



2025 Blood Lead Testing and Response Plan



Nevada Institute for Children's Research & Policy



University of Nevada - Las Vegas

Authors

Erika Marquez, PhD, MPH

Project Director of the NvCLPPP

Assistant Professor

UNLV School of Public Health

Amanda Haboush-Deloye, PhD

Project Evaluator for the NvCLPPP

Executive Director

Nevada Institute for Children's

Research and Policy

UNLV School of Public Health

Jelsy A. Cadenas-Santos, BA

Program Coordinator for the NvCLPPP

Assistant Research Analyst

Nevada Institute for Children's

Research and Policy

UNLV School of Public Health

Lung-Chang Chien, DrPH

Associate Professor in Biostatistics

Department of Epidemiology and Biostatistics

UNLV School of Public Health

Suggested Citation

Marquez, E., Haboush-Deloye, A., Cadenas-Santos, J. A., & Chien, L.C. (2025). 2025 blood lead testing and response plan. Nevada Childhood Lead Poisoning Prevention Program. University of Nevada, Las Vegas.

Funding Acknowledgement

This publication was supported by the Grant or Cooperative Agreement Number, 1 NUE2EH001366-01-00, funded by the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention or the Department of Health and Human Services.

Advisory Board

Kaleigh Behrendt

Senior Public Health Nurse
Northern Nevada Public Health

Haley Blake

Communicable Disease Supervisor
Southern Nevada Health District

Dustin Booth, MPH, REHS

Division Manager
Disease Control and Prevention, Carson City

Christopher Bordigioni

Epidemiologist
Office of State Epidemiology

Cheryl Borgstrom

Program Analyst
Department of Housing and Urban Development

Jennifer L. Carr, PE, CPM, CEM

Deputy Administrator
Nevada Division of Environmental Protection

Katherine Contreras

Disease Data Collection Specialist II
Southern Nevada Health District

Susan Crutchfield, BSN, RN, CLC

Community Health Nursing Manager
Southern Nevada Health District

Olivia Diaz

Environmental Health Specialist
Central Nevada Health District

Lauren DiPrete

Environmental Health Supervisor
Southern Nevada Health District

Shawn Gerstenberger, PhD

Dean
UNLV School of Public Health

Betsy Huang, MD, FAAP

Pediatrician
American Academy of Pediatrics Chapter

Matthew Kappel, MPH

Senior Epidemiologist
Southern Nevada Health District

Anil Mangla

Director of Disease Surveillance and Control
Southern Nevada Health District

Maria Menjivar

Program Manager
Central Nevada Health District

Sharon Montiel

Environmental Health Specialist
Central Nevada Health District

Elif L. Nahas, MD

Pathologist
Quest Diagnostics

Monica Schiffer

Chief, Community and Provider Engagement
Nevada Medicaid

Rebecca Topol

Epidemiology Supervisor
Southern Nevada Health District

Kelly Verling

Public Health Nurse Supervisor
Northern Nevada Public Health

Mariam Zarret

Community Health Nurse II
Southern Nevada Health District

Lei Zhang

Public Health Informatics Manager
Southern Nevada Health District

Table of Contents

List of Acronyms.....	7
NvCLPPP Mission and Vision Statements	8
Vision	8
Mission	8
Nevada at a Glance.....	9
Preface	10
A Call to Action.....	10
Challenges in Nevada	11
An Opportunity for Nevada.....	11
Lead Poisoning	12
Case Definitions	12
Impacts of Lead Poisoning	12
Risk Factors.....	14
Age	14
Race and Ethnicity	14
Poverty.....	15
Age of Housing	15
Refugee and Immigrant Populations.....	16
Children with Developmental Disabilities.....	17
Pregnant and Lactating Persons	17
Lead Exposure	18
Pathways of Exposure and Absorption.....	18
Sources of Lead Exposure	19
Home-Based Exposures	20
Exposure from Jobs and Hobbies.....	20
Consumer Product Exposures.....	20
Blood Lead Surveillance in Nevada	24
Surveillance System.....	24
Blood Lead Reporting	24
Blood Lead Testing Rates	25

NvCLPPP Testing Recommendations.....	25
Recommendations for Children.....	25
Testing Schedule.....	25
Testing Methods.....	26
Childhood Lead Risk Questionnaire.....	26
Recommendations for Pregnant and Lactating Persons.....	28
Risk Factors.....	28
Lead Exposure Questionnaire for Pregnant and Lactating Persons.....	30
Follow-up Testing and Case Management.....	32
Responding to Lead-Exposed Children.....	32
Responding to Lead-Exposed Pregnant and Lactating Persons.....	35
Nevada’s Lead Exposure Risk Index.....	37
Geographic Areas of Priority.....	40
References.....	42
Appendix A: Federal Lead Policies.....	51
Appendix B: US Standards and Regulations for Lead Levels.....	53
Appendix C: Lead Exposure Risk Index Maps.....	56
State Lead Index – Nevada.....	56
Carson City Map.....	57
Churchill County Map.....	58
Clark County Maps.....	59
Douglas County Map.....	63
Elko County Map.....	64
Esmeralda County Map.....	65
Eureka County Map.....	66
Humboldt County Map.....	67
Lander County Map.....	68
Lincoln County Map.....	69
Lyon County Map.....	70
Mineral County Map.....	71
Nye County Map.....	72
Pershing County Map.....	73

Storey County Map	74
Washoe County Maps.....	75
White Pine County Map	76
Figure 1. Counties in Nevada	9
Figure 2. Estimated IQ loss in US children aged 5-10 years at different BLLs	13
Figure 3. X-ray showing lead stored in bones	18
Figure 4. Sources of lead exposure	19
Figure 5. Peeling lead paint.....	20
Figure 6. Recent CPSC toy recalls	21
Figure 7. Recalled cinnamon apple sauces	22
Figure 8. Turmeric with lead warning.....	22
Figure 9. Bean pot with lead.....	23
Figure 10. ZIP codes with the highest lead exposure risk by county.....	41



List of Acronyms

Table 1. List of Acronyms

Acronym	Definition
AAP	American Academy of Pediatrics
ACS	American Community Survey
ATSDR	Agency for Toxic Substances and Disease Registry
BLL	Blood lead level
BLRV	Blood lead reference value
CCHHS	Carson City Health and Human Services
CDC	Centers for Disease Control and Prevention
CLRQ	Childhood Lead Risk Questionnaire
CNHD	Central Nevada Health District
CPSC	Consumer Product Safety Commission
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
GFAAS	Graphite Furnace Atomic Absorption Spectrometry
HBBF	Healthy Babies Bright Futures
HUD	Department of Housing and Urban Development
ICP/MS	Inductively Coupled Plasma Mass Spectrometry
IQ	Intelligence Quotient
LBP	Lead-based paint
LERI	Lead Exposure Risk Index
NDPBH	Nevada Division of Public and Behavioral Health
NHANES	National Health and Nutrition Examination Survey
NNDSS	National Notifiable Diseases Surveillance System
NNPH	Northern Nevada Public Health
NRS	Nevada Revised Statutes
NvCLPPP	Nevada Childhood Lead Poisoning Prevention Program
OSHA	Occupational Safety and Health Administration
POC	Point-of-care
ppb	Parts per billion
ppm	Parts per million
SNHD	Southern Nevada Health District
US	United States
USCB	United States Census Bureau
WHO	World Health Organization
WIC	Women, Infants, and Children
XRF	X-ray fluorescence
µg/dL	Micrograms per deciliter

NvCLPPP Mission and Vision Statements

Vision

Building a lead-safe world where everyone can thrive.

Mission

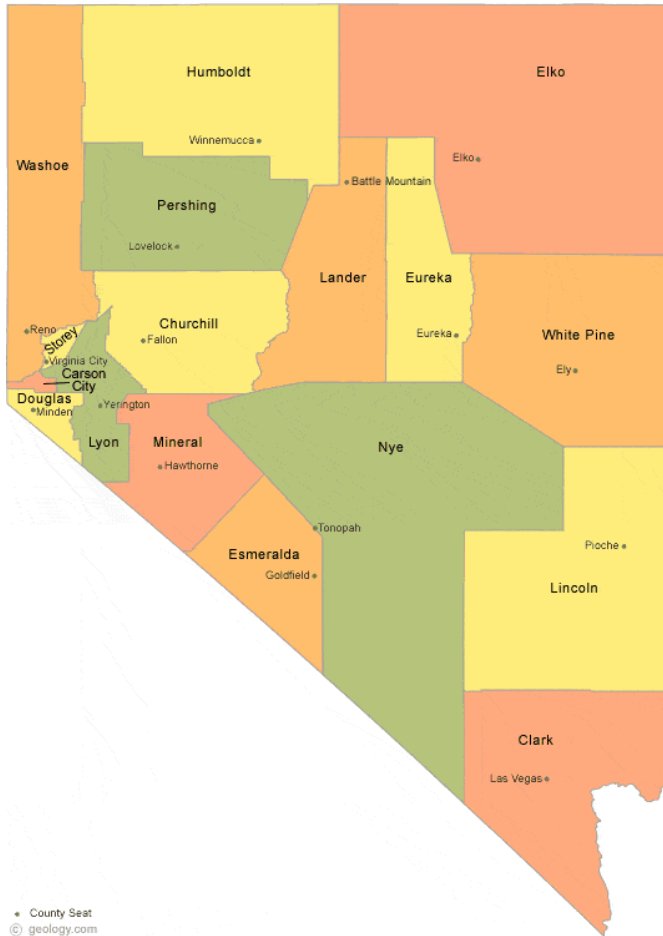
To prevent lead poisoning by advancing scientific innovation, education, policy, interventions, and collaborative partnerships.



Nevada at a Glance

Nevada is home to over 3.2 million residents across 17 counties (**Figure 1; United States Census Bureau [USCB], 2024**). Three counties house most of the population— with over 2.3 million living in Clark County, over 507,000 in Washoe County, and over 58,000 in Carson City (USCB, 2024). The rest of the population lives in rural/frontier areas. Among the state’s population are over 215,000 children under the age of six (USCB, 2023).

Figure 1. Counties in Nevada



Five local health authorities serve Nevada:

- The **Southern Nevada Health District (SNHD)**, serves Clark;
- **Northern Nevada Public Health (NNPH)**, serves Washoe;
- **Carson City Health and Human Services (CCHHS)**, serves Carson City and Douglas;
- The **Central Nevada Health District (CNHD)** serves Mineral, Pershing, Churchill, and Eureka;
- The **Nevada Division of Public and Behavioral Health (NDPBH)** oversees the remaining rural counties: Elko, Esmeralda, Humboldt, Lander, Lincoln, Lyon, Nye, Storey, and White Pine.

Preface

Childhood lead poisoning is one of the most preventable environmental health hazards in history. While childhood lead poisoning rates have decreased substantially since the 1970s, mounting evidence suggests that chronic, low-level exposure in early childhood can have long-lasting impacts on children.

In 2021, the **Centers for Disease Control and Prevention (CDC)** lowered the **blood lead reference value (BLRV)** from 5 to 3.5 **micrograms per deciliter ($\mu\text{g}/\text{dL}$)**, based on the 97.5th percentile of **blood lead levels (BLLs)** among U.S. children aged 1–5 from the latest **National Health and Nutrition Examination Survey (NHANES)**. The BLRV is not a health standard but a tool to identify children with higher BLLs. About 2.5% of children under six—around 470,000—have BLLs at or above the BLRV (Ruckart et al., 2021).

The **Nevada Childhood Lead Poisoning Prevention Program (NvCLPPP)** staff and Advisory Board encourage stakeholders to use this document as a guide to help prevent local lead exposure and address blood lead levels accordingly.

A Call to Action

Lead exposure risk is marked by significant disparities, disproportionately affecting children from low-income households, racial/ethnic minorities, and children of immigrant and refugee backgrounds (CDC, 2024a). Lead exposure can cause serious harm to a child's health, including damage to the brain and nervous system, slowed growth and development, as well as learning, behavioral, hearing, and speech problems (CDC, 2025). These impacts often do not become apparent until children enter school, disproportionately impacting low-income children who are already at higher risk for school-based challenges.

The good news is that lead poisoning is completely preventable—but we must act now. Routine blood lead screening and testing are essential to identifying children who are exposed—before irreversible harm to their growth and development occurs. Stakeholders, healthcare providers, educators, and policymakers must work together to expand testing efforts and ensure that every child in Nevada has the opportunity to grow up lead-free.

QUICK FACTS



215,000+

children under the age of 6 live in NV.



ONLY 3%

of those children are tested for lead.

Nevada has the



LOWEST

blood lead testing rate in the U.S.

Challenges in Nevada

Blood lead testing in the primary care setting has been a critical tool in identifying lead-poisoned children. Thus, states with low testing rates face a significant problem. In Western states, including Nevada, it is estimated that three times as many children go untested than are diagnosed (Roberts et al., 2017). In Nevada, there are over 215,000 children under the age of 6, but only 3% are tested for lead – making Nevada the lowest testing state in the U.S according to national blood lead surveillance data (CDC, 2024b).

In 2017, the NvCLPPP surveyed Clark County physicians who provide care for children under six to assess their blood lead testing practices and identify barriers to parental compliance (Haboush-Deloye et al., 2017). The study identified the following two major challenges among physicians in Nevada:

- A lack of adherence to lead testing recommendations among local physicians
- Low follow-up by parents on physician-ordered testing, likely due to financial concerns or the absence of visible lead poisoning symptoms in the child

An Opportunity for Nevada

Nevada is home to many communities that could be at high risk for lead exposure, including racial and ethnic minorities, communities residing in rural areas, and families living in poverty or in older housing (Carrel et al., 2017; CDC, 2024a). In the last decade, the Latino population grew by 37%, and the Black population grew by 39% (Girrus, 2021). Nevada also has a unique geography, with two urban centers within 400 miles of each other. At the same time, most of the state's land mass consists of rural and frontier areas, including prominent mining towns. Additionally, nearly 25% (295,524) of Nevada homes were built before the ban on **lead-based paint (LBP)** in 1978 (Marquez et al., 2020).

With current blood lead testing and reporting rates being so low, the data on childhood blood lead levels is scarce, making it impossible to pinpoint at-risk communities and specific sources of lead exposure in the state. This lack of data is concerning, as lead exposure in children is linked to irreversible cognitive, behavioral, and developmental harm (**American Academy of Pediatrics [AAP]**, 2016).

The NvCLPPP partners with local health districts, providers, and other organizations to strengthen the state's ability to:

- Increase testing and reporting rates
- Enhance epidemiologic data to identify at-risk communities
- Mitigate health disparities in lead poisoning

These efforts represent a critical opportunity for Nevada to protect vulnerable populations from the long-term effects of lead poisoning. With improved testing and data surveillance, the state can better inform policy, direct resources where they're needed most, and create healthier environments for Nevada's children.

Lead Poisoning

Case Definitions

A blood lead test is the only acceptable method for confirming lead poisoning. Lead poisoning may be confirmed with a single venous sample or two capillary samples. **Table 1** summarizes the CDC laboratory criteria for confirmatory and supportive evidence for lead poisoning in children. It is important to note that these case definitions are used to classify and count cases uniformly, as reporting blood lead test results is mandated in all states (**National Notifiable Diseases Surveillance System [NNDS]**, 2023).

Table 2. Lead poisoning case definitions.

Specimen	BLRV	Criteria	Type of Evidence
Venous	3.5 µg/dL	A single venous sample tested by GFAAS or ICP/MS that is at or above the reference value	Confirmatory
Capillary	3.5 µg/dL	Two capillary samples at or above the reference value collected within 12 weeks of each other	Confirmatory and Supportive
Capillary	3.5 µg/dL	A single capillary sample at or above the reference value in a child under 16 years of age	Supportive

(CDC's NNDS, 2023)

Impacts of Lead Poisoning

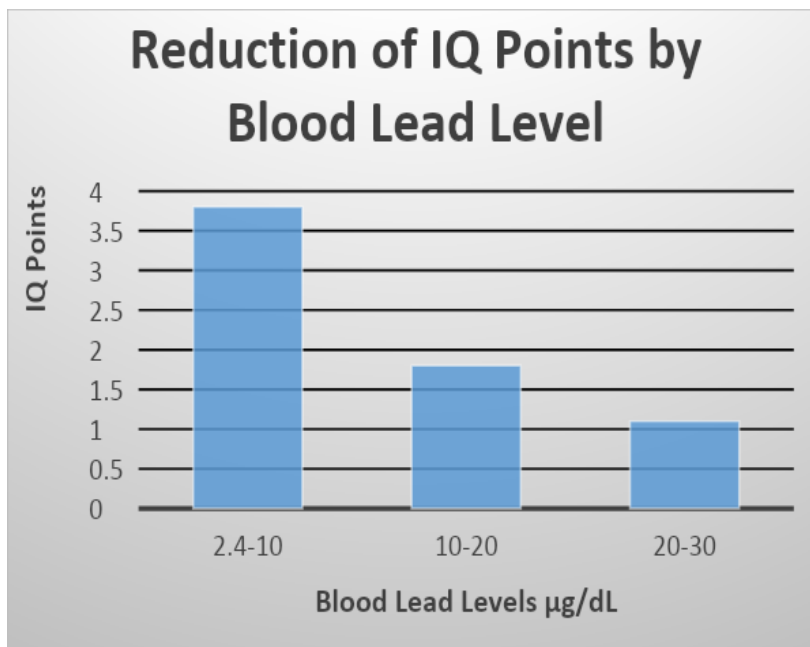
Lead poisoning is associated with a range of general, nonspecific symptoms (Miracle, 2017; Ying et al., 2018). In fetuses and newborns, lead exposure can cause significant congenital abnormalities, low birth weight, and preterm birth or spontaneous abortion (AAP, 2016; Wong et al., 2015). In children, transient digestive and neurologic symptoms such as constipation and fatigue are commonly reported (Miracle, 2017; Ying et al., 2018). However, lead exposure can also cause permanent learning disabilities and attention deficits (American Academy of Pediatrics, 2016; Lanphear, 2007). The type and severity of health effects highly depend on the duration and intensity of exposure.

Acute (short-term, high-level) lead exposure leads to a quick increase in BLLs. Common symptoms of acute lead poisoning for BLLs less than 50 µg/dL include abdominal pain, constipation, diarrhea, and muscle pain or weakness (Oregon Health Authority, 2018). Very high lead levels (>70 µg/dL) can result in more severe symptoms—including protracted vomiting, encephalopathy, coma, and death (AAP, 2016; WHO, 2010).

Chronic (long-term, low-level) lead exposure does not usually cause overt symptoms. However, it can cause permanent developmental, intellectual, and neurobehavioral disorders (AAP, 2016). Studies have demonstrated that BLLs are risk factors for reading problems, intellectual delays, school failure, attention deficit hyperactivity disorder, and antisocial behavior (AAP, 2016; Lanphear, 2007). Recent research also shows that greater aggregate BLLs at the population level are associated with increased occurrences of violent and non-violent crimes (Boutwell et al., 2016).

Notably, chronic lead exposure causes a significant reduction in IQ points. Children with BLLs ≥ 5 will, on average, experience a larger IQ deficit over their lifetime. Each increase of 10 $\mu\text{g}/\text{dL}$ in the lifetime average blood lead concentrations is associated with a 4.6 decrease in IQ points (Canfield et al., 2003). However, the majority of IQ points lost due to lead exposure occur in children with low BLLs. **Figure 2** demonstrates that the steepest loss of IQ points occurred at BLLs under 10 $\mu\text{g}/\text{dL}$ (Lanphear et al., 2019). This relationship appears counterintuitive, but some studies suggest that cellular defense mechanisms may not be fully operational until a high enough concentration of heavy metals is achieved in the body (Canfield et al., 2003).

Figure 2. Estimated IQ loss in US children aged 5-10 years at different BLLs



Source: Lanphear et al., 2019

Chronic lead exposure can also adversely influence cardiovascular conditions, such as increasing the rates of hypertensive events like heart disease, strokes, pre-eclampsia, and other cardiovascular events (WHO, 2010). Low-level lead exposure has been linked to greater mortality from cardiovascular disease and ischemic heart disease (Lanphear et al., 2018).

Risk Factors

No child is immune to lead poisoning; however, individual factors put certain groups at increased risk for lead exposure. Disparities by race, ethnicity, and socioeconomic status persist despite the overall decline in BLLs (Sampson & Winter, 2016). In particular, young children living in poverty, in old or deteriorated housing, who are of a minority racial or ethnic group or refugee status are at the highest risk (CDC, 2013b).

Age

Children are particularly vulnerable to lead exposure due to their physiology and behaviors. Children can absorb 4 to 5 times more lead than adults, yet their livers are less efficient at eliminating it from the body (Tarragó & Brown, 2017; WHO, 2019). Once in the bloodstream, lead can cross a child's blood-brain barrier and disrupt their neurological development (Lanphear et al., 2002; Sanders et al., 2009). Children under the age of three are especially at risk due to their frequent hand-to-mouth activity and proximity to the ground. Among children with lead exposure, BLLs are known to peak around age two (Lanphear et al., 2019).

In Nevada, nearly half of the children under 6 years old are under 3 years of age; see **Table 3**.

Table 3. Population of children under 6 in Nevada by age and jurisdiction

	Clark	Washoe	Carson City	Rural
<3 years	48.04%	47.64%	52.24%	43.85%
3 and 4 years	34.61%	34.07%	28.52%	36.8%
5 years	17.36%	18.3%	19.24%	19.35%

Source: USCB, 2022, American Community Survey (ACS) Table B09001. Retrieved from <https://data.census.gov/>

Race and Ethnicity

Among children ages one through five, non-Hispanic Black children are more likely to have higher BLLs (Teye et al., 2021). African American households have significantly more LBP hazards than White households (Department of Housing and Urban Development [HUD], 2011). For non-Latino Black people, BLLs are inexorably linked to the legacy of racial segregation and discriminatory lending practices (i.e., redlining) that contributed to the devaluation of Black-owned properties and subsequent financial strain (Sampson & Winter, 2016).

Latino/Hispanic children also experience elevated BLLs due to a complex combination of environmental, cultural, and social factors (Brown & Longoria, 2010). In addition to being more likely to live in severely substandard housing compared to White children, Latino/Hispanic children may be exposed to lead through their parents' occupations, traditional pottery, folk remedies, and imported food products such as candy (Blackowicz et al., 2016).

Nevada has a growing diverse population, with some counties are approaching majority-minority status, see **Table 4**. In particular, Nevada houses a large, growing Latino population,

with approximately 897,000 Latinos comprising 29% of the state’s population (USCB, 2021). Nevada also has a steadily growing Black population, with an estimated 273,070 Black or African American residents that comprise about 8.9% of the state’s population (USCB, 2021).

Table 4. Population by race/ethnicity by jurisdiction

	Clark	Washoe	Carson City	Rural
Hispanic or Latino (of any race)	32.02%	25.47%	25.02%	13.46%
White	39.74%	60.47%	64.27%	77.23%
Black/African American	11.55%	2.33%	2.12%	1.65%
American Indian and Alaska Native	0.39%	0.96%	1.56%	2.24%
Asian	9.93%	5.23%	2.61%	0.57%
Native Hawaiian and Pacific Islander	0.72%	0.66%	0.02%	0.02%
Other	0.50%	0.40%	0.20%	0.34%
Two or more races	4.80%	4.00%	3.80%	4.05%

Source: USCB, 2022, ACS Table B03002. Retrieved from <https://data.census.gov/>

Poverty

Childhood lead exposure is also associated with socioeconomic status: BLLs are higher in low-income populations (Marshall et al., 2020). Historically, children from low-income families that served by public assistance programs, such as Medicaid and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), have been considered to be at greater risk for lead exposure compared to those not enrolled in these programs (Aoki & Brody, 2018; Wengrovitz & Brown, 2009). These families are more likely to live in older, poorly maintained housing that may contain lead hazards (Aoki & Brody, 2018; Marshall et al., 2020).

An estimated 9.10% of families in Nevada live below the poverty level (**Table 5**; USCB, 2021).

Table 5. Families living in poverty by jurisdiction

	Clark	Washoe	Carson City	Rural
Family income below 50% of poverty level	4.31%	2.36%	1.98%	3.71%
Family income below 125% of poverty level	13.62%	9.54%	11.92%	10.43%
Family income below 150% of poverty level	17.99%	12.29%	15.23%	12.26%
Family income below 200% of poverty level	26.42%	18.79%	22.44%	19.00%

Source: USCB, 2022, ACS Table B17026. Retrieved from <https://data.census.gov/>

Age of Housing

Homes constructed before the 1978 ban on LBP are more likely to contain lead. The older the home, the higher the likelihood of lead presence: approximately 87% of homes built before

1940, 69% of homes built between 1940 and 1959, and 24% of homes built between 1960 and 1977 contain LBP (EPA, 2023b).

Despite the majority of homes in Nevada being built after 1980 (**Table 6**), there remains a large number of older homes across the state that could expose children to deteriorating LBP. Approximately 25% of Nevada homes were built prior to the LBP ban, and it is estimated that about 49,100 of them could pose lead risks (Marquez et al., 2020).

Table 6. Age of housing by jurisdiction

	Clark	Washoe	Carson City	Rural
Built since 1980	81.70%	63.85%	50.30%	58.31%
Built 1970 – 1979	10.36%	18.68%	31.94%	14.62%
Built 1960 – 1969	4.80%	8.40%	10.45%	7.98%
Built 1950 – 1959	2.09%	4.59%	4.66%	4.44%
Built 1940 – 1949	0.66%	2.31%	0.84%	2.66%
Built before 1940	0.39%	2.15%	1.82%	11.99%

Source: USCB, 2022, ACS Table B25034. Retrieved from <https://data.census.gov/>

Refugee and Immigrant Populations

Refugee and foreign-born children are disproportionately impacted by lead poisoning compared to U.S.-born children. When tested for lead poisoning, foreign-born children are five times more likely to have an elevated BLL than children born in the U.S. (Tehrani et al., 2008). Newly arrived refugee children aged 1-5 years are 10 times more likely to have elevated BLLs than those in the general U.S. population (AAP, 2019). Some refugee subgroups have seen elevated rates up to fourteen times that of the general U.S. population (Tanaka et al., 2018).

Potential risks for refugee children include pre-settlement exposure to leaded gasoline, paint, batteries, industrial emissions, food, ceramics, and traditional medicines and cosmetics (Shakya & Bhatta, 2019). Additionally many children who were exposed to lead in their native countries may continue to be at risk in the U.S. due to living in older urban housing, use of imported goods, malnourishment, and environmental inequalities stemming from a lack of funding, legislation, and advocacy (Lupone et al., 2020; Mahaffey, 1995).

Nevada has a growing foreign-born (**Table 7**) and refugee population (**Table 8**). Nearly one-fifth of the state’s residents were born in a foreign country. Most of Nevada’s foreign-born population originates from Mexico, the Philippines, El Salvador, Cuba, and China (American Immigration Council, 2023). Between 2011 and 2017, Nevada received over 12,800 refugees of all ages. Most of the refugees currently present in Nevada are from Venezuela, Guatemala, Afghanistan, Democratic Republic of Congo, and Nicaragua (American Immigration Council, 2023).

Table 7. Foreign-born and non-U.S. citizen population by jurisdiction

	Clark	Washoe	Carson City	Rural
Foreign-born population Total % of Population	21.89%	14.79%	11.70%	6.26%
Not U.S. Citizens Total % of Foreign-Born Population	54.21%	55.66%	59.33%	54.38%

Source: USCB, 2022, ACS Table B05002. Retrieved from <https://data.census.gov/>

Table 8. Number of refugees resettled by year in the state

	Nevada
October 2020 to September 2021	852
October 2021 to September 2022	3,101
October 2022 to September 2023	5,158
October 2023 to September 2024	5,587

Source: Southern Nevada Catholic Charities

Children with Developmental Disabilities

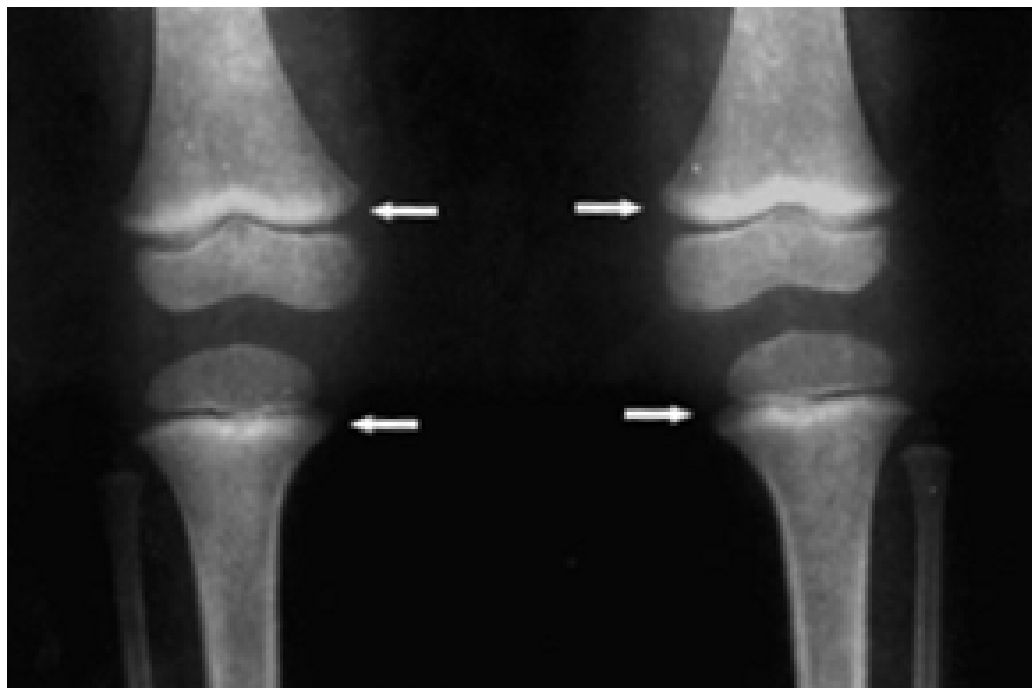
Past research has demonstrated that there is an association between elevated BLLs and developmental disabilities (Delgado et al., 2018); however, it is unclear which occurs first. These studies have highlighted several key behaviors that increase risk for lead exposure, such as spending time on the floor, increased hand-to-mouth behaviors, and pica. Pica occurs at a higher rate in persons with developmental and/or intellectual disabilities, including those with autism spectrum disorder, increasing their risk of ingesting lead-contaminated non-food items such as soil and paint chips (CDC, 2019; Hauptman et al., 2019; Matson et al., 2011)

In Nevada, it is estimated that as many as 8,500 school-age children have been diagnosed with autism spectrum disorder, with most living in the Las Vegas Valley area (Real Autism Difference, n.d).

Pregnant and Lactating Persons

If a pregnant person has been exposed to lead in the past, lead may have been stored in their bones (**Figure 3**), which can be released into the bloodstream during pregnancy (Meyer et al., 2008). This mechanism can cause increased BLLs, negatively affecting the pregnant person and their developing baby. The effects of lead on pregnant persons include an increased risk of miscarriage, gestational hypertension, and preeclampsia (Hertz-Picciotto, 2000; Poropat, Laidlaw, Lanphear, Ball, & Mielke, 2018). Moreover, lead can cross the placenta, which can subsequently impact the fetus—including increased risk for pre-term birth, low birth weight, congenital disorders, and damage to the brain, kidneys, and nervous system (Bellinger, 2005; Hu et al., 2006; Mason et al., 2014; A. P. Sanders et al., 2018).

Figure 3. X-ray showing lead stored in bones



Note: Arrows indicate sections with visible lead storage.

Lead Exposure

Pathways of Exposure and Absorption

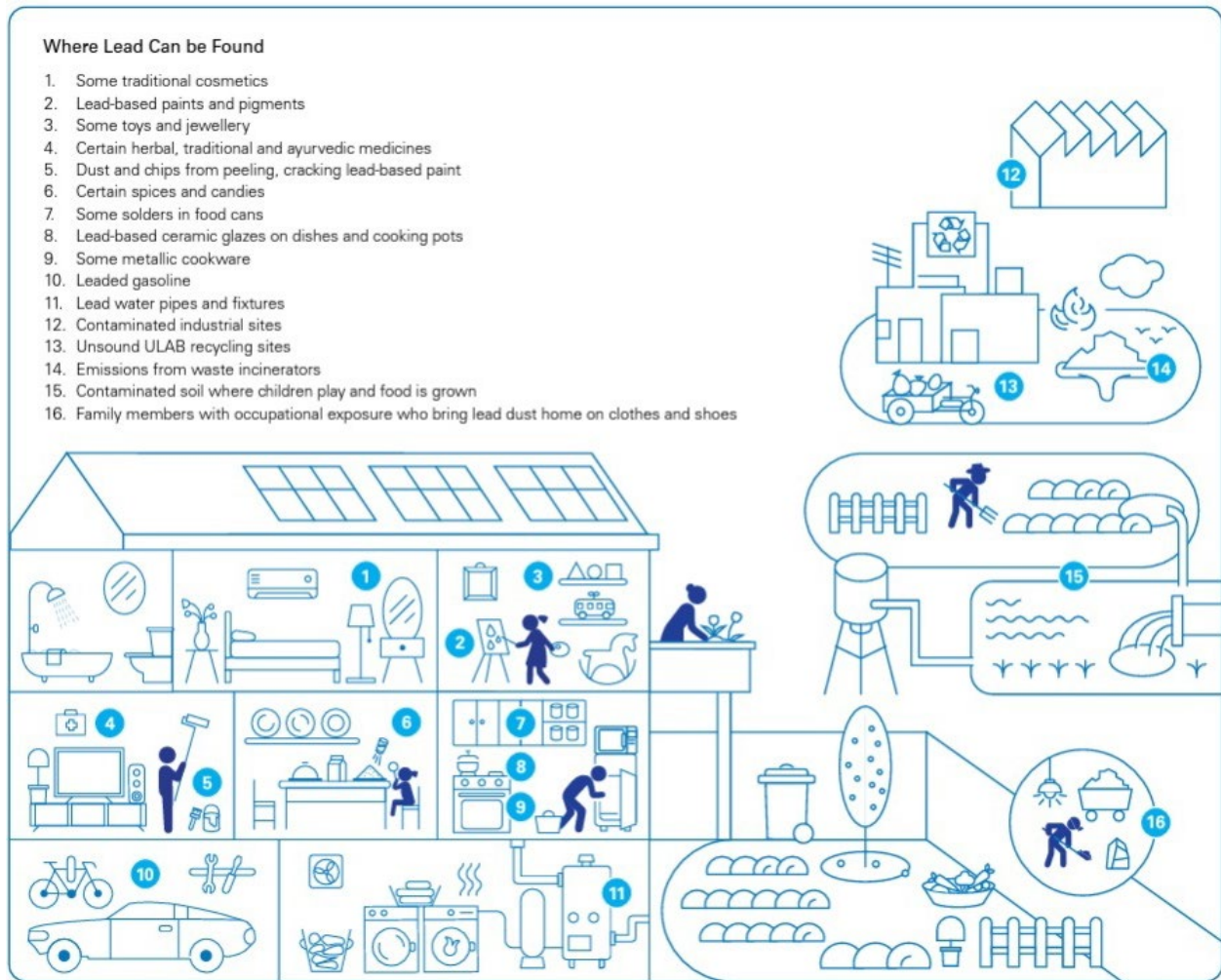
Lead absorption primarily occurs via inhalation and ingestion. However, it can also occur via dermal absorption and endogenous routes such as trans-placental exposure (Agency for Toxic Substances and Disease Registry, 2023). Once lead enters the body, the absorption rate is affected by various factors, including age, nutritional status, health, and particulate size of the lead. Children are more susceptible to the effects of lead than adults, and it is estimated that their bodies can absorb 50% of ingested lead on a full stomach and up to 100% on an empty stomach. Proper nutrition with meals high in iron and calcium and low in fats may slow the rate of lead absorption (Oregon Health Authority, 2018; Tennessee Department of Health, n.d.). Lastly, smaller lead particulate sizes are more readily absorbed by the body.

Blood plays a crucial role in the transport of absorbed lead, carrying it to the bones and soft tissues. Most of the lead in the body tends to accumulate in bone regions undergoing calcification. The body can accumulate lead over time and usually releases it very slowly. During certain events—such as pregnancy, lactation, bone fractures, and illness—the stored lead may leave the bones and reenter the bloodstream, which can cause high BLLs long after exposure has ended (Agency for Toxic Substances and Disease Registry, 2023).

Sources of Lead Exposure

Federal, state, and local regulations have significantly reduced childhood lead poisoning by regulating the use of lead in specific products (**Appendix A** and **Appendix B**). Nevertheless, the potential for childhood lead exposure remains. Children are still exposed through a variety of sources (**Figure 4**).

Figure 4. Sources of lead exposure



Note: The above infographic is an illustrative example only of likely sources of lead exposure. It is not meant to be fully comprehensive of all possible exposure pathways.

Source:(Pure Earth, 2020)

The most common source of lead exposure for U.S. children is LBP, which, in addition to chipping, can contaminate household dust and soil as it deteriorates. Although less common, non-paint sources can also expose children to lead. For example, certain items such as jewelry, ceramics, and traditional medicines have been associated with cases of lead poisoning.

Home-Based Exposures

Lead-based paint

Lead was commonly added to paint to increase its durability, but was banned for residential use in 1978. However, LBP remains present in older homes built before the ban: HUD estimates that as of 2021, 34.6 million U.S. homes contain LBP. LBP hazards in older homes result from the peeling, disintegrating, and chipping of old paint, which makes it easier to ingest or inhale (**Figure 5**). Additionally, home renovations and lead abatement projects can increase the risk of lead exposure due to disruption of the paint and improper clean-up (Spanier et al., 2013).

Figure 5. Peeling lead paint



Dust

The HUD estimates that 21.9 million homes in the U.S. have lead dust hazards. Most lead dust in homes comes from LBP (New York State, 2010). Other sources of lead dust can come from tracking lead dust from outside the home, such as lead-contaminated soil and take-home lead from hobbies or industrial sources (Oregon Health Authority, 2018).

Soil

Lead-contaminated soil persists as a source of lead exposure with estimates of 2.4 million U.S. homes having lead-related soil hazards (HUD, 2022). Soil can contain lead from deteriorated paint, deposits from leaded gasoline, and industrial emissions (New York State, 2010; Oregon Health Authority, 2018). Homes near busy roads or industrial factories are more likely to have lead-contaminated soil. Children may ingest or inhale contaminated soil while playing outdoors or consume produce grown in lead-tainted soil (United States Environmental Protection Agency [EPA], 2020).

Exposure from Jobs and Hobbies

Lead exposure from jobs and hobbies is often an overlooked pathway through which workers or hobbyists may unintentionally bring lead into their homes via clothing, shoes, skin, or hair, potentially exposing household members. Common jobs with a risk of lead exposure include demolition, construction, soldering, plumbing, mining, radiator repair, and shooting range work (Occupational Safety and Health Administration [OSHA], 2014). In addition, several adult hobbies involve materials that may contain or be contaminated with lead. These include home remodeling, painting, hunting, fishing, casting, soldering, gardening, and ceramic glazing (Oregon Health Authority, 2018).

Consumer Product Exposures

Exposure to lead-contaminated consumer products presents additional risks. These products include, but are certainly not limited to, toys, food products, glazed pottery, cosmetics, folk remedies, and recalled items identified by regulatory agencies such as the **Food and Drug**

Administration (FDA) or the **Consumer Product Safety Commission (CPSC)**. Lead may be found in products for both unintentional and intentional reasons. Unintentional contamination may occur through environmental sources like lead-contaminated soil, or during manufacturing and packaging processes (Angelon-Gaetz et al., 2018; Diaz-Ruiz et al., 2017; FDA, 2016; Lynch et al., 2000; Meyer et al., 2008). In other instances, lead is intentionally added to improve product appearance, increase weight, or due to perceived health benefits in traditional practices (Cowell et al., 2017; Tiffany-Castiglioni et al., 2012).

Toys and Toy Jewelry

Figure 6. Recent CPSC toy recalls



Source: CPSC

Lead can be found in the paint, metal, and plastic parts of toys and toy jewelry, particularly those made cheaply or in other countries, as well as in antique toys and collectibles (CDC, 2019a). Notably, toys made with PVC plastic and/or yellow colorant are more likely to contain excessive concentrations of lead (Greenway & Gerstenberger, 2010). Young children are at risk for ingesting lead from toys due to normal hand-to-mouth activity (Schnur & John, 2014). Additionally, toys with lead paint can taste sweet, which might further encourage children to mouth them (WHO, 2019).

Toys containing lead that exceeds the 2008 CPSC Lead Limit of **90 parts per million (ppm)** are not uncommon

(**Figure 6**). In 2010, an analysis of toys from day care centers in Las Vegas revealed that about 5% of the sampled toys contained lead in excess of the old standard of 600 ppm (Greenway & Gerstenberger, 2010). The number of toys with excessive lead content would have been higher had the analysis compared toys against the current CPSC standard of 90 ppm.

Baby Foods and Formula

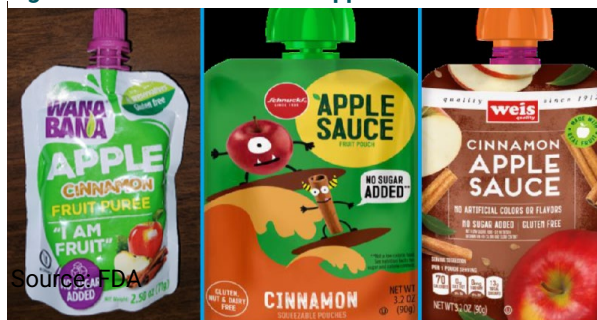
Baby foods containing grain and root vegetable ingredients such as rice, quinoa, and sweet potatoes have been found to contain traces of lead (Gardener et al., 2019; Parker et al., 2022). Food pouches and jarred baby foods are more likely to exceed lead limits and some formulas have been found to have quantifiable amounts of lead (Gardener et al., 2019).

In efforts to reduce the amount of lead in baby foods, in January of 2025 the FDA issued final guidance for lead levels in baby foods as part of their *Closer to Zero* action plan (FDA, 2025):

- 10 **parts per billion (ppb)** for fruits, vegetables, mixtures, yogurts, custards/puddings, and single ingredient meats
- 20 ppb for root vegetables
- 20 ppb for dry cereals

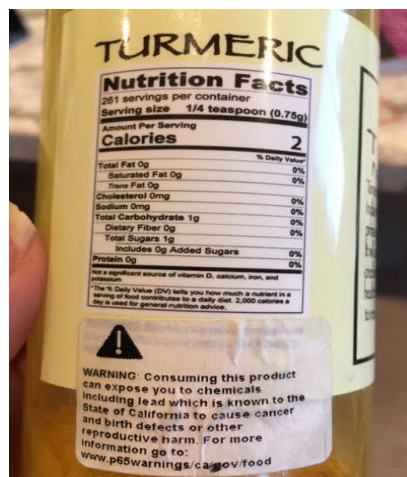
Despite these regulatory advances, lead is still sometimes found in excessive levels in some children's foods. In recent times, a nationwide investigation revealed over 560 cases of childhood lead poisoning due to cinnamon applesauce (Figure 7) that contained 200-300 times the recommended action level (Troeschel et al., 2025).

Figure 7. Recalled cinnamon apple sauces



Imported Spices and Food Products

Figure 8. Turmeric with lead warning



The average lead content in imported spices is often higher than those purchased in the U.S. (Hore et al., 2019). Turmeric is a popular spice that may be contaminated with lead. Figure 8 shows a label on the bottle of ground turmeric that warns of potential lead exposure. However, most imported foods and spices often do not disclose the risk of lead exposure on the label, making it hard for consumers to be aware of the lead in their products.

Lead has also been found in tamarind candies, candy wrappers, chili powders, and chapulines (dried grasshoppers) imported from Mexico (CDC, 2002; Oregon Health Authority, 2018). Other countries found to commonly sell food products that exceed the allowable lead limit include Bangladesh, Morocco, Nepal, and Pakistan (Hore et al., 2019).

Case notes: Lead poisoning in Las Vegas due to contaminated turmeric

In March of 2019, a blood lead test revealed that a Las Vegas child had a **BLL of 48 µg/dL** due to the consumption of lead tainted turmeric.

The turmeric was brought from Afghanistan by the child's parents and was being given to the child for its medicinal properties. Further investigation revealed that multiple of the child's family members also had lead poisoning.

The environmental investigator who tested the turmeric by **X-ray fluorescence (XRF)** found that it contained 15,000 ppm of lead

Dishware and Cookware

Ceramic dishware and cookware may contain lead in the glaze, paint, or clay. Lead in ceramic dishware poses a hazard because of lead leaching. Lead leaching into foods and beverages is most likely to occur with highly acidic products, long-term storage, and cracked, chipped, or

deteriorating dishware. Additionally, putting dishware in the microwave or dishwasher speeds up deterioration, which can lead to greater lead leaching (CDC, 2004b).

The FDA regulates the amount of lead in dishware and cookware (See **Appendix B**). Although products that exceed FDA regulations cannot be legally sold in the U.S., imported, old, handmade, poorly made, or improperly labeled dishware may contain high levels of lead and continue to be sold and used in the U.S. For example, **Figure 9** shows a traditional bean pot with over 9,000 ppm of lead on the outside and 520,000 ppm on the glazed inside.

Figure 9. Bean pot with lead



Figure 10. Bowl labeled as "lead free" despite containing lead



Additionally, dishware labeled as "lead free" may not truly be lead free. **Figure 10** shows a bowl labeled as "lead free". Through XRF testing, this bowl was revealed to contain 695 ppm of lead. Per the FDA, as long as the dishware does not leach excessive lead, the use of "lead free" labeling is permissible.

Traditional Medicines and Cosmetics

Lead has been found in some traditional cosmetics and medicines used by Middle Eastern, Asian, and Latin cultures. Kajal, kohl, surma, and tiro are commonly used in Asian and Arab cultures, and may contain more than 50% lead (CDC, 2012, 2013; Parry & Eaton, 1991). Some ayurvedic medicines from India and other South Asian countries, such as *rasa shastra* medicines, may contain up to 200,000 µg/g of lead (California Department of Public Health, 2019). Litargirio, used among Dominicans and other Latinos as a deodorant and folk remedy, can contain up to 36% lead content (CDC, 2005). Other common Latin American folk remedies, such as greta and azarcon from Mexico may contain up to 97% and 95% lead, respectively (CDC Work Group on Lead and Pregnancy & Pregnancy, 2010). In some cases, greta is mixed with milk, sugar, and cooking oil to be incorporated into a child's milk or in tortilla mix (Gorospe & Gerstenberger, 2008).



Blood Lead Surveillance in Nevada

Surveillance System

The Nevada Department of Health and Human Services and all local health districts receive blood lead testing data from healthcare providers and laboratories via **EpiTrax**, the state electronic disease surveillance system. This surveillance system serves a key method to identify children with BLLs at or above the BLRV.

Blood Lead Reporting

In Nevada, childhood blood lead screening laws are defined by the **Nevada Revised Statutes (NRS) 442.700**. In summary, [NRS 442.700](#) states the following:

1. Each provider of health care or other services who:
 - a. Is qualified to conduct a blood lead test is encouraged to perform, or cause to be performed, a test when a child reaches 12 and 24 months, or at least once before the child reaches 6 years of age
 - b. Provides early and periodic screening, diagnostic and treatment services to children is encouraged to conduct a blood lead test in accordance with the guidelines of the Centers for Medicare and Medicaid Services
2. Any blood lead test performed using a capillary sample that results in a blood lead level greater than the reference value should be confirmed by a follow-up venous blood lead test.
3. All blood lead tests, regardless of results, should be reported to the appropriate health authority. The report must include:
 - a. The name, sex, race, ethnicity and date of birth of the child
 - b. The address of the child, including the county and zip code in which the child resides
 - c. The date on which the sample was collected
 - d. The type of sample that was collected
 - e. The name and contact information of the health care provider who ordered the test

Blood Lead Testing Rates

There are over 215,000 children under the age of 6 in Nevada. Between October 2022 and September 2023, only about 3% (6,184 children) received a blood lead test. Nevada’s testing rate has remained at around 3% for several years (**Table 9**) and currently has one of the lowest blood lead testing rates in the country.

Table 9. Number of kids who received a BLL test in Nevada

Date	Clark County	Washoe County	All Other Counties	Nevada total
2017 – 2018	7926	342	540	8808
2018 – 2019	6797	292	577	7666
2019 – 2020	4699	216	446	5361
2020 – 2021	5748	205	410	6363
2021 – 2022	5955	326	530	6811
2022 – 2023	5418	325	441	6184

Note: Report periods begin on the first of October and end on the last day of September

NvCLPPP Testing Recommendations

Recommendations for Children

Testing Schedule

Due to low testing rates, it is difficult to ascertain the extent of lead poisoning in Nevada. Therefore, the NvCLPPP recommends universal testing as a method to adequately assess the epidemiological data. At a minimum, providers are recommended to:

- Test all Medicaid-eligible children at 12 and 24 months of age, or at least once before the child reaches 6 years of age
- Test all refugee children ages 6 months to 16 years within 90 days of arrival
- Test children who are symptomatic, regardless of the child’s age
- Test children if a potential lead risk exposure is identified, regardless of the child’s age
- Test children with developmental disabilities, regardless of the child’s age¹
- Test children under the age of 6 with at least one answer of “Yes” or “Don’t Know” when screened with the **Childhood Lead Risk Exposure Questionnaire (CLRQ)**

Testing Methods

A blood lead test is the only way to confirm if a child has lead poisoning (NNDS, 2023). Two types of blood lead tests may be used for initial testing: a capillary test or a venous test.

A capillary test uses a finger prick to take a small sample of blood. Capillary samples may be analyzed using a **point-of-care (POC)** lead testing instrument, such as Magellan Diagnostics' LeadCare II. The LeadCare II is the only FDA-approved CLIA-waived POC lead testing instrument in use today (Maryland Department of Health and Mental Hygiene, 2014). Capillary POC is often used for initial testing because it is a quick, easy, and minimally-invasive. As such, parents tend to be more amenable to test their children via the capillary method. However, capillary testing is less accurate than venous testing as capillary samples are more prone to contamination from lead in the environment and due to instrument limits of detection.

A venous blood lead test uses blood drawn from a vein in the child's arm. Blood collected from the vein is less likely to be contaminated with lead during the collection process and venous samples are more reliable at identifying lower blood lead levels than capillary samples when analyzed using higher complexity methods; results are therefore more accurate. However, venous testing requires a trained phlebotomist to take the sample and laboratory analysis can take a few days to produce results.

Childhood Lead Risk Questionnaire

The CLRQ is a screening tool used to assess the risk of potential exposure during well-child visits. The AAP Bright Future's Periodicity Schedule recommends that providers should screen children at: 6 months, 9 months, 12 months, 18 months, 24 months, and at 3, 4, 5 and 6 years of age. If the answer to any question on the screening tool is "Yes" or "Don't know," a blood lead test should be performed.

The following CLRQ was adapted from the Illinois Department of Public Health to fit local needs based on local data and input from professionals and parents (Illinois Department of Public Health, 2015; NvCLPPP, 2025).



Child's Name:	Child's DOB: ___/___/___
	Today's Date: ___/___/___

Nevada Childhood Lead Exposure Risk Questionnaire

Lead exposure can harm children's health and development even without visible symptoms. This questionnaire checks if your child may need a blood lead test. If you answer 'Yes' or 'Don't Know' to any question, the healthcare provider should recommend testing for lead.

		Yes	No	Don't Know																																																								
1	Is your child planning to enroll or currently enrolled in Medicaid, Head Start, Early Intervention or the Women Infant Child Program (WIC)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
2	Is your child a refugee, migrant, immigrant, adopted from another country, or in foster care? <i>(Children born abroad should be tested when they arrive in the United States and again 3 to 6 months after they have settled in permanent housing.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
3	Has your child ever lived near a place where lead is used or was used in the past? <i>(Examples include mines, lead smelters, paint factories, battery recycling plants, or small airports.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
4	Does your child eat ice chips or put nonfood items (such as painted toys, metal jewelry, paint chips, or dirt) in their mouth often?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
In the last 12 months:																																																												
5	Has your child spent time outside the United States?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
6	Did your family use products from other countries (such as ceramic or metal cookware/dishware, health remedies including ointments or creams, supplements, cosmetics, religious powders, spices, candies, or foods)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
7	Did your child spend time with someone whose job or hobby could involve lead exposure? <i>(Examples include bridge repainting or repair; construction or demolition; automotive or electronics repair; plumbing; building renovation or repair; furniture refinishing; soldering; welding; hunting; fishing; mining; or working with firearms, jewelry, pottery, stained glass, metals, or color pigments.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
8	Has your child or any of their siblings, playmates, or other household members had a high blood lead test?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
9	Has your child spent time in an older home or daycare [built before 1978] with peeling or damaged paint and/or around a building undergoing renovation? <i>(Lead-based paint for residential use was banned in the United States in 1978.)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																								
10	Did your child live in any of the zip codes listed below? If yes, please circle the zip code. <i>(The following zip codes are considered to have a higher risk of lead exposure.)</i>																																																											
	<table style="width: 100%; border: none;"> <tr> <td style="padding: 2px 10px;">89014</td> <td style="padding: 2px 10px;">89086</td> <td style="padding: 2px 10px;">89110</td> <td style="padding: 2px 10px;">89130</td> <td style="padding: 2px 10px;">89156</td> <td style="padding: 2px 10px;">89431</td> <td style="padding: 2px 10px;">89701</td> </tr> <tr> <td style="padding: 2px 10px;">89020</td> <td style="padding: 2px 10px;">89101</td> <td style="padding: 2px 10px;">89113</td> <td style="padding: 2px 10px;">89139</td> <td style="padding: 2px 10px;">89166</td> <td style="padding: 2px 10px;">89433</td> <td style="padding: 2px 10px;">89705</td> </tr> <tr> <td style="padding: 2px 10px;">89030</td> <td style="padding: 2px 10px;">89102</td> <td style="padding: 2px 10px;">89115</td> <td style="padding: 2px 10px;">89141</td> <td style="padding: 2px 10px;">89178</td> <td style="padding: 2px 10px;">89447</td> <td style="padding: 2px 10px;">89706</td> </tr> <tr> <td style="padding: 2px 10px;">89031</td> <td style="padding: 2px 10px;">89103</td> <td style="padding: 2px 10px;">89119</td> <td style="padding: 2px 10px;">89142</td> <td style="padding: 2px 10px;">89179</td> <td style="padding: 2px 10px;">89502</td> <td style="padding: 2px 10px;">89883</td> </tr> <tr> <td style="padding: 2px 10px;">89032</td> <td style="padding: 2px 10px;">89104</td> <td style="padding: 2px 10px;">89120</td> <td style="padding: 2px 10px;">89143</td> <td style="padding: 2px 10px;">89183</td> <td style="padding: 2px 10px;">89506</td> <td></td> </tr> <tr> <td style="padding: 2px 10px;">89054</td> <td style="padding: 2px 10px;">89106</td> <td style="padding: 2px 10px;">89122</td> <td style="padding: 2px 10px;">89146</td> <td style="padding: 2px 10px;">89314</td> <td style="padding: 2px 10px;">89508</td> <td></td> </tr> <tr> <td style="padding: 2px 10px;">89081</td> <td style="padding: 2px 10px;">89107</td> <td style="padding: 2px 10px;">89128</td> <td style="padding: 2px 10px;">89147</td> <td style="padding: 2px 10px;">89408</td> <td style="padding: 2px 10px;">89512</td> <td></td> </tr> <tr> <td style="padding: 2px 10px;">89084</td> <td style="padding: 2px 10px;">89108</td> <td style="padding: 2px 10px;">89129</td> <td style="padding: 2px 10px;">89148</td> <td style="padding: 2px 10px;">89427</td> <td style="padding: 2px 10px;">89523</td> <td></td> </tr> </table>	89014	89086	89110	89130	89156	89431	89701	89020	89101	89113	89139	89166	89433	89705	89030	89102	89115	89141	89178	89447	89706	89031	89103	89119	89142	89179	89502	89883	89032	89104	89120	89143	89183	89506		89054	89106	89122	89146	89314	89508		89081	89107	89128	89147	89408	89512		89084	89108	89129	89148	89427	89523		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
89014	89086	89110	89130	89156	89431	89701																																																						
89020	89101	89113	89139	89166	89433	89705																																																						
89030	89102	89115	89141	89178	89447	89706																																																						
89031	89103	89119	89142	89179	89502	89883																																																						
89032	89104	89120	89143	89183	89506																																																							
89054	89106	89122	89146	89314	89508																																																							
89081	89107	89128	89147	89408	89512																																																							
89084	89108	89129	89148	89427	89523																																																							

Thank you for taking the time to complete this questionnaire.
 nvclppp.org | (702)895-5067



Please note: This questionnaire has not been validated and is subject to change. The questionnaire may not represent the entirety of lead exposure risk. A risk evaluation should **never** be used in place of a required blood lead test.

Recommendations for Pregnant and Lactating Persons

The prevalence of lead poisoning in women of child-bearing age is less than 1% (CDC Work Group on Lead and Pregnancy & Pregnancy, 2010). Given the overall low prevalence of lead exposure in this population, the CDC does not recommend universal blood lead testing for pregnant persons in the U.S. However, routine blood lead testing may be warranted in specific U.S. subpopulations at increased risk for lead exposure due to local environmental sources of lead and/or the demographics of the population (CDC Work Group on Lead and Pregnancy & Pregnancy, 2010)

Risk Factors

In the absence of local data on the distribution of blood lead levels in pregnant persons, the CDC has provided a table of risk factors that can be used to help determine if individuals are at risk of lead exposure ([Table 10](#)).



Table 10. Risk factors for lead exposure in pregnant and lactating persons

Risk Factors	Examples
Recent immigration or residency	Immigration from or residency in areas with high lead contamination.* <ul style="list-style-type: none"> • South Asia • Sub-Saharan Africa • East Asia and Pacific • Middle East and North Africa • Latin America and Caribbean
Living near a source of lead exposure	<ul style="list-style-type: none"> • Lead mines • Lead smelters • Industrial or manufacturing facilities • Auto repair shops • Major highways • Airports with propeller-driven airplanes (leaded aviation gasoline)
Renovating/remodeling homes built before 1978	Activities that disturb lead paint or create lead dust <ul style="list-style-type: none"> • Do It Yourself home projects
Hobbies/occupations with lead exposure	<ul style="list-style-type: none"> • Making ceramics with leaded glazes and paints • Jewelry making and electronics (with lead solder) • Making stained glass and glass blowing • Print-making • Refinishing old furniture • Hunting and target shooting • Casting ammunition, fishing weights, or lead figurines • Enameling copper • Casting bronze • Welding • Glass manufacturing • Recycling of metals, electronics, and batteries • Distilling liquor
Use of imported traditional medicines, spices, or ceramics	In Indian, Middle Eastern, West Asian, and Latin American cultures <ul style="list-style-type: none"> • Azarcon • Greta • Kohl/surma • Bhasma • Rasa Shastra • Turmeric • Georgian saffron • Lead glazed ceramics used for cooking, serving or storing food
Pica	Eating or mouthing non-food items that may be contaminated with lead: <ul style="list-style-type: none"> • Dirt • Clay • Crushed pottery • Paint chips
History of previous lead exposure or living with someone with current lead exposure	<ul style="list-style-type: none"> • Previous lead exposure of any level • Especially for individuals deficient in calcium and iron • Living with someone with an elevated blood lead level or who works in lead-industries (take-home lead)

*(Rees & Fuller, 2020)

Adapted from Centers for Disease Control and Prevention (2010) Table 4-1. Risk Factors for Lead Exposure in Pregnant and Lactating Women

Lead Exposure Questionnaire for Pregnant and Lactating Persons

Obstetric health care providers should consider the possibility of lead exposure in pregnant women by evaluating risk factors for exposure as part of a comprehensive health risk assessment (American College of Obstetricians and Gynecologists, 2012). The NvCLPPP has constructed a lead exposure risk questionnaire for pregnant and lactating persons based on risk factors identified by the CDC. The following questionnaire should be administered at the earliest contact with the pregnant patient.

If the answer to any question is “Yes” or “Don’t know,” a blood lead test should be performed. Venous blood sample is recommended for maternal blood lead testing.



NvCLPPP Lead Exposure Questionnaire for Pregnant and Lactating Persons

-
- 1 Were you born outside of the United States, or recently spent time outside of the United States? Check all that apply.
- | | |
|--|---|
| <input type="checkbox"/> South Asia | <input type="checkbox"/> Middle East and North Africa |
| <input type="checkbox"/> Sub-Saharan Africa | <input type="checkbox"/> Latin America and Caribbean |
| <input type="checkbox"/> East Asia and Pacific | |
-
- 2 Do you live near any of the following, which could indicate exposure to lead? Check all that apply, even if the establishment is closed.
- | | |
|---|---|
| <input type="checkbox"/> Lead mines | <input type="checkbox"/> Major highways |
| <input type="checkbox"/> Lead smelters | <input type="checkbox"/> Airports with propeller-driven airplanes (aviation gasoline) |
| <input type="checkbox"/> Industrial or manufacturing facilities | |
| <input type="checkbox"/> Auto repair shops | |
-
- 3 Do you have a hobby or job that can expose you to lead? Check all that apply.
- | | |
|---|--|
| <input type="checkbox"/> Making ceramics with leaded glazes and paints | <input type="checkbox"/> Enameling copper |
| <input type="checkbox"/> Jewelry making and electronics (lead solder) | <input type="checkbox"/> Casting bronze |
| <input type="checkbox"/> Making stained glass and glass blowing | <input type="checkbox"/> Welding |
| <input type="checkbox"/> Print-making | <input type="checkbox"/> Glass manufacturing |
| <input type="checkbox"/> Refinishing old furniture | <input type="checkbox"/> Recycling of metals, electronics, and batteries |
| <input type="checkbox"/> Hunting and target shooting | <input type="checkbox"/> Distilling liquor |
| <input type="checkbox"/> Casting ammunition, fishing weights, or lead figurines | <input type="checkbox"/> Renovation/remodeling activity/Do it yourself home projects |
-
- 4 Do you use traditional medicines, spices, or ceramics known to contain lead? Check all that apply.
- | | |
|---------------------------------------|--|
| <input type="checkbox"/> Azarcon | <input type="checkbox"/> Turmeric |
| <input type="checkbox"/> Greta | <input type="checkbox"/> Georgian saffron |
| <input type="checkbox"/> Kohl/surma | <input type="checkbox"/> Lead glazed ceramics used for cooking, serving, or storing food |
| <input type="checkbox"/> Bhasma | |
| <input type="checkbox"/> Rasa Shastra | |
-
- 5 Do you ever get the urge to eat or mouth non-food items—even accidentally? Check all that apply.
- | | |
|------------------------------------|--|
| <input type="checkbox"/> Dirt/soil | <input type="checkbox"/> Crushed pottery |
| <input type="checkbox"/> Clay | <input type="checkbox"/> Paint chips |
-
- 6 Do you live in or regularly visit a home built before 1978 with recent or ongoing renovation/remodeling activity?
- Yes No Don't know
-
- 7 Have you experienced any of these other risk factors for lead exposure? Check all that apply.
- | | |
|--|--|
| <input type="checkbox"/> Previous lead exposure of any level | <input type="checkbox"/> Living with someone with an elevated blood lead level |
| <input type="checkbox"/> Deficient in calcium and/or iron | |
-

If you answered “**yes**” or “**don't know**” to any of these questions, ask your doctor for blood lead test to determine if you have been exposed to lead.

Thank you for taking the time to complete this questionnaire.
nvclppp.org | (702)895-5067



Adapted from the 2010 Centers for Disease Control and Prevention “Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women”.

Blood lead testing early in the course of a pregnancy has the benefit of early identification of chronic, ongoing, or historical cumulative exposures (Hu et al., 1996; Hu & Hernandez-Avila, 2002). Recommendations for early blood lead testing in pregnancy do not mean there are no risks later in pregnancy, however. In some cases, behaviors such as pregnancy-related pica may occur after the initial blood lead test in the first trimester (CDC Work Group on Lead and Pregnancy & Pregnancy, 2010). Therefore, testing at multiple times during the course of a pregnancy may be warranted as well as during lactation (**Table 11**).

Table 11. Recommended follow-up actions and frequency of lead up testing during pregnancy by initial venous result

Venous* BLL (ug/dL)	Perform follow-up test(s)**
<5	None (no follow-up testing is indicated).
5-14	Within 1 month. Obtain a maternal BLL*** or cord BLL at delivery.
15-24	Within 1 month and then every 2-3 months. Obtain a maternal BLL or cord BLL at delivery. More-frequent testing may be indicated based on risk factor history.
25-44	Within 1-4 weeks and then every month. Obtain a maternal BLL or cord BLL at delivery.
≥45	Within 24 hours and then at frequent intervals depending on clinical interventions and trend in BLLs. Consultation with a clinician experienced in the management of pregnant women with BLLs in this range is strongly advised. Obtain a maternal BLL or cord BLL at delivery.

*Venous blood samples are recommended for maternal blood lead testing.

**The higher the BLL on the screening test, the more urgent the need for confirmatory testing.

***If possible, obtain a maternal BLL prior to delivery since BLLs tend to rise over the course of pregnancy
Adapted from Centers for Disease Control and Prevention (2010) Table 5-3. Frequency of Maternal Blood Lead Follow-up Testing During Pregnancy

Follow-up Testing and Case Management

Responding to Lead-Exposed Children

BLLs responses are conducted by corresponding health authorities including the SNHD, Northern Nevada Public Health, Carson City Health and Human Services, Central Nevada Health District, and the Nevada Department of Health and Human Services. Responses within each jurisdiction vary widely based on capacity

The NvCLPPP recommends healthcare providers and health districts follow CDC guidelines for follow-up testing and response actions.

The CDC guidelines can be found online at <https://www.cdc.gov/lead-prevention/hcp/clinical-guidance/index.html> and are summarized in **Table 12**.

Table 12. Follow-up schedule and case management by blood lead results for children

Initial BLL (µg/dL)	Venous Confirmation By*	Recommended actions based on BLL	Venous Retest – after recommended actions
<3.5	None	<ul style="list-style-type: none"> • Education on the sources and prevention of lead exposure** • Check development to make sure age-appropriate milestones are being met and discuss diet and nutrition with a focus on iron and calcium intake. • Conduct follow-up BLL testing at recommended intervals based on child's age. 	Retest according to AAP Bright Futures Periodicity Schedule
3.5-9	3 months	Above actions, plus: <ul style="list-style-type: none"> • Environmental exposure history to identify potential lead sources • Refer to health department for environmental investigation of home • Ensure the child does not have iron deficiency using testing and treatment. • Discuss child's diet and nutrition with focus on calcium and iron and refer to supportive services if needed (WIC) • Developmental monitoring and referral to support services if needed 	3 months for first 2-4 tests 6-9 months after BLLs are declining
10-19	1 month		1-3 months for first 2-4 tests 3-6 months after BLLs are declining
20-44	Within 2 weeks	Above actions, plus: <ul style="list-style-type: none"> • Complete history and physical exam • Environmental investigation of home and refer for lead hazard reduction program • Consider abdominal x-ray (if lead ingestion is suspected) • Contact Pediatric Environmental Health Specialty Unit or Nevada Poison Center for guidance 	2 weeks-1 month for first 2-4 tests 1-3 months after BLLs are declining
≥45	ASAP Within 48 hours	Above actions, plus: <ul style="list-style-type: none"> • Complete history and physical exam with detailed neurological exam • Perform abdominal X-ray and, if needed, bowel decontamination • Consider hospitalization if lead-safe environment cannot be assured, or source of lead has not been identified and further exposure is possible • If patient exhibits signs or symptoms including, confusion, weakness, seizures, coma, nausea, vomiting, and abdominal pain, admit them to a hospital as soon as possible. • Commence gastrointestinal decontamination or chelation therapy with consultation from medical toxicologist or pediatrician experienced in lead poisoning 	ASAP or medically indicated

* If the initial BLL test was performed using a venous sample, then the child patient does not need another venous draw to confirm the BLL. Proceed to CDC's recommended actions for the next steps. If the initial test was performed using a capillary sample, then the provider must perform a confirmatory venous blood lead test

** The NvCLPPP has prepared numerous educational materials to share with families. The resources can be freely accessed online at <https://www.nvclppp.org/resources/educational-materials/>

Responding to Lead-Exposed Pregnant and Lactating Persons

For pregnant persons with BLLs less than 5 $\mu\text{g}/\text{dL}$ at initial testing, no follow-up testing is required. For those with BLLs $\geq 5 \mu\text{g}/\text{dL}$, follow-up blood lead testing and treatment should be performed in accordance with the CDC's recommended schedules (**Table 13**).

Lactating parents with a confirmed BLL of 40 $\mu\text{g}/\text{dL}$ or higher should not initiate breastfeeding until their BLL has decreased to less than 40 $\mu\text{g}/\text{dL}$. Blood lead tests should be repeated every 1–2 weeks after the source of exposure has been identified and removed. After the lactating parent's BLL is below 40 $\mu\text{g}/\text{dL}$, breastfeeding should be initiated and accompanied by monitoring of infant BLLs (American College of Obstetricians and Gynecologists, 2012).



Table 13. Follow-up schedule and case management by blood lead results for pregnant persons

Venous* BLL (µg/dL)	Perform follow-up test(s)**	Recommended actions based on BLL
<5	No following testing indicated	<ul style="list-style-type: none"> • CDC has not identified any allowable lead exposure level safe for mother and fetus • Provide dietary guidance (calcium and iron) and environmental and health education materials
5 -14	1 month	<p><u>Above Actions, plus:</u></p> <ul style="list-style-type: none"> • Attempt to determine source(s) of lead exposure and counsel patients on strategies to reduce exposure, including identification and assessment of pica behavior • Obtain a maternal BLL*** or cord BLL at delivery and perform newborn follow-up testing • Assess nutrition adequacy and counsel on a balanced diet with adequate daily intake of iron and calcium • Maintain a daily intake of 2,000 mg of calcium through diet or in combination with supplementation • Encourage breastfeeding consistent within safety provisos • If exposure is in the workplace, women should be eligible for medical removal from the exposure environment. Review proper use of personal protective equipment and recommend contacting the employer to encourage reducing exposure • For those above 10µg/dL: refer to occupational medicine specialists and remove from workplace lead exposure
15 -24	1 month and then every 2-3 months	<p><u>Above Actions, plus:</u></p> <ul style="list-style-type: none"> • Environmental investigation of the home, lead hazard reduction, and case management by local or state health department
25 -44	1-4 weeks and then every month	<ul style="list-style-type: none"> • Consultation with a physician specialized in the management of blood lead levels
≥45	24 hours and then at frequent intervals depending on clinical interventions and trend in BLLs	<p><u>Above Actions, plus:</u></p> <ul style="list-style-type: none"> • Treat as high-risk pregnancy and consult with an expert in lead poisoning on chelation and other treatment decisions • Hospitalize and commence chelation therapy in conjunction with consultation from a medical toxicologist or a pediatric environmental health specialty unit

*Venous Blood sample is recommended for maternal blood lead testing

**The higher the BLL on the screening test, the more urgent the need for confirmatory testing.

***If possible, obtain a maternal BLL prior to delivery since BLLs tend to rise over the course of pregnancy.

Adapted from (Centers for Disease Control and Prevention, 2010) Table 5-3. Frequency of Maternal Blood Lead Follow-up Testing During Pregnancy

Nevada's Lead Exposure Risk Index

The Nevada **Lead Exposure Risk Index (LERI)** was developed at the ZIP code level using the following methodology. Initially, we identified the key variables to incorporate into the index. To inform this selection process, we referred to the work of Jacob and colleagues (Jacobs et al., 2002) calculating the weighted risk score, who conducted an extensive study estimating the prevalence of significant LBP hazards in housing units across the country. We extracted household data by ZIP code pertaining to six critical characteristics from the ACS, specifically focusing on age of housing, housing unit type, occupant status, household income, race, and ethnicity. These variables were chosen based on their inclusion in Jacob et al.'s study, and we obtained the percentages of housing units with lead hazards from their research (**Table 14**).

Table 14. Percentage of homes with lead hazards by household characteristics

Characteristic	Percent with lead hazards
Age of housing	
After 1980	3%
1960-1979	8%
1940-1959	43%
Before 1940	68%
Housing unit type	
Single family	26%
Multifamily	19%
Occupant status	
Owner occupied	23%
Renter occupied	30%
Household income	
<\$30,000/year	35%
≥\$30,000/year	19%
Race	
White	25%
African American	29%
Other	23%
Ethnicity	
Hispanic/Latino	32%
Non-Hispanic/Latino	24%



We made slight adjustments to the first two ages of housing categories, "after 1980" and "1960-1979", to align them with the available categories in our household data.

The subsequent step involved calculating R_i , the weighted risk score for each household characteristic, using the following formulas:

- Age of housing

$$R_{AH} = \frac{HH_{80+} \times 0.03 + HH_{60-79} \times 0.08 + HH_{40-59} \times 0.43 + HH_{40-} \times 0.68}{Total\ Households}$$

- Housing unit type

$$R_{TP} = \frac{HH_{single} \times 0.26 + HH_{multi} \times 0.19}{Total\ Households}$$

- Occupant status

$$R_{OS} = \frac{HH_{owner} \times 0.23 + HH_{renter} \times 0.30}{Total\ Households}$$

- Household income

$$R_{HI} = \frac{HH_{<30k} \times 0.35 + HH_{\geq 30k} \times 0.19}{Total\ Households}$$

- Race

$$R_{RA} = \frac{HH_{White} \times 0.25 + HH_{AA} \times 0.29 + HH_{Other} \times 0.23}{Total\ Households}$$

- Ethnicity

$$R_{ET} = \frac{HH_{hispanic} \times 0.32 + HH_{nonhispanic} \times 0.24}{Total\ Households}$$

HH_i indicates the number of households with a specific household characteristic.

The third step involved formulating the LERI, recognizing that it constitutes a weighted summation of the aforementioned weighted risk scores. Furthermore, we incorporated the percentage of children ages 6 and under ($Child6$) and the poverty rate ($Poverty$) into the LERI formula. As a result, the LERI formula appears as follows:

$$LERI = w_{AH} \times R_{AH} + w_{TP} \times R_{TP} + w_{OS} \times R_{OS} + w_{HI} \times R_{HI} + w_{RA} \times R_{RA} + w_{ET} \times R_{ET} + w_{Child6} \times Child6 + w_{Poverty} \times Poverty$$

, where w_i indicates the risk weight for a given risk score R_i .

Nonetheless, because of the lack of theoretical support to estimate the eight weights ($w_{AH}, w_{TP}, w_{OS}, w_{HI}, w_{RA}, w_{ET}, w_{Child6}, w_{Poverty}$). The fourth step applied factor analysis to reconstruct the formula using a reduced number of factors that could still adequately represent the original eight variables. The updated formula is expressed as:

$$LERI = \sum_{i=1}^p w_p \times FS_p + c$$

where p is less than eight, w_p is the weight of the p th factor score FS_p , and c is a constant used to scale the LERI, ensuring that it remains strictly positive.

We identified the first four factors, accounting for 31.49%, 21.44%, 13.34%, and 12.18% of variance explained. This collective explanation of 78.44% of the variance from the original eight variables demonstrates the effectiveness of these factors in capturing the underlying patterns.

The fifth step was to compute the weights of the four selected factors.

We rescaled their proportions of variance ($Prop_x$) explained by $w_j = \frac{Prop_j}{\sum_{i=1}^4 Prop_i}$ to make the total weights equal to 1. The four weights were computed as:

$$w_1 = \frac{0.3149}{0.3149 + 0.2144 + 0.1334 + 0.1218} = 0.40$$

$$w_2 = \frac{0.2144}{0.3149 + 0.2144 + 0.1334 + 0.1218} = 0.27$$

$$w_3 = \frac{0.1334}{0.3149 + 0.2144 + 0.1334 + 0.1218} = 0.17$$

$$w_4 = \frac{0.1218}{0.3149 + 0.2144 + 0.1334 + 0.1218} = 0.16$$

Therefore, the final index score can be formulated as:

$$LERI = 0.40 \times FS_1 + 0.27 \times FS_2 + 0.17 \times FS_3 + 0.16 \times FS_4 + 1.12$$

The factor analysis was exclusively applied to ZIP codes with households. ZIP codes without households are postal routes that correspond to address groups or delivery routes and are not a representation of physical boundaries, buildings, or populations. Consequently, a total of 15 ZIP codes without households were excluded from the analysis.

Lastly, we categorized the calculated LERIs into deciles, with each decile representing 10% of the remaining 175 ZIP codes in Nevada. **Table 15** provides the LERI ranges for each decile.

Table 15. Lead exposure risk index range by decile for Nevada’s ZIP codes

Decile	LERI
1st	0.10-1.33
2nd	1.33-1.75
3rd	1.75-2.09
4th	2.09-2.31
5th	2.31-2.46
6th	2.46-2.52
7th	2.52-2.56
8th	2.56-2.62
9th	2.62-2.68
10th	2.68-2.95

Geographic Areas of Priority

ZIP codes in deciles 1, 2, and 3 are considered low-risk. ZIP codes in deciles 4, 5, 6, and 7 are considered medium-risk. Lastly, ZIP codes in deciles 8, 9, and 10 are considered as areas at high-risk for lead exposure and are NvCLPPP’s areas of priority (**Table 16**).¹

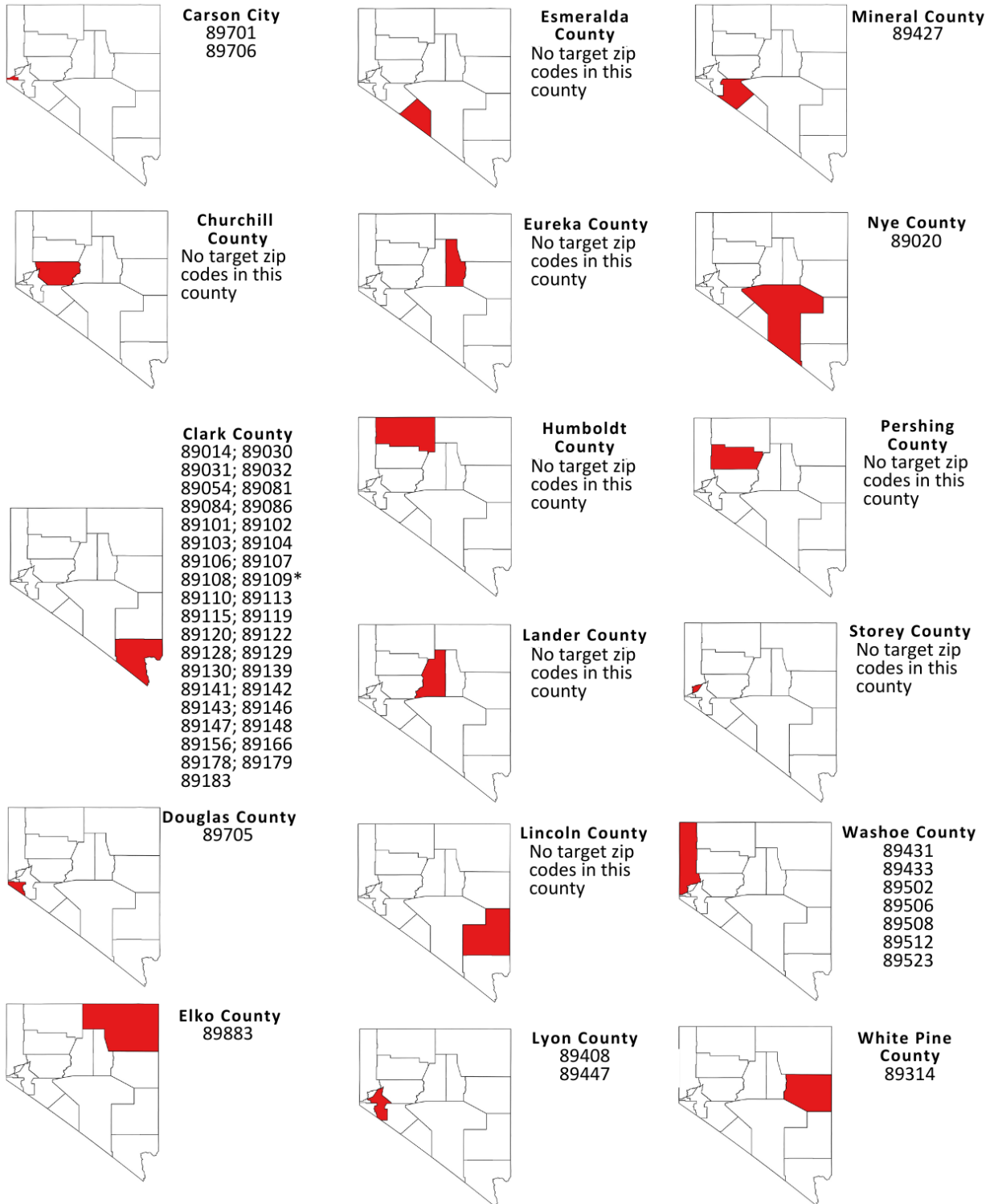
Table 16. LERI by risk ranking for Nevada’s ZIP codes

Decile Range	LERI Range	Ranking
1 st -3 rd	0.10-2.09	Low-risk
4 th -7 th	2.09-2.56	Medium-risk
8 th -10 th	2.56-2.95	High-risk

Zip code 89109 was manually added to the list of high-risk zip codes based on guidance from the NvCLPPP advisory board. While blood lead surveillance data was not incorporated at this time due to low screening rates, the NvCLPPP plans to improve the collection of epidemiologic data to be able to include race and ethnicity of BLL above the BLRV and other BLL data in future surveillance maps. **Figure 10** highlights high-risk ZIP codes for each county.

¹ DISCLAIMER: The LERI and its associated data are meant for broad planning purposes only. This tool was created to target outreach and education efforts in high-risk zip codes, based on the relative risk of childhood lead exposure across zip codes with households in NV. A LERI score is not a substitute for a clinical risk assessment using a childhood lead risk questionnaire as nationwide datasets and risk factor weights used as inputs for the LERI may not be representative of local data. Please keep in mind that historical and current lead hazards in surrounding areas can also increase the risk of lead exposure to your patients, regardless of the LERI score of their residential zip code.

Figure 10. ZIP codes with the highest lead exposure risk by county



*89109 was manually included in the list of high-risk zip codes based on guidance from the NvCLPPP advisory board.

References

- Agency for Toxic Substances and Disease Registry. (2023, May 24). *What are routes of exposure to lead?* https://www.atsdr.cdc.gov/csem/leadtoxicity/exposure_routes.html
- American Academy of Pediatrics. (2016). Prevention of childhood lead toxicity. *Pediatrics*, 138(1). <https://doi.org/10.1542/peds.2016-1493>
- American Academy of Pediatrics. (2019, April 17). *Blood lead levels may be higher in refugee children resettled in the US*. <https://www.aap.org/en/news-room/news-releases/pediatrics2/2019/blood-lead-levels-may-be-higher-in-refugee-children-resettled-in-the-us/>
- American College of Obstetricians and Gynecologists. (2012). Lead screening during pregnancy and lactation. *Obstetrics & Gynecology*, 120, 416–420.
- American Immigration Council. (2023). *Immigrants in Nevada*. <https://www.americanimmigrationcouncil.org/research/immigrants-in-nevada>
- Angelon-Gaetz, K. A., Klaus, C., Chaudhry, E. A., & Bean, D. K. (2018). Lead in spices, herbal remedies, and ceremonial powders sampled from home investigations for children with elevated blood lead levels—North Carolina, 2011-2018. *Morbidity & Mortality Weekly Report*, 67(46), 1290–1294. <https://doi.org/10.15585/mmwr.mm6746a2>
- Aoki, Y., & Brody, D. J. (2018). WIC participation and blood lead levels among children 1-5 years: 2007-2014. *Environmental Health Perspectives*, 126(6). <https://doi.org/10.1289/EHP2384>
- Ban on Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint, Pub. L. No. 110–314, 16 C.F.R. Part 1303 Code of Federal Regulations (CFR) (2009). <https://www.ecfr.gov/current/title-16/part-1303>
- Bellinger, D. C. (2005). Teratogen update: Lead and pregnancy. *Birth Defects Research Part A: Clinical and Molecular Teratology*, 73(6), 409–420. <https://doi.org/10.1002/bdra.20127>
- Blackowicz, M., Hryhorczuk, D., Rankin, K., Lewis, D., Haider, D., Lanphear, B., & Evens, A. (2016). The Impact of Low-Level Lead Toxicity on School Performance among Hispanic Subgroups in the Chicago Public Schools. *International Journal of Environmental Research and Public Health*, 13(8), 774. <https://doi.org/10.3390/ijerph13080774>
- Boutwell, B. B., Nelson, E. J., Emo, B., Vaughn, M. G., Schootman, M., Rosenfeld, R., & Lewis, R. (2016). The intersection of aggregate-level lead exposure and crime. *Environmental Research*, 148, 79–85. <https://doi.org/10.1016/j.envres.2016.03.023>
- Brown, R. W., & Longoria, T. (2010). Multiple risk factors for lead poisoning in Hispanic sub-populations: A review. *Journal of Immigrant and Minority Health*, 12(5), 715–725. <https://doi.org/10.1007/s10903-009-9245-8>

California Department of Public Health. (2019). *Lead in Ayurvedic remedies: A warning to providers*.
https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/CLPPB/CDPH%20Document%20Library/Ayurvedic_onesheet_providers_20190110.pdf

Canfield, R. L., Henderson, C. R., Cory-Slechta, D. A., Cox, C., Jusko, T. A., & Lanphear, B. P. (2003). Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter. *New England Journal of Medicine*, *348*(16), 1517–1526.
<https://doi.org/10.1056/NEJMoa022848>

Carrel, M., Zahrieh, D., Young, S. G., Oleson, J., Ryckman, K. K., Wels, B., & Saftlas, A. (2017). High prevalence of elevated blood lead levels in both rural and urban Iowa newborns: Spatial patterns and area-level covariates. *PloS One*, *12*(5). <https://doi.org/10.1371/journal.pone.0177930>

Centers for Disease Control and Prevention. (2002). Childhood lead poisoning associated with tamarind candy and folk remedies – California 1999-2000. *Morbidity and Mortality Weekly Report*, *51*(31), 684–686.

Centers for Disease Control and Prevention. (2004). Childhood lead poisoning from commercially manufactured French ceramic dinnerware—New York City, 2003. *Morbidity and Mortality Weekly Report*, *53*(26), 584–586.

Centers for Disease Control and Prevention. (2005). Lead poisoning associated with use of litargirio – Rhode Island 2003. *Morbidity and Mortality Weekly Report*, *54*(9), 227–229.

Centers for Disease Control and Prevention. (2012). Infant lead poisoning associated with use of tiro, an eye cosmetic from Nigeria. *Morbidity and Mortality Weekly Report*, *61*(30), 574–576.

Centers for Disease Control and Prevention. (2013). Childhood lead exposure associated with the use of kajal, an eye cosmetic from Afghanistan. *Morbidity and Mortality Weekly Report*, *62*(46), 917–919.

Centers for Disease Control and Prevention. (2019). *Lead in consumer products*.
<https://www.cdc.gov/nceh/lead/prevention/sources/consumer-products.htm>

Centers for Disease Control and Prevention. (2024a, April 10). *People at increased risk for childhood lead poisoning*. <https://www.cdc.gov/lead-prevention/risk-factors/index.html>

Centers for Disease Control and Prevention. (2024b, July 3). *Childhood Blood Lead Surveillance: National Data*. <https://www.cdc.gov/lead-prevention/php/data/national-surveillance-data.html>

Centers for Disease Control and Prevention. (2025a, January 31). *CDC Updates Blood Lead Reference Value*. Childhood Lead Poisoning Prevention. <https://www.cdc.gov/lead-prevention/php/news-features/updates-blood-lead-reference-value.html>

Centers for Disease Control and Prevention. (2025b, March 21). *Risk Factors and Children*. <https://www.cdc.gov/lead-prevention/risk-factors/children.html>

Centers for Disease Control and Prevention Work Group on Lead and Pregnancy & Pregnancy. (2010). *Guidelines for the identification and management of lead exposure in pregnant and lactating women*. <https://stacks.cdc.gov/view/cdc/11854>

Children's Products Containing Lead; Lead Paint Rule, Pub. L. No. 110–314, 15 U.S.C. § 1278a United States Code (U.S.C.) (2011). <https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title15-section1278a&num=0&edition=prelim>

Cowell, W., Ireland, T., Vorhees, D., & Heiger-Bernays, W. (2017). Ground turmeric as a source of lead exposure in the United States. *Public Health Reports*, 3, 289–293. <https://doi.org/10.1177/0033354917700109>

CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic—Lead Contamination. (n.d.).

Delgado, C. F., Ullery, M. A., Jordan, M., Duclos, C., Rajagopalan, S., & Scott, K. (2018). Lead exposure and developmental disabilities in preschool-aged children. *Journal of Public Health Management and Practice*, 24(2), 10–17. <https://doi.org/10.1097/PHH.0000000000000556>

Department of Housing and Urban Development. (2011). *American healthy homes survey: Lead and arsenic findings*. https://www.hud.gov/sites/documents/ahhs_report.pdf

Diaz-Ruiz, A., Tristán-López, L. A., Medrano-Gómez, K. I., Torres-Domínguez, J. A., Ríos, C., & Montes, S. (2017). Glazed clay pottery and lead exposure in Mexico: Current experimental evidence. *Nutritional Neuroscience*, 20(9), 513–518. <https://doi.org/10.1080/1028415X.2016.1193967>

Food and Drug Administration. (2016). *Hazard analysis and risk-based preventive controls for human food: Draft guidance for industry*. <https://www.fda.gov/media/99558/download>

Food and Drug Administration. (2025). *FDA Issues Final Guidance for Industry on Action Levels for Lead in Processed Food Intended for Babies and Young Children*. Food and Drug Administration. <https://www.fda.gov/food/hfp-constituent-updates/fda-issues-final-guidance-industry-action-levels-lead-processed-food-intended-babies-and-young>

Gardener, H., Bowen, J., & Callan, S. P. (2019). Lead and cadmium contamination in a large sample of United States infant formulas and baby foods. *The Science of the Total Environment*, 651(Pt 1), 822–827. <https://doi.org/10.1016/j.scitotenv.2018.09.026>

Girrus, A. C. (2021, August 16). *Census data shows communities of color are the new Nevada*. <https://www.nevadacurrent.com/2021/08/16/census-data-shows-communities-of-color-are-the-new-nevada/>

Gorospe, E. C., & Gerstenberger, S. L. (2008). Atypical sources of childhood lead poisoning in the United States: A systematic review from 1966-2006. *Clinical Toxicology*, 46(8), 728–737. <https://doi.org/10.1080/15563650701481862>

Greenway, J. A., & Gerstenberger, S. L. (2010). An evaluation of lead contamination in plastic toys collected from day care centers in the Las Vegas Valley. *Bulletin of Environment Contamination and Toxicology*, 85(4), 363–366. <https://doi.org/10.1007/s00128-010-0100-3>

- Haboush-Deloye, A., Marquez, E. R., & Gerstenberger, S. L. (2017). Determining childhood blood lead level screening compliance among physicians. *Journal of Community Health, 42*(4), 779–784. <https://doi.org/10.1007/s10900-017-0317-8>
- Hauptman, M., Stierman, B., & Woolf, A. (2019). Children with autism spectrum disorder and lead poisoning: Diagnostic challenges and management complexities. *Clinical Pediatrics, 58*(6), 605–612. <https://doi.org/10.1177/0009922819839237>
- Hore, P., Alex-Oni, K., Sedlar, S., & Nagin, D. (2019). A spoonful of lead: A 10-year look at spices as a potential source of lead exposure. *Journal of Public Health Management and Practice, 25*(1), 63–70. <https://doi.org/10.1097/PHH.0000000000000876>
- Hu, H., Hashimoto, D., & Besser, M. (1996). Levels of lead in blood and bone of women giving birth in a Boston hospital. *Archives of Environmental Health, 51*(1), 52–58. <https://doi.org/10.1080/00039896.1996.9935994>
- Hu, H., & Hernandez-Avila, M. (2002). Invited commentary: Lead, bones, women, and pregnancy—The poison within? *American Journal of Epidemiology, 156*(12), 1088–1091. <https://doi.org/10.1093/aje/kwf164>
- Hu, H., Téllez-Rojo, M. M., Bellinger, D., Smith, D., Ettinger, A. S., Lamadrid-Figueroa, H., & Hernández-Avila, M. (2006). Fetal lead exposure at each stage of pregnancy as a predictor of infant mental development. *Environmental Health Perspectives, 114*(11), 1730–1735. <https://doi.org/10.1289/ehp.9067>
- Illinois Department of Public Health. (2015). *Childhood lead risk questionnaire*. <http://www.idph.state.il.us/envhealth/pdf/ChildhoodLeadRiskQuestionnaire.pdf>
- Jacobs, D. E., Clickner, R. P., Zhou, J. Y., Viet, S. M., Marker, D. A., Rogers, J. W., & Friedman, W. (2002). The prevalence of lead-based paint hazards in US housing. *Environmental Health Perspectives, 110*(10), 599–606. <https://doi.org/10.1289/ehp.021100599>
- Lanphear, B. P. (2007). The conquest of lead poisoning: A pyrrhic victory. *Environmental Health Perspectives, 115*(10), 484–485. <https://doi.org/10.1289/ehp.10871>
- Lanphear, B. P., Hornung, R., Khoury, J., Yolton, K., Baghurst, P., Bellinger, D. C., & Roberts, R. (2019). Low-level environmental lead exposure and children’s intellectual function: An international pooled analysis. *Environmental Health Perspectives, 127*(9). <https://doi.org/10.1289/EHP5685>
- Lanphear, B. P., Rauch, S., Auinger, P., Allen, R. W., & Hornung, R. W. (2018). Low-level lead exposure and mortality in US adults: A population-based cohort study. *The Lancet Public Health, 34*(4), 177–184. [https://doi.org/10.1016/S2468-2667\(18\)30025-2](https://doi.org/10.1016/S2468-2667(18)30025-2)
- Lead Solders, Pub. L. No. 75–717, 21 C.F.R. § 189.240 Code of Federal Regulations (CFR) (1995). <https://www.ecfr.gov/current/title-21/part-189/section-189.240>
- Lead-Based Paint Poisoning Prevention in Certain Residential Structures, Pub. L. No. 94–469, 40 C.F.R. Part 745 Code of Federal Regulations (CFR) (1976). <https://www.ecfr.gov/current/title-40/part-745>

Lupone, C. D., Daniels, D., Lammert, D., Borsuk, R., Hobart, T., Lane, S., & Shaw, A. (2020). Lead exposure in newly resettled pediatric refugees in Syracuse, NY. *Journal of Immigrant and Minority Health*, 22(1), 34–43. <https://doi.org/10.1007/s10903-019-00880-y>

Lynch, R. A., Boatright, D. T., & Moss, S. K. (2000). Lead-contaminated imported tamarind candy and children's blood lead levels. *Public Health Reports*, 115(6), 537–543. <https://doi.org/10.1093/phr/115.6.537>

Mahaffey, K. R. (1995). Nutrition and lead: Strategies for public health. *Environmental Health Perspectives*, 103(6), 191–196. <https://doi.org/10.1289/ehp.95103s6191>

Marquez, E., López, E., Osterholt, A., & Campos-Garcia, B. (2020). *Lead in our homes factsheet: A look at housing equity and lead-based paint hazards in Nevada*. https://nvcldppp.org/wp-content/uploads/2021/07/NvCLPPP-Housing-FactSheet_02012021.pdf

Marshall, A. T., Betts, S., Kan, E. C., McConnell, R., Lanphear, B. P., & Sowell, E. R. (2020). Association of lead-exposure risk and family income with childhood brain outcomes. *Nature Medicine*, 26, 91–97. <https://doi.org/10.1038/s41591-019-0713-y>

Maryland Department of Health and Mental Hygiene. (2014, January). *Report to the general assembly by the task force on point of care testing for lead poisoning chapter 365*. https://health.maryland.gov/phpa/Documents/Final%20Report_Lead%20Poisoning%20Point%20of%20Care%20Testing.pdf

Mason, L. H., Harp, J. P., & Han, D. Y. (2014). Pb neurotoxicity: Neuropsychological effects of lead toxicity. *BioMed Research International, Article*, 840547. <https://doi.org/10.1155/2014/840547>

Matson, J. L., Belva, B., Hattier, M. A., & Matson, M. L. (2011). Pica in persons with developmental disabilities: Characteristics, diagnosis, and assessment. *Research in Autism Spectrum Disorders*, 5(4), 1459–1464. <https://doi.org/10.1016/j.rasd.2011.02.006>

Meyer, P. A., Brown, M. J., & Falk, H. (2008). Global approach to reducing lead exposure and poisoning. *Mutation Research/Reviews in Mutation Research*, 659(2), 166–175. <https://doi.org/10.1016/j.mrrev.2008.03.003>

Miracle, V. A. (2017). Lead poisoning in children and adults. *Dimensions of Critical Care Nursing*, 36(1), 71–73. <https://doi.org/10.1097/DCC.0000000000000227>

National Notifiable Diseases Surveillance System. (2023). *Lead in blood 2023 case definition*. <https://ndc.services.cdc.gov/case-definitions/lead-in-blood/>

National Primary Drinking Water Regulations for Lead and Copper: Improvements (LCRI), 40 C.F.R. Part 141, Subpart I Code of Federal Regulations (CFR) 93 (2024). <https://www.federalregister.gov/documents/2024/10/30/2024-23549/national-primary-drinking-water-regulations-for-lead-and-copper-improvements-lcri>

New York State. (2010). *Sources of Lead*. New York Department of Health. <https://www.health.ny.gov/environmental/lead/sources.htm>

Occupational Safety and Health Administration. (2014). *Lead: If you work around lead, don't take it home! OSHA QuickCard™ Publication 3680*. United States Department of Labor. <https://www.osha.gov/sites/default/files/publications/OSHA3680.pdf>

Occupational Safety and Health Administration. (n.d.). *Lead*. <https://www.osha.gov/lead>

Occupational Safety and Health Standards, 29 CFR 1910.1025 Code of Federal Regulations (CFR) (2022). <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1025>

Oregon Health Authority. (2018). *Lead investigative guidelines*. <https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/HEALTHYNEIGHBORHOODS/LEADPOISONING/COUNTYHEALTHDEPARTMENTS/Documents/Diseaseguidelines.pdf>

Parker, G. H., Gillie, C. E., Miller, J. V., Badger, D. E., & Kreider, M. L. (2022). Human health risk assessment of arsenic, cadmium, lead, and mercury ingestion from baby foods. *Toxicology Reports*, 9, 238–249. <https://doi.org/10.1016/j.toxrep.2022.02.001>

Parry, C., & Eaton, J. (1991). Kohl: A lead-hazardous eye makeup from the third world to the first world. *Environmental Health Perspectives*, 94, 121–123. <https://doi.org/10.2307/3431304>

Pure Earth. (2020). *The toxic truth: Children's exposure to lead pollution undermines a generation of future potential*. <http://www.pureearth.org/wp-content/uploads/2021/03/The-Toxic-Truth-Childrens-Exposure-To-Lead-Pollution-UNICEF-Pure-Earth-2020.pdf>

Real Autism Difference. (XXXX). *A bit about autism*. <https://radlv.org/>

Rees, N., & Fuller, R. (2020). *The Toxic Truth: Children ' s Exposure to Lead Pollution Undermines a Generation of Future Potential*. 1–90.

Requirements for Specific Standardized Beverages, Pub. L. No. 75–717, 21 C.F.R. § 165.110 Code of Federal Regulations (CFR) (1938). <https://www.ecfr.gov/current/title-21/part-165/section-165.110>

Roberts, E. M., Mardrigal, D., Valle, J., King, G., & Kite, L. (2017). Assessing child lead poisoning case ascertainment in the US, 1999-2010. *Pediatrics*, 139(5), 10 1542 2016-4266. <https://doi.org/10.1542/peds.2016-4266>

Ruckart, P. Z., Jones, R. L., Courtney, J. G., LeBlanc, T. T., Jackson, W., Karwowski, M. P., & Breyse, P. N. (2021). Update of the blood lead reference value – United States, 2021. *Morbidity and Mortality Weekly Report*, 70(43), 1509–1512. <https://doi.org/10.15585/mmwr.mm7043a4>

Sampson, R. J., & Winter, A. (2016). The racial ecology of lead poisoning: Toxic inequality in Chicago neighborhoods, 1995-2013. *Du Bois Review: Social Science Research on Race*, 12(2). <https://doi.org/10.1017/S1742058X16000151>

Sanders, A. P., Svensson, K., Gennings, C., Burriss, H. H., Oken, E., Amarasiriwardena, C., & Tellez-Rojo, M. M. (2018). Prenatal lead exposure modifies the effect of shorter gestation on increased blood pressure in children. *Environment International*, 120, 464–471. <https://doi.org/10.1016/j.envint.2018.08.038>

- Sanders, T., Liu, Y., Buchner, V., & Tchounwou, P. B. (2009). Neurotoxic effects and biomarkers of lead exposure: A Review. *Reviews on Environmental Health*, 24(1), 15–45.
<https://doi.org/10.1515/reveh.2009.24.1.15>
- Schnur, J., & John, R. M. (2014). Childhood lead poisoning and the new Centers for Disease Control and Prevention guidelines for lead exposure. *Journal of the American Association of Nurse Practitioners*, 26(5), 238–247. <https://doi.org/10.1002/2327-6924.12112>
- Shakya, S., & Bhatta, M. P. (2019). Elevated blood lead levels among resettled refugee children in Ohio, 2009-2016. *American Journal of Public Health*, 109(6), 912–920.
<https://doi.org/10.2105/AJPH.2019.305022>
- Spanier, A. J., Wilson, S., Ho, M., Hornung, R., & Lanphear, B. P. (2013). The contribution of housing renovation to children’s blood lead levels: A cohort study. *Environmental Health*, 12, Article 72. <https://doi.org/10.1186/1476-069X-12-72>
- Tanaka, M., Petsios, K., Dikalioti, S. K., Pouloupoulou, S., Matziou, V., Theocharis, S., & Pavlopoulou, I. D. (2018). Lead exposure and associated risk factors among new migrant children arriving in Greece. *International Journal of Environmental Research and Public Health*, 15(6), 1057. <https://doi.org/10.3390/ijerph15061057>
- Tarragó, O., & Brown, M. (2017). *Case studies in environmental medicine (CSEM): Lead toxicity. Agency for Toxic Substances and Disease Registry.*
https://www.atsdr.cdc.gov/csem/lead/docs/CSEM-Lead_toxicity_508.pdf
- Tehraniifar, P., Leighton, J., Auchincloss, A. H., Faciano, A., Alper, H., Paykin, A., & Wu, S. (2008). Immigration and risk of childhood lead poisoning: Findings from a case-control study of New York City children. *American Journal of Public Health*, 98(1), 92–97.
<https://doi.org/10.2105/AJPH.2006.093229>
- Tennessee Department of Health. (n.d.). *Healthy diet & lead poisoning prevention.* Tennessee Department of Health. <https://www.tn.gov/health/health-program-areas/mch-lead/for-parents/lead-prevention.html>
- Teye, S. O., Yanosky, J. D., Cuffee, Y., Weng, X., Luquis, R., Farace, E., & Wang, L. (2021). Exploring persistent racial/ethnic disparities in lead exposure among American children aged 1–5 years: Results from NHANES 1999–2016. *International Archives of Occupational and Environmental Health*, 94(4), 723–730. <https://doi.org/10.1007/s00420-020-01616-4>
- Tiffany-Castiglioni, E., Barhoumi, R., & Mouneimne, Y. (2012). Kohl and surma eye cosmetics as significant sources of lead (Pb) exposure. *Journal of Local and Global Health Science*, 2012(1).
<https://doi.org/10.5339/jlghs.2012.1>
- Troeschel, A. N., Buser, M. C., Winquist, A., Ruckart, P., Yeh, M., Kuai, D., Chang, A., Pennington, A. F., Rumph, J. T., Smith, M. R., Lara, M. V., Cataldo, N., Lewis, K., Arnold, K., Harris, S., Nicholas, D. C., Hughes, M., Wortmann, T., Norman, E., ... Daniel, J. (2025). Investigation of Lead and Chromium Exposure After Consumption of Contaminated Cinnamon-Containing Applesauce—

United States, November 2023–April 2024. *MMWR. Morbidity and Mortality Weekly Report*, 74(14), 239–244. <https://doi.org/10.15585/mmwr.mm7414a2>

United States Census Bureau. (2021). *2017–2021 American community survey 5-year estimates*.

United States Census Bureau. (2022). *Annual estimates of the resident population by single year of age and sex for the United States: April 1*. <https://www.census.gov/data/tables/time-series/demo/popest/2020s-national-detail.html>

United States Census Bureau. (2023). *Population under 18 years by age: Nevada 5-year estimates (Table B09001)* [Dataset]. American Community Survey. <https://data.census.gov/table/ACSST5Y2023.B09001?q=B09001:+Population+Under+18+Years+by+Age&g=040XX00US32>

United States Census Bureau. (2024). *QuickFacts: Nevada* [Dataset]. <https://www.census.gov/quickfacts/fact/table/NV>

United States Environmental Protection Agency. (2020). *Lead in Soil*. <https://www.epa.gov/sites/default/files/2020-10/documents/lead-in-soil-aug2020.pdf>

United States Environmental Protection Agency. (2023). *Protect your family from sources of lead*. <https://www.epa.gov/lead/protect-your-family-sources-lead>

U.S. Consumer Product Safety Commission. (n.d.a). *Lead in Paint*. U.S. Consumer Product Safety Commission. <https://www.cpsc.gov/Business–Manufacturing/Business-Education/Lead/Lead-in-Paint>

U.S. Consumer Product Safety Commission. (n.d.b). *Total Lead Content*. U.S. Consumer Product Safety Commission. <https://www.cpsc.gov/Business–Manufacturing/Business-Education/Lead/Total-Lead-Content>

U.S. Department of Housing and Urban Development. (2022). *Fiscal Year 2022 Agency Financial Report* (Annual Report No. HUD-2022-Agency-FR). U.S. Department of Housing and Urban Development. <https://archives.hud.gov/reports/afr/afr2022.pdf>

U.S. Environmental Protection Agency. (2024a, January 11). *Updated Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* [Other Policies and Guidance]. <https://www.epa.gov/superfund/updated-soil-lead-guidance-cercla-sites-and-rcra-corrective-action-facilities>

U.S. Environmental Protection Agency. (2024b, December 20). *Lead Regulations* [Overviews and Factsheets]. EPA. <https://www.epa.gov/lead/lead-regulations>

U.S. Food & Drug Administration. (2025). *Lead in Food and Foodwares*. FDA. <https://www.fda.gov/food/environmental-contaminants-food/lead-food-and-foodwares>

U.S. Food & Drug Administration & Human Foods Program. (2025, January 6). *Guidance for Industry: Action Levels for Lead in Processed Food Intended for Babies and Young Children*. FDA. <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-action-levels-lead-processed-food-intended-babies-and-young-children>

Wengrovitz, A. M., & Brown, M. J. (2009). Recommendations for blood lead screening of Medicaid-eligible children aged 1–5 years: An updated approach to targeting a group at high risk. *Morbidity and Mortality Weekly Report: Recommendations and Reports*, 58(9), 1–13.

Wong, A., Dargan, P., Koutsogiannis, Z., Sokol, J., Ramkrishna, J., & Greene, S. L. (2015). Chronic Ayurvedic medicine use associated with major and fatal congenital abnormalities. *The Medical Journal of Australia*, 203(11), 443–444. <https://doi.org/10.5694/mja15.00636>

World Health Organization. (2010, September 1). *Childhood lead poisoning*. <https://www.who.int/publications/i/item/childhood-lead-poisoning>

World Health Organization. (2019, July 4). *Exposure to lead: A major public health concern*. <https://www.who.int/publications/i/item/9789240037632>

Ying, X. L., Gao, Z. Y., Yan, J., Zhang, M., Wang, J., Xu, J., & Yan, C. H. (2018). Sources, symptoms and characteristics of childhood lead poisoning: Experience from a lead specialty clinic in China. *Clinical Toxicology*, 56(6), 397–403. <https://doi.org/10.1080/15563650.2017.1391392>



Appendix A: Federal Lead Policies

Year	Policy
1966	Federal Hazardous Substances Act – Ban on toys and child products with high levels of lead.
1970	Clean Air Act (CAA) - A comprehensive federal law that regulates air quality, including lead in the air. Lead in the air is regulated as one of the six common pollutants under the National Ambient Air Quality Standard and as a toxic air pollutant by regulations set for industrial facility emissions. Under the CAA, the use of gasoline containing lead or lead additives for use as motor vehicle fuel was prohibited after 1995.
1971	Lead-Based Paint Poisoning Prevention Act – Prohibited the use of lead-based paint in residences constructed or rehabilitated by the federal government or with federal assistance and defined paint chips as the primary health hazard of lead-based paint.
1972	Clean Water Act - Prohibits anyone from discharging pollutants including, lead, through a point source into a water of the United States unless they have a National Pollutant Discharge Elimination System (NPDES).
1973	The Environmental Protection Agency (EPA) initiated a health-based regulation to begin phasing out lead in gasoline.
1973	Consumer Product Safety Commission (CPSC) banned hazardous amounts of lead in toys and other products intended for use by children and required warning labels on other lead-containing products.
1973	EPA initiates a phasedown of lead levels in EPA motor vehicle gasoline to reduce health risks from lead emissions.
1974	Safe Drinking Water Act – Set limits on lead and other contaminants in drinking water. It also required lead-free solder, flux, fittings, and pipes. Lead in drinking water is regulated under the Lead and Copper Rule.
1976	Toxic Substance Control Act - Limits the manufacture, processing, commercial distribution, use, and disposal of chemical substances including PCB's, asbestos, radon, and lead-based paint.
1976	Resource Conservation and Recovery Act – Regulates how waste, such as lead-based paint debris, dust, and chips with a concentration of lead less than or greater than 5 mg/L should be handled.
1978	The federal government banned lead-based paint for residential use.
1978	A federal ban was put in place prohibiting toys and other children's items from having more than 0.06 percent lead (by weight) in paints or surface coatings.
1980	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund) - Provides a federal "Superfund" to clean up sites contaminated with hazardous waste, as well as preventing contamination of future sites.
1986	Lead in plumbing banned.
1988	Lead Contamination Control Act – Authorized the Centers for Disease Control to support local and state agencies to develop comprehensive childhood lead poisoning prevention programs (CLPPPs).
1991	Lead and Copper Rule – Regulation to control lead and copper in drinking water. The rule established a maximum contaminant level goal of zero for lead. It also allowed publicly owned sectors to conduct partial service line replacements.
1991	Lead shot banned for all waterfowl hunting in the United States.

1992	Residential Lead-Based Paint Hazards Reduction Act (Title X) – Comprehensive law to protect families from exposure to lead from paint, dust, and soil. Section 1018 of the Act directed the United States HUD and the EPA to require the disclosure of known information on lead-based paint and lead-based paint hazards before the sale and lease of most housing built before 1978. The Act also authorized the administration of grants to state and local entities for lead-based paint hazard reduction activities in homes.
1995	Federal Food, Drug, and Cosmetic Act – The use of lead solder in food cans, including imported cans, was banned.
1996	Final Ban on Leaded Gasoline – The EPA banned leaded gasoline for on-road vehicles, significantly lowering airborne lead levels and childhood blood lead exposure.
1999	Lead Safe Housing Rule – lead-based paint in federally owned and assisted housing regulated.
1999-2001	Standards for lead in paint, dust, and soil created by the EPA.
2008	Renovation, Repair and Painting Rule – Enacted to protect the public from lead-based paint (LBP) hazards associated with renovation, repair, and painting activities. The rule requires contracts that disturb LBP in pre-1978 homes and child-care centers to be EPA – or – state-certified and to follow specific work practices to prevent lead contamination.
2008	Consumer Product Safety Improvement Act – mandated reducing the lead limit in children’s products to 0.009% by weight.
2008	The Ridley-Tree Condor Preservation Act – Requires the use of nonleaded centerfire rifle and pistol ammunition when taking big game and coyote within specific areas.
2011	Total lead in children’s products limited to 100 ppm.
2016	The Water Infrastructure Improvements for the Nation Act – A comprehensive legislation to address the needs of America’s harbors, locks, dams, flood protection, and other water resource infrastructure. Under the Act, \$35 million was allocated to CDC to enhance childhood lead poisoning prevention activities; to establish a voluntary Flint, Michigan, lead exposure registry, and to establish the Lead Exposure and Prevention Advisory Committee.
2017	HUD updated lead-paint regulations.
2021	Bipartisan Infrastructure Law – investment in the nation’s water and wastewater infrastructure, including \$15 billion dedicated to lead service line replacement and \$11.7 billion of general Drinking Water State Revolving Funds that can be used for lead service line replacement.
2024	Lead and Copper Rule Improvements (EPA) – A final rule requiring drinking water systems across the country to identify and replace lead pipes within 10 years. The rule also strengthens requirements to locate lead pipes, improve testing for lead in water, and ensure that exposure is minimized while lead pipe replacement efforts are underway.

Appendix B: US Standards and Regulations for Lead Levels

Lead Hazard Standards

Media	Level	Agency
Ceramic Foodwares – cups and mugs(CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination, n.d.)	0.5 µg/mL*	FDA
Ceramic Foodwares – flatware(CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination, n.d.)	3 µg/mL*	FDA
Ceramic Foodwares – large hollowware other than pitchers(CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination, n.d.)	1 µg/mL*	FDA
Ceramic Foodwares – pitchers(CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination, n.d.)	0.5 µg/mL*	FDA
Ceramic Foodwares – small hollowware other than cups and mugs(CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination, n.d.)	2 µg/mL*	FDA
Consumer Products – accessible parts of children’s products(Ban on Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint, 2009; U.S. Consumer Product Safety Commission, n.d.b)	100 ppm	CPSC
Consumer Products – food cans, solder(Lead Solders, 1995; U.S. Food & Drug Administration, 2025)	banned	FDA
Consumer Products – paint and similar surface coatings(Children’s Products Containing Lead; Lead Paint Rule, 2011; U.S. Consumer Product Safety Commission, n.d.a)	90 ppm	CPSC
Dust	any reportable level	EPA
Lead-Based Paint (any paint, varnish, shellac, or other coating)(Lead-Based Paint Poisoning Prevention in Certain Residential Structures, 1976; U.S. Environmental Protection Agency, 2024b)	1.0 mg/cm ² 5,000 µg/g 5,000 ppm 5,000 mg/kg	EPA
Processed Foods Intended for Babies and Young Children – fruits, vegetables (excluding single-ingredient root vegetables), mixtures (including grain- and meat-based mixtures), yogurts, custards/puddings, and single-ingredient meats(U.S. Food & Drug Administration & Human Foods Program, 2025)	10 ppb	FDA
Processed Foods Intended for Babies and Young Children – single-ingredient root vegetables(U.S. Food & Drug Administration & Human Foods Program, 2025)	20 ppb	FDA
Processed Foods Intended for Babies and Young Children – Dry infant cereals(U.S. Food & Drug Administration & Human Foods Program, 2025)	20 ppb	FDA
Soil – play areas(U.S. Environmental Protection Agency, 2024a)	200 ppm	EPA
Soil – property with multiple sources of lead exposure(U.S. Environmental Protection Agency, 2024a)	100 ppm	EPA
Drinking water – bottled(Requirements for Specific Standardized Beverages, 1938; U.S. Food & Drug Administration, 2025)	5 ppb	FDA
Drinking water – tap(National Primary Drinking Water Regulations for Lead and Copper, 2024)	10 ppb 0.010 mg/L	EPA

*Based on the level of lead per mL of *leaching solution*.

Dust-Lead Action Levels

Media	Level	Agency
Dust – floors ⁴	5 µg/ft ²	EPA
Dust – window sills ⁴	40 µg/ft ²	EPA
Dust – window troughs ⁴	100 µg/ft ²	EPA

Health-Related Values

Type	Level	Agency
Adult, Action Level in the Workplace – Air(Occupational Safety and Health Administration, n.d.; Occupational Safety and Health Standards, 2022)	30 µg/m ³	OSHA
Adult, Blood Lead Level in the Workplace(Occupational Safety and Health Administration, n.d.; Occupational Safety and Health Standards, 2022)	40 µg/100g	OSHA
Adult, Permissible Exposure Limit (PEL) in the Workplace – Air(Occupational Safety and Health Administration, n.d.; Occupational Safety and Health Standards, 2022)	50 µg/m ³ (averaged over 8-hour period)	OSHA
Children, Blood Lead Reference Value(Centers for Disease Control and Prevention, 2025a)	3.5 µg/dL	CDC

Note: These tables were last updated as of April 2025. Please check each agency for the most current standards.

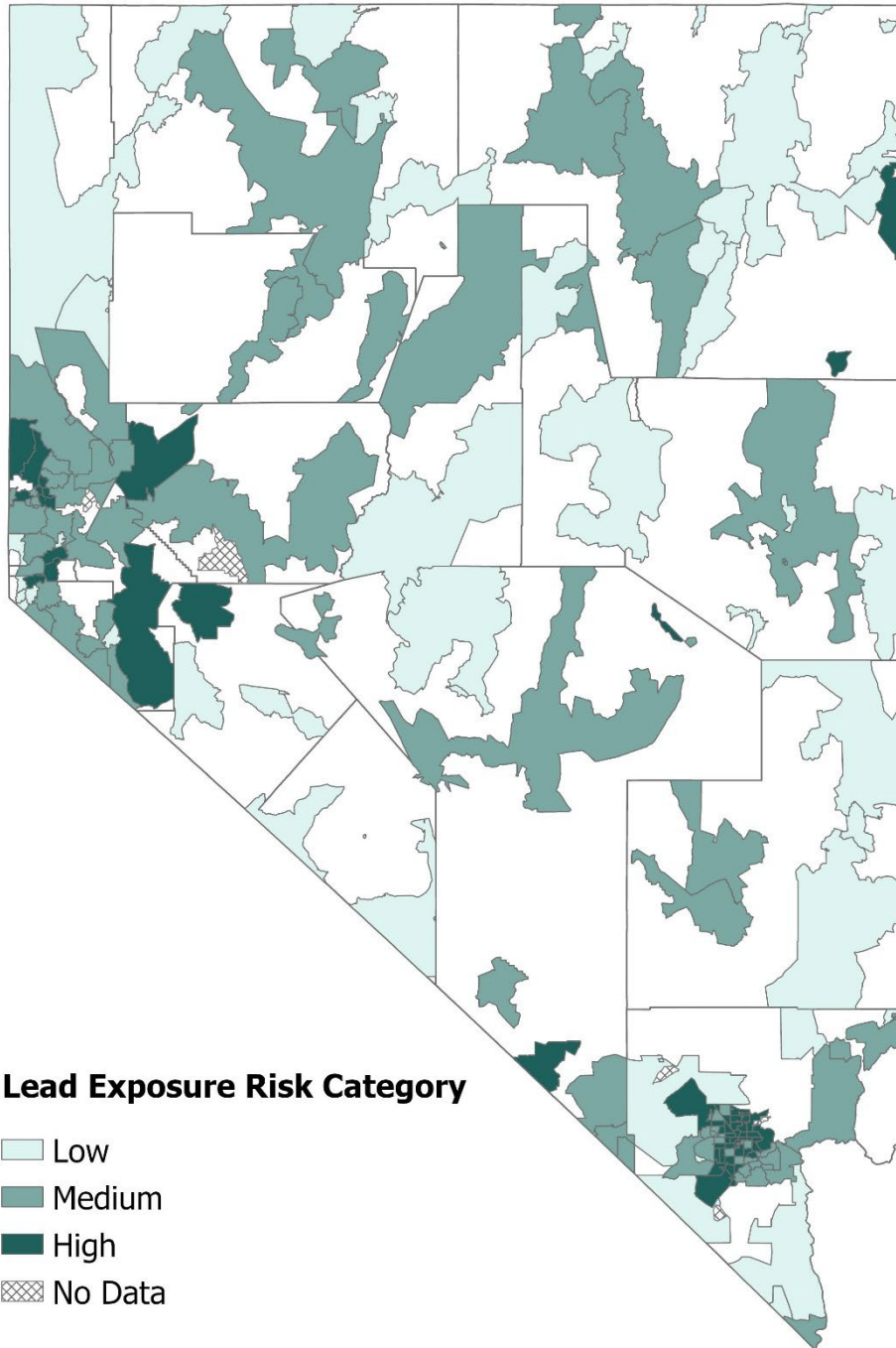
References

1. CPG Sec. 545.450 Pottery (Ceramics); Import and Domestic - Lead Contamination.
2. U.S. Consumer Product Safety Commission. Ban on Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint. Vol 16 C.F.R. Part 1303.; 2009. Accessed April 3, 2025. <https://www.ecfr.gov/current/title-16/part-1303>
3. U.S. Consumer Product Safety Commission. Total Lead Content. U.S. Consumer Product Safety Commission. n.d. Accessed April 3, 2025. <https://www.cpsc.gov/Business--Manufacturing/Business-Education/Lead/Total-Lead-Content>
4. U.S. Food & Drug Administration. Lead Solders. Vol 21 C.F.R. § 189.240.; 1995. Accessed April 3, 2025. <https://www.ecfr.gov/current/title-21/part-189/section-189.240>
5. U.S. Food & Drug Administration. Lead in Food and Foodwares. FDA. Published online January 6, 2025. Accessed April 3, 2025. <https://www.fda.gov/food/environmental-contaminants-food/lead-food-and-foodwares>
6. U.S. Consumer Product Safety Commission. Children’s Products Containing Lead; Lead Paint Rule. Vol 15 U.S.C. § 1278a.; 2011. Accessed April 3, 2025. <https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title15-section1278a&num=0&edition=prelim>
7. U.S. Consumer Product Safety Commission. Lead in Paint. U.S. Consumer Product Safety Commission. n.d. Accessed April 3, 2025. <https://www.cpsc.gov/Business--Manufacturing/Business-Education/Lead/Lead-in-Paint>
8. U.S. Environmental Protection Agency. Lead-Based Paint Poisoning Prevention in Certain Residential Structures. Vol 40 C.F.R. Part 745.; 1976. Accessed April 3, 2025. <https://www.ecfr.gov/current/title-40/part-745>
9. U.S. Environmental Protection Agency. Lead Regulations. EPA. December 20, 2024. Accessed April 3, 2025. <https://www.epa.gov/lead/lead-regulations>
10. U.S. Food & Drug Administration, Human Foods Program. Guidance for Industry: Action Levels for Lead in Processed Food Intended for Babies and Young Children. January 6, 2025. Accessed April 3, 2025. <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-action-levels-lead-processed-food-intended-babies-and-young-children>

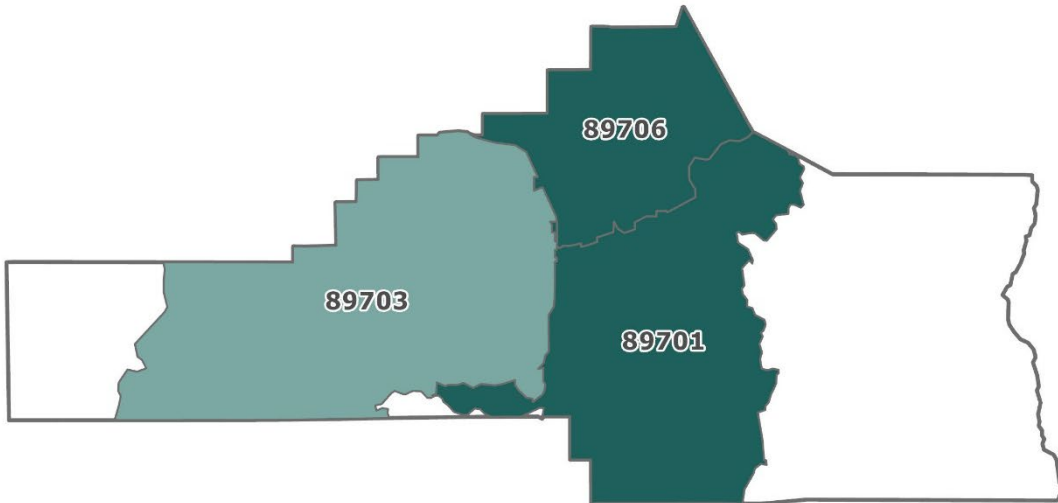
11. U.S. Environmental Protection Agency. Updated Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. January 11, 2024. Accessed April 3, 2025. <https://www.epa.gov/superfund/updated-soil-lead-guidance-cercla-sites-and-rcra-corrective-action-facilities>
12. U.S. Food & Drug Administration. Requirements for Specific Standardized Beverages. Vol 21 C.F.R. § 165.110.; 1938. Accessed April 3, 2025. <https://www.ecfr.gov/current/title-21/part-165/section-165.110>
13. U.S. Environmental Protection Agency. National Primary Drinking Water Regulations for Lead and Copper: Improvements (LCRI). Vol 40 C.F.R. Part 141, Subpart I.; 2024:93-523. Accessed April 3, 2025. <https://www.federalregister.gov/documents/2024/10/30/2024-23549/national-primary-drinking-water-regulations-for-lead-and-copper-improvements-lcri>
14. Occupational Safety and Health Administration. Occupational Safety and Health Standards. Vol 29 CFR 1910.1025.; 2022. Accessed April 3, 2025. <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1025>
15. Occupational Safety and Health Administration. Lead. n.d. Accessed April 3, 2025. <https://www.osha.gov/lead>
16. Centers for Disease Control and Prevention. CDC Updates Blood Lead Reference Value. Childhood Lead Poisoning Prevention. January 31, 2025. Accessed April 3, 2025. <https://www.cdc.gov/lead-prevention/php/news-features/updates-blood-lead-reference-value.html>

Appendix C: Lead Exposure Risk Index Maps





State Lead Index – Nevada



Carson City Map

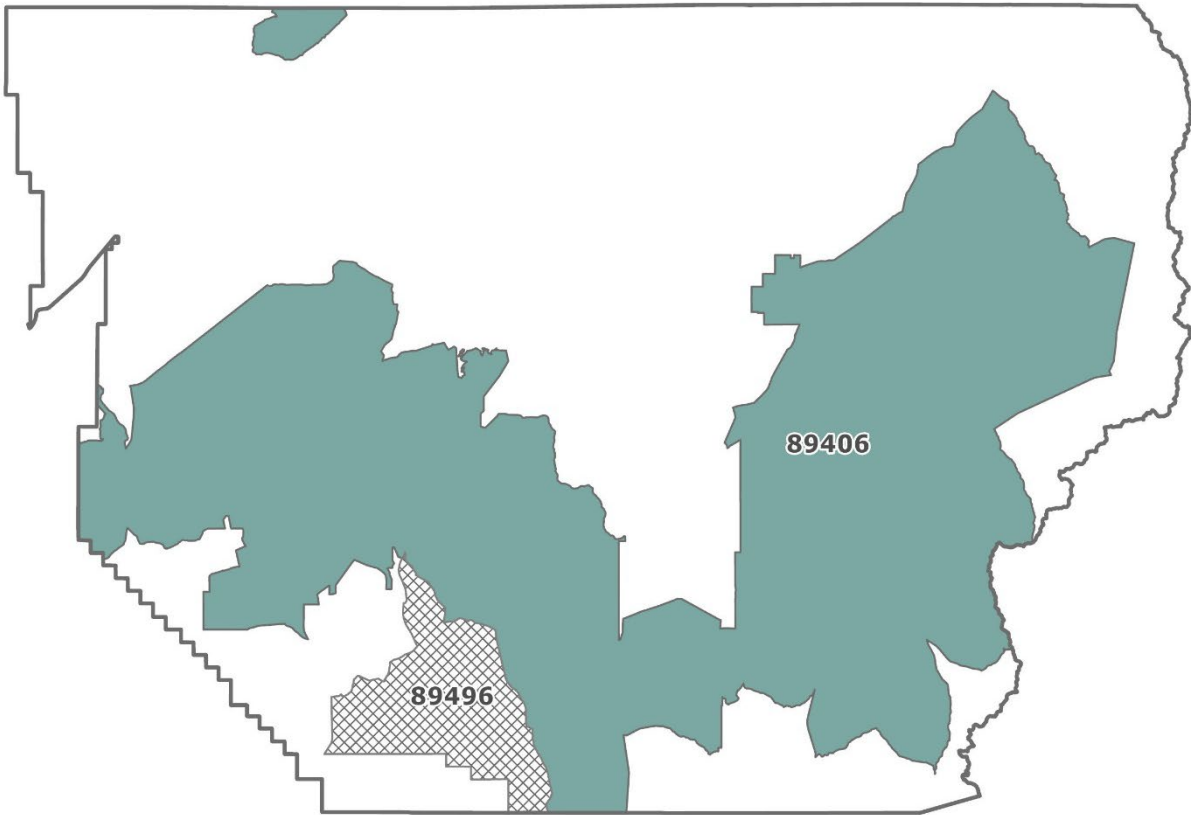


Lead Exposure Risk Category





-  Low
-  Medium
-  High
-  No Data*

Zip Code	Lead Exposure Risk Category
89701	High
89706	High
89703	Medium

Churchill County Map

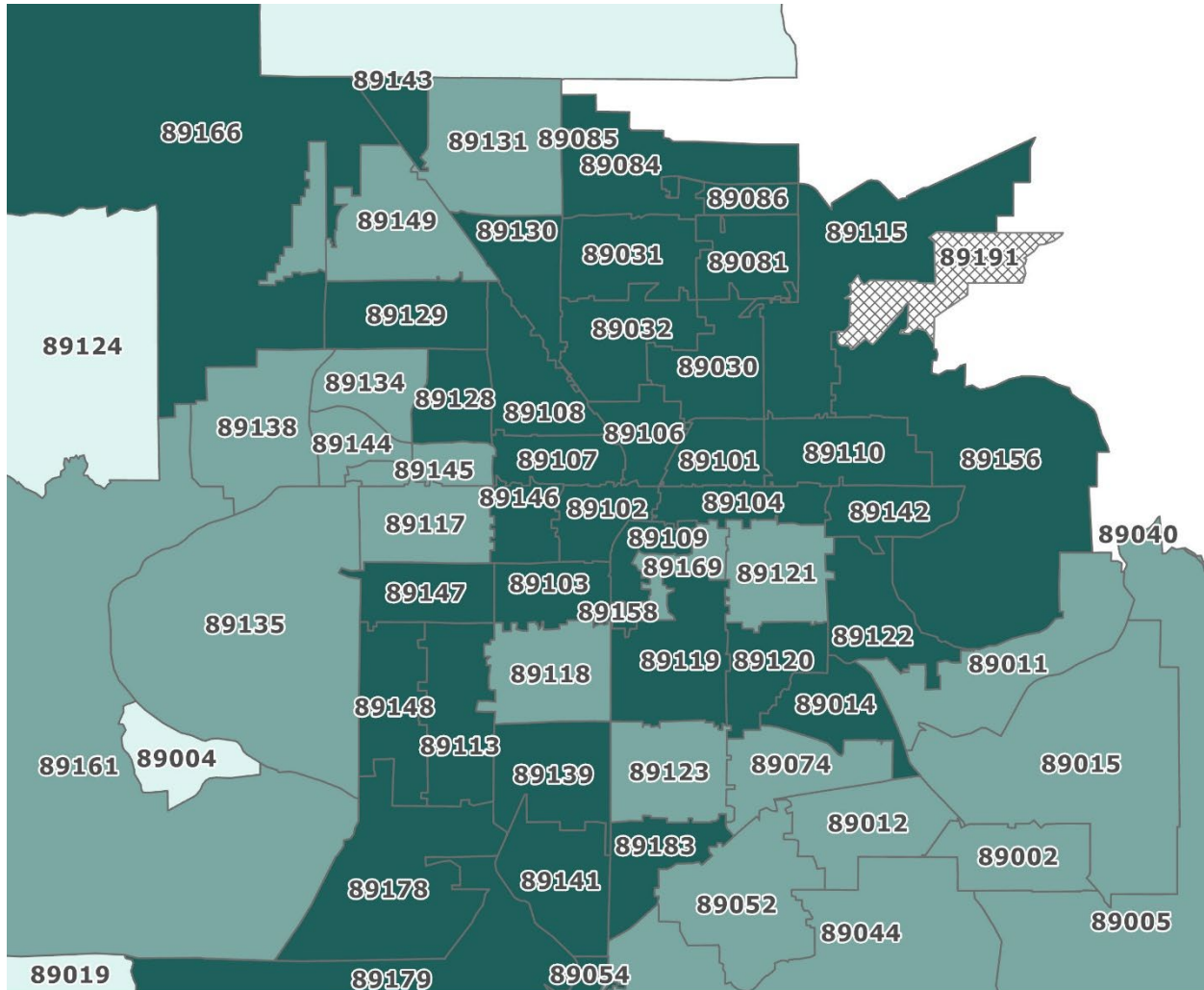


Lead Exposure Risk Category

-  Low
-  Medium
-  High
-  No Data*

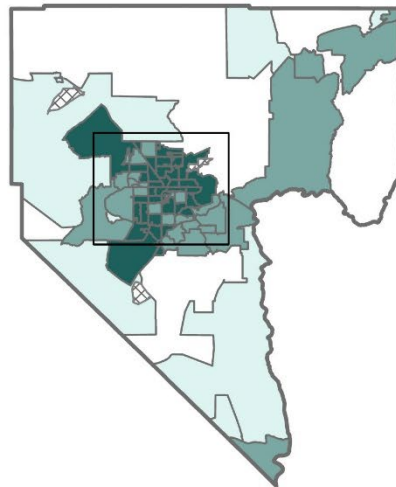
Zip Code	Lead Exposure Risk Category
89406	Medium

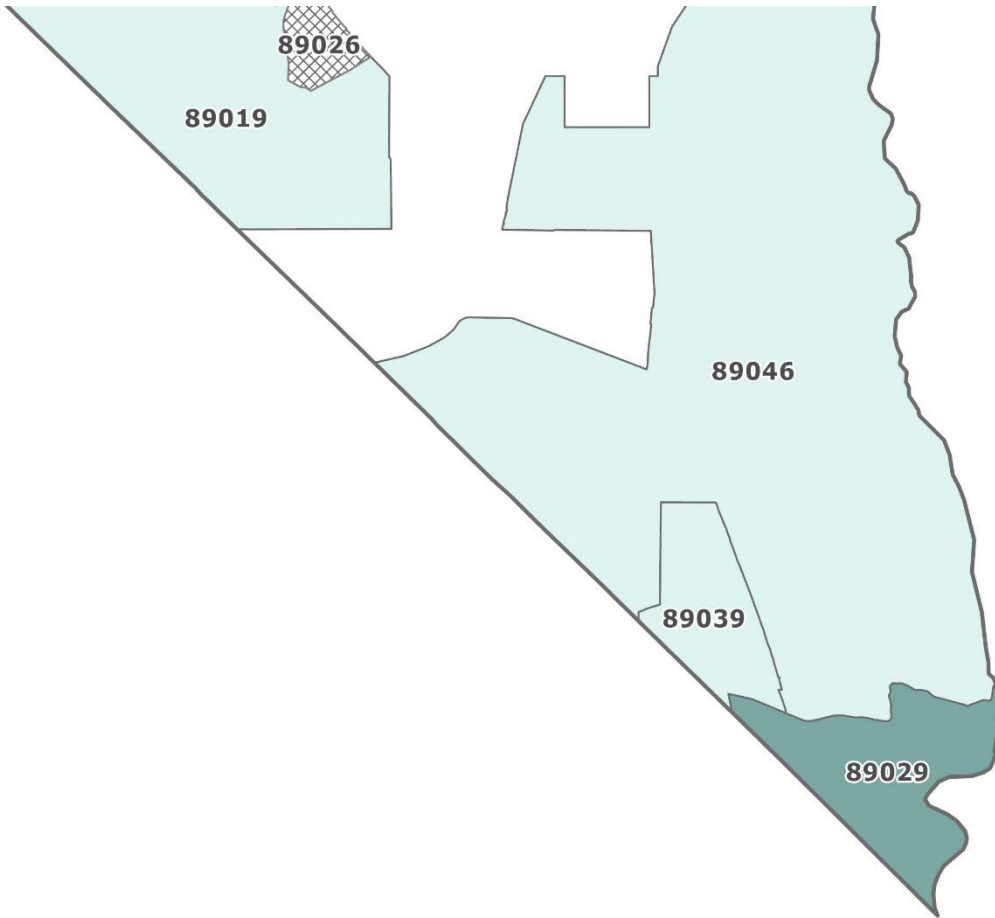
Clark County Maps



Lead Exposure Risk Category

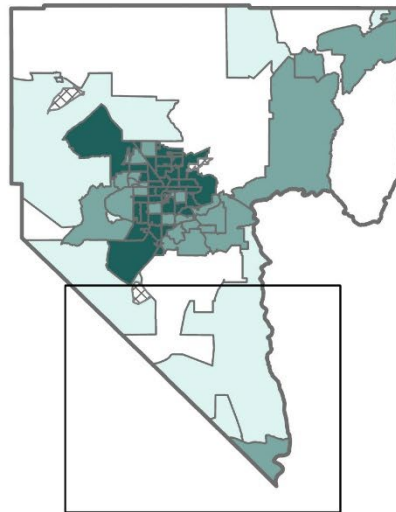
- Low
- Medium
- High
- No Data*

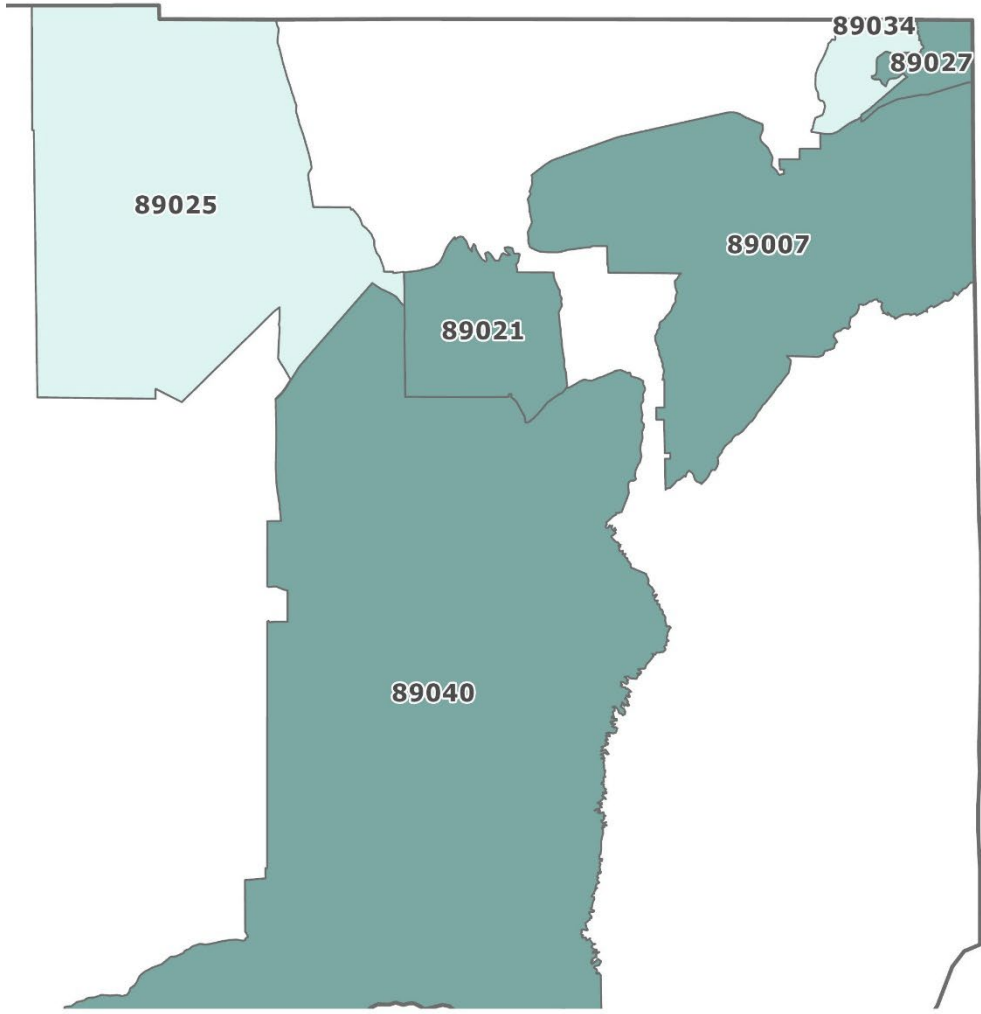




Lead Exposure Risk Category

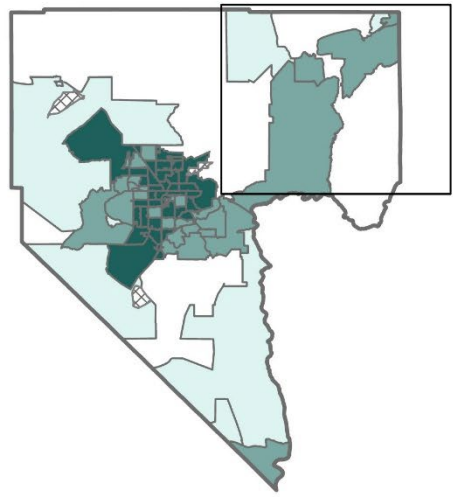
- Low
- Medium
- High
- No Data*





Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

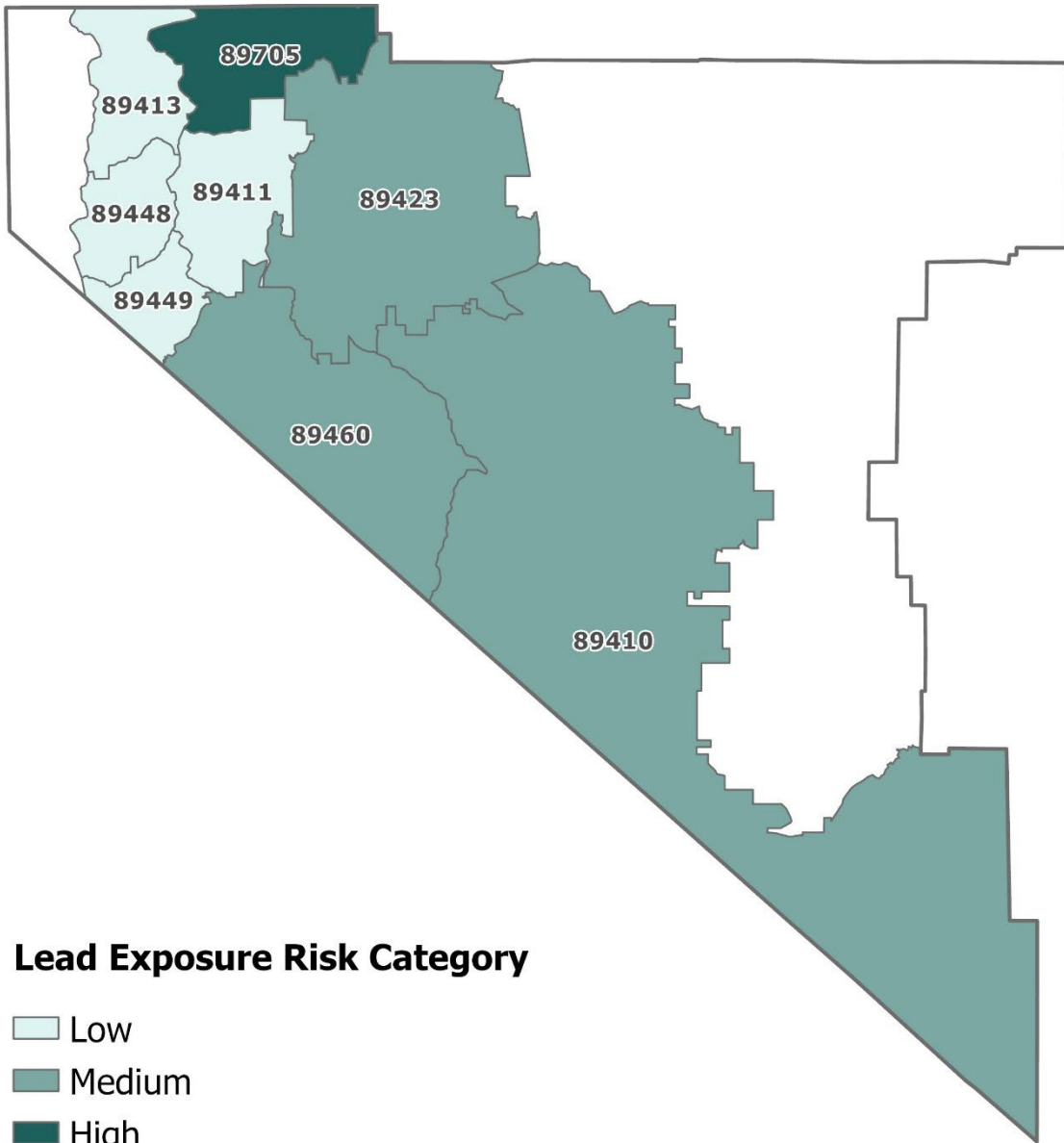


Zip Code	Lead Exposure Risk Category
89014	High
89030	High
89031	High
89032	High
89054	High
89081	High
89084	High
89086	High
89101	High
89102	High
89103	High
89104	High
89106	High
89107	High
89108	High
89109*	High
89110	High
89113	High
89115	High
89119	High
89120	High
89122	High
89128	High
89129	High
89130	High
89139	High
89141	High
89142	High
89143	High
89146	High
89147	High
89148	High
89156	High
89166	High
89178	High
89179	High

89183	High
89002	Medium
89005	Medium
89007	Medium
89011	Medium
89012	Medium
89015	Medium
89021	Medium
89027	Medium
89029	Medium
89040	Medium
89044	Medium
89052	Medium
89074	Medium
89085	Medium
89117	Medium
89118	Medium
89121	Medium
89123	Medium
89131	Medium
89134	Medium
89135	Medium
89138	Medium
89144	Medium
89145	Medium
89149	Medium
89161	Medium
89169	Medium
89004	Low
89018	Low
89019	Low
89025	Low
89034	Low
89039	Low
89046	Low
89124	Low
89158	Low

*89109 was manually included in the list of high-risk zip codes based on guidance from the NvCLPPP advisory board.

Douglas County Map

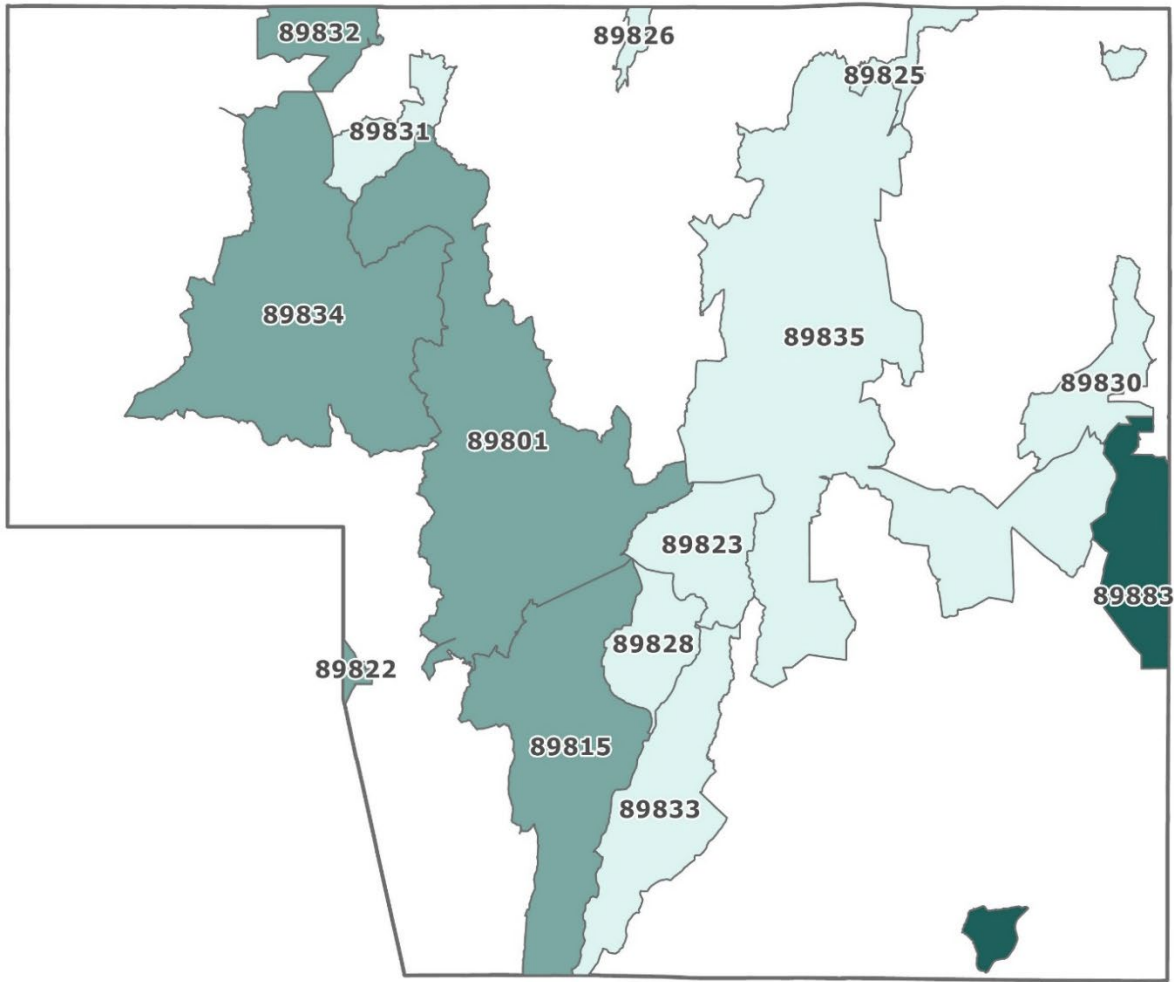


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89705	High
89410	Medium
89423	Medium
89460	Medium
89411	Low
89413	Low
89448	Low
89449	Low

Elko County Map



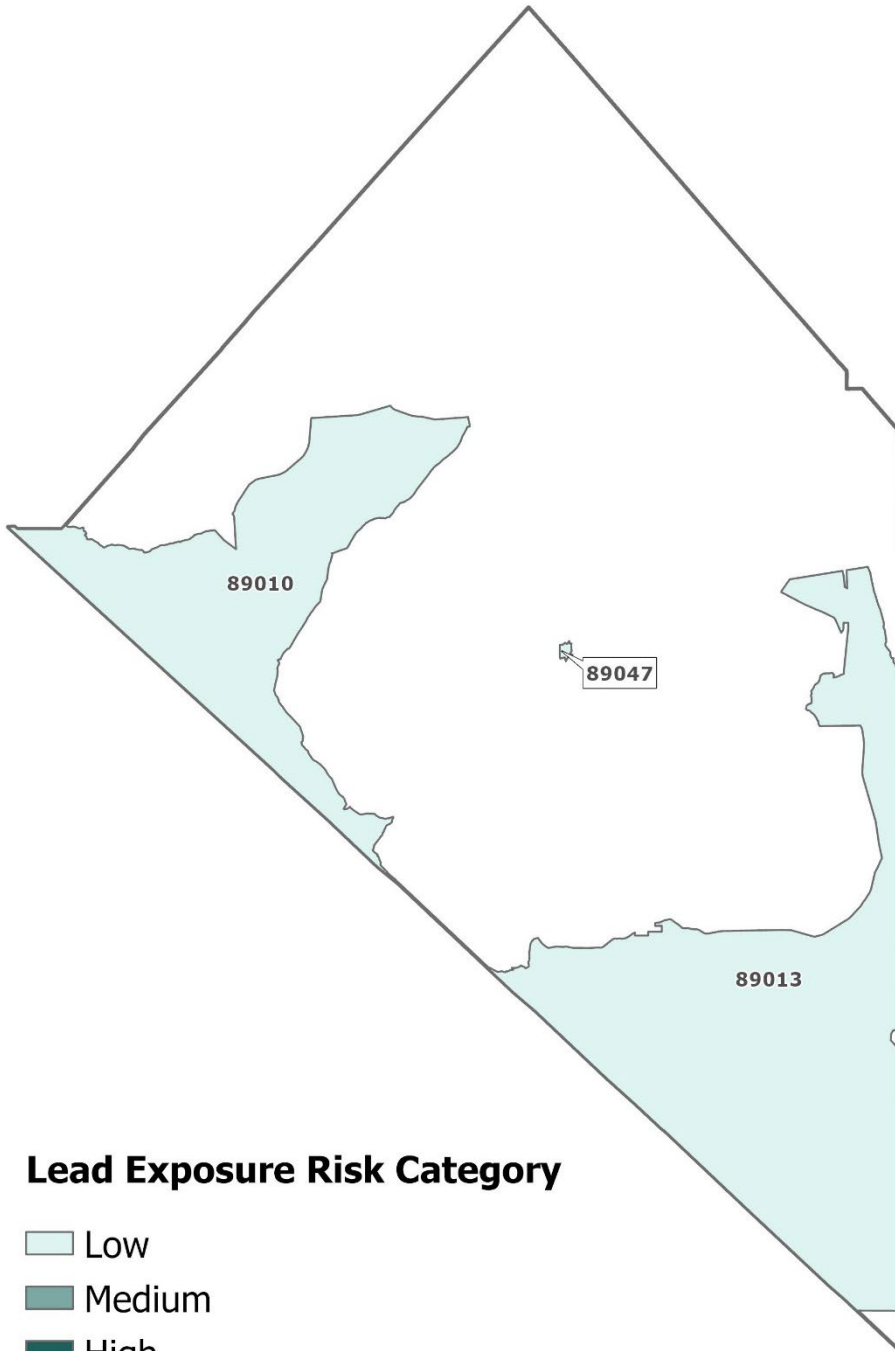
Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89883	High
89801	Medium
89815	Medium
89822	Medium
89832	Medium
89834	Medium
89823	Low

89825	Low
89826	Low
89828	Low
89830	Low
89831	Low
89833	Low
89835	Low

Esmeralda County Map



Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89010	Low
89013	Low
89047	Low

Eureka County Map

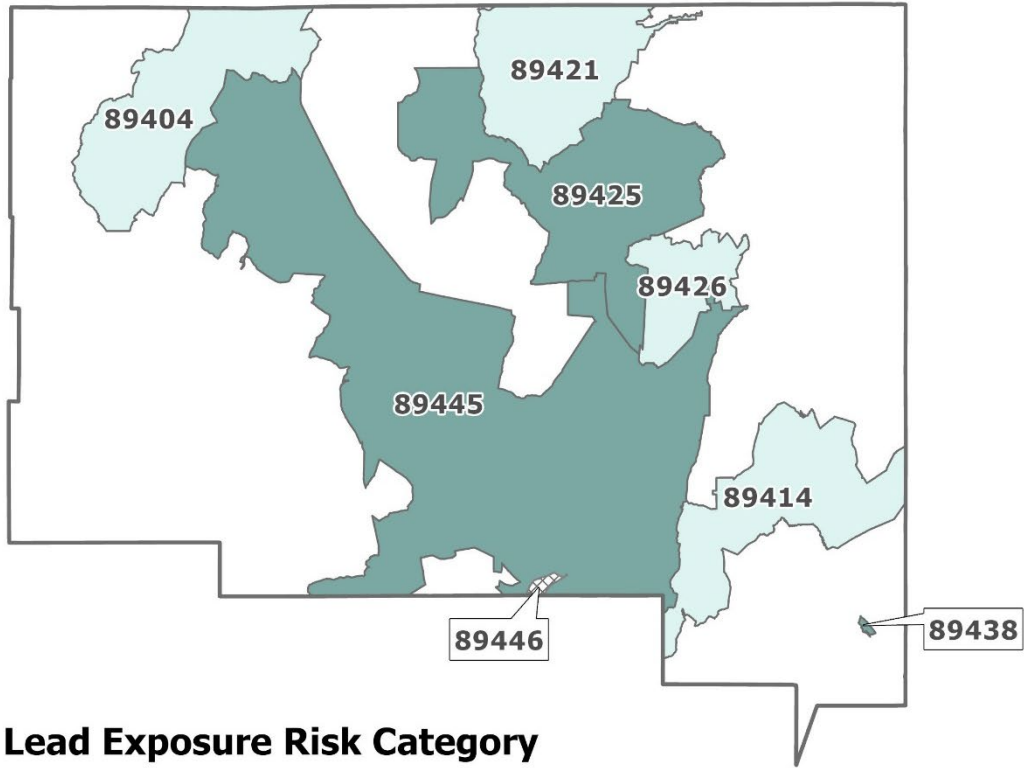


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89316	Low
89821	Low

Humboldt County Map

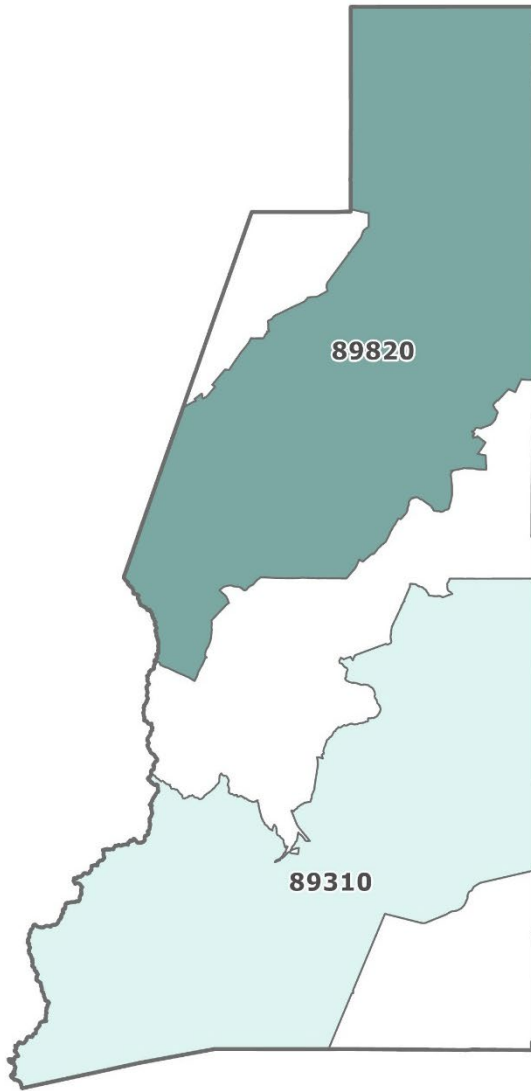


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89425	Medium
89438	Medium
89445	Medium
89404	Low
89414	Low
89421	Low
89426	Low

Lander County Map

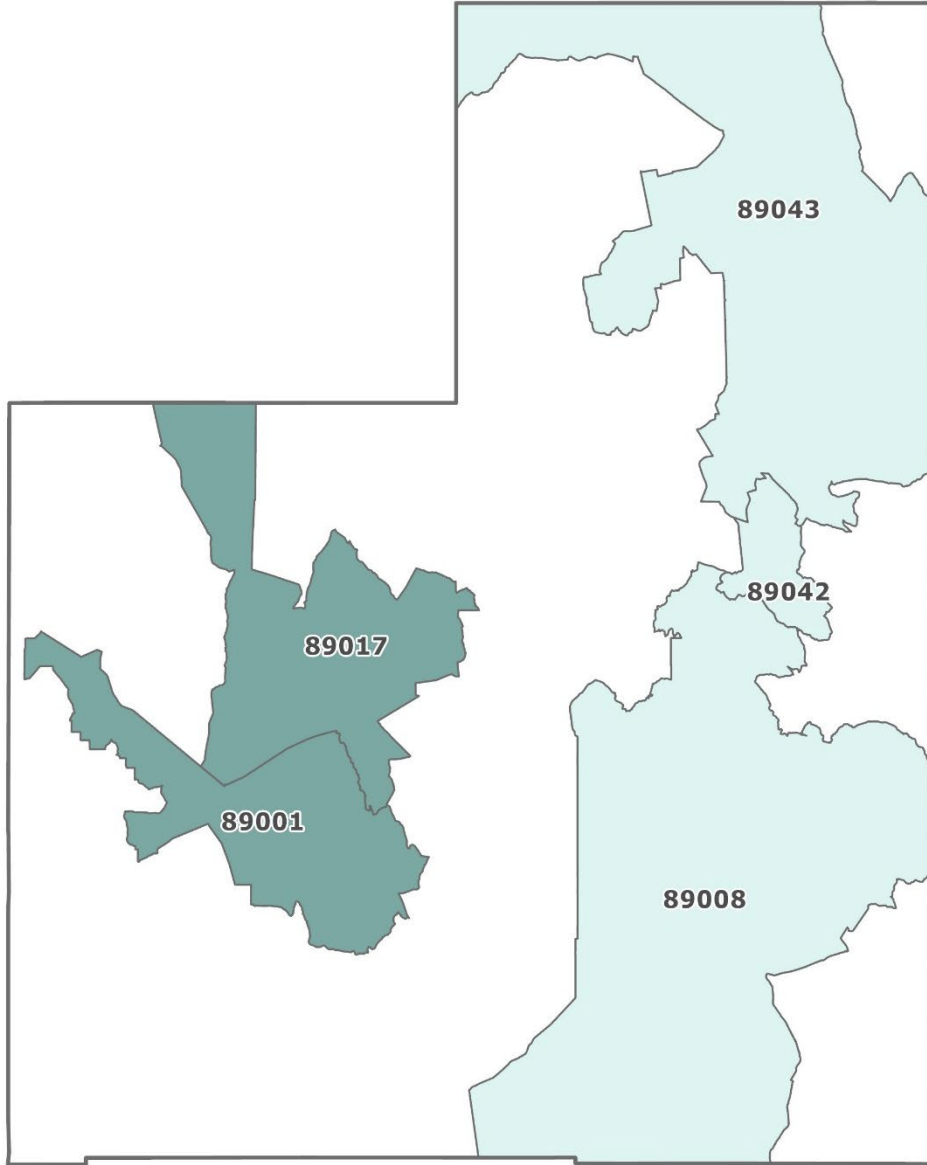


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89820	Medium
89310	Low

Lincoln County Map



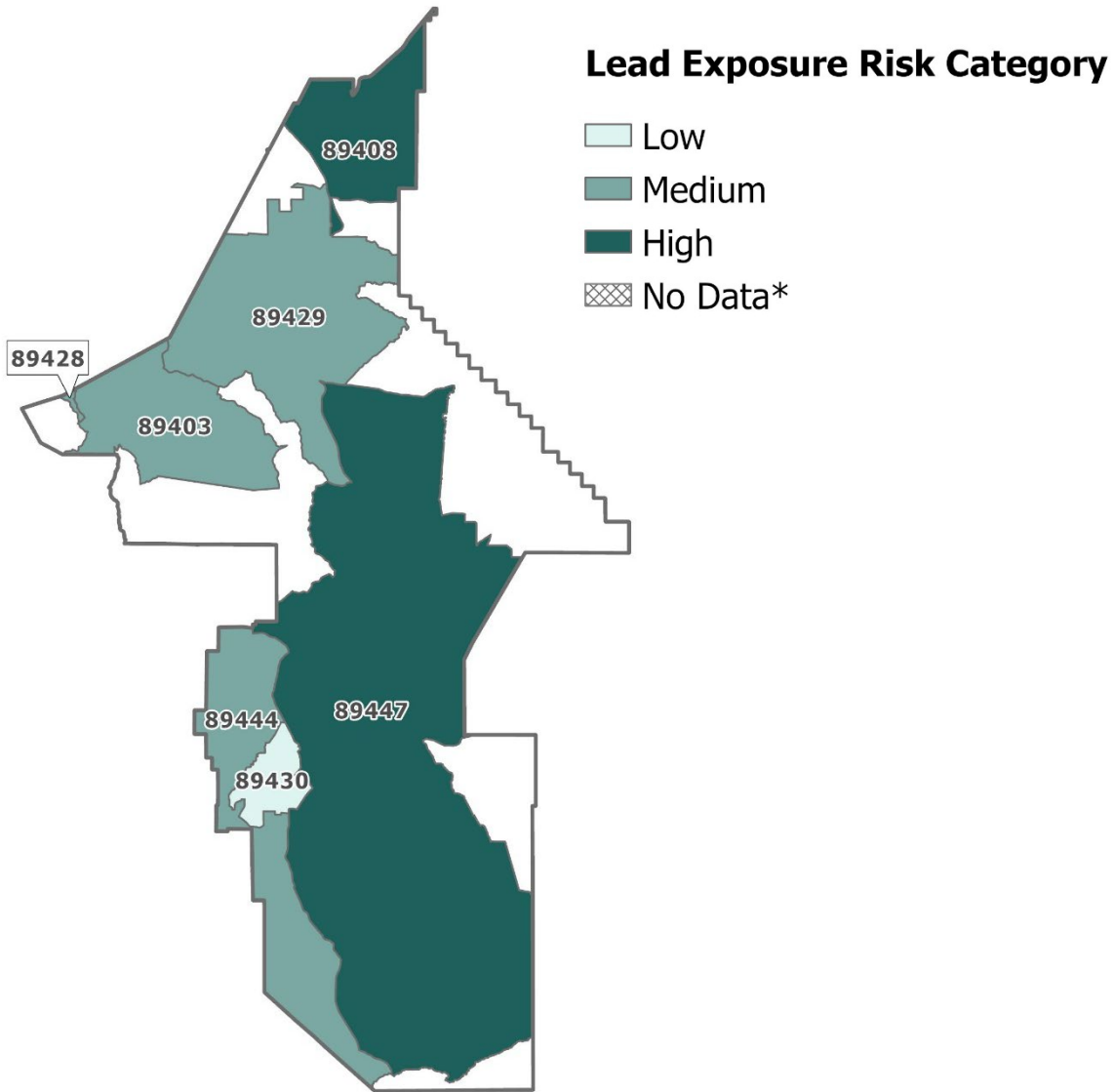
Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89001	Medium
89017	Medium

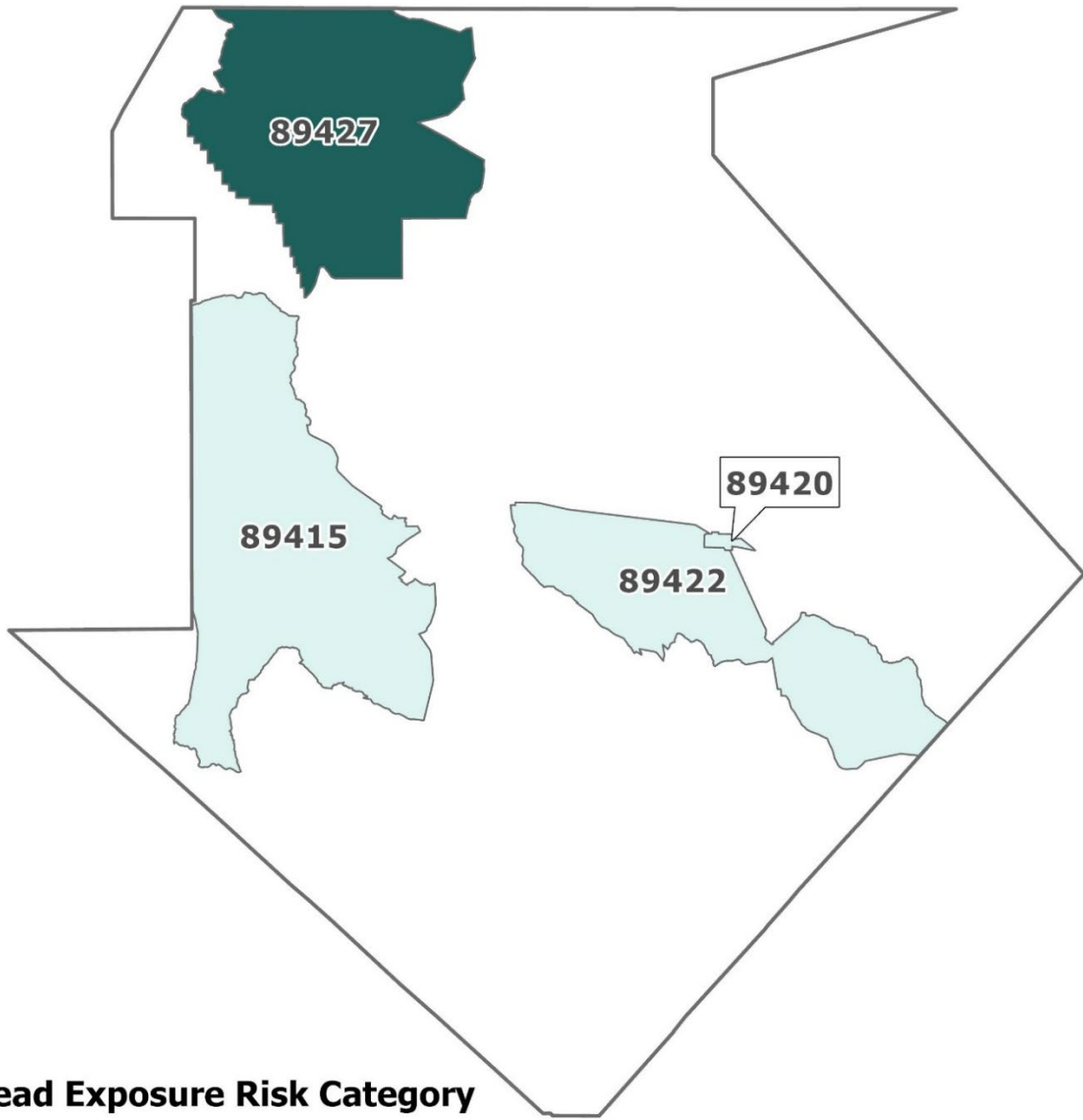
89008	Low
89042	Low
89043	Low

Lyon County Map



Zip Code	Lead Exposure Risk Category
89408	High
89447	High
89403	Medium
89428	Medium
89429	Medium
89444	Medium
89430	Low

Mineral County Map

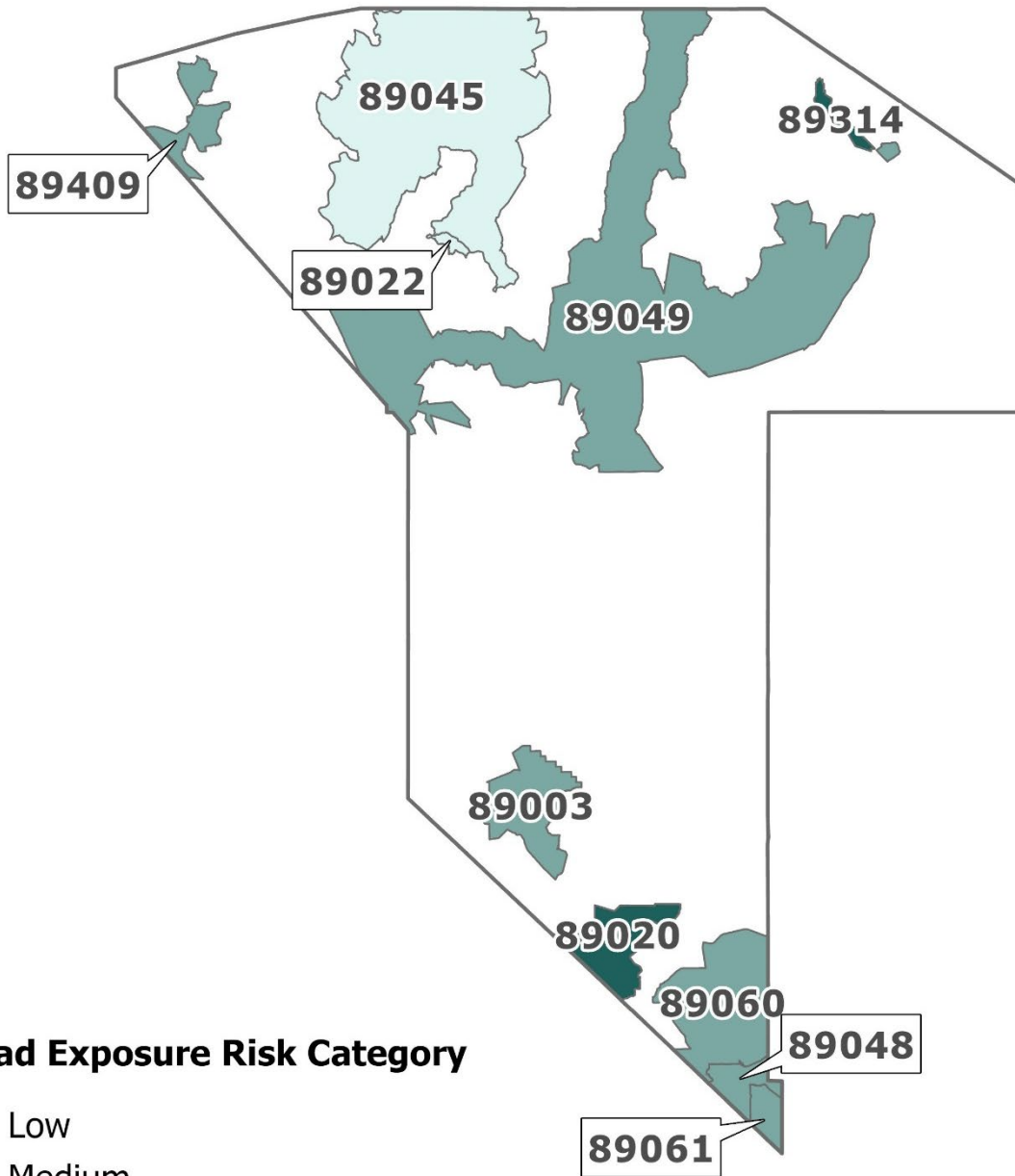


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89427	High
89415	Low
89420	Low
89422	Low

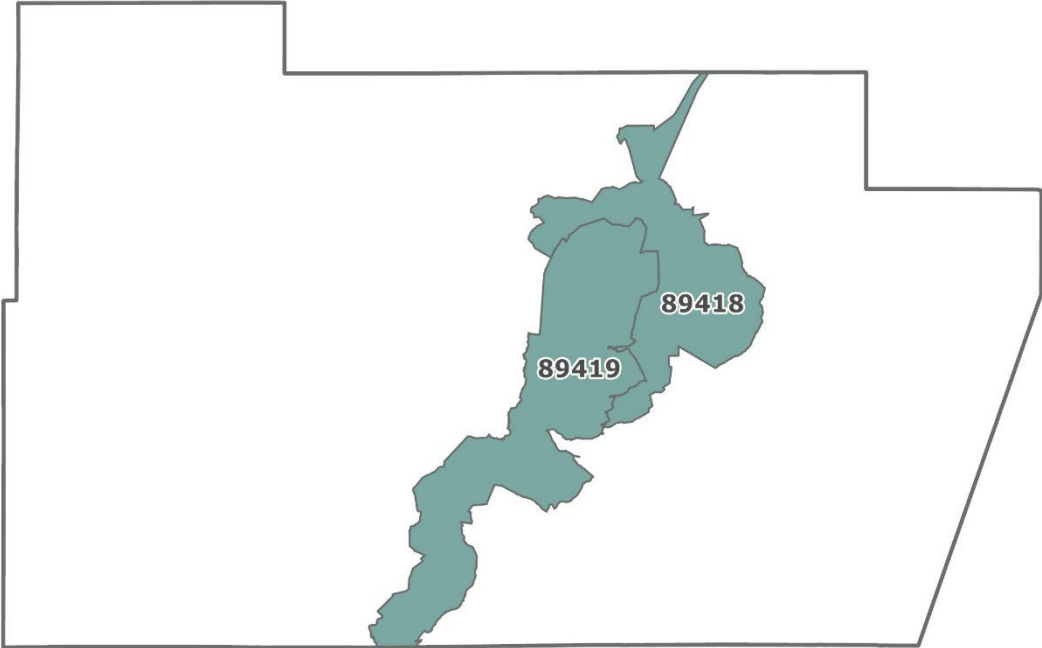
Nye County Map



Zip Code	Lead Exposure Risk Category
89020	High
89003	Medium
89048	Medium
89049	Medium

89060	Medium
89061	Medium
89409	Medium
89022	Low
89045	Low

Pershing County Map

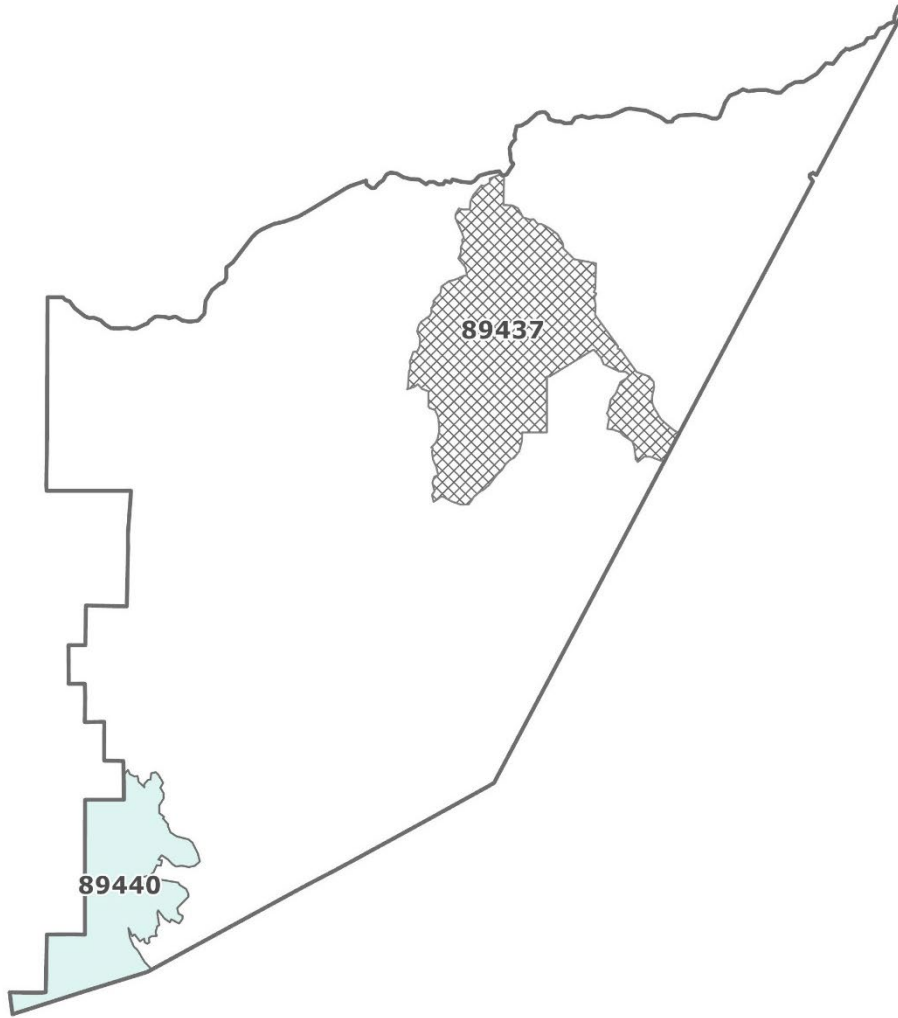


Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89418	Medium
89419	Medium

Storey County Map



Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

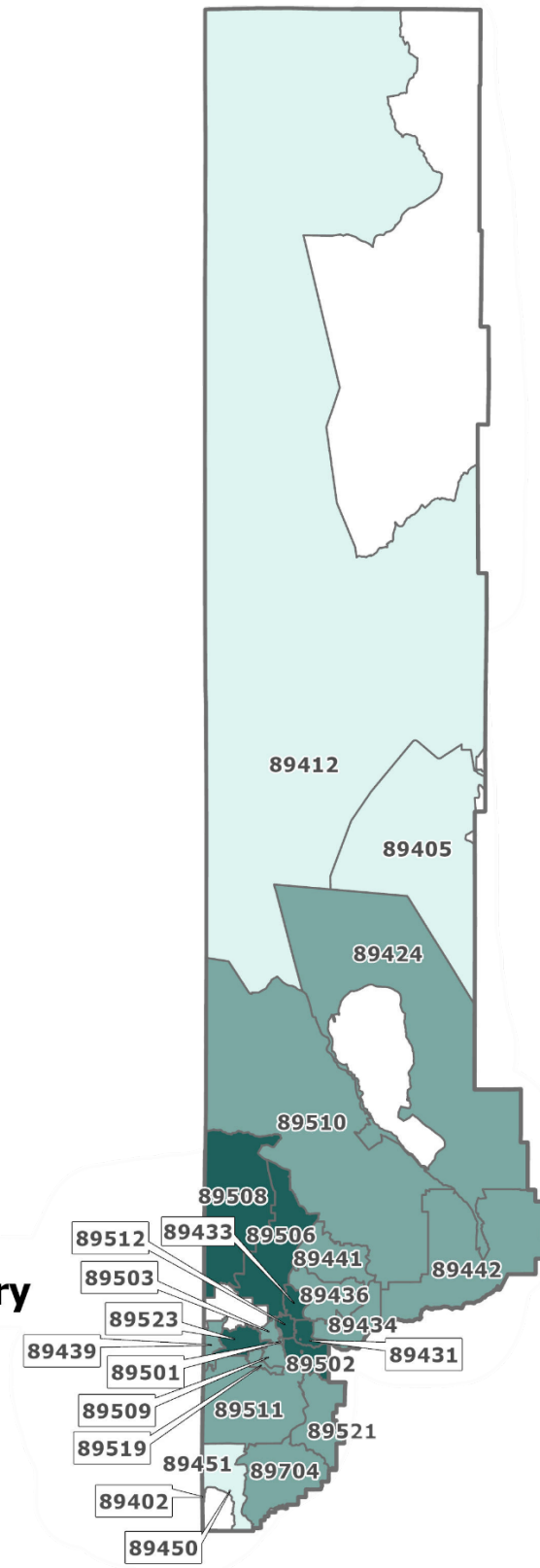
Zip Code	Lead Exposure Risk Category
89440	Low

Washoe County Maps

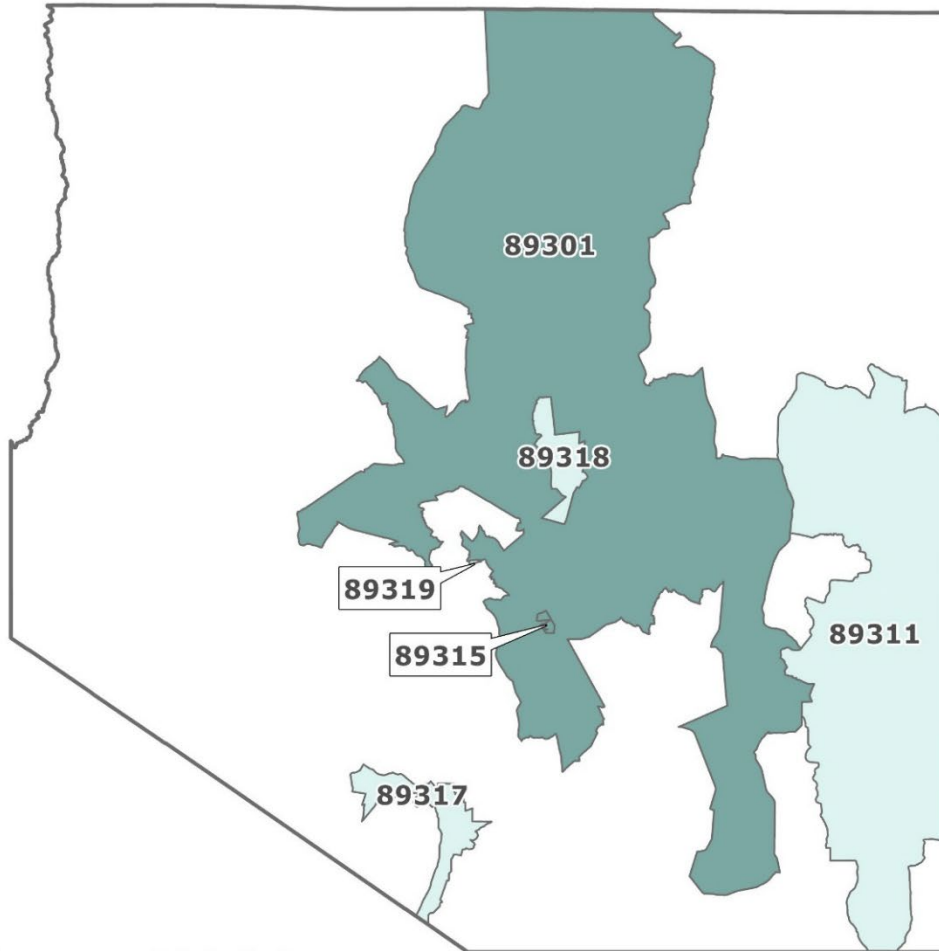
Zip Code	Lead Exposure Risk Category
89431	High
89433	High
89502	High
89506	High
89508	High
89512	High
89523	High
89424	Medium
89434	Medium
89436	Medium
89439	Medium
89441	Medium
89442	Medium
89501	Medium
89503	Medium
89509	Medium
89510	Medium
89511	Medium
89519	Medium
89521	Medium
89704	Medium
89402	Low
89405	Low
89412	Low
89450	Low
89451	Low

Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*



White Pine County Map



Lead Exposure Risk Category

- Low
- Medium
- High
- No Data*

Zip Code	Lead Exposure Risk Category
89314	High
89301	Medium
89315	Medium
84034	Low
89311	Low
89317	Low
89318	Low
89319	Low