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

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 primary prevention by developing and engaging in multi-level transdisciplinary partnerships to leverage strategies for lead poisoning prevention, and by identifying and eliminating all lead hazards where children live, play, learn, and spend time. CLPP Program's focus on secondary prevention includes timely detection of all children who are lead burdened through universal evaluation and risk-appropriate blood lead testing.

This report provides an update on California's efforts preventing and managing childhood lead exposure. This report includes new data for 2021 and 2022. As of October 2021, the Centers for Disease Control and Prevention lowered its blood lead reference value (BLRV) from 4.5 µg/dL to 3.5 µg/dL as the threshold for which children are identified as having elevated blood lead levels. Data in this report uses the new CDC BLRV of 3.5 µg/dL throughout, increasing the number of children now considered to have elevated blood lead levels. Any comparisons of data between 2021 and 2022 in this report uses the new BLRV of 3.5 µg/dL so that comparisons can be comparably made. The CLPP Program began providing public health services to children with BLLs at this new BLRV on July 1, 2023. Prior to July, 1, 2023, the CLPP Program provided public health services to children with BLLs 4.5 µg/dL and greater.

Key findings

- Two-and-a-half percent more children under the age of six were tested in 2022 (n = 376,007) compared to 2021 (n = 370,981). Among the children tested under the age of six, the percentage of children with elevated BLLs was slightly elevated compared with prior years (2.00 percent and 1.88 percent, for 2022 and 2021, respectively).
- Rates of childhood lead poisoning vary widely across the state of California. In 2022, the percentage of tested children under 6 years old with elevated BLLs ranged from 8.55 percent in Nevada County, to 0.76 percent in San Mateo County. In eighteen out of 46 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). Data at the ZIP code (2022) and census tract level (combined from 2018 to 2022) are also shown.
- Environmental lead hazards are pervasive throughout the state of California. CDPH developed geographic risk indicators and found that 99.3 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 CLPP Program is implementing its commitment to advance health equity, reach new populations, and provide community-specific resources to improve blood lead testing rates. Through partnerships with the U.S. Department of Justice, for example, CDPH addressed environmental justice issues in areas that have been disproportionately burdened by environmental and health hazards.
- In response to a Class I recall of blood lead test equipment which could lead to falsely low blood lead level results, CLPPB sent notifications to 500 reporting laboratories, all contracted CLPPPs at the local level, developed a fact sheet for providers, and submitted a Medical Board of California e-blast to California physicians to notify partners of the recall.

From January 1, 2021, through December 31, 2022:

a) The CLPP Program conducted provider outreach through approximately 2,210 office visits and presentations.

b) 3,500 retesting reminder letters were sent to health care providers throughout the state for children with BLLs ≥ 4.5 micrograms per deciliter (µg/dL) identified from January through June 2020 as not receiving indicated follow-up testing.

c) Approximately 3,543 community outreach activities were conducted, reaching an estimated 338,978 families and individuals.

d) The CLPP Program provided training to an estimated 21,783 childcare providers and the families they serve through targeted lead-related training and education outreach activities.

The California Department of Public Health continues to make significant progress in improving childhood lead poisoning prevention over the past two years. Between the lowered threshold for case management from the CDC Blood Lead Reference Value update, California laying the foundation for improved Renovation, Repair, and Painting (RRP) compliance, and the increase tracking and preventing of non-housing sources, California Department of Public Health is on track to continue its progress in preventing childhood lead poisoning prevention.

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Introduction

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 (≥4.5 µg/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).[1]

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.[2,3] Lead exposure causes a wide range of problems and can result in lifelong damaging effects.[2,4] At very high levels of exposure, lead can cause seizures, coma, and death.[2,3] Lower levels of lead affect the nervous system and cause lowered intelligence and learning deficits.[4,5] Lead can also affect the kidneys, decrease growth, decrease hearing acuity, cause anemia (low red blood count), and delay sexual maturation.[2,6,7] Prenatal and postnatal increased BLLs have been significantly associated with self-reported frequencies of antisocial and delinquent behaviors in adolescents.[8] Increased levels of bone lead have been associated with an increased risk for adolescent arrest and adjudication.[9] Lead compounds are also considered probable human carcinogens.[10]

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 2022, the percentage of children tested with an elevated BLL ranged from 8.55 percent in Nevada County to 0.76 percent in San Mateo 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.[2,3] 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.[11]

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; it is the CLPP Program's third biennial report. 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 programmatic activities. Chapter 3 looks to the future with a discussion of upcoming changes that will impact the Childhood Lead Poisoning Prevention Program. 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 2022, and Appendix E identifies ZIP codes and geospatial indicators of risk for lead exposure.

Chapter 1: Key Data

1) Universal Laboratory Reporting of Blood Lead Level Tests

In 2022, over 430,000 blood lead tests (involving over 418,000 individual children) were reported to CDPH 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.

2) Rates of California Children with Elevated Blood Lead Levels

As of October 2021, the Centers for Disease Control and Prevention lowered its blood lead reference value (BLRV) from 4.5 µg/dL to 3.5 µg/dL as the threshold for which children are identified as having elevated blood lead levels. This current report shows data with the new BLRV of 3.5 µg/dL. There was a two-and-a-half percent increase in children tested for lead from 2021 to 2022. Additionally, the percentage of children with elevated BLLs also slightly increased from 2021 to 2022 (4.33 percent increase).

In 2022, among the 418,681 children < 21 old tested in California, 9,069 (2.17 percent) had BLLs ≥ 3.5 µg/dL. In 2021, among the 408,449 children < 21 old tested in California, 8,495 (2.08 percent) had BLLs ≥ 3.5 µg/dL. In 2022:

- Among children under the age of six years old, the percentage of children tested with BLLs ≥ 3.5 µg/dL increased slightly from 1.88 percent in 2021 to 2.00 percent.
- The percentage of tested children (< 6 years old) with elevated BLLs (≥ 3.5 µg/dL) varied by county from 8.55 percent in Nevada County to 0.76 percent in San Mateo County. Humboldt County and Shasta County had the next highest rates of BLLs ≥ 3.5 µg/dL. (Figure 1 and Table 2).
- In eighteen out of the 45 jurisdictions that were able to be reported, more than 2.5 percent of the children tested had BLLs ≥ 3.5 µg/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) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
2021	Age < 6	364,008	98.12%	6,973	1.88%	370,981
	Age 6 to < 21	35,946	95.94%	1,522	4.06%	37,468
	Age < 21	399,954	97.92%	8,495	2.08%	408,449
2022	Age < 6	368,493	98.00%	7,514	2.00%	376,007
	Age 6 to < 21	41,119	96.36%	1,555	3.64%	42,674
	Age < 21	409,612	97.83%	9,069	2.17%	418,681

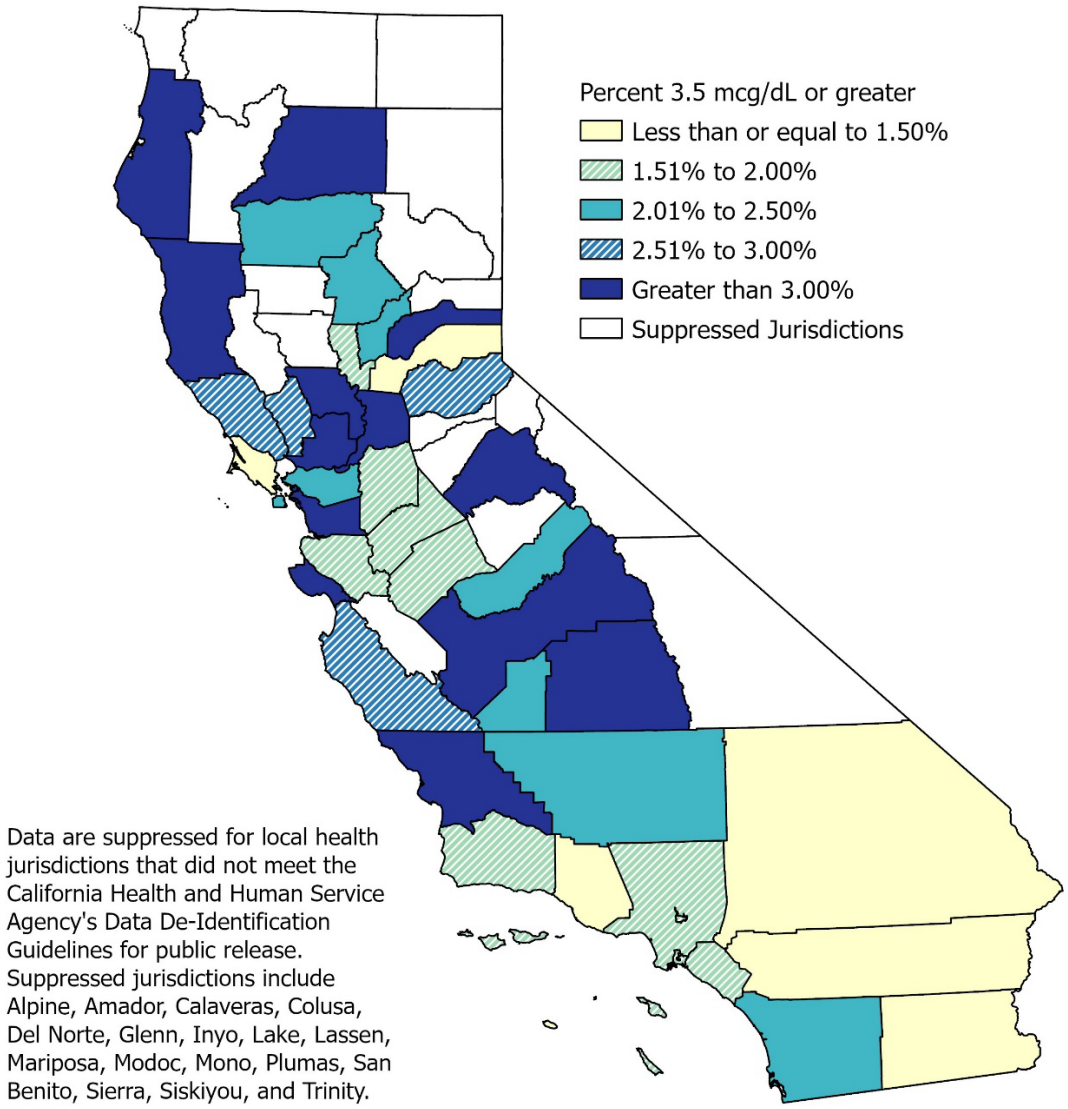
Notes:

- Data for 2021 are from the RASSCLE surveillance database archive of 01/03/2023. Data for 2022 are from the RASSCLE surveillance database archive of 07/03/2023.
- 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.

Results by individual LHJs for 2022 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.[12] 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 (≥ 3.5 µg/dL), CDPH refers the case directly to the LHJ as soon as the child is identified.

A map and table of children under 6 years old with BLLs of ≥ 3.5 µg/dL for 2022 by LHJ in descending order are shown in Figure 1 and Table 2, respectively. BLLs for children of all ages (including older children age 6 to < 21) are illustrated by LHJs for 2022 in Appendix D. Jurisdictions for which data are suppressed are listed in the text box to the right of the map.

Figure 1. Percent of Children Under 6 Years Old with a Blood Lead Level of 3.5 µg/dL or Greater, by California Local Health Jurisdiction, 2022



Notes:

- Data are from the RASSCLE surveillance database archive of 7/03/2023.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2022.
- 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 2022 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 (BLL) of 3.5 µg/dL or Greater, in Descending Order, 2022

Local Health Jurisdiction	BLL < 3.5 n	BLL < 3.5% (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Total Number of Children Under 6 Screened
Nevada	214	91.45%	20	8.55%	234
Humboldt	1,540	92.16%	131	7.84%	1,671
Shasta	1,157	94.45%	68	5.55%	1,225
Tuolumne	244	94.94%	13	5.06%	257
Berkeley	576	95.52%	27	4.48%	603
Fresno	10,151	95.91%	433	4.09%	10,584
Solano	3,773	95.98%	158	4.02%	3,931
San Luis Obispo	1,075	96.50%	39	3.50%	1,114
Yolo	1,889	96.62%	66	3.38%	1,955
Santa Cruz	1,949	96.68%	67	3.32%	2,016
Sacramento	15,556	96.83%	510	3.17%	16,066
Alameda	14,150	96.86%	458	3.14%	14,608
Tulare	4,632	96.92%	147	3.08%	4,779
Mendocino	861	96.96%	27	3.04%	888
Monterey	6,094	97.08%	183	2.92%	6,277
Sonoma	2,562	97.19%	74	2.81%	2,636
Napa	889	97.37%	24	2.63%	913
El Dorado	603	97.42%	16	2.58%	619
Kings	1,452	97.71%	34	2.29%	1,486
Tehama	900	97.72%	21	2.28%	921
Contra Costa	7,167	97.74%	166	2.26%	7,333
Butte	1,436	97.75%	33	2.25%	1,469
Suppressed Jurisdictions	3,169	97.78%	72	2.22%	3,241
San Francisco	6,949	97.78%	158	2.22%	7,107
Yuba	738	97.88%	16	2.12%	754
Kern	12,652	97.89%	273	2.11%	12,925
Madera	3,132	97.94%	66	2.06%	3,198
San Diego	32,119	97.97%	666	2.03%	32,785
Pasadena	999	98.04%	20	1.96%	1,019
Long Beach	3,933	98.08%	77	1.92%	4,010

Local Health Jurisdiction	BLL < 3.5 n	BLL < 3.5% (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Total Number of Children Under 6 Screened
Orange	24,680	98.12%	472	1.88%	25,152
Santa Barbara	5,389	98.12%	103	1.88%	5,492
Santa Clara	16,524	98.27%	291	1.73%	16,815
Sutter	1,095	98.29%	19	1.71%	1,114
Merced	2,891	98.30%	50	1.70%	2,941
San Joaquin	9,173	98.32%	157	1.68%	9,330
Los Angeles	88,301	98.40%	1,438	1.60%	89,739
Stanislaus	5,863	98.41%	95	1.59%	5,958
Placer	1,530	98.52%	23	1.48%	1,553
Marin	1,790	98.57%	26	1.43%	1,816
San Bernardino	24,894	98.75%	316	1.25%	25,210
Ventura	7,348	98.83%	87	1.17%	7,435
Riverside	29,084	98.94%	311	1.06%	29,395
Imperial	2,552	98.99%	26	1.01%	2,578
San Mateo	4,817	99.24%	37	0.76%	4,854
CLPPB	1	100.00%	0	0.00%	1
California Totals	368,493	98.00%	7,514	2.00%	376,007

Notes:

- Data are from the RASSCLE surveillance database archive of 07/03/2023.
- Each individual is counted only once, using their highest blood lead level (BLL) during 2022.
- 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 2022 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, Plumas, San Benito, Sierra, Siskiyou, and Trinity.

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 3). The range in percentage of tested young children under 6 years old with BLLs ≥ 3.5 µg/dL increased from 2021 to 2022. Additionally, the number of jurisdictions in which ≥ 2.5% percent of tested children had BLLs ≥

3.5 µg/dL increased from 2021 to 2022. Communities where more than 2.5% of children have BLLs above the 2021 CDC reference value have a higher prevalence of childhood lead poisoning than the nation as a whole.

Table 3. Comparison of Elevated BLLs by Local Health Jurisdiction by Year

Comparisons	2021	2022
Range in percentage of tested young children (< 6 years old) with EBLLs (≥ 3.5 µg/dL)	0.93% - 8.55%	0.76% - 8.55%
Number of jurisdictions in which ≥ 2.5% of tested children had BLLs ≥ 3.5 µg/dL	15 of 45 jurisdictions	18 of 45 jurisdictions

Notes:

- Data for 2021 are from the RASSCLE surveillance database archive of 01/03/2023. Data for 2022 are from the RASSCLE surveillance database archive of 07/03/2023.
- 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.

Smaller Geographic Area Analysis Unsuppressed ZIP Codes and Census Tracts, 2022

For reported BLL results for children < 6 years old tested in 2022, Esri 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 ≥ 3.5 µg/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 2022 were reported to CDPH from 1,464 of California's 1,777 non-PO 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 be displayed for 755 (42.5 percent) of the 1,777 ZIP Codes. This is because the 755 ZIP codes had no BLLs ≥ 3.5 µg/dL. Previous reports did not show ZIP codes with no BLLs ≥ 3.5 µg/dL since we were focused on ZIP codes that had children with BLLs ≥ 3.5 µg/dL, however, we have received requests to share data of ZIP codes with no children with with BLLs ≥ 3.5 µg/dL. Additionally, data for 109 (6.1 percent) of the 1,777 ZIP codes could be shown because they had a sufficient number of BLLs ≥ 3.5 µg/dL and a high population count, meeting the DDG criteria. Due to the number of ZIP codes that now can be displayed (864 ZIP codes), data for the top 20 unsuppressed ZIP codes ranked by percentage of reported BLLs ≥ 3.5 µg/dL are shown in Table 4 and the full table of 1,777 ZIP Codes with suppression applied to adhere to the DDGs can be found online. Because the DDGs required suppression of data for 913 (51.4 percent) of California's 1,777 non-PO Box ZIP Codes, this publicly reportable

data is of limited use for identifying geographic areas with high percentages of children with elevated BLLs. Data for 2021 has been posted and is publicly available on the CDPH website.

Table 4. Percent of Children with a Blood Lead Level (BLL) of 3.5 µg/dL or Greater, by ZIP Code, 2022 (top 20 for 2022)

ZIP Code	Postal District Name	Number of children under 6 with a BLL of 3.5 µg/dL or greater	Percent of children under 6 with a BLL of 3.5 µg/dL or greater	Total number of children under 6 with a BLL
94538	Fremont	54	6.93%	779
95608	Carmichael	43	6.92%	621
92021	El Cajon	51	6.65%	767
94591	Vallejo	31	5.83%	532
92020	El Cajon	40	5.76%	695
94109	San Francisco	14	5.43%	258
90037	Los Angeles	51	5.42%	941
94536	Fremont	36	5.36%	672
92126	San Diego	20	5.24%	382
93257	Porterville	40	5.15%	777
93291	Visalia	21	5.13%	409
90019	Los Angeles	25	5.03%	497
95014	Cupertino	13	5.02%	259
92701	Santa Ana	36	4.76%	757
90011	Los Angeles	77	4.27%	1,803
94110	San Francisco	19	4.11%	462
95076	Watsonville	46	4.09%	1,126
90004	Los Angeles	21	3.99%	526
92703	Santa Ana	35	3.74%	937
92115	San Diego	23	3.67%	626

Notes:

- Data are from the RASSCLE surveillance database archive of 7/3/2023.
- Each individual is counted only once, using their highest blood lead level during 2022.
- 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 or 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 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 2022 to meet the California Health and Human Services Agency's Data De-Identification Guidelines for public release. Only the top 20 unsuppressed ZIP Codes are in this table.

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 ≥ 3.5 µg/dL. For the census tract table, 5 years' worth of data were combined (2018-2022). Due to the number of years spanned, no suppression is needed, per the DDGs. The full census tract table can be found online. The data table can be combined with external data sources at the census tract level for additional analyses to identify areas for outreach and intervention.

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. Since 2020, CLPPB and DHCS have 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 *2022 Preventive Services Report* contains DHCS-calculated blood lead testing rates for children who were under age 6 in 2021 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 5). County data is presented in quintiles, with each measure (column) having its own unique quintile range. Higher quintiles, such as Quintile 5, indicate higher rates of testing compared to lower quintiles, such as Quintile 1.

Table 5. Department of Health Care Services Calculated Blood Lead Screening Measures for Managed Care Medi-Cal Children in 2021 by Race/Ethnicity, Primary Language, Gender, Delivery Type Model, Population Density, and County [1]

Stratification: Statewide Aggregate	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Statewide Aggregate	43.98%	34.50%	21.26%	32.29%	52.06%

Stratification: Race/ethnicity	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
American Indian or Alaska Native	33.80%	24.23%	10.78%	24.65%	44.79%
Asian	54.53%	40.76%	26.02%	38.94%	58.62%
Black or African American	29.40%	24.05%	10.58%	29.90%	35.51%

Hispanic or Latino	48.46%	38.82%	24.87%	37.14%	57.30%
Native Hawaiian or Other Pacific Islander	29.60%	23.10%	11.67%	25.84%	34.08%
White	36.45%	26.69%	15.39%	22.53%	43.95%
Other	42.65%	31.98%	19.08%	30.94%	49.53%
Unknown/Missing	38.57%	29.76%	17.32%	27.42%	46.57%

Stratification: Primary language	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Arabic	55.47%	41.37%	28.98%	45.92%	62.39%
Armenian	42.96%	27.76%	10.86%	23.90%	44.34%
Cambodian	54.84%	45.98%	25.97%	58.14%	58.82%
Chinese	74.32%	54.98%	41.69%	50.51%	70.45%
English	39.27%	30.47%	17.32%	29.09%	47.29%
Farsi	52.24%	39.39%	23.14%	64.04%	60.15%
Hmong	44.44%	30.59%	18.01%	43.37%	59.43%
Korean	61.03%	35.53%	22.66%	20.69%	59.86%
Russian	44.54%	33.33%	15.82%	39.53%	45.95%
Spanish	57.83%	46.54%	32.64%	42.97%	66.32%
Tagalog	46.67%	37.02%	22.29%	37.18%	54.27%
Vietnamese	58.47%	46.63%	27.80%	58.51%	58.81%
Other	52.33%	42.20%	25.26%	60.74%	64.30%
Unknown/Missing	26.79%	20.00%	Fewer than 11 cases exist in the numerator; data suppressed	19.28%	28.57%

Stratification: Gender	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Female	44.01%	34.28%	21.18%	32.39%	51.84%
Male	43.95%	34.71%	21.33%	32.20%	52.27%

Stratification: Delivery Type Model	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
County Organized Health Systems	48.58%	38.47%	27.02%	25.34%	57.20%
Geographic Managed Care	44.43%	35.01%	21.16%	38.15%	52.85%
Two-Plan (Local Initiative or Commercial Plan)	42.70%	33.34%	19.40%	34.06%	50.39%
Regional	34.94%	27.25%	16.33%	19.13%	45.14%

Stratification: Population Density	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Rural	40.70%	32.66%	21.96%	27.20%	53.65%
Urban	44.25%	34.65%	21.22%	32.71%	51.97%

Stratification: County	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Alameda	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 3 (16.22% - 22.36%)	Quintile 4 (28.02% - 34.41%)	Quintile 3 (48.06% - 56.04%)
Alpine	NA	NA	NA	NA	NA
Amador	Quintile 3 (36.90% - 42.13%)	Quintile 2 (20.09% - 28.32%)	Quintile 3 (16.22% - 22.36%)	NA	Quintile 3 (48.06% - 56.04%)
Butte	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 1 (below 16.67%)	Quintile 3 (48.06% - 56.04%)
Calaveras	Quintile 1 (below 26.96%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 3 (21.91% - 28.01%)	Quintile 2 (36.56% - 48.05%)
Colusa	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 4 (22.37% - 28.97%)	NA	Quintile 4 (56.05% - 64.54%)
Contra Costa	Quintile 2 (26.96% - 36.89%)	Quintile 1 (below 20.09%)	Quintile 1 (below 10.81%)	Quintile 2 (16.67% - 21.90%)	Quintile 2 (36.56% - 48.05%)

Stratification: County	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Del Norte	Quintile 1 (below 26.96%)	Quintile 1 (below 20.09%)	Quintile 1 (below 10.81%)	Quintile 2 (16.67% - 21.90%)	Quintile 1 (below 36.56%)
El Dorado	Quintile 1 (below 26.96%)	Quintile 1 (below 20.09%)	Quintile 1 (below 10.81%)	Quintile 1 (below 16.67%)	Quintile 1 (below 36.56%)
Fresno	Quintile 3 (36.90% - 42.13%)	Quintile 4 (33.88% - 41.02%)	Quintile 3 (16.22% - 22.36%)	Quintile 4 (28.02% - 34.41%)	Quintile 3 (48.06% - 56.04%)
Glenn	Quintile 2 (26.96% - 36.89%)	Quintile 4 (33.88% - 41.02%)	Quintile 5 (28.98% +)	Quintile 2 (16.67% - 21.90%)	Quintile 5 (64.55% +)
Humboldt	Quintile 2 (26.96% - 36.89%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 3 (21.91% - 28.01%)	Quintile 5 (64.55% +)
Imperial	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 5 (34.42% +)	Quintile 5 (64.55% +)
Inyo	Quintile 2 (26.96% - 36.89%)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 3 (21.91% - 28.01%)	Quintile 4 (56.05% - 64.54%)
Kern	Quintile 4 (42.14% - 53.25%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 5 (34.42% +)	Quintile 3 (48.06% - 56.04%)
Kings	Quintile 4 (42.14% - 53.25%)	Quintile 3 (28.33% - 33.87%)	Quintile 4 (22.37% - 28.97%)	Quintile 4 (28.02% - 34.41%)	Quintile 5 (64.55% +)
Lake	Quintile 1 (below 26.96%)	Quintile 2 (20.09% - 28.32%)	Quintile 1 (below 10.81%)	Quintile 2 (16.67% - 21.90%)	Quintile 1 (below 36.56%)
Lassen	Quintile 3 (36.90% - 42.13%)	Quintile 1 (below 20.09%)	Quintile 2 (10.81% - 16.21%)	Quintile 5 (34.42% +)	Quintile 4 (56.05% - 64.54%)
Los Angeles	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 3 (16.22% - 22.36%)	Quintile 5 (34.42% +)	Quintile 3 (48.06% - 56.04%)
Madera	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 4 (28.02% - 34.41%)	Quintile 5 (64.55% +)

Stratification: County	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Marin	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 5 (34.42% +)	Quintile 5 (64.55% +)
Mariposa	Quintile 1 (below 26.96%)	Quintile 1 (below 20.09%)	NA	Quintile 1 (below 16.67%)	Quintile 1 (below 36.56%)
Mendocino	Quintile 4 (42.14% - 53.25%)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 3 (21.91% - 28.01%)	Quintile 5 (64.55% +)
Merced	Quintile 2 (26.96% - 36.89%)	Quintile 3 (28.33% - 33.87%)	Quintile 2 (10.81% - 16.21%)	Quintile 4 (28.02% - 34.41%)	Quintile 3 (48.06% - 56.04%)
Modoc	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	NA	Quintile 3 (48.06% - 56.04%)
Mono	NA	NA	NA	NA	NA
Monterey	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 3 (21.91% - 28.01%)	Quintile 5 (64.55% +)
Napa	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 2 (16.67% - 21.90%)	Quintile 5 (64.55% +)
Nevada	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 1 (below 16.67%)	Quintile 3 (48.06% - 56.04%)
Orange	Quintile 4 (42.14% - 53.25%)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 3 (21.91% - 28.01%)	Quintile 4 (56.05% - 64.54%)
Placer	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 2 (16.67% - 21.90%)	Quintile 2 (36.56% - 48.05%)
Plumas	NA	NA	NA	Quintile 1 (below 16.67%)	Quintile 1 (below 36.56%)
Riverside	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 5 (34.42% +)	Quintile 2 (36.56% - 48.05%)
Sacramento	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 5 (34.42% +)	Quintile 2 (36.56% - 48.05%)

Stratification: County	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
San Benito	Quintile 5 (53.26% +)	Quintile 3 (28.33% - 33.87%)	Quintile 4 (22.37% - 28.97%)	Quintile 2 (16.67% - 21.90%)	Quintile 4 (56.05% - 64.54%)
San Bernardino	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 4 (28.02% - 34.41%)	Quintile 2 (36.56% - 48.05%)
San Diego	Quintile 4 (42.14% - 53.25%)	Quintile 5 (41.03% +)	Quintile 4 (22.37% - 28.97%)	Quintile 5 (34.42% +)	Quintile 4 (56.05% - 64.54%)
San Francisco	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 5 (34.42% +)	Quintile 5 (64.55% +)
San Joaquin	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 2 (10.81% - 16.21%)	Quintile 4 (28.02% - 34.41%)	Quintile 2 (36.56% - 48.05%)
San Luis Obispo	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 1 (below 16.67%)	Quintile 3 (48.06% - 56.04%)
San Mateo	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 5 (34.42% +)	Quintile 4 (56.05% - 64.54%)
Santa Barbara	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 5 (28.98% +)	Quintile 4 (28.02% - 34.41%)	Quintile 4 (56.05% - 64.54%)
Santa Clara	Quintile 5 (53.26% +)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 5 (34.42% +)	Quintile 3 (48.06% - 56.04%)
Santa Cruz	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 2 (16.67% - 21.90%)	Quintile 5 (64.55% +)
Shasta	Quintile 1 (below 26.96%)	Quintile 1 (below 20.09%)	Quintile 1 (below 10.81%)	Quintile 1 (below 16.67%)	Quintile 1 (below 36.56%)
Sierra	NA	NA	NA	NA	NA
Siskiyou	Quintile 1 (below 26.96%)	Quintile 2 (20.09% - 28.32%)	Quintile 1 (below 10.81%)	Quintile 1 (below 16.67%)	Quintile 1 (below 36.56%)
Solano	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 4 (28.02% - 34.41%)	Quintile 2 (36.56% - 48.05%)

Stratification: County	Blood Lead Screening: 12 Months of Age[2]	Blood Lead Screening: 24 Months of Age[3]	Two Tests by 24 Months of Age[4]	Catch-Up Test by 6 Years of Age[5]	Catch-Up Test by 6 Years of Age[5]
Sonoma	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 1 (below 10.81%)	Quintile 3 (21.91% - 28.01%)	Quintile 1 (below 36.56%)
Stanislaus	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 4 (28.02% - 34.41%)	Quintile 2 (36.56% - 48.05%)
Sutter	Quintile 3 (36.90% - 42.13%)	Quintile 2 (20.09% - 28.32%)	Quintile 2 (10.81% - 16.21%)	Quintile 3 (21.91% - 28.01%)	Quintile 2 (36.56% - 48.05%)
Tehama	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 4 (28.02% - 34.41%)	Quintile 4 (56.05% - 64.54%)
Trinity	Quintile 2 (26.96% - 36.89%)	Quintile 2 (20.09% - 28.32%)	NA	NA	Quintile 2 (36.56% - 48.05%)
Tulare	Quintile 4 (42.14% - 53.25%)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 3 (21.91% - 28.01%)	Quintile 5 (64.55% +)
Tuolumne	Quintile 3 (36.90% - 42.13%)	Quintile 1 (below 20.09%)	Quintile 2 (10.81% - 16.21%)	Quintile 5 (34.42% +)	Quintile 4 (56.05% - 64.54%)
Ventura	Quintile 5 (53.26% +)	Quintile 5 (41.03% +)	Quintile 5 (28.98% +)	Quintile 3 (21.91% - 28.01%)	Quintile 4 (56.05% - 64.54%)
Yolo	Quintile 5 (53.26% +)	Quintile 4 (33.88% - 41.02%)	Quintile 4 (22.37% - 28.97%)	Quintile 4 (28.02% - 34.41%)	Quintile 4 (56.05% - 64.54%)
Yuba	Quintile 3 (36.90% - 42.13%)	Quintile 3 (28.33% - 33.87%)	Quintile 3 (16.22% - 22.36%)	Quintile 2 (16.67% - 21.90%)	Quintile 2 (36.56% - 48.05%)

[1] Original tables can be found in the Department of Health Care Services' *2022 Preventive Services Report.* "NA" indicates the rate had a small denominator (i.e., less than 30).

[2] 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.

[3] 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.

[4] 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.

[5] 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).

[6] 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 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 2021 and 2022, there were 1308 total attendees at a total of 47 Childhood Lead Poisoning Prevention Provider Outreach presentations, 55% of which were health care providers. Due to COVID-19 pandemic restrictions, live webinars replaced in-person presentations during 2021

and 2022. Written notes from attendees about how their current practice would change in response to the training included: ”Educate parents and guardians regarding lead poisoning,”“Monitor ways to avoid lead in the local environment,” Screen for lead exposure, test at age one and two, test when at risk or symptoms indicate,” “Closely monitor for refugee status,” “Better discussions with family,” “Speak more about pica and lead exposure,” “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,” “Distribute information about lead prevention in pediatric offices,“ “Address cultural practices,” and “Implement point-of-care testing.” Suggestions included “Increased awareness in advertising on TV and social media,” “More videos”.

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 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. There were no Medical Board Newsletter articles from CLPPB in 2022.

Outreach materials for families are available on the CDPH website, and print versions are also available free of charge to health care providers and can be ordered on the CDPH website. 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, 2021, through December 31, 2022, approximately 2,210 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-training and post-training test scores.

To help ensure appropriate follow-up testing, from January 1, 2021 to December 31, 2022, CLPPPs sent over 3,500 retesting reminder letters to medical providers throughout the state for children with BLLs ≥ 4.5 µg/dL.

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, dissemination of educational materials, presentations, newsletters, and social media outreach. The CLPP Program expands the reach of its prevention work through partnerships with other state and local programs. CLPPB has 30 educational materials available that provide information about a variety of lead sources, recommendations for preventing lead exposure, and encourage blood lead screening for at-risk children. 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, 2021, and December 31, 2022, approximately 3,543 community outreach activities were performed by CLPPB and local CLPPPs. These activities reached an estimated

338,978 families and individuals. During the same period, targeted lead-related training and education outreach activities reached an estimated 21,783 childcare providers and the families they serve.

CDPH updated local CLPPPs' contract scope of work (SOW) for fiscal years 2020-23 to require evaluation of outreach activities for purposes of assessing effectiveness. CLPPPs received a toolkit to assist with implementation. CLPPPs' evaluation data demonstrate positive knowledge gain and/or behavior change among recipients of educational outreach.

Through a strategic planning process that involved input from CDPH programs and local health jurisdictions, the CLPP Program updated its SOW requirements for fiscal years 2023-2026 related to outreach and primary prevention to strengthen partnerships for more meaningful community involvement and interventions. CLPPPs will receive training and support to successfully make this shift in primary prevention and community engagement.

6) Case Management Services

Direct services to children with elevated BLLs are provided by 49 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 ≥ 4.5 µg/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. Although the CDC adopted a new BLRV of 3.5 µg/dL in 2021, the CLPP Program began providing services to children based on this new BLRV on July 1, 2023. This delay was due to needing to secure additional resources to support the expansion of services.

Information about the number of children with BLLs ≥ 4.5 µg/dL receiving CLPP Program services (CLPPB and local contracted CLPPPs) provided during 2021 and 2022 is based on CLPPPs self-reporting in semi-annual progress reports. For counties without CLPPPs, data was obtained from CLPPB records.

- In 2021, services were reported for 2,442 children with elevated BLLs below full case-making criteria.
- In 2022, services were reported for 2,791 children with elevated BLLs below full case-making criteria.

Full Case Management: Public Health Nurse Services

Two hundred and ninety-two children received full case management services in 2022. 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 µg/dL. Beginning July 1, 2023, PHNs will follow up until the BLL has declined and remains below 3.5 µg/dL. The vast majority of children receiving case management services see a decline in blood lead levels over time.

Table 6 shows the number of children eligible for and receiving full case management services from a PHN in 2021 and 2022 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.

Table 6. Number of Children Eligible for and Receiving Full Case Management Services from a PHN 2021 and 2022

Year	New Full Case Identified	Number and Percent of Full Cases (%) Receiving Public Health Nurse Home Visits
2021	327	312 (95%)
2022	292	261 (89%)

Every child meeting the full case definition is eligible to receive both PHN case management services and an environmental investigation (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.

Table 7 displays the number of referrals, environmental investigations, and properties with lead hazards in 2021 and 2022 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. An increase in full cases, subsequent EI referrals, and clearances was noted in 2021 as a result of reopening state after the pandemic and lifting the stay at home orders.

Table 7. Number of Referrals, Environmental Investigations, and Properties with a Lead Hazard in 2021 and 2022

Year	2021	2022
Number of PHN referrals for an EI	851	720
Number of initial EIs performed	313	311
Number of properties identified as having a lead hazard using criteria	147	100

In 2021-2022 years, the discrepancy between the number of EIs and the number of referrals was primarily due to the effect of the pandemic. Families continued to feel uncomfortable having non-family members come into their homes and families also moved to more affordable housing areas in response to the large increase in housing costs during COVID. Non-pandemic factors for the decrease in the number of EIs compared to referrals include: sometimes a referral is received near the end of a reporting period and the EI is performed during the subsequent reporting period; families sometimes repeatedly refuse services or do not respond after multiple contact attempts; families moved or were out of town shortly after the referral, which delayed services; and 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.

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 109 in 2021 and 208 in 2022. 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 2020-2021 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, for example food items, cosmetics, or potteries (Table 9).

In FY 2020-2021, initial EI started as a remote exposure assessment by a structured questionnaire on the phone due to COVID-19 pandemic, then, based on family's consent, an on-site EI was completed. 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 during FY 2020-2021 who received full case management, including environmental services, were included. As of July 1, 2016, children meet full case criteria with either a single venous BLL at or above 14.5 µg/dL or persistent levels at or above 9.5 µg/dL. Data on blood lead results were gathered from the RASSCLE 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. The lead content in these samples were measured by X-Ray Fluorescence (XRF) screening by EPs, as well as quantitatively in the environmental health laboratories.
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 in the lead follow-up forms 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 California Department of Public Health vital statistics reporting categories for race/ethnicity for the data analysis. Mutually exclusive race/ethnicity categories were:

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

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 Multirace (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). OMB made changes in their race/ethnicity categorizations in 2020, which affected our grouping for children of Afghan origin. Afghans mostly identified themselves as 'White', 'Asian' or 'Other'

and specified as Afghan. Previously, Afghan children were categorized as 'White' in accordance with OMB recommendations. In 2020, OMB category for Afghans changed to 'Asian - Central Asian'. In our FY2020-21 analysis, Afghans are counted within the Asian category.

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). 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 8).

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 are based on recent changes in action levels and recommendations and proposals under consideration by regulatory agencies. 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).

Table 8. Definitions of Housing-Related Sources of Lead Exposure

Type of housing-related source	Current Regulatory Level	Lower "Actionable" Level
Paint	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 (≥ 1.0 mg/cm^2). In addition, full cases were attributed to paint at local regulatory level in Los Angeles at ≥ 0.7 mg/cm^2. (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010) 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).	Paint with lead ≥ 600 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 mg/cm^2, the level chosen for XRF instruments was 0.1 mg/cm^2, which is the lowest level detectable to the tenths place to be most health protective.
Dust	Lead-contaminated at greater than or equal to 40 micrograms of lead per square foot of surface area (≥ 40 $\mu g/ft^2$) for interior floor surfaces, ≥ 250 $\mu g/ft^2$ for interior horizontal surfaces, and ≥ 400 $\mu g/ft^2$ for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)	Lead levels ≥ 10 $\mu g/ft^2$ for interior floor surfaces, and ≥ 100 $\mu g/ft^2$ 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.

Type of housing-related source	Current Regulatory Level	Lower "Actionable" Level
Soil	Lead-contaminated at greater than or equal to 400 parts per million (≥ 400 ppm) in children's play areas. 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).	Bare soil with ≥ 80 ppm 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.
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 (≥ 0.015 mg/L) is above the action level. (40 CFR Section 141.80)	Drinking water ≥ 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 9. 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, lozenna, 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

Results

In FY 2020-2021, there were 269 new children meeting full case criteria. Of those 269 new childhood lead cases, 175 (65.1%) received full case management services (both home visit and on-site environmental investigation) and 168 unique properties went through an environmental investigation. In some cases, there were multiple children with case-making BLLs living in the same property; in other cases, family moved and a second EI was done in the new house (n=20).There were several reasons for incomplete home visits and/or EIs: persistent refusal (n=46), remote exposure assessment (n=24), uncooperative family (n=7), other administrative reasons (n=6), moved away (n=3), aged-out (n=1), or missing information (n=7); these children are excluded from results.

The characteristics of children who received full case management services are described in Table 10. Most of the full cases were less than 6 years old (90.9 percent), female (50.3 percent), Hispanic-single race (57.7 percent). Of the 175 children who received full services, five (2.9 percent) had a BLL higher than 44.4 µg/dL, 120 (68.6 percent) had a BLL between 14.5 and 44.4 µg/dL, and 50 (28.5 percent) had a BLL between 9.5 and 14.4 µg/dL.

Table 10. Demographic Characteristics of Full Cases[1], Fiscal Year 2020-21 (n=175)

Characteristic: Age	n=175	Percent (%)
Less than 6 years	159	90.9
Between 6 and 21 years	16	9.1

Characteristic: Sex	n=175	Percent (%)
Female	88	50.3
Male	87	49.7

Characteristic: Race/Ethnicity	n=175	Percent (%)
Non-Hispanic Asian (n=50)[2]	[Separated below]	[Separated below]
Afghan	17	9.7
Asian Indian	22	12.5
Cambodian	2	1.2
Chinese	2	1.2
Filipino	1	0.6
Japanese	1	0.6
Pakistani	4	2.2
Tibetian	1	0.6
Unspecified	1	0.6
Non-Hispanic Black	5	2.8
Non-Hispanic Hawaiian/ Pacific Islander[3]	0	0
Hispanic (Single race)	101	57.7

Characteristic: Race/Ethnicity	n=175	Percent (%)
Multi race (any Hispanic status)	1	0.6
Non-Hispanic Native American/Alaskan	0	0
Non-Hispanic Other Race (unspecified)	1	0.6
Non-Hispanic White	13	7.4
Declined or unknown	4	2.3

[1] 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.
[2] No full case was identified, specifically, as Bangladeshi, Burmese, Hmong, Indonesian, Korean, Laotian, Malaysian, Sri Lankan, Taiwanese, Thai, or Vietnamese as an Asian sub-group within the Non-Hispanic Asian category.
[3] No full case was identified, specifically, as Fijian, Hawaiian, Guamanian or Chamorro, Marshaleese, Native Hawaiian, Samoan, or Tongan as a Pacific Islander sub-group within the Non-Hispanic Hawaiian/Pacific Islander category.

Based on current regulatory levels, lead exposure source was unknown for 51 children (29.1 percent). Nonhousing sources were identified in 56 children (32.0 percent) as the only source of lead exposure. The high occurrence of non-housing sources was driven mostly by Asian children which accounted for 57% of non-housing sources. Housing-related sources were identified in 43 children (24.6 percent) as the only source of lead exposure. Both housing-related and non-housing sources of lead exposure were identified in 25 children (14.3 percent) (Table 11). Therefore, a total of 68 children (38.9 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 45 children (25.7 percent) as the only source and both housing-related and non-housing sources of lead exposure were identified in 34 children (19.4 percent). Hence, a total of 79 children (45.1 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 11).

Table 11. Sources of Lead Exposure Among Full Cases, Fiscal Year 2020-21 (n=175)

Exposure source	Current Regulatory Level[1]	Lower "Actionable" Level[2]
Only Housing source	43 (24.6%)	45 (25.7%)
Both Housing and Non-Housing	25 (14.3%)	34 (19.4%)
Only Non-Housing source	56 (32.0%)	47 (26.9%)
Unknown	51 (29.1%)	49 (28.0%)

[1]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 ≥ 1.0 mg/cm^2. In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at ≥ 0.7 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 ≥ 40 µg/ft^2 for interior floor surfaces, ≥ 250 µg/ft^2 for interior horizontal surfaces, and ≥ 400 µg/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 ≥ 400 ppm in children's play areas.
- Water levels are categorized by an action level; according to the US EPA Federal Lead and Copper Rule, ≥ 0.015 mg/L is above the action level (40 CFR Section141.80). 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.

[2] Lower "actionable" level for housing-related sources of lead exposure:

- Paint with lead ≥ 600 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 mg/cm^2, the level used for XRF instruments was 0.1 mg/cm^2, which is the lowest level detectable to the tenths place in order to be most health protective.
- Dust lead levels ≥ 10 µg/ft^2 for interior floor surfaces, and ≥ 100 µg/ft^2 for interior horizontal surfaces were used in order to match changes in federal dust standards effective in 2020.
- Bare soil with ≥ 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 ≥ 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 <0.0001, Table 12). Housing-related sources of lead were identified as a common source of lead exposure among Black (40 percent) and Hispanic children (36.6 percent) while non-housing sources of lead exposure were identified as the most common source among Asian Indian children (63.6 percent), and Afghan children (76.5 percent, Table 12). The exposure source of lead did not differ by age group or identified sex at birth in FY2020-21 (p=0.0543, Table 12).

Table 12. Source of Lead Exposure at Current Regulatory Levels[1] by Demographic Characteristics Among Full Cases, Fiscal Year 2020-21 (n=175)

Characteristic: Age p-value: 0.054	Only Housing (n=43)	Both Housing and Non-Housing (n=25)	Only Non-Housing (n=56)	Unknown (n=51)
Less than 6 years (n=159)	43 (27.0%)	21 (13.2%)	48 (30.2%)	47 (29.6%)
Between 6 and 21 years (n=16)	0 (0.0%)	4 (25.0%)	8 (50.0%)	4 (25.0%)

Characteristic: Sex p-value: 0.36	Only Housing (n=43)	Both Housing and Non-Housing (n=25)	Only Non-Housing (n=56)	Unknown (n=51)
Female (n=88)	24 (27.3%)	10 (11.4%)	25 (28.4%)	29 (32.9%)
Male (n=87)	19 (21.8%)	15 (17.2%)	31 (35.6%)	22 (25.3%)

Characteristic: Race/Ethnicity p-value: <0.001	Only Housing (n=43)	Both Housing and Non-Housing (n=25)	Only Non-Housing (n=56)	Unknown (n=51)
Non-Hispanic Asian Afghan (n=17)	0 (0.0%)	1 (5.9%)	13 (76.5%)	3 (17.6%)
Non-Hispanic Asian Asian Indian (n=22)	1 (4.7%)	0 (0.0%)	14 (66.7%)	6 (28.6%)
Non-Hispanic Asian All Other Asian (n=11)	1 (9.1%)	0 (0.0%)	5 (45.4%)	5 (45.4%)
Non-Hispanic Black (n=5)	2 (40.0%)	0 (0.0%)	0 (0.0%)	3 (60.0%)
Non-Hispanic Hawaiian/ Pacific Islander (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Hispanic (Single race, n=101)	37 (36.6%)	17 (16.8%)	18 (17.8%)	29 (28.7%)
Non-Hispanic Native American/Alaskan (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Multi race (any Hispanic status, n=1)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Non-Hispanic Other (n=1)	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)
Non-Hispanic White (n=13)	0 (0.0%)	6 (46.1%)	4 (30.8%)	3 (23.1%)
Declined or Unknown (n=4)	1 (25.0%)	1 (25.0%)	0 (0.0%)	2 (50.0%)

[1] Housing-related sources of lead exposure include:

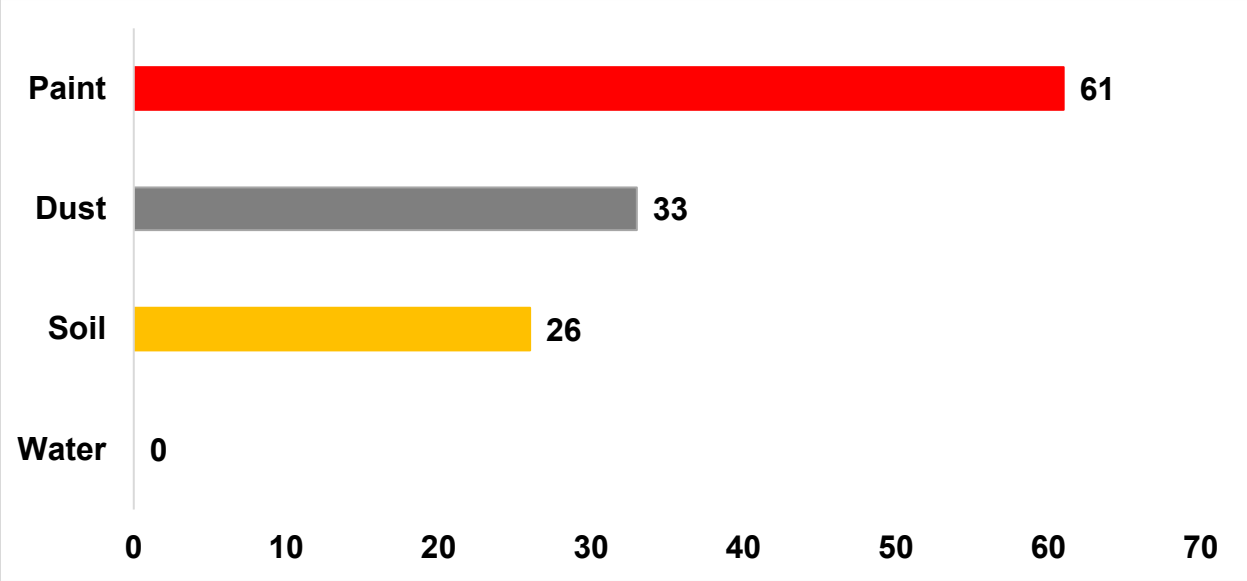
- Paint is considered a source when the presence of deteriorated lead-based paint tested at the state regulatory level of ≥ 1.0 mg/cm^2. In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at ≥ 0.7 mg/cm^2. (17 CCR Sections 35022, 35033, 35037; Los Angeles County Code Section 11.28.010)
- Dust is considered a source when it is lead contaminated at ≥ 40 µg/ft^2 for interior floor surfaces, ≥ 250 µg/ft^2 for interior horizontal surfaces, and ≥ 400 µg/ft2 for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at ≥ 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, ≥ 0.015 mg/L is above the action level (40 CFR Section141.80). 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 2 shows the distribution of housing-related sources of lead exposure at current regulatory levels during FY 2020-21. Paint was the most common housing-related source of lead exposure, followed by dust, soil and water. Table 13 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 over the years.

Figure 2. Total Occurrences[1] of Housing-Related Sources of Lead Exposure[2] Among Full Cases, Fiscal Year 2020-21 (n=120)



[1]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=68) identified with a housing-related source of lead exposure.

[2]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 ≥ 1.0 mg/cm^2. In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at ≥ 0.7 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 ≥ 40 µg/ft^2 for interior floor surfaces, ≥ 250 µg/ft^2 for interior horizontal surfaces, and ≥ 400 µg/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 ≥ 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, ≥ 0.015 mg/L is above the action level (40 CFR Section141.80). 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 13. Total Occurrences[1] of Housing-Related Sources of Lead Exposure[2] by Race/Ethnicity Among Full Cases, Fiscal Year 2020-2021 (n=120)

Housing-related Lead Sources	Non-Hispanic Asian - Afghan	Non-Hispanic Asian - Indian	Non-Hispanic Asian - Other	Non-Hispanic Black	Non-Hispanic Hawaiian/ Pacific Islander	Hispanic (Single race)	Multi race (any Hispanic status)	Non-Hispanic Native American /Alaskan	Non-Hispanic Other	Non-Hispanic White	Declined or Unknown
Paint (n=61)	0 (0.0%)	1 (1.6%)	0 (0.0%)	2 (3.3%)	0 (0.0%)	50 (82.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)	5 (8.2%)	2 (3.3%)
Dust (n=33)	1 (3.0%)	0 (0.0%)	1 (3.0%)	1 (3.0%)	0 (0.0%)	25 (75.8%)	1 (3.0%)	0 (0.0%)	0 (0.0%)	4 (12.1%)	0 (0.0%)
Soil (n=26)	1 (3.9%)	0 (0.0%)	0 (0.0%)	1 (3.9%)	0 (0.0%)	20 (76.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (15.3%)	0 (0.0%)
Water (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

[1]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=68) identified with a housing-related source of lead exposure.

[2]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 ≥ 1.0 mg/cm2. In addition, full cases were attributed to paint at local regulatory levels in Los Angeles at ≥ 0.7 mg/cm2. (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 ≥ 40 µg/ft2 for interior floor surfaces, ≥ 250 µg/ft2 for interior horizontal surfaces, and ≥ 400 µg/ft2 for exterior floor and exterior horizontal surfaces. (17 CCR Sections 35035, 35037)
- Soil is considered a source when it is lead contaminated at ≥ 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, ≥ 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.

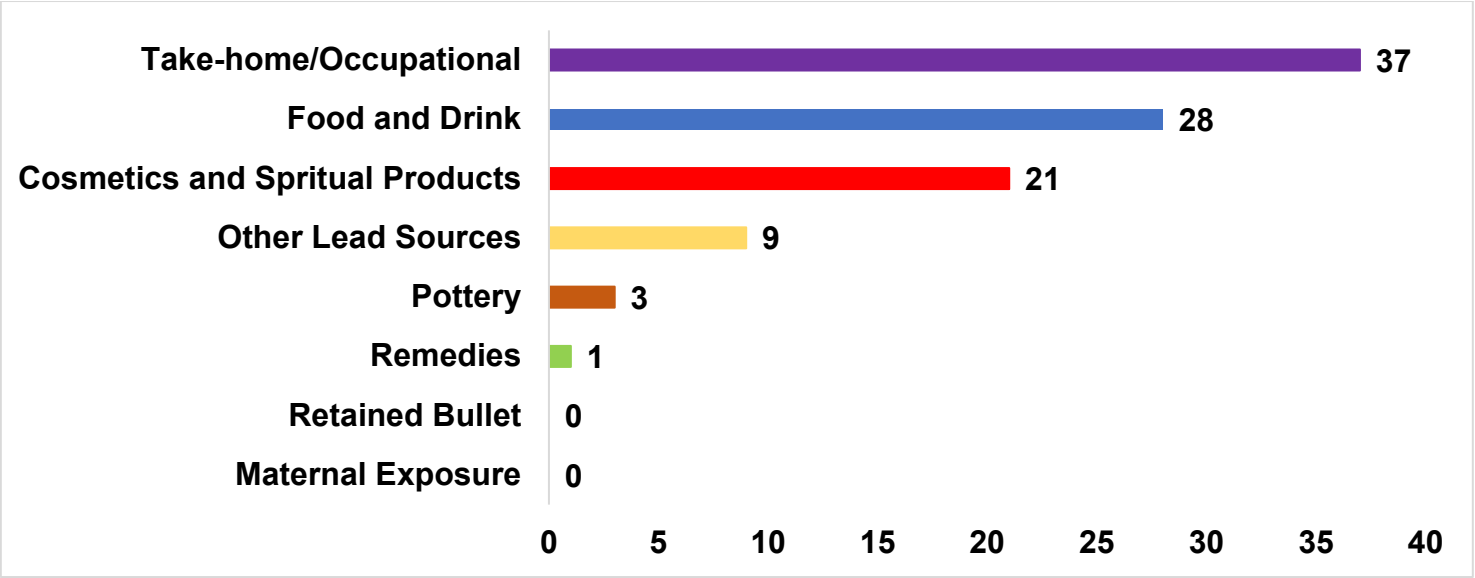
Removal, Remediation, or Abatement of Identified Housing-Related Sources of Lead Exposure

Of the 175 full cases in our analysis, housing-related sources of lead exposure were identified at current regulatory levels in 70 properties. There were a total of 70 properties that needed housing-related sources of lead exposure removed, remediated, or abated and required clearance. Keep in mind that multiple children may be living at the same property as well as EI done in multiple properties for some children, number of properties are independent from the number of cases. Of those 70 properties, 55 (78.6 percent) had their housing-related source of lead exposure removed, remediated, or abated while 15 properties (21.4 percent) are still in process.

Distribution of Non-Housing Sources of Lead Exposure

For FY 2020-21, the main non-housing sources identified were 'take-home/occupational' exposures' followed by 'food, spice and drink items', and 'cosmetics/spiritual products' (Figure 3).

Figure 3. Total Occurrences[1] of Non-Housing Sources of Lead Exposure Among Full Cases, Fiscal Year 2020-21 (n=99)



[1]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=81) identified with a non--housing lead hazard.

Lead exposure through 'Take-home/occupational exposure' differed by race/ethnicity (p=0.005). Of the 37 children where 'Take-home/occupational exposure' was identified as the lead source, 26 were Hispanics (70 percent), 7 were Whites (18.9 percent), 3 were Asian (8.1 percent) and 1 was Unknown race (2.7 percent, Table 14).

Table 14. Total Occurrences[1] of Non-Housing Sources of Lead Exposure by Race/Ethnicity Among Full Cases, Fiscal Year 2020-21 (n=99)

Non-Housing Exposure Source of Lead	Non-Hispanic Asian-Afghan	Non-Hispanic Asian-Indian	Non-Hispanic Asian-Other	Non-Hispanic Black	Non-Hispanic Hawaiian/ Pacific Islander	Hispanic (Single race)	Non-Hispanic Native American/Alaskan	Multi race (any Hispanic status)	Non-Hispanic Other	Non-Hispanic White	Declined or Unknown
Take-Home/ Occupational (n=37)	0 (0.0%)	0 (0.0%)	3 (8.1%)	0 (0.0%)	0 (0.0%)	26 (70.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	7 (18.9%)	1 (2.7%)
Food and Drink (n=28)	8 (28.6%)	10 (35.7%)	2 (7.1%)	0 (0.0%)	0 (0.0%)	6 (21.4%)	0 (0.0%)	0 (0.0%)	1 (3.6%)	1 (3.6%)	0 (0.0%)
Cosmetics and Spiritual Products (n=21)	13 (61.9%)	5 (23.8%)	2 (9.5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.8%)	0 (0.0%)
Other Lead Sources (n=9)	0 (0.0%)	0 (0.0%)	2 (22.2%)	0 (0.0%)	0 (0.0%)	6 (66.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (11.1%)	0 (0.0%)
Pottery (n=3)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Remedies (n=1)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Maternal Exposure (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Retained Bullet (n=0)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

[1]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=81) identified with a non-housing source of lead exposure.

Lead exposure through food, spice and drinks differed by race/ethnicity (p <0.0001, Table 14). Of the 28 children, where "food, spices and drinks' were identified as the source of exposure, 20 were Asian (71.4 percent), 6 were Hispanics (21.4 percent) and 1 was White (3.6 percent) and 1 was Other race (3.6 percent, Table 14). Of the 20 Asian children where 'food, spices and drinks' was a source of lead exposure, 10 were Asian Indians, 8 were Afghans.

Lead exposure through cosmetics and spiritual items differed by race/ethnicity (p <0.0001, Table 14). Of the 21 children where cosmetics and spiritual items were identified as the source of lead exposure, 20 were Asians (95.2 percent). Of the 20 Asian children, 13 were Afghans, 5 were Asian Indians (Table 14).

Lead exposure though 'other sources of lead' were identified among 9 children. Six of them were Hispanics (66.7%), two were Asians (22.2%), and one was White (11.1%, p-value=0.9). Pottery was identified as a source of lead exposure among three children. They were all Hispanics (p=0.9, Table 14). Remedies were identified as a source of lead exposure in only one Asian child (Table 14). Non-housing sources of lead exposure were not identified among Black and Multi-race children (Table 14).

Among the 37 take-home/occupational exposures, the most common sectors were construction (n= 15), fishing (n= 5), painting (n=4, data not shown). Although unconfirmed, exposures from previous residence/travel outside of California were suspected in 45 children with the top countries where previous residence/travel outside of California included Afghanistan (n= 16), Mexico (n= 15), and India (n= 10) (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 ≥ 5 µg/dL.[13] 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 March 2023, California had a total of 1,746 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 15 below, based on the AAP recommendation to screen children living in ZIP codes where at least 25 percent of homes were built before 1960, children living in 893 (51.1 percent) of the 1,746 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 510 ZIP codes, bringing the cumulative number of targeted ZIP codes to 80.4 percent. While there were 80 ZIP codes meeting the AAP criteria of having at least 5 percent of children with BLLs at least 5 µg/dL, adding this criterion only added six 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 428 ZIP codes where 2.5 percent of children had BLLs 3.5 µg/dL or greater adds 46 additional ZIP codes to the cumulative list. Taking into account the 885 ZIP codes within 1.7 miles of a known current or historic lead emitting facility adds an additional 157 ZIP codes to the cumulative list. Including the 1,522 ZIP codes for which a portion of the ZIP code was within 1,000 feet of a state highway adds 111 ZIP codes to the cumulative list. The 250 ZIP codes for cities with a former smelter adds four ZIP codes to the cumulative risk. The 341 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 one ZIP code. The 952 ZIP codes where a portion of the ZIP code is within 1 km of railroad tracks moving freight adds five 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 ZIP codes overlapped with a water service area with at least one known leaded service line or fitting, adding 1 ZIP code.

Taking into account all eleven geospatial risk indicators, 99.3 percent of California's ZIP codes present increased risk for lead exposure. Only 12 California non-PO Box ZIP codes do not have a geospatial risk indicator. See Appendix E for the lists of covered and remaining ZIP codes.

Table 15. Geospatial Indictors of Risk for Childhood Lead Exposure for California ZIP Codes

Indicator of Risk[A]	ZIP Codes[B, C]	Additional ZIP Codes[D]	Cumulative ZIP Codes[E]	Percent of ZIP Codes Covered[F]
American Academy of Pediatrics recommendation: 25% of residential parcels were built before 1960[G]	893	893	893	51.1%
25% of residential parcels were built before 1978[H]	1,403	510	1,403	80.4%
American Academy of Pediatrics recommendation: 5% of children tested in 2022 had a BLL of 4.5 mcg/dL or greater[I]	80	6	1,409	80.7%
2.5% of children tested in 2022 had a BLL of 3.5 mcg/dL or greater[J]	428	46	1,455	83.3%
Within 1.7mi of a current or historic lead emitting facility[K]	885	157	1,612	92.3%
Within 1,000ft of a state highway[L]	1,522	111	1,723	98.7%
Within a city with a former lead or steel smelter[M]	250	4	1,727	98.9%
Within 1km of an airport where leaded avgas is used[N]	341	1	1,728	99.0%
Within 1km of a railroad moving freight[O]	952	5	1,733	99.3%
Within 1,000ft of a speedway[P]	84	0	1,733	99.3%
In a water service area with at least one known leaded user service line or fitting[Q]	170	1	1,734	99.3%
Remaining[R]	--	12	1,746	100.0%
Total	--	1,746	--	--

[A] These criteria were compiled from existing recommendations by the American Academy of Pediatrics (AAP), 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).

[B] 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 1,778 ZIP codes in the March 2023 shapefile, 32 of which begin with "000" and represent large unpopulated government lands. These 32 ZIP codes have been excluded from this analysis, leaving 1,746 ZIP codes.[14]

[C] 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.
[D] 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, 111 of the 1,522 ZIP codes that at least partially intersected 1,000 feet of a state highway were not already represented in the five rows above.
[E] 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, 1,723 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.
[F] 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, 98.7% 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.
[G] 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 October 2022, was built before 1960. Residential parcels with a missing year built were excluded from these calculations.[13, 15, 16]
[H] To acknowledge the risk of lead hazards in all houses built before 1978, the AAP criterion was repeated using 1978 instead of 1960.
[I] 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 µg/dL. The State rounds and considers a level of 4.5 µg/dL a 5. The blood lead data are for calendar year 2022 from the RASSCLE surveillance database archive of July 3, 2023.[13, 16]
[J] 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. As of October 2021, the Centers for Disease Control and Prevention uses a blood lead reference value (BLRV) of 3.5 µg/dL to identify children with blood lead levels that are higher than most children's levels.
[K] 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 July 27, 2023) 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.[17, 18, 19]
[L] 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.[20, 21]
[M] 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.

[N] 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. The same extract was performed on July 13, 2023 to identify any new airports and the two lists were then combined. Airports that were on the 2021 list but not the 2023 list were kept in the analysis as there could still be legacy soil contamination even if there is no longer air contamination. An article by Miranda found lead soil contamination up to 1 km away from airports where planes use avgas.[22, 23, 24, 25]

[O] 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. The layer of railroads in California from Caltrans was extracted three times and merged; the layers were last modified on October 31, 2013, January 27, 2020, and June 20, 2023. Railroads that were on any of the layers were kept in the analysis as there could be soil contamination from whenever the railroad was in use. Only railroads marked as moving freight were included (i.e. passenger-only railroads are excluded.) A study by Li found lead-contaminated dust up to 1 km away from railroad tracks.[26, 27, 28, 29]

[P] 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.[30, 31]

[Q] 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). The list was revised down based on replacement/identification reports completed in 2022, such that only those water services areas that still had known leaded user service lines or fittings remained. and was joined to California Water Resources Control Board's Drinking Water Service Area Boundaries layer updated on May 23, 2023.[32, 33, 34]

[R] 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 service area 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 4: California census tracts[A] by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing[B]; proximity to a current or historic lead emitting facility[C], state highway[D], smelter[E], small-craft airport[F], railroad[G], and speedway[H]; and served by at least one known lead water user service line or fitting[I]

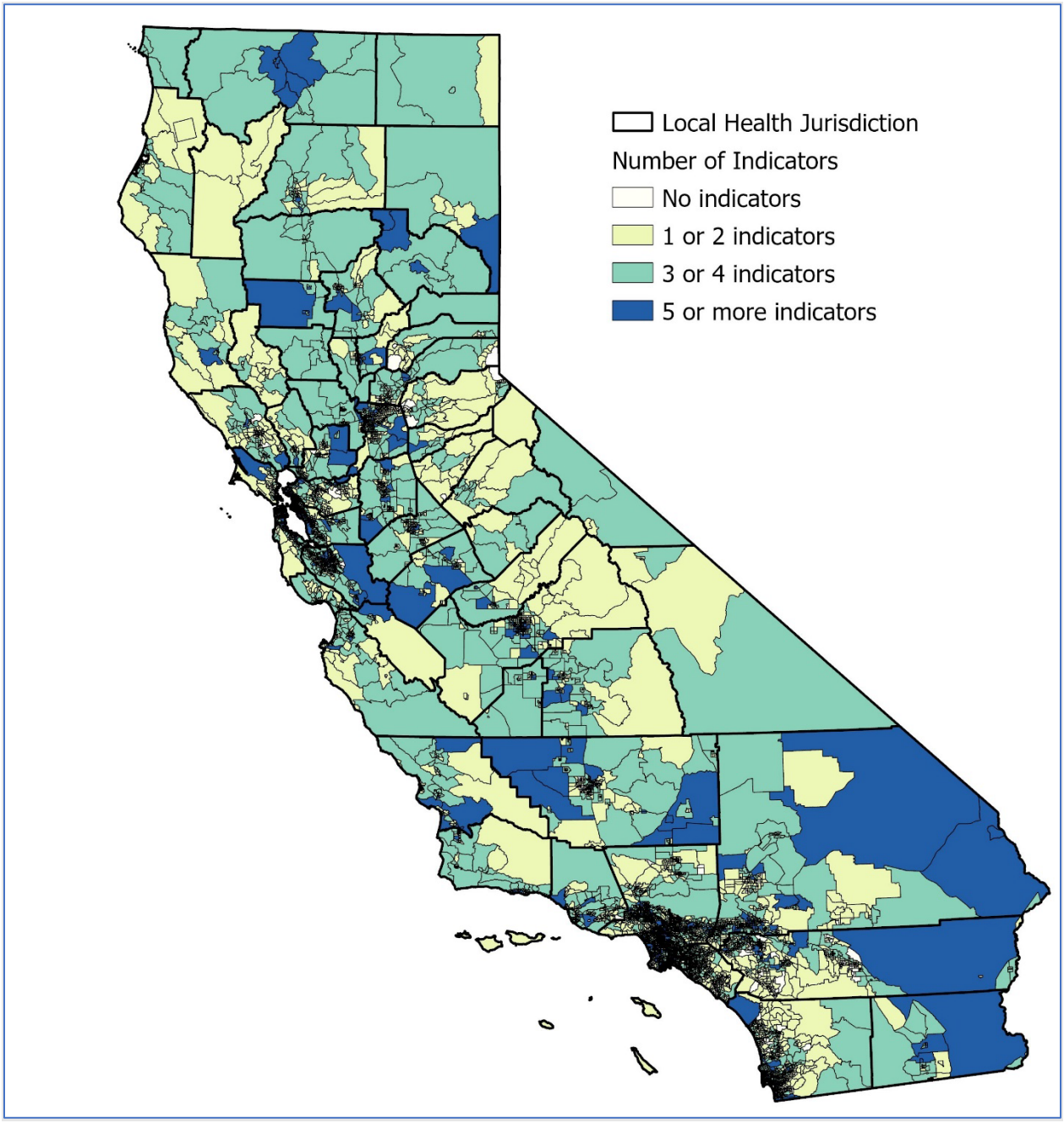


Figure 5: Los Angeles area local health jurisdictions' census tracts[A] by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing[B]; proximity to a current or historic lead emitting facility[C], state highway[D], smelter[E], small-craft airport[F], railroad[G], and speedway[H];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

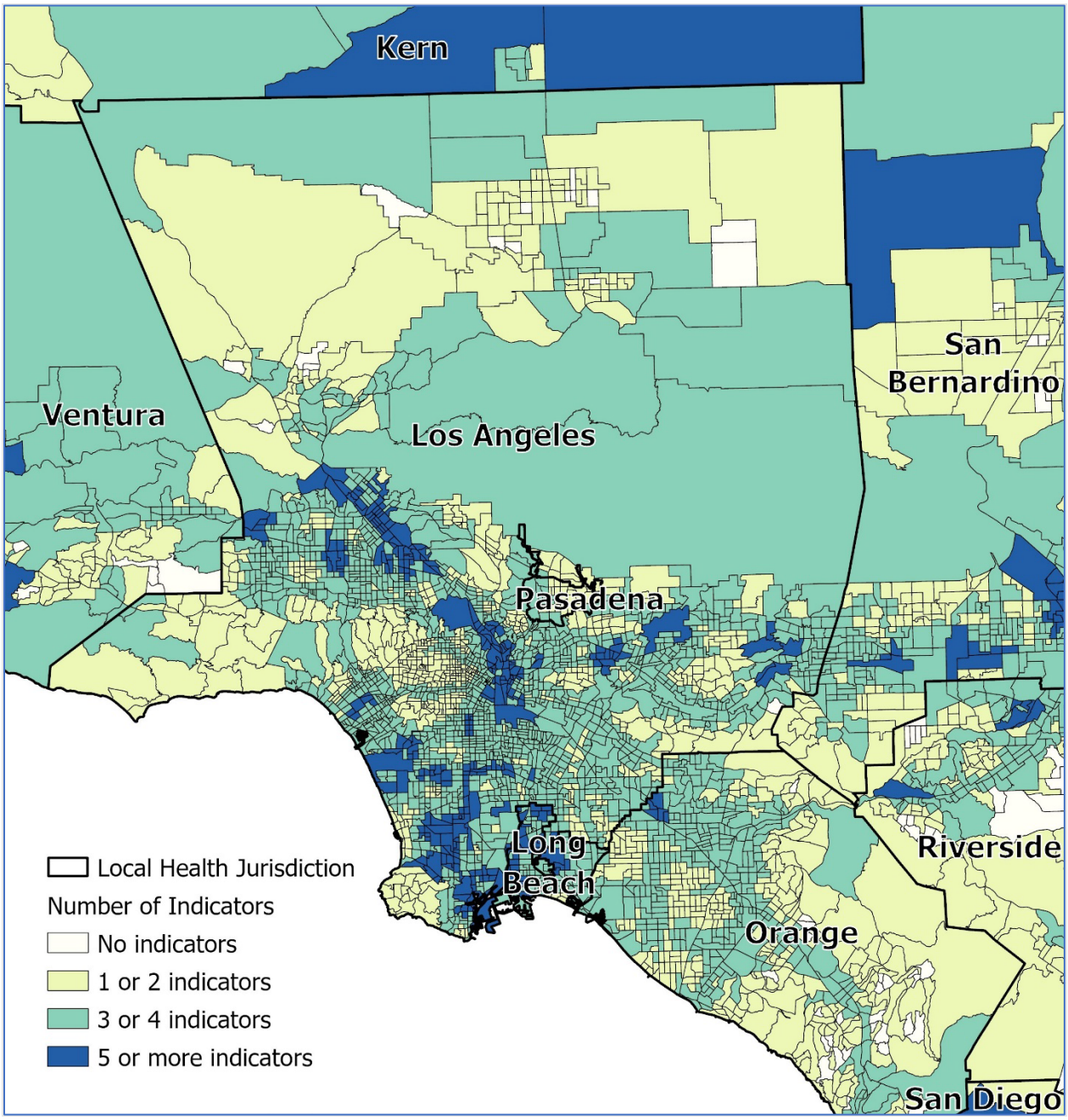


Figure 6: Bay Area local health jurisdictions' census tracts[A] by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing[B]; proximity to a current or historic lead emitting facility[C], state highway[D], smelter[E], small-craft airport[F], railroad[G], and speedway[H];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

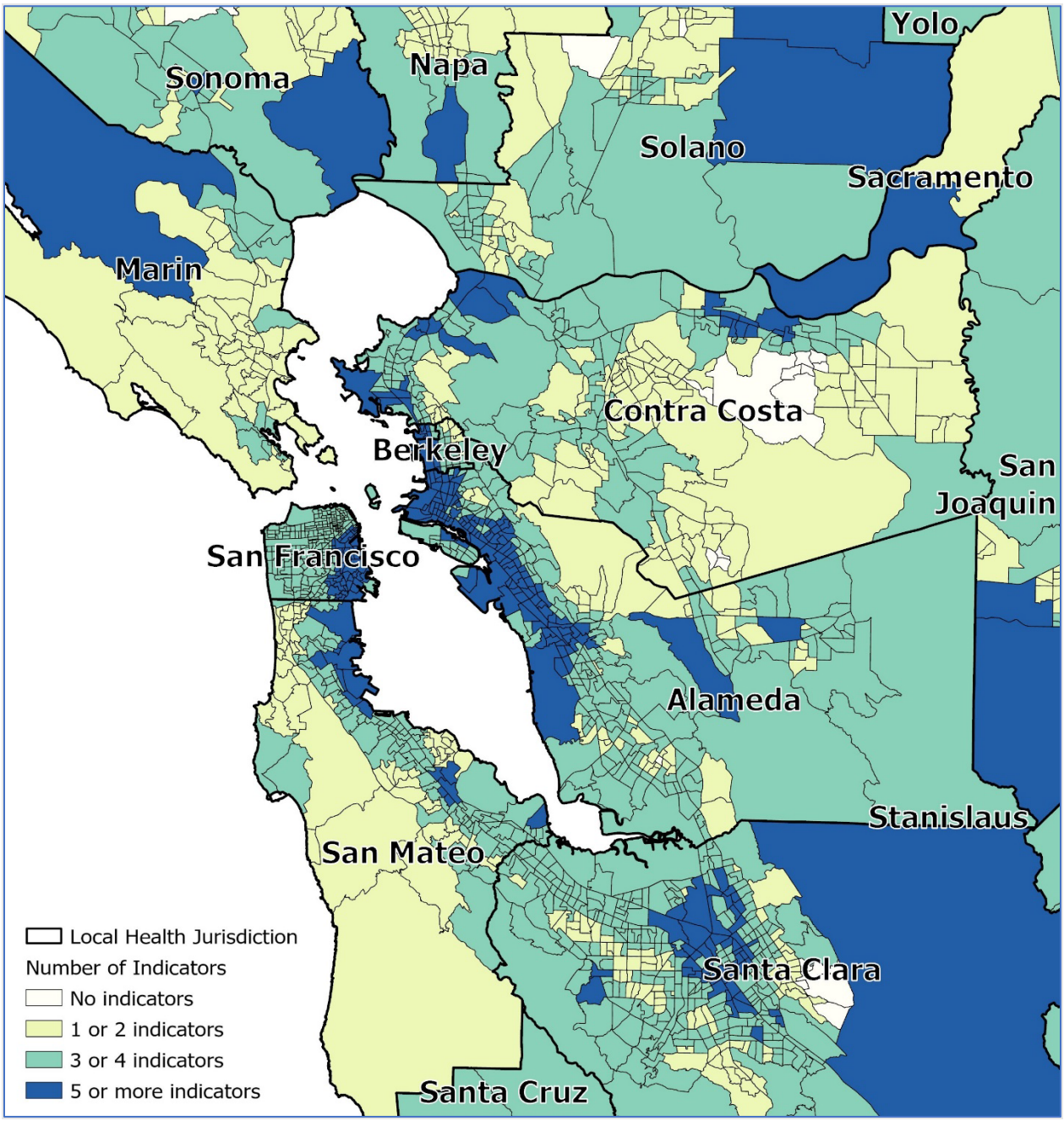
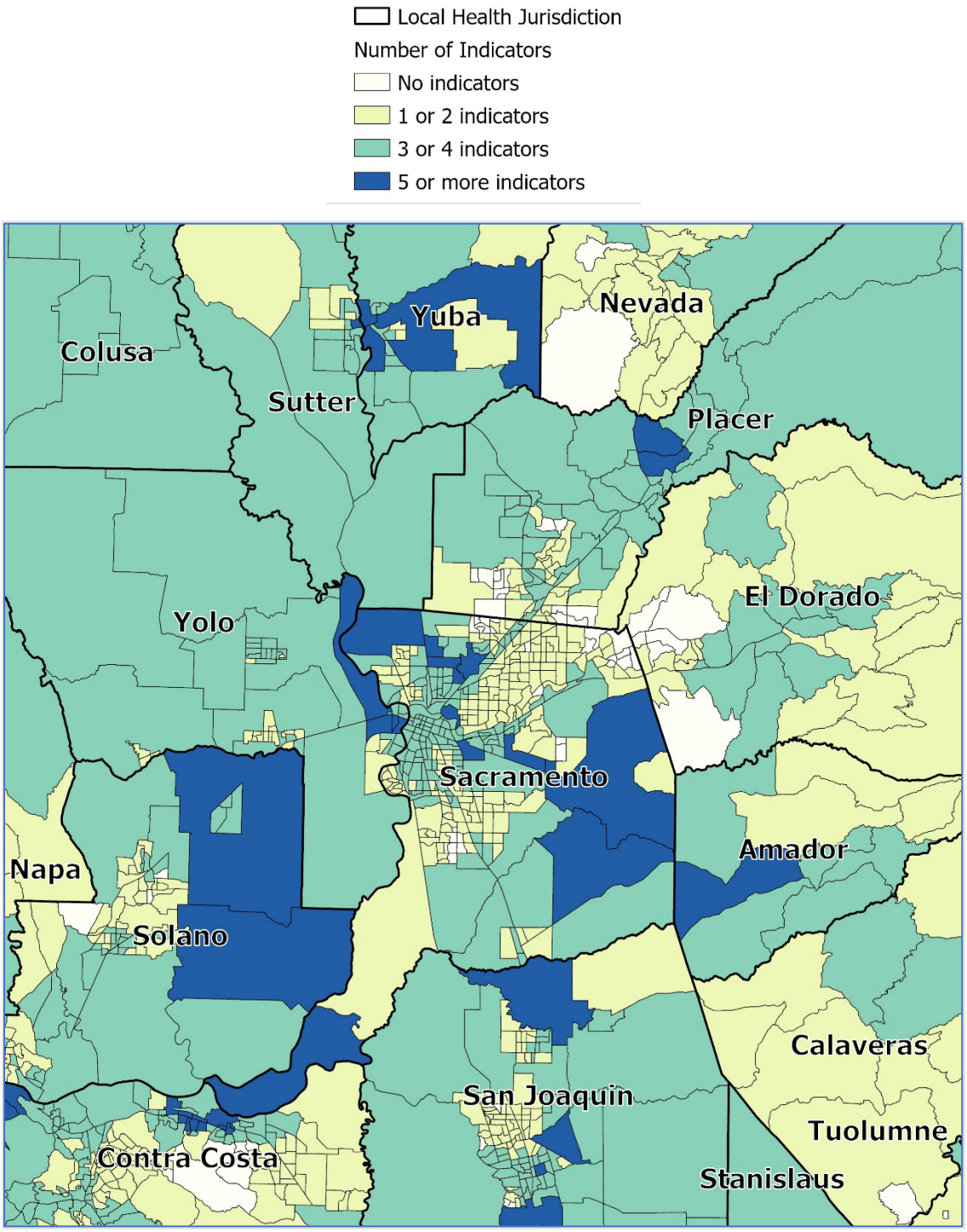


Figure 7: Sacramento area local health jurisdictions' census tracts[A] by number of geospatial indicators of risk for childhood lead exposure: pre-1978 housing[B]; proximity to a current or historic lead emitting facility[C], state highway[D], smelter[E], small-craft airport[F], railroad[G], and speedway[H];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



[A] Census tracts with no land area are excluded, leaving 9,107 of California's 9,129 census tracts.[35]

[B] 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 October 2022, was built before 1978. Residential parcels with a missing year built were included as pre-1978 parcels in these calculations to be protective.[13, 15, 16]

[C] 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 July 27, 2023) 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.[17, 18, 19]

[D] 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.[20, 21]

[E] 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. Because census tracts can cross city boundaries, a census tract was considered to be within a city with a smelter if the majority of the census tract's land area was in that city.

[F] 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. The same extract was performed on July 13, 2023 to identify any new airports and the two lists were then combined. Airports that were on the 2021 list but not the 2023 list were kept in the analysis as there could still be legacy soil contamination even if there is no longer air contamination. An article by Miranda found lead soil contamination up to 1 km away from airports where planes use avgas.[22, 23, 24, 25]

[G] 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. The layer of railroads in California from Caltrans was extracted three times and merged; the layers were last modified on October 31, 2013, January 27, 2020, and June 20, 2023. Railroads that were on any of the layers were kept in the analysis as there could be soil contamination from whenever the railroad was in use. Only railroads marked as moving freight were included (i.e. passenger-only railroads are excluded.) A study by Li found lead-contaminated dust up to 1 km away from railroad tracks.[26, 27, 28, 29]

[H] 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.[30, 31]

[I] 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). The list was revised down based on replacement/identification reports completed in 2022, such that only those water services areas that still had known leaded user service lines or fittings remained. The water service areas were joined to California Water Resources Control Board's Drinking Water Service Area Boundaries layer updated on May 23, 2023.[32, 33, 34]

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

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" In response to the California State Auditor's (CSA) 2020 report. In 2022, CLPPB provided updates on each objective's progress in its biennial report. This chapter provides further programmatic updates on the work completed to improve the program.

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

CLPPB continues to reduce barriers to appropriate screening. One strategy for doing so has been working with providers to assess what barriers exist and provide further education on childhood lead poisoning. As part of this effort, CLPPB conducted 40 presentations to providers in 2021 and 2022 to a total of 1,308 attendees. Of those attendees, 721, or 55% were health care providers. CDPH worked with providers to assess barriers to screening and testing and obtained provider determinations for changes to their practice. The top 3 reasons cited by providers as barriers to blood screening and follow-up testing included patients do not go to the lab and get tested; more telehealth visits decreased family compliance with lab testing, and lack of point-of-care blood lead testing kits as a result of the Magellan recall. Common provider plans to change included educating parents more about the risk of lead exposure to children and testing more at ages one and two. Next steps include identifying health care providers with increased rates of testing children for lead and surveying them for best practices so we can inform other health care providers and promote greater testing for children at risk.

CLPPB has updated maps and data tables on blood lead levels and geospatial indicators of risk by census tract for use by local health jurisdictions and the public. Local CLPPPs and CLPPB continue to target high-risk geographic areas for more focused interventions and publish data identifying geographic areas of concern.

CLPPB published articles in the Medical Board Newsletter for the fourth quarter of 2021 to disseminate information about mandated screening requirements, exposure risk factors, and more.

In addition, CLPPB, in coordination with DHCS, updated the Health Assessment Guidelines to reflect the new standards of care for pediatric assessments provided to children served by the Child Health and Disability Program (CHDP). The Guidelines provide childhood lead poisoning screening requirements for all primary health care providers, whether in a public program or private practice. The updated Blood Lead Testing and Anticipatory Guidance replaces the CHDP Health Assessment Guidelines Section 6: Blood Lead Test and Anticipatory Guidance.

Response to a Blood Lead Tests Recall

In May 2021, Magellan Diagnostics, Inc., recalled its LeadCare II, LeadCare Plus, and LeadCare Ultra Blood Lead Tests due to a significant risk of falsely low results, which may lead to health risks especially in special populations such as young children and pregnant and lactating women. The FDA identified this as a Class I recall, the most serious type of recall. Use of these devices may lead to serious consequences. Obtaining falsely low results may lead to patient harm including delayed puberty, reduced postnatal growth, decreased IQ, and attention and behavior problems in children. The impacted test kits were distributed between December 8, 2020 to May 28, 2021.

The CDC issued a Health Alert Network (HAN) Health Update to notify health care providers and state and local health departments about the recall notice and to recommend appropriate follow-up actions in the shortage of LeadCare lead tests.

In response, CLPPB sent notifications to 500 active blood lead reporting laboratories, all contracted CLPPPs at the local level, and submitted a Medical Board of California e-blast to California physicians to notify partners of the Magellan recall. CLPPB continued to contact the FDA, CDC, and Magellan to request additional information as it became available.

As new information was received, including an expansion of the recall and CDC guidance on retesting, CLPPB continued to perform internal analyses of blood lead data. However, laboratories do not report test kit lot information. This limited CLPPB's knowledge of which children may be affected and which children needed to be retested. To ensure laboratories were doing their due diligence to see if any children needed retesting, CLPPB called all actively reporting laboratories to inquire about actions they were taking in response to the recall and inform them of CDC guidance on retesting. In addition, CLPPB developed and distributed a fact sheet to medical providers about the expanded recall and why retesting is needed.

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

A significant achievement towards this objective is the adoption of Assembly Bill (AB) 2326. Effective July 1, 2023, Section 124130 of the California Health and Safety Code has been amended to include changes to reporting timeframes and additional required data elements for electronic blood lead reporting.

CDPH is following the CDC Blood Lead Reference Value (BLRV) guideline of 3.5 µg/dL, which sub-section (d) of the Health and Safety Code refers to as "the most recent federal Centers for Disease Control and Prevention (CDC) reference level for an elevated blood lead level (BLL)." Blood lead values greater than or equal to 3.5 mg/dL must be reported within three working days of analysis, down from the previous 30 working days, which will allow for earlier detection

and outreach efforts to children and families to prevent further poisoning of lead-burdened children.

The CLPP Program continues to work with laboratories in implementation of new data reporting elements including race and ethnicity information, blood lead analysis methodologies, and reporting Medi-Cal or other health plan information which provides more comprehensive information on children tested to better inform surveillance data and racial health disparities affecting children in California.

AB 2326 resolves communication barriers with health care providers and improving case management services in California. Prior to AB 2326, written consent was required for CLPPPs to communicate with health care providers for the purpose of case management and care coordination. This requirement has been a barrier preventing effective case management communication with health care providers.

With AB 2326 in effect, CLPPPs may directly communicate, by phone and mail, with health care providers treating and caring for a child or young adult with elevated blood lead levels or receiving case management services without obtaining consent from their clients or clients' parents or legal guardians. Written consent is still required for full clinical and environmental case management services. Written consent to disclose information from individuals 18 or older or a minor child's legal parents or guardians remains best practice when feasible.

Additionally, CLPPB identified increased oversight of, and technical assistance to, local CLPPPs as a key strategy to accomplish this objective. As of July 2023, CLPPB completed site reviews of all 49 contracted LHJs for contract cycle 2020-2023. CLPPB continues to conduct site reviews to track work activities for each new contract cycle. In addition, to improve the effectiveness of site reviews, CLPPB created and implemented site review communications guidelines to streamline site review communications, improve coordination with local CLPPPs, and increase the effectiveness of the site review process. Additionally, CLPPB implemented a process to add all CLPPP-proposed action plans to their corresponding Performance Trackers. These action plans are provided by CLPPPs in response to Actions Required included in the Site Review Summary Letter and describe how LHJs plan to change processes, procedures, and/or practices moving forward. By having a process in place to track and monitor LHJ implementation of these longer-term plans, CLPPB will be able to provide ongoing support for LHJs.

In October 2022, CLPPB established the Program Performance & Reporting Unit to implement and oversee program performance initiatives in alignment with the Program's strategic plan. CLPPB's new unit will facilitate increased oversight of local CLPPPs through a more comprehensive analysis of CLPPPs' performance toward meeting Scope of Work requirements. This will allow CLPPB to readily identify deficiencies and more effectively prioritize areas for technical assistance and other support services to help address them.

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

The primary strategies for decreasing sources of lead in the environment are continued strengthening of the Lead Related Construction (LRC) program, increasing funding to remediate identified sources of lead, and expansion of proactive inspections. In 2021, CLPPB processed approximately 10,000 applications and implemented an online certification application data system enabling individuals to apply for lead certification and pay the associated fees online. 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.

In addition, CLPPB 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.

CLPPB successfully continued to manage the US EPA grant and was awarded funding from the US EPA for the 2022-24 grant cycle. The grant supports staffing for certification-related activities, information technology costs for processing certification application, and staffing costs to seek authorization to implement the RRP rule as mandated by Senate Bill 1076.

In 2021 CLPPB successfully competed for funding from the US Housing and Urban Development and is managing oversight of identification and removal of lead hazards from 100 homes in Orange and Ventura Counties. In 2022 CLPPB took steps to formalize the proactive inspection requirements for contracted local health jurisdictions and identified resources that will be developed during the 2023-2026 contract cycle to facilitate the process and funding of lead hazard removal by LHJs and, in non-contracted jurisdictions, by CLPPB.

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

CLPPB continues efforts to build partnerships in order to increase primary prevention of lead poisoning, broad awareness of lead exposure, and rates of childhood lead testing. These partnerships provide an opportunity for the CLPP Program to strengthen its commitment to health equity, reach new populations, and provide community-specific resources to improve blood lead testing rates. In recent years, CLPPB maintained 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.

CLPPB staff participated in collaborative meetings and conferences with agencies including code enforcement, U.S. Housing and Urban Development, and First 5. In 2022 and 2023, CLPPB

disseminated six newsletters to external stakeholders with programmatic, legislative, and time-sensitive updates.

In regards to new partnerships, CLPPB sought out partnerships with stakeholders who interface with populations at an increased risk of lead exposure, including Mexican Consulates and the U.S. Department of Justice Environmental Justice Coordinator.

Chapter 3: Moving Forward

As CLPPB continues to implement its 2021 comprehensive strategic plan and strengthen existing programs, new developments are on the horizon. Three distinct aspects guide future programmatic changes.

First and foremost, CLPPB is focused on implementing the new CDC BLRV. The change in reference value decreases the BLL threshold at which California children receive services from 4.5 µg/dL to 3.5 µg/dL., and is anticipated to increase the number of children in need of services. This development will ensure childhood lead poisoning prevention is identified earlier, and is expected to result in a reduction in childhood lead poisoning levels overall. On July 1, 2023, the CLPP Program began a new three-year contract cycle to help with implementation of the new BLRV and the expected resulting increase in children in need of services. An additional $10 million was allocated to local CLPPPs for the new three-year contract cycle. In addition, the contract scope of work (SOW) was updated to provide detailed guidance to LHJs to improve primary prevention. New activities include:

- Implementing mechanisms to leverage funding for healthy housing.
- Tracking referrals made to organizations that assist with short-term lodging and families provided with short-term lodging during remediation according to local standard operating procedures (SOP).
- Documenting SOPs for connecting tenants with low-cost legal services.
- Tracking results of enforcement actions taken to improve lead-related construction work compliance.
- Tracking the percentage of families referred to partner organizations who are provided successful interventions to address unsafe housing conditions.

In addition to the activities, the additional funding in this contract cycle will allow contracted CLPPPs to provide comprehensive lead poisoning prevention and direct case management services at the levels needed to effectively reduce childhood lead poisoning.

Second, the CLPP Program received a new Legislative mandate when Senate Bill (SB) 1076 became law on January 1, 2023. SB 1076 updated Section 105254 of the Health and Safety Code to require CDPH to review and amend its regulations to adopt and comply with the federal Environmental Protection Agency's (EPA) RRP Rule. This would advance efforts to reduce lead poisoning by providing clarity on the training and certification requirements for lead safe work practices, as well as by improving oversight and enforcement of those requirements at the state level.

The RRP Rule helps prevent exposure to lead by regulating renovation of homes and child-occupied building constructed before the ban on the use of lead-based paint in 1978. Lead-based paint disturbed during renovation creates paint chips and dust. Ingestion of lead-

contaminated house dust contributes almost 40 percent of the increase in blood lead levels in U.S. children and creates hazards for workers. In 2019, 6,913 children in California had such excessive levels of lead in their blood that it placed them in the top 2.5 percent of children nationwide. California has more homes built before 1978, and more residential remodeling contractors, than any other state.

The RRP program is currently implemented by the US EPA as part of the statutory responsibilities assigned by the federal Toxic Substances Control Act (TSCA). The federal RRP Rule regulates renovation of homes and child-occupied facilities built before the ban on the use of lead-based paint in 1978. Upon approval by the EPA, RRP administration authority is delegated to states. To secure EPA approval, the state program must be at least as protective as the EPA program and provide for adequate enforcement. The EPA requires renovation contractors:

- To assume the presence of lead-based paint in such properties
- To be trained and certified to follow lead-safe work practices
- To maintain proper records
- Receive certification for companies that conduct such work

Once CDPH becomes an RRP authorized state, CLPPB will implement the RRP program to expand training opportunities to residential renovation contractors to learn about lead-safe work practices, create a lead-safe residential renovation workforce, increase awareness of the threat of lead poisoning and associated screening, and support compliance with and enforcement of RRP requirements.

Finally, 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.

Despite extensive CLPPB 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 CLPPB'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.

One example is the Childhood Health and Disability Program (CHDP), which DHCS will be sunsetting on July 1, 2024. The CHDP program is locally administered by 58 counties and 3 cities. Local CHDP programs conduct targeted provider outreach and education activities for the CLPP Program. DHCS proposes to transition these responsibilities to the Medi-Cal managed care plans, as appropriate, as part of its goal to make Medi-Cal a more consistent and seamless system for enrollees to navigate by reducing complexity, increasing flexibility, and streamlining and reducing duplication across multiple programs. CHDP and CLPP Programs are closely

connected and CLPPB will be working with local contracted health jurisdictions to support any loss in capacity resulting from the program's sunset.

CLPPB 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. CLPPB 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. In particular, CLPPB seeks partnerships with code enforcement agencies to support follow-up on tips and complaints as well as cases of childhood lead poisoning due to lead hazards from deteriorated paint. CLPPB also seeks partnerships from agencies or organizations with funding opportunities aligned with lead hazard reduction, such as weatherization or healthy home funding.

The coming years hold opportunities for significant advancement in childhood lead poisoning prevention. Between the lowered threshold for case management from the BLRV update, California laying the foundation for improved RRP compliance, and the increased work tracking and preventing non-housing sources, CDPH is on track to continue its progress in preventing childhood lead poisoning.

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

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.[1,2,3] 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.

[1] CDC, Centers for Disease Control and Prevention. Screening Young Children for Lead Poisoning: Guidance for State and Local Health Officials. Atlanta: 1997.
[2] United States General Accounting Office. Lead Poisoning; Federal Healthcare Programs are not Effectively Reaching At-Risk Children. Washington, D.C.: GAO/HEHS-99-18; 1999.
[3] California Medical Provider Regulations. California Code of Regulations, Title 17, Sections 37000 through 37100.

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.[3] 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.[3,4]

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.[3] 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.

[4] https://www.medicaid.gov/medicaid/benefits/epsdt/lead-screening/index.html [online]

- 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 exposurein 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 andcertify 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

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

- 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 ≥ 4.5 µg/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 µg/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. Since July 1, 2023, services were provided to children with BLLs ≥ 3.5 µg/dL.
- Blood lead level (BLL) means a whole blood test result indicating the presence of lead.

- 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.
- 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. Since July 1, 2023, the full case definition for two BLLs ≥ 9.5 µg/dL does not require that the BLLs be drawn at least 30 calendar days apart.
- 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 2022

Number of Individual Children Screened for Lead, by California Local Health Jurisdiction and Highest, 2022

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
Alameda	Age < 6	14,150	96.86%	458	3.14%	14,608
	Age 6 to 21	2,670	95.49%	126	4.51%	2,796
	Local Total age < 21	16,820	96.64%	584	3.36%	17,404
Alpine	Age < 6					1
	Age 6 to 21					0
	Local Total age < 21					1
Amador	Age < 6					197
	Age 6 to 21					13
	Local Total age < 21					210
Berkeley	Age < 6	576	95.52%	27	4.48%	603
	Age 6 to 21	60	95.24%	3	4.76%	63
	Local Total age < 21	636	95.50%	30	4.50%	666
Butte	Age < 6	1,436	97.75%	33	2.25%	1,469
	Age 6 to 21	100	97.09%	3	2.91%	103
	Local Total age < 21	1,536	97.71%	36	2.29%	1,572
Calaveras	Age < 6					228
	Age 6 to 21					27
	Local Total age < 21					255
Colusa	Age < 6					355
	Age 6 to 21					20
	Local Total age < 21					375
Contra Costa	Age < 6	7,167	97.74%	166	2.26%	7,333
	Age 6 to 21	822	93.09%	61	6.91%	883
	Local Total age < 21	7,989	97.24%	227	2.76%	8,216
Del Norte	Age < 6					220
	Age 6 to 21					9
	Local Total age < 21					229
El Dorado	Age < 6	603	97.42%	16	2.58%	619
	Age 6 to 21	39	97.50%	1	2.50%	40
	Local Total age < 21	642	97.42%	17	2.58%	659
Fresno	Age < 6	10,151	95.91%	433	4.09%	10,584
	Age 6 to 21	628	98.28%	11	1.72%	639
	Local Total age < 21	10,779	96.04%	444	3.96%	11,223

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
Glenn	Age < 6					347
	Age 6 to 21					14
	Local Total age < 21					361
Humboldt	Age < 6	1,540	92.16%	131	7.84%	1,671
	Age 6 to 21	40	90.91%	4	9.09%	44
	Local Total age < 21	1,580	92.13%	135	7.87%	1,715
Imperial	Age < 6	2,552	98.99%	26	1.01%	2,578
	Age 6 to 21	258	98.10%	5	1.90%	263
	Local Total age < 21	2,810	98.91%	31	1.09%	2,841
Inyo	Age < 6					150
	Age 6 to 21					8
	Local Total age < 21					158
Kern	Age < 6	12,652	97.89%	273	2.11%	12,925
	Age 6 to 21	954	97.75%	22	2.25%	976
	Local Total age < 21	13,606	97.88%	295	2.12%	13,901
Kings	Age < 6	1,452	97.71%	34	2.29%	1,486
	Age 6 to 21	39	95.12%	2	4.88%	41
	Local Total age < 21	1,491	97.64%	36	2.36%	1,527
Lake	Age < 6					472
	Age 6 to 21					29
	Local Total age < 21					501
Lassen	Age < 6					231
	Age 6 to 21					12
	Local Total age < 21					243
Long Beach	Age < 6	3,933	98.08%	77	1.92%	4,010
	Age 6 to 21	476	99.37%	3	0.63%	479
	Local Total age < 21	4,409	98.22%	80	1.78%	4,489
Los Angeles	Age < 6	88,301	98.40%	1,438	1.60%	89,739
	Age 6 to 21	13,070	97.90%	280	2.10%	13,350
	Local Total age < 21	101,371	98.33%	1,718	1.67%	103,089
Madera	Age < 6	3,132	97.94%	66	2.06%	3,198
	Age 6 to 21	269	97.46%	7	2.54%	276
	Local Total age < 21	3,401	97.90%	73	2.10%	3,474
Marin	Age < 6	1,790	98.57%	26	1.43%	1,816
	Age 6 to 21	333	97.08%	10	2.92%	343
	Local Total age < 21	2,123	98.33%	36	1.67%	2,159
Mariposa	Age < 6					68
	Age 6 to 21					19
	Local Total age < 21					87

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
Mendocino	Age < 6	861	96.96%	27	3.04%	888
	Age 6 to 21	29	100.00%	0	0.00%	29
	Local Total age < 21	890	97.06%	27	2.94%	917
Merced	Age < 6	2,891	98.30%	50	1.70%	2,941
	Age 6 to 21	151	98.05%	3	1.95%	154
	Local Total age < 21	3,042	98.29%	53	1.71%	3,095
Modoc	Age < 6					102
	Age 6 to 21					6
	Local Total age < 21					108
Mono	Age < 6					19
	Age 6 to 21					5
	Local Total age < 21					24
Monterey	Age < 6	6,094	97.08%	183	2.92%	6,277
	Age 6 to 21	624	93.13%	46	6.87%	670
	Local Total age < 21	6,718	96.70%	229	3.30%	6,947
Napa	Age < 6	889	97.37%	24	2.63%	913
	Age 6 to 21	49	100.00%	0	0.00%	49
	Local Total age < 21	938	97.51%	24	2.49%	962
Nevada	Age < 6	214	91.45%	20	8.55%	234
	Age 6 to 21	22	100.00%	0	0.00%	22
	Local Total age < 21	236	92.19%	20	7.81%	256
Orange	Age < 6	24,680	98.12%	472	1.88%	25,152
	Age 6 to 21	2,359	98.01%	48	1.99%	2,407
	Local Total age < 21	27,039	98.11%	520	1.89%	27,559
Pasadena	Age < 6	999	98.04%	20	1.96%	1,019
	Age 6 to 21	104	97.20%	3	2.80%	107
	Local Total age < 21	1,103	97.96%	23	2.04%	1,126
Placer	Age < 6	1,530	98.52%	23	1.48%	1,553
	Age 6 to 21	251	96.54%	9	3.46%	260
	Local Total age < 21	1,781	98.23%	32	1.77%	1,813
Plumas	Age < 6					79
	Age 6 to 21					2
	Local Total age < 21					81
Riverside	Age < 6	29,084	98.94%	311	1.06%	29,395
	Age 6 to 21	1,930	98.17%	36	1.83%	1,966
	Local Total age < 21	31,014	98.89%	347	1.11%	31,361
Sacramento	Age < 6	15,556	96.83%	510	3.17%	16,066
	Age 6 to 21	2,894	90.30%	311	9.70%	3,205
	Local Total age < 21	18,450	95.74%	821	4.26%	19,271

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
San Benito	Age < 6					642
	Age 6 to 21					41
	Local Total age < 21					683
San Bernardino	Age < 6	24,894	98.75%	316	1.25%	25,210
	Age 6 to 21	2,724	98.52%	41	1.48%	2,765
	Local Total age < 21	27,618	98.72%	357	1.28%	27,975
San Diego	Age < 6	32,119	97.97%	666	2.03%	32,785
	Age 6 to 21	2,204	91.83%	196	8.17%	2,400
	Local Total age < 21	34,323	97.55%	862	2.45%	35,185
San Francisco	Age < 6	6,949	97.78%	158	2.22%	7,107
	Age 6 to 21	837	98.70%	11	1.30%	848
	Local Total age < 21	7,786	97.88%	169	2.12%	7,955
San Joaquin	Age < 6	9,173	98.32%	157	1.68%	9,330
	Age 6 to 21	926	97.47%	24	2.53%	950
	Local Total age < 21	10,099	98.24%	181	1.76%	10,280
San Luis Obispo	Age < 6	1,075	96.50%	39	3.50%	1,114
	Age 6 to 21	49	89.09%	6	10.91%	55
	Local Total age < 21	1,124	96.15%	45	3.85%	1,169
San Mateo	Age < 6	4,817	99.24%	37	0.76%	4,854
	Age 6 to 21	603	98.21%	11	1.79%	614
	Local Total age < 21	5,420	99.12%	48	0.88%	5,468
Santa Barbara	Age < 6	5,389	98.12%	103	1.88%	5,492
	Age 6 to 21	334	94.62%	19	5.38%	353
	Local Total age < 21	5,723	97.91%	122	2.09%	5,845
Santa Clara	Age < 6	16,524	98.27%	291	1.73%	16,815
	Age 6 to 21	2,218	95.19%	112	4.81%	2,330
	Local Total age < 21	18,742	97.90%	403	2.10%	19,145
Santa Cruz	Age < 6	1,949	96.68%	67	3.32%	2,016
	Age 6 to 21	268	96.40%	10	3.60%	278
	Local Total age < 21	2,217	96.64%	77	3.36%	2,294
Shasta	Age < 6	1,157	94.45%	68	5.55%	1,225
	Age 6 to 21	64	96.97%	2	3.03%	66
	Local Total age < 21	1,221	94.58%	70	5.42%	1,291
Sierra	Age < 6					6
	Age 6 to 21					5
	Local Total age < 21					11
Siskiyou	Age < 6					59
	Age 6 to 21					10
	Local Total age < 21					69

Local Health Jurisdiction	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
Solano	Age < 6	3,773	95.98%	158	4.02%	3,931
	Age 6 to 21	274	96.48%	10	3.52%	284
	Local Total age < 21	4,047	96.01%	168	3.99%	4,215
Sonoma	Age < 6	2,562	97.19%	74	2.81%	2,636
	Age 6 to 21	355	94.92%	19	5.08%	374
	Local Total age < 21	2,917	96.91%	93	3.09%	3,010
Stanislaus	Age < 6	5,863	98.41%	95	1.59%	5,958
	Age 6 to 21	856	93.45%	60	6.55%	916
	Local Total age < 21	6,719	97.75%	155	2.25%	6,874
Sutter	Age < 6	1,095	98.29%	19	1.71%	1,114
	Age 6 to 21					113
	Local Total age < 21					1,227
Tehama	Age < 6	900	97.72%	21	2.28%	921
	Age 6 to 21					45
	Local Total age < 21					966
Trinity	Age < 6					65
	Age 6 to 21					4
	Local Total age < 21					69
Tulare	Age < 6	4,632	96.92%	147	3.08%	4,779
	Age 6 to 21	250	98.04%	5	1.96%	255
	Local Total age < 21	4,882	96.98%	152	3.02%	5,034
Tuolumne	Age < 6	244	94.94%	13	5.06%	257
	Age 6 to 21	13	100.00%	0	0.00%	13
	Local Total age < 21	257	95.19%	13	4.81%	270
Ventura	Age < 6	7,348	98.83%	87	1.17%	7,435
	Age 6 to 21	428	98.17%	8	1.83%	436
	Local Total age < 21	7,776	98.79%	95	1.21%	7,871
Yolo	Age < 6	1,889	96.62%	66	3.38%	1,955
	Age 6 to 21	126	93.33%	9	6.67%	135
	Local Total age < 21	2,015	96.41%	75	3.59%	2,090
Yuba	Age < 6	738	97.88%	16	2.12%	754
	Age 6 to 21					55
	Local Total age < 21					809
CLPPB	Age < 6	1	100.00%	0	0.00%	1
	Age 6 to 21	0	0.00%	0	0.00%	0
	Local Total age < 21	1	100.00%	0	0.00%	1
California Totals	Age < 6	368,493	98.00%	7,514	2.00%	376,007
	Age 6 to 21	41,119	96.36%	1,555	3.64%	42,674
	Local Total age < 21	409,612	97.83%	9,069	2.17%	418,681

Table Notes:

- Data are from the RASSCLE surveillance database archive of 07/03/2023.
- As of October 2021, the Centers for Disease Control and Prevention uses a blood lead reference value (BLRV) of 3.5 µg/dL to identify children with blood lead levels that are higher than most children's levels.
- Each individual is counted only once, using their highest BLL during 2022.
- 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 or 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 2022 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

ZIP Codes with at Least One Geospatial Indicator of Risk for Childhood Lead Exposure (n = 1,734)

90001	91011	92036	92398	93215	93645	94550	95192	95521	95915
90002	91016	92037	92399	93218	93646	94551	95202	95524	95916
90003	91020	92040	92401	93219	93647	94552	95203	95525	95917
90004	91024	92054	92404	93221	93648	94553	95204	95526	95918
90005	91030	92055	92405	93222	93650	94555	95205	95527	95919
90006	91040	92056	92407	93223	93651	94556	95206	95528	95920
90007	91042	92057	92408	93224	93652	94558	95207	95531	95922
90008	91101	92058	92410	93225	93653	94559	95209	95536	95923
90011	91103	92059	92411	93226	93654	94560	95210	95540	95925
90012	91104	92060	92415	93230	93656	94561	95211	95542	95926
90013	91105	92061	92501	93234	93657	94563	95212	95543	95928
90014	91106	92064	92503	93235	93660	94564	95215	95546	95930
90015	91107	92065	92504	93238	93662	94565	95219	95547	95932
90016	91108	92066	92505	93239	93664	94566	95220	95548	95934
90017	91123	92069	92506	93240	93666	94567	95222	95549	95935
90018	91201	92070	92507	93241	93667	94568	95223	95550	95936
90019	91202	92071	92508	93242	93668	94569	95224	95551	95937
90020	91203	92075	92509	93243	93669	94571	95225	95552	95938
90021	91204	92078	92518	93244	93673	94572	95226	95553	95939
90022	91205	92081	92521	93245	93675	94574	95227	95554	95941

90023	91206	92082	92530	93246	93701	94576	95228	95555	95942
90024	91207	92083	92532	93247	93702	94577	95230	95556	95943
90025	91208	92084	92536	93249	93703	94578	95231	95558	95944
90026	91210	92086	92539	93250	93704	94579	95232	95560	95945
90027	91214	92093	92543	93251	93705	94580	95236	95562	95946
90028	91301	92096	92544	93252	93706	94582	95237	95563	95947
90029	91302	92101	92545	93254	93710	94583	95240	95564	95948
90031	91303	92102	92548	93255	93711	94585	95242	95565	95949
90032	91304	92103	92549	93256	93720	94586	95245	95567	95951
90033	91306	92104	92551	93257	93721	94587	95246	95568	95953
90034	91307	92105	92553	93260	93722	94588	95247	95569	95954
90035	91311	92106	92555	93262	93723	94589	95248	95570	95955
90036	91316	92107	92557	93263	93725	94590	95249	95571	95956
90037	91320	92108	92561	93265	93726	94591	95251	95573	95957
90038	91321	92109	92562	93266	93727	94592	95252	95585	95959
90039	91324	92110	92563	93267	93728	94595	95253	95587	95960
90040	91325	92111	92570	93268	93730	94596	95254	95589	95961
90041	91326	92113	92571	93270	93737	94597	95255	95595	95963
90042	91330	92114	92582	93271	93741	94598	95257	95601	95965
90043	91331	92115	92583	93272	93901	94599	95258	95602	95966
90044	91335	92116	92584	93274	93905	94601	95301	95603	95968
90045	91340	92117	92585	93276	93906	94602	95303	95605	95969
90046	91342	92118	92586	93277	93907	94603	95304	95606	95970
90047	91343	92119	92590	93280	93908	94605	95305	95607	95971
90048	91344	92120	92591	93283	93920	94606	95306	95608	95972
90049	91345	92121	92592	93285	93923	94607	95307	95610	95973
90056	91350	92122	92595	93286	93924	94608	95310	95612	95974
90057	91351	92123	92596	93287	93925	94609	95311	95614	95975
90058	91352	92124	92602	93291	93926	94610	95312	95615	95977
90059	91354	92126	92603	93292	93927	94611	95313	95616	95978
90061	91355	92127	92604	93301	93930	94612	95315	95618	95979
90062	91356	92128	92606	93304	93932	94613	95316	95619	95981
90063	91360	92129	92610	93305	93933	94618	95317	95620	95982
90064	91361	92130	92612	93306	93940	94619	95318	95621	95983
90065	91362	92131	92614	93307	93943	94621	95319	95623	95984
90066	91364	92134	92617	93308	93944	94702	95320	95624	95987
90067	91367	92135	92618	93309	93950	94703	95321	95626	95988
90068	91371	92136	92620	93311	93953	94704	95322	95627	95991
90069	91381	92139	92624	93312	93954	94705	95323	95628	95993
90071	91384	92140	92625	93313	93955	94706	95324	95629	96001
90073	91387	92145	92626	93314	93960	94707	95326	95630	96002
90077	91390	92147	92627	93401	93962	94708	95327	95631	96003

90089	91401	92152	92629	93402	94002	94709	95328	95632	96006
90094	91402	92154	92630	93405	94005	94710	95329	95633	96007
90095	91403	92155	92637	93407	94010	94720	95330	95634	96008
90201	91405	92173	92646	93408	94014	94801	95333	95635	96009
90210	91406	92182	92647	93410	94015	94803	95334	95637	96010
90211	91411	92201	92648	93420	94018	94804	95335	95638	96013
90212	91423	92203	92649	93421	94019	94805	95336	95640	96014
90220	91436	92210	92651	93422	94020	94806	95337	95641	96015
90221	91501	92211	92653	93426	94021	94901	95338	95642	96016
90222	91502	92220	92655	93427	94022	94903	95340	95645	96017
90230	91504	92223	92656	93428	94024	94904	95341	95648	96019
90232	91505	92225	92657	93429	94025	94920	95345	95650	96020
90240	91506	92227	92660	93430	94027	94922	95346	95651	96021
90241	91521	92230	92661	93432	94028	94923	95348	95652	96022
90242	91522	92231	92662	93433	94030	94924	95350	95653	96023
90245	91523	92233	92663	93434	94035	94925	95351	95655	96024
90247	91601	92234	92672	93435	94037	94928	95354	95658	96025
90248	91602	92236	92673	93436	94038	94929	95355	95659	96027
90249	91604	92239	92675	93437	94040	94930	95356	95660	96028
90250	91605	92240	92676	93440	94041	94931	95357	95661	96031
90254	91606	92241	92677	93441	94043	94933	95358	95662	96032
90255	91607	92242	92679	93442	94044	94937	95360	95663	96033
90260	91608	92243	92683	93444	94060	94938	95361	95664	96034
90262	91701	92249	92688	93445	94061	94939	95363	95665	96035
90263	91702	92250	92691	93446	94062	94940	95364	95666	96038
90265	91706	92251	92692	93449	94063	94941	95365	95667	96039
90266	91708	92252	92694	93450	94065	94945	95366	95668	96040
90270	91709	92253	92701	93451	94066	94946	95367	95669	96041
90272	91710	92254	92703	93452	94070	94947	95368	95670	96044
90274	91711	92256	92704	93453	94074	94949	95369	95673	96046
90275	91722	92257	92705	93454	94080	94951	95370	95674	96047
90277	91723	92258	92706	93455	94085	94952	95372	95676	96048
90278	91724	92259	92707	93458	94086	94954	95374	95677	96050
90280	91730	92260	92708	93460	94087	94956	95376	95678	96051
90290	91731	92262	92780	93461	94089	94957	95377	95679	96052
90291	91732	92264	92782	93463	94102	94960	95379	95681	96054
90292	91733	92266	92801	93465	94103	94963	95380	95682	96055
90293	91737	92268	92802	93501	94104	94964	95382	95683	96056
90301	91739	92270	92804	93505	94105	94965	95383	95684	96057
90302	91740	92273	92805	93510	94107	94970	95385	95685	96058
90303	91741	92274	92806	93512	94108	94971	95386	95686	96059
90304	91744	92275	92807	93513	94109	94972	95387	95687	96061

90305	91745	92276	92808	93514	94110	94973	95388	95688	96062
90401	91746	92277	92821	93516	94111	95002	95389	95689	96063
90402	91748	92278	92823	93517	94112	95003	95391	95690	96064
90403	91750	92280	92831	93518	94114	95004	95401	95691	96065
90404	91752	92281	92832	93519	94115	95005	95403	95692	96067
90405	91754	92282	92833	93523	94116	95006	95404	95693	96069
90501	91755	92283	92835	93524	94117	95007	95405	95694	96071
90502	91759	92284	92840	93526	94118	95008	95407	95695	96073
90503	91761	92285	92841	93527	94121	95010	95409	95697	96075
90504	91762	92301	92843	93528	94122	95012	95410	95698	96076
90505	91763	92304	92844	93529	94123	95013	95412	95699	96080
90506	91764	92305	92845	93531	94124	95014	95415	95701	96085
90601	91765	92307	92860	93532	94127	95017	95417	95703	96086
90602	91766	92308	92861	93534	94128	95018	95419	95709	96087
90603	91767	92309	92865	93535	94129	95019	95420	95713	96088
90604	91768	92310	92866	93536	94130	95020	95421	95714	96089
90605	91770	92311	92867	93541	94131	95023	95422	95715	96091
90606	91773	92313	92868	93543	94132	95030	95423	95717	96093
90620	91775	92314	92869	93544	94133	95032	95425	95720	96094
90621	91776	92315	92870	93545	94134	95033	95426	95721	96096
90623	91780	92316	92878	93546	94143	95035	95427	95722	96097
90630	91784	92317	92879	93549	94158	95037	95428	95724	96101
90631	91786	92318	92880	93550	94301	95039	95429	95726	96103
90638	91789	92320	92881	93551	94303	95041	95432	95728	96104
90639	91790	92321	92882	93552	94304	95043	95436	95735	96105
90640	91791	92322	92883	93553	94305	95045	95437	95736	96106
90650	91792	92324	92886	93554	94306	95046	95439	95742	96107
90660	91801	92325	92887	93555	94401	95050	95441	95746	96108
90670	91803	92327	93001	93558	94402	95051	95442	95747	96109
90680	91901	92328	93003	93560	94403	95053	95443	95757	96110
90701	91902	92332	93004	93561	94404	95054	95444	95758	96111
90703	91905	92333	93010	93562	94501	95060	95445	95762	96112
90704	91906	92335	93012	93563	94502	95062	95446	95765	96113
90706	91910	92336	93013	93591	94503	95064	95448	95776	96114
90710	91911	92337	93015	93601	94505	95065	95449	95811	96115
90712	91913	92338	93021	93602	94506	95066	95450	95814	96116
90713	91914	92339	93022	93603	94507	95070	95451	95815	96117
90715	91915	92341	93023	93604	94508	95073	95452	95816	96118
90716	91916	92342	93030	93606	94509	95075	95453	95817	96119
90717	91917	92344	93033	93608	94510	95076	95454	95818	96120
90720	91931	92345	93035	93609	94511	95110	95456	95819	96121
90723	91932	92346	93036	93610	94512	95111	95457	95820	96122

90731	91934	92347	93040	93611	94513	95112	95458	95821	96123
90732	91935	92350	93041	93612	94514	95113	95459	95822	96124
90740	91941	92352	93042	93614	94515	95116	95460	95823	96125
90742	91942	92354	93043	93615	94517	95117	95461	95824	96126
90743	91945	92356	93060	93616	94518	95118	95462	95825	96128
90744	91950	92358	93063	93618	94519	95119	95464	95826	96129
90745	91962	92359	93065	93619	94520	95120	95465	95827	96130
90746	91963	92363	93066	93620	94521	95121	95466	95828	96132
90747	91977	92364	93067	93621	94523	95122	95467	95829	96133
90755	91978	92365	93101	93622	94525	95123	95468	95830	96134
90802	91980	92368	93103	93623	94526	95124	95469	95831	96136
90803	92003	92371	93105	93624	94528	95125	95470	95832	96137
90804	92004	92372	93106	93625	94530	95126	95471	95833	96140
90805	92007	92373	93108	93626	94531	95127	95472	95834	96141
90806	92008	92374	93109	93627	94533	95128	95476	95835	96142
90807	92009	92376	93110	93628	94534	95129	95482	95836	96143
90808	92010	92377	93111	93630	94535	95130	95485	95837	96145
90810	92011	92378	93117	93631	94536	95131	95488	95838	96146
90813	92014	92382	93201	93633	94538	95132	95490	95841	96148
90814	92019	92384	93202	93634	94539	95133	95492	95842	96150
90815	92020	92385	93203	93635	94541	95134	95493	95843	96161
90822	92021	92386	93204	93636	94542	95135	95494	95864	96162
90840	92024	92389	93205	93637	94544	95136	95497	95901	
91001	92025	92391	93206	93638	94545	95138	95501	95903	
91006	92026	92392	93207	93640	94546	95139	95503	95910	
91007	92027	92394	93208	93641	94547	95140	95511	95912	
91008	92028	92395	93210	93643	94548	95141	95514	95913	
91010	92029	92397	93212	93644	94549	95148	95519	95914	

ZIP Codes with No Geospatial Indicator of Risk for Childhood Lead Exposure (n = 12)

91377	92567	95463
92067	92587	95636
92091	92697	95672
92267	93424	95962