, 17920.10, 105250-105257\)](#)

Deems a building to be in violation of the State Housing Law if it contains lead hazards and requires local enforcement agencies to enforce provisions related to lead hazards. Makes it a crime for a person to engage in specified acts related to lead hazard evaluation, abatement, and lead-related construction courses, unless certified or accredited by the Department. Permits local enforcement agencies to order the abatement of lead hazards or issue a cease-and-desist order in response to lead hazards.

## Lead Exposure Screening

[\(California Health and Safety Code Section 1367.3\)](#)

Requires health care service plans, covering hospital, medical, or surgical expenses on a group basis, to offer benefits that include screening for BLLs in at-risk children.

[\(California Insurance Code, Section 10119.8\)](#)

Requires insurers offering individual or group disability insurance policies, covering hospital, medical, or surgical expenses, to offer coverage for blood lead screening.

## Real Estate Disclosure Requirements

[\(California Civil Code Sections 1102 to 1102.16\)](#)

Requires the disclosure of known lead-based paint hazards upon sale of a property.

## Lead-Safe Schools Protection Act

[\(California Education Code Sections 32240 to 32245\)](#)

Implemented a lead poisoning prevention and protection program for California schools for a survey to evaluate risk factors that predicted lead contamination in public schools. The survey was completed in 1998.

## Lead-Related Activities in Construction Work

[\(California Labor Code Sections 6716 to 6717\)](#)

Provides for the establishment of standards that protect the health and safety of employees who engage in lead-related construction work, including construction, demolition, renovation, and repair.

## Lead in Children's Toys

[\(California Health and Safety Code Sections 108550 to 108580\)](#)

Prohibits the manufacture, sale, or exchange of toys with lead content in excess of the amount permitted by federal regulations.

## Lead in Candy

[\(California Health and Safety Code Sections 110552\)](#)

Limits the amount of lead in candies and lead in candy wrappers to naturally occurring levels.

## Lead in Jewelry

[\(California Health and Safety Code Sections 25214.1 to 25214.4.2\)](#)

Limits the amount of lead allowed in jewelry.

## Lead in Plumbing

[\(California Health and Safety Code Sections 116875 to 116880\)](#)

Requires the use of lead-free pipes and fixtures in any installation or repair of a public water system or in a facility where water is provided for human consumption.

## Occupational Lead Poisoning Prevention

[\(California Health and Safety Code Sections 105185 to 105197\)](#)

Establishes an occupational lead poisoning prevention program to register and monitor laboratory reports of adult lead toxicity cases, monitor reported cases of occupational lead poisoning to ascertain lead poisoning sources, conduct investigations of take-home exposure cases, train employees and health professionals regarding occupational lead poisoning prevention, and recommended means for lead poisoning prevention.

## Childhood Lead Poisoning Prevention

[\(Health and Safety Code Sections 1367.3, 105280, 105285, 105290, 105310, 124125, 124130, and 124150, 124151 and Insurance Code Sections 10123.5 and 10123.55\)](#)

Requires the Department to develop regulations establishing a standard of care to include the determination of risk factors for whether a child is at risk for lead poisoning and would require the department, when determining those risk factors, to consider the most significant environmental risk factors, as specified.

## Lead Poisoning Case Management Reporting

[\(Health and Safety Code Section 105295\)](#)

Requires the department to prepare a biennial report describing the effectiveness of appropriate case management efforts.

## Blood Lead Screening of Children Enrolled in Medi-Cal

[\(Health and Safety Code Sections 105285, 105286, 105295, 105300, and 124125\)](#)

Requires all children at risk of lead exposure to receive blood lead screening tests, requires the department to act, and to require local agencies to act, as necessary to ensure these goals are met. Requires the department to report on additional content, including the total number of children enrolled in Medi-Cal and who have secured blood lead screening tests.

## Drinking Water Testing in Child Day Care Facilities

[\(Health and Safety Code Sections 1596.7996, 1596.866, 1596.8661 and 1596.7996\)](#)

Requires a licensed child day care center that is located in a building that was constructed before January 1, 2010, to have its drinking water tested for lead contamination levels on a specified schedule.

## Drinking Water Testing at School Sites

[\(Health and Safety Code 116277\)](#)

Requires that a community water system that serves a school site of a local educational agency with a building constructed before January 1, 2010, shall test for lead in the potable water system of the school site on or before July 1, 2019.

## Section 3: California Lead Poisoning Prevention Regulations

### Title 17

#### [California Code of Regulations, Title 17, Sections 37000 to 37100](#)

For more information, please see [Health Care Providers](#) pages. Specifies a standard of care for health care providers, regarding screening and assessing for childhood lead poisoning. It includes anticipatory guidance, risk assessment, and blood lead testing for children at risk for lead poisoning.

#### [California Code of Regulations, Title 17, Section 35001 et seq \(PDF\)](#)

For more information, see the [Lead-Related Construction](#) pages. Requirements for lead hazard evaluation and abatement activities, accreditation of training providers, and certification of individuals engaged in lead-based paint activities.

### Title 8

#### [California Code of Regulations, Title 8, Section 1532.1 et seq](#)

Worker protection requirements for employees conducting lead-related construction activities.

## Appendix B: Current Lead Poisoning Prevention Program Organization

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The Childhood Lead Poisoning Prevention Branch (CLPPB), through state- and local- level functions, carries out prevention, screening, case management, and follow up for lead exposure. The overall CLPP Program infrastructure consists of CLPPB in CDPH and 50 local CLPP programs (CLPPPs) in jurisdictions throughout the state that contract to provide lead activities.

The State CLPPB currently has six goals as part of its mission statement:

- An informed public able to protect children from lead exposures.
- Well-supported, effective local programs to detect, manage, and prevent childhood lead poisoning.
- Fully developed capacity to track lead exposure statewide, and to monitor the management of lead-burdened children.
- Strong infrastructure enabling the prevention of children's exposure to lead through partnerships with government agencies, community-based organizations, and private sector.
- Full compliance with federal and state statutory and regulatory requirements.
- Continued state and national leadership through research, policy development, and standard setting.

The State CLPPB:

- Sets policies and establishes regulations; oversees activities of local CLPPPs; provides direct services in health jurisdictions without a local CLPPP; develops educational materials; promotes screening and case identification through outreach activities and written materials; tracks follow up of children with EBLLs and potential sources of exposure; seeks to assure the quality of local CLPP services; and provides scientific and technical expertise.
- Maintains a database on lead screening and lead-poisoned children and their case management, used to monitor and assist with case management of lead-poisoned children, identify sources of poisoning, and guide intervention strategies.
- Incorporates the Lead-Related Construction Program that develops regulations for lead-safe construction practices, provides training accreditation and worker certification, conducts related enforcement and compliance activities, and offers technical assistance to state and local housing and environmental agencies.



Local CLPPPs:

- Carry out public health nursing case management and environmental investigations for children with high BLLs.
- Provide extensive outreach and education activities to families, communities, and health care providers.
- Promote local screening.
- Reduce sources of lead exposure in their communities.
- Help identify additional sources of lead exposure.

## Appendix C: Definitions and Terms

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- Anticipatory guidance means every health care provider who performs a periodic health assessment of a child, from 6 months until 72 months of age shall comply with the following standard or care:
  - Provide oral or written anticipatory guidance to a parent or guardian of the child, including at a minimum, the information that children can be harmed by exposure to lead, especially deteriorating or disturbed lead-based paint and the dust from it, and are particularly at risk of lead poisoning from the time the child begins to crawl until 72 months of age.
  - If the child receives services from a publicly funded program for low-income children, order the child screened for lead poisoning as the child is presumed to be at risk of lead poisoning.
  - If the child does not receive services from a publicly funded program for low-income children, evaluate the child's risk of lead poisoning by asking a parent or guardian of the child the following question: "Does your child live in, or spend a lot of time in, a place built before 1978 that has peeling or chipped paint or that has been recently renovated?" If the parent or guardian answers "yes" or "don't know" to the question, order the child screened for lead poisoning.
- Appropriate case management means health care referrals, environmental assessments, and educational activities, performed by the appropriate person, professional, or entity, necessary to reduce a child's exposure to lead and the consequences of the exposure, as determined by the United States Centers for Disease Control and Prevention, or as determined by the department (California Health and Safety [HSC] Section 105280 (a)).
- Basic case since July 1, 2016, children from birth up to age 21 years of age with an initial BLL  $\geq 4.5$   $\mu\text{g}/\text{dL}$  and less than 14.5 do not meet the case criteria for full case management but should receive basic services to reduce lead exposure. These basic case management services include, at a minimum, monitoring, outreach and education, and re-testing reminders to the health care provider. Services may include, as resources allow, other graded responses up to and including full public health nursing and environmental investigation (EI) based on the trend in BLL. Children with initial BLLs equal to or greater than 4.5 and less than 14.5  $\mu\text{g}/\text{dL}$ , who are found on follow-up to have persistent BLLs would be considered a state case of lead poisoning and would receive all case management services.

- Blood lead level (BLL) means a whole blood test result indicating the presence of lead. CDPH rounds BLLs to the nearest whole number (for example, 5 includes 4.5 µg/dL and 10 includes 9.5 µg/dL).
- CDC reference value is the “reference value” that physicians should use to consider a child’s BLL elevated and to warrant further evaluation and monitoring. In 2012, the CDC determined that a BLL of 5 µg/dL in a child under age 6 is the “reference value”. In 2021, the CDC updated the reference value to 3.5 µg/dL. The 2021 CDC reference value for childhood blood lead of 3.5 µg/dL was obtained from the 97.5th percentile of BLLs in children less than 6 years old in the two most recent National Health and Nutrition Examination Survey (NHANES). Communities where more than 2.5% of children have BLLs above the reference value have a higher prevalence of childhood lead poisoning than the nation as a whole.
- Elevated BLL means a blood lead level that is at or above the blood lead reference value as specified in the most recent guidelines issued by the CDC. In this case, an elevated blood lead level means a BLL at or over 3.5 µg/dL detected in capillary, whole venous, arterial, or cord blood. The CDC updated the reference value from the previous blood lead level of 5µg/dL in October 2021; data in this report were produced prior to the update and reflect the 2012 reference value of 4.5 µg/dL (CDPH rounds BLLs to the nearest whole number so 4.5 µg/dL would round to 5 µg/dL).
- Full case since July 1, 2016, means a child from birth up to age 21 years of age with one venous BLL ≥ 14.5 µg/dL; or two BLLs ≥ 9.5 µg/dL, at least the second of which is venous, drawn at least 30 calendar days apart. (There may be lower BLLs during the same period; These BLLs do not have to be consecutive specimens). Children identified as full cases are eligible for full case management services.
- Local enforcement agency means the health department, environmental agency, housing department, or building department of any city, county, or city and county.
- Local health jurisdiction (LHJ) includes the 58 county health departments and an additional 3 city health departments (Long Beach, Berkeley, and Pasadena) that provide local public health services.

## Appendix D: Number of Children Tested for Lead by Local Health Jurisdiction in 2020

Number of Individual Children Screened for Lead, by California Local Health Jurisdiction and Highest, 2020

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
Alameda	Age < 6	11,733	98.17%	161	1.35%	58	0.49%	11,952
	Age 6 to 21	1,297	96.29%	37	2.75%	13	0.97%	1,347
	Local Total age < 21	13,030	97.98%	198	1.49%	71	0.53%	13,299
Alpine	Age < 6							
	Age 6 to 21							
	Local Total age < 21							
Amador	Age < 6							
	Age 6 to 21							
	Local Total age < 21							303
Berkeley	Age < 6	396	97.06%	10	2.45%	2	0.49%	408
	Age 6 to 21	26	100.00%	0	0.00%	0	0.00%	26
	Local Total age < 21	422	97.24%	10	2.30%	2	0.46%	434
Butte	Age < 6	1,642	98.56%	16	0.96%	8	0.48%	1,666
	Age 6 to 21	55	94.83%	3	5.17%	0	0.00%	58
	Local Total age < 21	1,697	98.43%	19	1.10%	8	0.46%	1,724
Calaveras	Age < 6							
	Age 6 to 21							
	Local Total age < 21							293
Colusa	Age < 6							
	Age 6 to 21							
	Local Total age < 21							313
Contra Costa	Age < 6	5,243	98.57%	51	0.96%	25	0.47%	5,319
	Age 6 to 21	447	94.30%	24	5.06%	3	0.63%	474
	Local Total age < 21	5,690	98.22%	75	1.29%	28	0.48%	5,793

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
Del Norte	Age < 6							
	Age 6 to 21							
	Local Total age < 21							153
El Dorado	Age < 6	420	97.67%	10	2.33%	0	0.00%	430
	Age 6 to 21	36	100.00%	0	0.00%	0	0.00%	36
	Local Total age < 21	456	97.85%	10	2.15%	0	0.00%	466
Fresno	Age < 6	11,785	98.13%	182	1.52%	43	0.36%	12,010
	Age 6 to 21	795	98.39%	11	1.36%	2	0.25%	808
	Local Total age < 21	12,580	98.14%	193	1.51%	45	0.35%	12,818
Glenn	Age < 6							
	Age 6 to 21							
	Local Total age < 21							395
Humboldt	Age < 6	1,629	95.65%	66	3.88%	8	0.47%	1,703
	Age 6 to 21	37	97.37%	1	2.63%	0	0.00%	38
	Local Total age < 21	1,666	95.69%	67	3.85%	8	0.46%	1,741
Imperial	Age < 6	2,945	98.53%	39	1.30%	5	0.17%	2,989
	Age 6 to 21	153	99.35%	1	0.65%	0	0.00%	154
	Local Total age < 21	3,098	98.57%	40	1.27%	5	0.16%	3,143
Inyo	Age < 6							
	Age 6 to 21							
	Local Total age < 21							
Kern	Age < 6	12,623	98.87%	123	0.96%	21	0.16%	12,767
	Age 6 to 21	832	98.23%	11	1.30%	4	0.47%	847
	Local Total age < 21	13,455	98.83%	134	0.98%	25	0.18%	13,614
Kings	Age < 6	1,283	98.24%	21	1.61%	2	0.15%	1,306
	Age 6 to 21	39	100.00%	0	0.00%	0	0.00%	39
	Local Total age < 21	1,322	98.29%	21	1.56%	2	0.15%	1,345
Lake	Age < 6							448
	Age 6 to 21							19
	Local Total age < 21							467
Lassen	Age < 6							

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
	Age 6 to 21							
	Local Total age < 21							170
Long Beach	Age < 6	3,674	99.38%	17	0.46%	6	0.16%	3,697
	Age 6 to 21	263	99.62%	0	0.00%	1	0.38%	264
	Local Total age < 21	3,937	99.39%	17	0.43%	7	0.18%	3,961
Los Angeles	Age < 6	81,353	99.01%	644	0.78%	167	0.20%	82,164
	Age 6 to 21	9,398	98.72%	81	0.85%	41	0.43%	9,520
	Local Total age < 21	90,751	98.98%	725	0.79%	208	0.23%	91,684
Madera	Age < 6	3,341	97.63%	70	2.05%	11	0.32%	3,422
	Age 6 to 21	351	98.60%	5	1.40%	0	0.00%	356
	Local Total age < 21	3,692	97.72%	75	1.99%	11	0.29%	3,778
Marin	Age < 6	1,445	99.24%	10	0.69%	1	0.07%	1,456
	Age 6 to 21	108	96.43%	3	2.68%	1	0.89%	112
	Local Total age < 21	1,553	99.04%	13	0.83%	2	0.13%	1,568
Mariposa	Age < 6							
	Age 6 to 21							
	Local Total age < 21							80
Mendocino	Age < 6	985	98.30%					1,002
	Age 6 to 21							21
	Local Total age < 21							1,023
Merced	Age < 6	2,606	97.38%	57	2.13%	13	0.49%	2,676
	Age 6 to 21	110	96.49%	4	3.51%	0	0.00%	114
	Local Total age < 21	2,716	97.35%	61	2.19%	13	0.47%	2,790
Modoc	Age < 6							
	Age 6 to 21							
	Local Total age < 21							
Mono	Age < 6							
	Age 6 to 21							
	Local Total age < 21							
Monterey	Age < 6	5,896	98.45%	81	1.35%	12	0.20%	5,989
	Age 6 to 21	566	95.29%	21	3.54%	7	1.18%	594

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
	<b>Local Total age &lt; 21</b>	6,462	98.16%	102	1.55%	19	0.29%	6,583
<b>Napa</b>	<b>Age &lt; 6</b>	781	99.36%	5	0.64%	0	0.00%	786
	<b>Age 6 to 21</b>	22	100.00%	0	0.00%	0	0.00%	22
	<b>Local Total age &lt; 21</b>	803	99.38%	5	0.62%	0	0.00%	808
<b>Nevada</b>	<b>Age &lt; 6</b>							225
	<b>Age 6 to 21</b>							18
	<b>Local Total age &lt; 21</b>							243
<b>Orange</b>	<b>Age &lt; 6</b>	23,019	98.97%	185	0.80%	55	0.24%	23,259
	<b>Age 6 to 21</b>	1,762	99.04%	10	0.56%	7	0.39%	1,779
	<b>Local Total age &lt; 21</b>	24,781	98.97%	195	0.78%	62	0.25%	25,038
<b>Pasadena</b>	<b>Age &lt; 6</b>	927	98.62%	10	1.06%	3	0.32%	940
	<b>Age 6 to 21</b>	70	100.00%	0	0.00%	0	0.00%	70
	<b>Local Total age &lt; 21</b>	997	98.71%	10	0.99%	3	0.30%	1,010
<b>Placer</b>	<b>Age &lt; 6</b>	1,156	98.97%	10	0.86%	2	0.17%	1,168
	<b>Age 6 to 21</b>	106	94.64%	5	4.46%	1	0.89%	112
	<b>Local Total age &lt; 21</b>	1,262	98.59%	15	1.17%	3	0.23%	1,280
<b>Plumas</b>	<b>Age &lt; 6</b>							
	<b>Age 6 to 21</b>							
	<b>Local Total age &lt; 21</b>							
<b>Riverside</b>	<b>Age &lt; 6</b>	25,790	99.53%	99	0.38%	23	0.09%	25,912
	<b>Age 6 to 21</b>	1,329	98.59%	17	1.26%	2	0.15%	1,348
	<b>Local Total age &lt; 21</b>	27,119	99.48%	116	0.43%	25	0.09%	27,260
<b>Sacramento</b>	<b>Age &lt; 6</b>	11,684	96.91%	294	2.44%	79	0.66%	12,057
	<b>Age 6 to 21</b>	1,444	82.85%	277	15.89%	22	1.26%	1,743
	<b>Local Total age &lt; 21</b>	13,128	95.13%	571	4.14%	101	0.73%	13,800
<b>San Benito</b>	<b>Age &lt; 6</b>							590
	<b>Age 6 to 21</b>							18
	<b>Local Total age &lt; 21</b>							608
<b>San Bernardino</b>	<b>Age &lt; 6</b>	20,871	99.20%	142	0.67%	26	0.12%	21,039
	<b>Age 6 to 21</b>	1,625	99.09%	11	0.67%	4	0.24%	1,640
	<b>Local Total age &lt; 21</b>	22,496	99.19%	153	0.67%	30	0.13%	22,679
<b>San Diego</b>	<b>Age &lt; 6</b>	31,402	98.97%	257	0.81%	69	0.22%	31,728

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
	Age 6 to 21	1,460	96.24%	47	3.10%	10	0.66%	1,517
	Local Total age < 21	32,862	98.85%	304	0.91%	79	0.24%	33,245
San Francisco	Age < 6	6,479	98.41%	88	1.34%	17	0.26%	6,584
	Age 6 to 21	415	98.57%	5	1.19%	1	0.24%	421
	Local Total age < 21	6,894	98.42%	93	1.33%	18	0.26%	7,005
San Joaquin	Age < 6	8,524	98.84%	73	0.85%	27	0.31%	8,624
	Age 6 to 21	636	99.07%	6	0.93%	--	--	642
	Local Total age < 21	9,160	98.86%	79	0.85%	27	0.29%	9,266
San Luis Obispo	Age < 6	1,054	98.69%	12	1.12%	2	0.19%	1,068
	Age 6 to 21	33	100.00%	0	0.00%	0	0.00%	33
	Local Total age < 21	1,087	98.73%	12	1.09%	2	0.18%	1,101
San Mateo	Age < 6	4,773	98.86%	43	0.89%	12	0.25%	4,828
	Age 6 to 21	386	98.97%	4	1.03%	0	0.00%	390
	Local Total age < 21	5,159	98.87%	47	0.90%	12	0.23%	5,218
Santa Barbara	Age < 6	4,765	99.13%	33	0.69%	9	0.19%	4,807
	Age 6 to 21	204	95.77%	7	3.29%	2	0.94%	213
	Local Total age < 21	4,969	98.98%	40	0.80%	11	0.22%	5,020
Santa Clara	Age < 6	13,900	98.88%	116	0.83%	42	0.30%	14,058
	Age 6 to 21	1,340	97.88%	19	1.39%	10	0.73%	1,369
	Local Total age < 21	15,240	98.79%	135	0.88%	52	0.34%	15,427
Santa Cruz	Age < 6	1,680	97.39%	38	2.20%	7	0.41%	1,725
	Age 6 to 21	191	96.46%	3	1.52%	4	2.02%	198
	Local Total age < 21	1,871	97.30%	41	2.13%	11	0.57%	1,923
Shasta	Age < 6	416	99.05%	4	0.95%	0	0.00%	420
	Age 6 to 21	30	100.00%	0	0.00%	0	0.00%	30
	Local Total age < 21	446	99.11%	4	0.89%	0	0.00%	450
Sierra	Age < 6							
	Age 6 to 21							
	Local Total age < 21							
Siskiyou	Age < 6							
	Age 6 to 21							
	Local Total age < 21							222



Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
<b>Solano</b>	Age < 6	3,522	98.16%	51	1.42%	15	0.42%	3,588
	Age 6 to 21	122	99.19%	1	0.81%	0	0.00%	123
	<b>Local Total age &lt; 21</b>	3,644	98.19%	52	1.40%	15	0.40%	3,711
<b>Sonoma</b>	Age < 6	1,596	99.13%	10	0.62%	4	0.25%	1,610
	Age 6 to 21	220	98.65%	1	0.45%	2	0.90%	223
	<b>Local Total age &lt; 21</b>	1,816	99.07%	11	0.60%	6	0.33%	1,833
<b>Stanislaus</b>	Age < 6	4,771	99.13%	30	0.62%	12	0.25%	4,813
	Age 6 to 21	586	94.52%	32	5.16%	2	0.32%	620
	<b>Local Total age &lt; 21</b>	5,357	98.60%	62	1.14%	14	0.26%	5,433
<b>Sutter</b>	Age < 6	1,041	98.11%					1,061
	Age 6 to 21							95
	<b>Local Total age &lt; 21</b>							1,156
<b>Tehama</b>	Age < 6	1,066	99.16%					1,075
	Age 6 to 21							16
	<b>Local Total age &lt; 21</b>							1,091
<b>Trinity</b>	Age < 6							
	Age 6 to 21							
	<b>Local Total age &lt; 21</b>							
<b>Tulare</b>	Age < 6	4,521	98.56%	52	1.13%	14	0.31%	4,587
	Age 6 to 21	243	97.98%	4	1.61%	1	0.40%	248
	<b>Local Total age &lt; 21</b>	4,764	98.53%	56	1.16%	15	0.31%	4,835
<b>Tuolumne</b>	Age < 6							
	Age 6 to 21							
	<b>Local Total age &lt; 21</b>							258
<b>Ventura</b>	Age < 6	7,618	99.49%	32	0.42%	7	0.09%	7,657
	Age 6 to 21	362	99.72%	1	0.28%	0	0.00%	363
	<b>Local Total age &lt; 21</b>	7,980	99.50%	33	0.41%	7	0.09%	8,020
<b>Yolo</b>	Age < 6	1,639	97.91%	28	1.67%	7	0.42%	1,674
	Age 6 to 21	58	95.08%	3	4.92%	0	0.00%	61
	<b>Local Total age &lt; 21</b>	1,697	97.81%	31	1.79%	7	0.40%	1,735
<b>Yuba</b>	Age < 6							

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 4.5 n	BLL < 4.5 % (row)	BLL ≥ 4.5 to < 9.5 n	BLL ≥ 4.5 to < 9.5 % (row)	BLL ≥ 9.5 n	BLL ≥ 9.5 % (row)	Totals
	<b>Age 6 to 21</b>							
	<b>Local Total age &lt; 21</b>							763
<b>CLPPB</b>	<b>Age &lt; 6</b>	1	100.00%	0	0.00%	0	0.00%	1
	<b>Age 6 to 21</b>	0	0.00%	0	0.00%	0	0.00%	0
	<b>Local Total age &lt; 21</b>	1	100.00%	0	0.00%	0	0.00%	1
<b>California Totals</b>	<b>Age &lt; 6</b>	336,386	98.79%	3,292	0.97%	838	0.25%	340,516
	<b>Age 6 to 21</b>	27,497	97.17%	658	2.33%	142	0.50%	28,297
	<b>Local Total age &lt; 21</b>	363,883	98.66%	3,950	1.07%	980	0.27%	368,813

Table Notes:

- Data are from the RASSCLE surveillance database archive of 7/30/2021.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2020.
- Measures are in micrograms per deciliter (µg/dL) of whole blood and include arterial, cord, venous, capillary, and unknown samples. Not all elevated capillary samples are confirmed by a follow-up venous sample.
- Results later determined to be false positive and errors have been excluded.
- All results of blood lead analyses are reportable under California law, and the State works to ensure complete reporting.
- Results that are not submitted to the State, however, would not be included here.
- Those BLLs reported from the analyzing laboratory as “< 5 µg/dL” are included in the category “BLL < 4.5 µg/dL.”
- Patient jurisdiction is determined by geocoding the address associated with the child’s highest BLL using Esri’s StreetMap Premium North America locator.
- Data are suppressed for local health jurisdictions that did not have enough blood lead tests in 2020 to meet the California Health and Human Services Agency’s Data De-Identification Guidelines for public release

## Appendix E: ZIP Codes and Geospatial Indicators of Risk for Childhood Lead Exposure

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ZIP Codes with at Least One Geospatial Indicator of Risk for Childhood Lead Exposure (n = 1,713)

90001	91008	92026	92391	93205	93640	94545	95135	95511	95915
90002	91010	92027	92392	93206	93641	94546	95136	95514	95916
90003	91011	92028	92394	93207	93643	94547	95138	95519	95917
90004	91016	92029	92395	93210	93644	94548	95139	95521	95918
90005	91020	92036	92397	93212	93645	94549	95140	95524	95919
90006	91024	92037	92398	93215	93646	94550	95141	95525	95920
90007	91030	92040	92399	93218	93647	94551	95148	95526	95922
90008	91040	92054	92401	93219	93648	94552	95192	95527	95923
90011	91042	92055	92404	93221	93650	94553	95202	95528	95925
90012	91101	92056	92405	93222	93651	94555	95203	95531	95926
90013	91103	92057	92407	93223	93652	94556	95204	95536	95928
90014	91104	92058	92408	93224	93653	94558	95205	95540	95930
90015	91105	92059	92410	93225	93654	94559	95206	95542	95932
90016	91106	92060	92411	93226	93656	94560	95207	95543	95934
90017	91107	92061	92415	93230	93657	94561	95209	95546	95935
90018	91108	92064	92501	93234	93660	94563	95210	95547	95936
90019	91123	92065	92503	93235	93662	94564	95211	95548	95937
90020	91201	92066	92504	93238	93664	94565	95212	95549	95938
90021	91202	92069	92505	93239	93667	94566	95215	95550	95939
90022	91203	92070	92506	93240	93668	94567	95219	95551	95941
90023	91204	92071	92507	93241	93669	94568	95220	95552	95942
90024	91205	92075	92508	93242	93673	94569	95222	95554	95943
90025	91206	92078	92509	93243	93675	94571	95223	95555	95944
90026	91207	92081	92518	93244	93701	94572	95225	95556	95945
90027	91208	92082	92521	93245	93702	94574	95226	95558	95946
90028	91210	92083	92530	93246	93703	94576	95227	95560	95947
90029	91214	92084	92532	93247	93704	94577	95228	95562	95948
90031	91301	92086	92536	93249	93705	94578	95230	95563	95949
90032	91302	92093	92539	93250	93706	94579	95231	95564	95951
90033	91303	92096	92543	93251	93710	94580	95232	95565	95953
90034	91304	92101	92544	93252	93711	94582	95236	95567	95954
90035	91306	92102	92545	93254	93720	94583	95237	95568	95955
90036	91307	92103	92548	93255	93721	94585	95240	95569	95956
90037	91311	92104	92549	93256	93722	94586	95242	95570	95957

90038	91316	92105	92551	93257	93723	94587	95245	95573	95959
90039	91320	92106	92553	93260	93725	94588	95246	95585	95960
90040	91321	92107	92555	93263	93726	94589	95247	95587	95961
90041	91324	92108	92557	93265	93727	94590	95249	95589	95963
90042	91325	92109	92561	93266	93728	94591	95251	95595	95965
90043	91326	92110	92562	93267	93730	94592	95252	95602	95966
90044	91330	92111	92563	93268	93737	94595	95254	95603	95968
90045	91331	92113	92570	93270	93741	94596	95255	95605	95969
90046	91335	92114	92571	93271	93901	94597	95257	95606	95970
90047	91340	92115	92582	93272	93905	94598	95258	95607	95971
90048	91342	92116	92583	93274	93906	94599	95301	95608	95972
90049	91343	92117	92584	93276	93907	94601	95303	95610	95973
90056	91344	92118	92585	93277	93908	94602	95304	95612	95975
90057	91345	92119	92586	93280	93920	94603	95306	95614	95977
90058	91350	92120	92590	93283	93923	94605	95307	95615	95979
90059	91351	92121	92591	93285	93924	94606	95310	95616	95981
90061	91352	92122	92592	93286	93925	94607	95311	95618	95982
90062	91354	92123	92595	93287	93926	94608	95313	95619	95983
90063	91355	92124	92596	93291	93927	94609	95315	95620	95984
90064	91356	92126	92602	93292	93930	94610	95316	95621	95987
90065	91360	92127	92603	93301	93932	94611	95317	95623	95988
90066	91361	92128	92604	93304	93933	94612	95318	95624	95991
90067	91362	92129	92606	93305	93940	94613	95319	95626	95993
90068	91364	92130	92610	93306	93943	94618	95320	95627	96001
90069	91367	92131	92612	93307	93944	94619	95321	95628	96002
90071	91371	92134	92614	93308	93950	94621	95322	95629	96003
90073	91381	92135	92617	93309	93953	94702	95323	95630	96006
90077	91384	92136	92618	93311	93954	94703	95324	95631	96007
90089	91387	92139	92620	93312	93955	94704	95326	95632	96008
90094	91390	92140	92624	93313	93960	94705	95327	95633	96009
90095	91401	92145	92625	93314	93962	94706	95328	95634	96010
90201	91402	92147	92626	93401	94002	94707	95329	95635	96013
90210	91403	92152	92627	93402	94005	94708	95330	95636	96014
90211	91405	92154	92629	93405	94010	94709	95333	95637	96015
90212	91406	92155	92630	93407	94014	94710	95334	95638	96016
90220	91411	92173	92637	93410	94015	94720	95335	95640	96017
90221	91423	92182	92646	93420	94018	94801	95336	95641	96019
90222	91436	92201	92647	93421	94019	94803	95337	95642	96020
90230	91501	92203	92648	93422	94020	94804	95338	95645	96021
90232	91502	92210	92649	93426	94021	94805	95340	95648	96022
90240	91504	92211	92651	93427	94022	94806	95341	95650	96023

90241	91505	92220	92653	93428	94024	94901	95345	95651	96024
90242	91506	92223	92655	93429	94025	94903	95346	95652	96025
90245	91521	92225	92656	93430	94027	94904	95348	95653	96027
90247	91522	92227	92657	93432	94028	94920	95350	95655	96028
90248	91523	92230	92660	93433	94030	94922	95351	95658	96031
90249	91601	92231	92661	93434	94035	94923	95354	95659	96032
90250	91602	92233	92662	93435	94037	94924	95355	95660	96033
90254	91604	92234	92663	93436	94038	94925	95356	95661	96034
90255	91605	92236	92672	93437	94040	94928	95357	95662	96035
90260	91606	92239	92673	93440	94041	94929	95358	95663	96038
90262	91607	92240	92675	93441	94043	94930	95360	95664	96039
90263	91608	92241	92676	93442	94044	94931	95361	95665	96040
90265	91701	92242	92677	93444	94060	94933	95363	95666	96041
90266	91702	92243	92679	93445	94061	94937	95364	95667	96044
90270	91706	92249	92683	93446	94062	94938	95365	95668	96046
90272	91708	92250	92688	93449	94063	94939	95366	95669	96047
90274	91709	92251	92691	93450	94065	94940	95367	95670	96048
90275	91710	92252	92692	93451	94066	94941	95368	95673	96050
90277	91711	92254	92694	93452	94070	94945	95369	95674	96051
90278	91722	92256	92701	93453	94074	94946	95370	95677	96052
90280	91723	92257	92703	93454	94080	94947	95372	95678	96054
90290	91724	92258	92704	93455	94085	94949	95374	95679	96055
90291	91730	92259	92705	93458	94086	94951	95376	95681	96056
90292	91731	92260	92706	93460	94087	94952	95377	95682	96057
90293	91732	92262	92707	93461	94089	94954	95379	95683	96058
90301	91733	92264	92708	93463	94102	94956	95380	95684	96059
90302	91737	92266	92780	93465	94103	94957	95382	95685	96061
90303	91739	92268	92782	93501	94104	94960	95383	95687	96062
90304	91740	92270	92801	93505	94105	94963	95385	95688	96064
90305	91741	92273	92802	93510	94107	94964	95386	95689	96065
90401	91744	92274	92804	93512	94108	94965	95388	95690	96067
90402	91745	92275	92805	93513	94109	94970	95389	95691	96069
90403	91746	92276	92806	93514	94110	94971	95391	95692	96071
90404	91748	92277	92807	93516	94111	94972	95401	95693	96073
90405	91750	92278	92808	93517	94112	94973	95403	95694	96075
90501	91752	92280	92821	93518	94114	95002	95404	95695	96076
90502	91754	92281	92823	93519	94115	95003	95405	95698	96080
90503	91755	92282	92831	93523	94116	95004	95407	95699	96085
90504	91759	92283	92832	93524	94117	95005	95409	95701	96086
90505	91761	92284	92833	93526	94118	95006	95410	95703	96087
90506	91762	92285	92835	93527	94121	95007	95412	95709	96088

90601	91763	92301	92840	93528	94122	95008	95415	95713	96089
90602	91764	92304	92841	93529	94123	95010	95417	95714	96091
90603	91765	92305	92843	93531	94124	95012	95419	95715	96093
90604	91766	92307	92844	93532	94127	95013	95420	95717	96094
90605	91767	92308	92845	93534	94128	95014	95421	95720	96096
90606	91768	92309	92860	93535	94129	95017	95422	95721	96097
90620	91770	92310	92861	93536	94130	95018	95423	95722	96101
90621	91773	92311	92865	93541	94131	95019	95425	95724	96103
90623	91775	92313	92866	93543	94132	95020	95426	95726	96104
90630	91776	92314	92867	93544	94133	95023	95427	95728	96105
90631	91780	92315	92868	93545	94134	95030	95428	95735	96106
90638	91784	92316	92869	93546	94143	95032	95429	95736	96107
90639	91786	92317	92870	93549	94158	95033	95432	95742	96108
90640	91789	92318	92878	93550	94301	95035	95436	95746	96109
90650	91790	92320	92879	93551	94303	95037	95437	95747	96110
90660	91791	92321	92880	93552	94304	95039	95439	95757	96111
90670	91792	92322	92881	93553	94305	95041	95441	95758	96112
90680	91801	92324	92882	93554	94306	95043	95442	95762	96113
90701	91803	92325	92883	93555	94401	95045	95443	95765	96114
90703	91901	92327	92886	93560	94402	95046	95444	95776	96115
90704	91902	92328	92887	93561	94403	95050	95445	95811	96116
90706	91905	92332	93001	93562	94404	95051	95446	95814	96117
90710	91906	92333	93003	93563	94501	95053	95448	95815	96118
90712	91910	92335	93004	93591	94502	95054	95449	95816	96119
90713	91911	92336	93010	93601	94503	95060	95450	95817	96120
90715	91913	92337	93012	93602	94505	95062	95451	95818	96121
90716	91914	92338	93013	93603	94506	95064	95452	95819	96122
90717	91915	92339	93015	93604	94507	95065	95453	95820	96123
90720	91916	92341	93021	93606	94508	95066	95454	95821	96124
90723	91917	92342	93022	93608	94509	95070	95456	95822	96125
90731	91931	92344	93023	93609	94510	95073	95457	95823	96126
90732	91932	92345	93030	93610	94511	95075	95458	95824	96128
90740	91934	92346	93033	93611	94512	95076	95459	95825	96129
90742	91935	92347	93035	93612	94513	95110	95460	95826	96130
90743	91941	92350	93036	93614	94514	95111	95461	95827	96132
90744	91942	92352	93040	93615	94515	95112	95462	95828	96133
90745	91945	92354	93041	93616	94517	95113	95464	95829	96134
90746	91950	92356	93042	93618	94518	95116	95465	95830	96136
90747	91962	92358	93043	93619	94519	95117	95466	95831	96137
90755	91963	92359	93060	93620	94520	95118	95467	95832	96140
90802	91977	92363	93063	93621	94521	95119	95468	95833	96141

90803	91978	92364	93065	93622	94523	95120	95469	95834	96142
90804	91980	92365	93066	93623	94525	95121	95470	95835	96143
90805	92003	92368	93067	93624	94526	95122	95471	95836	96145
90806	92004	92371	93101	93625	94528	95123	95472	95837	96146
90807	92007	92372	93103	93626	94530	95124	95476	95838	96148
90808	92008	92373	93105	93627	94531	95125	95482	95841	96150
90810	92009	92374	93106	93628	94533	95126	95485	95842	96161
90813	92010	92376	93108	93630	94534	95127	95488	95843	96162
90814	92011	92377	93109	93631	94535	95128	95490	95864	
90815	92014	92378	93110	93633	94536	95129	95492	95901	
90822	92019	92382	93111	93634	94538	95130	95493	95903	
90840	92020	92384	93117	93635	94539	95131	95494	95910	
91001	92021	92385	93202	93636	94541	95132	95497	95912	
91006	92024	92386	93203	93637	94542	95133	95501	95913	
91007	92025	92389	93204	93638	94544	95134	95503	95914	

ZIP Codes with No Geospatial Indicator of Risk for Childhood Lead Exposure (n = 13)

91377	92567	95672
92067	92587	95962
92091	92697	96063
92253	93262	
92267	93424	