



LIVE WELL
SAN DIEGO

Health Equity:

Childhood Lead Poisoning Prevention

County of San Diego
Health and Human Services Agency
Public Health Services
Epidemiology & Immunization Services
Branch

April 2024



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COUNTY OF SAN DIEGO
HEALTH AND HUMAN SERVICES AGENCY



LIVE WELL
SAN DIEGO



Health Equity: Childhood Lead Poisoning Prevention Program

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Health Equity: Childhood Lead Poisoning Prevention Program

EXECUTIVE SUMMARY

Introduction

Lead is a naturally occurring metal that can be found in many aspects of a child's environment, including lead-based paint and home building materials, products such as toys and jewelry, and traditional home remedies. Exposures can also occur (and be taken home) in certain hobbies and occupations. Lead remains a pervasive problem in the environment that can cause negative health effects, both in the short term and long term, especially in children under the age of 6 years old. Health effects of lead poisoning can cause problems with growth and development that can be difficult to identify with symptoms in children. No safe blood lead level in children has been identified and should be tolerated.

The purpose of this white paper, titled *"Health Equity: Childhood Lead Poisoning Prevention Program,"* is to provide an overview of the Childhood Lead Poisoning Prevention Program (CLPPP) in the Epidemiology and Immunization Services Branch of the Public Health Services department, of the County of San Diego (County) Health and Human Services Agency (HHSa).

Methods

FOCUS POPULATION

CLPPP is a Public Health Services program that cares for lead-poisoned children by working together with families and health care providers to identify and eliminate sources of lead exposure. Services provided include nursing case management for those affected by lead, education and outreach, and environmental investigations. With lead exposure as a children's environmental health concern, it is important that CLPPP provides equitable and child-centered care, reducing health disparities for those focused populations experiencing lead poisoning and for the community, in general. Approaches to address lead exposures include prevention through education and outreach, as well as case management, which may include environmental health inspections.

PREVENTION

Health education staff members conduct outreach and education by providing information to families, health care providers, community-based organizations, and the general public regarding possible lead sources, nutrition, and blood lead testing recommendations. Educational materials are developed for primary and secondary prevention to educate the public about lead poisoning and how to prevent exposure to this public health hazard.

CASE MANAGEMENT

The CLPPP team provides case management services including monitoring, resource coordination, and education. During home visits, public health nurses complete a child/family assessment, identify and test

for possible lead sources such as pottery and home remedies and provide health education, monitor lead levels, and encourage medical follow-up. The case management team will encourage appropriate venous retesting to children with elevated blood lead levels, as needed, for 3.5 mcg/dL and higher. If indicated, environmental health professionals evaluate the environmental health of a property by conducting an inspection, with specialized equipment, and guiding a remediation of any identified lead hazards in places where the child lives or spends significant time.

Results

FOCUS POPULATION

Some local geographic areas experience higher rates of cases, such as the City of San Diego and the County's HHSA Central Region, due to circumstances such as older or deteriorating homes, or areas that may have higher refugee/immigrant populations. The highest percentage of children experiencing lead poisoning in San Diego County are Hispanic/Latino (40.8%), and White (31.4%), followed by Asian (14.3%), Black/African American (8.1%), Other (3.1%), Two or More Races (1.3%), Native Hawaiian/Other Pacific Islander (0.4%) and American Indian/Alaska Native (0.4%).

CLPPP wants to ensure that all groups receive equity in CLPPP services and considers specific risk factors, as needed. Identifying the focused populations at greatest risk for lead exposure is essential to the CLPPP program. Children from low-income households and those who live in housing built before 1978 are at the greatest risk of lead exposure. Immigrant and refugee children from less developed countries are at higher risk of being exposed to lead due to less strict rules protecting children from lead exposure in their country of origin. Many County CLPPP clients have spent time in, or relocated from, many varying countries. Pregnant people should also know the risk of lead exposure because lead can pass to a baby during pregnancy. Breastfeeding can also be a source of lead exposure to babies, since adults who are, or have been, exposed to lead can also pass lead to their babies. Formula prepared using water contaminated with lead from leaded pipes and plumbing parts can also result in a baby being exposed to lead. Some adults work in industries or have hobbies that expose them to lead. These adults may bring lead home (i.e., take home) with them and expose their families to lead without knowing.

PREVENTION

Efforts are made to educate the community on the dangers of lead through a comprehensive strategy involving impactful ads and informative brochures. Furthermore, the CLPPP outreach team consistently engages with the public across San Diego County, conducting ongoing community outreach at medical facilities, schools, libraries, and health fairs. These efforts extend to tailored presentations for healthcare professionals and nursing students, ensuring a thorough understanding of lead exposure risks among future healthcare providers.

CASE MANAGEMENT

With the levels reported to San Diego County CLPPP, by health care providers and the California Childhood Lead Poisoning Prevention Branch and health care providers, to the County CLPPP program, CLPPP staff

can appropriately follow-up with the varying levels of involvement exposures, based on their blood lead level.

The environmental health team carries out home inspections and provides guidance on remediating any identified lead hazards. These inspections take place at the lead-impacted child's home alongside Public Health Nurses.

Discussion

While lead paint was banned more than 40 years ago, it is still a persistent health risk, as this heavy metal does not dissolve or fade over time and will remain in the environment. Primary, secondary, and tertiary prevention are key to greatly improving children's health outcomes. These strategies ensure that children do not experience harmful long-term effects of lead exposure.² *Primary prevention* is the removal of lead hazards from the environment before a child is lead exposed. *Secondary prevention* includes blood lead testing and follow-up care and referral for children who are exposed to lead. *Tertiary prevention* focuses on minimizing long-term effects and complications of lead exposure. These measures remain an essential safety net for children who may be exposed to lead.² Health care providers and parents can both work together to accomplish primary and secondary actions to maintain the health of children. Additionally, by reviewing data through a health equity lens, lead prevention efforts and the CLPP Program can break down barriers to ensure access to care and follow-up for all communities.

Lead poisoning prevention is especially important in children under six years of age, as their bodies are still developing and growing rapidly. Long-term outcomes of a child's health can be greatly improved by simple methods of prevention. The most important steps in prevention are obtaining blood lead levels, removing lead sources, and practicing everyday measures, such as hand washing and eating proper nutrition.

CLPPP's efforts can be greatly amplified with continual assessment of data and outcomes through a health equity lens. As an environmental health problem, lead poisoning can affect anyone. Strategies with an equitable lens, such as language assistance, accessibility to health care, proper nutrition, connections to resources, and adequate education outreach efforts, can help individuals at greatest risk for lead exposure to decrease adverse health impacts. The CLPPP program assists with these resources and efforts to improve health outcomes.

Call to Action

To better the health and well-being of children, it is important to prevent their exposure to lead. It is the responsibility of health care providers and parents to maintain the health of children through the following actions.

Health Care Providers

As an integral part of the lead poisoning prevention collaborative effort health care providers must continue to cast a wide net of screening and blood lead testing to ensure that the first step of blood lead level awareness is met. This can prompt a cascade of follow-up actions by families and CLPPP.

Additionally, health care providers are often the primary link to care for families. Having a thorough understanding of potential exposures and preventive measures can bridge the gap in care and avoid any type of confusion or disregard for the importance of lead poisoning.

Parents

A blood test is the best way to determine if a child has been exposed to lead. The amount of lead in blood is referred to as a blood lead level, which is measured in micrograms of lead per deciliter of blood (mcg/dL). Most children with lead in their blood have no obvious symptoms. Talk to your child's health care provider about getting a blood lead test.²

Preventing lead poisoning at home can begin even before blood lead test results are known. Simple steps can include:

- Washing hands and face frequently.
- Washing toys, countertops, windowsills and floors weekly with wet wipes and cleaning products
- Avoid play in areas where bare soil is exposed.
- Removing shoes before entering the home.
- Vacuuming frequently using a vacuum with a HEPA filter.
- Clean up paint chips and peeling paint safely, and keeping furniture away from damaged paint areas, especially things like cribs or changing tables.
- Avoid giving children imported candy, chaupalines, or snacks containing chili or tamarind.
- Feed children regular meals with a diet high in calcium, iron, and vitamin C.
- Allow cold water to run for a few minutes in the morning before using it for drinking, cooking, or mixing formula in case there may be lead in household pipes.
- Use only cold water from the tap for drinking or in food preparation. If water needs to be heated, draw water from the cold tap and heat it on the stove or in the microwave.
- Avoid using handmade, older, imported dishes or crystal for food or drink preparation, storage, or serving, unless you are sure they do not contain lead.
- Avoid using traditional remedies or cosmetics that contain lead.
- Avoid imported foods that come in cans with wide seams.
- Change out of work clothes before entering the house or being in contact with family members. If an adult in the home works with lead at their job or hobby, it is best to shower at the workplace, if possible, or showering and removing clothing immediately upon returning home.
- Handle work clothing carefully and wash separately.
- When moving into a home, ask the owner about any problems with lead and know the age of the building.
- Before remodeling, ask a trained professional to test the paint in and around the home.

CONCLUSION

The County of San Diego CLPPP program has over 35 years of experience preventing and case managing lead poisoning case in children of this local region. No level of lead detected in local cases is acceptable. Since 2013, CLPPP lowered the lead level cutoff to 5 mcg/dL and above. In early 2022, the CDC lowered the level to 3.5 mcg/dL and above.

The facts are resounding:

- The highest percentage of children experiencing lead poisoning in San Diego County reside in the City of San Diego.
- The Healthy Places Index, looking at community characteristics such as access to healthcare, housing, education, and more, shows children receiving services through CLPPP are with quartile 1 indicating the least healthy communities. Between 2017 and 2021, 57.9% of CLPPP cases with a known address lived in communities categorized as the least healthy.
- Following the health equity analysis, between 2017 and 2021, 24.7% of the overall population lived in one of the 39 Health Equity zip codes, while 48.5% of CLPPP clients with known addresses lived in these zip codes.
- Children less than six years old are at a higher risk of lead exposure, where 83% of children receiving CLPPP services between 2017 and 2021 were under six.
- Lastly, of children experiencing lead poisoning in San Diego County are Hispanic/Latino (40.8%), followed by White (31.4%).

CLPPP is committed to ensuring all groups receive equity in CLPPP services and considers specific risk factors, as needed. The public, as well as high-risk populations, are informed about and protected from lead exposures of all kinds. As such, the EISB health equity goal is to “address to childhood lead poisoning, by ensuring that “95% of children under age 21 who have elevated blood levels (3.5 cg/dL or greater) receive case management services in timely fashion (depending upon lead levels).” In addition, CLPPP is committed to a population health goal, in alignment with *Healthy People 2030*, to “reduce blood lead levels in children aged 1 to 5 years from 3.31 micrograms per deciliter (mcg/dL) to 1.18 mcg/dL.”

Prevention and control efforts to reduce exposure to lead is essential to protect the lives of children in San Diego County. Collaboration between parents, healthcare providers, and the County will ensure this commitment is upheld, and anticipated outcomes are achieved.

Health Equity: Childhood Lead Poisoning Prevention Program

INTRODUCTION

Lead can cause negative health effects both in the short term and long term. Exposure to lead can cause well-documented adverse effects such as: damage to the brain and nervous system, slowed growth and development, learning and behavior problems, hearing, and speech problems. These effects can also cause lower IQ, decreased ability to pay attention, and underperformance in school. There is also evidence that childhood exposure to lead can cause long-term harm. Lead exposure in children is often difficult to see. Most children have no obvious immediate symptoms.¹

The health effects of exposure are more harmful to children less than six years of age because their bodies are still developing and growing rapidly. Young children also tend to put their hands or other objects, which may be contaminated with lead dust, into their mouths, so they are more likely to be exposed to lead than older children.¹

Protecting children from exposure to lead is important to lifelong good health. No safe blood lead level in children has been identified. Even low levels of lead in blood have been shown to affect learning, ability to pay attention, and academic achievement. While the effects of lead exposure may be permanent, if caught early there are things that can be done to prevent further exposure and reduce damage to a child's health. According to an analysis from the Health Impact Project, eliminating lead hazards from the places where children live, learn, and play could generate approximately \$84 billion in long-term benefits per birth cohort. Additionally, permanently removing lead hazards from the environment would benefit future birth cohorts, and savings would continue to grow over time.²

Childhood Lead Poisoning Prevention Program

The Childhood Lead Poisoning Prevention Acts of 1986 and 1989, with Subsequent Legislative Revisions, declared childhood lead exposure as the most significant childhood environmental health problem in the state. With these legislations in place, the Childhood Lead Poisoning Prevention Program (CLPPP) was established and instructed to continue to take steps necessary to reduce the incidence of childhood lead exposure in California.³

The Childhood Lead Poisoning Prevention Act of 1991 reaffirmed California's commitment to lead poisoning prevention activities. This act provided the California Department of Public Health (CDPH) with broad mandates on blood lead screening protocols, laboratory quality assurance, identification, management of lead exposed children, and reducing lead exposures.³

In San Diego County, CLPPP is a part of the Epidemiology Unit of the Epidemiology and Immunization Services Branch (EISB) in the Public Health Services department, of the County of San Diego Health and Human Services Agency. The Epidemiology Unit works to identify, investigate, register, and evaluate communicable, reportable, and emerging diseases and conditions to protect the health of the community. CLPPP staff members work closely with the California Childhood Lead Poisoning Prevention

Branch (CLPPB), which is in CDPH. CLPPB's mission is to eliminate childhood lead poisoning by identifying and caring for children who are lead poisoned and preventing environmental exposures to lead.

The CLPPP program cares for lead-poisoned children by working together with families and health care providers to identify and eliminate sources of lead exposure. Services provided include nursing case management and environmental investigations for lead-poisoned children, as well as education to health care providers, community groups, families, and the public. The purpose of CLPPP is to increase awareness regarding the hazards of lead exposure, reduce lead exposure, and increase the number of children assessed and appropriately blood tested for lead poisoning.⁴

Potential Sources of Lead

Lead is a naturally occurring metal that can cause negative health effects. Lead exposure occurs when a child comes in contact with lead by touching, swallowing, or breathing it in, such as by eating lead chips, ingesting contaminated food or water, and or by breathing in lead dust.⁵ Lead can be found throughout a child's environment including places they live, play, and spend time. These can include:

- Homes built before 1978 (when lead-based paints were banned) probably contain lead-based paint. When the paint peels and cracks, it makes lead dust. Children can be exposed to lead when they swallow or breathe in lead dust.
- Certain water pipes may contain lead.
- Lead can be found in some products, such as toys and jewelry.
- Lead is sometimes in candies or traditional home remedies.
- Certain jobs and hobbies involve working with lead-based products, like stain glass work, and may cause parents to bring lead into the home. These are referred to as "take-home exposures."
- Children who live near airports may be exposed to lead in air and soil from aviation gas used in piston engine aircrafts.
- Some children are at a greater risk for lead exposure from paint, water, soil, some imported items such as traditional medicines and herbs, industrial sources, and from certain jobs and hobbies (through their parents and caregivers).⁶

Because there are many potential lead exposure sources in a child's environment, it is possible for children to be exposed to more than one hazard at a time.

Health Equity Priority

The CLPPP program offers multi-layered solutions to this complex problem, seeking to eliminate childhood lead poisoning. CLPPP aims to reduce childhood lead poisoning through education and outreach, early identification, and treatment of children with elevated blood lead levels. CLPPP hopes to create lead-safe environments by identifying and reducing lead hazards where children live, play, learn, and spend time. Additionally, through education and outreach, CLPPP aims to advance public health best practices, policies, and interventions through data-driven research. Lead poisoning prevention requires timely detection of all children who are lead poisoned through universal evaluation and risk-appropriate blood

lead testing. It is important that CLPPP provides equitable and child-centered care, reducing health disparities for those experiencing lead poisoning.

Purpose

The purpose of the paper is to highlight the valuable work the CLPPP program is conducting to prevent lead exposure in children, particularly those from low-income and refugee families. CLPPP facilitates lead testing through pediatricians, offers case management services, conducts home visits to identify and mitigate lead hazards, and provides long-term, follow-up care until patient lead levels drop below the state threshold of 3.5 micrograms per deciliter (mcg/dL) of blood. Additionally, the program works to address health inequities by educating families and connecting them to vital community resources. Furthermore, CLPPP collaborates with medical providers from CDPH to coordinate informative lead education presentations at the provider level for pediatric providers in San Diego County. This paper analyzes data from the most recent year available, which was through 2021.

METHODS

CLPPP's comprehensive approach to achieve the goal of reducing childhood lead poisoning involves a multi-disciplinary approach and team in the areas of case management and education and outreach. Public health nurses, administrative staff, and environmental professionals work together to ensure a streamlined workflow to identify lead sources, find ways to remove them from the child's environment, and continued follow up to ensure that the lead levels come down. The internal team of public health nurses and environmental professionals work alongside families and clinical providers to accomplish these goals.

Focus Population

The Public Health Services (PHS) department of the County of San Diego is committed to fostering community well-being and safeguarding public health across the county, encompassing its eighteen municipalities and unincorporated regions. San Diego County's demographic landscape is unique given its diversity in race and socioeconomic status. Home to over three million residents, the county embraces a mosaic of ethnicities, including Hispanic or Latino, White, Asian, Middle Eastern, African American, African, Caribbean, and Native American communities. This diversity extends to socioeconomic backgrounds, with residents spanning various income levels, educational backgrounds, and employment sectors. From affluent neighborhoods to areas facing economic challenges

The CLPPP program aims to serve all children impacted by lead poisoning. However, the focused population is comprised of refugee and undocumented families that often possess low health literacy skills and come from indigent socioeconomic backgrounds. CLPPP plays a critical role in helping these families access critical services needed to ameliorate the many issues they face when accessing care and lead abatement work. County Public Health Nurses work with refugee families originating from countries such as Africa, Haiti, Mexico, and Afghanistan. Refugee communities often face disproportionate

challenges accessing healthcare resources due to having a language barrier and may encounter elevated risks of lead exposure due to various socioeconomic factors, including inadequate housing conditions and limited access to preventive measures. By prioritizing outreach efforts and tailored interventions, the program aims to bridge these disparities and ensure equitable access to lead testing, education, and environmental remediation services. Moreover, it endeavors to empower refugee parents, caregivers, and healthcare providers with culturally sensitive information and resources to recognize and address the risks of lead poisoning effectively. Through these initiatives, the program strives to promote health equity by safeguarding the well-being of all children, regardless of their background or circumstances.

Prevention

Primary prevention for lead-affected children involves identifying and eliminating the source of lead in their home environment. This proactive approach aims to stop lead exposure before it occurs by locating and removing any sources of lead contamination in the living environment. By taking this step, we can prevent children from being exposed to harmful levels of lead, safeguarding their health and development.

EDUCATION AND OUTREACH

Education and outreach are vital components in the prevention aspect of the CLPP Program. Health education staff can provide information to families, healthcare providers, community-based organizations, and the general public regarding possible lead sources, nutrition, and blood lead testing recommendations. Additionally, Health educators can provide presentations and education at health fairs.⁷

The education and outreach arm of CLPPP dedicates its time to identifying audiences that may benefit from further knowledge about lead poisoning prevention. Target groups include clinical providers, such as doctors' offices and clinic staff, families, childcare providers, and nursing students. It is important for the education and outreach team to approach each audience with the appropriate level of learning.⁷

Case Management

The CLPPP team provides ongoing case management services. Working together with families, health care providers and environmental health professionals, the team can provide monitoring, outreach, and education. CLPPP program offers home visits to children with high blood lead levels. At these home visits public health nurses complete a child/family assessment, identify and test for possible lead sources such as pottery and home remedies and provide health education, monitor lead levels, and encourage medical follow-up. The case management team will encourage appropriate venous retesting to children with elevated blood lead levels, as needed. Additionally, if criteria are met, the case management team will coordinate with the Department of Environmental Health to conduct an environmental investigation of the areas where the child lives and spends time.⁸

In 2013, CLPPP took steps to monitor individuals with levels of 5 mcg/dL and higher, even though the recommendation at the time was 9.5 mcg/dL and above. In early 2022, the County of San Diego CLPPP

program began monitoring levels of 3.5 mcg/dL and higher, based on a new Centers for Disease Control and Prevention (CDC) change in the blood lead reference value, from 5 mcg/dL to 3.5 mcg/dL, on October 28, 2021.⁸

Case management encompasses all aspects of the CLPPP program, starting from notification of blood level exceedances, through remediation of environments and education.

ENVIRONMENTAL INVESTIGATION

If indicated, environmental health professionals will conduct home inspection, and guide in remediation of any identified lead hazards. These environmental inspections can take place at places where the child lives or spends significant time. Environmental professionals have specialized equipment to test for possible lead sources in areas of the home including paint, soil, and dust. These professionals will provide recommendations to reduce contact with lead and follow up to see that sources of lead are corrected.⁷

RESULTS

CLPPP's multi-layered solution, with the goal of eliminating childhood lead poisoning, includes prevention, early identification, and treatment of children with elevated blood lead levels. CLPPP hopes to create lead-safe environments by identifying and reducing lead hazards where children live, play, learn, and spend time.

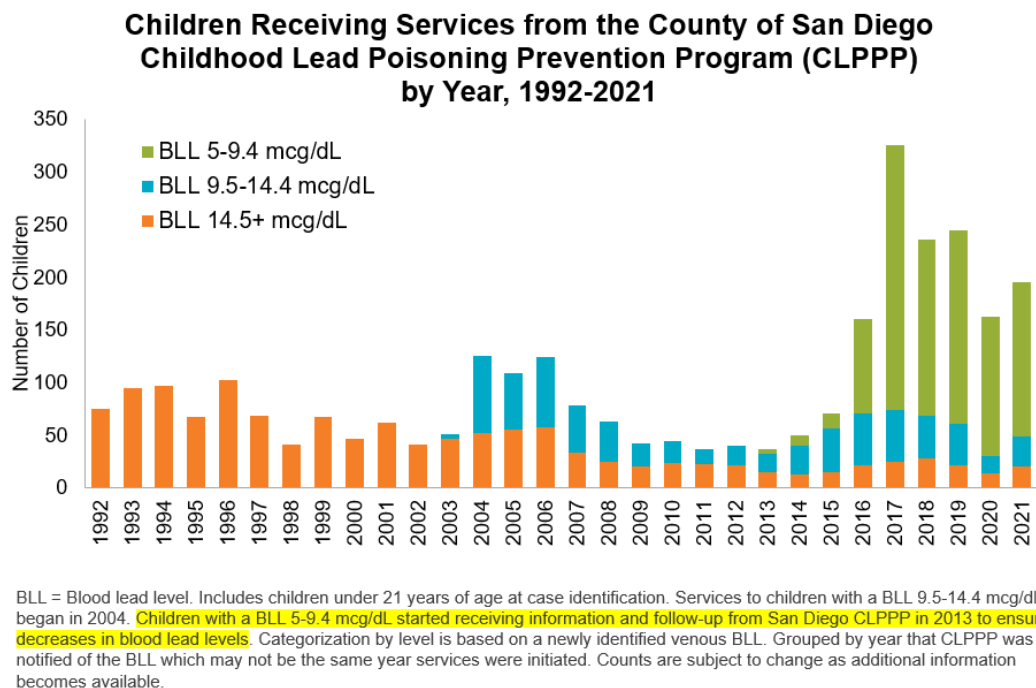
Focus Population

San Diego County's demographics reflect a diverse population, encompassing various ethnicities, cultures, and socioeconomic backgrounds.

In 2021, there were an estimated 939,921 San Diego County residents 20 years old and under. Of these residents, an estimated 243,070 were under the age of 6, representing 7.3% of the county.⁹ Among the San Diego County population aged 20 years and younger in 2021, 42.6% were Hispanic, 37.6% were non-Hispanic (NH) White, 8.8% were NH Asian, 4.9% were NH Black, 0.5% were NH American Indian/Alaska Native, 0.4% were NH Native Hawaiian/Other Pacific Islander, 5.2% were two or more non-Hispanic races, and the remaining 0.3% were some other non-Hispanic race.⁹

With the levels reported to San Diego County CLPPP, by CLPPB and health care providers, CLPPP can appropriately follow up with varying levels of involvement based on their blood lead level. **Figure 1** refers to all children receiving CLPPP services, categorized by blood lead level (BLL). Since 1992, CLPPP has been notified of BLLs exceeding 14.5 mcg/dL among children under 21 years of age. Services to children with a BLL 9.5-14.4 mcg/dL began in 2004. Children with a BLL 5-9.4 mcg/dL started receiving information and follow-up from San Diego CLPPP in 2013 to ensure decreases in blood lead levels. Since 2016, CLPPP has been notified of over 150 children with BLL over 5 mcg/dL each year.

Figure 1. Children Receiving Services.



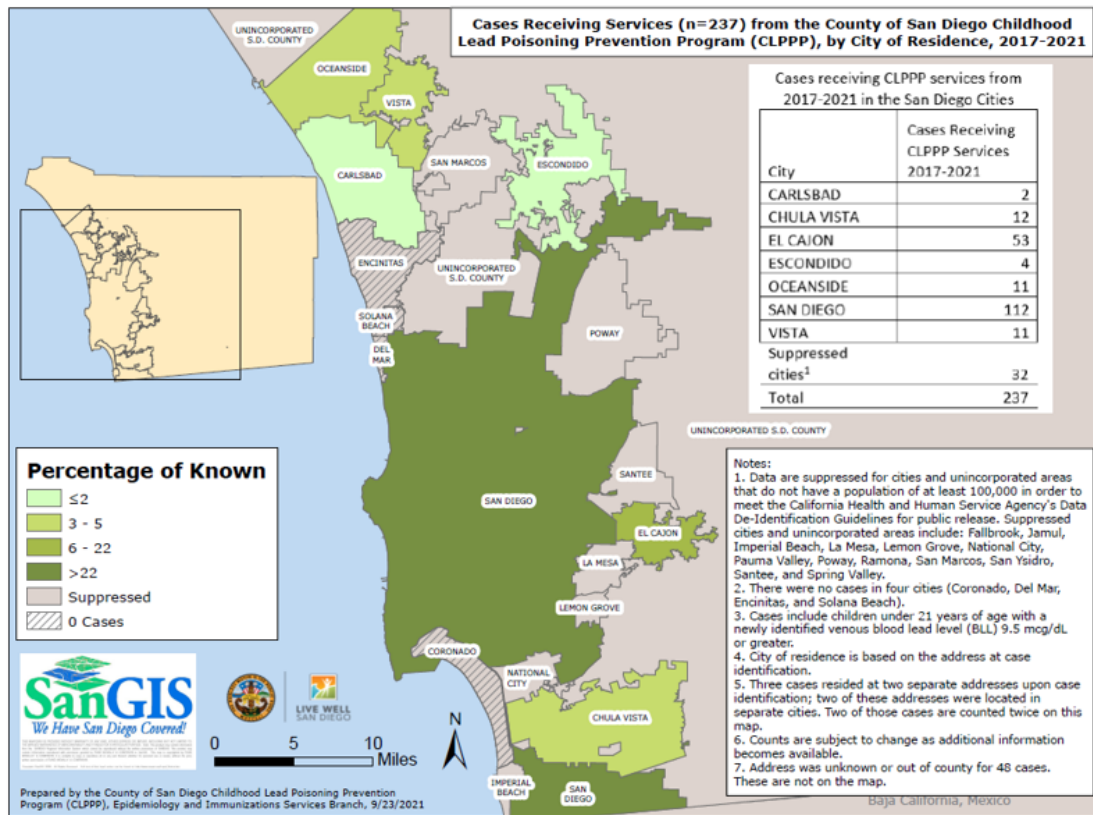
Prepared by San Diego County CLPPP, 11/17/2022

This information is disaggregated by geography, age, race/ethnicity, exposure sources, and newcomer/travel status. CLPPP aims to reach all children and families that may benefit from case management services and education.

GEOGRAPHY

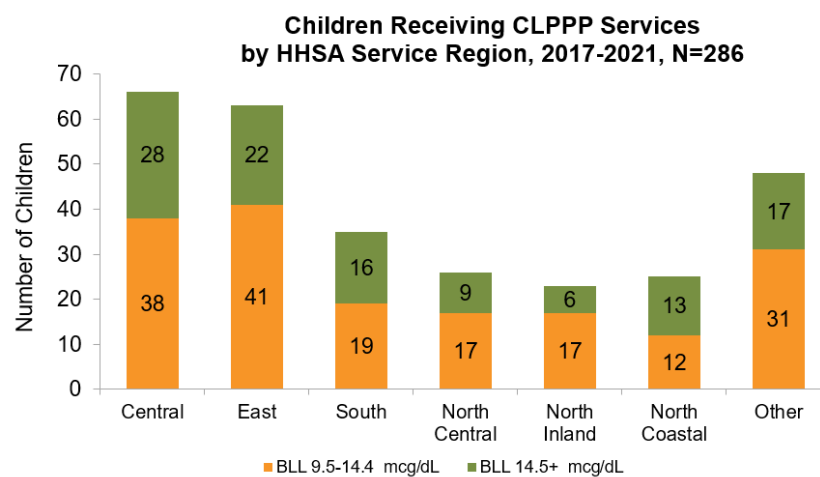
Figures 2 and 3 demonstrate the number of children receiving CLPPP services by city of residence and Health and Human Services Agency (HHSA) service region. Areas that experience higher rates of cases, such as the City of San Diego, and the County's Central Region, may be areas that have older or deteriorating homes, or areas that may have higher refugee/immigrant populations.

Figure 2. Children Receiving Services by The City of Residence.



Prepared by San Diego County CLPPP, 11/17/2022

Figure 3. Children Receiving Services by Health and Human Services Agency (HHSA) Service Region.



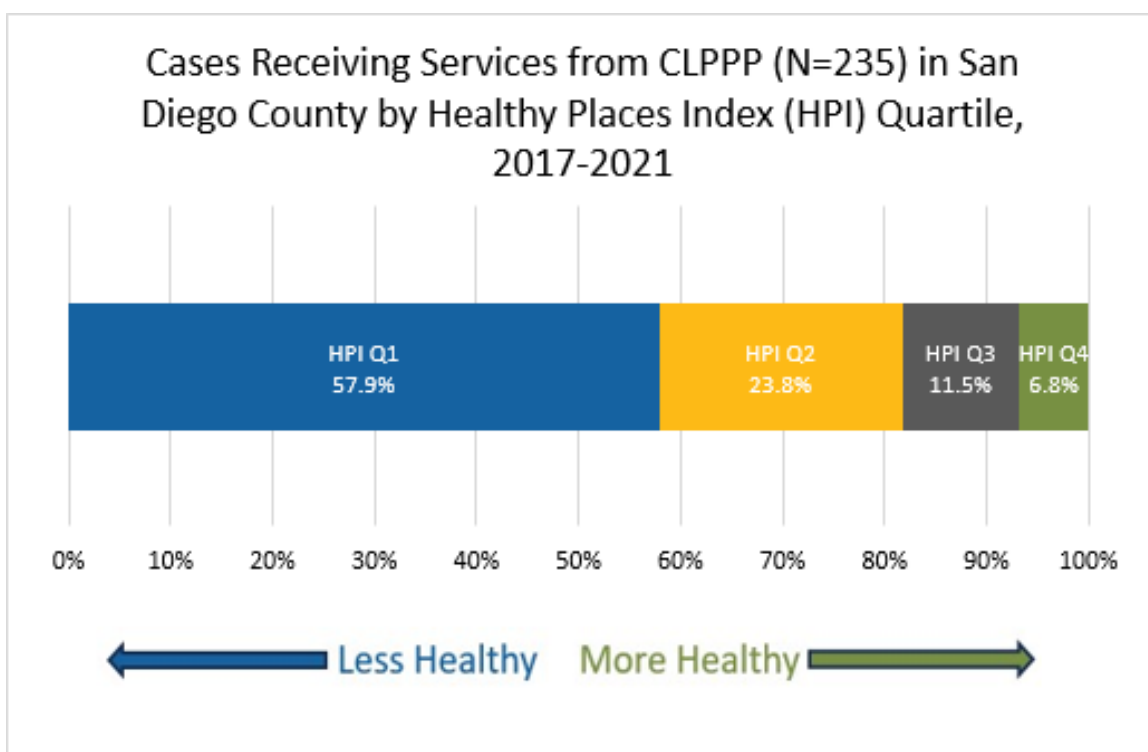
Includes children with a newly identified venous BLL 9.5 mcg/dL or greater. Based on address at case identification. Three cases resided at two separate addresses at case identification; these addresses were located in separate regions. One case was identified out of county and 47 had unknown addresses at case identification. San Diego County is divided into six Health and Human Services Agency (HHSA) service regions, created by grouping contiguous zip codes.

Prepared by San Diego County CLPPP, 11/17/2022

Additional ways to examine this population by geography include by [Healthy Places Index \(HPI\) Quartile](#) and by [Health Equity zip codes](#).

The HPI combines 25 community characteristics, like access to healthcare, housing, education, and more, into a single indexed HPI score. The healthier a community, the higher the HPI score. These scores were categorized into quartiles, with quartile 1 indicating the least healthy communities and quartile 4 indicating the most health communities. Between 2017 and 2021, 57.9% of CLPPP cases with a known address lived in communities categorized as the least healthy (**Figure 4**).

Figure 4. Children Receiving Services by Healthy Places Index Quartile.

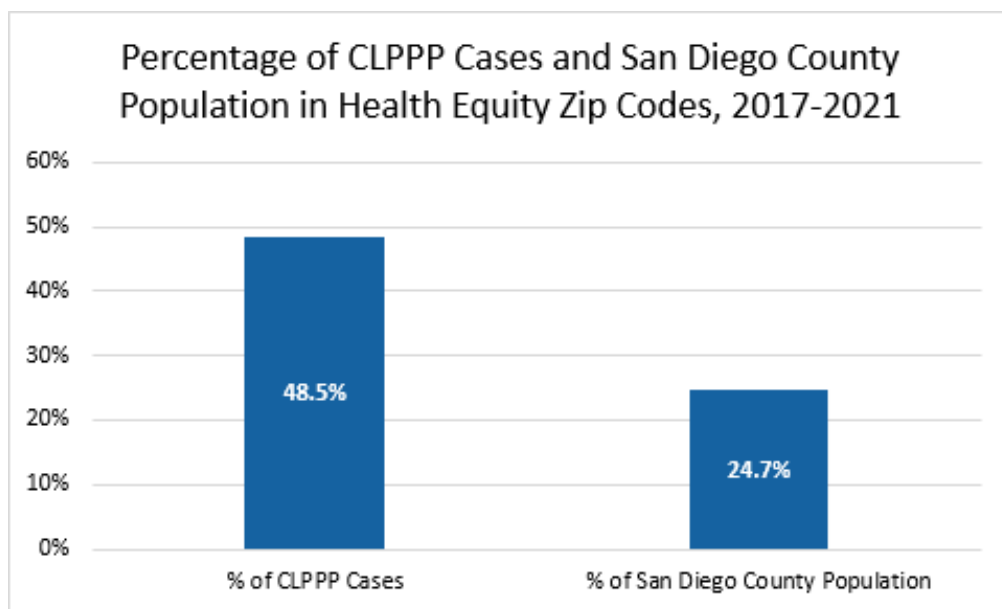


Notes:

1. Cases include children under 21 years of age with a newly identified venous blood lead level (BLL) 9.5 mcg/dL or greater.
2. Residence is address at case identification. Case addresses were geocoded to an HPI quartile and percentage of cases in each HPI quartile were calculated.
3. Address was unknown or out of county for 48 cases. Those cases did not have an HPI quartile identified.

Similarly, Health Equity zip codes were identified within the county based on how much of the area was considered a Healthy Places Index Health Equity Quartile census tract. There are 34 zip codes in San Diego County that are designated as Health Equity zip codes. In San Diego County, between 2017 and 2021, 24.7% of the overall population lived in Health Equity zip codes, while 48.5% of CLPPP clients with known addresses lived in these zip codes (**Figure 5**).

Figure 5. Percentage of CLPPP Cases and San Diego County Population in Health Equity Zip Codes.



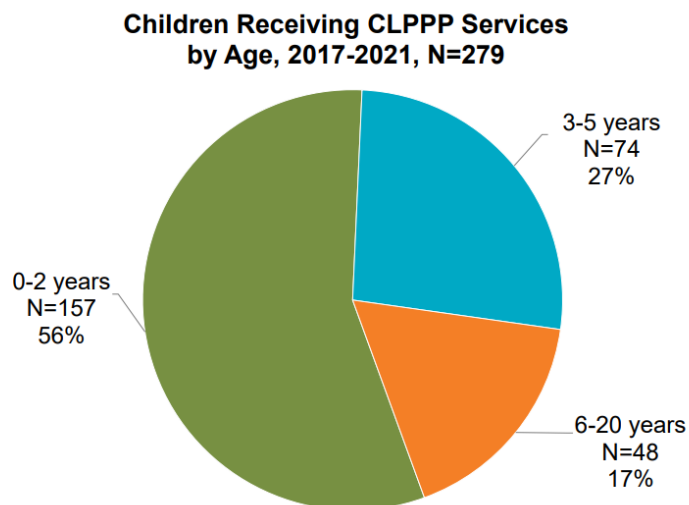
Notes:

1. Cases include children under 21 years of age with a newly identified venous blood lead level (BLL) 9.5 mcg/dL or greater.
2. Residence is address at case identification. Case addresses were geocoded and percentage of cases in health equity zip codes was calculated.
3. Address was unknown or out of county for 48 cases. Those cases did not have a health equity zip code identified.
4. There are 34 health equity zip codes in San Diego County: 91901, 91915, 91948, 91980, 92058, 92083, 92110, 92173, 91905, 91917, 91950, 92004, 92060, 92084, 92113, 92259, 91906, 91934, 91962, 92020, 92066, 92086, 92114, 92536, 91910, 91935, 91963, 92070, 92102, 92672, 91911, 92055, 92081, 92105
5. SANDAG 2019 population estimates used for SDC population.

HIGH-RISK AGE GROUP

Children less than six years old are at a higher risk of lead exposure, as evidenced by the results shown below in **Figure 6**, where 83% of children receiving CLPPP services between 2017 and 2021 were under six. This is because their bodies are rapidly developing and more susceptible to taking in lead if exposed. Young children also tend to put their hands or other objects into their mouths. This is why the most common source of lead exposure in young children is lead dust that they swallow after placing their lead-contaminated hands or other objects in their mouths.

Figure 6. Children Receiving Services by Age.



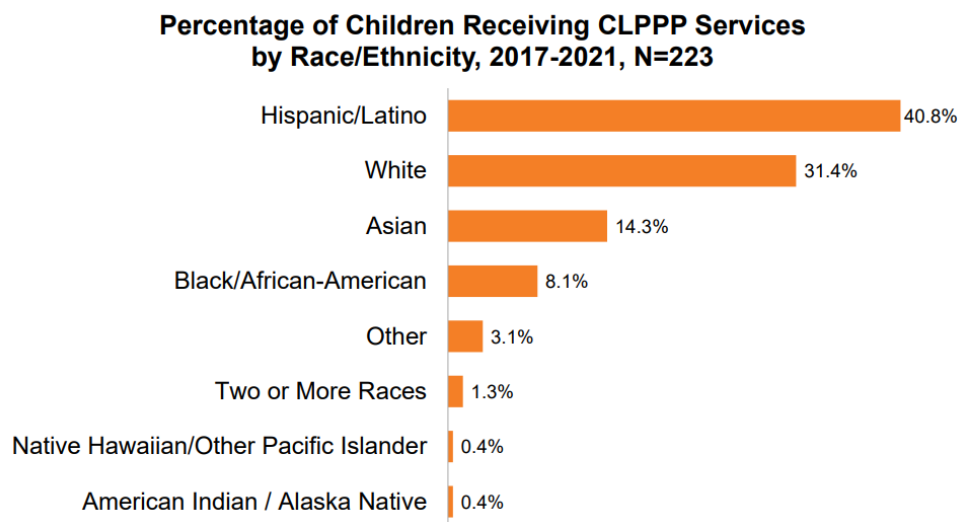
Includes children with a newly identified venous BLL 9.5 mcg/dL or greater.

Prepared by San Diego County CLPPP, 10/10/2022

RACE/ETHNICITY

The highest percentage of children experiencing lead poisoning in San Diego County are Hispanic/Latino (40.8%), followed by White (31.4%) (**Figure 7**). CLPPP wants to ensure that all groups receive equity in CLPPP services and takes into account specific risk factors, as needed.

Figure 7. Children Receiving Services by Race/Ethnicity.



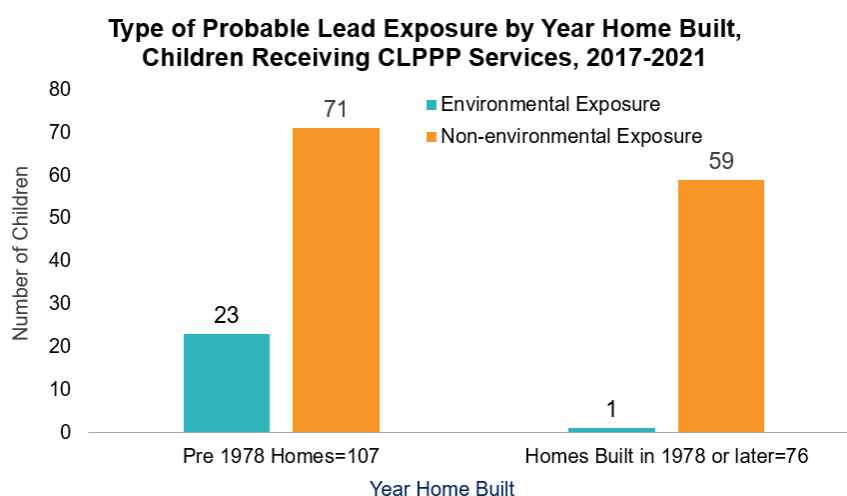
Includes children with a newly identified venous BLL 9.5 mcg/dL or greater, excluding those with unknown race and ethnicity. Race and ethnicity are based on self-identification; those with unknown race/ethnicity are primarily those who did not receive a home visit where information could be obtained.

Prepared by San Diego County CLPPP, 10/10/2022

AGE OF HOME/INCOME RISK FACTORS

Children from low-income households and those who live in housing built before 1978 are at the greatest risk of lead exposure. **Figure 8** shows that children living in homes built before 1978 experience a much higher rate of environmental exposures (23, as compared to 1). Houses built before 1978, the time before the use of lead in paint was banned, and houses in low-income areas, many of which have homes built before 1978, are more likely to contain lead-based paint and have pipes, faucets, and plumbing fixtures containing lead.

Figure 8. Age of Home and Probable Exposures.



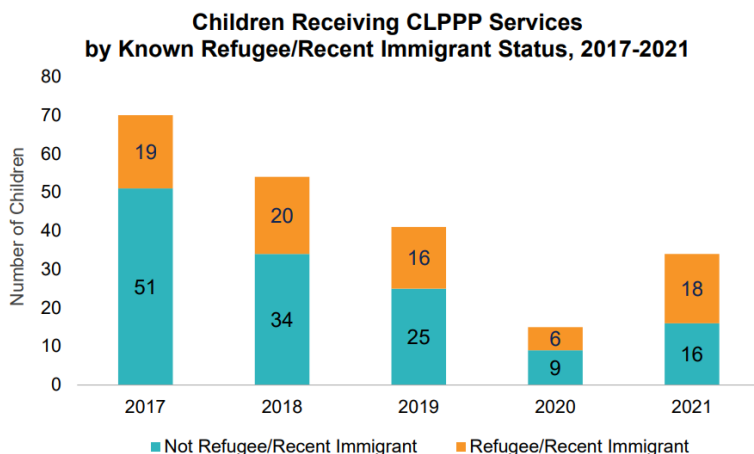
Children under 21 years of age with a newly identified venous BLL 9.5 mcg/dL or greater. A child may have environmental and non-environmental exposures and may be included in both categories. Includes children with known age of home and a probable source(s) identified. Environmental exposures include paint, dust, dirt, and water.

Prepared by San Diego County CLPPP, 11/17/2022

REFUGEE/RECENT IMMIGRANT

Immigrant and refugee children from less developed countries are at higher risk of being exposed to lead due to less strict rules protecting children from lead exposure in their country of origin. Because of this, children who are immigrants, refugees, or recently adopted from less developed countries are also at risk for lead exposure. In most years in San Diego County, we can see nearly half of cases being refugees and newcomers, as noted in **Figure 9**. At times, this number increased to over half, due to global movement trends or other reasons.

Figure 9. Refugee/Recent Immigrant Status.

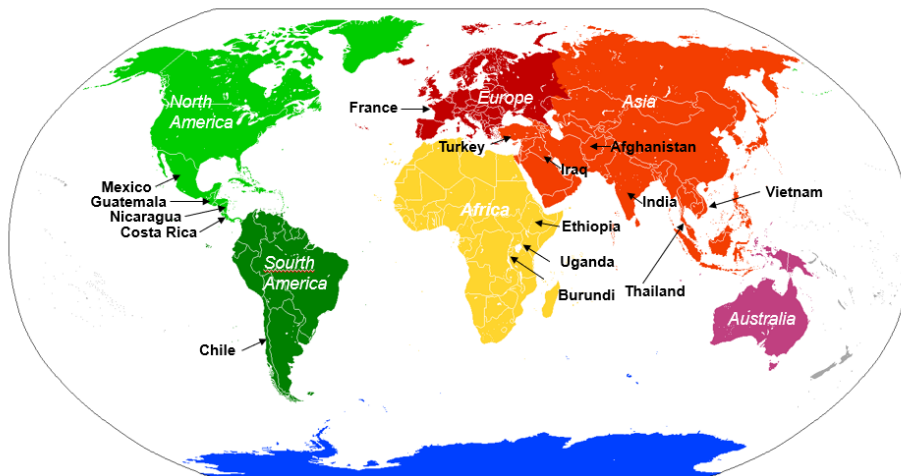


Children under 21 years of age with a newly identified venous BLL 9.5 mcg/dL or greater. Refugees/recent immigrant children include any children who moved to the U.S. from another country in the year prior to case identification.

Prepared by San Diego County CLPPP, 10/10/2022

Figure 10 shows the many varying places that San Diego County CLPPP clients have spent time or relocated from. Because the risk factors can vary from country to country, it is important for recent arrival to be taken into consideration when determining where lead poisoning sources are coming from.

Figure 10. Countries Where Children Receiving CLPPP Services Previously Lived or Visited.

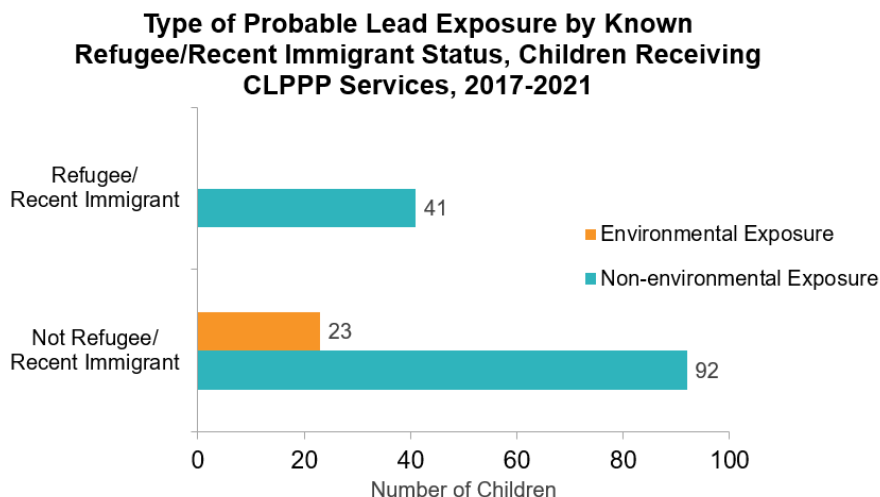


Children under 21 years of age with a newly identified venous BLL 9.5 mcg/dL or greater. Includes children who immigrated to U.S. and children who visited these countries.

Prepared by San Diego County CLPPP, 11/17/2022

Refugee and recent immigrant children are more likely to have non-environmental exposures, as seen in **Figure 11**, with items such as imported foods, cosmetics, or tableware to name a few.

Figure 11. Probable Source of Lead Exposure for Recent Immigrants.



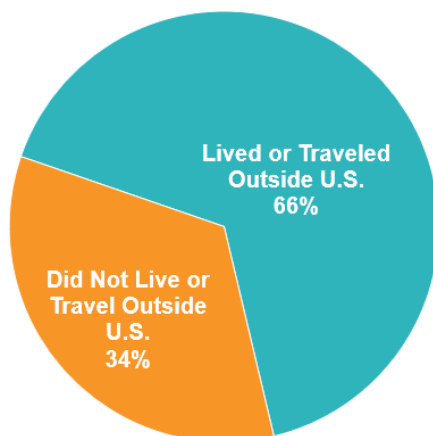
A child may have environmental and non-environmental exposures and may be included in both categories. Includes children with known age of home and a probable source(s) identified. Environmental exposures include paint, dust, dirt, and water. Children under 21 years of age with a newly identified venous BLL 9.5 mcg/dL or greater. There were no environmental exposures identified for refugee/recent immigrants.

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A large portion of San Diego County CLPPP cases have recently traveled or arrived from a country outside the US (66%), as noted in **Figure 12**.

Figure 12. Children Who Traveled or Lived Outside the U.S.

**Children Receiving CLPPP Services Who Have Lived or
Traveled Outside the United States within the Past Year,
2017-2021, N=223**



Includes children under 21 years of age with a newly identified venous BLL 9.5 mcg/dL or greater. Exposures to lead outside of the U.S. may contribute to children's lead poisoning. Information not available for 60 cases.

Prepared by San Diego County CLPPP, 11/17/2022

OTHER HIGH-RISK POPULATIONS

Pregnant people should know the risk of lead exposure because lead can pass to their baby during pregnancy. Breastfeeding can also be a source of lead exposure to babies, since adults who are or have been exposed to lead can also pass lead to their babies. Formula prepared using water contaminated with lead from leaded pipes and plumbing parts can also result in a baby being exposed to lead.

Some adults work in industries or have hobbies that expose them to lead. These adults may bring lead home with them and expose their families to lead without knowing. For example, a parent who works in battery manufacturing or renovation of older homes could bring home lead dust on their clothes, shoes, skin, hair, and hands. This dust can be tracked onto carpets, floors, furniture, and other surfaces that a child may touch. Adults who are exposed to lead in their workplace or from hobbies should take steps to keep them and their families safe from lead.¹⁰

Prevention

EDUCATION AND OUTREACH

During Lead Week, the last week in October, additional efforts are made to put information into the community drawing awareness and providing education. One of these efforts can be seen in the bus shelter ads placed around San Diego County, as seen in **Figure 13**.

Figure 13. Bus Shelter Ad during Lead Week 2023.

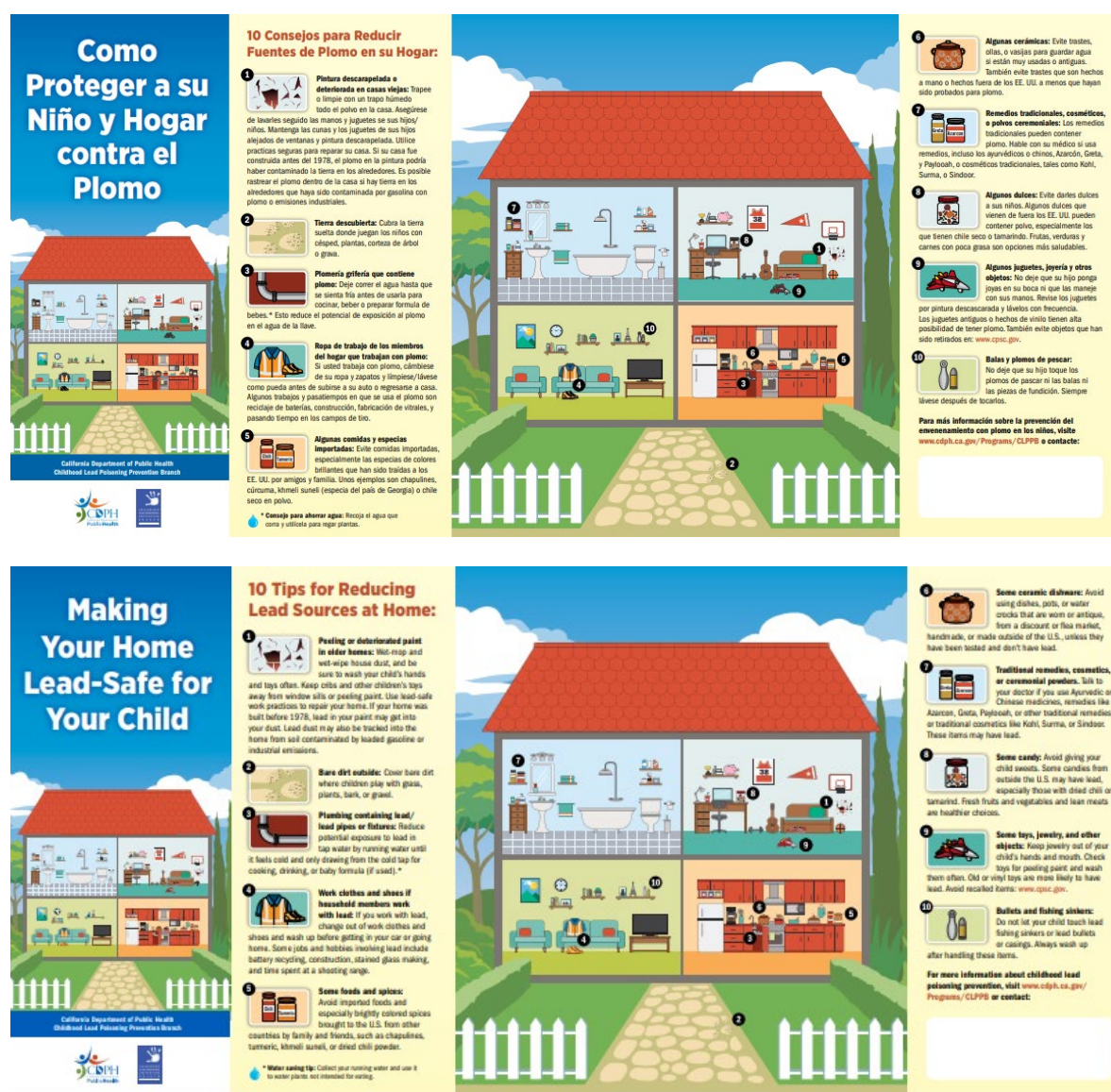


Source: San Diego Childhood Lead Poisoning Prevention Branch, 2023.

These ads serve as a visible reminder to residents about the dangers of lead exposure and the importance of prevention measures. These initiatives aim to reach a wider audience and empower individuals with knowledge about lead poisoning prevention, including how to identify potential hazards in their surroundings and take proactive steps to protect themselves and their families. Through these concerted efforts, Lead Week becomes a pivotal moment for raising awareness, fostering community involvement, and advancing the mission of the Childhood Lead Poisoning Prevention Program.

Additionally, many of the brochures and information available through CLPPP and CLPPB are offered in multiple languages, as seen in **Figure 14**.

Figure 14. Lead Educational Material Example Available on CLPPB Website.¹¹



Source: California Department of Public Health, California Childhood Lead Poisoning Prevention Branch, n.d.


Case Management

From 2017 to 2021 CLPPP served 237 children impacted by lead poisoning residing in San Diego County through case management services. Since then, there has been a gradual increase in the number of surveillance, early prevention, and state cases.

EDUCATION

During home visits, public health nurses conduct an Ages and Stages Questionnaire (ASQ) assessment for the lead impacted child to determine if the child is meeting their developmental milestones. An example of an ASQ assessment, ASQ-3 for infants 12-16 months old, is shown in **Figure 15**. Additionally, public health nurses provide parents with a several educational brochures aimed at increasing the knowledge on lead exposure and prevention. One brochure that is provided to parents is shown in **Figure 16** and shares information about where lead may be found and how to keep one's family safe.

Figure 15. Ages and Stages Questionnaire, Activities for Infants 12-16 Months Old.

Activities for Infants 12-16 Months Old				
Babies love games at this age (Pat-a-Cake, This Little Piggy). Try different ways of playing the games and see if your baby will try it with you. Hide behind furniture or doors for Peekaboo; clap blocks or pan lids for Pat-a-cake.	Make puppets out of a sock or paper bag—one for you and one for your baby. Have your puppet talk to your baby or your baby's puppet. Encourage your baby to "talk" back.	To encourage your baby's first steps, hold your baby in standing position, facing another person. Have your baby step toward the other person to get a favorite toy or treat.	Give your baby containers with lids or different compartments filled with blocks or other small toys. Let your baby open and dump. Play "putting things back." This will help your baby learn how to release objects where he wants them.	Loosely wrap a small toy in a paper towel or facial tissue without tape. Your baby can unwrap it and find a surprise. Use tissue paper or wrapping paper, too. It's brightly colored and noisy.
Babies enjoy push and pull toys. Make your own pull toy by threading yogurt cartons, spools, or small boxes on a piece of yarn or soft string (about 2 feet long). Tie a bead or plastic stacking ring on one end for a handle.	Tape a large piece of drawing paper to a table. Show your baby how to scribble with large nontoxic crayons. Take turns making marks on the paper. It's also fun to paint with water.	Arrange furniture so that your baby can work her way around a room by stepping across gaps between furniture. This encourages balance in walking.	Babies continue to love making noise. Make sound shakers by stringing canning rims together or filling medicine bottles (with child-proof caps) with different-sounding objects like marbles, rice, salt, bolts, and so forth. Be careful to secure lids tightly.	This is the time your baby learns that adults can be useful! When your baby "asks" for something by vocalizing or pointing, respond to his signal. Name the object your baby wants and encourage him to communicate again—taking turns with each other in a "conversation."
Play the naming game. Name body parts, common objects, and people. This lets your baby know that everything has a name and helps her begin to learn these names.	Make an obstacle course with boxes or furniture so that your baby can climb in, on, over, under, and through. A big box can be a great place to sit and play.	Let your baby help you clean up. Play "feed the wastebasket" or "give it to Mommy or Daddy."	Make a surprise bag for your baby to find in the morning. Fill a paper or cloth bag with a soft toy, something to make a sound, a little plastic jar with a screw-top lid, or a book with cardboard pages.	Play "pretend" with a stuffed animal or doll. Show and tell your baby what the doll is doing (walking, going to bed, eating, dancing across a table). See if your baby will make the doll move and do things as you request. Take turns.
Cut up safe finger foods (do not use foods that pose a danger of your baby's choking) in small pieces and allow your baby to feed himself. It is good practice to pick up small things and feel different textures (bananas, soft crackers, berries).	Let your baby "help" during daily routines. Encourage your baby to "get" the cup and spoon for mealtime, to "find" shoes and coat for dressing, and to "bring" the pants or diaper for changing. Following directions is an important skill for your baby to learn.	Your baby is learning that different toys do different things. Give your baby a lot of things to roll, push, pull, hug, shake, poke, turn, stack, spin, and stir.	Most babies enjoy music. Clap and dance to the music. Encourage your baby to practice balance by moving forward, around, and back. Hold her hands for support, if needed.	Prepare your baby for a future activity or trip by talking about it beforehand. Your baby will feel like a part of what is going on rather than being just an observer. It may also help reduce some fear of being "left behind."

Ages & Stages Questionnaires®, Third Edition (ASQ-3™), Squires & Bricker © 2009 Paul H. Brookes Publishing Co. All rights reserved.

Source: Squires and Bricker, 2009.

Figure 16. Protect Your Child from Lead Educational Brochure.

Protect your child from LEAD



Lead can be found in many places inside and outside your home.

Lead can hurt your child. Lead can harm a child's brain. Lead poisoning can make it hard for children to learn, pay attention and behave. Most children who have lead poisoning do not look or act sick.

Take these steps to keep your family safe from lead.

Taking Care of Your Child

Do not let your child chew on painted surfaces or eat paint chips. Some old paint has lead in it. When paint gets old, it breaks down into dust. This dust spreads all around your home.



Wash your child's hands and toys often. Always wash hands before eating and sleeping. Lead dust and dirt can stick to hands and toys that children put in their mouths.

Feed your child healthy meals and snacks every day. Make sure to give your child fruit and vegetables with every meal, and foods that have:

- calcium** (milk, plain yogurt, almond milk, soy milk, spinach, kale, tofu, cheese, calcium-fortified cereals)
- iron** (beef, chicken, turkey, eggs, cooked dried beans, almonds, cashews, peanuts, pumpkin seeds, potatoes, oatmeal)
- vitamin C** (oranges, tomatoes, tomatillos, limes, bell peppers, purple cabbage, papaya, jicama, and broccoli)



Calcium, iron and vitamin C help keep lead from hurting your child.

Avoid giving your child sweets. Some candies from outside the USA have lead in them. Fresh fruit and vegetables, lean meats, whole grains and dairy products are healthier choices for your child.

Talk to your child's doctor about testing for lead.

Inside and Outside Your Home

Let water run until it feels cold (usually at least 30 seconds) before using it for cooking or drinking. Always use water from the cold tap for cooking, drinking, or baby formula (if used). If water needs to be heated, draw water from the cold water tap and heat the water on the stove or in a microwave.

Keep your home clean and dust-free. Wet mop floors, wet wipe windowsills, vacuum, and wash all surfaces often. This keeps lead in dust and dirt from spreading in the house.



Keep furniture away from paint that is chipped or peeling. Move cribs, playpens, beds and high chairs away from damaged paint. This helps keep lead in paint chips and dust away from your child.

Never sand, dry scrape, power wash or sandblast paint unless it has been tested and does not have lead in it.



There may also be lead in the dirt around your home from the past use of lead in gasoline and in factories.

Cover bare dirt outside where your child plays. Use grass or other plants, bark, gravel, or concrete. This keeps lead in the dirt away from your child.

Take off shoes or wipe them on a doormat before going inside. This keeps lead in dirt outside.

Change out of work clothes and shoes, and wash up or shower before getting in a car or going home if you work with lead. Lead is in many workplaces:

- painting and remodeling sites
- radiator repair shops
- places that make or recycle batteries



Ask your employer to tell you if you work with lead. Children can be poisoned from lead dust brought home on skin, hair, clothes, and shoes, and in the car.

Things you Buy and Use

Avoid using water crocks or dishes and pots that are worn or antique, from a discount or flea market, made of crystal, handmade, or made outside the USA unless they have been tested and don't have lead.



Do not let your child put jewelry or toys in his or her mouth. Some jewelry and toys have lead in them. There is no way to tell if there is lead in jewelry and toys. Even items marked "Lead Free" can have lead in them.

Talk to your doctor before using imported products that often have lead in them, like

- natural remedies — bright orange, yellow, or white powders for stomach ache or other illnesses
- make-up — Kohl, Khali, Surma, or Sindoor
- food or spices, like chapulines or turmeric



These items have lead in them — keep them away from your child:

- lead fishing sinkers
- lead bullets
- lead solder

More Information

Go to www.cdph.ca.gov/programs/clppb or contact:



CDPH 17 142519

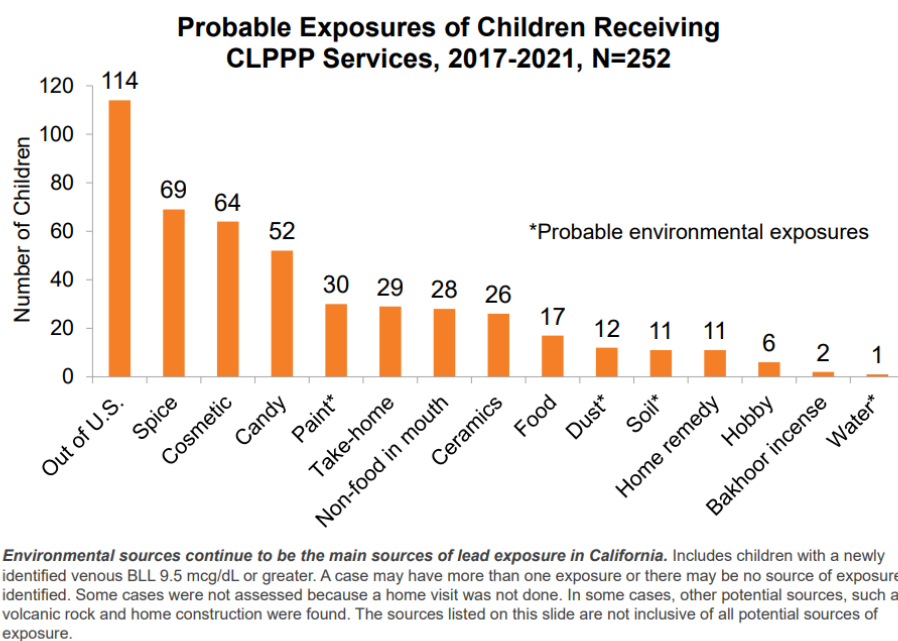
Source: California Department of Public Health, Childhood Lead Poisoning Prevention Branch, n.d.

Furthermore, the Health Educator reaches out to all surveillance cases, comprising of patients whose blood lead levels are between 3.5-9.4 mcg/dL, as per protocol. The Educator contacts parents encouraging them to have their child retested for lead, in accordance with CDC testing guidelines advocating for three retests for lead-affected children. Beyond mere outreach, the educator provides comprehensive education on the long-term impact of lead poisoning in children. Emphasizing the dangers of lead exposure and how it can adversely impact a growing child's cognitive abilities and damage their vital organs during a child's crucial developmental stages.

ENVIRONMENTAL INVESTIGATION

Environmental sources continue to be the main source of lead exposure in California. **Figure 15** shows some of the potential lead hazards.

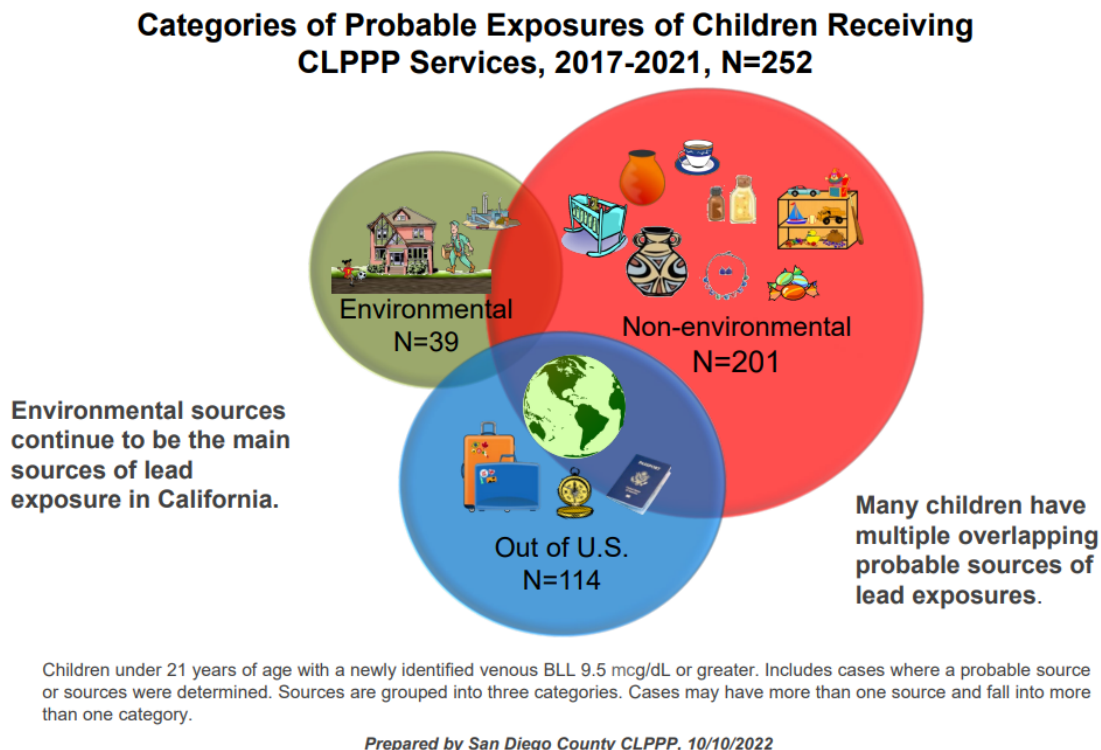
Figure 15. Probable Sources of Lead Exposure.



Prepared by San Diego County CLPPP, 10/10/2022

Figure 16 demonstrates that a portion of children in San Diego County are experiencing a combination of exposure categories including non-environmental, environmental, as well as exposures outside the US.

Figure 16. Categories of Probable Sources of Lead Exposure.



DISCUSSION

Although lead paint was banned in 1978, more than 40 years ago, it is a persistent issue as this heavy metal does not dissolve or fade over time and will remain in the environment, even as a broken-down material. Prevention is key to reducing this issue for families, with the multi-pronged approach in the health care setting, childcare and school setting, and of course at home. Long term outcomes of a child's health can be greatly improved by these simple methods of prevention. These preventative measures can be practiced by obtaining and evaluating blood lead levels, identifying and removing lead sources, and practicing everyday measures, such as hand washing and eating proper nutrition. These activities are coordinated by the CLPPP efforts.

To better the health and well-being of children, it is important to prevent their exposure to lead. *Primary prevention* is the removal of lead hazards from the environment before a child is lead exposed. It is the most effective way to ensure that children do not experience harmful long-term effects of lead exposure.² For children who are exposed to lead, *secondary prevention* includes blood lead testing and follow-up care and referral. It remains an essential safety net for children who may already be exposed to lead. Additionally, *tertiary prevention* focuses on minimizing long-term effects and complications of lead exposure. For example, this may involve medical treatment such as chelation therapy for high levels, educational support, nutritional interventions, environmental remediation, and long-term monitoring.

Efforts are further amplified by reviewing data through a health equity lens. As an environmental health problem, lead poisoning can affect anyone. Historically marginalized communities may have a more difficult time accessing care to begin the process of evaluating their lead poisoning levels and risks. It is important that lead poisoning prevention efforts and CLPPP remain vigilant in breaking down barriers to ensure access to care and follow up. Through education and outreach, early identification, and treatment of children with elevated blood lead levels, CLPPP helps to create lead-safe environments for all communities. Providing language assistance, access to health care, proper nutrition, connections to resources, and adequate education outreach efforts, CLPPP efforts ensure essential equitable needs are met.

Lead poisoning prevention is especially important in children under six years of age as their bodies are still developing and growing rapidly. Long term outcomes of a child's health can be greatly improved by simple methods of prevention. CLPPP's efforts can be greatly amplified with continual assessment of data and outcomes through a health equity lens, such as identifying cases in the Health Equity zip codes and the Healthy Places Index. As an environmental health problem, lead poisoning can affect anyone.

CLPPP's multi-disciplinary approach aims to utilize case management and education and outreach as a way to meet the goals of lead poisoning prevention in our community with a team of public health nurses, administrative staff, education and outreach staff members, and environmental professionals. With continual input from the community and partners, all involved parties can work together to meet the ultimate goal of preventing and decreasing the occurrence of lead poisoning in San Diego County children.

CALL TO ACTION

It is the responsibility of parents and health care providers to maintain the health of children through the following actions. This section provides actions that health care providers and parents can take to eliminate the risk of exposure to lead and its complications.

Health Care Providers

As an integral part of the lead poisoning prevention collaborative effort health care providers must continue to cast a wide net of screening and blood lead testing to ensure that the first step of blood lead level awareness is met. This can prompt a cascade of follow-up actions by families and CLPPP.

Additionally, health care providers are often the primary link to care for families. Having a thorough understanding of potential exposures and preventive measures can bridge the gap in care and avoid any type of confusion or disregard for the importance of lead poisoning.

Parents

A blood test is the best way to determine if a child has been exposed to lead. The amount of lead in blood is referred to as a blood lead level, which is measured in micrograms of lead per deciliter of blood

(mcg/dL). Most children with lead in their blood have no obvious symptoms. Talk to your child's health care provider about getting a blood lead test.²

Preventing lead poisoning at home can begin even before blood lead test results are known. Simple steps can include:

- Washing hands and face frequently.
- Washing toys, countertops, windowsills and floors weekly with wet wipes and cleaning products
- Avoid play in areas where bare soil is exposed.
- Removing shoes before entering the home.
- Vacuuming frequently using a vacuum with a HEPA filter.
- Clean up paint chips and peeling paint safely, and keeping furniture away from damaged paint areas, especially things like cribs or changing tables.
- Avoid giving children imported candy, chaupalines, or snacks containing chili or tamarind.
- Feed children regular meals with a diet high in calcium, iron, and vitamin C.
- Allow cold water to run for a few minutes in the morning before using it for drinking, cooking, or mixing formula in case there may be lead in household pipes.
- Use only cold water from the tap for drinking or in food preparation. If water needs to be heated, draw water from the cold tap and heat it on the stove or in the microwave.
- Avoid using handmade, older, imported dishes or crystal for food or drink preparation, storage, or serving, unless you are sure they do not contain lead.
- Avoid using traditional remedies or cosmetics that contain lead.
- Avoid imported foods that come in cans with wide seams.
- Change out of work clothes before entering the house or being in contact with family members. If an adult in the home works with lead at their job or hobby, it is best to shower at the workplace, if possible, or showering and removing clothing immediately upon returning home.
- Handle work clothing carefully and wash separately.
- When moving into a home, ask the owner about any problems with lead and know the age of the building.
- Before remodeling, ask a trained professional to test the paint in and around the home.
- Before remodeling, ask a trained professional to test the paint in and around the home.

CONCLUSION

The County of San Diego CLPPP program has over 35 years of experience preventing and case managing lead poisoning case in children of this local region. No level of lead detected in local cases is acceptable. Since 2013, CLPPP lowered the lead level cutoff to 5 mcg/dL and above. In early 2022, the CDC lowered the level to 3.5 mcg/dL and above.

The facts are resounding:

- The highest percentage of children experiencing lead poisoning in San Diego County reside in the City of San Diego (**Figure 2**).
- The Healthy Places Index, looking at community characteristics such as access to healthcare, housing, education, and more, shows children receiving services through CLPPP are with quartile 1 indicating

the least healthy communities. Between 2017 and 2021, 57.9% of CLPPP cases with a known address lived in communities categorized as the least healthy (**Figure 4**).

- Following the health equity analysis, between 2017 and 2021, 24.7% of the overall population lived in one of the 39 Health Equity zip codes, while 48.5% of CLPPP clients with known addresses lived in these zip codes (**Figure 5**).
- Children less than six years old are at a higher risk of lead exposure, as evidenced by the results shown below in **Figure 6**, where 83% of children receiving CLPPP services between 2017 and 2021 were under six.
- Lastly, of children experiencing lead poisoning in San Diego County are Hispanic/Latino (40.8%), followed by White (31.4%) (**Figure 7**).

CLPPP is committed to ensuring all groups receive equity in CLPPP services and considers specific risk factors, as needed. The public, as well as high-risk populations, are informed about and protected from lead exposures of all kinds. As such, the EISB health equity goal is to “address to childhood lead poisoning, by ensuring that “95% of children under age 21 who have elevated blood levels (3.5 cg/dL or greater) receive case management services in timely fashion (depending upon lead levels).” In addition, CLPPP is committed to a population health goal, in alignment with *Healthy People 2030*, to “reduce blood lead levels in children aged 1 to 5 years from 3.31 micrograms per deciliter (mcg/dL) to 1.18 mcg/dL.”

Prevention and control efforts to reduce exposure to lead is essential to protect the lives of children in San Diego County. Collaboration between parents, healthcare providers, and the County will ensure this commitment is upheld, and anticipated outcomes are achieved.

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