NEVADA CHILDHOOD LEAD POISONING PREVENTION PROGRAM

2020 BLOOD LEAD TESTING AND RESPONSE PLAN

LEAD FREE NV

NvCLPPP

Nevada Childhood Lead Poisoning Prevention Program

Table of Contents

List of Tables

List of Figures

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Mission and Vision Statement

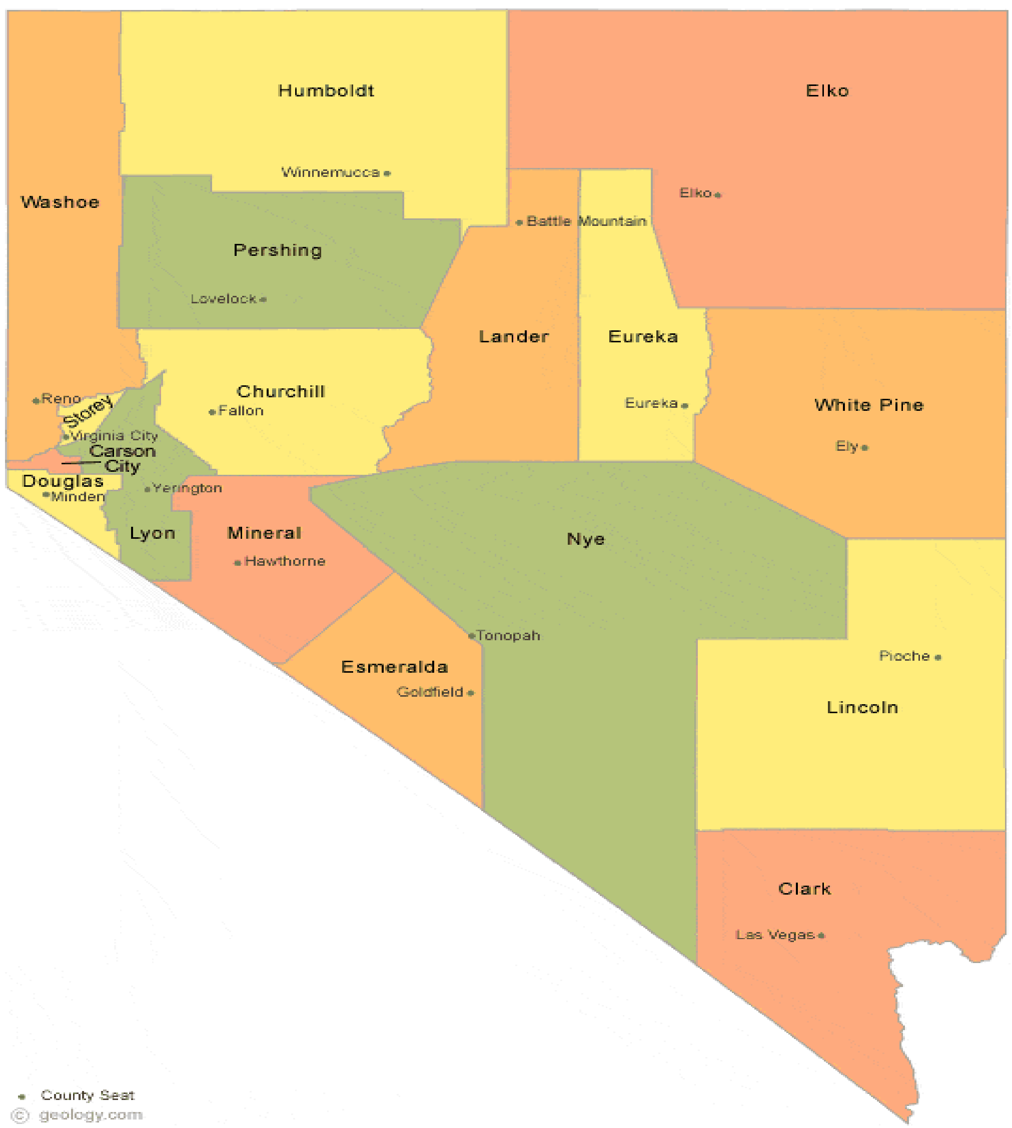
Vision
Our mission is to promote a lead-safe home environment so that all Nevada children can achieve their full potential.

Mission
The mission of the Nevada Childhood Lead Poisoning and Prevention Program (NvCLPPP) aims to reduce the long-term health risk of childhood lead poisoning through prevention, education, and surveillance.

Nevada at a Glance

Nevada has over 2.8 million residents distributed across 17 counties. Three counties house most of the population with over 2.2 million living in Clark County, over 445,000 in the Washoe area, and over 54,000 in Carson City. The rest of the population lives in rural/frontier areas. Nevada is home to over 217,000 children under six years of age. Three health districts serve the most populated areas of the state, which include the Southern Nevada Health District located in Clark County, the Washoe County Health District located in Washoe County, and the Carson City Health and Human Services located in Carson City. The Nevada Division of Public and Behavioral Health oversees all the rural/frontier areas of the state.

Figure 1. Counties in Nevada



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 can have long-lasting impacts on children. It is imperative that we ensure that children in our state have healthy environments in which they can live, learn, and play. Over 217,000 children under the age of 6 call Nevada home but less than four percent are screened for lead making Nevada one of the lowest screening states across the U.S. The Nevada Childhood Lead Poisoning Prevention Program (NvCLPPP) staff and the Advisory Committee hope that stakeholders use this blood lead testing plan as guidance to prevent and address local issues.

A Call to Action

In 2012, the Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP) made critical recommendations on how local communities should address children with elevated blood lead levels (EBLLs). Prior to the updated recommendations, children were considered to have EBLLs at 10 ug/dL which was considered a “level of concern” at which county or state health districts should mount an environmental investigation to identify the sources of lead exposure, reduce exposure, and develop a case management plan with medical staff to monitor the reduction of lead in the blood. However, based on recent literature, the 2012 ACCLPP lowered the blood lead reference value to 5 ug/dL because there is sufficient evidence that at this level children can suffer from lower IQ scores, attention-related behavior problems, and lower levels of academic achievement (CDC, 2012a).

The Nevada Committee on Commerce and Labor passed Senate Bill 90 in July 2019, thereby amending the Nevada Revised Statute

QUICK FACTS

217,331

Children under the age of 6 live in Nevada

Less than

4 percent

are screened for lead

Nevada has one of the

lowest

screening rates across the United States

442.700 to lower the reference value for an elevated blood lead level from 10 ug/dL to ≥ 5 ug/dL. It is critical that young children are screened for lead exposure as effects may not be notable until children reach school age and may disproportionately impact low-income children who are already at higher risk for school-based challenges.

A recent study revealed that the negative effects of lead exposure (e.g., lower IQ scores and smaller brain volume) where amplified in children from low-income homes relative to high-income homes due to the interaction effect between lead exposure and household income (Marshall, Betts, Kan, McConnel, Lanphear, and Sowell, 2020). According to the National Health and Nutrition Examination Surveys (NHANES), 2.9 percent of preschoolers have EBLLs at 5 ug/dL representing nearly 535,000 children in the US between the ages of 1 and 5 (AAP, 2016). The response to the new recommendations has varied by jurisdictions – some have updated policies and procedure to respond to the new reference value while others have made no changes.

Challenges in Blood Lead Screening in Nevada

Federal, state and local regulations have played a significant role in reducing childhood lead poisoning by regulating the use of lead in specific products, such as paint and gasoline (Kemper, Cohn, Fant, Dombkowski, & Hudson, 2005). Nevertheless, the potential for childhood exposure to lead remains high, particularly due to the stability of lead in the environment, usage of lead in numerous industrial applications and widespread use of lead-based paint in older housing. In attempts to mitigate effects of childhood lead poisoning, many efforts have been initiated among schools of public health, public health departments, and healthcare professionals comprising of primary and secondary prevention methods.

Screening of children for blood lead levels in the primary care setting has been a critical tool in identifying lead-poisoned children. One problem arises, particularly in states in which screening rates are low. According to Roberts et al. (2017), it is estimated that in Western states, including Nevada, 3x as many children are underreported than are diagnosed (Roberts et al., 2017). Nevada has the second lowest ratio of childhood lead poisoning ascertainment.

Two recent studies support these results. In one study evaluating BLL screening in Clark County, Nevada, researchers found only five percent of children had been previously tested (Haboush-Deloye, Marquez, & Gerstenberger, 2017a). In another study conducted in Clark County, Nevada, barriers to childhood blood lead testing were identified.

Physicians who work with children six and under were surveyed about BLL testing practices, including whether they adhered to Centers for Disease Control and Prevention (CDC) screening guidelines. The study identified two major barriers to lead screening. First, a lack of adherence to CDC recommendations for lead screening by local physicians, and the second major barrier identified was parental noncompliance with doctor recommended BLL testing (Haboush-Deloye, Marquez, & Gerstenberger, 2017b).

A New Opportunity for Nevada

At present, surveillance data is sparse and makes it impossible to identify at risk-communities within both urban and rural settings. Nearly 25 percent of homes in Nevada were built before the 1978 ban of lead-based paint. Nevada is also home to one of the largest growing Hispanic minority populations – which is often concentrated in segregated communities of low-income and older housing. Nevada also has unique geography with two urban centers within 400 miles of each other while the rest of the state is rural or frontier, including prominent mining towns. Recent research indicates that rural communities may be at equal risk for lead exposure (Carrel et al., 2017).

The CDC grant offers the opportunity to strengthen the epidemiologic data to identify at risk-communities, mitigate any health disparities in blood lead poisoning that have been identified in the literature, and increase low-screening states. By using this data to better understand the population in Nevada, at-risk children who may otherwise go untested can be identified and linked to vital resources.

Pathways of Lead Exposure

The removal of lead-based paint and leaded gasoline from regular use during the 1970s led to a significant decrease in average childhood blood lead levels by the early 1990s (Gilbert and Weiss, 2006). Lead paint and dust that remain in older homes remain a primary source of lead exposure in the United States (Lanphear et al., 1998). However, other sources of lead like dust along roadways from decades of leaded gasoline use, cosmetics, and imported goods contribute to a substantial portion of elevated blood levels in the U.S. (Mielke, 1999).

Age of Housing

Age of housing is the largest and most established risk factor for lead poisoning among children (HUD, 2011). Older homes have a higher likelihood of having lead in the building, and older homes with of lower property value are more likely to have damaged paint than homes of a higher property value. Lead hazards in older homes result from peeling, disintegrating, and chipping of lead paint, dust from renovations and abatement that settles into the interior of older homes and contaminates surrounding soil.

Figure 2. Peeling Lead Paint

The Department of Housing and Urban Development (HUD) estimates that as of 2019, 24 million homes in the United States still have lead somewhere in the building (HUD, 2019). More than 34 percent of those households have a child under age six living in them (HUD, 2011). Children who live in older homes have higher mean blood lead levels than children who live in homes built after lead paint was banned (Kim et al., 2002). Children who live in houses with any lead can attain levels of lead in their blood as high as 20 µg/dL even without consuming lead-based paint chips (WHO, 2010). Undue exposure to lead can cause adverse health effects like decreased IQ and other neurodevelopmental challenges (Lanphear et al., 1998).

Dust from deteriorating paint and lead abatement during home renovations can become a source of exposure in household dust and soil, increasing the risk of childhood lead exposure (Spanier et al., 2013). Home renovation of houses where lead has been identified is significantly associated with increased blood lead levels of children in the home (Spanier et al., 2013).

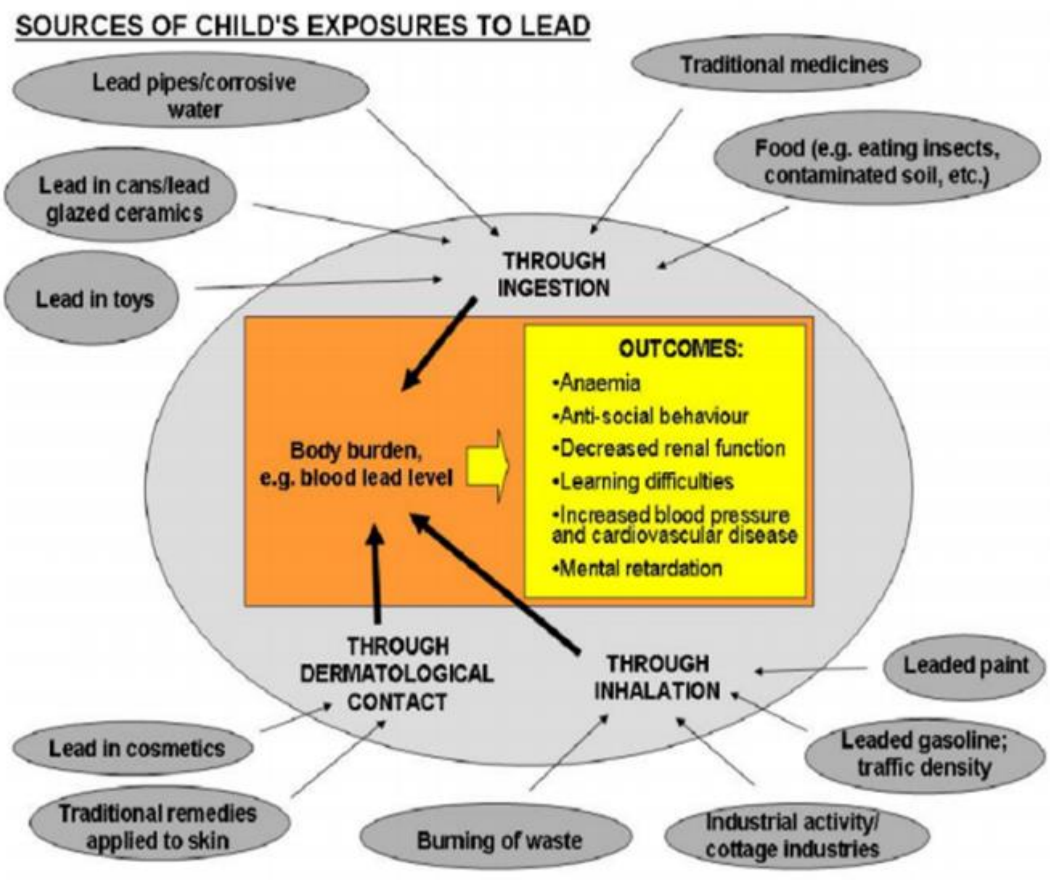
Other Sources of Lead Exposure

While the main source of lead exposure in the U.S. today is from deteriorating lead-based paint in older housing, there are still many other pathways by which children can be exposed to lead (Figure 2). A systemic review of the literature supports that atypical sources of exposure can lead to childhood lead poisoning cases and require the expansion of screening techniques by pediatricians and medical providers to identify children who may have an EBLLs (Grospe & Gerstenberger, 2008).

The variety of sources and pathways by which children can be poisoned makes no child immune to lead poisoning. However, the burden isn't equal with children of lower economic status, living in deteriorated housing, often of ethnic minority (non-Hispanic Black and Mexican American children) status carry the greatest burden (Sampson, 2016). Disparities by race/ethnicity and socioeconomic status persist despite the overall decline in blood lead levels (BLLs) (Sampson, 2016). Figure 2. Sources of Child's Lead Exposure. Source: World Health Organization 2010

Figure 3. Sources of Child's Lead Exposure.

Source: World Health Organization, 2010



Parent's Occupation

Workers are exposed to lead through the production, use, maintenance, recycling, and disposal of lead materials and products (OSHA, 2019). Workers in specific occupations such as demolition, smelting, mining, radiator repair, and gun range work have been found to have elevated blood lead levels (OSHA, n.d.). Children of lead-exposed workers have disproportionately higher BLLs when compared to other children of non-lead exposed workers (Porter et al., 2015). This is largely attributed to "take home lead dust" which can be brought from the job site to the home on the clothes, the body and hair, and in the vehicles of workers, subsequently leading to increased lead levels in the home (CDC, 2009).

In a study of six families conducted by Maine's Childhood Lead Poisoning Prevention Program (MCLPP), it was found that "5 of the 6 family vehicles tested positive for lead dust with a median of 550 µg/ft2 for driver/passenger seats (range: 49--2,100 µg/ft2) and a median of 1,570 µg/ft2 for driver/passenger floors (range: 240--2,900 µg/ft2)" (CDC, 2009). In the same study of the five families, 2 of the 5 families' homes had lead dust in areas where family members removed and kept work clothes, including an entryway/deck (110 µg/ft2), another entryway (1,200 µg/ft2), and a laundry room (40 µg/ft2). One nationwide study estimated that 48,000 families have children under age 6 living with household members occupationally exposed to lead (Roscoe et al., 1999). In addition, it is estimated that more than 1.64 million workers in the U.S. are exposed to up to 50 µg/m^3 lead daily in the workplace (OSHA, 2012).

Imported Goods Contaminated with Lead

Traditional Medicines

Other sources of lead exposure in the U.S. come from imported goods contaminated with lead such as certain cosmetics, ceramics, foods, and traditional folk remedies. Traditional cosmetics/medicines like kajal, kohl, surma, and tiro have been used for millennia in North Africa, the Middle East, and the Indian subcontinent to promote visual acuity and to soothe irritated eyes; however, these cosmetics/medicines may contain more than 50 percent lead (CDC, 2012, 2013a; Parry and Eaton, 1991). For example, a laboratory analysis of kohl found samples with a lead content greater than 85% (Jallad & Hedderich, 2005), while tiro showed a lead content of 82.6 percent (CDC, 2012b). In one study, surma users had higher average blood lead levels (29.6 ± 10.2 µg/dL) compared to non-surma users (4.9 ± 0.8 µg/dL; $p < .001$; Goswami, 2013).

Some ayurvedic medicines from India and other South Asian countries have caused blood lead levels as high as 112 µg/dL (CDC, 2004a). The rasa shastra branch of ayurvedic medicine, in particular, combines herbs, metals, & minerals into medicines to treat gastrointestinal, cardiovascular, and respiratory symptoms as well as infertility, diabetes, and teething (Prpic Majic, Pizent, Jurasovic, Pongracic, Restek-Samarzija, 1996; Raviraja, Vishal Babu, Sehgal, Saper, Jayawardene, Amarasiriwardena, Venkatesh, 2010). However, some rasa shastra medicines may contain up 200,000 µg/g of lead (CDPH, 2019).

Saper and colleagues (2008) found that rasa shastra ayurvedic medicines were more than two times as likely to contain lead than non-rasa shastra ayurvedic medicines, 41% versus 17%, respectively, $p = .007$. Additionally, Saper and colleagues (2004) found that 20% of ayuervedic medicines sold in Boston, MA contained lead in excess of daily permissible limits. Furthermore, 21% of both US and Indian manufactured ayurvedic medicines sold on the internet contained detectable levels of lead.

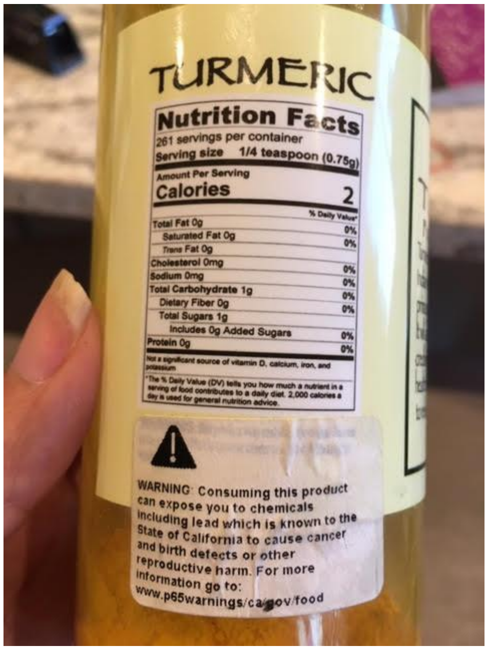
Another traditional remedy, litargirio, used among Latinos/Dominicans as a deodorant and folk remedy can contain up to 36 percent lead content (CDC, 2005). Similarly, the fine yellow powder greta and the bright orange colored azarcon are used throughout Latin America, but especially in Mexico, to treat upset stomach, constipation, diarrhea, vomiting, and teething. These powders may also go by the name alarcon, coral, luiga, maria luisa or rueda depending on country in Latin America (CDC, 2019). Greta may contain up to 97 percent lead, while azarcon may contain up to 95 percent lead (CDC Work Group on Lead and Pregnancy; National Center for Environmental Health, Division of Emergency and Environmental Health Services, 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).

Foods and Spices

Imported foods and spices may also contain excessive lead content. In March 2019 a blood lead test revealed that a Las Vegas child had an elevated blood lead level due to 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. The Environmental Investigator from the Southern Nevada Health District tested the turmeric by XRF and found that it contained 15,000 PPM of lead.

In 2018-2019, numerous imported turmeric spices were found to be contaminated with lead. In many cases, these products are not properly labeled. Figure 4 shows a label on the bottle of ground turmeric that warns of potential lead exposure.

Figure 4. The Label on this Bottle of Ground Turmeric Warns about Lead Exposure



The New York City Department of Mental Hygiene and Health examined approximately 1,500 spices/foods and found that over 30 percent had lead concentrations that exceeded the allowable limit of 2PPM (Hore et al. 2019). The average lead content was higher in spices purchased abroad than in the US (66% versus 40%, p < .001; Hore et al. 2019). Seventy percent of the spices from the country of Georgia exceed the allowable lead limit (2 PPM) including Georgian saffron, svaneti salt, caraway, and adjika (Hore et al. 2019). The other countries with the greatest percentage of food products that exceeded the allowable lead limit included Bangladesh (54%), Morocco (48%), Nepal (30%), Pakistan (25%), and Mexico (18%).

Lead has also been found in some tamarind candies imported from Mexico (CDC, 2002). Historically, some Mexican candy manufactures have had two versions of their product lines: one made for export to the US that meets FDA standards and one for sale in Mexico that contains excessive amounts of lead (Medlin, 2004).

California's Proposition 65 requires consumer products, foods, and beverages that contain excessive lead content to be properly labeled with the P65 warning label (Figure 5; Cox and Hirsch, 2019). Additionally, in 2007 the Center for Environmental Health in California initiated legislation and monitoring that limited the amount of lead in candies to 0.1 PPM. This legislation and subsequent litigation against several candy manufactures resulted in a reduction of lead contaminated chili and tamarind candies in California from 45 percent2004 to 0 percent by 2013-2016 (Cox and Hirsch, 2019).

Figure 5. California Proposition 65 Warning Label

Similarly, recent legislation in Mexico has established a program to monitor the level of lead in food, water, and consumer products (Tamayo-Ortiz, Sanders, Rosa, Wright, Amarasiriwardena, Mercado-Garcia,…Tellez-Rojo 2020). In 2018, retesting of 50 Mexican candies that initially tested positive for high levels of lead 10 years prior, revealed that only 0.04% of those candies still tested positive for lead (Tamayo-Ortiz et al., 2020). Among the two that tested positive, both were found to contain 0.1 PPM of lead, the maximum allowable limit in Mexico and California (Tamayo-Ortiz et al., 2020). Although the reduction of lead in candies in California and Mexico is promising news, Nevada has no such labeling mandate for products that contain lead. As such, this is fertile ground for future policy change.

Ceramic Dishware

The U.S. Food and Drug Administration (FDA) regulates the sale of dishware and cookware that contains hazardous substances such as lead. Ceramic dishware and cookware may contain lead in the glaze, paint or clay. Lead from dishware can leach into foods and beverages (Centers for Disease Control, 2004). This is most likely to occur when foods are highly acidic and when foods or beverages are stored in dishware for long periods of time (Centers for Disease Control, 2004). Cracked or chipped dishware is a high risk for lead leaching (Centers for Disease Control, 2004). Additionally, putting dishware in the microwave or dishwasher speeds up deterioration, which can lead to greater lead leaching (Centers for Disease Control, 2004). Dishware that exceeds the FDA action levels cannot be sold legally in the U.S. Figure 6 lists the various action levels for lead in dishware (Food and Drug Administration 2000).

Figure 6. FDA Lead Action Levels for Ceramicware and hollowware

LEAD

Commodity	Action Level (µg/ml leaching solution)	Reference
Ceramicware		
Flatware (average of 6 units)	3.0	CPG 545.450
Small hollowware (other than cups and mugs) (any 1 of 6 units)	2.0	CPG 545.450
Large hollowware (other than pitchers) (any 1 of 6 units)	1.0	CPG 545.450
Cups and mugs (any 1 of 6 units)	0.5	CPG 545.450
Pitchers (any 1 of 6 units)	0.5	CPG 545.450
Silver-plated hollowware		
Product intended for use by adults (average of 6 units)	7	CPG 545.500
Product intended for use by infants and children (any 1 of 6 units)	0.5	CPG 545.500

Lead tainted ceramics have been found in the US, Latin America, Africa, Southern Europe, and the Middle East (CDC, 2004b; Diaz-Ruiz et al., 2017; Romieu, Lacasana, & McConnell, 1997;). The FDA requires decorative or ornamental ceramicware with extractable lead to be properly labeled so that the item is not used for food or beverage handling purposes (Food and Drug Administration 2010). However, these products often bear a stick-on label or bear a message on the packaging— and not the item itself (Food and Drug Administration 2010). As a result, once the sticker or packaging are removed, the items often gets used for food and beverage handling purposes.

For example, one Latin American ceramic bean pot in the possession of NvCLPPP was tested with X-ray fluorescence (XRF) and found to have over 520,000 parts per million (52%) lead content in the inner glazed cooking surface (Figure 8). This item has substantial deterioration on the inner glazed surface from extensive use. Since the 1990s, studies in Mexico have linked lead-glazed ceramics to elevated blood levels (Lynch, Elledge, and Peters, 2008). Many of these same ceramics continue to be used in the US. Valles-

Medina and colleagues (2014) found that 81% of glazed pots sold in a Mexico-US border tested positive for the presence of lead.

Figure 7. Traditional Bean Pot with over 9,00 PPM of lead outside and over 520,000 PPM of lead inside

Given greater consumer awareness and concern about lead in ceramics, some manufacturers market ceramics as "lead free" despite that they contain leachable lead. The FDA has confirmed these reports and established the action level guidelines for lead leaching (Food and Drug Administration 2010).

If lead leaching exceeds the action levels, the FDA may consider the use of the term "Lead Free" to be false and misleading (Food and Drug Administration 2010). FDA's guidance documents do not establish legally enforceable responsibilities, instead this guidance should be viewed as recommendations unless statutory requirements are cited (Food and Drug Administration 2010). In essence, dishware labeled as "lead free" may not truly be lead free. XRF testing revealed that one ceramic bowl labeled as "lead free" in the possession of NvCLPPP contained 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.

Figure 8. Dishware labeled as "Lead Free" despite containing lead

Toys

Lead can also be found in the paint, metal, and plastic parts of some toys and toy jewelry, particularly those made in other countries, as well as antique toys and collectibles (CDC, 2019). According to the Consumer Product Safety Commission Act of 2008, the surface of children's products must not contain more than 0.009 percent (90 parts per million) of lead in paint or any similar surface coatings (CPSC, 2008). One interlocking plastic brick child's toy that was XRF tested by NvCLPPP was found to contain 2,893 part per million of lead, well exceeding the 90 PPM limit. Young children are at risk for ingestion and absorption of lead from toys and toy jewelry due to their tendency to engage in hand-to-mouth activity (Schnur & John, 2018).

Prior to the CPSC Act of 2008, children's toys could not exceed 600 PPM of lead (Federal Register 2009). An analysis of toys from day care centers in Las Vegas revealed that about 5% of the sampled plastic toys contained lead in excess 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 2008 CPSC standard. Notably, toys made with PVC plastic and/or yellow colorant were more likely to contain

Figure 9. Children's Bead Maze Toy with 528 PPM Lead in the Green Wire, exceeds the 2008 CPSC Lead Limit of 90 PPM

excessive concentrations of lead (Greenway & Gerstenberger, 2010). Another study from China found that toys sold by unorganized sellers (akin to Ebay), cheaper and poorer quality toys, toys intended for infants, and toys with small sales volume tended to have greater lead concentrations (Shen, Hou, Zhang, Wang, Zhang, Shi & O'Connor, 2018).

Why is lead in traditional medicines, spices, cultural items, and toys?

Some food products may inadvertently be contaminated during the manufacturing or packaging process (Food and Drug Administration [FDA], n.d.). For instance, the grinding wheel used to ground spices may contain lead parts, which subsequently may contaminate spices with lead. Additionally, some herbs and spices may unintentionally be planted in lead contaminated soil (Angelon-Gaetz, Klaus, Chaudhry & Bean, 2011). Tamarindo pulp may be stored in leaded glazed ceramics, which thereby leaches lead into the pulp (Lynch et al. 2000; Meyer et al. 2008; Diaz-Ruiz et al. 2016). In other cases, lead may be leached from the individual colorful plastic packaging of tamarind candies (Lynch, Boatright & Moss, 2000).

In other instances, lead is deliberately added to products. In the case of Ayurvedic medicine and kohl/surma, lead is added as users believe that it has unique medicinal properties (Tiffany-Castiglion, Barhoumi & Mouneimne, 2012). Yet in other instances, lead is intentionally added to turmeric and other colorful spices to increase weight for sale and to make colors more vibrant (Cowell, Ireland, Vorhees & Heiger-Bernays, 2017). Lead is regularly used in plastic toys as it softens plastic, making it more flexible so that it can go back to its original shape (Centers for Disease Control 2019). Additionally, lead stabilizes molecules in plastic from heat (Centers for Disease Control 2019). Furthermore, lead is used to plastics and paint of children's toys to help create vibrant colors (Centers for Disease Control 2019).

Risk Factors

Beyond the environmental risk factors, individual host factors are also associated with elevated blood lead levels. Blood lead data from the National Health and Nutritional Examination Surveys (NHANES) have been used since 1976 to describe children with increased blood lead levels. The most recent analysis indicated that differences in mean blood lead levels persist between income groups and racial/ethnic groups. Children at highest risk for elevated mean blood lead levels are non-Hispanic Blacks, children from poor families, and children who live in housing built before 1950 (CDC, 2013b).

Age

Children aged six months to three years of age are more susceptible to increased blood lead levels because of their lack of control over their environment, their behaviors that may expose them to lead dust and lead coated items, and their physiology (Lanphear et al., 2002; ATSDR, Tarragó & Brown 2017). Notably, children eat more food and breath in more air per kilogram; ATSDR, 2017). Compared to adults, children are able to absorb 4 to 5 times more lead due to the efficiency of their stomachs (WHO, 2019). Conversely, once this lead is absorbed, children's livers are less efficient at removing lead from the body. Children under age three are at higher risk of exposure due to their proximity to the ground, and their inclination for placing things in their mouth, exposing them to dust and soil that may be contaminated with lead. Young children are especially susceptible to the negative effects of lead exposure because of their ongoing neurological development (Lanphear et al., 2002). Once lead enters the body, it enters the blood stream and has the opportunity to cross the blood-brain barrier and reach the brain (Buchner et al., 2009). Within the brain, lead-induced damage in the prefrontal cerebral cortex, hippocampus, and cerebellum can lead to a variety of neurological disorders and behavioral problems. Among children with lead exposure, lead levels are known to peak around age two.

Race and Ethnicity

Among children ages, one through five, elevated blood lead levels are associated with race and ethnicity. Non-Latino Black children have higher average blood lead levels compared to non-Latino White children (1.8 vs. 1.3 µm/dL, respectively; CDC, 2013). Although overall blood lead levels have decreased since the 1970s, the racial disparity in elevated blood lead levels persist over time, especially between Black and White children (White, Bonilha & Ellis, 2015). For non-Latino Blacks elevated BLLs are inexorably linked to the legacy of racial residential segregation and discriminatory lending practices (i.e. redlining) that contributed to the devaluation of Black-owned properties and the subsequent financial strain to maintain said properties resulting from lost wealth (Sampson and Winter, 2016).

Children living in households receiving housing assistance through federal housing assistance programs are at high risk of lead poisoning, with black children disproportionately represented among those affected. There are about 4.3 million housing units in the assistance program. In 2016, the US Department of Housing and Urban Development (HUD) identified 57,000 federally assisted housing units with documented lead hazards and 450,000 housing units occupied by children containing potential lead hazards (i.e., pre-1978 lead-based paint; Benfer, 2017). According to the most recent data from the American Healthy Homes Survey, African American households have significantly more lead-based paints (45.6%) compared to White households (32%) and African American households were also more likely (28%) to have lead-based paint hazards than White households (20%) (Cox, Dewalt, O'Haver, & Salatino, 2011).

Compared to the general population, a higher percentage of Latino children have elevated blood lead levels (Brown and Longoria, 2010). Unlike other populations, exposure to lead among Latinos is multi-dimensional and incorporates environmental, cultural, and social dimensions (Brown and Longoria, 2010). Among some of the social dimensions, ethnic subpopulation, generation status (i.e., first-, second-, third-generation), nativity (i.e., US-born versus foreign-born), and length of time in the US are associated with blood lead levels. With regard to ethnic subpopulation, 2.7% of Puerto Ricans, 1.6% Mexican-Americans, and 0.9% of Cubans have been found to elevated BLLs (>25 µg/dL; Carter-Pokras, Prikle, Chavez, and Gunter, 1990). With regard to generational status, first-generation Mexican-American children had higher BLLs compared to third-generation Mexican-American children (Morales, Gutierrez, and Escarce, 2005). Similarly, Mexican-born children had higher BLLs compared to US-born Latino children (20% vs. 7%, respectively; Snyder, Mohle-Boetani, Palla, and Fenstersheib, 1995). Lastly, greater time spent in the US is associated with lower BLLs (Rothenberg, Manalo, Jiang, Khan, Cuellar, Reyes, et al., 1999).

Poverty

Like racial disparities, socioeconomic disparities in elevated blood lead levels also persist over time. Approximately 1.1 million homes that still have lead somewhere in the building are considered low-income (HUD, 2011). Children living in low-income housing were more likely to have elevated blood lead levels compared to children living in homes with higher property values (Kim et al., 2002). This suggests that homes with a lower value may have more deteriorated paint, increasing risk factors for lead exposure (Kim et al., 2002). Children enrolled in WIC and Medicaid have been found to be most at risk for having elevated blood lead levels compared to those not enrolled in these programs (Aoki & Brody, 2018).

Refugee and Immigrant Populations

Refugee children arriving in the United States have increased rates of elevated blood lead levels at their time of arrival. Overall, foreign-born children tested for lead poisoning are five times more likely to have an elevated blood lead level than children born in the U.S. (Tehranifar et al., 2008). Additionally, newly arrived refugee children ages 1-5 years are 10 times more likely to have elevated blood lead levels than same-aged children in the general U.S. population (AAP, 2019). Some subgroups of refugees have seen elevated rates up to fourteen times that of the general U.S. population (CDC, 2019). Potential lead exposure risks for refugee children include products like leaded gasoline, use and manufacture of ammunition, industrial emissions, and use of lead-containing products like food, ceramics, and traditional medicines.

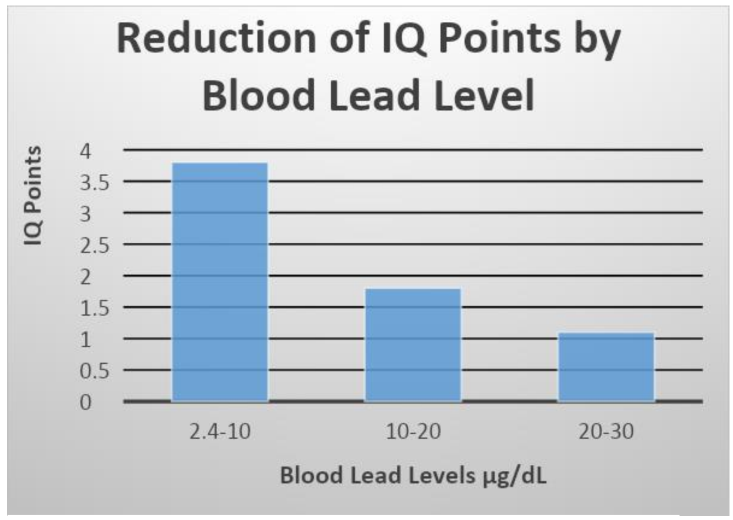
In particular, African refugees from Kenya, the Democratic Republic of Congo, and Somalia tend to have high BLLs stemming from pre-settlement exposure such as lead-based paint in dwellings and environmental inequalities such as the improper disposal of lead-acid batteries (Shakya and Bhatta, 2019). Asian refugees from Nepal, Thailand, Burma, and India have high BLLs from pre-settlement exposures, which have been linked to surma/kajal/kohl use, consumer products, and lead-based paint in dwellings (Shakya and Bhatta, 2019). Lastly, Middle Eastern refugees from Iraq and Afghanistan tend to have elevated BLLs from pre-settlement exposures linked to leaded gasoline and kohl/kejal (Shakya and Bhatta, 2019).

In addition to pre-settlement exposure, refugee children are at a risk of lead poisoning post-resettlement due to living older, urban housing and environmental inequalities stemming from lack of funding, legislation, and advocacy (Borsuk, 2019). Many children who come to the United States already exposed to lead in their native countries may continue to be exposed to lead due to contamination in their new surroundings and use of imported goods. Importantly, pre- and post-settlement lead exposure in refugee populations is further compounded by malnourishment, as deficiencies of nutrients like calcium and iron allow greater uptake of lead into the body (Mahaffey, 1995).

Impacts of Lead Exposure

Health effects resulting from lead exposure range on a continuum depending on the time and intensity of exposure. Children are more susceptible to the effects of lead because they absorb lead at a higher rate than adults and are most susceptible during the critical years of development from birth to five years of age. Blood lead levels over 40 µg/dL can lead to renal failure and nephropathy, while blood lead levels above 100 µg/dL can result in vomiting, encephalopathy, and death (AAP, 2016; WHO, 2010).

Figure 10. Estimated IQ loss in US children ages 5-10 years of age at different blood lead levels.



Source: American Academy of Pediatrics, 2016

Evidence continues to build that there is no safe level of lead in the blood. Recent studies have demonstrated that chronic, low-level lead exposure (<5 µg/dL) is a causal risk factor for diminished intellectual and academic abilities, higher rates of neurobehavioral disorders such as hyperactivity and attention deficits, and lower birth weight in children (AAP, 2016). Blood lead levels once thought to pose little to no risk have shown to be risk factors for reading problems, intellectual delays, school failure, attention deficit-hyperactivity disorder, and antisocial behavior (Lanphear, 2007; AAP, 2016).

Two key types of relationships exist between lead exposure and cognitive impairment—a non-linear and a linear relationship. In the non-linear relationship, IQ decrements are highest at low blood lead concentrations but reduce in severity at higher blood lead levels (Lanphear, 2019l AAP, 2016; Canfield et al. 2003). Figure 3 demonstrates that lower blood lead levels (2.4-10 µg/dL) were associated with greater IQ loss compared to blood lead levels of 10-20 and 20-30 µg/dL. This relationship may seem counterintuitive, but evidence suggests that cellular defense mechanisms to protect the brain from additional damage may not be fully operational until a critical mass of lead is achieved in the body (Canfield et al. 2003; Bae, Gennings, Carter, Yang, and Campain, 2001). As such, lower levels of lead in the body (<10 µg/dL) may "fly under the radar", thereby causing the most initial damage to brain function.

Yet at the same time, a linear relationship exists whereby each 10 µg per deciliter in the lifetime average blood lead concentrations is associated with a 4.6 decrease in IQ (Canfield et al. 2003). Said differently, greater average blood lead levels are associated with greater cognitive impairment over one's lifetime. Taken together both of these relationships reinforce that there is no safe level of lead in a child's body and that preventative action should be taken to ensure no amount of lead is in a child's environment.

Exposure to lead is also being studied in relation to its effect on crime. Increases in antisocial and other violent behavior have been hypothesized to be correlated with greater crime rates. Recent research shows that greater aggregate blood lead levels at the population level are associated with greater occurrences of violent and non-violent crimes (Boutwell, 2016). Furthermore, even low exposure to lead can lead to elevated blood pressure and increased rates of hypertensive events like heart disease, strokes, and cardiovascular episodes (WHO, 2010). Lastly, low-level lead exposure has been linked to greater mortality from cardiovascular disease and ischemic heart disease (Lanphear, 2018).

Blood Lead Testing in Nevada

Screening Rates

Nevada has 217,331 children under six according to the 2013-2017 Census – five-year estimates. The percentage of children across various counties and rural areas range from 31-33 percent (Table 1). Screening rates from October 1, 2018, to September 30, 2019, for the entire state equal 7,971 children screened for lead indicating less than 4 percent of all Nevada children are tested. The majority of blood test fall below 5 ug/dL. However, one severe limitation with reported data has been identified: due to laboratory reporting limits, many results do not indicate an absolute blood lead value and are often reported as <10 ug/dL (Table 2). This reporting limit makes it challenging to identify blood lead values that may fall between 5-9.9 ug/dL. Consequently, caregivers of children with elevated blood lead levels may not be receiving informational resources to reduce childhood lead poisoning when they should.

Table 1. Percentage of households with children under six by jurisdiction

Households with a Child Under Age Six, by Jurisdiction				
	Clark	Washoe	Carson City	Rural
Percent of Households with A Child Under Age 6	32.6%	32.7%	30.5%	31.5%

Source: U.S. Census Bureau. (2018) 2013-2017 American Community Survey 5-Year Estimates Retrieved from http://factfinder.census.gov

Table 2. Blood lead levels of children by age from October 2018 to September 2019

	Blood Lead Levels							
	Value not reported/ or cutoff <10.0	**3.5-4.9**	**5.0-9.9**	**10.0-19.9**	**20.0-44.9**	**45.0-69.9**	**70.0+**	**Total**
Under 12 months	301	6	2	1	0	0	0	310
12 – 23 months	3181	12	11	5	4	0	0	3213
24 – 35 months	1590	14	13	3	2	1	0	1623
36-47 months	1009	7	3	0	0	0	0	1019
48-59 months	1047	3	9	1	0	0	0	1060
60-71 months	730	3	5	0	0	0	0	738
Missing	8	0	0	0	0	0	0	8
Total	7866	45	43	10	6	1	0	7971

Source: Southern Nevada Health District and the Nevada Division of Public and Behavioral Health Surveillance Data

NvCLPPP Recommendations for Screening in Nevada

Current, screening rates for blood lead levels in children is low making it difficult to ascertain the extent lead poisoning in Nevada. Therefore, the NvCLPPP recommend universal screening as a method to adequately assess the epidemiological data. However, at a minimum the NvCLPPP recommends that:

Providers should screen Medicaid eligible children when the child:

- Reaches 12 and 24 months of age, respectively; or
- At least once before the child reaches 6 years of age

Providers should screen children who are symptomatic or if a potential lead exposure is identified, regardless of a child's age.

Providers should screen refugee children ages 6 months to 16 years within 90 days of arrival. Given the evidence of lead exposure post-resettlement in the US, lead screening should occur again after 3-6 months of placement in a permanent residence, regardless of the results of the initial lead test (CDC, 2019).

Providers of non-Medicaid eligible children should conduct a lead risk evaluation using the Childhood Lead Risk Questionnaire (CLRQ) to determine the risk of potential exposure during a health care visit. The following CLRQ was adapted from the Illinois Department of Public Health (State of Illinois, n.d.) Providers should test:

- Children through six years of age, beginning at 6 months
  - If all responses are "No" re-evaluate at every well-child visit or more often if deemed necessary
  - If any response is "YES" or "Don't Know", obtain a blood lead test.

Blood lead testing can be conducted via capillary or venous methods and should be reported as per NRS 442.700 **https://www.leg.state.nv.us/NRS/NRS-442.html#NRS442Sec700.** As with other health issues for which screening is appropriate, blood lead screening is more acceptable when it is less invasive (Boreland et al., 2015). As such, parents be more amendable to screening their children via the capillary method over the venous blood draw, when the option is available.

Point of Care Lead Testing

Past evaluations conducted by NvCLPPP have identified barriers to patient compliance with lead test requisitions (Haboush-Deloye, Marquez, and Gerstenberger 2017). Offsite lead testing in particular poses a barrier to at-risk populations as it requires access to transportation and additional time for a separate appointment. In contrast, point of care (POC) lead testing reduces barriers, increases patient compliance, and has been found to be an effective and efficient method to increase blood lead level testing rates (Gettens and Drouin, 2019; Haboush-Deloye, Marquez, and Gerstenberger 2017; Maryland Department of Health and Mental Hygiene, 2014).

Another barrier to lead testing is that parents tend to be concerned about the pain from the traditional venipuncture blood draw. In contrast to this method, POC capillary lead testing instruments use the less painful finger prick method to collect as little as two drops of blood (Advisory Committee for the Childhood Lead Poisoning Prevention Program CDC, 2013). Another benefit of the POC capillary testing instruments is that they can provide rapid results— in as little as 3 minutes (Advisory Committee for the

Childhood Lead Poisoning Prevention Program CDC, 2013). Overall, POC lead testing instruments may reduce some of the largest barriers to lead testing in populations that are at-risk for lead exposure.

In 2004, Megellan Diagnostics developed a POC lead testing instrument with the CDC known as the Lead Care II (Gettens and Drouin, 2019). The Lead Care II is the only Food and Drug Administration (FDA) approved POC lead testing instrument in use in the US today (Maryland Department of Health and Mental Hygiene, 2014). The FDA and the CDC have determined that this instrument is simple to operate with little risk of error (Gettens and Drouin, 2019). As such, the Lead Care II is the only POC blood lead testing instrument with a Comprehensive Laboratory Improvement Amendments (CLIA) waiver certificate (Gettens and Drouin, 2019).

Childhood Lead Poisoning Risk Questionnaire

The CLPRQ should be completed during a health care visit for children under 6 years of age.

A blood lead test should be performed on children:

- with any "Yes" or "Don't Know" response
- living in a high-risk ZIP code area
- all Medicaid-eligible children should have a blood lead test prior to 12 months of age and 24 months of age. If a Medicaid-eligible child between 36 months and 72 months of age has not been previously tested, a blood lead test should be performed.

If responses to all the questions are "No":

- re-evaluate at every well child visit or more often if deemed necessary

Child's name: ______________________________ Today's date: ______________

Age: ______________ Birthdate: __________________________ Zip Code: ______________________________

Respond to the following questions by circling the appropriate answer.	RESPONSE		
1. Is this child eligible for or enrolled in Medicaid, Head Start, or WIC?	Yes	No	Don't Know
2. Does this child have a sibling with a blood lead level of 5 ug/DL or higher?	Yes	No	Don't Know
3. Does this child live in or regularly visit a home built before 1978?	Yes	No	Don't Know
4. In the past year, has this child been exposed to repairs, repainting or renovation of a home built before 1978?	Yes	No	Don't Know
5. Is this child a refugee or an adoptee from any foreign country?	Yes	No	Don't Know
6. Has this child ever been to Mexico, Central or South America, Asian countries (i.e., China or India), or any country where exposure to lead from certain items could have occurred (for example, cosmetics, home remedies, folk medicines or glazed pottery)?	Yes	No	Don't Know
7. Does this child live with someone who has a job or a hobby that may involve lead (for example, jewelry making, building renovation or repair, bridge construction, plumbing, furniture refinishing, or work with automobile batteries or radiators, lead solder, leaded glass, lead shots, bullets or lead fishing sinkers)?	Yes	No	Don't Know
8. At any time, has this child lived near a factory where lead is used (for example, a lead smelter or a paint factory)?	Yes	No	Don't Know
9. Does this child reside in a high-risk ZIP code area? (see reverse side of page for list)	Yes	No	Don't Know

If there is any **"Yes"** or **"Don't Know"** response a blood lead test is not needed if both of the following apply

- the child has proof of two consecutive blood lead test results (documented below) that are each less than 5 mcg/dL (with one test at age 2 or older), **and**
- there has been no change in the child's living conditions

Test 1: Blood Lead Result:_____ug/dL Date:_________ Test 2: Blood Lead Result:_____ug/dL Date: _________

Nevada Makeup

Demographic Characteristics

Nevada is as diverse in its landscape as it is in its people. Tables 3-6 highlights the demographic characterizes in each county by race/ethnicity, foreign-born populations, refugees and those living in poverty. Nevada's Hispanic population ranks 14th largest in the nation with over 789,000 people comprising 28% of the State's population (Pew Research Center, 2014). Hispanic children represent 10.5% of children under five living in Nevada (Tuman, Damore, Agrada, 2013). Nevada has a large foreign-born population, particularly those with who are not U.S. citizens.

Table 3. Race/Ethnicity by jurisdiction.

Race/Ethnicity				
	Clark	Washoe	Carson City	Rural
African American/Black	12.5%	2.1%	1.0%	1.6%
American Indian/Alaska Native	0.6%	1.7%	2.5%	4.0%
Asian	6.8%	4.3%	1.7%	0.7%
Hispanic/Latino	43.1%	37.5%	39.3%	27.3%
Caucasian/White	54.9%	73.0%	70.8%	82.4%
Native Hawaiian/Pacific Islander	0.8%	0.8%	0.2%	-0.2%
Other	14.5%	9.2%	17.0%	6.0%
Multiple	9.9%	9.0%	6.8%	6.4%

Source: U.S. Census Bureau. (2018) 2013-2017 American Community Survey 5-Year Estimates Retrieved from http://factfinder.census.gov

Table 4. Foreign-born populations by jurisdiction.

Foreign-Born Population				
	Clark	Washoe	Carson City	Rural
Percent Foreign Born Population	22.3%	14.4%	11.2%	7.6%
Percent of Foreign-Born Population that are not U.S. Citizens	51.9%	52.1%	59.7%	58.3%

Source: U.S. Census Bureau. (2018) 2013-2017 American Community Survey 5-Year Estimates Retrieved from http://factfinder.census.gov

Table 5. Refugee populations by jurisdiction.

Refugees				
	Clark	Washoe	Carson City	Rural
Number of Refugees Resettled 2011 - 2015	8380	0	0	0
Number of Refugees Resettled 2016	3128	40	0	0
Number of Refugees Resettled 2017	1295	32	0	0

Source: Southern Nevada Catholic Charities

Table 6. Percent of those in poverty by jurisdiction.

Household Income, by County				
	Clark	Washoe	Carson City	Rural
Percent of Households with Income Below 50% of FPL	4.7%	3.2%	5.2%	3.6%
Percent of Households with Income Below 125% of FPL	15.2%	12.8%	15.9%	12.2%
Percent of Households with Income Below 150% of FPL	19.5%	16.9%	21.2%	16.4%
Percent of Households with Income Below 185% of FPL	26.2%	22.0%	28.4%	22.2%
Percent of Households with Income Below 200% of FPL	29.0%	24.0%	30.8%	24.4%

Source: U.S. Census Bureau. (2018) 2013-2017 American Community Survey 5-Year Estimates Retrieved from http://factfinder.census.gov

Age of Housing

Age of housing is one of the biggest indicators for risk to lead exposure. While most homes in the state are constructed after the band of lead-based paint in 1978, there are still a significant amount of homes across the state that have the potential to expose children to deteriorating lead-based paint as Nevada's older housing stock continues to age.

Table 7. Age of housing by county.

Age of Structure, by County				
	Clark	Washoe	Carson City	Rural
Built Since 1980	80.8%	62.3%	54.3%	68.1%
Built 1970 - 1979	10.7%	18.7%	29.2%	16.3%
Built 1960 - 1969	5.2%	9.1%	11.4%	5.1%
Built 1950 - 1959	2.1%	5.5%	3.3%	3.7%
Built 1940 - 1949	0.7%	2.1%	0.8%	2.5%
Built Before 1940	0.4%	2.4%	1.0%	4.2%

Source: U.S. Census Bureau. (2018) American Community Survey Five-year estimates Retrieved from https://data.census.gov/

Geographic Areas of Priority

US Census data was used to identify zip codes of *highest risk*. We compared zip codes in each county to identify areas with the highest number of homes built before 1950, those living in poverty, and the percentage of children under age six. Blood lead surveillance data was not used at this time since screening rates are low. The NvCLPPP will work on improving epidemiologic data to include race and ethnicity and blood lead level data in future surveillance maps. Figure 12. Highlights high-risk zip codes for the state.

Nevada's Lead Index

The lead index was creating following a model started by Washington state (WA DOH, 2016). This model uses two scores: the percent of children under age 5 living in poverty and the percent of homes in the geographical area of focus with a lead risk. Each score is weighted according to the proportion of risk each factor contributes to potential childhood lead exposure. Washington state determined each factor's risk by determining the percentage each factor contributed to the overall score. To determine the weight that each factor contributes to the overall score, the change in the national percentage of children with a BLL ≥5µg/dL living in poverty was added with the mean of the change in national percentage of children living in housing built before 1950. Each score was added together, then the score was divided by the sum of the total to determine what percentage each factor contributed to the overall score. The change in percentage of children living in poverty with a BLL ≥5µg/dL was determined by finding difference in the national percentage of children with a blood lead level ≥5µg/dL with a poverty index ratio of 1.3 or less, and a poverty index ratio of 1.3 of more was determined (CDC, 2013). The mean of the difference in national percentage of children with a BLL ≥5µg/dL living in housing built before 1950 or built between 1950 – 1977 and the difference in the national percentage of children with a BLL ≥5µg/dL living in housing built before 1950 and in housing built 1978 or later (CDC, 2013). Poverty was determined to contribute 42% of the total score, while age of housing was determined to contribute 58% of the total score.

After determining how each factor in the index should be weighted, each factor was weighted using the most recent American Community Survey 5-Year estimates for zip codes. Zip codes were chosen over census tracts because it is easier for physicians to identify the zip codes in which their patients live (TX Plan Citation). The American Community Survey provides estimates for the percent of children 5 and under living in poverty, and the total number of homes by construction year separated into 10-year increments. The American Community Survey already provides the percent of children age 5 or under living in poverty by zip code. That percent is divided by 100 to convert it to a decimal, and then multiplied by the weight (.42).

Calculating the score for age of housing requires several steps, starting with determining the lead exposure from housing risk for each zip code. Jacobs and colleagues (2002) determined the approximate risk of lead hazards by construction year of housing. The percent of homes with lead hazards increases with age of housing, as shown in Table 8. The number of houses in each category provided by the American Community Survey were added together to match the age categories in Table 8.

Table 8. Percent of homes with lead hazards by construction year.

Percent of homes with lead hazards by construction year	
Construction Year	Percent with Lead Hazards
After 1980	0%
1960 – 1979	8%
1940 – 1959	43%
Before 1940	68%

Once the number of houses in each of the above age categories was known, the following equation, where CY equals construction year, was used to determine the percent of houses in each zip code with lead risks, and then weight that score:

$$\left(\frac{\left((CYafter1980 \times 0) + (CY1960to1979 \times .08) + (CY1940to1959 \times .43) + (CYbefore1940 \times .68)\right)}{(CYafter1980 + CY1960to1979 + CY1940to1959 + CYbefore1940)}\right) \times .58$$

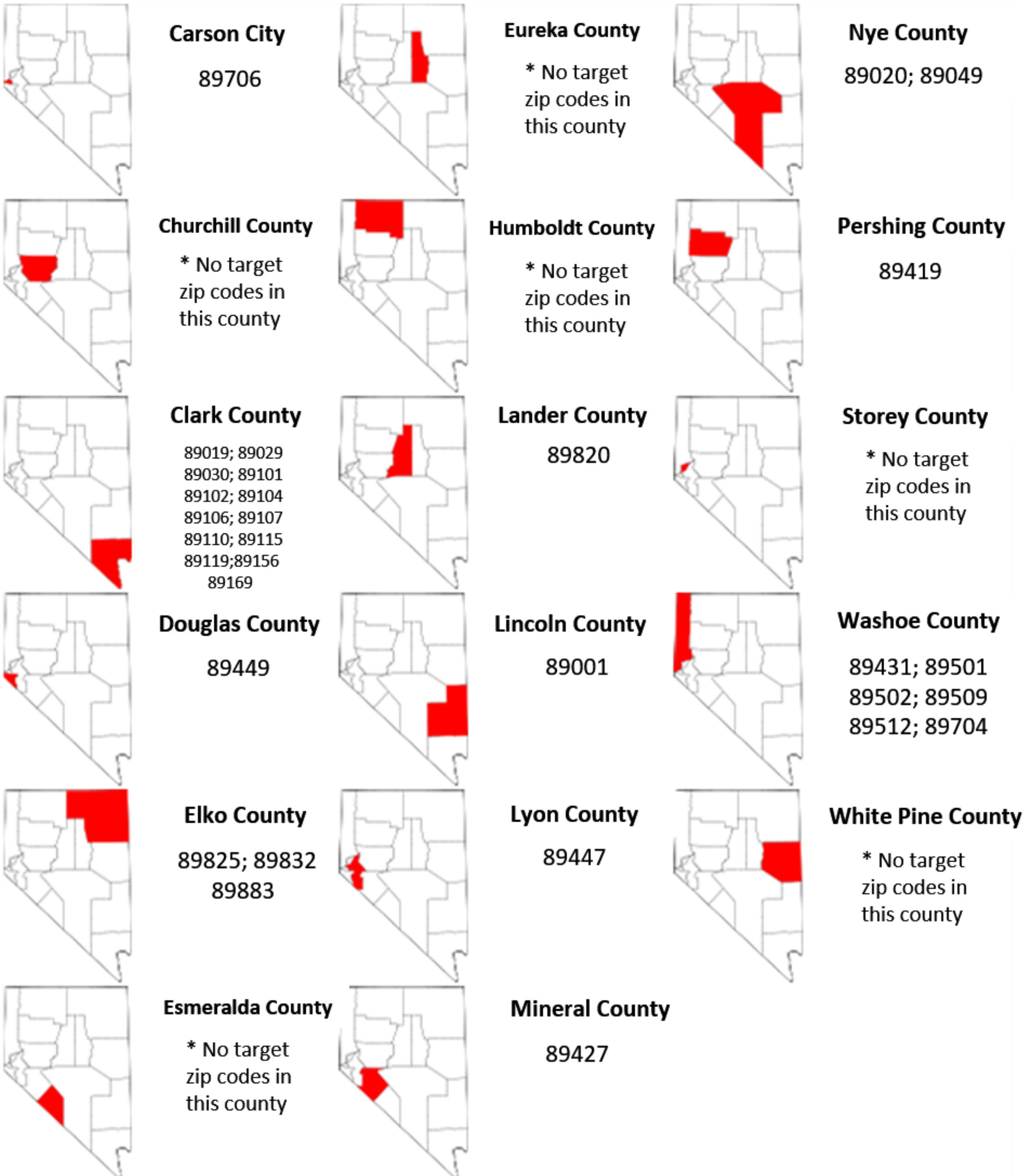
This formula determines the number of homes with lead risk in each age category by multiplying the total number of homes built during that time frame with the estimated percent of homes with a lead risk for that age category. The total number of homes in the zip code with any lead risk is then divided by the total number of homes in the zip code. Finally, the quotient is multiplied by the 58 percent needed to weight the result. The final index score is determined by adding the score for poverty and the score for age of housing together. Zip codes were then classified into deciles.

Each decile represents 10% of the total zip codes in Nevada. Nevada has 175 zip codes, so each decile has 17.5 zip codes. The decile scores for Nevada's zip codes range from 0 to 40.1 (Table 9) with higher numbers representing greater lead risk. Nevada's 9th and 10th deciles have the highest lead exposure risk scores in the state with scores ranging from scores ranging from 17.1 to 40.1. NvCLPPP's 2020 target zip codes are based on the 9th and 10th deciles.

Table 9. Lead index range by decile for Nevada's zip codes, from least concern to highest concern.

Lead index range by decile for Nevada's zip codes, from least concern to highest concern	
Decile	**Scores**
1st	0 – 2.1
2nd	2.1 – 3.2
3rd	3.2 – 4.7
4th	4.7 – 6.5
5th	6.5 – 8.6
6th	8.6 – 11.3
7th	11.3 – 13.6
8th	13.6 – 17.1
9th	17.1 – 23.9
10th	23.9 – 40.1

Figure 11. Target Zip Codes with Highest Lead Risk



Source: U.S. Census Bureau. (2018) American Community Survey Five-year Estimates Retrieved from http://factfinder.census.gov

Childhood Lead Poisoning Public Awareness and Outreach

Overview

One of the largest challenges that NvCLPPP faces is that many parents and physicians alike do not perceive lead exposure to be a relevant issue in Nevada. Thus, one of NvCLPPP's key objectives is to conduct outreach and education to inform community members, community partners, and medical providers about the sources and effects of lead exposure and the importance of lead screening. NvCLPPP's public awareness and outreach efforts are driven by surveillance data, which is used to identify high-risk geographical areas and priority populations. We have five priority populations, which include: 1) families of children under 6 in targeted communities, 2) medical providers and social service providers who serve targeted communities, 3) refugee children up to age 17, 4) pregnant women, and 5) workers with occupational lead exposure.

To increase the range of our outreach efforts, NvCLPPP relies on bilingual health educators to create outreach materials and deliver presentations in both English and Spanish. Similarly, NvCLPPP follows a carefully crafted communication and dissemination plan to ensure we are effectively reaching populations with a highest risk for lead exposure and the medical and service providers that serve them.

Outreach to Families with Children under 6, Pregnant Women, and Refugees

NvCLPPP generally uses two strategies to engage families with children under six years old, pregnant women, and refugees. First, NvCLPPP directly engages community members by participating in health and resource fairs such as those hosted by the Mobile Health Collaborative, University Medical Center Healthy Living Institute, and the City of Las Vegas. Secondly, NvCLPPP works with established community partners such as Clark County School District Family and Community Engagement Services (CCSD FACES) and the Catholic Charities Refugee Resettlement Program to deliver educational presentations directly to community members. These presentations cover childhood lead poisoning prevention and ways to reduce health hazards in the home such as those from pests, pesticides, accidental injuries, and indoor air quality issues.

Outreach to Service Providers

Community partners play a critical role in helping to achieve NvCLPPP's objectives. We regularly attend coalition meetings such as the monthly Immunize Nevada Coalition and Maternal Health and Child Coalition meetings as well as the quarterly refugee service provider meetings. By doing so we are able to build and maintain our partnerships with other existing organization that serve the same target populations.

Another key component of our outreach strategy is to deliver childhood lead poisoning prevention presentations to service providers. This is an effective strategy because it builds off of the already established trust that community members have with these organizations and it allows for greater reach of our message by having community partner staff help deliver our materials. We have delivered presentations to various WIC providers, the Urban League Friends and Family Program, Immunize Nevada, Catholic Charities Refugee Resettlement Program, and to head start programs such as those offered by Acelero and Sunrise Children's Foundation. We also regularly deliver brochures, flyers, and posters in English and Spanish to service providers so that they can distribute materials to the communities they serve. These include places such as Nevada Health Centers medical clinics and the Women's Health Center of Nevada, among others.

NvCLPPP also rely on existing efforts to help disseminate our message such as the Text4baby resource offered by Wellpass that reminds parents about critical health and safety information including when to get their children screened for lead. Similarly, the Tummy2Toddler app from Health Plan of Nevada tracks and monitors pregnancy milestones up to two years of age and includes information about childhood lead exposure and when to screen children for lead. Lastly, NvCLPPP also relies on the Mission Unleaded app from the Marion County Public Health Department to help teach community members and partners about the sources and effects of lead exposure.

Outreach to Medical Providers

NvCLPPP providers training sessions to physicians, nurses, and staff in target zip codes about childhood lead poisoning and the recent changes to Nevada Revised Statute 442.700, which requires the reporting of demographic information along with elevated blood lead levels. Additionally, we facilitate more efficient reporting of blood lead results to the Southern Nevada Health District through our collaboration to increase the capacity of their disease-reporting portal on their website. This year we are laying the groundwork so that we will be able to build similar reporting capacities with other health departments throughout the State of Nevada. Educational materials such as flyers, brochures, and coloring books are also distributed to medical provider offices to be shared with patients. Notably, because we recognize the role that nurses, medical clinic staff, and emerging health care professional play we also deliver presentations to nursing associations, nursing students, and clinic staff.

Outreach to Workers with Occupational Lead Exposure

Workers with occupational lead exposure constitute another important group for outreach. So-called *take home lead* is inadvertently brought from the job site to the car and home where children can be exposed. To strategically reach workers and their children who are most likely to be affected by lead, we have used peer-reviewed articles to identify which occupations tend have the highest lead exposure and corresponding blood lead levels in workers. Then, we located local businesses that engage in pertinent occupations such as iron working, glass making, shooting range work, and demolition. Lastly, we visited and distributed materials to these businesses to briefly talk about lead exposure and to provide the business owners with flyers about lead safety to be posted in staff locker rooms and restrooms. It is also important to mention that we stay current on occupational exposure research and keep our website, outreach materials, and presentations update to date with this information.

Communication and Dissemination Plan

The purpose of the NvCLPPP Communication and Dissemination Plan (C&D Plan) is to raise awareness among key stakeholders about the importance of childhood lead poisoning prevention.

The C&D Plan aims to demystify the idea that lead is not a problem in Nevada by communicating relevant and timely information about blood lead testing and sources of exposure. The NvCLPPP aims to accomplish this through various forms of communication including, print and electronic resources, as well as engage our diverse set of partners in the dissemination of content.

The goal of our C&D Plan is to raise awareness about:

- the CDC’s recommendations for lead testing
- the impact of lead exposure
- at-risk populations
- ways to mitigate lead hazards
- traditional sources of lead exposure such as household paint
- non-traditional sources such as toys, spices, folk medicines, ceramics and dishware, and occupational exposures

We seek to highlight prominent news stories that show why lead is an important and relevant issue for young children. This includes new stories that that show the increase in special needs education resulting from the Flint Michigan Water Crisis, stories of occupational exposure, children’s products that have been recalled due to excessive lead content, lead in tamarind candies, and the use of local housing data to identify lead hazards.

We use the following modes of communication to disseminate our messaging to the community:

- newsletters—both our own quarterly newsletter as well as those of our community partners
- fact sheets based on peer-reviewed scientific literature
- newspaper articles in both English and Spanish
- social media including Facebook and Twitter
- websites—both our own website and those of community partners

The NvCLPPP staff regularly participate in lead and healthy housing conferences and relevant webinars to stay current with the best-practices and emerging guidelines. The staff also read the latest peer-reviewed articles and reports pertaining to lead exposure and lead poisoning.

Responding to Lead-Exposed Children

Blood Lead Testing Surveillance and Response

The Nevada Department and Health and Human Services receives blood lead testing data from laboratories serving the greater Nevada area via the National Electronic Disease Surveillance System (NEDSS) Base System (NBS). The surveillance system serves a key method to identify children with elevated blood lead levels. In Nevada, blood lead level responses are conducted by corresponding health authorities including the Southern Nevada Health District, Washoe County District Health Department, Carson City Health, Human Services, and the Nevada Department of Health and Human Services. Responses within each jurisdiction vary mostly based on capacity.

Response to Lead-Exposed Children

The NvCLPPP recommends following CDC guidelines in responding to confirmed blood lead levels which can be found at https://www.cdc.gov/nceh/lead/acclpp/actions_blls.html. This guidance is summarized in Table 10.

Table 10. Recommendations for follow-up and case management of children based on confirmed blood lead levels.

		<5 µg/dL	5 – 9 µg/dL	10 – 14 µg/dL	15 – 19 µg/dL	20 – 44 µg/dL	45 – 69 µg/dL	≥70 µg/dL
Administrative	Phone Call		x	x	x	x	x	x
	Mail Letter and Brochure		x	x	x	x	x	x
	Refer Patient for Services		x	x	x	x	x	x
	Begin Coordination of Services		x	x	x	x	x	x
Assessment and Remediation of Residential Lead Exposure	Environmental Investigations with an XRF			x	x	x	x	x
	Visual inspection of the child's home and other sites			x	x	x	x	x
	Obtain a history of the child's exposure		x	x	x	x	x	x
	Measure environmental lead levels in the home and other sites - sampling only			x	x	x	x	x
	Interventions to reduce ongoing exposure			x	x	x	x	x
Medical Assessment and Interventions	Caregiver lead education (nutritional and environmental)		x	x	x	x	x	x
	Follow-up blood lead monitoring and testing		x	x	x	x	x	x
	Complete history and physical exam					x	x	x
	Complete neurological exam						x	x
	Labwork (e.g. hemoglobin or hematocrit, iron status)					x	x	x
	Lead hazard reduction					x	x	x
	Neurodevelopmental Monitoring					x	x	x
	Abdominal x-ray with bowel decontamination					x	x	x
	Chelation Therapy							x
Nutritional Assessment & Interventions	Diet Evaluation		x	x	x	x	x	x
	Referral to the Special Supplemental Nutrition Program for Women, Infants and Children (WIC)		x	x	x	x	x	x
	Referral to nutritionist		x	x	x	x	x	x
Developmental Assessment.	Conduct developmental assessment		x	x	x	x	x	x
	Refer for diagnostic evaluation for neurodevelopmental issues					x	x	x
	Refer for early intervention/stimulation programs					x	x	x

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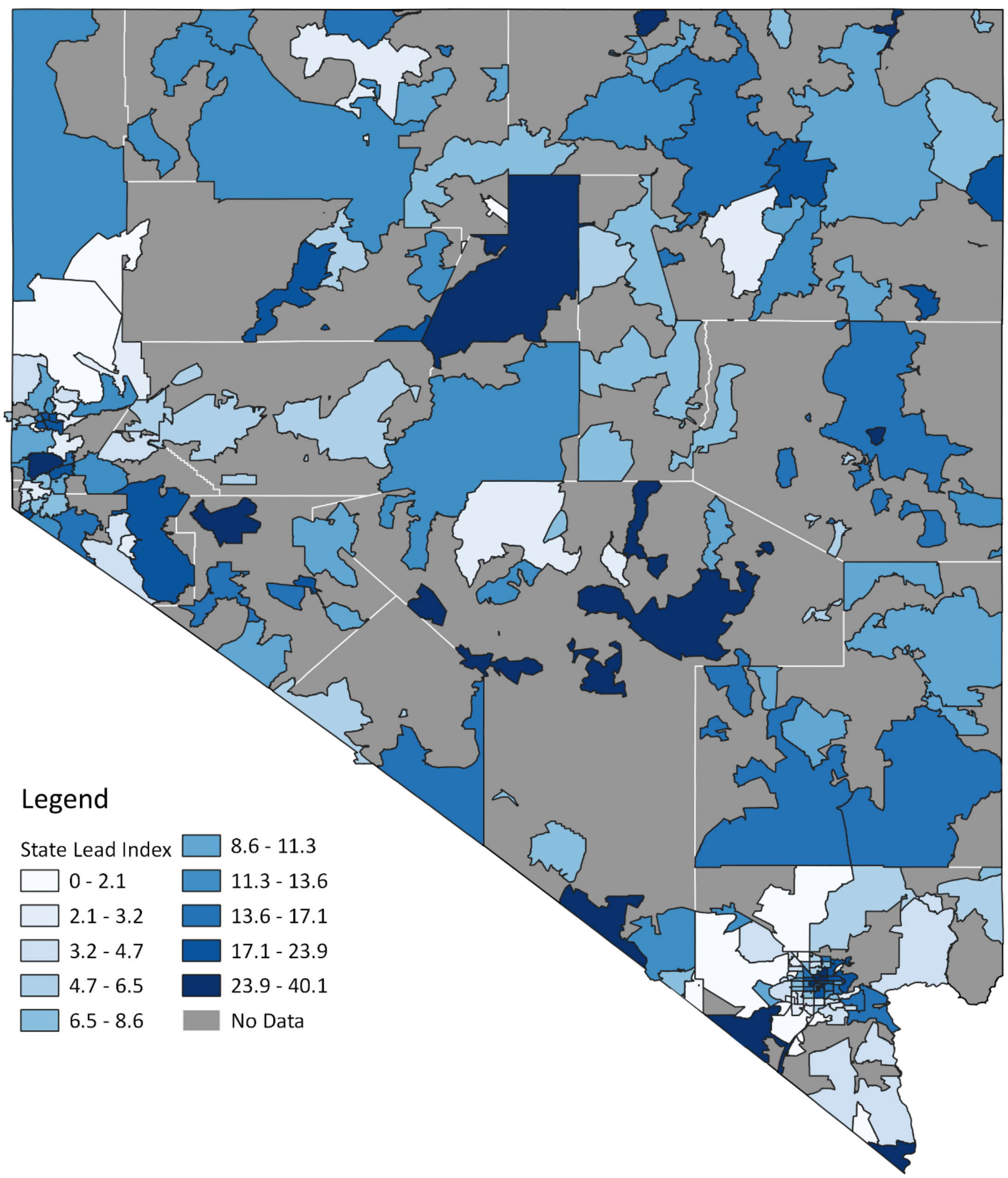
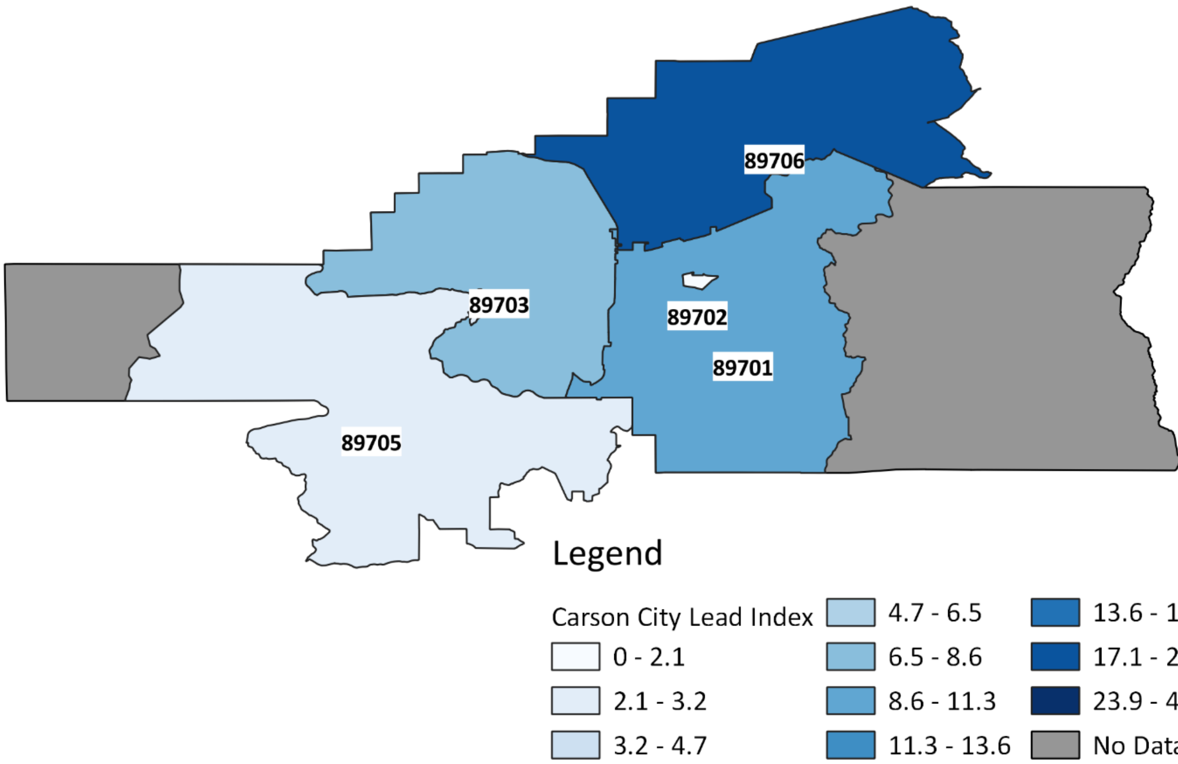
Appendices

State Lead Index – Nevada



Carson City Map



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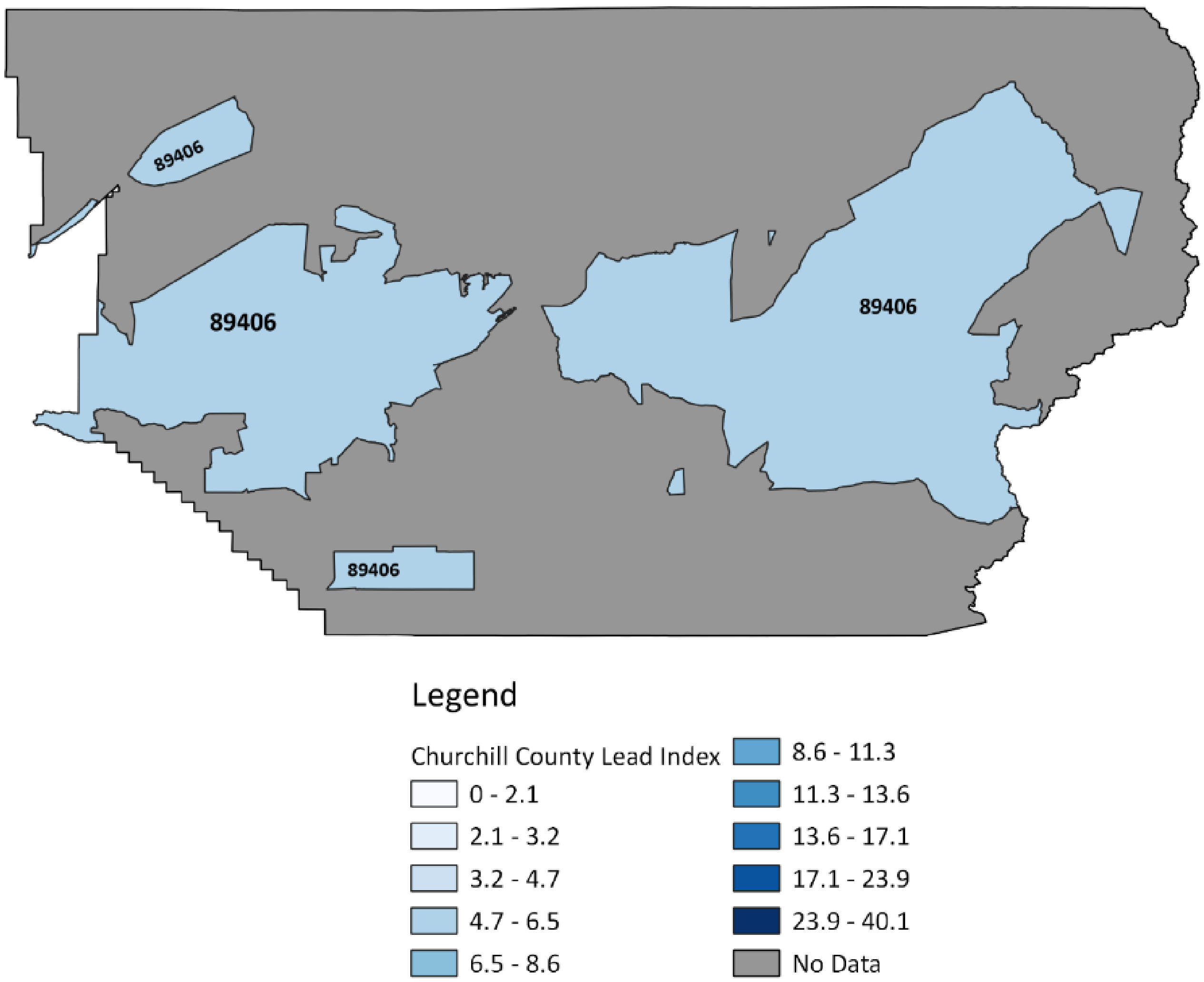
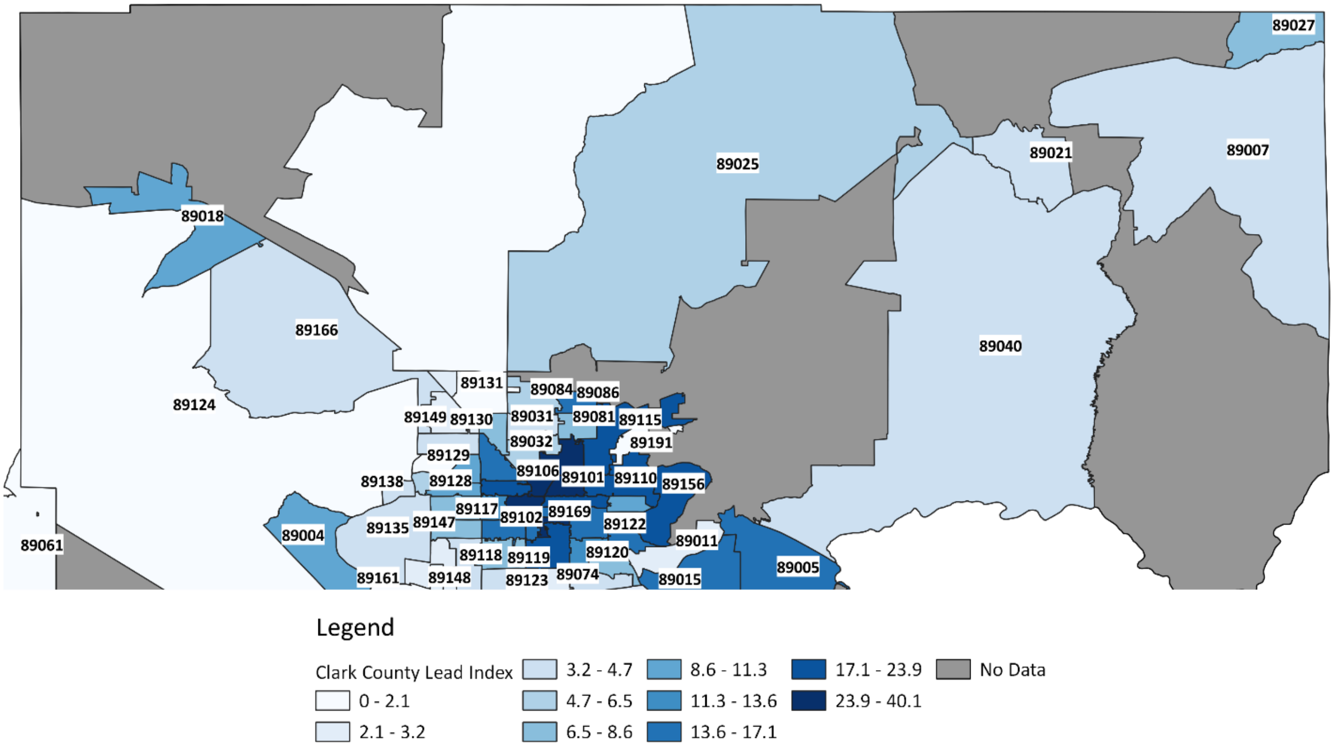
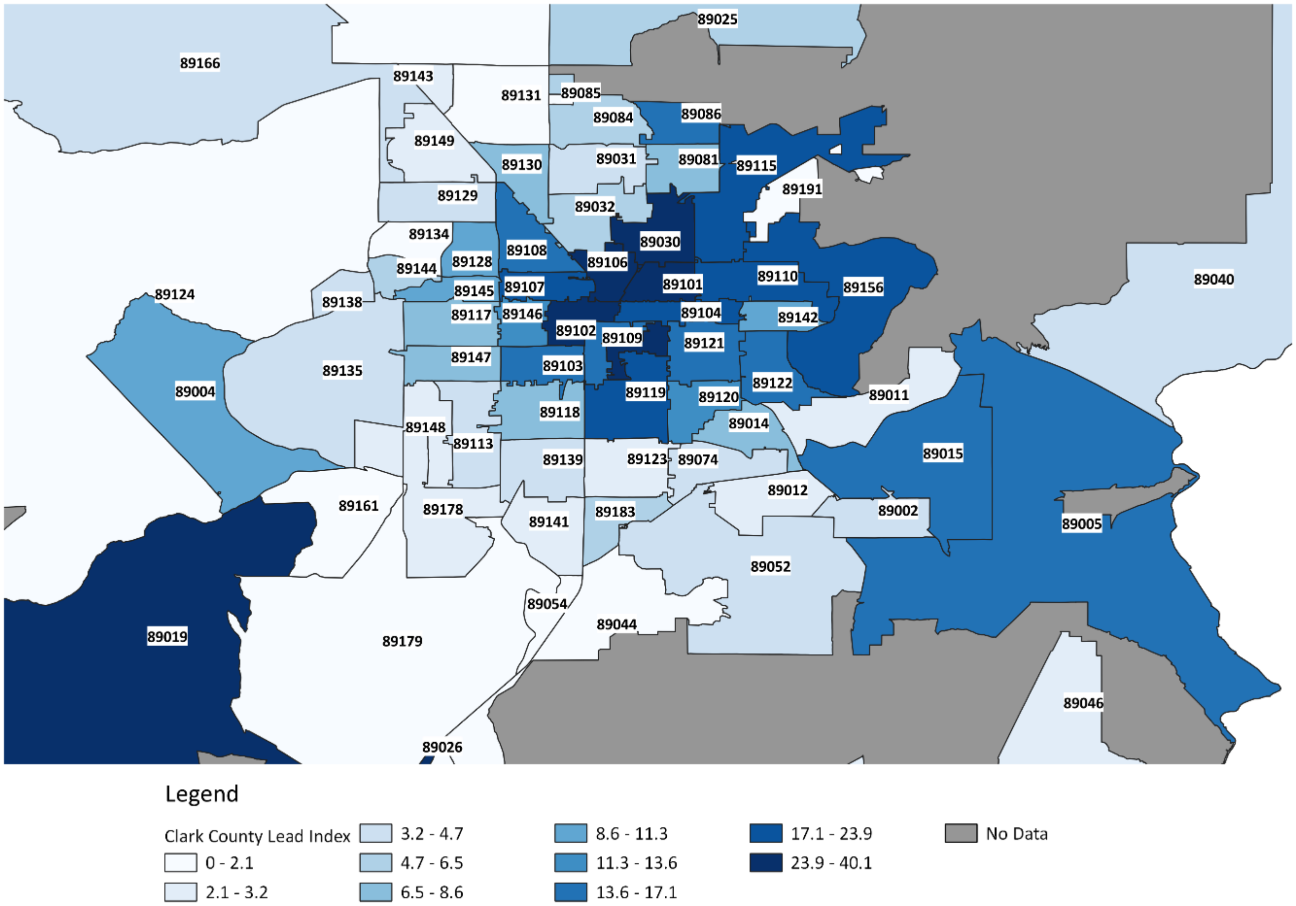


Clark County Maps

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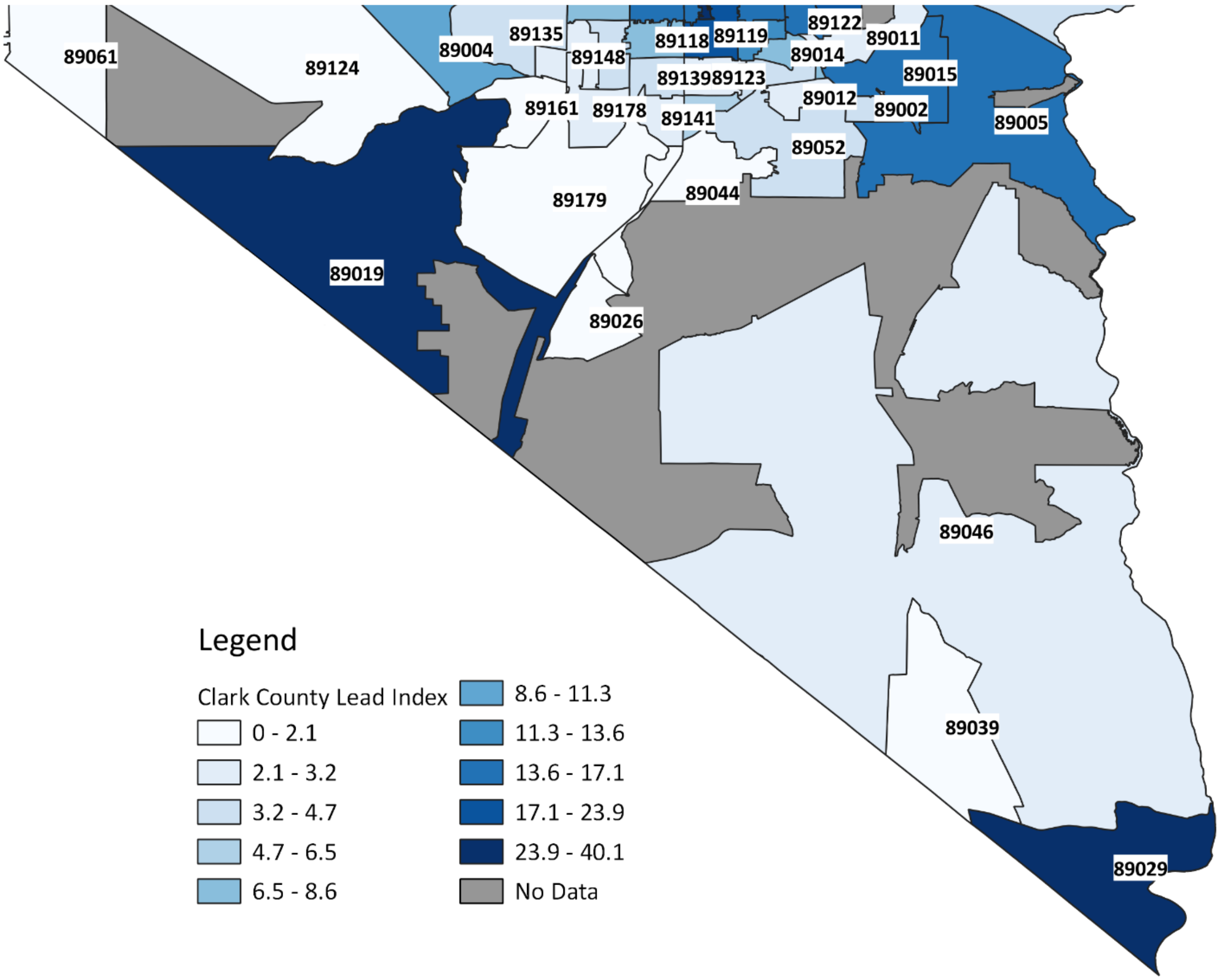
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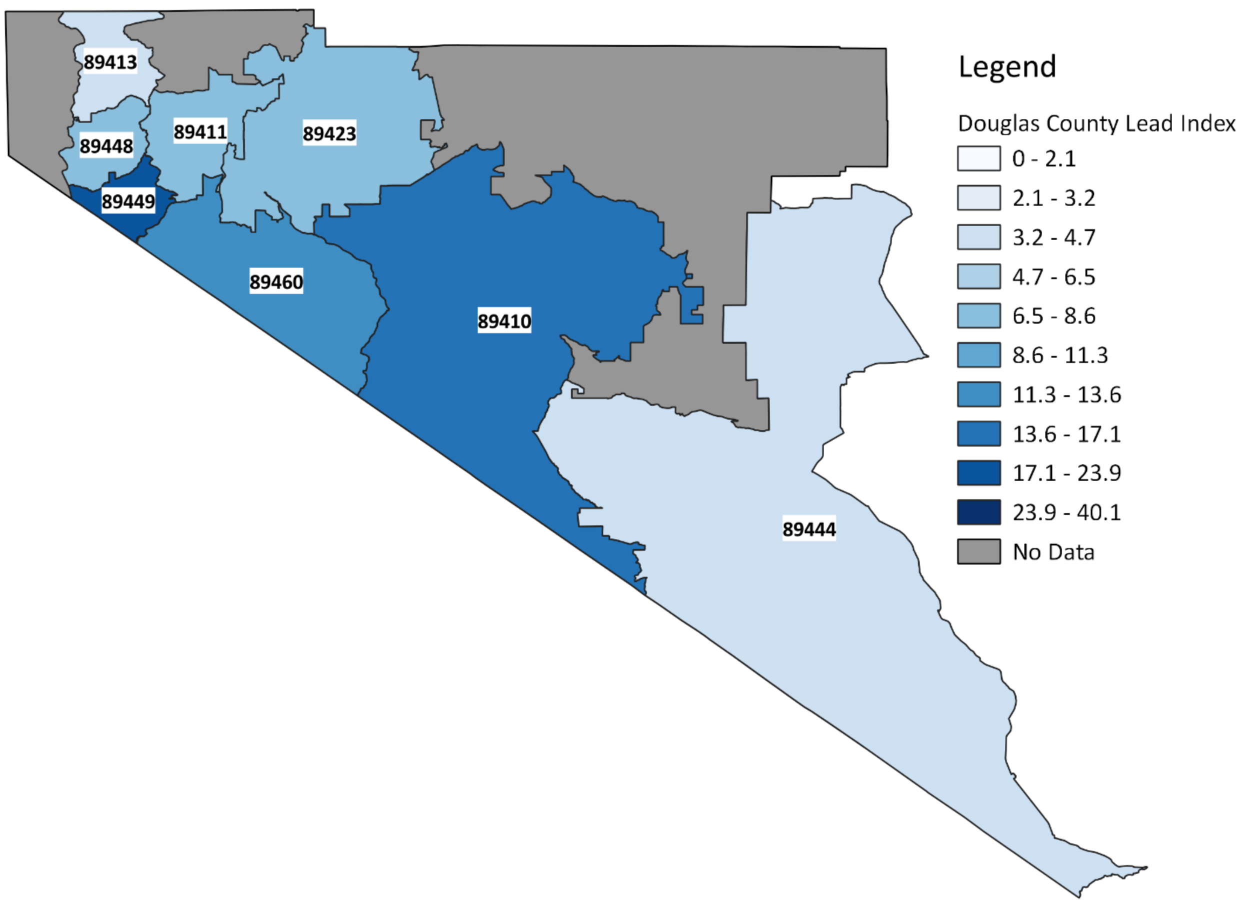

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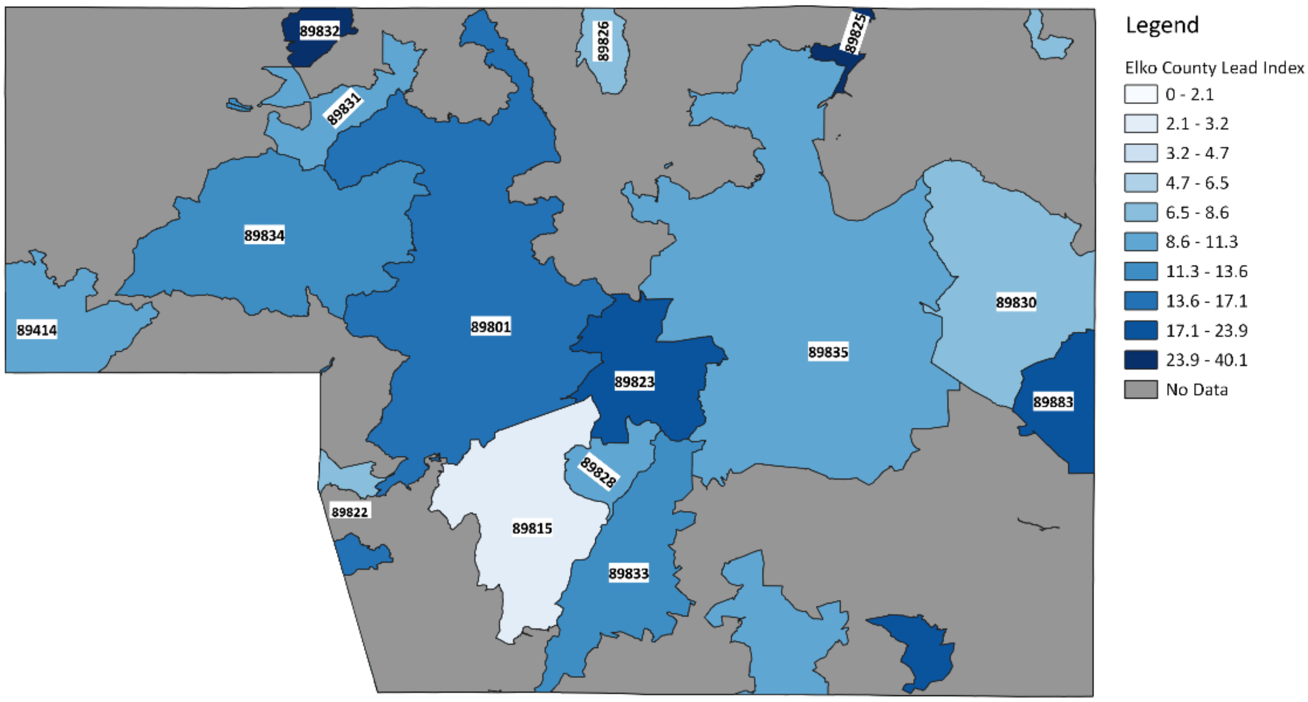

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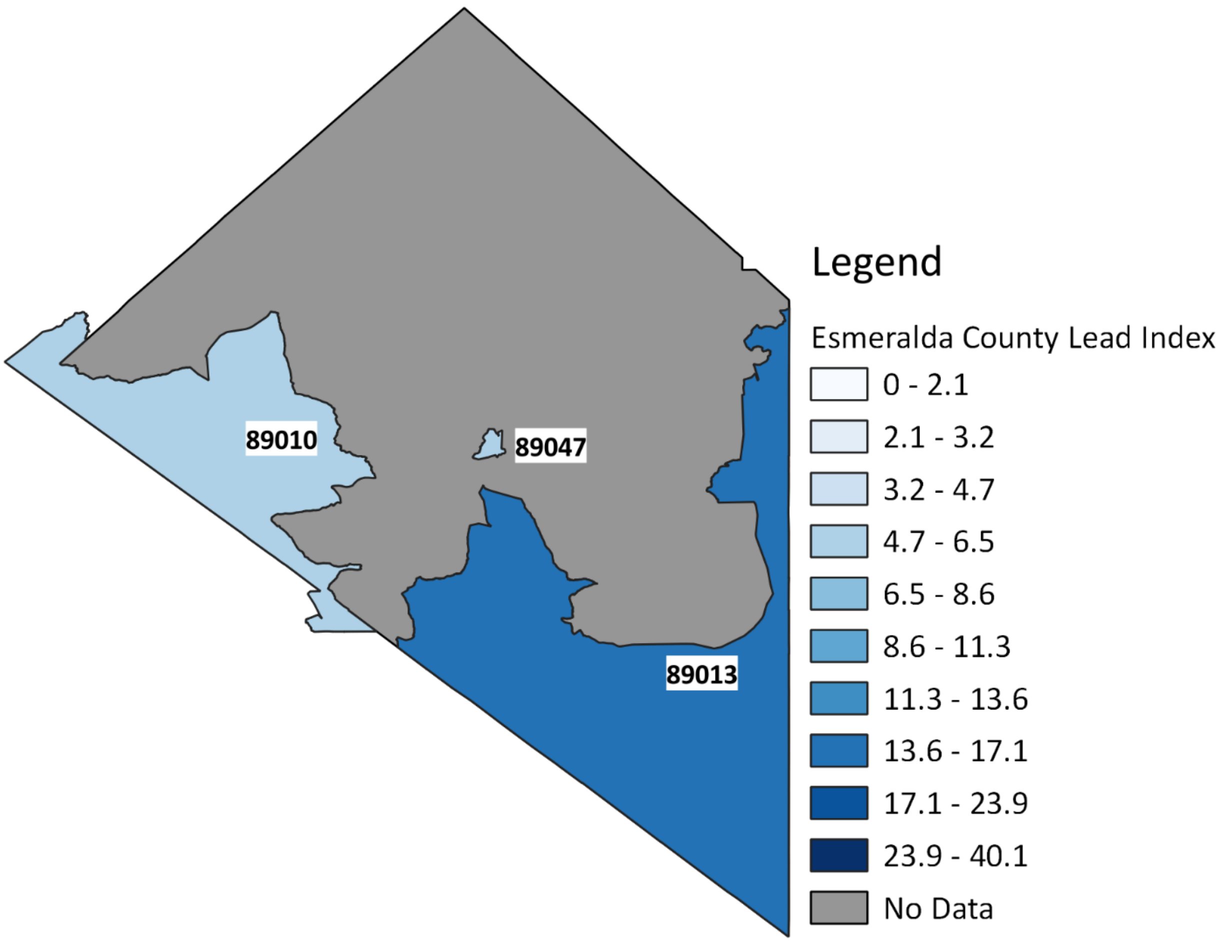
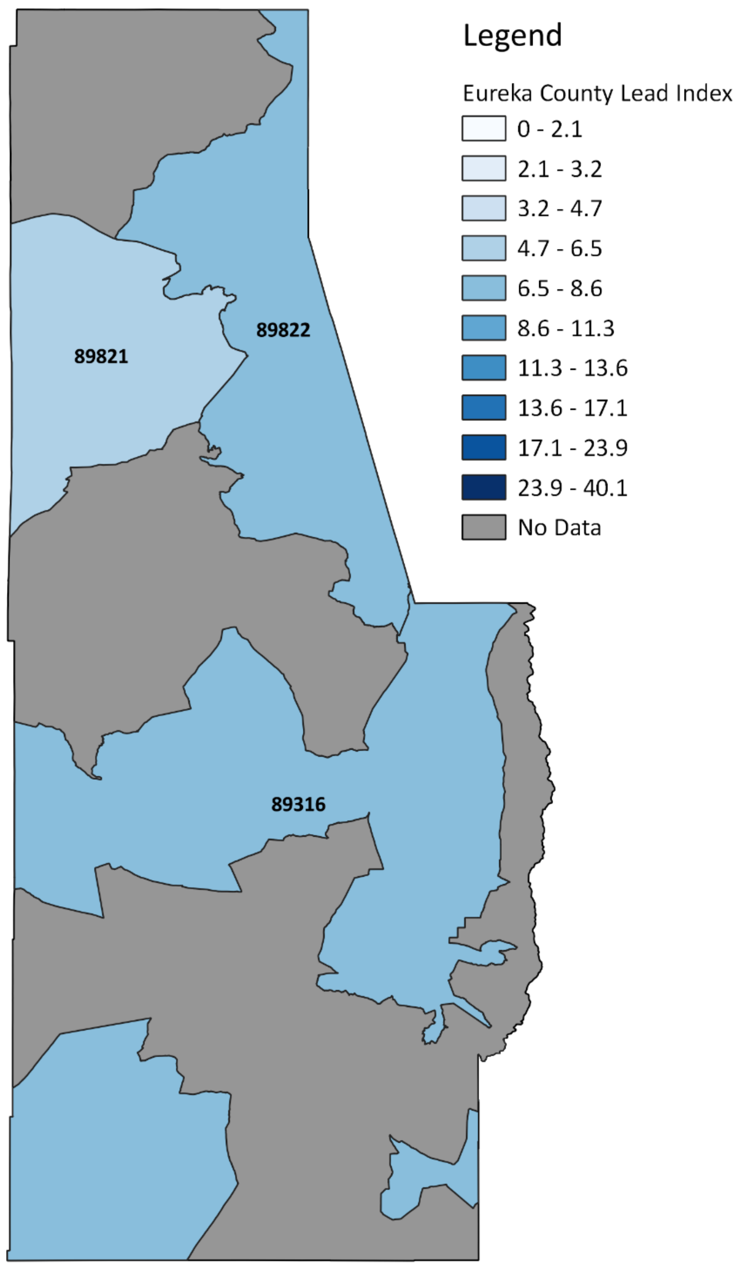
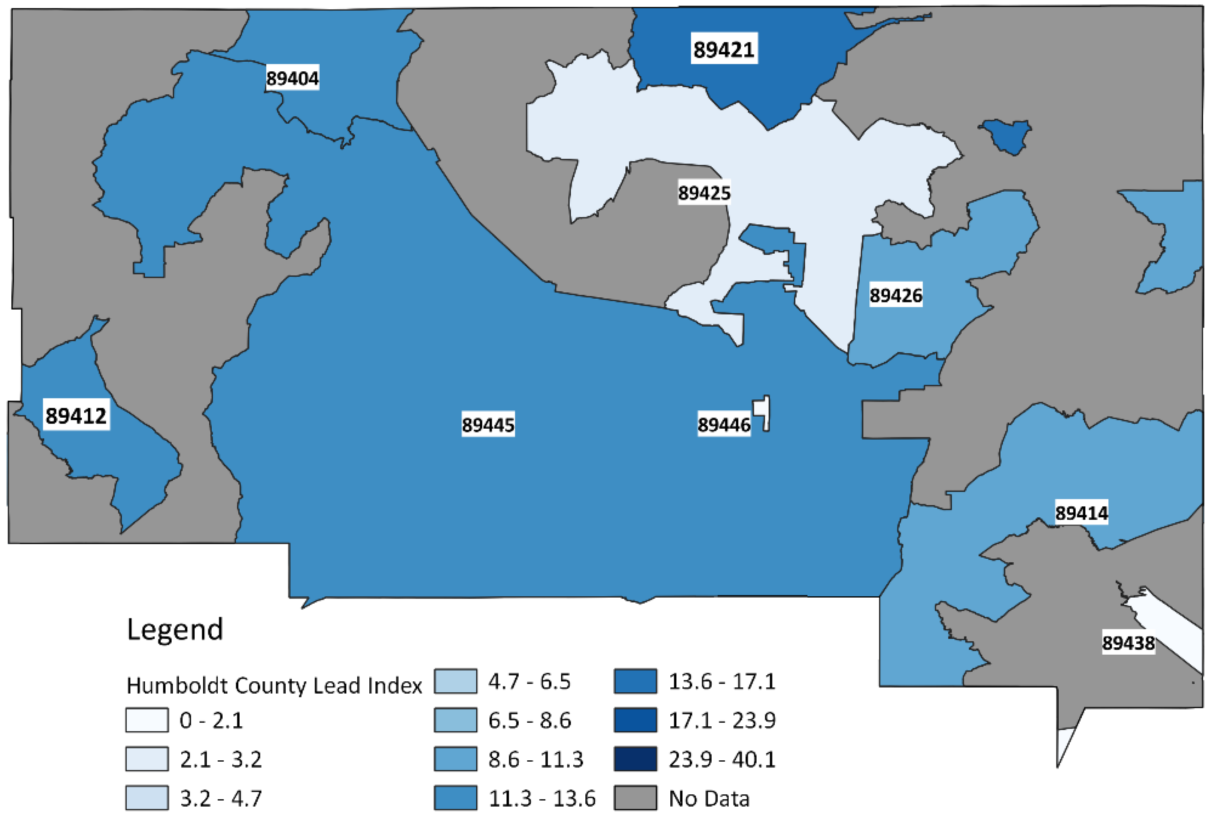


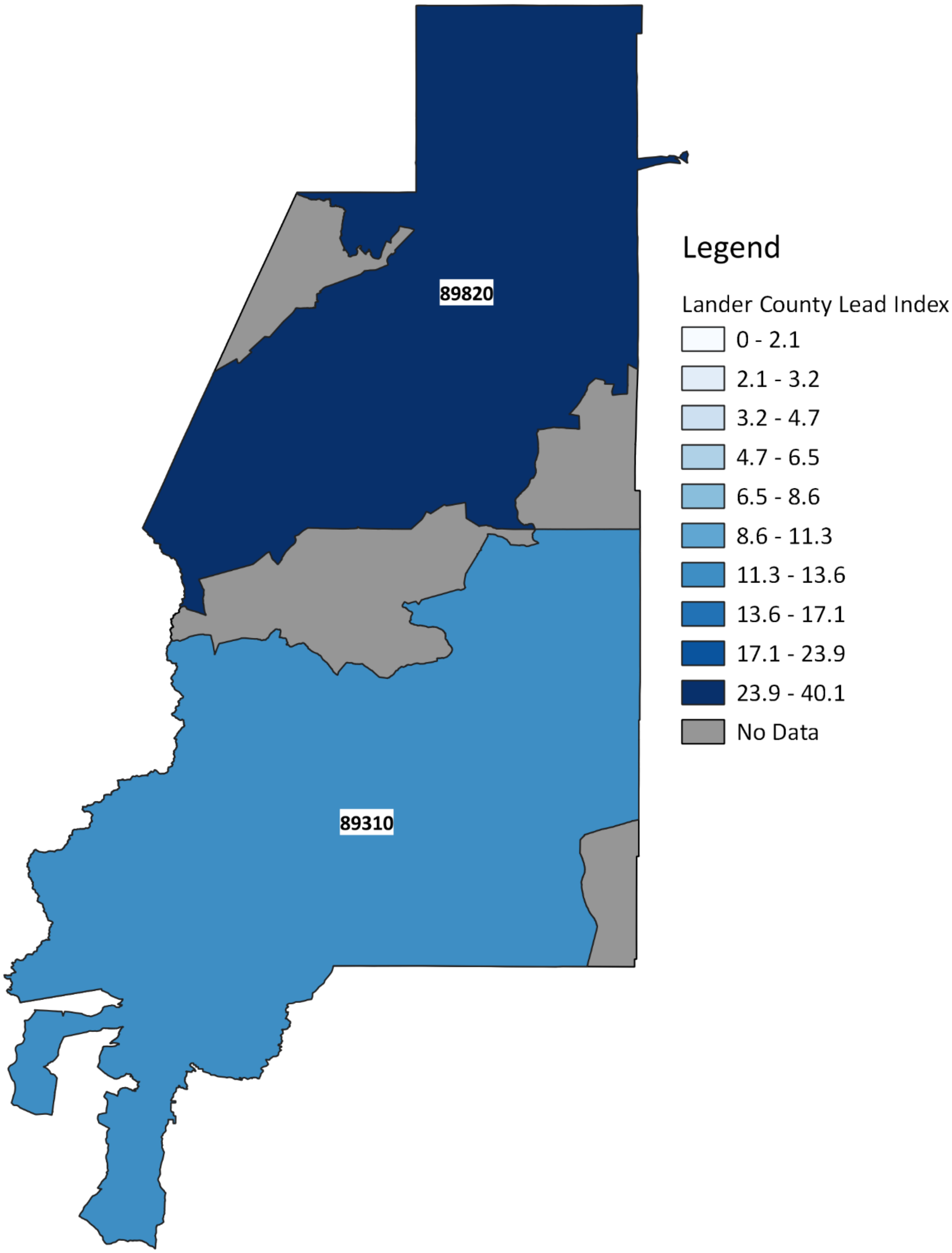
Eureka County Map



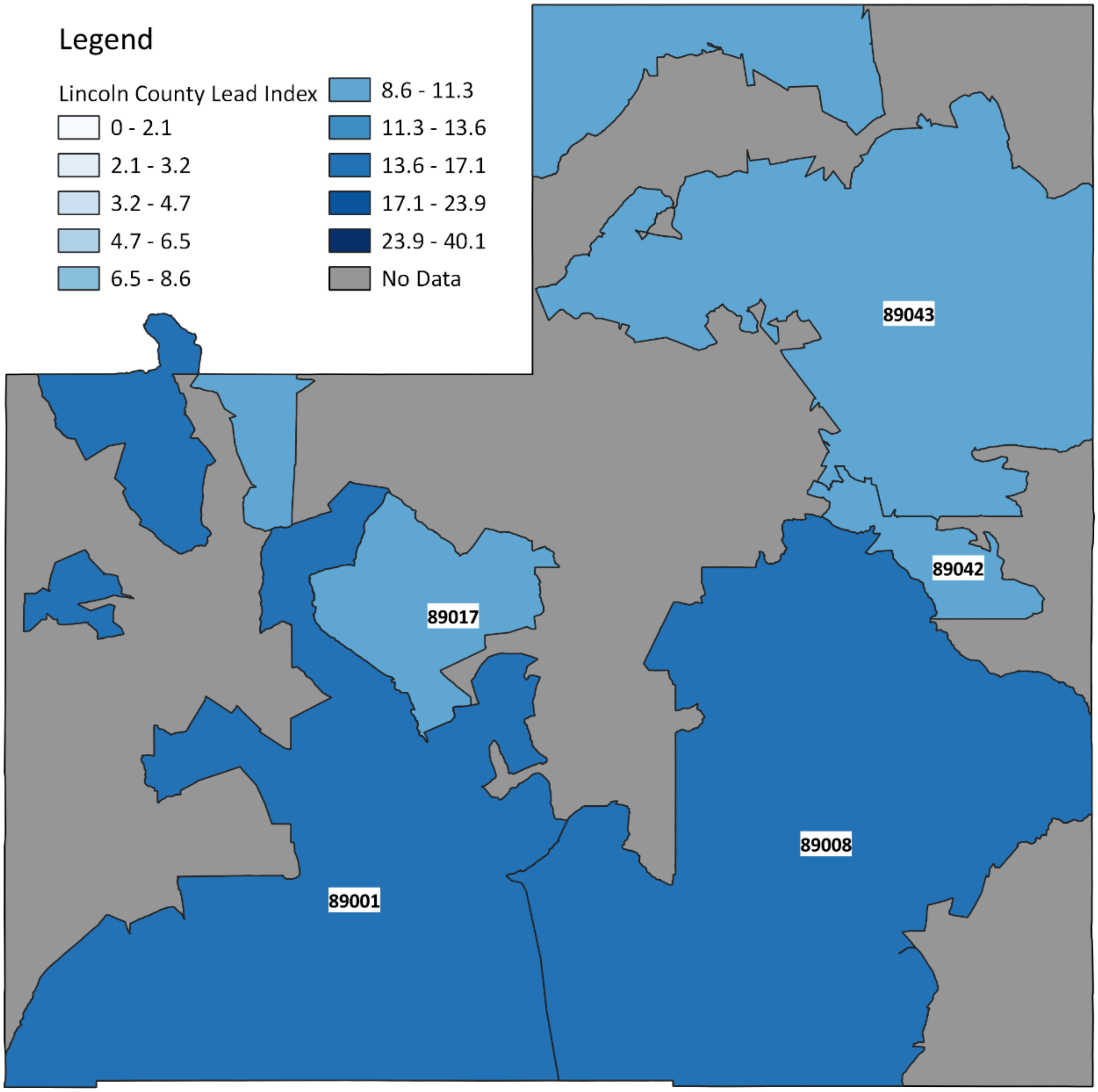
Humboldt County Map



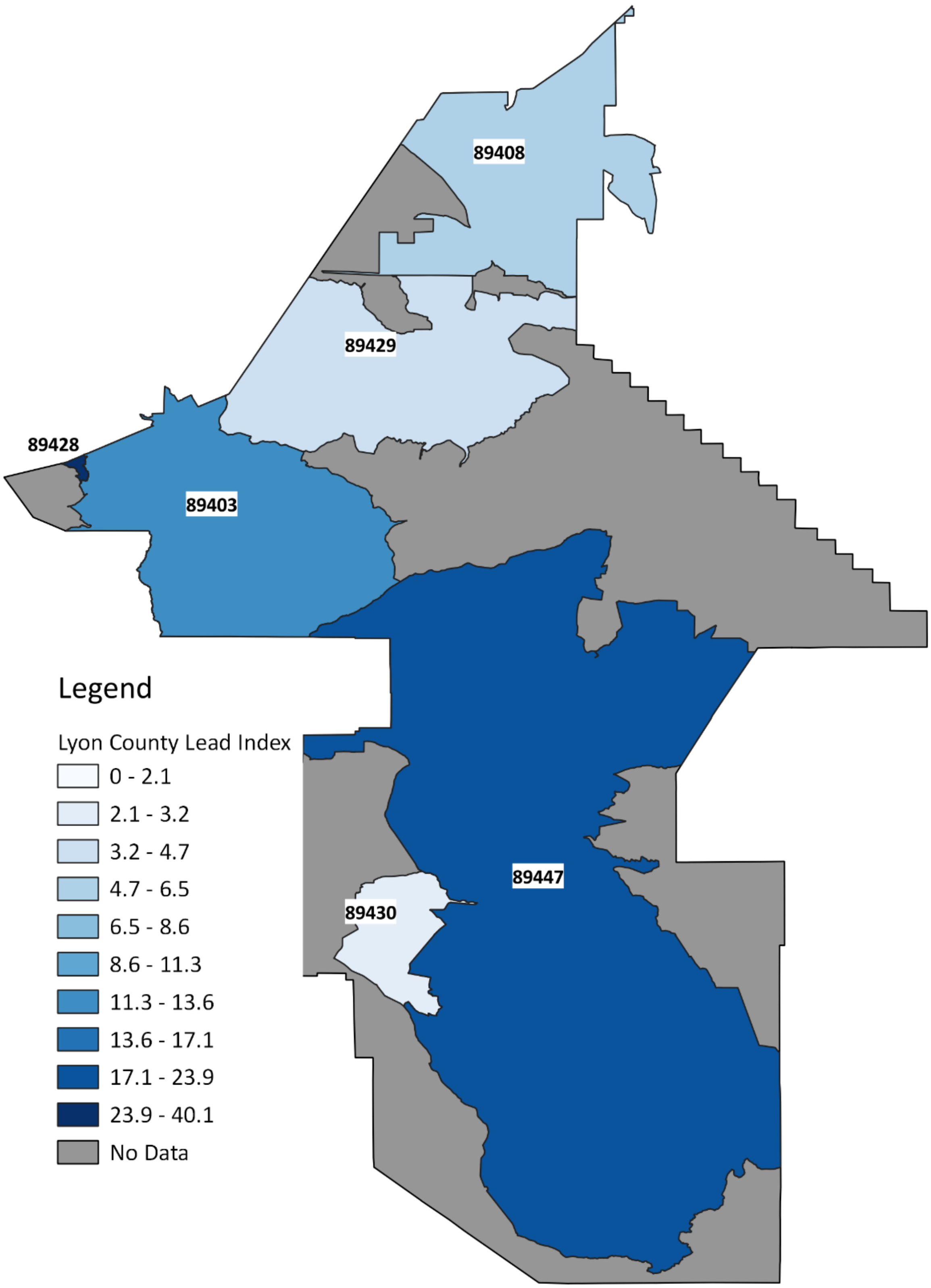
Lander County Map



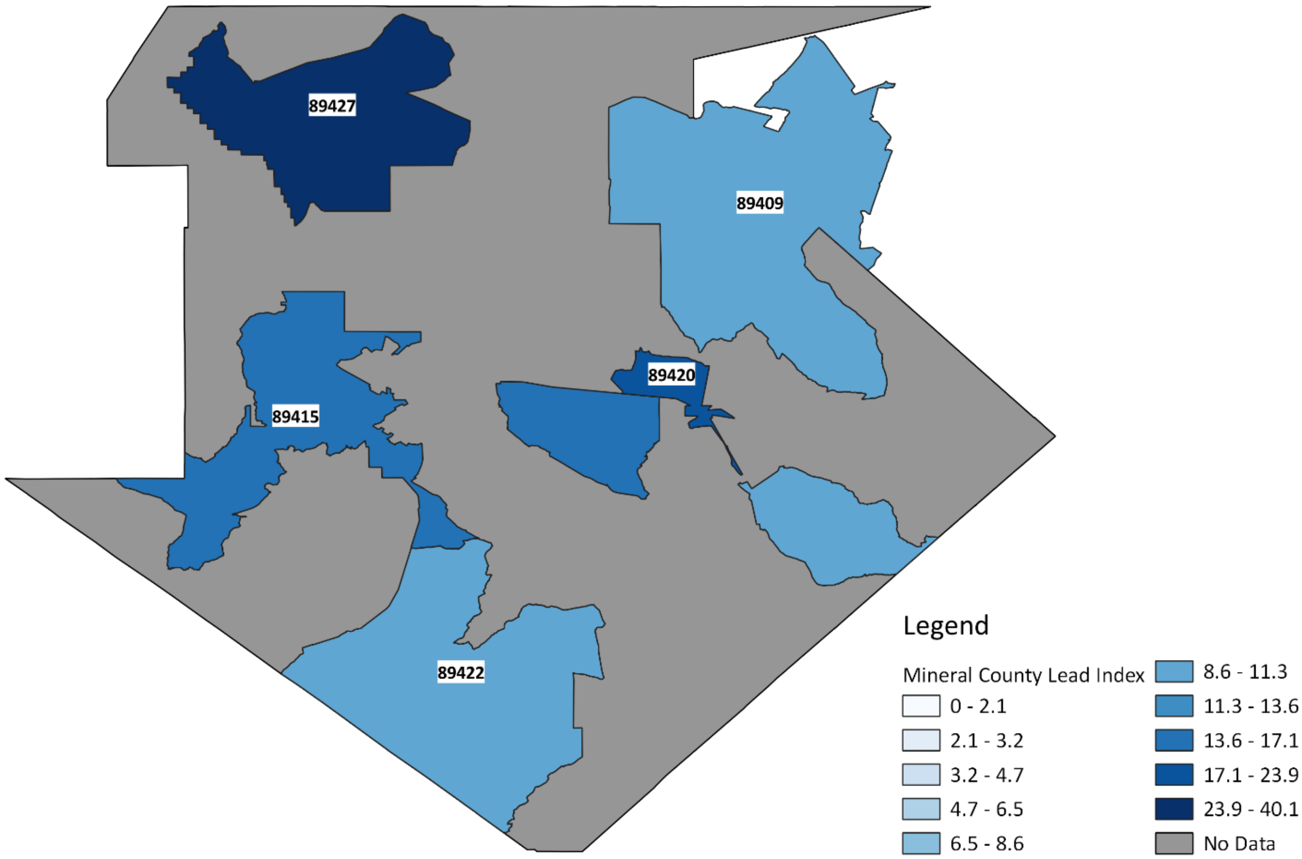
Lincoln County Map



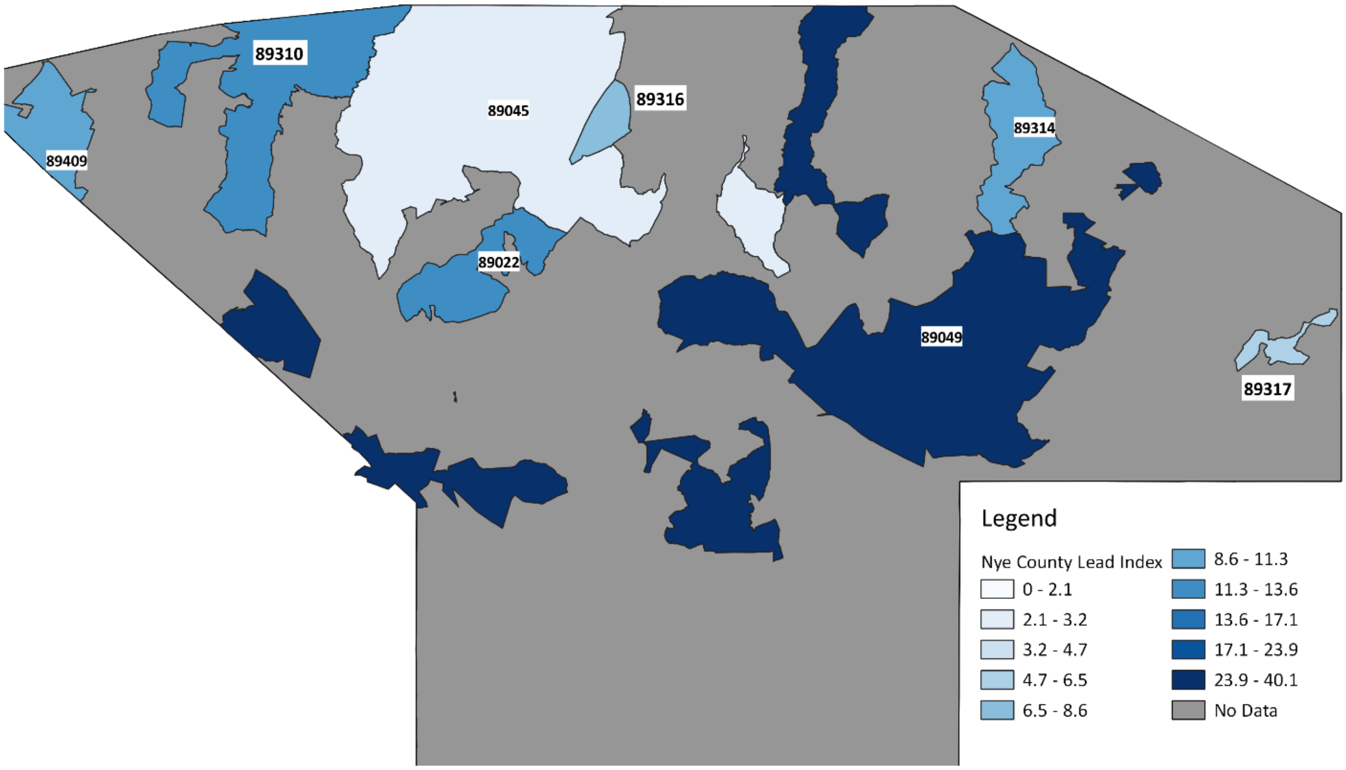
Lyon County Map

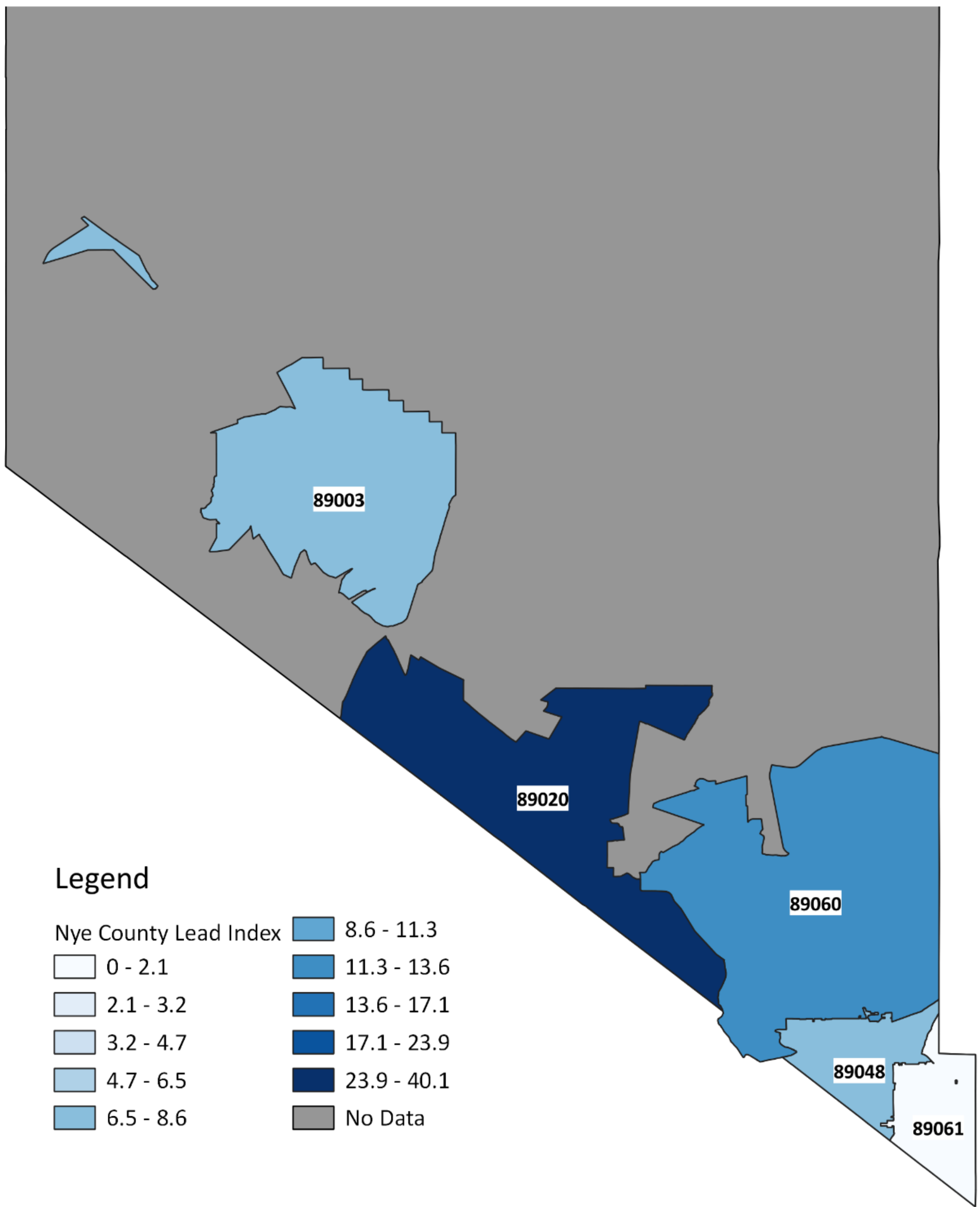


Mineral County Map

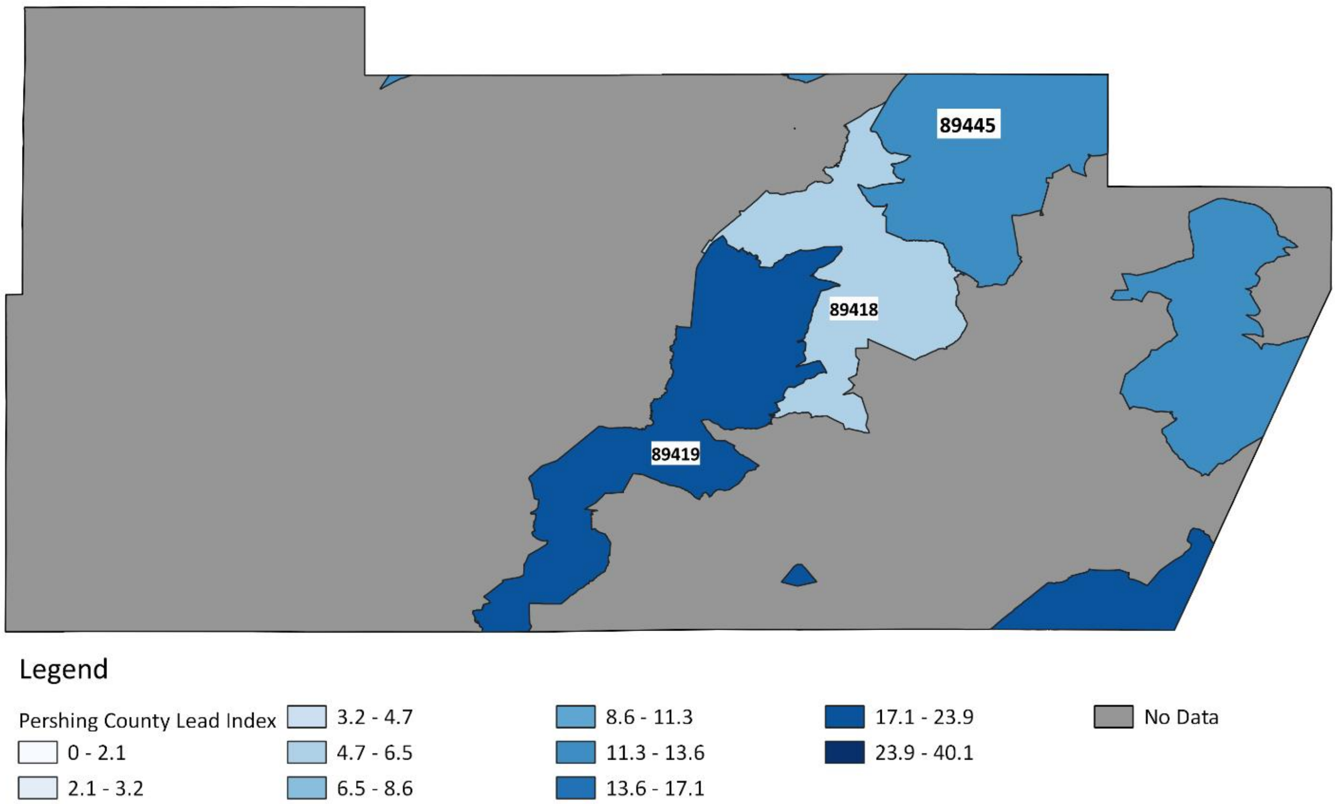


Nye County Map

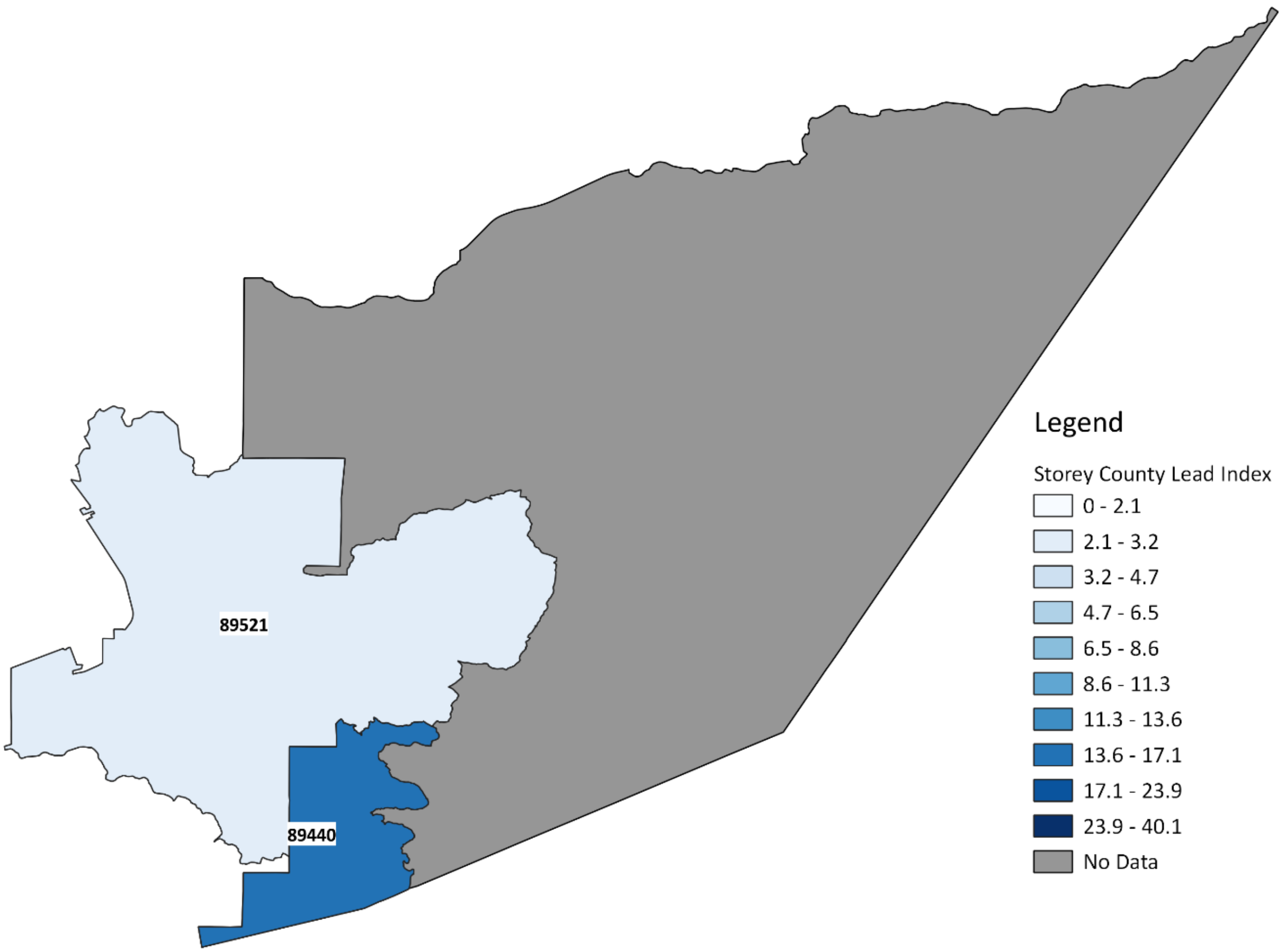



89003
89020
89060
89048
89061
Legend
Nye County Lead Index
0 - 2.1
2.1 - 3.2
3.2 - 4.7
4.7 - 6.5
6.5 - 8.6
8.6 - 11.3
11.3 - 13.6
13.6 - 17.1
17.1 - 23.9
23.9 - 40.1
No Data

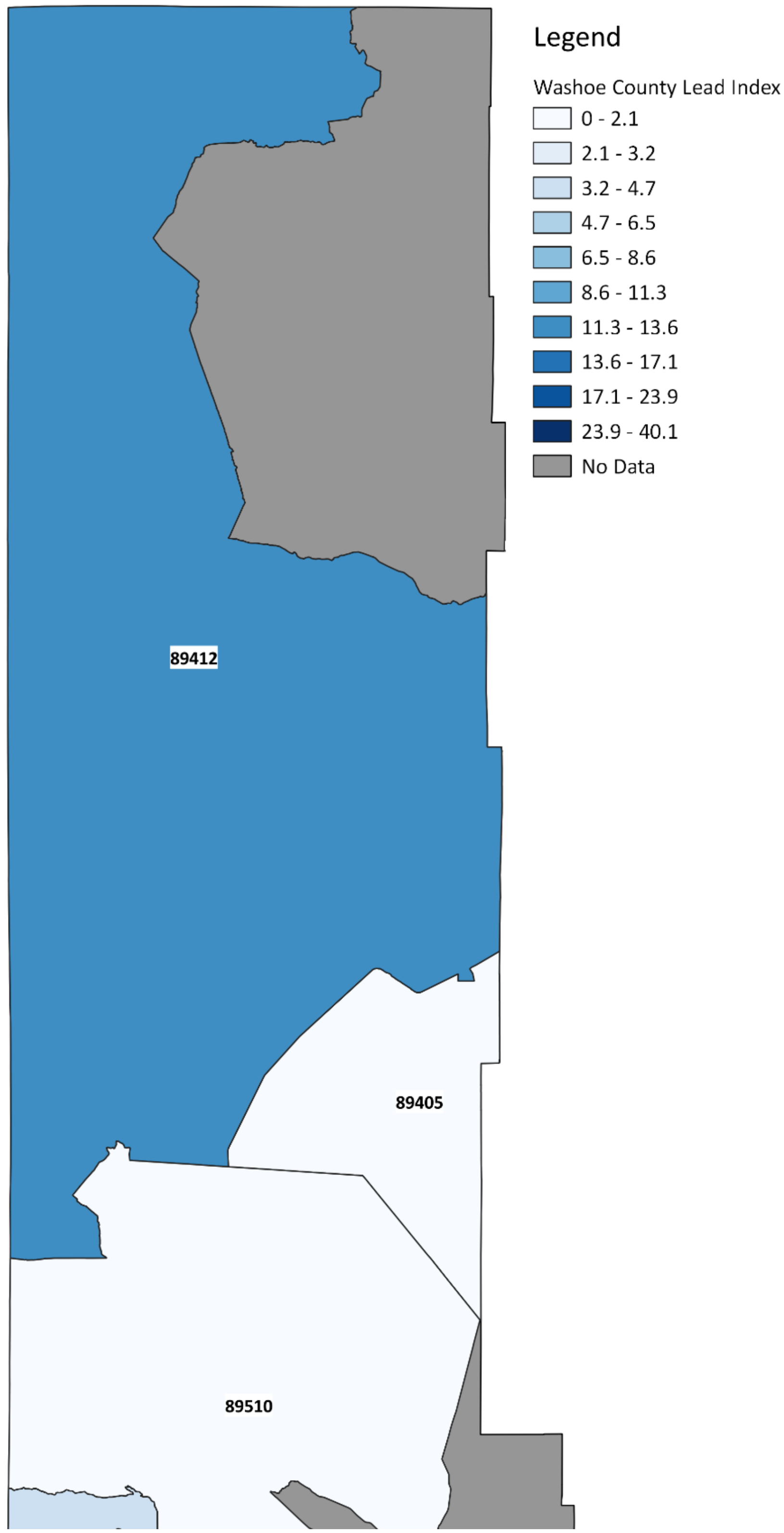
Pershing County Map

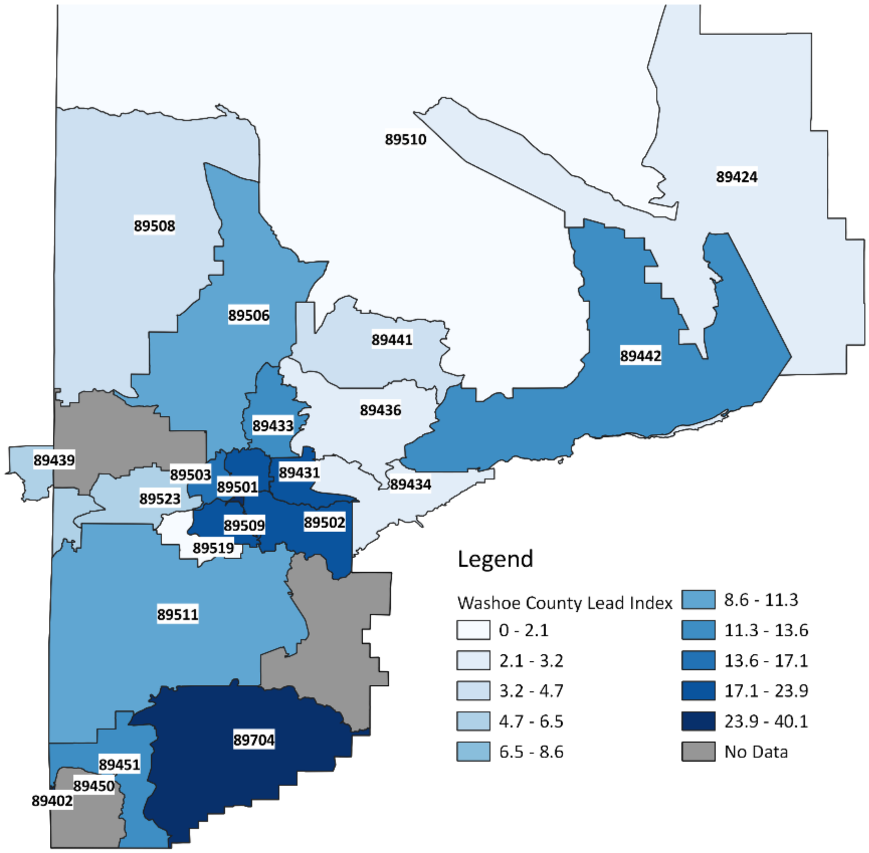


Storey County Map



Washoe County Maps




89510
89424
89508
89506
89441
89442
89436
89433
89439
89503
89431
89501
89434
89523
89509
89502
89519
89511
89704
89451
89450
89402
Legend
Washoe County Lead Index
0 - 2.1
2.1 - 3.2
3.2 - 4.7
4.7 - 6.5
6.5 - 8.6
8.6 - 11.3
11.3 - 13.6
13.6 - 17.1
17.1 - 23.9
23.9 - 40.1
No Data

White Pine County Map