

# **Chapter 1**

## **Introduction**

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# Chapter 1: INTRODUCTION

## Background

Childhood lead poisoning is one of the most common environmentally-caused pediatric health problems in the United States today. The persistence of lead poisoning—in light of present knowledge about the sources, pathways and prevention of lead exposure—continues to present a direct challenge to clinicians and public health authorities. According to the U.S. Centers for Disease Control and Prevention (CDC), there are approximately half a million U.S. children ages 1-5 with blood lead levels above 5 micrograms per deciliter ( $\mu\text{g}/\text{dL}$ ), the reference value at which CDC recommends public health actions be initiated.

### Lead Reference Value

In 2012, the CDC established a level of **5  $\mu\text{g}/\text{dL}$**  as the reference value at which public health interventions are initiated. This value is based on the 97.5<sup>th</sup> percentile of the blood lead distribution among children 1–5 years old in the United States using data generated by the National Health and Nutrition Examination Survey (NHANES). The reference value will be re-evaluated by CDC every four years based on the most recent data.

Lead has no known physiological value, and no safe level of lead has been identified. Children are particularly susceptible to its toxic effects. Although lead poisoning can affect nearly every system in the body, lead is especially toxic to the developing brains of young children. At low levels of exposure, lead can cause learning disabilities, lowered IQ, attention deficit disorders and anti-social behavior. However, most poisoned children have no apparent symptoms, and as a result, many cases go undiagnosed and untreated. At very high levels ( $\geq 70\mu\text{g}/\text{dL}$ ), lead exposure is an acute condition and can have devastating health consequences, including encephalopathy, seizures, coma and death. Blood lead testing is encouraged as an important element of a comprehensive program to eliminate childhood lead poisoning. The goal of such testing is to identify children who need individual interventions to reduce their exposure.



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The major source of lead exposure among U.S. children is deteriorated lead-based paint and lead-contaminated dust. Other sources of lead poisoning are contaminated drinking water; parental occupations with lead exposure; older vinyl mini-blinds; imported spices, candies, and home health remedies; and certain parental hobbies (listed on p.3). Although lead-based paint was banned for use in residential housing in 1978, an estimated 4 million homes continue to expose children to lead hazards. Children living in older, deteriorating housing and/or living in poverty are at higher risk for lead exposure. In North Carolina, deteriorating housing stock in rural areas may contribute to disproportionately higher percentages of children with blood lead levels  $\geq 10\mu\text{g}/\text{dL}$  in rural compared to urban counties.

However, no socioeconomic group, geographic area, racial or ethnic population is spared the effects of lead poisoning.

Ideally, *all* children would be offered blood lead testing when they are 1 and 2 years old. The risk of lead poisoning is highest at age 2, yet fewer children are tested at this age. Your clinic may choose to provide universal blood lead testing for all 1 and 2-year-olds at well-child or other visits. Our task as public health officials, as health care providers and as parents is to identify children who will most benefit from testing and ensure that they receive the necessary services. Blood lead testing at 1 and 2 years of age is **required** for children enrolled in Health Check (Medicaid), Health Choice and/ or the Special Nutrition Program for Women, Infants and Children (WIC Program). Detailed testing recommendations are covered in Chapter 2 of this manual.

## Sources and pathways of lead exposure in children

Lead primarily enters the body via ingestion or inhalation. Lead poisoning prevention best practices for the general public are to avoid the common sources of exposure listed below, to practice regular handwashing with soap and water to remove lead residue from the skin, and to eat a balanced diet rich in iron, calcium and vitamin C to slow lead absorption into the body.

**Lead-based paint.** A common source of high-dose lead exposure to young children is deteriorated paint found in older homes. Lead paint is most commonly found in pre-1950 homes but may be found in any home built before 1978.

**Soil and house dust.** Lead-contaminated dust from deteriorated paint is common on floors, porches, doorways and windows sills and troughs of pre-1978 homes. Soil containing lead may be found near the foundations of old homes and near major roads due to leaded gasoline. Lead dust released into the air by certain industries may also settle in the soil.



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**Vinyl miniblinds.** Miniblinds manufactured prior to 1996 may contain lead as a stabilizing agent. Exposure to ultra-violet light deteriorates the vinyl, causing lead-contaminated dust to accumulate on the surface of the blinds. Old miniblinds should be replaced with lead-free, cord-free window coverings in child-occupied homes.

**Drinking water.** Lead pipes or copper plumbing connected with lead solder may contaminate water. A change in the water treatment process may trigger leaching of lead into the public water supply.

**Food.** Some imported canned foods and spices contain lead, as do foods served from leaded crystal or



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ceramic dishes with lead-containing glaze. Some types of fish and products made from fish may also contain lead and mercury.

**Air.** Emissions from lead smelters and other lead-related industries may be sources of lead contamination.

**Parental occupations and hobbies.** People who work with lead may bring home lead-contaminated dust on their shoes, cell phones, eye glasses, keys, clothing, or vehicles. Workers in occupations such as battery manufacturing and recycling, car painting and repair, building painting and renovation, nonferrous smelting, radiator repair, brass and bronze foundries, locksmiths, pottery production, training on firing ranges, and demolition/maintenance of outdoor metal structures are more likely to have occupational lead exposure. Hobbies such as reloading or casting ammunition, renovating homes or furniture, or making stained glass, pottery, fishing weights and jewelry are common sources of lead exposure.

**Pottery.** Homemade and imported pottery may contain large amounts of lead in the glaze. Lead can leach out of this type of pottery if it is used to serve or store food, especially acidic foods. Traditional pottery used in cooking may poison entire families. Look for pottery labeled “lead-free” when purchasing new cookware.

**Medicines.** Immigrant families often use traditional medicines and folk remedies. Ayurvedic medicines have been implicated in both child and adult lead poisoning cases. Azarcon (also known as Rueda, Coral, Maria Luisa, Alarcon or Liga) and Greta are remedies imported from Mexico that contain 90 to 100 percent lead by weight. Any amount of these products is poisonous to children and adults. Azarcon is a bright orange powder; Greta is a yellow powder. Both are used to treat “Empacho” (intestinal illness). Children who are given these powders are ingesting lead, and they may develop the same symptoms that these medicines are intended to treat. Paylooah is a red powder that contains high levels of lead. Paylooah is used by the Hmong people to treat rash or fever. Lead has also been found in some Chinese herbal medications such as Ba-Baw-San. An FDA alert for lead content was issued for an Ayurvedic medicine called Balguti Kesaria after the product was tested in North Carolina in 2017 as part of the environmental investigation for a child with an elevated blood lead level.

**Cosmetics.** Another source of lead may be eye cosmetics called Surma, Kajal or Kohl, which are used by some Indian, African and Middle Eastern immigrants. Lead has been found in aphrodisiacs imported from India and Africa, and in sindoor, a Hindu religious powder and cosmetic.

*See the chart at the end of this chapter for other medications and cosmetics found to contain lead.*

**Toys.** Imported and antique toys and collectibles may put children at risk for lead exposure. Lead may be used in two aspects of toy manufacturing: paints or plastics. To reduce these risks, the U.S. Consumer Product Safety Commission (CPSC) issues recalls of toys that could potentially expose



children to lead. Look for children's products that meet American Society for Testing and Materials (ASTM) or other international safety certification. Photos and descriptions of recalled toys can be found at <http://www.cpsc.gov> or call 1-800-638-2772 (TTY 800-638-8270).

**Candy.** Lead has been found in some candies imported from Mexico. Certain candy ingredients such as chili powder and tamarind may be a source of lead exposure. Lead sometimes gets into the candy when processes such as drying, storing, and grinding the ingredients are done improperly. Also, lead has been found in the ink printed on wrappers of some imported candies. People selling these candies may not know whether the candy contains lead. You cannot tell by looking or tasting if candy contains lead, so blood lead testing is recommended to determine exposure. More information and advisories on lead in candy and other foods can be obtained from the FDA at [www.fda.gov](http://www.fda.gov) or 1-888-463-6332.

**Keys.** Brass keys and metal key chains often contain lead. Do not allow children to teethe or suck on house or car keys or other objects not intended for young children.

Visit the lead sources image library at <https://nchealthyhomes.com/lead-sources/> to view photographs of items that have been found to contain lead.

## STAFF ROLES

Prevention of and follow-up for childhood lead poisoning is a multidisciplinary effort requiring teamwork. Effective teams may include members with expertise in nursing, medicine, social work, nutrition, child development and environmental health.

## TRAINING OFFERED

Workshops offered by the NC Childhood Lead Poisoning Prevention Program (CLPPP) are open to all health care providers, and cover topics such as:

- ◆ Basic Information about lead
- ◆ Health effects from lead exposure
- ◆ Blood lead testing
- ◆ Case management for children with elevated lead levels
- ◆ Environmental remediation of lead hazards

For more information, contact the NC CLPPP office at 919-707-5950 or 888-774-0071.



The UNC Center for Environmental Health and Susceptibility also offers an online training module “Preventing Lead Poisoning: A Module for Health and Housing Professionals,” available at [https://nciph.sph.unc.edu/tws/HEP\\_CEHS1/certificate.php](https://nciph.sph.unc.edu/tws/HEP_CEHS1/certificate.php).

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## Alternative Cosmetics, Food Additives, and Medicines that Contain Lead

Exposure Source	Description/Exposure Pathway
<i>Albayaalde</i> or <i>albayaidle</i>	Used mainly by Mexicans and Central Americans to treat vomiting, colic, apathy and lethargy.
<i>Al Kohl</i> (Middle East, India, Pakistan, some parts of Africa)	A gray or black eye cosmetic applied to the conjunctival margins of the eyes for medicinal and cosmetic reasons. Can contain up to 83% lead. It is believed to strengthen and protect the eyes against disease and may be used as an umbilical stump remedy. Also known as simply as <b>kohl</b> .
<i>Al Murrah</i>	Used as a remedy for colic, stomach aches and diarrhea in Saudi Arabia.
<i>Anzroot</i>	A remedy from the Middle East used to treat gastroenteritis.
<i>Azarcon</i>	Also known as <b>alarcon</b> , <b>coral</b> , <b>luiga</b> , <b>maria luisa</b> , or <b>rueda</b> . Bright orange powder used to treat "empacho" (an illness believed to be caused by something stuck in the gastrointestinal tract, resulting in diarrhea and vomiting). Azarcon is 95% lead.
Ayurvedic medicine (Tibet)	Traditional medicines that may contain lead. Some examples include: <b>guglu</b> , <b>sundari kalp</b> , <b>jambrulin</b>
<i>Ba-Baw-San</i> or <i>Ba-Bow-Sen</i> (China)	Herbal medicine used to detoxify "fetal poisoning" and treat colic pain or to pacify young children.
<i>Bali goli</i>	A round, flat black bean which is dissolved in "gripe water" and used within Asian Indian cultures for stomach ache.
<i>Balguti Kesaria</i>	An Ayurvedic medicine from India used to treat rickets, cough and cold, worms and teething.
<i>Bint Al Zahab</i> (Iran)	Rock ground into a powder and mixed with honey and butter given to newborn babies for colic and early passage of meconium after birth.
<i>Bint Dahab</i> (Saudi Arabia; means "daughter of gold")	A yellow lead oxide used by local jewelers and as a home remedy for diarrhea, colic, constipation and general neonatal uses.
<i>Bokhoor</i> (Kuwait)	A traditional practice of burning wood and lead sulfide to produce pleasant fumes to calm infants.
<i>Cebagin</i>	Used in the Middle East as a teething powder.
<i>Chuifong tokuwan</i>	A pill imported from Hong Kong used to treat a wide variety of ailments.
<i>Cordyceps</i>	Used in China as a treatment for hypertension, diabetes and bleeding.
<i>Deshi Dewa</i>	A fertility pill used in Asia and India.
<i>Farouk</i>	A teething powder from Saudi Arabia.
<i>Ghasard</i>	Brown powder used in Asian Indian cultures as a tonic to aid in digestion.
<i>Greta</i> (Mexico)	Yellow powder used to treat "empacho" (see <b>azarcon</b> ); can be obtained through pottery suppliers, as it is also used as a glaze for low-fired ceramics. Greta is 97% lead.
<i>Hai Ge Fen</i> ( <i>Concha cyclinae sinensis</i> )	A Chinese herbal remedy derived from crushed clam shells.
<i>Henna</i>	Used as a hair dye and for temporary tattoos in the Middle East and India - may contain lead.

Items in **RED** were added by the NC Childhood Lead Poisoning Prevention Program.

Modified from CDC Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women, pg 194-195. Original document posted at: <http://www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf>



<i>Jin Bu Huan (China)</i>	An herbal medicine used to relieve pain.
<i>Kandu</i>	A red powder from Asia and India used to treat stomach ache.
<i>Koo Sar</i>	Red pills from China used to treat menstrual cramps.
<i>Kushta</i>	Used for diseases of the heart, brain, liver, and stomach and as an aphrodisiac and tonic in India and Pakistan.
<i>Litargirio</i>	A yellow or peach-colored powder used as a deodorant, a foot fungicide and a treatment for burns and wound healing particularly by people from the Dominican Republic.
<i>Lozeena</i>	An orange powder used to color rice and meat that contains 7.8%-8.9% lead.
<i>Mojhat ceremonial drink</i>	Egyptian tea used as lactation aid.
<i>Pay-loo-ah (Vietnam)</i>	A red powder given to children to cure fever or rash.
<i>Po Ying Tan (China)</i>	An herbal medicine used to treat minor ailments in children.
<i>Saffron supplement</i>	Red threads (stigmas) from a flower used as a spice, food coloring, and herbal supplement to treat respiratory ailments, depression, and menstrual problems. Can be found in orange-yellow capsule form for use as a supplement.
<i>Santrinj (Saudi Arabia)</i>	An amorphous red powder containing 98% lead oxide used principally as a primer for paint for metallic surfaces, but also as a home remedy for "gum boils" and "teething."
<i>Surma (India); Kohl; Kajal</i>	Black powder used as an eye cosmetic and as teething powder or umbilical stump remedy.
<i>Tibetan herbal vitamin</i>	Used to strengthen the brain.
<i>Traditional Saudi medicine</i>	Orange powder prescribed by a traditional medicine practitioner for teething; also has an antidiarrheal effect.

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