# Chapter 1
# Introduction

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## 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 US Centers for Disease Control and Prevention (CDC), there are approximately a half million U.S. children ages 1-5 with blood lead levels above 5 micrograms per deciliter (µg/dL), the reference value at which CDC recommends public health actions be initiated.

**Lead Reference Value**

In 2012, the CDC established a reference value of 5 µg/dL for which public health interventions are initiated. This value is based on the 97.5th percentile of the BLL 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 updated by CDC every four years based on the most recent data.

Lead has no known physiological value. Children are particularly susceptible to its toxic effects. Although lead poisoning can affect nearly every system in the body, lead is particularly 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. No safe level has been identified for the amount of lead in a child's body. At higher levels (≥70 µg/dL), lead exposure is an acute condition and can have devastating health consequences, including encephalopathy, seizures, coma and even 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 common sources of lead poisoning are drinking water contamination, parental occupations and hobbies, imported spices and home health remedies. 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 ≥10 µg/dL in rural compared to urban counties.

Ideally, all children would be offered blood lead testing

at 1 and 2 years old. Our task as public health officials, health care providers, and as parents is to identify children who will most benefit from testing and ensure that they receive the necessary services. Children should receive blood lead testing at 1 and 2 years old if they are participants in Health Check (Medicaid), Health Choice or the Special Nutrition Program for Women, Infants and Children (WIC Program); live in pre-1978 housing or a high-risk zip code; or have any of the other risk factors below.

## SOURCES AND PATHWAYS OF LEAD EXPOSURE IN CHILDREN

Lead poisoning prevention best practices for the general public are to avoid the common sources of exposure listed below, practice regular handwashing with soap and water to remove lead residue from the skin, and eat a balanced diet rich in iron, calcium and Vitamin C to slow 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 found most commonly in pre-1950 homes.

**Soil and house dust.** Dust contaminated by deteriorated paint, leaded gasoline and industry emissions may contain high concentrations of lead. Soil containing lead is found near the foundations of homes and near major roads. Contaminated dust is common on floors and windows sills and troughs.


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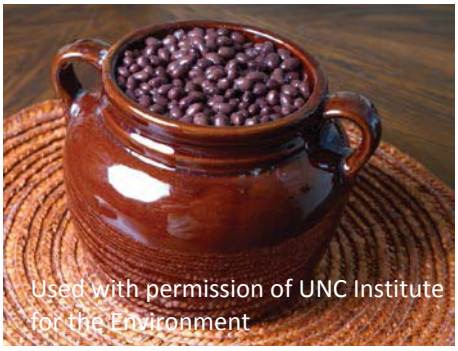
**Vinyl miniblinds.** Those manufactured prior to 1996 may contain lead as a stabilizing agent. Exposure to ultra-violet light deteriorates the vinyl, causing lead-contaminated dust to accumulate on the surface of the blinds.

**Drinking water.** Lead pipes or copper plumbing connected with lead solder may contaminate water. A change in water disinfectants 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 ceramic dishes with lead-containing glaze. Some types of fish and products made from fish may also contain lead and mercury.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**Air.** Emissions from lead smelters and other lead-related industry may be sources of lead contamination.

**Parental occupations and hobbies.** Workers may bring home lead-contaminated dust on their clothing, or may bring lead home via scrap materials. Workers in occupations such as battery manufacturing and recycling, lead based painting and renovation, nonferrous smelting, radiator repair, brass and bronze foundries, pottery production, training on firing ranges, and demolition/maintenance of outdoor metal structures have higher likelihood of having 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.

**Pottery.** Traditional pottery imported from Mexico or other countries may be improperly glazed, and the glaze used to make the pottery may contain large amounts of lead. Lead can leach out of this type of pottery if it is used to hold or store foods. Traditional pottery used in cooking may poison entire families.

**Medicines.** Immigrant families often use traditional medicines and folk remedies. Several of these can cause lead poisoning. 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 actually 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.

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

**Toys.** Toys that have been made in other countries and then imported into the U.S. 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. Photos and descriptions of recalled toys can be found at http://www.cpsc.gov or call 1-800-638-2772.


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**Candy.** Lead has been found in some consumer 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 or not 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 or 1-888-463-6332.

## MORE BACKGROUND INFORMATION

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### Scientific Articles (Some require journal subscription to access)

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Newman, N., Jones, C., Page, E., Ceballos, D., & Oza, A. (2015). Investigation of childhood lead poisoning from parental take-home exposure from an electronic scrap recycling facility—Ohio, 2012. MMWR Morb Mortal Wkly Rep, 64, 743-745. http://www.cdc.gov/MMWR/preview/mmwrhtml/mm6427a3.htm

## STAFF ROLES

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

## TRAINING REQUIRED

Clinical workshops offered regularly 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 exposure
- Environmental remediation for lead hazards

For more information, contact the NC CLPPP office at 919-707-5950.

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

| Exposure Source | Description / Exposure Pathway |
|---|---|
| *Albayalde* or *albayaidle* | Used by mainly by Mexicans and Central Americans to treat vomiting, colic, apathy and lethargy. |
| *Al Kohl (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 **kohl**. |
| *Al Murrah* | Used as a remedy for colic, stomach aches and diarrhea in Saudi Arabia. |
| *Anzroot* | A remedy from the Middle East used to treat gastroenteritis. |
| *Azarcon* | Also known as **alarcon**, **coral**, **luiga**, **maria luisa**, or **rueda**. 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: **guglu, sundari kalp, jambrulin** |
| *Ba-Baw-San* or *Ba-Bow-Sen* (China) | Herbal medicine used to detoxify "fetal poisoning" and treat colic pain or to pacify young children. |
| *Bali goli* | A round, flat black bean which is dissolved in "gripe water" and used within Asian Indian cultures for stomach ache. |
| *Bint Al Zahab* (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. |
| *Bint Dahab* (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. |
| *Bokhoor* (Kuwait) | A traditional practice of burning wood and lead sulfide to produce pleasant fumes to calm infants. |
| *Cebagin* | Used in the Middle East as a teething powder. |
| *Chuifong tokuwan* | A pill imported from Hong Kong used to treat a wide variety of ailments. |
| *Cordyceps* | Used in China as a treatment for hypertension, diabetes and bleeding. |
| *Deshi Dewa* | A fertility pill used in Asia and India. |
| *Farouk* | A teething powder from Saudi Arabia. |
| *Ghasard* | Brown powder used in Asian Indian cultures as a tonic to aid in digestion. |
| *Greta (Mexico)* | Yellow powder used to treat "empacho" (see **azarcon**); can be obtained through pottery suppliers, as it is also used as a glaze for low-fired ceramics. Greta is 97% lead. |
| *Hai Ge Fen* (Concha cyclinae sinensis) | A Chinese herbal remedy derived from crushed clam shells. |
| *Henna* | Used as a hair dye and for temporary tattoos in the Middle East and India - may contain lead. |

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| *Jin Bu Huan (China)* | An herbal medicine used to relieve pain. |
| *Kandu* | A red powder from Asia and India used to treat stomach ache. |
| *Koo Sar* | Red pills from China used to treat menstrual cramps. |
| *Kushta* | Used for diseases of the heart, brain, liver, and stomach and as an aphrodisiac and tonic in India and Pakistan. |
| *Litargirio* | 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. |
| *Lozeena* | An orange powder used to color rice and meat that contains 7.8%-8.9% lead. |
| *Pay-loo-ah (Vietnam)* | A red powder given to children to cure fever or rash. |
| *Po Ying Tan (China)* | An herbal medicine used to treat minor ailments in children. |
| *Santrinj (Saudi Arabia)* | 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." |
| *Surma (India)* | Black powder used as an eye cosmetic and as teething powder or umbilical stump remedy. |
| *Tibetan herbal vitamin* | Used to strengthen the brain. |
| *Traditional Saudi medicine* | Orange powder prescribed by a traditional medicine practitioner for teething; also has an antidiarrheal effect. |