

2023 Nebraska Blood Lead Testing Plan



Nebraska Childhood Lead Poisoning Prevention Program

Nebraska Department of Health and Human Services

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Background

Introduction

Childhood lead poisoning is still a public health threat to children. Despite significant progress in reducing lead poisoning since 1970, many children continue to be exposed to toxic lead. Lead exposure impacts children's growth and development, and the effects can persist throughout their lifetime. Pregnant women and adults exposed to lead are also at a higher risk of adverse health outcomes.

Lead is ubiquitous in the environment due to decades of lead use in paint and consumer products. All children can be exposed to lead, although children from low-income housing and those who live in housing built before 1978 are at greatest risk of lead exposure. Significant disparities exist with lead exposure, which disproportionately affects Black and other minority children, new immigrants, and refugees.

Lead exposure and poisoning is preventable. Because there is no known safe level of blood lead, it is important to prevent persons from being exposed. Early detection of exposure through blood lead testing and management of exposure are vital strategies toward prevention.

About the Nebraska Blood Lead Testing Plan

The Nebraska Childhood Lead Poisoning Prevention Program (NeCLPPP) was established by the Nebraska Childhood Lead Poisoning Prevention Act passed in April 2012 by the Nebraska Legislature (1). The program is housed within the Nebraska Department of Health and Human Services (NDHHS), Division of Public Health (DPH). NeCLPPP is tasked with developing a coordinated plan to minimize the general public's exposure to lead hazards. Nebraska Revised Statute §71-2518 requires the DPH to provide a standard for identifying elevated blood lead levels and establishes criteria for blood lead testing recommendations.

The 2023 Nebraska Blood Lead Testing Plan serves as an update to recommendations last revised in 2015. This Plan is intended to provide statewide guidance to healthcare providers, public health, and other groups for determining which children should be screened and tested for lead exposure, in accordance with Nebraska Revised Statutes. The Plan also provides testing recommendations for other populations, including refugees, pregnant women, and adults. Additional information is also provided on sources and health effects of lead exposure, reporting requirements and medical management recommendations.

For More Information

- Guidance documents, recommendations, and additional resources for healthcare providers and parents are available at the Nebraska Childhood Lead Poisoning Prevention Program website: <https://dhhs.ne.gov/Lead>.
- For questions or more information about blood lead testing, management, or lead poisoning prevention, contact the Nebraska Childhood Lead Poisoning Prevention Program at dhhs.epi@nebraska.gov or 402-471-2937.

Health Effects of Lead Exposure

Children

Lead exposure can seriously impact a child's health and development. Children under age 6 are at greatest risk for health problems caused by lead exposure because their bodies are still developing and are more susceptible to lead's harmful effects. Children under age 2 are at the highest risk of lead exposure because they tend to put their hands or other objects into their mouths.

There is no identified safe level of lead in blood. Lead exposure during childhood can result in a wide range of adverse health effects. At higher levels of blood lead, children may develop signs and symptoms of lead poisoning, such as anemia, kidney damage, colic, muscle weakness, and brain damage (2).

Children are more likely to have lower levels of blood lead, and they often have no overt signs or symptoms. Lower levels of lead in blood once thought to be safe are associated with damage to the brain and nervous system, slowed growth and development, learning and behavior problems, and hearing and speech problems (3). The neurological and behavioral effects of lead are believed to be irreversible.

The effects of lead exposure at a younger age can be observed later in life, including an increased risk of attention-deficit disorders, delayed learning, decreased cognitive performance, and lower intelligence quotient (IQ) test scores (3–5). Research suggests these and other health and developmental effects of lead exposure may persist beyond childhood into adulthood (6–8).

Educational Outcomes

The developmental delays and associated learning difficulties of lead exposure contribute to a variety of deficits which often become apparent when a child enters school. Studies among school-aged children have linked blood lead levels with a higher likelihood of poorer school performance and lower reading and math testing scores (9). The impact of lead exposure on learning and school performance is well evidenced by peer-reviewed research and has important educational implications.

Pregnant Women

When a pregnant woman is exposed, the lead in her blood can easily cross the placenta to the unborn child. Lead exposure during pregnancy can result in reduced fetal growth, premature birth, and cognitive deficiencies in the child (10). High lead blood levels are associated with an increase in a pregnant woman's risk of miscarriage (11).

Adults

Lead exposure in adults can cause serious and permanent damage to multiple systems. Adults with high blood lead levels are associated with an increased risk of death from all causes, cardiovascular disease, and cancer (12). Exposure in adults can result in increased blood pressure, reproductive problems, and decreased kidney function (13). Elevated blood lead levels in adults are also associated with several non-specific symptoms, such as abdominal pain, constipation, memory loss, nausea, weakness, and pain or tingling in the hands and/or feet (14).

Lead Exposure Risks in Nebraska

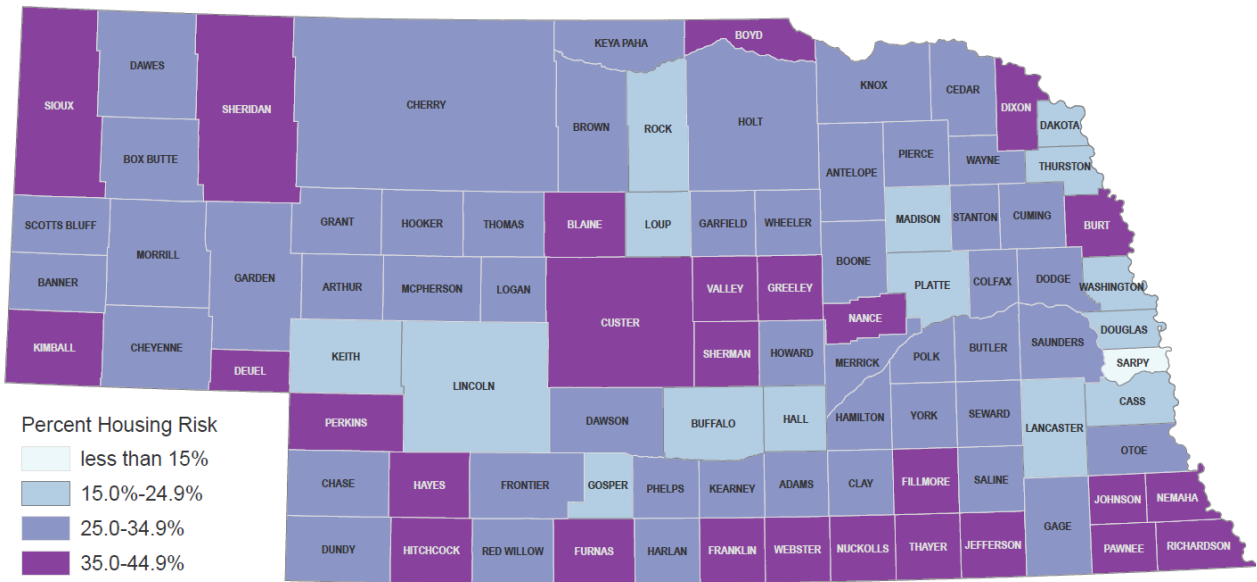
Lead-based Paint and Older Housing

Lead-based paint in older homes is a common source of lead exposure for young children. When lead-based paint deteriorates, it creates lead paint chips and lead dust. The most common pathway for lead exposure occurs when a child swallows lead dust or paint chips that gets on their hands and toys through normal hand-to-mouth activity. Remodeling or renovations in older homes can also create large quantities of lead dust. As a result, lead dust may be ingested and inhaled by children, pregnant women, and adults living in the home.

Lead-based paint was banned for residential use in 1978 by the Environmental Protection Agency (U.S. EPA). However, lead paint remains a hazard in thousands of Nebraska homes built before 1978. The older the home, the more likely it has lead-based paint. According to America's Health Rankings for 2021, one-fifth (22%) of Nebraska homes had the potential for elevated lead risk due to the age of the housing, which ranks as the 11th highest percent among all 50 states (15). When broken down by county, 27 counties (29%) in Nebraska have more than 35% of housing stock with potential elevated lead risk (16,17).

Housing with Lead Risk

Percentage of homes with elevated lead risk due to age of housing



Data source: 2017-2021 American Community Survey, 5 Year Estimates (Table B25034); Jacobs et. al. The prevalence of lead-based paint hazards in U.S. housing. Environ Health Perspect. 2002 Oct;110(10):A599-606.

Contaminated Soil

Children can be exposed to lead while playing in soil. Deteriorating and flaking lead paint on the exterior of homes and buildings can deposit in the soil around the home. Soil contaminated with lead can be carried into the home on shoes, clothing, or pets. Soil can also be contaminated from deposition of air emissions from historic use of leaded gasoline and lead processing operations.

Omaha Lead Superfund Site

The largest area of lead-contaminated soil in Nebraska is in the city of Omaha. The Omaha Lead Superfund Site was formally established in 2003 by the U.S. EPA. The site boundary encompassed 27 square miles near downtown Omaha, where two former lead-processing facilities operated and released lead-containing particulates into the atmosphere from the smokestacks. One lead refinery operated for more than 125 years. The lead particles were transported through the air and deposited on surrounding residential properties (18).

Jobs and Hobbies

Adults are mainly exposed to lead by breathing in lead-containing dust and fumes at work, or from hobbies that involve lead. Adults can also bring harmful levels of lead dust into the home on their skin, clothes, shoes, and work items. Children and pregnant women can be exposed to this 'take home' lead. High risk jobs include working in foundries and metal manufacturing, producing bullets and ammunition, construction, welding, plumbing, metal and battery recycling, and firing ranges. High risk hobbies include making stained glass, jewelry, auto repair, and working with scrap metal.

Imported Foods and Medicines

Imported foods, traditional medicines, and cosmetics have been found to contain high levels of lead and have resulted in lead poisoning in children and adults. Usually, these products are purchased in or brought to the United States from other countries, but some products containing lead may be found in domestic specialty stores and markets. Imported foods that have been found to contain lead include spices such as turmeric, curry powders, and chili powders. Some traditional medicines can contain lead, such as some Ayurvedic remedies. Cosmetics and ceremonial powders can contain lead, such as kohl, surma, sindoor, and kumkuma.

Cookware, Toys, and Other Consumer Products

Some antique dishware and imported cookware can contain lead, such as glazed ceramics and pottery, bean pots, pewter or brass utensils and cooking pots, pressure cookers, leaded crystal, and chipped or cracked dishes. Lead has been found in older painted toys, inexpensive children's jewelry, and keys (19).

Water

Lead can contaminate drinking water when a building's plumbing contains lead pipes and fixtures. The use of most lead-containing water fixtures and plumbing was banned in 1986 (20). Therefore, lead pipes, faucets, and fixtures are more likely to be found in older cities and homes built before 1986. Some homes have lead service lines, which are pipes that connect the home to the water main. A 2023 assessment by the U.S. EPA estimated Nebraska has 53,230 lead service lines (21).

Blood Lead Reference Value

Nebraska DHHS currently uses a blood lead reference value of 3.5 micrograms per deciliter ($\mu\text{g}/\text{dL}$) to identify a person with an elevated blood lead level. The blood lead reference value, or BLRV, is a screening tool used to identify children who have higher levels of lead in their blood compared with most children.

The BLRV is based on the on the 97.5th percentile of the blood lead values among U.S. of children ages 1-5 years from the 2015-2016 and 2017-2018 National Health and Nutrition Examination Survey (NHANES) cycles (23). Children with blood lead levels at or above the BLRV are among the top 2.5% of U.S. children with the highest blood lead levels.

The previous BLRV from 2012 to 2021 was 5 $\mu\text{g}/\text{dL}$. Nebraska DHHS updated the level in January 2022 following the Centers for Disease Control and Prevention (CDC) update to 3.5 $\mu\text{g}/\text{dL}$ in October 2021 (22).

Managing Blood Lead Levels

Medical Management

Medical management should be provided for all persons with a confirmed BLL of 3.5 $\mu\text{g}/\text{dL}$ or higher. In children, primary management of lead exposure should include but not be limited to:

- Finding and eliminating the source of the lead
- Instruction in personal/household/workplace hygiene measures
- Optimizing diet and nutritional status
- Repeat testing to monitor blood lead level

Clinicians should coordinate management with their local health department (LHD). LHDs can provide follow-up communication on public health case management activities.

- [Management recommendations in children](#)
- [Management recommendations in pregnant women](#)

Public Health Surveillance and Case Management

NeCLPPP maintains a surveillance system to detect cases of blood lead levels for initiating public health action. The system, a part of the the Nebraska Electronic Disease Surveillance System (NEDSS), contains a repository for all blood lead levels reported to NDHHS.

When a blood lead level at or above the reference value is reported by a healthcare provider or laboratory, a public health investigation is initiated by the local health department. Case management services are provided to the family, which include assessing risk factors, making referrals, conducting environmental assessments, and other interventions.

- [Public health case management recommendations in children](#)

Blood Lead Testing Methods and Reporting

Venous and capillary blood lead tests are the only testing methods recommended by CDC. Testing of hair, teeth, or urine provocation testing are not recommended for children or adults (24).

Venous blood lead tests

Venous blood tests are more accurate and have a lower chance of contamination and false positives. Venous tests should be used to confirm initial elevated capillary BLLs whenever possible. Venous samples can also be used for initial screening and follow-up blood lead testing.

Capillary blood lead tests

Capillary samples from a finger-prick or heel-prick can be used for a child's BLL screening test. Due to frequent false positive results, children who are screened with a capillary BLL $\geq 3.5\mu\text{g}/\text{dL}$ should have a confirmatory venous blood lead test. If a confirmatory venous blood draw is not possible (i.e. due to inability to access vein), a capillary test within 12 weeks of the initial elevated BLL may be performed. Treatment decisions should be based on a venous test result.

Capillary samples can be analyzed with point-of-care devices (LeadCare® Analyzer). Point-of-care lead tests are a Clinical Laboratory Improvement Amendments (CLIA)-waived test. Facilities using point-of-care devices (LeadCare® II) must meet all CLIA requirements and must report all blood lead levels to NDHHS. Capillary samples can also be collected in a capillary tube (or on filter paper) and sent to a laboratory for higher-complexity analysis.

Reducing Contamination in Capillary Samples

Lead on the skin can contaminate a capillary blood sample if the finger is not cleaned properly, which can lead to false positive results. Clinicians should follow all directions of the manufacturer if using a point-of-care device. Children's hands should first be washed thoroughly with soap and water and allowed to dry without touching any surface. An alcohol swab should be used to scrub the finger before the sample is collected. More information can be found on CDC's [Steps for Collecting Fingertick Blood Samples in Micro-Vials for Lead Testing](#) and [Mission Unleaded Video](#).

Reporting Requirements

In accordance with Nebraska Reportable Disease Regulations (173 NAC 1) and Nebraska Revised Statute §71-2518, reporting of blood lead level tests is required by law (25). Healthcare providers, clinics, and laboratories are required to submit reports of all blood lead tests to NDHHS within seven (7) days of detection. The laboratory can report in lieu of the physician.

- Report all blood lead levels regardless of the result or patient age (children or adults).
- Report all blood lead levels produced by point-of-care blood lead analyzers (LeadCare® II).
- Report must identify if the test was capillary or venous sample.
- Report must include standard patient demographic data elements, such as date of birth, address, sex. Race and ethnicity are required if available by the facility.
- Reports must be submitted electronically by laboratories.

Blood Lead Testing Recommendations

Summary

Healthcare providers in Nebraska should use the following statewide recommendations for determining when to test a child for lead. Local public health departments may recommend blood lead testing for additional populations.

- **Provide** anticipatory guidance on lead exposure to parent/guardian during well child visits (See [Appendix A](#) for anticipatory guidance).
- **Assess** children under 6 years old (9–71 months) for lead exposure risk at annual well child visits or more frequently, if necessary.
- **Blood lead test** children with any risk factor at the appropriate age as described below. Some providers may choose to test all children at 12 and 24 months.

Testing Recommendations for Children Under Age 6 Years

Criteria	Requirement/Recommendation	Rationale
Children Enrolled in Medicaid	<ul style="list-style-type: none"> • Children enrolled in Medicaid are required to receive a blood lead test at 12 <u>and</u> 24 months of age. • Children 24–71 months old (2–5 years) required to receive a blood lead test if not been previously tested. 	Blood lead testing among Medicaid-eligible children at ages 1 <u>and</u> 2 years is required under the Nebraska Medicaid regulations (471 NAC 33) and the Centers for Medicare and Medicaid Services (CMS) Early and Periodic Screening, Diagnostic and Treatment (EPSDT) program (26,27).
Children Living in a High Risk Zip Code	<ul style="list-style-type: none"> • Children living in a high risk zip code should receive a blood lead test at 12 <u>and</u> 24 months of age. • Children 24–71 months old (2–5 years) should receive a blood lead test at least once if not previously tested. 	Children living in areas with lead hazards from industrial pollution or older housing are at a higher risk of lead exposure. The High Risk Zip Codes List was developed to identify areas with high prevalence of elevated lead blood lead levels. Zip Codes are listed on Page 14 and on the DHHS Lead website . See Appendix C for details on methodology.
Children with Lead Exposure Risk Identified on a Risk Questionnaire	<ul style="list-style-type: none"> • Children with ≥1 risk factor identified on a risk questionnaire should receive a blood lead test at ages 12 <u>and</u> 24 months of age. • Children 24–71 months old (2–5 years) should receive a blood lead test at least once if not previously tested. 	Children may be at an increased risk for lead poisoning from a variety of sources. These sources include lead-based paint in older homes, parent occupations and hobbies, traditional medicines, imported spices, and other consumer products. See Appendix B for explanation on questions.

Testing Recommendations for Other Populations

Population	Rationale
<p>Recent Refugees, Immigrants, and Foreign Adoptees</p>	<p>Children recently arriving in the United States are at a high risk for lead poisoning due to exposures in their home country or cultural products they may use.</p> <p>CDC recommends a blood lead test for all newly arrived refugee children ages 6 months to 16 years. Children should receive a repeat test 3 to 6 months after placement in a permanent residence, regardless of initial results (28).</p>
<p>Participants in WIC</p>	<p>Children who are participants in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are more likely to have a blood lead level above the reference level (29). Federal policy requires that upon enrollment of a child in the WIC Program, the parent must be asked if the child has had a blood lead test (30). If the child has not had a test, they must be referred to programs where they can obtain such a test.</p>
<p>Pregnant Women</p>	<p>The CDC and the American College of Obstetricians and Gynecologists (ACOG) recommend screening pregnant women for lead exposure risks and performing a blood lead test if any risk factors are identified (11,31). The CDC recommends that state or local public health departments provide information to clinicians on community-specific risk factors that can be used to determine the need for testing in pregnant women.</p> <p>A risk questionnaire should be administered at the earliest prenatal visit. A blood lead test is recommended if the individual answers “Yes” or “Don’t Know” to any of the questions. See risk screening questions and management recommendations for pregnant women.</p>
<p>Adults with Occupational and Hobby Exposures</p>	<p>All adults who work with lead through their job or hobbies should be monitored for lead exposure by receiving blood lead testing. This recommendation is based on several studies that have shown adverse health effects of lead associated with the lower levels of exposure (13). Most employers are required to protect workers from lead exposure under lead standards by the Occupational Safety and Health Administration (OSHA) (32). The lead standards establish criteria for when medical surveillance of blood lead levels is initiated. For adults recommendations, see https://dhhs.ne.gov/Pages/Adult-Lead-Exposure.aspx.</p>
<p>Other Patients to Consider Blood Lead Testing</p>	<ul style="list-style-type: none"> • Patient with history of ingesting non-food items or pica behavior. • Child with neurodevelopmental disabilities such as autism, ADHD, or learning delays. • Parent or patient requests blood lead test.

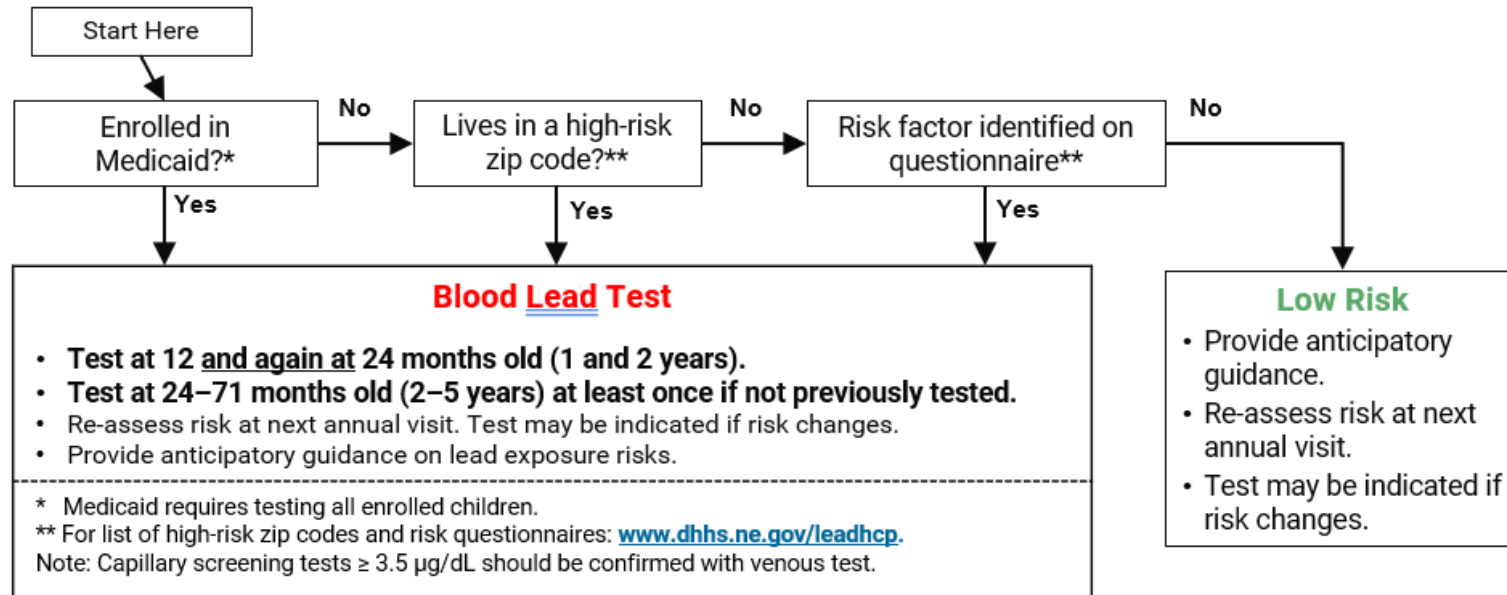
Pediatric Lead Testing Recommendations Summary Table

By Age

Age	Child Enrolled in Medicaid*	Child Lives in a High Risk Zip Code	All Other Children
12 months (1 year)	Blood lead test (required)*	Blood lead test**	Blood lead test if 1 or more risks present on risk questionnaire**
24 months (2 years)	Blood lead test (required)*	Blood lead test**	Blood lead test if 1 or more risks present on risk questionnaire**
24–71 months (2–5 years)	Blood lead test if not previously tested (required)*	Blood lead test if not previously tested**	Blood lead test if 1 or more risks present on risk questionnaire, if not previously tested**
<p>* Testing in Medicaid-eligible children is required at 12 <u>and</u> 24 months. Children 24–71 months old (2–5 years) should receive a blood lead test at least once if not previously tested.</p> <p>** For High Risk Zip Codes List and Risk Questionnaires: See Testing Plan at www.dhhs.ne.gov/leadhcp</p> <p>Note: Local public health departments may recommend blood lead testing for additional populations.</p>			
<p>Other Testing Recommendations/Considerations:</p> <ul style="list-style-type: none"> • Newly-arrived refugees and immigrants: Blood lead test children ages 6 months to 16 years and repeat test 3–6 months after placement in permanent residence. • Patient with history of ingesting non-food items or pica behavior. • Child with neurodevelopmental disabilities such as autism, ADHD, or learning delays. • Parent or patient requests a blood lead test. 			

Nebraska Blood Lead Testing Algorithm

Children < 6 years old



Other Patients to Consider Blood Lead Testing

- Newly-arrived refugees and immigrants.
- Patient with history of ingesting non-food items or pica.
- Child with neurodevelopmental disabilities such as autism, ADHD, or learning delays.
- Pregnant women with one or more lead exposure risk factors identified on questionnaire.**
- Adults with lead exposure from occupation or hobby.
- Parent or patient requests blood lead test.

Additional Information

- For additional guidance on blood lead testing and management: www.dhhs.ne.gov/leadhcp
- Questions? Childhood Lead Poisoning Prevention Program: dhhs.epi@nebraska.gov or 402-471-2937.
- For case referrals and local guidance, contact local health department www.dhhs.ne.gov/lhd
- Local health departments may recommend blood lead testing for additional populations.



Nebraska Blood Lead Testing Guidelines

Children

Recommendations for Nebraska Healthcare Providers

- > Children under 6 years old (9–71 months) should be assessed for lead exposure risk at annual well child visits or more frequently, if necessary.
- > Blood lead test children with any risk factor identified on the questionnaire below.
 - > **Test** at 12 months and again at 24 months (1 and 2 years).
 - > **Test** at 24–71 months old (2–5 years) at least once if not previously tested.

Lead Risk Questionnaire for Children

If **Yes or Don't Know** to any question, blood lead test is recommended per age guidelines above.

1. Is child enrolled in Medicaid? **Testing required at 12 and 24 months of age per Medicaid**
2. Does child live in a high risk zip code? **Zip code list: see back page or www.dhhs.ne.gov/lead/hcp**
3. Does child live in or often visit a home built before 1950?
4. Does child live in or often visit a home built before 1978 that has been remodeled or renovated within the last year?
5. Does child have a sibling or playmate with lead poisoning or elevated blood lead level?
6. Does child live with an adult with a job or hobby that involves exposure to lead?
 - Examples*
 - Metal manufacturing and foundries, welding, battery recycling
 - Building repair, renovation, and painting
 - Ammunition production, firing ranges, casting bullets
 - Making stained glass, pottery and glazing, auto repair
7. Does child's family use products from other counties that may contain lead? Such as traditional medicines, cosmetics, spices, or glazed pottery?
 - Examples*
 - Traditional medicines: Ayurvedic medicine, bali gali, pay-loo-ah
 - Cosmetics and powders: surma, kohl, sindoor, kumkuma
 - Spices imported or brought in from another county
 - Glazed pottery and imported cookware
8. Is child a refugee, migrant, immigrant, foreign adoptee, or in foster care?

Additional Information

- > Capillary screening tests ≥ 3.5 $\mu\text{g}/\text{dL}$ should be confirmed with a venous test.
- > All blood lead levels are required to be reported to DHHS (regardless of the result).
- > Local health departments may recommend blood lead testing for additional populations.
- > Additional guidance on blood lead testing and management: www.dhhs.ne.gov/leadhcp

Nebraska High Risk Zip Codes List

For Lead Testing in Children Under 6 Years Old

High risk zip codes for targeted blood lead testing in Nebraska children are listed by city.*
For complete lead testing recommendations, visit: www.dhhs.ne.gov/leadhcp.

City	Zip	City	Zip	City	Zip	
Ainsworth	69210	Fairfield	68938	Omaha	68102, 68104, 68105, 68106, 68107, 68108, 68110, 68111, 68112, 68131, 68132	
Arnold	69120	Fordyce	68736		Orchard	68764
Ashby	69333	Franklin	68939		Osceola	68651
Auburn	68305	Garland	68360		Oshkosh	69154
Avoca	68307	Geneva	68361		Otoe	68417
Beaver City	68926	Gibbon	68840		Overton	68863
Bee	68314	Grand Island	68801		Oxford	68967
Beemer	68716	Gresham	68367		Pawnee City	68420
Bladen	68928	Hardy	68943		Paxton	69155
Blue Springs	68318	Hastings	68901		Pender	68047
Bradshaw	68319	Hebron	68370	Plainview	68769	
Bridgeport	69336	Holstein	68950	Polk	68654	
Brock	68320	Howells	68641	Primrose	68655	
Burr	68324	Hubbell	68375	Raymond	68428	
Byron	68325	Humboldt	68376	Red Cloud	68970	
Cairo	68824	Johnson	68378	Rushville	69360	
Callaway	68825	Kenesaw	68956	Saint Edward	68660	
Campbell	68932	Lawrence	68957	Scottsbluff	69361	
Carleton	68326	Leigh	68643	Scribner	68057	
Carroll	68723	Lincoln	68502, 68503, 68508, 68510	Spalding	68665	
Cedar Bluffs	68015	Lindsay	68644	Stanton	68779	
Cedar Rapids	68627	Litchfield	68852	Sterling	68443	
Central City	68826	Loup City	68853	Stromsburg	68666	
Ceresco	68017	Lyman	69352	Superior	68978	
Clatonia	68328	Madison	68748	Syracuse	68446	
Clay Center	68933	McCool	68401	Talmage	68448	
Comstock	68828	Junction	68041	Tilden	68781	
Craig	68019	Mead	68041	Trenton	69044	
Curtis	69025	Merna	68856	Trumbull	68980	
Dannebrog	68831	Milligan	68406	Utica	68456	
Dawson	68337	Mitchell	69357	Wahoo	68066	
Deshler	68340	Monroe	68647	Walthill	68067	
Dunbar	68346	Nebraska City	68410	Wauneta	69045	
Duncan	68634	Nehawka	68413	Wisner	68791	
Elba	68835	Newman Grove	68758	Wolbach	68882	
Elm Creek	68836	Oakland	68045	Wood River	68883	
Fairbury	68352	Ohiova	68416			

*High risk zip codes are defined as having higher than average prevalence of children with elevated blood lead levels. For more information on the methodology, see the blood lead testing plan at www.dhhs.ne.gov/leadhcp.

Lead Exposure Risk Questionnaire

For Parents and Caregivers

Child Name: _____ Date of Birth: _____ Age (in years): _____
 Date: _____ Provider Name: _____ Child's Zip Code: _____

Instructions

- > Lead is a toxic metal that can harm a child's health, especially in children under age 6.
- > Complete the questionnaire below for children under 6 years old to identify lead exposure risks.
- > If answer is **Yes or Don't Know** to any question:
 - Your child may need a blood lead test.
 - Ask your child's healthcare provider about blood lead testing.

Lead Risk Questions for Children	Yes	No	Don't Know
1. Is your child enrolled in Medicaid? Children enrolled in Medicaid are required to have lead test at ages 12 and 24 months.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does your child live in a high risk zip code? See zip code list on back or www.dhhs.ne.gov/lead-prevention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Does your child live in or often visit a home built before 1950?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Does your child live in or often visit a home built before 1978 that has been remodeled or renovated within the last year?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Does your child have a sibling or playmate with lead poisoning or an elevated blood lead level?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Does child live with an adult with a job or hobby that involves exposure to lead? <i>Examples</i> <ul style="list-style-type: none"> • Metal manufacturing and foundries, welding, battery recycling • Building repair, renovation, and painting • Ammunition production, firing ranges, casting bullets • Making stained glass, pottery and glazing, auto repair 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Does child's family use products from other counties that may contain lead? Such as traditional medicines, cosmetics, spices, or glazed pottery? <i>Examples</i> <ul style="list-style-type: none"> • Traditional medicines: Ayurvedic medicine, bali gali, pay-loo-ah • Cosmetics and powders: surma, kohl, sindoor, kumkuma • Spices imported or brought in from another county • Glazed pottery and imported cookware 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Is your child a refugee, migrant, immigrant, foreign adoptee, or in foster care?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Medical Management Recommendations

Lead Exposure in Children

Schedule for Confirmatory BLL	
Initial Capillary BLL (µg/dL)	Confirm with Venous Blood Test
3.5 – 9	Within 3 months*
10 – 19	Within 1 month*
20 – 44	Within 2 weeks*
≥ 45	Within 24 - 48 hours*
*The higher the BLL on a screening test, the more urgent the need for confirmatory testing.	

Schedule for Follow-up BLLs		
Confirmed BLL (µg/dL)	Retest first 2-4 tests	Retest after BLLs declining
3.5 – 9	3 months*	6–9 months
10 – 19	1–3 months*	3–6 months
20 – 44	2–4 weeks	1–3 months
≥ 45	As soon as possible. Consult with expert.	
*Some providers may choose to repeat BLL within a month to ensure the level is not rising more quickly than anticipated.		

Medical Management Recommendations for Confirmed Blood Lead Levels

Confirmed BLL	Recommended Actions Based on Confirmed BLL
< 3.5 µg/dL	<ul style="list-style-type: none"> • Anticipatory guidance about common sources of lead exposure and how to prevent exposure. • Routine assessment of developmental milestones and nutritional status. • Repeat blood lead level in 6–12 months if the child is at high risk or risk changes during the timeframe.
3.5 – 19 µg/dL	<ul style="list-style-type: none"> • Re-test BLL at recommended intervals to ensure BLL is not rising and lead exposures are controlled. • Take environmental history to identify potential sources of exposure. Provide education. • Consider testing young siblings and other children in the home who may be exposed. • Ensure iron sufficiency with testing and treatment. Consider multivitamin with iron. • Provide nutritional counseling related to calcium and iron. Refer to services as needed (e.g. WIC). • Perform structured developmental screening and monitoring. Refer to early intervention for evaluation if developmental delays suspected or diagnosed. • Report case to local health department and coordinate management. • Refer to local health department for environmental investigation if confirmed BLL is ≥10 µg/dL. Some health departments may perform environmental investigations for confirmed BLLs ≥3.5 µg/dL.
20 – 44 µg/dL	<p>Follow recommendations for BLL 3.5-19 µg/dL as listed above.</p> <ul style="list-style-type: none"> • Complete history and physical exam assessing for signs and symptoms related to lead. • Consider abdominal x-ray based on history (e.g. history of pica or excessive mouthing behaviors). • Contact state or local health department for guidance.
≥ 45 µg/dL	<p>URGENT: Follow guidance above, plus:</p> <ul style="list-style-type: none"> • Complete history and physical exam including detailed neurological exam. • Obtain abdominal X-ray and initiate bowel decontamination if indicated. • Consider chelation therapy and/or hospitalization. Child should be discharged to a lead-safe environment. • Consult with an expert about chelation therapy. Contact Pediatric Environmental Health Specialty Unit (1-800-421-9916) or Poison Control Center (1-800-222-1222).

Source: Adapted from: CDC, Recommended Actions Based on Blood Lead Levels: <https://www.cdc.gov/nceh/lead/advisory/acclpp/actions-blls.htm> and Pediatric Environmental Health Specialty Unit: https://www.pehsu.net/Lead_Exposure.html

Public Health Case Management Guidelines

Lead Exposure in Children

Suspect Cases (Initial Unconfirmed Capillary BLL)

BLL	Recommended Actions for Initial Capillary BLL
≥ 3.5 $\mu\text{g/dL}$	<p>Within 1 month</p> <p>Notify the caregiver: Phone call (or letter) to family with BLL results and confirmatory test recommendations.</p> <p>Contact the family and/or provider if confirmatory test not completed within recommended timeframe.</p>

Confirmed Cases (Initial Venous BLL)

BLL	Recommended Actions for Initial Confirmatory or Venous BLL
$3.5 - 9$ $\mu\text{g/dL}$	<p>Within 1 month</p> <p>Notify the caregiver: Contact family with BLL results and follow-up testing recommendations.</p> <p>Provide health education: Send educational materials to family about exposure sources and prevention.</p> <p>Obtain environmental history: Interview caregiver to assess the child's environmental history and risk factors. Recommend ways to prevent further lead exposure based on risk factors.</p> <p>Contact the healthcare provider: Initiate contact with provider to discuss medical management and case coordination. Follow-up with provider to communicate case management activities and investigation findings.</p> <p>Refer the family to developmental programs and community resources: Make referrals as needed to: healthcare providers' office, early intervention and/or other early childhood programs, health, nutrition counseling or WIC, and housing and/or social services when appropriate.</p> <p>Ensure follow-up test scheduled within 3 months: Contact healthcare provider and/or family if follow-up test not completed within 3 months.</p>
$10 - 19$ $\mu\text{g/dL}$	<p>Within 2 weeks</p> <p>Same actions as above for 3.5-9 $\mu\text{g/dL}$, plus:</p> <p>Arrange on-site environmental investigation and educational home visit: Environmental investigation of the home to identify potential sources of lead. Recommend ways to prevent further lead exposure.</p> <p>Assess family needs: Assess the child's status and needs (medical, environmental, nutritional, developmental, housing, and social services).</p> <p>Develop a case management plan: Collaborate with the family, physicians, and other providers to develop an appropriate plan based on the needs assessment. Include all necessary referrals in the plan.</p>
$20 - 44$ $\mu\text{g/dL}$	<p>Within 1 week</p> <p>Same actions as above for 10-19 $\mu\text{g/dL}$, plus:</p> <p>Ensure follow-up test scheduled within 2-4 weeks: Higher BLLs (≥ 25 $\mu\text{g/dL}$) may require more frequent monitoring. Contact healthcare provider and/or family if follow-up test is not completed within 4 weeks.</p>
≥ 45 $\mu\text{g/dL}$	<p>Within 2 days</p> <p>Same actions as above for 20-44 $\mu\text{g/dL}$, plus:</p> <p>Chelation treatment: Chelation therapy is indicated. Discuss treatment with healthcare provider. Chelation should be done in consultation with an expert. Contact Pediatric Environmental Health Specialty Unit (1-800-421-9916) or Poison Control Center (1-800-222-1222).</p> <p>Facilitate alternative lead-safe housing: A lead-safe environment must be assured before chelation.</p>

Blood Lead Testing Guidelines

For Pregnant Women

Recommendations for Nebraska Healthcare Providers

- > Screen pregnant women for lead exposure risk at the earliest prenatal visit.
- > Administer the screening questionnaire below to assess risk.
- > Blood lead test is recommended for pregnant women with at least one risk factor.

Lead Risk Questionnaire for Pregnant Women

If **Yes or Don't Know** to any of the questions, blood lead test is recommended.

1. Do you or others in your household have a job or hobby that involves lead exposure?
 - Examples*
 - Metal manufacturing and foundries, welding, battery recycling
 - Building repair, renovation, and painting
 - Ammunition production, firing ranges, casting bullets
 - Making stained glass, pottery and glazing, auto repair
2. Do you use any products from other countries that may contain lead? Such as traditional medicines, cosmetics, spices, or glazed pottery?
 - Examples*
 - Traditional medicines: Ayurvedic medicine, bali gali, pay-loo-ah
 - Cosmetics and powders: surma, kohl, sindoor, kumkuma
 - Spices imported or brought in from another county
 - Glazed pottery and imported cookware
3. Do you live in a home built before 1978 that has been remodeled or renovated within the last year that created large amounts of dust?
4. Do you eat or chew on any nonfood items, such as clay, pottery, soil, or paint chips?
5. Do you live with someone with lead poisoning or an elevated blood lead level?
6. Do you have a history of lead poisoning or an elevated blood lead level?
7. Did you move to the United States from another country within the past 12 months?

Additional Information

- > Guidance on blood lead testing and management: www.dhhs.ne.gov/leadhcp
- > CDC Lead and Pregnant Women: www.cdc.gov/nceh/lead/prevention/pregnant.htm
- > CDC Guidelines for Lead Exposure in Pregnant and Lactating Women: <https://www.cdc.gov/nceh/lead/publications/leadandpregnancy2010.pdf>.

Lead Exposure Management Recommendations For Pregnant Women

BLL	Recommended Actions	Follow-up Testing
<3.5 µg/dL	<ul style="list-style-type: none"> Provide anticipatory guidance and health education on sources of lead, how to prevent exposure, and nutritional information. 	None
3.5–9 µg/dL	<p>Above actions plus:</p> <ul style="list-style-type: none"> If result from capillary test, confirm with venous test. Provide counseling on possible sources of lead and information on how to reduce or eliminate exposure. Assess nutritional adequacy. For occupationally exposed women, review proper use of personal protective equipment and exposure controls. Notify public health (state or local health department). 	Retest in 1 month. Obtain a maternal BLL or cord BLL at delivery.
10–44 µg/dL	<p>Above actions plus:</p> <ul style="list-style-type: none"> For occupationally exposed women, recommend removal from exposure. Refer to an occupational medicine specialist. Refer to public health for environmental assessment. Contact state or local health department. Assist state or local health department with complete source exposure assessment. 	<p>Retest within 1 month and then every 1–3 months.* Obtain a maternal BLL or cord BLL at delivery.</p> <p>* More frequent testing may be indicated based on risk factor history.</p>
≥45 µg/dL	<p>Above actions plus:</p> <ul style="list-style-type: none"> Treat as high-risk pregnancy. Consider chelation (inpatient) in consultation with a lead poisoning expert. 	Retest within 24 hours. Consult with a lead poisoning expert to determine frequency of retesting. Obtain a maternal BLL or cord BLL at delivery.

References

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Appendix A. Anticipatory Guidance for Lead Exposure

Keep Children Away from Lead Paint and Lead Dust

- Most homes built before 1978 contain lead paint.
- Keep children away from areas with chipping and peeling paint.
- Do not allow children to eat paint chips, eat soil, or chew on painted surfaces.
- Cover bare soil with grass, mulch, or wood chips. Prevent children from playing in bare soil that may be contaminated with lead.

Wash Hands and Toys Often

- Wash children's hands often, especially before eating, sleeping, and after playing outside.
- Wash toys, stuffed animals, pacifiers, and bottles with soap and water on a regular basis.

Keep it Clean

- Keep the home clean and dust-free.
- Routinely clean floors, windowsills, and other surfaces with a wet mop or disposable rag. Do not dry sweep.
- Take off shoes when entering the home.

Renovate Safely

- Renovation in older homes (pre-1978) can create hazardous lead dust.
- Children, pregnant women, and pets should stay away from repairs that disturb old paint until area is cleaned.
- Use lead safe work practices when remodeling or making repairs. Use wet cleaning methods and a vacuum fitted with a high efficiency particulate air (HEPA) filter.
- Make sure contractors are certified in lead safe work or lead removal.

Don't Bring Lead Home from Job or Hobby

- If parent works with lead, change work clothes and wash face, hands and uncovered skin before going home.
- Wash work clothes separately from other family member's clothes.
- Wear PPE and avoid generating lead dust and fumes.

Avoid Products That May Contain Lead

- Avoid using certain products that can contain lead. These products include traditional medicines, imported spices and cosmetics from other countries, and antique toys.
- Avoid using imported pottery and ceramics for food and drinks if you do not know if it contains lead.

Serve Healthy Foods

- Give your child healthy meals and snacks.
- A balanced diet with foods that provide calcium, iron, and vitamin C may help keep lead out of the body.

Appendix B. Questionnaire Risk Factors Explanation

Risk Factor	Explanation
Child enrolled in Medicaid	<ul style="list-style-type: none"> • Testing Medicaid-enrolled children is required per state and federal regulations.
Living in or often visit a home built before 1950	<ul style="list-style-type: none"> • Homes built before 1950 are most likely to contain lead-based paint hazards. Lead can be found in chipping and flaking paint and in dust. Lead from paint and dust is one of the most common causes of lead poisoning.
Live in or often visit a home built before 1978 that has been remodeled within the last year	<ul style="list-style-type: none"> • Remodeling or renovations in older homes can create large quantities of lead dust and, as a result, may be ingested and inhaled by children, pregnant women, and adults in the home.
Jobs, occupations, or hobbies that involves exposure to lead	<ul style="list-style-type: none"> • People who work around lead and some metals may be exposed to lead and can bring home lead on their skin, clothes, shoes, and work items. • High risk jobs include working in foundries, construction and demolition, welding, plumbing, bullet making, firing ranges, and metal recycling. • High risk hobbies include making stained glass, jewelry, auto repair, and scrap metal
Traditional medicines, imported foods and spices, or imported cosmetics that may contain or use lead	<ul style="list-style-type: none"> • Some traditional medicines and herbal remedies can contain lead, such as some Ayurvedic remedies, Daw Tway, Pay-loo-ah, Ba-baw-san. • Some imported foods and spices from other countries can contain lead, such as turmeric, curry powder, chili powder, coriander, masala, etc. • Cosmetics and powders such as Kohl, Surma, Sindoor, Kumkuma.
Imported ceramic cookware/dishware or imported pottery	<ul style="list-style-type: none"> • Leaded glazes have traditionally been used on ceramic and glassware from countries, such as ceramic bean pots from Latin America. • Imported dishware and cooking pots made with lead.
Refugees, migrant, immigrant, foreign adoptee, or in foster care	<ul style="list-style-type: none"> • Environmental lead hazards are common in many home countries of refugees and immigrants. Household and personal use items such as traditional remedies, herbal supplements, spices, candies, cosmetics, and jewelries/amulets have been associated with increased lead levels, both before and after US arrival.
Consumption of non-food items	<ul style="list-style-type: none"> • Consumption of nonfood items, such as clay, crushed pottery, soil, or paint chips can lead to high blood lead levels.

Appendix C. High Risk Zip Code Methodology

Overview

Children residing in areas with lead hazards from industrial pollution or older housing are at a higher risk of lead exposure. For example, the 2019 American Healthy Homes Survey II found that 68% of housing units built before 1960 had significant lead-based hazards somewhere in the dwelling (33). Nebraska's Blood Lead Testing Plan includes geography as one of the three criteria to recommend when a child is tested for lead poisoning. Per Nebraska Revised Statute §71-2518, the Testing Plan must recommend that a child be tested for lead poisoning if the child resides in a zip code with a high prevalence of children with elevated blood lead levels as demonstrated by previous testing data (1).

Data Sources

Blood lead level data reported to the NDHHS from 2017–2021 were used to calculate prevalence of elevated lead blood lead levels by zip code. During this period, the CDC blood lead reference value for identifying an elevated blood lead level was 5.0 micrograms per deciliter. Blood lead level data for children aged 1 and 2 years old were used for the analysis. The number of children aged 1 and 2 with a confirmed or suspect case of elevated blood lead level during 2017 to 2021 were aggregated by zip code (34). Data from the U.S. Census Bureau 2010 Decennial Census was used to calculate the population of children aged 1 and 2 years old for each Nebraska zip code. The percentage of homes built before 1950 for each zip code was calculated using U.S. Census Bureau American Community Survey 2017-2021 data.

High Risk Zip Code Identification

Five-year population prevalence rates were calculated by dividing the number of elevated blood lead level cases by the population in each zip code. Zip codes were also flagged if more than 27% of homes were built before 1950, per CDC guidance (5). High risk zip codes were selected if the prevalence rate was higher than the statewide average rate and if more than 27% of the housing units were built before 1950. A total of 125 zip codes were identified, representing 28% of the population of children aged 1 and 2 years old and about 20% of Nebraska zip codes.

Discussion and Limitations

Identifying high risk zip codes in Nebraska relied on blood lead level surveillance data to determine prevalence of elevated blood lead levels. There are important limitations in using surveillance data for this purpose. Providers in some geographic areas, especially in rural Nebraska, are less likely to test for lead. Therefore, testing data may not be representative of the pediatric population in every geographic area. It is likely that there are missing data in some zip codes due to some healthcare providers and laboratories not in compliance with the requirement to report all blood lead level tests.

Due to changes in lead risk over time, NDHHS will periodically evaluate testing recommendations and surveillance data. NDHHS plans to evaluate surveillance data at a minimum of every five years and update high risk zip codes as necessary.

Appendix D. High Risk Zip Codes By County

Adams 68928, 68932, 68901, 68950, 68956, 68957, 68980, 68883	Douglas 68102, 68104, 68105, 68106, 68107, 68108, 68110, 68111, 68112, 68131, 68132	Johnson 68324, 68443, 68448	Polk 68367, 68651, 68654, 68666
Antelope 68764, 68769, 68781	Dundy 69045	Kearney 68932, 68840, 68956	Saline 68406
Boone 68627, 68758, 68655, 68660, 68781, 68882	Fillmore 68361, 68406, 68416	Keith 69155	Richardson 68337, 68376
Brown 69210	Franklin 68932, 68939	Knox 68764, 68769	Saunders 68015, 68017, 68041, 68066
Buffalo 68836, 68840	Frontier 69025	Lancaster 68017, 68502, 68503, 68508, 68510, 68428	Scotts Bluff 69352, 69357, 69361
Burt 68019, 68045	Furnas 68926, 68967	Lincoln 69120	Seward 68314, 68360, 68367, 68456
Butler 68314	Gage 68318, 68328	Madison 68748, 68758, 68781	Sheridan 69360
Cass 68307, 68413	Garden 69154	Merrick 68826, 68801	Sherman 68852, 68853
Cedar 68723, 68736	Gosper 68967	Morrill 69336	Sioux 69357, 69361
Chase 69045	Grant 69333	Nance 68627, 68660	Stanton 68641, 68643, 68748, 68779
Cherry 69333	Greeley 68655, 68665, 68882	Nemaha 68305, 68320, 68376, 68378, 68448	Thayer 68325, 68326, 68340, 68370, 68375
Clay 68933, 68938, 68901, 68980	Hamilton 68654, 68980	Nuckolls 68943, 68957, 68978	Thurston 68047, 68067
Colfax 68641, 68643	Harlan 68967	Otoe 68307, 68324, 68346, 68410, 68413, 68417, 68443, 68446, 68448	Valley 68828
Cuming 68716, 68641, 68045, 68047, 68791	Hayes 69045	Pawnee 68420	Wayne 68723, 68047, 68791
Custer 69120, 68825, 68828, 68852, 68856	Hall 68824, 68801, 68883	Phelps 68836, 68863	Webster 68928, 68957, 68970
Dawson 68863, 68836	Hitchcock 69044	Pierce 68769, 68781	Wheeler 68665
Dodge 68057	Howard 68824, 68831, 68835, 68882	Platte 68634, 68643, 68644, 68647, 68660	York 68319, 68367, 68401, 68654, 68666
	Jefferson 68352		

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