

Lead-Free Communities Toolkit

Resources to Support
Communities on the Road to
Lead Hazard Elimination



Letter from CDC

Dear Partners,

The Centers for Disease Control and Prevention (CDC) appreciates the hard work you do to prevent childhood lead poisoning in your communities. Identifying sources of lead exposure and addressing those dangers takes coordination and effort. One person or group cannot do this work alone. CDC looks forward to continuing to work together to eliminate childhood lead poisoning as a public health problem. Through teamwork, we can strengthen blood lead testing, improve reporting and surveillance, link exposed children to recommended services, and assist with population-based interventions.

We are providing this Lead-Free Communities (LFC) Toolkit to help you in this critical work. The Toolkit can be customized to meet your unique needs and serve as a roadmap for involving community members and partners. Thank you for your dedication and commitment to health equity by addressing sources of lead.

Sincerely,

CDC Childhood Lead Poisoning Prevention Program

Take Action

Start developing your community’s plan to eliminate lead exposure hazards to protect children. Visit our website to learn more about the Lead-Free Communities (LFC) Initiative and download the [LFC Action Plan template](#) today.

<https://www.cdc.gov/lead-prevention/community-stories/index.html>



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Learn more about CHLI and the NLAPH program

healthleadership.org
leadershipacademy.health/programs/lfc

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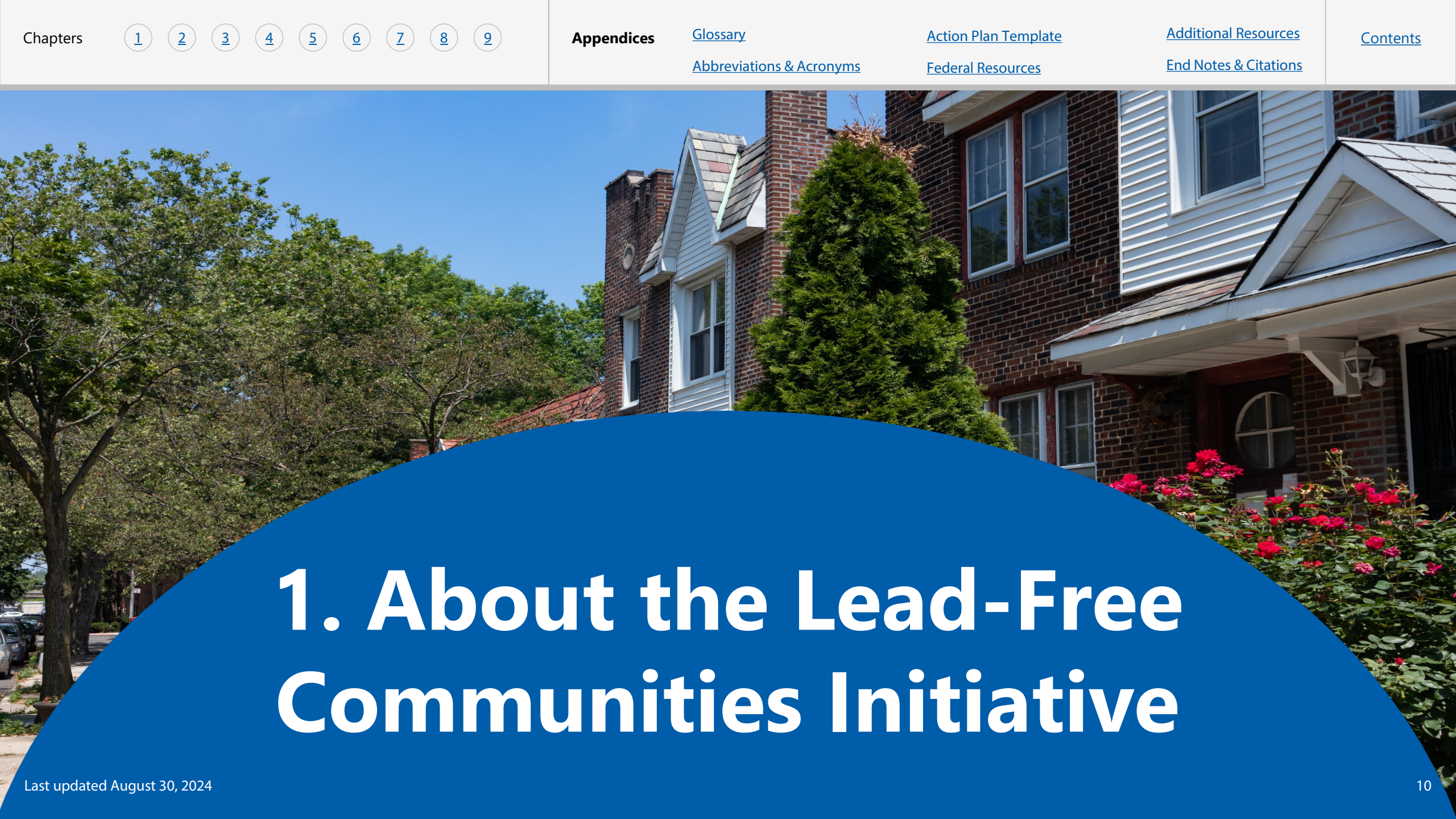
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1. About the Lead-Free Communities Initiative

About the Lead-Free Communities (LFC) Initiative

LFC is a national initiative to eliminate lead exposure and its associated negative health effects in communities across the United States. It offers a unique, comprehensive multi-sector approach for encouraging and supporting communities to collaboratively develop and implement a customized plan to become lead-free. LFC will also build a national learning and support network of communities working on lead elimination, which will simultaneously support local progress and serve as a catalyst for progress on a larger scale.



LFC and Health Equity

The LFC Initiative emphasizes health equity and environmental justice and seeks to ensure all parts of a community are supported to becoming lead-free.

The LFC Initiative acknowledges that lead is a widespread, naturally occurring element that cannot be completely eliminated. Communities can, however, take steps to reduce and eliminate lead exposure hazards through the coordinated use of proven interventions.

Each implemented intervention brings that community one step closer to removing all lead exposure hazards, and each step on that path can have a significant impact on the health and wellbeing of the people who live, work, learn, and play in that community. Each community that takes steps towards becoming “lead-free” will help make progress towards making the United States a “lead-free” nation.

Health Equity

The United States has made strides in reducing exposure to lead over the last several decades, but the problem persists in many communities across the country — especially in communities that experience lower incomes and communities of color, which have been historically plagued by inequitable infrastructure development and disinvestment.

Lead exposure is an important environmental issue, and reducing lead exposure is key to ensuring equitable access to a healthy environment.



Federal Action Plan

To address these challenges, in 2021, the Biden-Harris Administration released its [Lead Pipe and Paint Action Plan](#), a historic and ambitious effort that provided catalytic resources from the Bipartisan Infrastructure Law¹ while leveraging tools across federal, state, and local government to deliver clean drinking water, replace lead pipes, and remediate lead paint.

¹ [BILLS-117hr3684enr.pdf \(congress.gov\)](#)



Lead Pipe and Paint Action Plan Work

The plan included new actions from several federal agencies to ensure the federal government is utilizing every resource available to update rules and strengthen enforcement, support communities, and reduce exposure in schools, early care and education centers, and public housing. This is an unparalleled investment to support transformational impacts for public health and wellbeing. Additionally, federal agencies have come together in developing the [*Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts*](#) as a blueprint for reducing lead exposure through collaboration among federal agencies and with a range of implementing partners.²

² [Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts, December 2018 \(epa.gov\)](#)

LFC Framework

The LFC Initiative offers a framework for supporting lead elimination strategies at the local level, as well as a national learning and support network of communities that seek to become lead-free. It also supports a holistic, locally driven approach to the coordination, planning, and implementation of primary and secondary prevention. This LFC Toolkit has been created to help communities prepare for and implement comprehensive lead elimination plans; it is intended as a resource to be utilized by the individuals in a community that are organizing and leading local efforts to reduce exposures to lead hazards.

LFC Framework

This Toolkit and the National LFC Network, a national learning and support network of communities working on lead elimination activities, will help ensure communities have the technical assistance required to adequately prepare for and implement the [Lead Pipe and Paint Action Plan](#) and other lead-related interventions funded by federal dollars.

Lead Reduction Challenges

(1 of 3)

Eliminating all lead exposure hazards in a community is a complex, expensive, and ambitious process that will require public, private, and community collaboration. Communities with children who are at the greatest risk for lead exposure hazards may not currently be prepared to identify where lead hazards exist lead hazards exist or whom to work with and how to safely eliminate these hazards.



Lead Reduction Challenges

(2 of 3)

As more federal resources become available, it will be important for states to identify and prioritize communities with the highest exposures to lead as well as other environmental injustices. Then, these communities could quickly develop or enhance the necessary capacity for careful planning, coordination, and collaboration to ensure efficient, effective, and equitable use of federal resources to eliminate lead exposure hazards. States and communities will also need to understand how to access and leverage these federal resources.

Lead Reduction Challenges

(3 of 3)

The LFC Initiative will also help communities prioritize blood lead testing efforts and interventions in under-resourced populations facing significant lead exposure threats and will be able to mobilize financial resources and technical assistance to support these populations. Furthermore, the LFC Initiative is working on strategies to help coordinate and expand funding opportunities to eliminate lead exposure sources in communities across the country.

Over time the LFC Initiative will help promote the following:



A reduction in blood lead levels



A gradual reduction in resources required to address lead hazards



Improvements in health equity

Impact of Addressing Lead Hazards



A reduction in blood lead levels

A reduction in blood lead levels (BLLs) across the country – and especially in communities where people are underserved– such that the [blood lead reference value](#) (BLRV) continues to decrease. A BLRV is intended to identify children with higher levels of lead in their blood compared with levels in most children. The value is based on the 97.5th percentile of the blood lead distribution in U.S. children ages 1–5 years.



A gradual reduction in resources required to address lead hazards

A gradual reduction in resources that are required nationally, locally, and at the state level to address the health effects resulting from lead exposure due to a decrease in exposure to lead hazards.



Improvements in health equity

Communities can live without exposure to lead regardless of socially-determined circumstances.

Toys, Jewelry, and Cosmetics



Toys

Some vintage or imported toys may contain traces of lead in paint, metal, or plastic parts



Jewelry

Some metal costume jewelry may contain traces of lead.



Cosmetics

Certain cosmetic goods and color additives (e.g., traditional eyeliners, lipstick or other lip products, and progressive hair dyes) may contain traces of lead.³

³ <https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/lead-cosmetics>

The LFC Initiative Model

The LFC Initiative serves as an innovative new model for supporting locally driven programs and increasing local capacity for cross-sector collaboration to help address local health hazards. By building capacity locally, communities can strengthen local ties and lay the groundwork for collaborating to address other issues that may affect local health and well-being.

The framework offers a new strategy for state-driven, community-led problem solving and boosting local public health infrastructure. Eliminating lead hazards is especially meaningful to communities most at risk for exposure, since they are also likely to be facing other environmental health threats.



2. How to Use the Lead-Free Communities Toolkit

LFC Toolkit Design

This Toolkit has been designed to support community-led efforts to address local lead exposure hazards to aid communities of all sizes and varieties in collaborating to develop a plan for systematically identifying and eliminating lead exposure hazards. It includes concrete steps and interventions communities of all sizes can take as they work towards the vision of becoming lead-free. The Toolkit has tips for establishing a local network of partners to design and manage the local LFC Action Plan, suggestions for how to approach plan implementation, and information about how to ensure the broader community has input.

Each community is unique, and while this Toolkit is offered as a roadmap for community mobilization, communities are encouraged to utilize and adapt these resources as appropriate to fit their local needs and circumstances.

Making the LFC Toolkit Work in Your Community

This Toolkit is designed to be comprehensive so that it can be useful to communities – regardless of where they are in their efforts to address lead exposure hazards. Each community is encouraged to customize the tips and suggestions provided in this Toolkit to address their community’s specific needs, based on the lead hazards present in their community and their current progress towards becoming a lead-free. It is important for communities to consider health equity when working through a plan for implementation to ensure all members of the community are afforded the opportunity to live in an environment free of lead hazards.

Eliminating Lead Exposure

Because children are most adversely affected by exposure to lead, the LFC Toolkit focuses primarily on interventions designed to reduce and eliminate the common pathways of exposure to lead in children's environments (i.e., the places where they live, learn, and play). Reducing and eliminating these common pathways of lead exposure will also benefit adults. The Toolkit also includes information about other pathways through which lead exposures occur, such as food, occupational exposures, consumer goods, and cultural products.



Future Updates to the LFC Toolkit

This Toolkit is dynamic and will be expanded and updated over time to include additional relevant information. It will also be updated to reflect lessons learned from local plan development and implementation in communities across the country.

The background of the slide features a close-up photograph of peeling paint on a wall. The paint is chipped and flaking, revealing a reddish-brown surface underneath. A large, solid blue semi-circle is positioned in the lower half of the image, serving as a backdrop for the title text.

3. Understanding Lead Exposure and the Associated Health Risks



How Lead Exposure Affects Human Health

Lead is a highly toxic metal occurring naturally in the earth's crust. Lead has been mined and used by humans for centuries, resulting in widespread environmental contamination. Exposure to lead can affect every organ in the human body, but primarily affects the central nervous system, and particularly the developing brain. Additionally, some data show that lead is a possible carcinogen.⁴

⁴ <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/lead.pdf>

Lead Exposure is Harmful to Children

Children (particularly under the age of 6 years old) are at greater risk of significant health outcomes because their bodies are still developing and growing rapidly, and they absorb a greater proportion of the lead to which they are exposed than do adults.

Research has shown that even small amounts of lead can cause damage to a child's brain and nervous system, resulting in slowed growth and development and learning and behavior problems.

Severe neurologic problems—including seizures, comas, and death—can also occur at higher levels of exposure.⁵

⁵ [Lead Exposure Symptoms and Complications | Childhood Lead Poisoning Prevention | CDC](#)



Lead Exposure Can Harm Adults

Blood lead levels (BLLs) exceeding 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) are associated with the following: cardiovascular effects; nerve disorders; decreased kidney function; adverse effects on sperm and semen, such as lower sperm counts and motility; and fertility problems, including delayed conception. Additionally, BLLs below 10 $\mu\text{g}/\text{dL}$ are associated with increases in blood pressure, and incidence of essential tremor, a degenerative disorder of the central nervous system characterized by a tremor of the arms or hands during voluntary movements, such as eating and writing.

There is also evidence showing that adults who have BLLs even lower than 5 $\mu\text{g}/\text{dL}$ may have decreased kidney function, reduced cognitive function, increased behavioral issues, and other adverse effects.⁶

⁶ [National Institute of Environmental Health Sciences: Lead \(nih.gov\)](#)

Common Sources of Lead Exposure

Lead is found in a wide variety of products and from a range of industrial and non-industrial sources. The following are the most common sources of lead exposure:



Lead-based paint and contaminated dust



Contaminated drinking water



Contaminated soil



Consumer goods, some food products, and cultural products



Certain work environments or hobbies



Lead-based Paint and Contaminated Dust



Deteriorating lead paint and contaminated dust from painted surfaces continue to be one of the most common sources of lead exposure for children. An estimated 22 million housing units have lead-based paint hazards, about 2.6 million of which are home to young children.⁷ While the United States government banned the use of lead-based paint in housing and consumer goods in 1978, many homes built before that year still contain lead-based paint. Of particular concern are paint chips and lead contaminated dust; for example, the friction caused by opening and closing wooden windows with lead-based paint and the resulting dust may be a significant source of lead exposure for children.⁸

⁷ [Objectives of Lead Sampling in the American Healthy Homes Survey \(AHHS\) \(hud.gov\)](#)

⁸ [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)

Contaminated drinking water

Drinking water can also be a source of exposure due to the presence of lead in pipes, brass plumbing fixtures (including faucets), solder,⁹ and private wells.

In homes with lead service lines, the pipes that connect the home to the water main, these pipes are typically the most significant source of lead in the water.¹⁰ While lead pipe was banned in 1986, including the use of lead in new service lines, it is estimated that approximately 6-10 million lead service lines remain in use in the United States.¹¹

⁹ [Introduction to Lead and Lead Service Line Replacement - LSLR Collaborative \(lslr-collaborative.org\)](#)

¹⁰ [Basic Information about Lead in Drinking Water | US EPA](#)

¹¹ [Lead Service Lines | US EPA](#)





Contaminated soil



Soil may be contaminated with lead from chipping and flaking lead-based paint on the exterior of houses and buildings. Soil near industrial sites, such as mining and smelting facilities, can become contaminated with lead due to industrial activities. Additionally, lead from vehicle emissions has contaminated soil and dust across the nation, primarily in urban environments and near busy roads. Approximately 250,000 tons of organic lead (e.g., tetraethyl lead) were added to gasoline on an annual basis in the United States prior to 1970, and although U.S. Environmental Protection Agency (EPA) regulation of the lead content in gasoline began in the early 1970s, much of this environmental contamination remains.



Consumer goods and cultural products

Some consumer goods (e.g., batteries, ceramics, cosmetics, and toys¹²) can contain lead. Lead exposure can also occur through ingestion of contaminated food, use of certain folk remedies, and use of certain cultural products.¹³

¹² [Preventing Childhood Lead Poisoning | Childhood Lead Poisoning Prevention | CDC](#)

¹³ [About Lead in Foods, Cosmetics, and Medicines | Childhood Lead Poisoning Prevention | CDC](#)





Certain work environments or hobbies



Lead exposure can occur through occupational exposure and can be taken home from workplaces where materials with lead components may be handled or where lead is being processed. Lead may also be introduced into a home after individuals participate in certain hobbies such as casting or soldering, mixing or applying glaze or pigments containing lead, and conducting home renovation on pre-1978 structures.¹⁴ Take-home exposure occurs when lead components on clothing, shoes or individuals are brought into the home and result in exposure to other individuals, including children, living in the home.

¹⁴ [About Lead in Jobs, Hobbies, or Other Activities | Childhood Lead Poisoning Prevention | CDC](#)

Additional details about these sources of exposure can be found in the [Identifying and Eliminating Primary Sources of Lead Exposure](#) section of this Toolkit.

Lead as an Environmental Health Equity Concern

(1 of 2)

The risk of being exposed to lead is not the same for all individuals, so lead elimination is an important environmental health equity concern. Data show disparities in exposure for households that are African-American, experiencing lower incomes, and in certain geographic locations.¹⁵ Analysis of National Health and Nutrition Examination Survey (NHANES) data identified important risk factors for higher BLLs in U.S. children, including race/ethnicity (non-Hispanic Black), housing age (pre-1978), and poverty.¹⁶

¹⁵ [Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts, December 2018 \(epa.gov\)](#)

¹⁶ Caldwell KJ, Cheng P-Y, Jarrett JM, Makhmudov A, Vance K, Ward CD, Jones RL, Mortensen ME. Measurement Challenges at Low Blood Lead Levels. *Pediatrics* 2017 Aug;140(2):e20170272. doi: 10.1542/peds.2017-0272. Epub 2017 Jul 17.
Egan KB, Cornwell CR, Courtney JG, Ettinger AS. Blood Lead Levels in U.S. Children Ages 1-11 Years, 1976-2016. *Environ Health Perspect* 2021 Mar;129(3):37003. doi: 10.1289/EHP7932. Epub 2021 Mar 17.

Lead as an Environmental Health Equity Concern (2 of 2)

The U.S. Department of Housing and Urban Development's (HUD's) American Healthy Homes Survey data established important housing-related lead exposure factors, including homes that do not receive government rental support.¹⁷ Because of these disparities in BLLs, and because lead sources vary with location, eliminating sources of lead exposure begins by identifying risk factors at the community level.¹⁸ This approach allows for health equity to be at the forefront of interventions, as elimination may be prioritized for communities at greatest risk for exposure.

¹⁷ [Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts, December 2018 \(epa.gov\)](#)

¹⁸ [10 Policies to Prevent and Respond to Childhood Lead Exposure | The Pew Charitable Trusts \(pewtrusts.org\)](#)

Blood Lead Levels (BLLs) and Data Sources



BLL is a measure of the amount of lead in blood. No safe level of lead in blood has been identified.¹⁹ In 2021, Centers for Disease Control and Prevention (CDC) lowered the [blood lead reference value](#) (BLRV) of 5 µg/dL to 3.5 µg/dL. The CDC blood lead reference value for children had been at 5 µg/dL since 2012. BLRV identifies children with BLLs that are higher than most children's levels. The value is based on the U.S. population of children ages 1–5 years who are in the highest 2.5% of children when tested for lead in their blood.²⁰ The BLRV is not a measure of an acceptable range of blood lead,²¹ rather it is a policy tool that helps identify the children who may be experiencing greater levels of exposure to lead.

¹⁹ [Blood lead levels in children \(cdc.gov\)](#)

²⁰ [About the Data: Blood Lead Surveillance | Childhood Lead Poisoning Prevention | CDC](#)

²¹ [Update of the Blood Lead Reference Value — United States, 2021 | MMWR \(cdc.gov\)](#)

Role of Surveillance Activities

Federal agencies, states, and local childhood lead poisoning prevention programs can use surveillance data to help identify potential areas or populations that may be experiencing higher levels of lead exposure and to evaluate the effectiveness of programmatic activities and interventions designed to meet childhood lead poisoning prevention goals.

For these reasons, these data sources and surveillance activities are an important component of the LFC Initiative.

Examples of Relevant Tools and Data Sources (1 of 3)

- ***National and state-based childhood blood lead surveillance systems:*** These systems are repositories of reported blood lead level (BLL) testing data.
- ***National Health and Nutrition Examination Survey (NHANES) data:*** These data can be used to monitor nationwide progress in lowering BLLs.
- ***Geographic information systems (GIS):*** If designed to show the location and age of housing units as well as population distributions, housing conditions, and BLLs of children, GIS systems can be used to locate lead hazards in communities.²²
- ***National and state environmental public health tracking systems:*** These systems can be used to monitor relationships among hazards, exposers, and health effects. Additionally, CDC maintains an [Environmental Dashboard](#) with data on environmental exposures, community characteristics, and health burden.

²² [Using GIS to assess and direct childhood lead poisoning prevention; guidance for state and local childhood lead poisoning prevention programs \(cdc.gov\)](#)

Examples of Relevant Tools and Data Sources (2 of 3)

- ***Environmental Index (EI)***: CDC has developed the first national, geographic-driven tool designed to measure the cumulative impacts of environmental burden through the lenses of human health and health equity.²³ The [EI](#) uses data from the U.S. Census Bureau, the U.S. EPA, the U.S. Mine Safety and Health Administration, and CDC to rank the cumulative impacts of environmental unfairness on health for every census tract. One indicator used is the proportion of tract area within 1-mi buffer of an active lead mine.
- ***Targeted Testing***: Targeted testing can be implemented in communities undertaking lead elimination actions. Testing may be focused in areas determined to have a high risk of lead exposure and where lead elimination activities are being conducted. This will allow a community to monitor longer term progress towards reducing BLLs. More details on using testing to measure longer term progress can be found in the [Monitoring Long-Term Progress](#) section of this Toolkit.

²³ [Environmental Justice Index \(EJI\) \(cdc.gov\)](#)

Examples of Relevant Tools and Data Sources (3 of 3)

- ***Lead Exposure Risk Index (LERI)***: CDC is developing an interactive web-based tool called LERI, which uses nationally consistent data to map community-level risk for lead exposure throughout the U.S. This tool will have the capacity to assist public health programs, health care providers and the public in identifying areas at high-risk for lead exposure, which can be used to guide targeted blood lead screening and population-based interventions. LERI uses estimates from the U.S. Census American Community Survey and data from the EPA and the U.S. Geological Survey to develop an overall composite indicator for lead exposure in the U.S. based on sociodemographic, housing, and environmental risk factors. CDC is currently validating the LERI model and finalizing the web application.



4. Building a Local LFC Movement

Building Lead-Free Communities



Building a local LFC movement requires thoughtful and organized collaboration across sectors within a community (e.g., local government, public health, utilities, planning, civil society organizations, local philanthropy, academic institutions, the private sector, concerned community members). Working together can boost capacity locally and build the political will needed to address the challenges and opportunities of becoming lead-free. It also requires the leadership of a motivated, self-organized, and committed local team utilizing input from a wide cross-section of people who live, work, and learn in the community. This section of the Toolkit offers communities some insights for building their local LFC team to organize and manage local efforts that will, when taken collectively, spark a national movement.

Establishing a Local LFC Team

While communities will need to determine what kind of an approach to eliminating lead exposure hazards will work best locally, creating a local LFC team can be a helpful strategy for organizing these efforts. Anyone in the community can organize a local LFC team.

The coordinated team may include local non-governmental organizations (NGOs), local or state public health officials, academic institutions, businesses and private sector partners, or others who may be interested in leading and supporting a local Lead-Free Communities effort.



Local LFC Team

(1 of 2)

The local LFC team can serve as the driving force behind a community's LFC movement and take responsibility for the following:



Articulating what success will look like



Building a community commitment to eliminate lead exposure hazards



Mapping and building a network of partners

Local LFC Team (2 of 2)

The local LFC team can serve as the driving force behind a community's LFC movement and take responsibility for the following:



Creating the local LFC Action Plan



Ensuring adequate financial resources are available to implement the plan



Reporting progress to the broader community



Articulating What Success Will Look Like

Articulating what success will look like upfront and building local consensus around this goal will help ensure all involved in the development and implementation of a local LFC Action Plan understand the plan's goals and how to support these goals. It will also help the team understand what kinds of partnerships will be needed to achieve success.



Building a community commitment to eliminate lead exposure hazards

Many of the communities at highest risk for exposure to lead are also communities that are historically underrepresented in efforts to plan for and implement lead hazard interventions. Because this kind of work is most effective when there is a community-wide commitment, extensive and thoughtful engagement with various and relevant community members and partners from all segments of a community is critical. For example, civic and community leaders are vital partners for building support for the planning and implementation of needed actions.

A thoughtful approach to community engagement offers an opportunity to begin addressing environmental unfairness in communities that have been underserved for a long time.



Mapping and Building a Network of Partners

A useful early step is for the local LFC team to identify the broader network of key partners that will be needed to help develop and implement interventions and help drive the LFC movement locally. Partners may be needed to identify and map exposure hazards, conduct BLL testing and reporting, conduct public health surveillance, identify and conduct necessary interventions, and promote community outreach and engagement. As a part of this partner mapping process, the local LFC team may wish to articulate a shared vision for how those partners will be involved in the development and implementation of the local LFC Action Plan.



Creating the Local LFC Action Plan

The local LFC team can take responsibility for developing a comprehensive, yet implementable, local LFC Action Plan that is informed by input from the local network of partners and others in the larger community regarding intervention priorities and approaches.



Ensuring Adequate Financial Resources to Implement the Plan

Implementing the local LFC Action Plan will likely require funding from multiple sources. The local LFC team can determine the resources required to implement the plan (i.e., the budget), identify potential funding sources that could provide the necessary resources, and secure financial commitments. Ensuring transparency and accountability of committed resources will be critical for building and maintaining the community's trust in the team.



Reporting Progress to the Broader Community

It would be helpful for the local LFC team to track progress towards the implementation of the LFC Action Plan and provide regular updates to the broader community regarding progress, successes, challenges, and potential changes to the plan. This could include sharing progress on specific indicators from the community's LFC Action Plan, including longer-term measures, such as blood lead levels, and shorter-term measures, such as the number of lead service lines replaced. This Toolkit offers insights on steps communities can take to monitor and report progress.



LFC Team Members (1 of 4)

Ideally, the local LFC team will include community leaders who have an interest in addressing lead hazards in the community and who are committed to engaging all interested sectors in the development and implementation of the local LFC Action Plan. It is especially helpful to identify a team member who represents an organization with funding and leadership skills to help guide and coordinate local planning and implementation efforts.

Teams would benefit from recruiting individuals who can cultivate relevant local partnerships and from including at least one person with expertise in public health and protecting communities from health hazards associated with lead exposure.

LFC Team Members (2 of 4)

Local LFC teams could also include people from sectors and organizations that will be especially critical to decisions related to plan implementation (e.g., local government, state and local public health agencies, local water utilities and water systems, healthcare providers, technical experts, social service organizations, leaders from various community groups or institutions). Other perspectives that may be helpful include parents of affected children or other residents affected by the problem.

LFC Team Members (3 of 4)

Additionally, local LFC teams would benefit from including or engaging with individuals with expertise in managing large grants and other funding sources. While each community will vary in its needs, it will be helpful to assemble a local LFC team that is small enough (e.g., 8-10 people, depending on the size and needs of the community) to be effective and nimble, but inclusive of the multitude of perspectives that will be central to successfully developing and implementing the local LFC Plan.

LFC Team Members (4 of 4)

It is important to acknowledge that communities may vary significantly in terms of the expertise, resources, and initial capacity to initiate and implement something like a local LFC Action Plan. While this Toolkit offers strategies for helping to boost local capacity, some communities may require robust technical assistance and other forms of support to develop and implement a local LFC Action Plan. The LFC Initiative, through its National LFC Network, offers a forum for communities and individuals to learn from each other and from experts in various elements of lead hazard identification and removal, planning, partner collaboration, and community engagement.

LFC Resources and Operations



Identify and use resources that will help bolster the team's success

Local teams may benefit from seeking technical assistance (e.g. guidance from organizations working in the field, access to subject matter experts) or other kinds of support (e.g., leadership tools for building community support) to help build local capacity to develop and implement the local LFC Action Plan. Teams can leverage these resources to bolster efficiency and effectiveness.



Establish a clear approach to the local LFC team's operations

It is helpful to establish from the beginning a set of shared expectations and ground rules for the team's operations and work together.

This includes establishing expectations for how the team will coordinate and collaborate, make decisions, and handle disagreements.

Building a Network of Local Partners

A primary objective of the local LFC team is to create and sustain a network of partners to help build and support the local LFC movement. This means recruiting partners that can help identify the challenges and opportunities in addressing local needs, help develop the LFC Action Plan, support implementation of the LFC Action Plan, engage the larger community, and build community support for the plan.

Partnerships

Local LFC teams can also enlist partners to help with the following activities:



BLL Testing and Public Health Surveillance



Hazard mapping



Identifying necessary interventions



Overseeing implementation of interventions



Engaging with the larger community to gather input and build support



Blood Lead Level Testing and Public Health Surveillance

To understand the extent of lead exposure in the community and which populations are at highest risk of lead exposure within the community, local partners with expertise in BLL testing and public health surveillance should be included in the development of the local LFC Action Plan. Examples of potential partners include state or local health departments, laboratory scientists, healthcare professionals, pediatricians, epidemiologists, and academic institutions. These experts may be able to help inform efforts to identify lead hazards, make decisions about safely implementing interventions, monitor successful implementation of the LFC Action Plan, and communicate health effects and risk to the community at large.



Hazard mapping

One of the first steps in developing the local LFC Action Plan is identifying your community's lead exposure hazards. Details about hazard mapping can be found in the [Identifying and Eliminating Primary Sources of Lead Exposure](#) section of the Toolkit. Local partners with the appropriate expertise to conduct inspections and assess the existence of potential hazards may be engaged in the development of the LFC Action Plan, as the hazard mapping process will gather the data on which the rest of the plan is based. Examples of potential partners include trained community members, local health departments, housing inspectors, water system and utility representatives, representatives of the local housing authority, and school facilities managers. In some cases, there may be existing data on the location of lead hazards that can be used as a starting point to identify areas of intervention (e.g., inventory of lead service lines in the community).



Identifying necessary interventions

A key component of the local LFC Action Plan is articulating in detail the specific interventions that will be required to eliminate lead exposure hazards. [The Identifying and Eliminating Primary Sources of Lead Exposure](#) section of this Toolkit includes information about the types of interventions that may be needed. Partners who understand the interventions required and who will be responsible for implementing the identified interventions could be included in the development of the local LFC Action Plan to help ensure the plan is comprehensive, accurate, and implementable. Examples of potential partners include water system and utility representatives, representatives of the local housing authority, and contractors affiliated with EPA's [Lead Renovation, Repair, and Painting Program](#) (RRP).



Overseeing implementation of interventions

Communities can decide the sequence of intervention implementation, with timelines, equity, and financial considerations. Engaging with the entities and individuals who will ultimately be responsible for ensuring implementation of the relevant interventions is recommended. These individuals and entities can offer important information such as the steps involved in performing of, creating timelines for, and estimating cost of the intervention. In addition, these partners could also be involved in providing intervention-specific implementation progress reports to the local LFC team. Examples of potential partners include contractors affiliated with Environmental Protection Agency's Renovation, Repair and Painting Program, water system and utility representatives, representatives of the local housing authority, and local government representatives who oversee infrastructure and public works projects.



Engaging with the community to gather input and build support

Support from the larger community is a vital component to the success of a local LFC Action Plan. Local LFC teams can benefit from identifying key partners who can communicate with various segments of the larger community about the LFC Action Plan, gather input from the larger community to incorporate into the plan where appropriate, and build support for the plan. Examples of potential partners include local community leaders (e.g., from faith-based organizations, community organizations), local non-governmental organizations (e.g., social service organizations, health and wellness groups/programs, community development organizations), school leadership (e.g., school board or administration), owners of local early care and education centers, local business owners, corporations with a local presence, universities, and state and local government officials or agency representatives, among others.

Building Partnerships

(1 of 2)

Local LFC teams can begin by developing a list of potential individuals or entities that will be critical to developing and implementing the LFC Action Plan and assessing the degree to which members of the team are already connected to these prospective partners. Where relationships do not already exist, teams can outline potential strategies for making connections and fostering partnerships. As a part of this exercise, teams may wish to think about potential non-traditional partnerships and the ways in which these kinds of relationships may bring creativity, innovation, and unique perspectives and expertise to local planning and implementation efforts.

Building Partnerships

(2 of 2)

To help bring new partners into the fold, teams can explain their objectives for creating a Lead-Free Community, highlight the role of prospective partners, and learn about the needs and interests of prospective partners. Investing time in learning about a prospective partner and factoring their needs and interests into the development and implementation of the local LFC Action Plan will support relationship building and will help ensure that the Action Plan is realistic, applicable to all relevant implementation partners, and befitting of the community it is meant to serve.



5. Developing A Local LFC Action Plan

Embarking on the Local LFC Planning Process

Developing a local LFC Action Plan, ensuring partner commitment, and building community support will require a substantial up-front time investment for the local LFC team and its partners. A thorough and thoughtful approach to community engagement and plan development will help ensure a smoother implementation process that is supported by the local community.

CDC experts and members of the National LFC Network may provide technical assistance to communities in developing plans and implementing interventions and may offer support in identifying additional partners for technical assistance. A local LFC Action Plan can build on work already happening in a community and offer creative ideas for recruiting new partners, expanding to different parts of the community, and ensuring that all lead exposure hazards are addressed.

Developing a Plan

(1 of 3)

The process of developing the local LFC Action Plan might include following elements:



Identifying key partners in implementation and their roles in moving a local LFC Action Plan forward



Identifying a shared set of specific goals to guide development and implementation of the local LFC Action Plan



Outlining community engagement strategies to gather input and a plan for sharing information about local hazards and anticipated interventions with the community and report progress

Developing a Plan

(2 of 3)



Getting a detailed understanding of the lead hazards in the community, including lead in water, paint, and soil



Outlining potential interventions for each lead exposure hazard and determining how these might be implemented (e.g., specific actions for intervention, responsible party, timeline for action)



Establishing criteria to help prioritize implementation of interventions within the community

Developing a Plan

(3 of 3)



Determining the types of resources and commitments that will be required to support implementation of the local LFC Action Plan



Developing a plan to assess progress, evaluate implementation outcomes, and revise the local LFC Action Plan as needed

Communities Can Learn from Each Other

Local LFC teams can learn from other communities that have been or are going through a similar process and can seek technical assistance with developing the plan where needed. This will help ensure the local LFC Action Plan is comprehensive, actionable, and supported by the community it is intended to serve. The LFC Initiative will convene a National LFC Network as a forum to showcase and support this kind of shared learning and collaboration

Developing a Local LFC Action Plan



Local LFC teams may find it beneficial to develop a comprehensive LFC Action Plan, detailing the lead hazards that exist in the community (which could be defined as a county, city or other geographical area working to eliminate lead, as defined by the local team) and the steps for removing lead hazards. Any ongoing work on lead elimination could be outlined in the LFC Action Plan and used as a starting point for further action. Because the LFC Action Plan will serve as a community's roadmap for becoming lead-free, it is important to ensure that the plan is clear and contains all pertinent information.

Components of a Local LFC Action Plan (1 of 2)

The included template lists the components and can be customized locally as needed. Once the plan is developed, it should be shared publicly to ensure transparency.



Part 1: Overview of the Local LFC Team and its Approach to Operations



Part 2: Description of Community Engagement Strategies



Part 3: Summary of Local Lead Hazards

Components of a Local LFC Action Plan

(2 of 2)



Part 4: Summary of Steps Required to Address Local Lead Hazards



Part 5: Plan Budget and Finances



Part 6: Monitoring and Reporting Plan Implementation Progress



Part 1: Overview of the Local LFC team and its Approach to Operations

This section of the plan could include a roster of team members, their qualifications for serving on the team, and an overview of how the team operates and makes decisions. Some communities may choose to take a less formal approach to operations, but it is still important to consider which individuals or organizations are able to take a leadership role in moving a local LFC Initiative forward.



Part 2: Description of Community Engagement Strategies (1 of 2)

It is important for community input to be gathered and incorporated into a local LFC Action Plan to ensure it is reflective of the needs and desires of the population. This will aid the planning process as well as help build relationships and foster trust for the plan within the community. Because community support is a critical component of plan development and implementation, local LFC teams may wish to consider clearly outlining the community engagement strategies that will be employed to gather community input (e.g., indicating how the draft plan will be made available for public review and comment before the plan is finalized). Members of the broader community can provide a valuable perspective on health equity concerns as well as considerations for fair and equitable implementation.



Part 2: Description of Community Engagement Strategies (2 of 2)



Allowing the individuals within the community to weigh in on a plan that will directly affect them provides the local LFC team with the opportunity to better understand implications for implementing the plan and to adjust the plan as needed to better suit the needs of those it is intended to serve. See the [Community Education, Outreach, and Engagement](#) section of this Toolkit for additional details around soliciting community input and feedback.



Part 3: Summary of Local Lead Hazards

This section could provide a detailed summary of the known lead hazards that are present in the community, including the kinds of hazards that exist and where they are located. Inventorying lead exposure hazards is difficult, so it is important to understand that inventories may not be 100% accurate, despite best efforts to make them so. This information can include detailed data or links to detailed data that will help the members of a community clearly understand whether the places that they and their families live, learn, work, and play are areas of potential exposure. The local water utility and the county assessor's office may be a useful starting point for gathering some preliminary data. The local LFC team could use [the Identifying and Eliminating Primary Sources of Lead Exposure](#) section of this Toolkit to identify and summarize local lead hazards. The purpose of this summary is twofold – it will help illustrate where specific hazards exist, and it will serve as the foundation for developing a detailed plan to remove these hazards.

Summary of Local Lead Hazards



Lead-based paint hazards



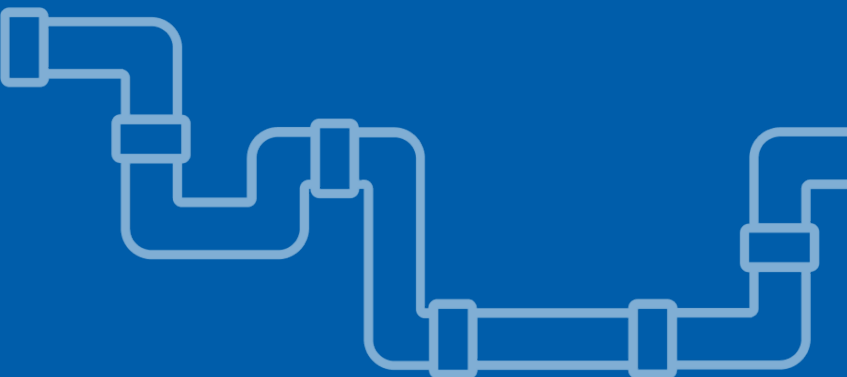
Lead-contaminated drinking water hazards



Lead-contaminated soil hazards



Other sources of lead exposure



Part 4: Summary of Steps Required to Address Local Lead Hazards

This section could outline a detailed plan for addressing the lead hazards in the community, including details about what actions will be taken, where, when, and by whom. Steps may include the following:



Identifying appropriate local interventions



Determining implementation sequencing and priorities

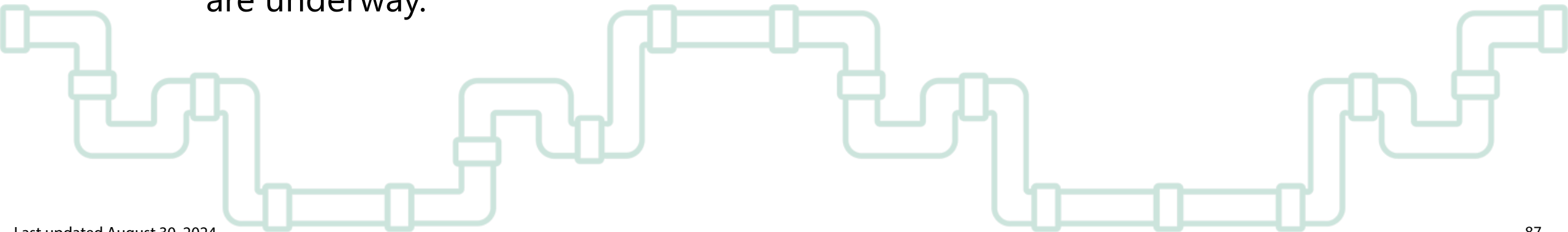


Identifying key implementation partners



Identifying appropriate local interventions

A community may use the [Identifying and Eliminating Primary Sources of Lead Exposure](#) section of this Toolkit to consider and identify interventions that may be appropriate for addressing their most common sources of lead. An action plan will be most useful if it articulates the specific detailed goals and steps that will be required to permanently remove each lead hazard in the community. This section could also include strategies that will be taken to help individuals reduce lead exposure temporarily while remediation efforts are underway.





Determining implementation sequencing and priorities

An inevitable question that will need to be addressed in the local Action Plan is which hazards might be addressed first. This is an important and sensitive issue that can be considered from a lens of health equity and with input from community members. Health equity is achieved when each individual has the opportunity to attain his or her full health potential.²⁴

²⁴ [Health Equity Science: Research and Evaluation | Advancing Health Equity in Chronic Disease | CDC](#)

Ensuring an equitable approach to hazard elimination

The following activities may be considered to help ensure an equitable approach to hazard elimination:



Determine where in the community the lead hazards are most concentrated



Consider who is most at risk for lead exposure



Engage the community to assist with decision making regarding where and how to prioritize interventions



Be transparent



Determine where lead hazards are most concentrated

The hazard assessment and mapping process could reveal where there are hazards present in the community and acknowledge that the risk of being exposed to lead is not the same for all individuals. The areas with the greatest hazards often include neighborhoods with older homes and buildings and households experiencing lower incomes, though hazards may also exist elsewhere.

Additionally, a focus on increased BLL testing efforts and analyzing surveillance data may be helpful in identifying which lead hazards are contributing to increased lead exposure in the community. Identifying where lead hazards are present might help inform where interventions may be needed most urgently.



Consider who is most at risk for lead exposure

Eliminating sources of exposure begins by identifying risk factors at the local (community) level. A community may consider prioritizing interventions in a way that will first provide relief to those who are most affected by the hazards. For example, because children aged 5 and under are most adversely affected by lead exposure, the community may want to prioritize removing lead hazards in areas where many children congregate (e.g., schools, early care and education centers, playgrounds). A focus on increasing BLL testing efforts and analyzing surveillance data can help identify populations who are at highest risk of lead exposure in the community.





Engage the community to prioritize interventions

Taking the time to connect with the people who will be affected by the LFC Action Plan will help ensure that their needs and perspectives are appropriately considered in the development and implementation of the plan.

Additionally, taking the time to engage the community around plan development will help boost trust for the process and support of the plan.



Be transparent

An important element of building community trust and buy-in for the plan is being transparent about how decisions around intervention implementation will be made (e.g., who will ultimately decide where and when interventions will occur, what data will inform that decision, how the decision will be reached). The decision-making process should be clearly explained in the LFC Action Plan. Once this decision-making process is established, it is important to follow the process to ensure consistency and predictability.



Identifying key implementation partners

The local LFC Action Plan might articulate who the key partners will be for plan implementation.

These implementation partners can be consulted during the plan's development and periodically as implementation is underway. Refer to the section on [Building a Local LFC Team](#) for guidance on partners to consider including.



Part 5: Plan Budget and Finances

Local LFC teams would benefit from developing a detailed cost estimate for identifying lead hazards and completing interventions as well as the sources of funding to support this work. The costs for remediating many lead hazards interventions can be extensive, so it is important to do some research to understand the financial resources that will be necessary for completing the interventions outlined in the LFC Action Plan. Cost estimates will vary by location, so local LFC Action Plan budgets will be most useful if they reflect local costs.

Estimated Costs

The following are some roughly estimated costs for the interventions outlined in this Toolkit, which can serve as a useful starting point for developing a local budget.



Lead-based paint removal



Window replacement



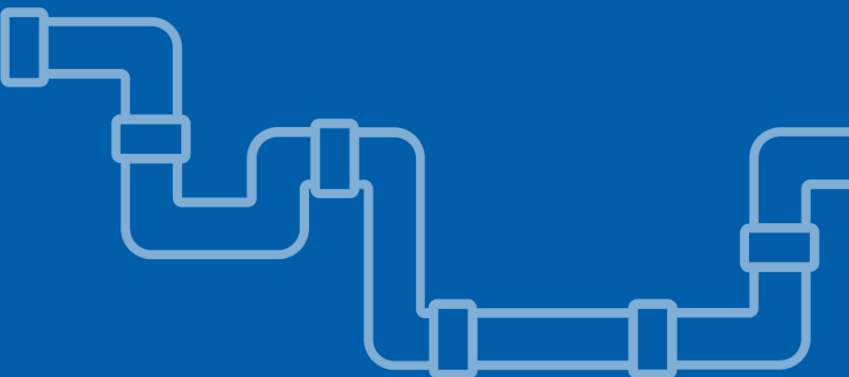
Lead service line replacement



Premise plumbing and fixture replacement



Soil remediation





Lead-based paint removal

Costs to safely remove lead-based paint may average from approximately \$8-15 per square foot of painted surface. Total costs will vary based on the size of the home or building, the number of rooms and surfaces that require paint remediation, local labor rates for contractors who are certified to remove lead-based paint, and the local cost of materials. A 2017 report from the Pew Charitable Trusts, [*10 Policies to Prevent and Respond to Childhood Lead Exposures*](#), estimated a per unit (household) cost of \$10,000 using data from HUD's Lead Hazard Control program for full remediation, including replacing some windows, treating deteriorated paint, remediating contaminated soil and repairing high risk areas (e.g., doors and windows); this estimate also includes costs for testing paint, dust and soil before and after work.²⁵

²⁵ [hip_childhood_lead_poisoning_report.pdf \(pewtrusts.org\)](#)



Lead-based paint encapsulation

While encapsulating lead-based paint is not a permanent solution, it may be a more affordable way to temporarily reduce exposure to lead-based paint hazards. On average, encapsulation products cost approximately \$50 per gallon, with the average cost of materials to encapsulate a 1200-2000 square foot home totaling approximately \$800-1400.

Encapsulation should be performed by a skilled professional, so labor rates (which will vary locally) should be considered when estimating paint encapsulation costs.²⁶

²⁶ <https://www.angi.com/articles/how-much-cost-removing-lead-paint.htm>



Window replacement

The cost to replace windows in a home or building will vary greatly based on several factors. For example, the number of contaminated windows that need to be replaced, the type of window, the cost of new window units, and local labor costs to remove and replace the windows will affect the estimated costs.





Lead service line replacement

The cost to replace a lead service line from the water main to the home averages between \$1,200 - \$12,300.²⁷ Costs will vary based on the technique used for replacing the service line, the length of the service line, local labor rates, and other considerations.

²⁷ https://www.epa.gov/sites/production/files/2019-10/documents/strategies_to_achieve_full_lead_service_line_replacement_10_09_19.pdf



Premise plumbing and fixture replacement

The cost to replace pipes and fixtures within a home or building will vary significantly based on the nature of the building, the type of replacement that is needed, and local labor rates.





Soil remediation

The cost to remediate lead-contaminated soil can vary greatly depending on the site and will need to factor in expenses such as the cost to remove soil, the cost to safely dispose of it, and the cost to add clean fill.

Teams can contact local remediation experts to determine local labor and material costs and factor in the square footage of soil that needs to be remediated.

Account for costs to keep people safe during remediation

Another consideration is the expenses involved in keeping people safe while lead remediation efforts are underway. For example, because buildings should not be occupied while paint remediation activities occur (due to the possibility of producing lead-contaminated dust), resources may be required to temporarily rehouse families or businesses while remediation is being performed. If lead service lines have been detected in an area, there will be costs associated with temporarily providing filters or bottled water until service lines can be fully replaced and flushed. Communities can also consult CDC's [Sustainability of Funding Toolkit for Childhood Lead Poisoning Prevention Programs](#) for detailed information on a variety of funding opportunities that may be leveraged. The Action Plan Template includes a budgeting spreadsheet which can be used by communities during the planning process.



Part 6: Monitoring and Reporting Plan Implementation Progress

This section of the local LFC Action Plan can articulate an approach to evaluating implementation progress, revising the plan and implementation timeline when needed, and regularly making progress reports publicly available.

Description of How Progress will be Assessed

To keep the larger community informed, the LFC Action Plan may include information about how progress will be measured and monitored for each specific intervention. It is important to include focused blood lead surveillance as one measure of progress to show that lead exposure is declining within the community as the plan is implemented.

Assessing progress toward reduced BLLs will require increased BLL surveillance to establish good baseline measures within a community. LFC Action Plans may also include information about the anticipated pace of progress to help set expectations as to when different pieces of the plan will be completed. Regular review and revision of the timeline is important to ensure the community stays informed on progress and has realistic expectations.

Description of How Progress will be Reported

(1 of 2)

Progress towards implementing the local LFC Action Plan can be reported regularly so members of the broader community can track how plan implementation is going (i.e., what has been completed, what is in progress, what work remains, when and why changes may be needed). Plans for delivering progress reports may include the following elements:



Report progress regularly



Use familiar mechanisms and/or visual tools to help illustrate progress



Recognize and celebrate progress and successes

Description of How Progress will be Reported

(2 of 2)



Acknowledge challenges and/or setbacks



Share updates about changes to the plan



Provide a mechanism for community members to ask questions or share feedback on the changes

Reporting Progress (1 of 2)



Report progress regularly

It is helpful to report on plan progress to the broader community at least annually, but ideally more frequently (e.g., semiannually or quarterly). Local teams may wish to detail the reporting schedule and process in the plan, so the community understands from the beginning when and how they will be able to track the plan's progress. See the [Community Engagement and Outreach](#) section of the Toolkit for suggestions for how to disseminate progress reports and other information about the plan.

Reporting Progress (2 of 2)



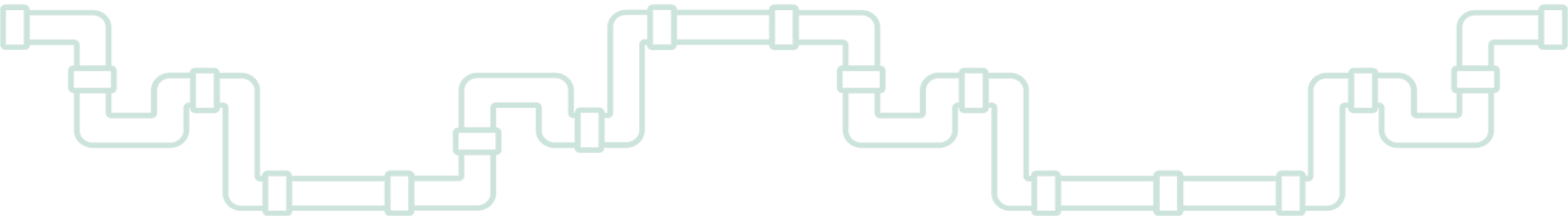
Use familiar mechanisms and/or visual tools to help illustrate progress

Progress reports do not necessarily need to entail writing and publishing lengthy reports. Consider using familiar reporting mechanisms and graphic tools to help demonstrate progress. For example, progress reports could use charts to demonstrate the percentage of work that has been completed to date or follow a school report card format that grades actual progress against anticipated progress.



Recognize and celebrate progress and successes

Eliminating lead hazards can be a challenging, time-consuming, and expensive process; this is part of the reason why so many lead hazards have remained unaddressed to date. Communities that are looking to become lead-free can take pride in the fact that they are collaborating to eliminate these hazards and can acknowledge and celebrate progress along the road to becoming lead-free. Acknowledging progress also helps those who live and work in a community to see that work is being done and that there is steady movement towards becoming lead-free.





Acknowledge challenges and/or setbacks

While it is important to develop an LFC Action Plan that is realistic and achievable, it will not be uncommon to encounter implementation challenges and setbacks as new issues arise or new information becomes available. Each local LFC Action Plan can acknowledge this possibility up front and include a section that explicitly states how changes will be made to the plan. It is important to acknowledge implementation challenges or setbacks and plan changes in the regular progress reports issued by the local LFC team. Demonstrating this kind of transparency will help build and maintain trust in and support of the plan.



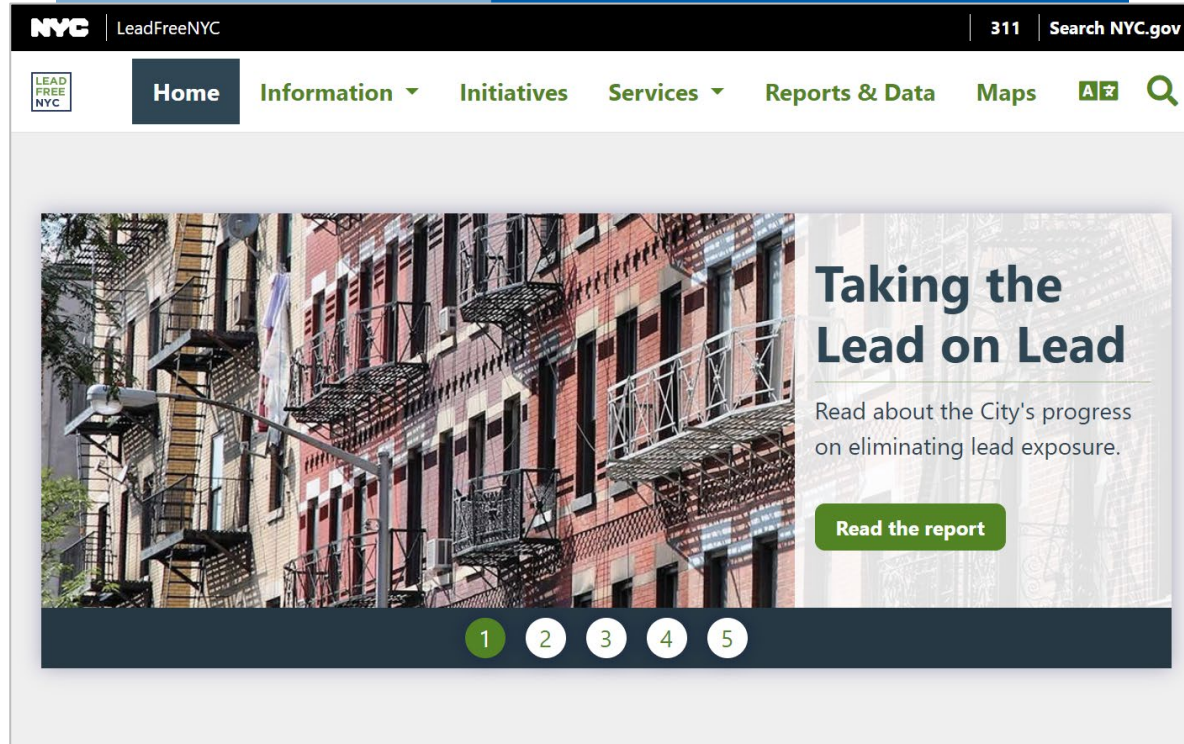
Share updates about changes to the plan

Progress reports might indicate whether there are any changes to the LFC Action Plan (including the timeline for implementing the plan) and, if so, why the changes are needed and what the changes entail. Frequent interim progress reports may be beneficial throughout implementation to ensure the community remains up to date on progress and any changes to the timeline. It is useful to communicate any changes to the plan as early as possible and with special care to communicate changes to any individuals or groups who will be particularly affected.



Provide a way for community to ask questions or share feedback on the changes

Changes to the original plans may be unexpected and may create new challenges to specific individuals or groups within the community. While certain changes may be unavoidable, it is important to allow those who are impacted by the changes to raise questions, share concerns, and offer ideas about how best to accommodate or implement these changes. While not every request will likely be able to be accommodated, leaving space for dialogue about these changes also leaves space for better understanding an individual or group's needs, promoting joint problem solving, and potentially identifying creative solutions or opportunities for better accommodating the changes. This kind of dialogue also demonstrates respect for the individuals within the community.



Feedback Example

The LeadFreeNYC program offers a useful [model](#) for reporting progress on 45 separate initiatives that the LeadFreeNYC Task Force and several city agencies are undertaking to reduce the risk of lead poisoning in children.



6. Monitoring Long-term Progress

Monitoring Lead Elimination Progress

It is important to monitor progress towards lead elimination and report results regularly to the broader community and other interested parties. The local LFC team could develop baseline measures, then develop a set of performance measurements or evaluation metrics that will be used to help track a community's progress towards goals related to interventions for each type of exposure hazard (i.e., lead in water, paint, soil, and other sources). It is important that the metrics are clear and easy to measure so it is easy to understand the degree to which progress is being made and where new or additional efforts may be needed.





Showcasing Progress

It is also important that progress reports be easy to obtain and understand. The local LFC team might consider setting up an online dashboard to track progress or publishing frequent (e.g., quarterly or semiannually) reports so members of the broader community can track progress. In addition to posting information online, the local LFC team could explore other locally appropriate communications tools (e.g., hosting town hall meetings, providing updates in city council discussions, sending flyers or other news updates to residents, enlisting partner community leaders to share information with their networks).

Tracking Long-Term Progress Through Blood Lead Levels (BLLs) (1 of 2)

While it is important to measure progress on shorter-term intervention implementation, such as the number of lead service lines replaced or the number of homes in which lead paint abatement is complete, it is also important to track longer-term measures of progress, such as a reduction in BLLs in the community or reduced referrals to services for children with high BLLs due to fewer children in the community having BLLs above the Blood Lead Reference Value.

Tracking Long-Term Progress Through Blood Lead Levels (BLLs) (2 of 2)

BLL testing should continue or increase where it is already occurring and can be initiated in parts of the community where it is not currently being conducted. BLL testing can continue throughout the life of a lead elimination effort, as it can be an important component of measuring progress. Testing BLLs could demonstrate the long-term impact of the LFC Initiative within a community. State and local health departments, as well as pediatricians and others in the healthcare arena, will be key partners in these efforts.

7. Financial Considerations



Considerable costs to remove lead hazards

It is critical for communities to assess the extent to which lead exposure hazards exist in the community and to develop an estimated budget for removing these hazards. The Action Plan Template provided as an appendix to this Toolkit contains a budgeting spreadsheet to assist communities in thinking through how to build a budget for their specific needs.

Action Plan Template: Budgeting Spreadsheet

The example inputs provided in the template offer only a sample of some of the possible costs to consider; this list is not exhaustive, and every community will have a different budget based on their individual situation and Action Plan. Once the estimated cost has been established, communities will need to develop plans for obtaining the resources necessary to implement the plan.

This is likely to be a challenging endeavor—especially for communities with many lead exposure hazards—but ensuring sufficient financial resources to implement lead elimination activities is key to success.



Considering sources of funding

(1 of 2)

Due to the significant financial resources required for many of these interventions, it may be necessary to consider a broad range of potential financing sources, including leveraging federal and state funding opportunities, accessing grant and loan programs, securing philanthropic funding, and partnering with local utilities or private industries where feasible. Local funding opportunities may also exist and may be explored to match or supplement state, federal, and private funding.



Considering sources of funding (2 of 2)

In some circumstances, homeowners may be asked to directly share the responsibility of certain costs, though it is important to be aware that not all homeowners will have the resources required to contribute to lead removal costs. Furthermore, it is often the case that the individuals who live in homes with lead hazards are those who are least likely to be able to afford remediation. Special care can be given to finding ways to reduce the financial burden for these individuals to safely remove lead hazards from their homes. Landlords may be involved in the maintenance of homes and apartments containing lead hazards, and it is important to consider ways to encourage landlords to remediate lead.



Funding

CDC has developed the [Sustainability of Funding Toolkit for Childhood Lead Poisoning Prevention Programs](#) as a resource for public health and environmental agencies to identify and consider possible funding sources, including federal and state sources as well as a variety of nongovernmental sources (e.g., nonprofit hospitals, hospital community benefits, banks and financial institutions, pay for success programs). This Toolkit provides links and explores these funding opportunities in greater detail. It also provides information about how communities can leverage various funding sources to support the kinds of activities outlined in their local LFC Action Plan. Because federal, state, and local funding programs change frequently, it is important to track these programs to understand what funding programs may currently exist, when these programs may change or expire, and what new programs or opportunities may become available.

Paying for Lead Exposure Reduction Activities

(1 of 4)



Special loans or financing programs to help homeowners pay for lead remediation

In certain areas, special no or low interest loans may be available to homeowners seeking to remediate lead hazards.



Grant programs

Various states and localities have created mechanisms (e.g., bonds, grant programs) for financing lead remediation activities.



Social impact investing

(See next page)



Paying for Lead Exposure Reduction Activities

(2 of 4)

Social impact investing

Social impact investments are financial investments that are made with the intention of generating both a financial return and a positive, measurable social and environmental impact. CDC's [Pay for Success: A how-to guide for local government focused on lead-safe homes](#) was created to share information about an innovative tool for bringing new capital to proven solutions for social problems with city and state leaders responsible for designing and administering social services (and others who may be interested in delivering social services to improve community wellbeing).

Pay for Success projects can provide alternative funding mechanisms to support lead exposure prevention.

Paying for Lead Exposure Reduction Activities

(3 of 4)



Donations from local businesses or corporations with a local presence

Local businesses or larger corporations with a local presence have an interest in the health and wellbeing of the community and are important partners to engage. These businesses and local corporations may be able to donate funds, tools, or other resources to aid lead elimination efforts in the communities they serve.



Utility rebates

Some water systems or utilities offer rebates or other financial credits to customers who replace the private portion of a lead service line.



Water rates

(see next page)



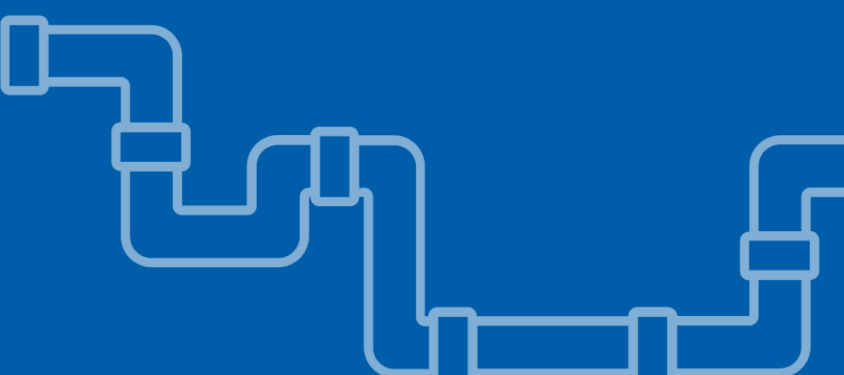
Paying for Lead Exposure Reduction Activities

(4 of 4)

Water rates

Some utilities have used increases in water rates to help pay for lead service line replacement costs. While this is one method for funding this work, increased rates are not always feasible or appropriate and can further disadvantage low-income households. It is important for utilities and community leaders to assess whether this is a viable approach before implementing rate increases to raise funds. It may be useful to gather community input to inform decisions about rate increases, as it is important to make sure that any increase in rates would not reduce the ability of those within a community—especially low-income households—to access safe drinking water. Water assistance programs or other programs may be able to help subsidize lower-income households to accommodate rate changes.

Financial Resources to Address Lead Exposure Hazards



Several organizations have developed useful resources regarding funding and financing sources for addressing lead exposure hazards. For example, the Green & Healthy Homes Initiative has created a [Lead Funding Toolkit](#), which features dozens of sources of funding that have been used to address lead hazards in residential properties. The Toolkit provides specific implementation instructions for each funding strategy and highlights examples of funding in communities across the country. Additionally, the Lead Service Line Replacement Collaborative has developed a [comprehensive overview](#) of many creative programs states and localities are developing and utilizing to help finance the cost of replacing lead service lines. This overview includes a summary of federal, state, local, and other funding sources and highlights other potential opportunities for providing funding to replace lead service lines.



8. Community Engagement, Education, and Outreach Considerations

Community Engagement, Education, and Outreach Considerations

(1 of 2)

Raising awareness regarding local lead hazards and building support for safely and systematically eliminating these hazards is essential for the success of a local LFC initiative. This involves educating individuals in the community about the harmful effects of lead exposure, sharing information about where lead hazards exist (or are most likely to exist), sharing information about how to minimize lead exposure risks, including a diverse cross-section of the community in developing a detailed plan for how the community will address local lead hazards, engaging the community in decision making, and keeping the community informed about progress towards eliminating lead hazards.

Community Engagement, Education, and Outreach Considerations

(2 of 2)

Community engagement is an important component of maintaining a focus on health equity and ensuring a local LFC Action Plan addresses any existing inequalities and adequately includes geographical areas/groups of concern within the community.

How communities can raise awareness, gather feedback, and build support for local action



Engaging the Community



Keeping the Broader Community Informed



Developing Educational Resources and Programs



Community Engagement

Broad community support is essential to the successful implementation of the local LFC Action Plan. Support for the plan is more likely if the local LFC team engages with a diverse cross-section of the community to inform and participate in the development of a realistic plan. People who see their needs, concerns, interests, and ideas acknowledged and addressed in the plan may be more inclined to trust the plan and the individuals and entities responsible for implementing the plan.

Broader Community Input

Here are some suggested points during which broader community input will be helpful for building support of the plan:



Engage the community in development of the draft local LFC Action Plan



Gather feedback on the local LFC Action Plan once it is drafted



Share regular progress reports



Engage the community in development of the draft local LFC Action Plan

(1 of 2)

The local LFC team can identify additional community members that can serve as LFC champions and work with the team to gather the kind of input that will help inform the development of the draft local LFC Action Plan. Input could be gathered through informal discussions, site visits, surveys, interviews, and community meetings. This information gathering process will help the local LFC team understand certain issues or considerations that would factor into implementation of the interventions.



Engage the community in development of the draft local LFC Action Plan

(2 of 2)

For example, it would be helpful to understand whether any water infrastructure repairs are planned and whether replacement of lead service lines could be coordinated with those construction efforts, or it may be helpful to know that community members are seeking to create a community garden in an area that is known to have lead contamination in the soil. Gathering this kind of information up front will help ensure the draft plan is grounded in the realities and circumstances of the community and that interventions are planned and sequenced in a way that will minimally disrupt—and possibly even support or enhance—community activities.



Gather feedback on the local LFC Action Plan once it is drafted

Local LFC teams should consider sharing the draft plan publicly for review and community input. Input can be gathered through public meetings, public comment processes, community surveys, or other mechanisms. This review process allows members of the community to understand what activities are planned, when they will occur, what implementation will look like, and how this may affect them. It also provides an opportunity for individuals within the community to articulate any questions or concerns or share suggestions for how to improve the plan. The final plan can be made publicly available and could explicitly indicate how community input informed the plan.



Share regular progress reports

Once the Local LFC Action Plan is implemented, it is important to keep community members abreast of the progress in executing the plan (see the [Monitoring and Reporting Plan Implementation Progress](#) section of the plan for additional details). The local LFC Leadership Team can include in the plan a schedule for and approach to providing implementation progress reports to the community. Progress reports can happen through a variety of mechanisms (e.g., newsletters or progress reports circulated by email and mail, updates at city council meetings, updates posted on the local LFC Initiative's website).

Soliciting Input

(1 of 2)



Be clear about the issues at hand and the type of input being sought



Gather input from different perspectives in the community



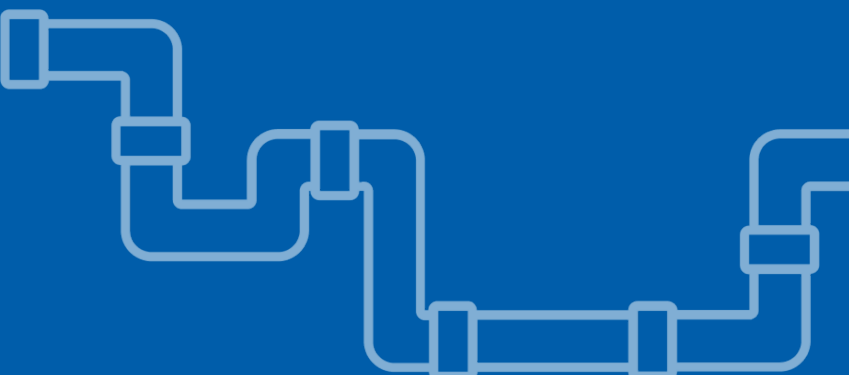
Make it easy to share input



Answer questions



Encourage continued engagement



Soliciting Input (2 of 2)



Be clear about the issues at hand and the type of input being sought

Take care to clearly frame and explain the issues and questions at hand. Communicate what kind of input you are seeking and be transparent about how that input will be used.



Gather input from different perspectives in the community

It is important to gather input from the various diverse groups that exist within a community, especially from the groups or individuals who may be most disproportionately affected by lead hazards within the community—and, thus, most affected by the interventions.



Make it easy to share input

(1 of 2)

Not everyone receives information or is able to provide input through the same mechanisms. Look for ways to remove barriers to participating in the process of gathering input. For example, consider soliciting information through several channels, providing ample time for providing input, and making information available in the languages that are predominantly used within the community. In some cases, providing support to community members in the form of subsidized transportation to meetings, offering childcare or meals during meetings, and even offering stipends or some other form of direct support for participation may be useful.

Make it easy to share input

(2 of 2)



Answer questions

Create a way individuals can ask questions and have these questions answered by a knowledgeable source, as this will help them to better understand the issues they are being asked to talk about.



Encourage continued engagement

Acknowledge and thank those who have shared their input and let them know when and how they can learn more about the decisions their participation has informed. This will help members of the community know they have been heard and will also encourage continued dialogue and engagement as the plan is implemented.



Keeping the Community Informed and Engaged

People who live, learn, or work in a community can better protect themselves from potential lead exposure hazards if they are made aware of the potential hazards that may exist locally and efforts that are being planned or implemented to help eliminate these hazards.

Because the local LFC Action Plan is meant to serve the community, it is important to keep the community informed about the development and implementation of the plan and the progress that is being made towards fully executing the plan. The local LFC team could consider developing an outreach campaign to help keep a community informed about the efforts to develop and implement the local LFC Action Plan.

Important guiding principles for sharing information (1 of 2)



Have a clear message



Share accurate information in a timely manner



Be consistent



Be transparent



Know your audiences

Important guiding principles for sharing information

(2 of 2)



Prioritize outreach to those in the community who are most directly affected by lead hazards



Recruit local leaders and volunteers to help with outreach



Develop a plan for responding to community questions/concerns



Assess effectiveness of outreach efforts



Have a clear message

Before embarking on a public education or outreach campaign, it is important to identify the key messages that most need to be communicated to the community and to specific subpopulations within the community. Individuals living and working in the community will likely be most interested in learning what hazards they are most likely to encounter, how to protect themselves and others from those hazards, the specific actions the community is taking to eliminate these hazards, and the progress or status of efforts to eliminate these hazards. Frame these messages in ways that are clear, easily understood, and culturally relevant.

When sharing information



Share accurate information in a timely manner

Providing comprehensive, accurate, and timely information from credible officials and individuals is a critical trust-building component.



Be consistent

Consistency is an important tool for reducing confusion.

If individuals hear the same message again and again, they are better positioned to understand and trust the information they are receiving. If new information is learned, or if circumstances change, it is important to provide updates and to explain how this new information impacts or affects previously shared information or plans.



Be transparent

It is important to be open and honest about the hazards that exist in the community and efforts to eliminate these hazards. This includes being honest about where there may be some unknowns. It is also important to be clear and transparent about how decisions around intervention implementation will be made (e.g., who will decide where and when interventions will occur, what information will inform those decisions, how the decisions will be reached).



Know your audiences

Public education campaigns are most impactful when they are culturally appropriate and tailored specifically to local circumstances. Assess the demographic and cultural makeup of your community and identify key constituencies, groups, and individuals. Not everyone has access to or processes information in the same way, so it is important to use a variety of communications methods to share critical information (e.g., host community meetings to share information and answer questions, develop a public-facing website for the local LFC initiative, build an email list through which to share frequent updates, send information packets through the U.S. mail, share information via a variety of social media platforms, share information with local media outlets, develop public service campaigns or local advertising campaigns, post fliers in community centers or other popular public places). Developing outreach tools in the languages most often used in the community will help ensure individuals who may not speak or read English have access to critical information that may impact their health and wellbeing.

Lead Exposure Communication Outreach



Prioritize outreach to those in the community who are most directly affected by lead hazards

While it is helpful to educate and receive support from all community members, it is especially important to inform and connect with the individuals who have been exposed to lead hazards and who are most likely to be affected by these lead hazards (e.g., people living in homes built before 1978, people living in homes with water delivered through lead service lines).



Recruit local leaders and volunteers to help with outreach

Connect with local community leaders or other active residents (e.g., local community groups, colleges, cultural organizations, religious groups, public health departments, service organizations) and tap into their local networks to share information. When possible, give these organizations and individuals the outreach tools and ask them to be a part of the local outreach team.



Develop a plan for responding to community questions/concerns

Community members will likely have questions about the lead hazards and the local LFC Action Plan. Make it clear where additional information can be accessed and where questions can be directed.





Assess effectiveness of outreach efforts

An important component of public education and outreach campaigns is periodically assessing their effectiveness. This helps determine whether a shift in messaging or outreach strategies may be needed. The reach and impact of education and outreach efforts can be evaluated in a variety of ways (e.g., tracking the number of unique visits to the online resource hub or materials downloaded; tracking the number of individuals participating in community meetings, trainings, or educational programs; tracking the number and variety of local leaders and partners sharing information; tracking questions and information requests received; surveying community members to assess the usefulness/impact of information provided).



Developing Educational Resources and Programs

Educational resources and programs are useful tools for keeping a community informed and engaged. The following are some approaches to helping individuals learn more about the hazards and the steps that can be taken to address these hazards.



Create a local LFC resource hub online



Educate new or expectant parents and caretakers about lead hazards



Host events to raise awareness on lead hazards



Create a local LFC resource hub online

A singular online resource hub can serve as a forum for sharing information about local lead hazards and the local LFC Action Plan, such as potential health effects of lead exposure and poisoning, common sources of lead exposure, common venues or locations where exposure is likely to occur, how to prevent or minimize exposure to existing hazards, how to eliminate lead hazards, information and training resources for do-it-yourself repairs/renovations, tips for finding local lead-certified experts (e.g., inspectors/contractors, healthcare experts), and local laws and policies regarding lead hazards. The CDC, Environmental Protection Agency, Housing and Urban Development, state and local health departments, and many non-governmental organizations have already produced or curated useful educational materials. Some institutions, such as the [California Department of Public Health](#), also have information available in multiple languages. Local Poison Control Centers are a free resource that provide callers with advice on lead exposure and lead poisoning as well as offering toxicology assistance for local planning prevention activities.²⁸

²⁸ [American Association of Poison Control Centers \(poisoncenters.org\)](#)



Educate new or expectant parents and caretakers about lead hazards

Because young children are most vulnerable to the negative health impacts from lead exposure, it is critical that parents and other caretakers are aware of how lead exposure can affect a child's development and are armed with information about how keep children's environments free of these hazards (e.g., setting up a lead-free nursery). Standard lead prevention education programs can be established as a component of prenatal visits, requirements for discharging a newborn from the hospital, and post-natal pediatrician visits. These educational programs may involve discussions on lead exposure, strategies for preventing lead poisoning, and the importance of blood lead level testing. They can be conducted with the support of a nurse, pediatrician, or family medicine doctor and may include educational videos and take-home pamphlets.

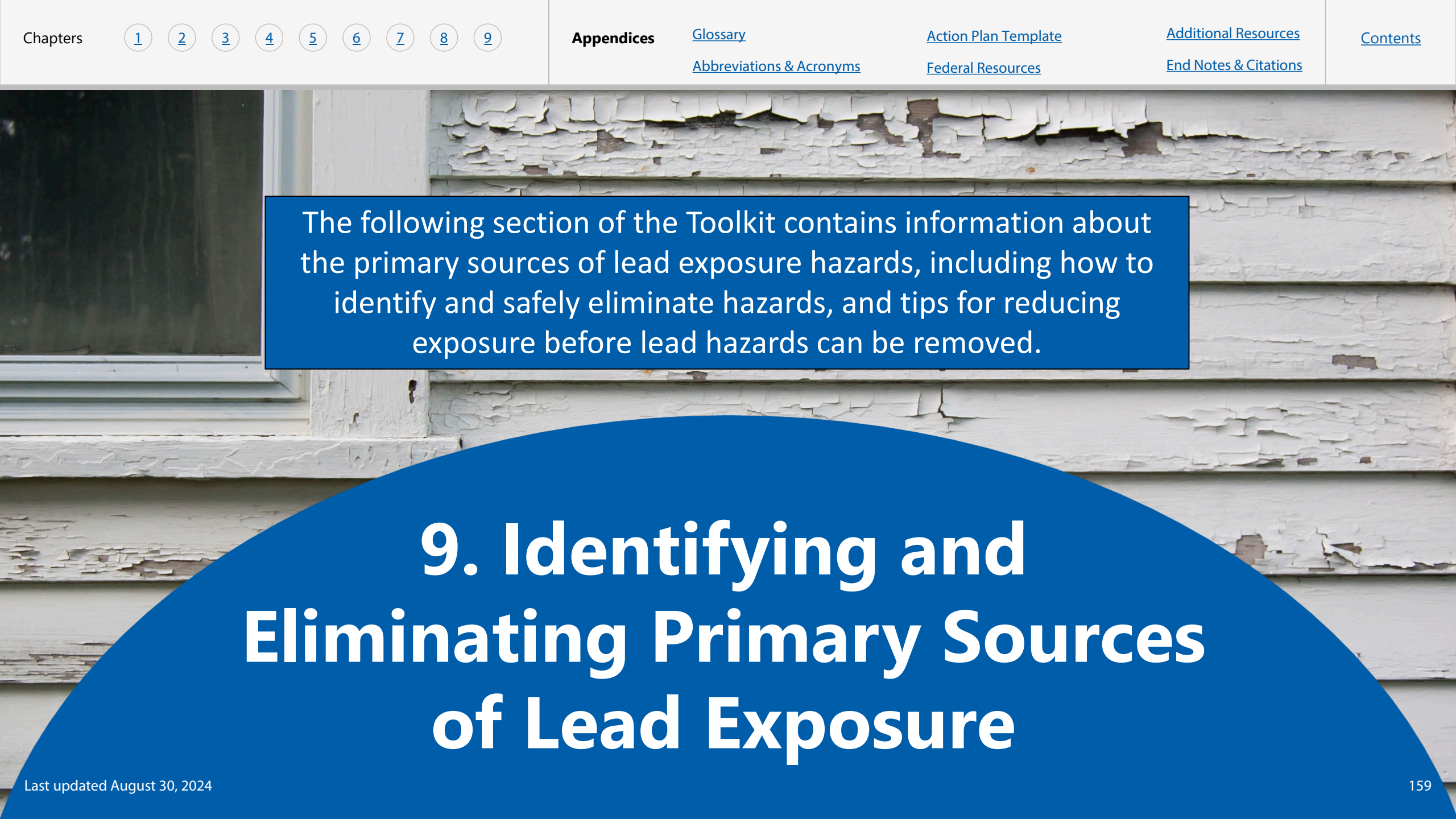




Host events to raise awareness of lead hazards

A community may host educational programs and campaigns to raise awareness on lead hazards in the community. CDC's Agency for Toxic Substances and Disease Registry (ATSDR) regularly hosts [Soil Screening, Health, Outreach, and Partnership](#) (soilSHOP) events to provide community members with free lead screening for soil gathered from their gardens or outdoor play areas. Through soilSHOPs, ATSDR and partner organizations provide health education and outreach to help people learn if their soil is contaminated and how to reduce exposures.²⁹ Educational programs work best if the community is informed well in advance to ensure availability to participate.

²⁹ [soilSHOP Toolkit | soilSHOP | ATSDR \(cdc.gov\)](#)



The following section of the Toolkit contains information about the primary sources of lead exposure hazards, including how to identify and safely eliminate hazards, and tips for reducing exposure before lead hazards can be removed.

9. Identifying and Eliminating Primary Sources of Lead Exposure

Lead-based paint hazards (1 of 2)

Lead-based paint and lead-contaminated dust are the most widespread hazardous sources of lead exposure for young children in the United States.³⁰ Peeling and cracking paint that contains lead produces lead-contaminated paint chips and dust. Any surface covered with lead-based paint where the paint may wear through rubbing or friction, including windows, doors, floors, porches, stairways, and cabinets, is also likely to contribute to lead-contaminated dust.

Individuals can be exposed to lead if they eat or breathe in lead-contaminated dust, ingest flaking paint chips, put their mouths on surfaces coated with lead-based paint (e.g., windowsills and door edges), or inadvertently transfer dust from hands to mouth after touching lead-based paint or surfaces with contaminated dust.



³⁰ [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)

Lead-based paint hazards

(2 of 2)

Congress banned residential use of lead-based paints in 1978. However, homes built in the U.S. before 1978 are likely to contain some lead-based paint, with older buildings usually associated with a higher risk of lead exposure. Additionally, paint-related lead hazards may come from other non-residential structures where people spend time, such as schools, early care and education centers, community recreation centers, gyms, and worksites.



Locating Lead-Based Paint Hazards

To better understand the risk of exposure to lead from paint within a community, a community will first need to determine whether homes or other buildings contain lead-based paint hazards. CDC, EPA, and HUD collaborated on a [state-of-science review of geospatial approaches for identifying US communities with high lead exposure risk](#). The article provides data sources and variable considerations that could be useful to any community attempting to locate lead-based paint hazards.

Assess Lead Hazards

Communities can consider taking the following steps to assess the presence of lead hazards in housing and other structures.



Assess risk based on building age



Use existing data to identify higher risk environments



Test for the presence of lead in paint



Use blood lead testing results to identify areas within a community that may have lead-based paint hazards



Assess risk based on building age

Homes, schools, early care and education centers, and other facilities built before 1978 are more likely to have lead-based paint than newer structures. Maps or databases of homes, schools and early care and education centers can be used to help identify homes built before 1978.³¹ Tax assessor databases are useful sources for identifying old housing.

³¹ National Environmental Public Health Tracking Network Query Tool - <https://ephtracking.cdc.gov> has map information on houses built before 1979 based on 2010 census



Use existing data to identify higher risk environments

Many communities have conducted lead inspections in buildings over time and may have already developed databases with the following information: inspection reports identifying buildings with high levels of lead in dust and paint chips on windowsills, floors, and other surfaces; houses with confirmed lead contamination and remediation status (i.e., completed, in progress, or not yet started); and buildings in designated high-risk areas with windows installed before 1978.



Test for the presence of lead in paint

EPA has recognized three lead test kits for use by a trained professional to determine whether lead-based paint or lead-contaminated dust is present. A community or individual can also inquire with their state and local health department about testing the dust or paint within a home or structure. Another useful tool is the HUD Deteriorated Paint Index which maps census tracts across the country expected to have significant percentage of housing units containing lead paint.³²

³² [Deteriorated Paint Index by Tract | Deteriorated Paint Index by Tract | HUD Open Data Site \(arcgis.com\)](#)



Use blood lead testing results

In combination with environmental or home investigations, reported test results of children with blood lead levels above CDC's Blood Lead Reference Value may provide an indication of where lead-based paint in housing, schools, daycare facilities, and other structures is likely to be found.³³ If relatively few children are being tested, then blood lead testing data may need to be supplemented with special surveillance projects or other data sources.

³³ [Deteriorated Paint Index by Tract | Deteriorated Paint Index by Tract | HUD Open Data Site \(arcgis.com\)](#)

Eliminating Lead-Based Paint Hazards

Proven interventions that can permanently eliminate lead-based paint contamination in homes, schools, daycare facilities, and other facilities where people spend time include the following:



Lead-based paint removal



Window replacement



Lead-based paint removal

(1 of 2)



Comprehensive lead-based paint removal (also known as abatement) safely removes all lead paint and associated contaminated dust. Abatement can be performed wherever lead-based paint is present. It is important to have [qualified contractors](#) perform all lead removal activities and take certain precautions to contain dust and lead paint chips while performing work; if appropriate precautions are not taken, paint removal can create new paint chips and dust, leading to more exposure risks.



Lead-based paint removal

(2 of 2)

Since 2010, EPA has required that anyone who performs renovations or repairs or applies paint that can disturb lead-based paint in pre-1978 housing or child-occupied facilities must be certified by the EPA or an EPA-authorized state.³⁴ Many states and localities already have guidelines, laws, and certification programs in place for contractors remediating lead-based paint or performing renovations or repairs on homes built before 1978. If guidelines, laws, and certification programs are not adequate or do not exist, communities can consider opportunities for creating new programs for contractors to ensure safe work practices when conducting remediation, renovation, repair, and painting in older homes and buildings.

³⁴ [Lead Renovation, Repair and Painting Program | US EPA](#)



Window replacement best practices

Window surfaces, including windowsills, sashes and jambs, and window wells are a common source of lead exposure due to deteriorating paint and lead dust accumulation. Look for places where paint is chipping or peeling as well as dust accumulating in window wells. If lead is detected on windows or window frames, the safest option is to remove and replace these materials. Replacement of older windows will have the added benefit of energy efficiency.

Temporarily Limiting Exposure to Lead-Based Paint Hazards (If Remediation is Not Immediately Feasible)

Strategies that can be used to limit exposure to lead-based paint include the following:



Encapsulating lead paint



Keeping children and pregnant persons away from lead paint



Conducting safe renovation and repairs



Cleaning regularly



Preventing take-home exposures



Encapsulation

(1 of 2)

If complete removal of lead-based paint is not feasible, a process known as paint encapsulation can temporarily limit exposure. Encapsulation involves applying a [lead encapsulant](#) on top of lead-based paint to cover the paint and seal a surface to avoid release of paint chips and dust. Traditional paint is not an encapsulant, and it is important to follow guidelines for preparation and application when using an encapsulant. Certain high friction surfaces, including windowsills and door jambs, may not be suitable for encapsulation.



Qualified contractors can ensure a safe encapsulation process. It is important to note that encapsulation does not remove the hazard, but instead helps limit exposure by creating a barrier between the paint and the rest of the environment. It is necessary to inspect and repair encapsulants over time to ensure they continue to provide a proper barrier.



Keep Children and Pregnant Women Away from Lead Paint

Young children and pregnant women are most vulnerable to lead-based paint hazards, so it is important to ensure these populations do not have access to peeling paint or surfaces (e.g., windowsills, doorframes) that contain lead-based paint. Barriers may be created between living/play areas and lead sources until environmental clean-up is completed. Temporary barriers such as contact paper or duct tape can be used to cover holes in walls or to block their access to sources of lead.³⁵

³⁵ [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)



Conduct safe renovation and repairs

Renovation and repair activities (e.g., sanding, cutting, window replacement) may create hazardous lead dust. Renovation and repair activities should always be performed by [EPA-certified contractors](#) in homes built before 1978 due to the potential for encountering lead-based paint. In addition, children and pregnant women can be encouraged to stay away from housing during renovations that may disturb old paint or known lead-based paint.

[EPA has produced a video](#) with guidance for safely renovating when there is lead-based paint in a home.



Regular cleaning

It is important to keep surfaces free of dust until lead-based paint remediation is complete. Regular wet mopping and wet wiping of floors and surfaces, including windowsills and doorframes, can be conducted to help remove dust. Regularly washing children's hands helps eliminate potential contamination from household dust or exterior soil.



Prevent take-home lead exposure

Lead paint may be brought into the home on clothes and shoes of individuals who have been in a contaminated environment. It is important to take off and thoroughly wash clothes and shoes potentially contaminated with lead paint chips or contaminated dust before entering a home. Showering after working around lead-based products will also reduce lead dust in the home.³⁶

³⁶ [Preventing Childhood Lead Poisoning | Childhood Lead Poisoning Prevention | CDC](#)

Additional Resources

- [CDC: Lead in Paint](#)
- [Department of Housing and Urban Development \(HUD\)](#)
- [EPA: Lead Website](#)

Lead in drinking water hazards

Before 1986, many of the materials used to manufacture plumbing components contained lead.³⁷ The primary plumbing components that may contain lead include lead service lines (pipes that connect a water main running under the street to a building's plumbing system); lead pipes used in a building's internal plumbing system (though this is not typical); leaded solder, which is used to connect copper pipes and fittings; and certain fittings and fixtures made with brass and other leaded alloys.³⁸

Fixtures installed before 2014 may also be a source of lead.

³⁷ Pieper, Kelsey J., Katner, Adrienne, Kriss, Rebecca, Tang, Min, and Edwards, Marc A. 2019. Understanding lead in water and avoidance strategies: a United States perspective for informed decision-making. *Journal of Water and Health* 17(4): 540-555

³⁸ <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>

History of Action on Lead in Drinking Water Hazards in the U.S. (1 of 4)

The Safe Drinking Water Act, enacted in 1986, prohibited the “use of any pipe or plumbing fitting or fixture, any solder, or any flux, after June 1986, in the installation or repair of (i) any public water system; or (ii) any plumbing in a residential or non-residential facility providing water for human consumption, that is not lead free.” EPA defines human consumption as drinking, bathing, showering, hand washing, food preparation, dishwashing, teeth brushing, and maintaining oral hygiene. In addition, EPA prohibited the introduction of any pipe or plumbing fitting or fixture, any solder, or any flux that was not lead free into commerce.³⁹ Beginning in 1986, “lead-free” pipes and other plumbing materials (including brass) could not contain more than 8% lead by weight; in 2014, the maximum lead content was reduced to 0.25%.^{40, 41}

³⁹ [About Lead in Drinking Water | Childhood Lead Poisoning Prevention | CDC](#); ⁴⁰ Pieper, Kelsey J., Katner, Adrienne, Kriss, Rebecca, Tang, Min, and Edwards, Marc A. 2019. Understanding lead in water and avoidance strategies: a United States perspective for informed decision-making. *Journal of Water and Health* 17(4): 540-555; ⁴¹ <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>;

History of Action on Lead in Drinking Water Hazards in the U.S. (2 of 4)

While many, if not most, communities stopped installing lead service lines before 1986,⁴² many older service lines and plumbing fixtures are still in use in communities around the country. Recent estimates suggest that as many as 10 million lead service lines are still in as many as 11,000 water systems in the United States.⁴³

⁴² <https://www.islr-collaborative.org/preparing-an-inventory.html>;

⁴³ <https://www.epa.gov/ground-water-and-drinking-water/lead-service-line-replacement>

History of Action on Lead in Drinking Water Hazards in the U.S. (3 of 4)

In 1991, the Environmental Protection Agency (EPA) implemented the Lead and Copper Rule (LCR), which mandates corrosion control in water utilities and requires periodic testing of lead concentrations in a sample of consumer water faucets or taps.⁴⁴ Since the rule was first finalized, public water systems have been monitoring for lead at customers’ water taps and taking steps to reduce lead levels in drinking water. The LCR, as revised in 2000, 2007, and most recently in 2021 (with compliance required by October 2024), utilizes corrosion control treatment in combination with public education to reduce lead exposure.

⁴⁴ <https://www.epa.gov/dwreginfo/lead-and-copper-rule>

History of Action on Lead in Drinking Water Hazards in the U.S. (4 of 4)

Although there has been a significant decrease in the occurrence of high lead levels in water, the problem still exists in many places. The most recent revisions in 2021 point to a new emphasis on completely replacing all remaining lead service lines. By removing lead service lines (including galvanized service lines preceded by lead service lines), it is possible to remove a significant source of lead and facilitate better corrosion control. The Infrastructure Investment and Jobs Act of 2022 provides a significant five-year increase in federal funding specifically for lead service line replacement.⁴⁵

⁴⁵ [Proposed Revisions to the Lead and Copper Rule | Ground Water and Drinking Water | US EPA](#)

How Drinking Water Becomes Contaminated

Drinking water can become contaminated with lead when lead-containing pipes or plumbing fixtures and materials begin to corrode (a process through which metal is worn away due to a chemical reaction between water and the plumbing materials). Corrosion is especially a concern in places where the water supply has high acidity or low mineral content.⁴⁶

Lead particulates from pipes may enter directly into the water or become trapped in the faucet aerator and released over time.⁴⁷ Any building or infrastructure connected to a lead service line or containing older plumbing fixtures with lead content has the potential to contribute to lead exposure through drinking water.

⁴⁶ <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>

⁴⁷ <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>



Lead Hazards from Private Wells

EPA estimates that more than 23 million households rely on private wells for drinking water.⁴⁸ Because private well owners are responsible for the safety of their water, it is important to educate the community on potential lead hazards and where/how to obtain testing. Lead can leach into drinking water from several sources including household plumbing and service lines, mining operations, and natural mineral deposits. Households that utilize ground water that is naturally corrosive may be at greater risk of lead exposure.⁴⁹ Individuals living near potential lead hazards may consider regular water testing to ensure safety. Only certified laboratories should be used for well water testing; local health departments may provide testing for free, and EPA offers a [list of certified labs](#).⁵⁰



⁴⁸ [Private Drinking Water Wells | US EPA](#)

⁴⁹ [Groundwater Corrosivity and Lead in Wells | Environmental Health Services | CDC](#)

⁵⁰ [Protect Your Home's Water | US EPA](#)

Locating Lead in Drinking Water

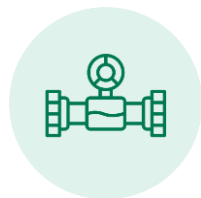
Lead contamination in drinking water cannot be detected visually or through taste or smell. To better understand an individual's risk of exposure to lead in drinking water, it is important to first determine if individuals access water for drinking and cooking through plumbing systems with lead components. The following are some ways communities can assess the presence of lead hazards in plumbing infrastructure:



Assess risk based on building /infrastructure /plumbing component age



Test for the presence of lead in drinking water



Visually assess whether service lines and plumbing fixtures are likely to contain lead



Use blood lead testing results to identify areas within a community that may have lead-based water hazards



Assess risk based on building/ infrastructure/ plumbing component age

Homes and buildings built before 1986 are more likely to use lead service lines and have interior plumbing components containing lead. Many communities or local water utilities have databases identifying the age of buildings or homes and containing information about the service lines servicing these structures. For communities that do not have a formal or complete database of service line materials, the [Lead Service Line Replacement Collaborative](#) offers tips for [how to use existing data](#) to help determine the presence of lead service lines. It is also important to test plumbing fixtures installed prior to 2014, the year the Reduction of Lead in Drinking Water Act became effective.



Test for Lead in Drinking Water

(1 of 2)

Local water utilities can test tap water to assess the presence of lead and can provide more information about the levels of lead that may be present in a community's water supply. Some homes, buildings, and structures in a community may be serviced by private wells rather than local water utilities; it is important to identify these homes and test for lead. EPA provides a [database of certified laboratories](#) by state that can be contacted to arrange private well water testing.



Test for Lead in Drinking Water

(2 of 2)

EPA also requires water sample testing of community water systems in high-risk houses and homes. EPA recommends schools and childcare facilities implement regular lead testing as part of their overall plans for maintaining healthy learning environments. Because the potential for lead to leach into water increases the longer the water remains in contact with leaded plumbing materials, facilities with intermittent water use patterns, such as schools, are more likely to have elevated lead concentration in their drinking water. Additionally, lead levels at a fixture or within a building have been shown to vary over time. EPA developed the [3Ts - Training, Testing, and Taking Action Approach](#) to help schools and childcare facilities identify potential lead exposure problems with plumbing systems and materials so targeted remediation efforts can be taken.



Visually assess whether service lines and plumbing fixtures are likely to contain lead

In 2015, the U.S. EPA published a guide entitled [How to Identify Lead Free Certification Marks for Drinking Water System & Plumbing Products](#). The [Lead Service Line Replacement Collaborative](#) also offers information about [visually identifying service line materials](#). However, most plumbing and lead service lines are not available for visual inspection. Additionally, lead is often added to new brass or bronze faucets.

NSF/ANSI/CAN 61, the drinking water product standard required in the U.S. and Canada, has optional tighter limits until they become mandatory in 2024. Certification to this standard is indicated on faucet packaging and may also appear on the faucet itself. If the NSF® mark or a reference to NSF/ANSI/CAN 61 certification is not visible on the product or packaging, the faucet may not be intended for drinking water use.⁵¹

⁵¹ [Faucets and Plumbing Products | NSF](#)



Use blood lead testing results in your strategy

Reported test results of children with blood lead levels above CDC's Blood Lead Reference Value could lead to environmental or home investigations that may provide an indication of where lead hazards in drinking water are likely to be found. Communities may work in partnership with state and local health departments to determine blood lead level testing measures and with water authorities to determine water sources within a community.

Eliminating Lead in Drinking Water

(1 of 2)

Water utilities use specific strategies for controlling corrosion based on the chemistry of the water and the amount of minerals found in the water. When applied effectively, corrosion control strategies can help reduce the level of lead entering the water supply. Water utilities carefully monitor corrosion control efforts and quickly adapt strategies to accommodate any changes in water chemistry.

Eliminating Lead in Drinking Water (2 of 2)

Additionally, the following are proven interventions for ultimately eliminating exposure to lead through drinking water:



Lead service line replacement



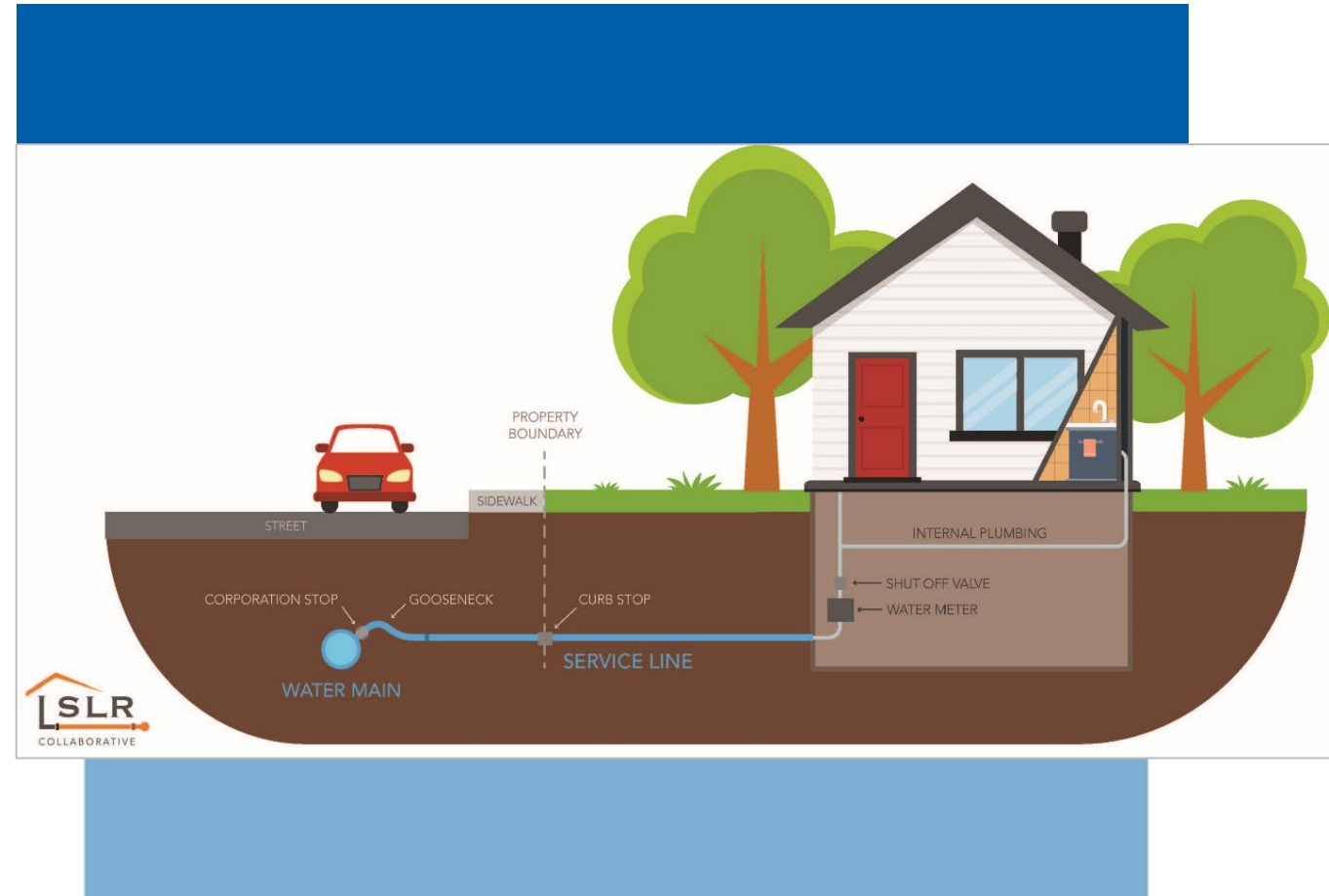
Replacement of internal plumbing fixtures containing lead

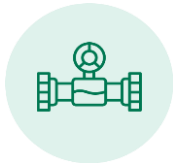


Lead Service Line Replacement

(1 of 2)

Service lines are pipes that connect water mains running under the street to a building's plumbing system. The [Lead Service Line Replacement Collaborative](#) created the diagram below to illustrate how a service line connects from the water main to a building's plumbing system.





Lead Service Line Replacement (2 of 2)

Lead service line replacement involves replacement of all portions of the pipe that are lead, from the water main to the connection point at a home or building. Additionally, galvanized service lines that are preceded by lead service lines are replaced during lead service line replacement. To eliminate lead exposure risks from service lines, it is necessary to replace the entire service line—both the public portion owned by the utility (typically from the water main to the curb stop) and the private portion owned by the building owner (typically from the curb stop to the building). Research indicates that replacing only a portion of a lead service line increases the chance of releasing lead particulate into drinking water.⁵³ When assessing the presence of lead service lines, it is important to look at both the private and public portions of the service line, as previous replacements may only have been made to one portion of the service line. The [Lead Service Line Replacement Collaborative](#) has compiled and developed resources for communities seeking to replace lead service lines, including [suggestions for how a community can launch a lead service line replacement program](#).

⁵³ <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>



Replacement of Internal Plumbing Fixtures Containing Lead

Replacement of internal plumbing fixtures containing lead, such as faucets, is also important to ensure drinking water is safe from lead contamination. Household plumbing fixtures, welding solder, and pipe fittings made prior to 1986 may contain lead. In addition, faucets purchased before 1997 were primarily made of brass or chrome-plated brass that contained up to 8% lead.⁵⁴ Lead may leach from brass faucets into water that sits in the faucet mechanism for more than a few hours. [The National Sanitary Foundation \(NSF\)®](#) certifies plumbing products that meet “lead-free” standards. Installing a new faucet that meets the NSF/ANSI/CAN 61 standard ensures the faucet, fitting, valve, or other components is safe to be in contact with drinking water. The NSF®/ANSI/CAN 61 certification is stamped on the product or product packaging to help make it easier to assess whether a faucet meets this standard. In 2021, this standard was updated to NSF®/ANSI/CAN 61 Q<1, an optional mark for lower-leaching lead faucets that will become mandatory in 2024.

⁵⁴ [Introduction to Lead and Lead Service Line Replacement - LSLR Collaborative \(lslr-collaborative.org\)](#)

Other Steps to Limit Exposure to Lead Contaminated Drinking Water

The following pages provide additional steps communities can take to reduce the likelihood of exposure to lead through drinking water while efforts are underway to replace lead service lines and plumbing fixtures.



Filters



Limit Exposure to Lead Contaminated Drinking Water: Filters

Lead exposure can be reduced by consuming tap water that has been run through a “point-of-use” filter certified by an independent testing organization.⁵⁵ Environmental Protection Agency (EPA) defines human consumption as drinking, bathing, showering, hand washing, food preparation, dish washing, teeth brushing, and maintaining oral hygiene. NSF International provides a [list of certified filters](#). Filters should meet the NSF® / American National Standards Institute (ANSI) standard 53 for lead removal and NSF/ANSI standard 42 for particulate removal. For more details, see EPA’s [Consumer Tool for Identifying Point of Use \(POU\) Drinking Water Filters Certified to Reduce Lead](#). Special care should be taken to properly install, use, and replace filters per the manufacturer’s instructions on an ongoing basis. It may be useful to continue testing water following installation of filters to ensure efficacy.

⁵⁵ [About Lead in Drinking Water | Childhood Lead Poisoning Prevention | CDC](#)

Additional strategies to reduce lead exposure through drinking water

Additional practices that could reduce lead exposure through drinking water include

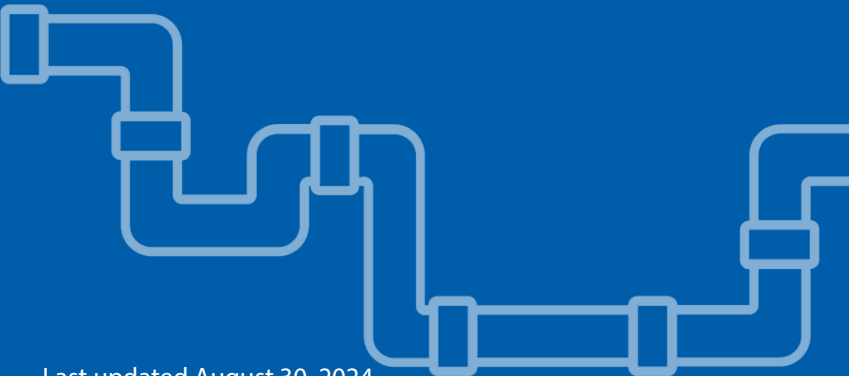
- Using only cold water for cooking or drinking (hot water will dissolve lead more quickly than cold water and may contain increased lead levels)
- Regularly cleaning a faucet's aerator (the screen can collect sediment, debris, and lead particles and release these contaminants into your water)
- Using only bottled water that has been certified by an independent testing organization for drinking or cooking (when safe drinking water is not available from the tap or faucet)

Additional Resources

- [CDC: Lead in Drinking Water](#)
- [Lead Service Line Replacement Collaborative](#)
- [EPA: Lead Website](#)

Lead-Contaminated Soil Hazards

Contaminated soil is a source of lead exposure for young children in the United States.



Deposits from leaded gasoline, exterior lead-based paint, and industrial sources have contributed to increased levels of lead in soil, especially around homes built before 1978, in urban areas, and near busy roads. Lead continues to be emitted into the air through leaded fuels in smaller piston-engine aircraft as well as from certain industrial activities including mining, smelting, and power plants that burn coal and other lead-contaminated fuels.⁵⁶

Lead in the air will eventually end up contaminating the top layer of soil in nearby areas. Contaminated soil may be found in residential yards and gardens, school yards, public areas (e.g., parks, playgrounds, community gardens), and industrial areas. People near this contaminated soil (e.g., children, gardeners) may be exposed to lead hazard. [Superfund sites](#) with legacy contamination may also be a source of lead hazards in soil.

⁵⁶ [hip_childhood_lead_poisoning_report.pdf \(pewtrusts.org\)](#)

Lead Contaminated Soil Near Mine Sites



Mining areas from the 1800's and early 1900's, particularly in the Rocky Mountain West, have developed into towns with tourism-based economies. In many of these areas, the legacy of past mining, processing and smelting has left in place elevated metals in the form of waste rock, tailings and slag and resulting in the contamination of the surrounding soil, surface water, and groundwater.⁵⁷

Lead is often found at historic mining sites and can be widespread in surrounding communities due to the use of readily available mine waste commonly used for road and construction base material, and contaminated soil used for grading, backfill, and topsoil.

⁵⁷ [Lead at Superfund Sites | US EPA](#)

Exposure Pathways for Lead-Contaminated Soil

Communities affected by mining may require different prevention strategies, depending on the relative contribution of lead sources. Several studies have shown a positive relationship between mining activities, high soil lead concentrations, and blood lead levels above CDC's BLRV in children.⁵⁸ Contaminated indoor dust has also been shown to be a significant contributor to higher blood lead levels in children in mining communities. Mining, smelting and refining activities have resulted in substantial increases in lead levels in the environment, especially near mining and smelting sites.⁵⁹ For example, surface soil in residential areas near the Colorado Smelter Superfund site contained lead concentrations that range from 1000-2000 ppm, with accessible areas of slag and smelter waste ranging as high as 10,000 ppm in the community.⁶⁰

⁵⁸ [IJERPH | Free Full-Text | Smelting Remains a Public Health Risk Nearly a Century Later: A Case Study in Pueblo, Colorado, USA \(mdpi.com\)](#); [Relationship between Lead Mining and Blood Lead Levels in Children: Archives of Environmental Health: An International Journal: Vol 53, No 6 \(tandfonline.com\)](#)

⁵⁹ <https://www.epa.gov/lead>

⁶⁰ [IJERPH | Free Full-Text | Smelting Remains a Public Health Risk Nearly a Century Later: A Case Study in Pueblo, Colorado, USA \(mdpi.com\)](#)

Remediating Lead Contaminated Soil

It is important for communities in historic lead mining areas to be aware of the potential for widespread lead contamination and exposure to lead in soil. Remediation in these areas may be a longer-term intervention given the large scale of contamination and therefore, education is a high priority to ensure community members understand lead exposure risks.⁶¹ Community members may limit their exposure to lead from soil by implementing practices including removing shoes and clothing and showering upon entering a home, damp mopping and dusting surfaces regularly, refraining from gardening in potentially-contaminated soil and avoiding areas known to contain lead tailings and slag.⁶²



⁶¹ [Challenges and Opportunities for Communicating Lead Exposure Risks in Idaho's Silver Valley | Case Studies in the Environment | University of California Press \(ucpress.edu\)](#)

⁶² [Protect Your Family from Lead Hazards in Historic Lead Mining Areas – Fact Sheet, August 2022 | US EPA](#)



Lead Contaminated Soil Exposure

Individuals may be exposed to lead by touching, breathing, or playing in lead-contaminated soil. Young children who play in lead-contaminated soil may put their hands in their mouths and ingest soil and dust particles from surface soil contaminated with lead. Individuals may also be exposed to lead when lead-contaminated soil is carried away from the source and brought inside as lead dust on clothes, shoes, or pets.⁶³ Lead exposure may also occur from eating fruits and vegetables grown in lead-contaminated soil.

⁶³ <https://www.atsdr.cdc.gov/toxprofiles/tp13.pdf>

Locating Lead-Contaminated Soil Hazards

(1 of 2)

A community can identify places where people might be exposed to lead in soil or dust (e.g., playgrounds, yards, gardens) and take the following steps to identify potential hazards:



Assess risk based on building/infrastructure age



Assess risk based on proximity to industrial areas



Assess risk based on proximity to highways or major roadways

Locating Lead-Contaminated Soil Hazards

(2 of 2)



Assess risk based on proximity to airports



Test for the presence of lead in soil



Use blood lead testing results to identify areas within a community that may have soil-based lead hazards



Assess risk based on building/infrastructure age

Yards of homes and buildings built before 1978 are more likely to contain lead contaminated soil due to lead-based paint dust from the exterior of the home. When paint chips or flakes, or when it is disrupted during renovation or repairs, lead-contaminated paint dust may fall to the ground and contaminate the yard. Even if the paint of a home has been remediated, lead may remain in the soil.



Assess risk based on proximity to industrial areas

Certain industries (in particular, mining, smelting, and metal and battery reclamation) are associated with lead contamination and may introduce lead into soil in neighboring areas. Lead hazards may be present in or around [Superfund sites](#), which are areas identified by the EPA for cleanup due to the presence of environmental contamination from hazardous waste, including improperly managed industrial facilities and mining sites. Soil near Superfund sites with historic contamination may also pose a lead hazard.





Assess risk based on proximity to highways or major roadways

Soil in areas near major highways or roads may contain high levels of lead due to emissions from cars that previously used leaded gasoline. Yards, playgrounds, or gardens in these locations may be at risk for lead contamination.



Assess risk based on proximity to airports

Leaded fuel from piston engine aircraft is currently the primary source of air lead emissions in the United States.⁶⁴ Soil near airports may contain higher levels of lead.

⁶⁴ [Regulations for Lead Emissions from Aircraft | US EPA](#)



Test for the presence of lead in soil

To identify yards, playgrounds, or other areas with high levels of lead in the soil, it may be necessary to conduct soil testing. Numerous laboratories can test for lead using soil samples collected from various areas, including those affiliated with EPA's [National Lead Laboratory Accreditation Program](#). Additionally, the Agency for Toxic Substances and Disease Registry (ATSDR) hosts regular events where soil screening is offered at no cost.



Use blood lead testing results to identify areas within a community that may have soil-based lead hazards

Reported test results of children with blood lead levels above CDC's BLRV may lead to environmental or home investigations that provide an indication of where lead hazards in soil are likely to be found.



Addressing Soil-Based Lead Contamination and Limiting Exposure

Lead is naturally occurring in soil at low levels, so it is not possible to eliminate all lead in soil. However, lead hazards to humans may be eliminated through the following:



Surface soil remediation

To remediate surface soil in a particular area, it is necessary to dig up contaminated soil and bring in clean soil to back fill. Contaminated soil must be carefully disposed of in a landfill. Another effective method of preventing exposure to contaminated soil is to cover the contaminated soil with a barrier of asphalt or concrete.

Reduce Likelihood of Exposure

The following are some steps that communities and individuals can take to reduce the likelihood of exposure to lead through soil while efforts are underway to remediate soil:



Create barriers



Safe gardening and lawn care practices



Minimize children's contact with soil



Shoe removal



Create Barriers

Contaminated soil may be covered with turf, concrete, or asphalt to create safe play surfaces. Soil can also be covered with a thick layer of mulch, grass, or other vegetation to reduce exposure hazards.



Safe gardening and lawn care practices

Educate gardeners and individuals involved in lawn care about how to work safely in areas with soil that may be contaminated with lead. Best practices for safe gardening include using raised beds for planting fruits and vegetables, wearing gloves, limiting children's involvement in gardening activities, and selecting locations away from roadways, house foundations, and driplines for planting.





Minimize children's contact with soil

Because children are most vulnerable to the effects of lead and are more likely than adults to ingest soil or soil dust due to normal hand-to-mouth behaviors, it is important to minimize children's contact with items possibly contaminated soil. Covering soil with grass, mulch or wood chips can help prevent exposure. It is also important to encourage proper handwashing behavior and to clean any toys that are used outdoors before bringing them inside.



Shoe removal

Encouraging individuals to remove shoes after walking or playing in potentially contaminated soil can reduce dust transfer into cars, homes, and other indoor areas.



Choose Safe Places

Additionally, when selecting sites for new early childcare and education centers, communities can take steps to avoid locations that may contain chemical hazards. The Agency for Toxic Substances and Disease Registry created the [Choose Safe Places](#) program to aid communities with site selection efforts.

Additional Resources

- [CDC: Lead in Soil](#)
- [EPA: Lead in Soil](#)

Other Sources of Lead Exposure Hazards

Communities working to become lead-free will also need to consider other possible sources of exposure to lead including food, consumer products, products used in certain cultural practices, and occupational exposures. The following pages highlight some of the primary considerations in each of these categories.

It is important to note that some households may have a higher risk of exposure to lead through these sources than others based on what they consume or cultural practices. Interventions to prevent exposure to lead from these sources may begin at the household level through education designed to increase awareness of potential lead hazards and strategies for reducing exposure. Additional suggestions for reducing exposure are noted throughout this Toolkit.

Food Products

(1 of 2)

While it can be difficult to detect lead in food sources, contamination in food products may occur due to the presence of lead in the environment (e.g., lead in soil can be absorbed by the animals we eat or plants used as food or for dietary supplements) or through manufacturing processes (e.g., lead can leach into food and beverages from containers and contact surfaces containing lead).⁶⁶

⁶⁶ <https://www.fda.gov/food/metals-and-your-food/lead-food-foodwares-and-dietary-supplements>



Food Products

(2 of 2)

Manufacturing changes in the 1990's, including a ban on the use of lead solder in food cans and EPA's actions to ban the use of lead additives in gasoline, which greatly contributed to reductions in lead air pollution and lead contamination of crops, has helped reduce the amount of lead that is found in the food supply.⁶⁷ Despite this progress, the U.S. Food and Drug Administration (FDA) notes that because it is a naturally occurring element in the environment, and because it is used in some consumer and industrial products and processes, it is not possible to remove lead entirely from the food supply.⁶⁸ Nevertheless, sharing information about food sources that may contain lead with individuals who may not be aware of these hazards may help reduce instances of exposure.

⁶⁷ <https://www.fda.gov/food/metals-and-your-food/lead-food-foodwares-and-dietary-supplements>

⁶⁸ <https://www.fda.gov/food/cfsan-constituent-updates/fda-issues-draft-guidance-industry-action-levels-lead-juice>

Potential Sources of Lead in Food Products

(1 of 2)



Spices

Lead has been found in spices imported from Vietnam, India, and Syria, among other countries.⁶⁹ Lead can be found in coloring agents or can be introduced via cross-contamination.



Imported candies or dried fruits

Candy and fruit-based foods with ingredients such as tamarind or chili powder may contain lead. Ink from paper/plastic wrappers may also contain lead that can leach into candies.

⁶⁹ [About Lead in Foods, Cosmetics, and Medicines | Childhood Lead Poisoning Prevention | CDC](#)

Potential Sources of Lead in Food Products (2 of 2)



Wild game

Wild game may contain lead residue from bullets/shot used for hunting purposes. This can then be ingested when the game is consumed.



Juices

Juice can be a significant source of exposure to lead and decreasing consumption would reduce potential exposure to lead from juice. Certain ceramic containers used to store acidic juices can also leach lead into the liquid.



Baby food and formula

Certain baby food products have been found to contain lead.⁷⁰ Formula can become contaminated when mixed with drinking water that contains lead contaminants.⁷¹

⁷⁰ [Oversight Subcommittee Staff Report Reveals Top Baby Foods Contain Dangerous Levels of Toxic Heavy Metals | The Committee on Oversight and Accountability Democrats \(house.gov\)](#)

⁷¹ <https://oversight.house.gov/sites/democrats.oversight.house.gov/files/2021-02-04%20ECP%20Baby%20Food%20Staff%20Report.pdf>

Limiting Exposure to Lead from Food Products



Increase awareness of potential lead

Increase awareness of which spices, foods, and dietary supplements may contain lead, through education campaigns and community events.⁷²



Educate consumers

Educate consumers on the importance of purchasing spices with clear labeling sold at reputable retailers or growing their own herbs at home in soil that is not contaminated with lead. Encourage parents/caregivers to have children's blood lead tested if they regularly use spices that have been found to be contaminated with lead, such as turmeric, chili, and paprika.⁷³



Consult FDA's [Closer to Zero](#) plan

This plan aims to reduce children's exposure to lead in foods and offers resources to parents on providing a healthy balanced diet to children.⁷⁴

⁷²https://journals.lww.com/jphmp/fulltext/2019/01001/A_Spoonful_of_Lead_A_10_Year_Look_at_Spices_as_a.11.aspx

⁷³ <https://www.healthline.com/health-news/can-you-get-lead-poisoning-from-spices>

⁷⁴ <https://www.fda.gov/food/cfsan-constituent-updates/fda-shares-action-plan-reducing-exposure-toxic-elements-foods-babies-and-young-children>

Consumer Products

Lead can be found in a variety of everyday consumer goods. It is important to understand which types of products may contain lead and to share this information with individuals who may not be aware of these hazards.



Potential Sources of Lead in Consumer Products



Toys



Jewelry



Cosmetics



Foodware



Ceramic glazes and pottery

Toys, Jewelry, and Cosmetics with Lead



Toys

Some vintage or imported toys may contain traces of lead in paint, metal, or plastic parts



Jewelry

Some metal costume jewelry may contain traces of lead.



Cosmetics

Certain cosmetic goods and color additives (e.g., traditional eyeliners, lipstick or other lip products, and progressive hair dyes) may contain traces of lead.⁷⁵

⁷⁵ <https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/lead-cosmetics>

Foodware and Ceramic Glazes and Pottery



Foodware

Lead can be found in metal, glass, and plastic products that come in close contact with food, such as food containers, aluminum cookware, and antique dishes.⁷⁶ Some crystal glassware, including goblets, decanters, and wine glasses, may also contain lead.⁷⁷

⁷⁶ <https://www.fda.gov/food/metals-and-your-food/lead-food-foodwares-and-dietary-supplements>

⁷⁷ Graziano JH, Blum C. Lead exposure from lead crystal. Lancet. 1991;337:141-2.



Ceramic glazes and pottery

Some pottery pieces, including Mexican and Central American cookware, contain lead or use ceramic glazes that contain lead.

Limiting Exposure to Lead in Consumer Products



Use only food safe containers to store or serve food

Check labels on imported ceramic pottery packaging, because some will indicate the pieces are “not for use with food.”⁷⁸



Avoid potentially contaminated pottery

Avoid pottery with certain characteristics that may indicate the presence of lead hazards (e.g., handmade with crude appearance or irregular shape, antique, damaged, or excessively worn, purchased from flea markets or street vendors, brightly decorated in orange/red/yellow, as lead is often used with these pigments to increase their intensity).⁷⁹



Check for product recalls related to lead contamination

Refer to [Consumer Product Safety Commission list](#) of recalled items when buying toys or other consumer goods.

⁷⁸ [Guidance for Industry: Safety of Imported Traditional Pottery Intended for Use with Food and the Use of the Term "Lead Free" in the Labeling of Pottery/Proper Identification of Ornamental and Decorative Ceramicware | FDA](#); ⁷⁹ <https://www.fda.gov/food/metals-and-your-food/questions-and-answers-lead-glazed-traditional-pottery>



Products Used in Cultural Practices

Lead can be found in products used for specific ceremonies and cultural practices. It is important to share information about potential lead hazards with individuals and groups who may not be aware of the health risks associated with these practices and to consider cultural appropriateness when communicating this information.

Cultural Goods and Practices that May Result in Lead Exposure



Use of certain traditional remedies and supplements



Use of certain lead-containing products in religious ceremonies or as cosmetics



Use of Certain Traditional Remedies and Supplements

(1 of 2)



Certain traditional remedies and supplements may contain lead.⁸⁰ For example, lead has been found in powders and tablets given for arthritis, infertility, upset stomach, menstrual cramps, colic, and other illnesses. These remedies and supplements are traditionally used by East Indian, South and Central Asian, Middle Eastern, and Hispanic cultures. Certain Ayurvedic medicine preparations contain very high lead levels. Greta and Azarcon (also known as alarcon, coral, luiga, maria luisa, or rueda) are traditional Hispanic medicines taken for an upset stomach (empacho), constipation, diarrhea, and vomiting. They are also used on teething babies. Greta and Azarcon are both fine orange powders with lead content as high as 90%.⁷⁹



Use of Certain Traditional Remedies and Supplements

(2 of 2)

- Paylooah, a red or orange powder that may be given to children in the Vietnamese and Hmong communities as a cure for rash or fever, has been found to contain lead.
- Ghasard, an Indian folk medicine, has also been found to contain lead. It is a brown powder used as a tonic.
- Ba-baw-san is a Chinese herbal remedy that contains lead. It is used to treat colic pain or to pacify young children.
- Daw Tway is a digestive aid used in Thailand and Burma. Analysis of Daw Tway samples showed them to contain as much as 970 parts per million (ppm) of lead.⁷⁹



Use of certain lead-containing products in religious ceremonies or as cosmetics

Certain products containing lead are sometimes used for religious ceremonies or as cosmetics. For example, some Hindu and Sikh married women traditionally wear red sindoor powder in the parting of their hair to indicate marital status. Children and adults have become lead poisoned by ingesting this. Though not intended to be food, sindoor might be used by some as a food additive. Testing of the Swad brand sindoor product found that it contained very high levels of lead, up to 87%. Some traditional eyeliners, such as kohl or surma, can contain high lead levels.⁸⁰



Limiting Exposure to Lead from Cultural Goods and Practices

It is important to raise awareness of potential lead exposure risks, while maintaining respect for cultural practices, as this allows individuals who engage in certain practices to understand the potential risks and make informed decisions about whether or how to reduce risks associated with these practices. The following are some approaches that can be used to share information about these risks:



Focused education and outreach

Share information with groups and individuals who may be most likely to use traditional medicines, supplements, cosmetics, or other materials containing lead. These messages must be developed and shared in culturally appropriate ways and should focus on raising awareness of the potential risks and danger that certain activities may involve.

Limiting Exposure to Lead During Work and Leisure Time



Occupational Exposures and Exposure Through Hobbies

Lead exposure may occur in certain workplaces and through work on certain hobbies. It is important to share information about potential lead hazards with individuals who work in occupations or on activities that may put them at risk of exposure.

Potential Occupational Environments and Hobbies that May Increase Exposure to Lead

Occupational exposures, or exposures at work, may result in lead hazards for an individual working in a certain kind of occupation. Individuals working in higher risk occupations may also inadvertently bring lead contaminated dust or residue home from jobsites on shoes, clothing, and tools. This can create an exposure risk for other members of their family or household (i.e., “take home” exposure).



Jobs that May Result in Lead Exposure

(1 of 3)



Abatement and cleanup of certain environments

Individuals who work on abatement or cleanup of certain kinds of residential and commercial buildings, steel structures, or environmental sites.



Demolition

Individuals who perform demolition of buildings and structures.



Product manufacturing

Individuals involved in manufacturing products containing or coated with lead (e.g., metal equipment parts, batteries, bullets, circuits).

Jobs that May Result in Lead Exposure (2 of 3)



Fabrication

Individuals involved in the fabrication of certain products (e.g., mixing or applying leaded ceramic glaze, glasswork, and stain glass windows).



Industrial processing activities

Individuals whose work involves activities such as mining, casting metal, smelting or melting products containing lead, welding, cutting, or working with incinerators.



Recycling

Individuals who use or process recycled materials (e.g., stripping electronics or dismantling old car batteries).

Jobs that May Result in Lead Exposure

(3 of 3)



Infrastructure building and maintenance

Individuals working with steel structures (e.g., bridges, water towers) or using industrial equipment involved in activities such as painting or sanding of these structures.



Renovation and remodeling

Individuals whose work involves repairing, renovating, remodeling, or painting of residential and commercial buildings.



Handling of firearms

Individuals whose work involves handling firearms (e.g., law enforcement, military, ammunition manufacturers) or whose hobbies involve handling firearms (e.g., hunting, time spent at firing ranges).

Certain Hobbies May Involve Increased Exposure to Lead.⁸¹

(1 of 2)



Casting or soldering (e.g., bullets, fishing weights, stained glass)



Mixing or applying glaze or pigments containing lead



Conducting home renovation, repair, remodeling, or painting (in structures built prior to 1978)

⁸¹ [About Lead in Jobs, Hobbies, or Other Activities | Childhood Lead Poisoning Prevention | CDC](#)

Certain Hobbies May Involve Increased Exposure to Lead.⁸¹

(2 of 2)



Shooting firearms during target practice



Drinking home-distilled liquids (e.g., moonshine)



Consuming complementary, alternative, or traditional medicines or using cosmetics or ceremonial powders that may contain lead

⁸¹ [About Lead in Jobs, Hobbies, or Other Activities | Childhood Lead Poisoning Prevention | CDC](#)

Limiting Exposure to Lead in Occupational Environments



Educating individuals in high-risk working environments

It is important that these individuals should also be made aware of the potential risks of take-home exposure and the steps that can be taken to minimize these risks. Refer individuals to [CDC's resources on prevention of take-home occupational exposures](#) and [EPA's Lead Renovation, Repair and Painting Program](#) resource.

Start Developing a Plan to Eliminate Lead in Your Community

Visit our website to learn more about the Lead-Free Communities Initiative and download the LFC Action Plan Template today.



<https://www.cdc.gov/lead-prevention/lfc/index.html>



Appendix A: Glossary

(1 of 6)

Blood Lead Level (BLL): Blood lead level is the amount of lead in blood measured in micrograms per deciliter of blood ($\mu\text{g}/\text{dL}$). During a blood lead test, a small amount of blood is taken from the finger, heel, or arm and tested for lead. A healthcare provider can determine if a blood lead test is needed and [Recommended Actions Based on Blood Lead Level | Childhood Lead Poisoning Prevention | CDC](#). No safe BLL in children has been identified and even low levels of lead in blood can cause developmental delays, difficulty learning, behavioral issues, and neurological damage. A blood lead test is the best way to determine if a child has been exposed to lead.

Blood Lead Reference Value (BLRV): CDC uses a blood lead reference value (BLRV) of 3.5 micrograms per deciliter ($\mu\text{g}/\text{dL}$) to identify children with blood lead levels higher than most children's levels. CDC estimates that approximately 500,000 children in the United States have blood lead levels at or above the BLRV.

Community: A group of people connected through geographic proximity, special interests, or similar situations.

Community Engagement: Community engagement is the process of working collaboratively with and through groups of people connected by geographic proximity, special interests, or similar situations to address issues affecting the well-being of those people.

Curbstop: An exterior valve used to turn water service to a building on and off that is generally (but not always) located at or near the property line.

Drinking Water State Revolving Fund: The Drinking Water State Revolving Loan Fund (DWSRF) was established by the 1996 amendments to the Safe Drinking Water Act (SDWA). The DWSRF is a financial assistance program to help water systems and states to achieve the health protection objectives of the SDWA. Congress appropriates funding for the DWSRF. Then, EPA awards capitalization grants to each state for their DWSRF based upon the results of the most recent Drinking Water Infrastructure Needs Survey and Assessment. The state provides a 20 percent match.

Appendix A: Glossary

(2 of 6)

Environmental health equity: Environmental health equity is eliminating environmental health disparities through the fair treatment and meaningful involvement of all people in environmental health policies, research, and programs and ensuring equal access to a healthy environment.

Evaluation: Evaluation is a systematic method for collecting, analyzing, and using data to examine the effectiveness and efficiency of programs and contribute to continuous program improvement.

Fill Soil: Clean fill soil has lead levels below EPA's standard. EPA defines a soil lead hazard as bare soil on residential real property or on the property of a child-occupied facility that contains total lead equal to or exceeding 400 parts per million (ppm) in a play area, or an average of 1,200 parts per million of bare soil in the rest of the yard based on soil samples. States may have their own standards.

Hazard: A source of potential harm from past, current, or future exposures.

Health Disparities: Health disparities are differences in health outcomes or status between different groups of people. If a health outcome is seen to a greater or lesser extent between populations, there is disparity.

Health Equity: Health equity is when everyone has a fair and just opportunity to attain their highest level of health. To attain their highest level of health, people need access to health care, a healthy environment, and health information.

Interventions: In the context of this Toolkit, interventions are specific actions taken by a community with the intent to prevent, change or improve the local situation related to lead exposure.

Appendix A: Glossary

(3 of 6)

Larger Community: In the context of this Toolkit, the term “larger community” refers to the members of a community beyond those who are directly involved in the development or implementation of a local LFC Action Plan.

Lead and Copper Rule: Lead and copper enter drinking water primarily through plumbing materials. In 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

Lead Renovation, Repair, and Painting Program (RRP): EPA’s Lead-Based Paint Renovation, Repair and Painting (RRP) Rule, aims to protect the public from lead-based paint hazards associated with renovation, repair and painting activities. These activities can create hazardous lead dust when surfaces with lead paint, even from many decades ago, are disturbed. The rule requires workers to be certified and trained in the use of lead-safe work practices, and requires renovation, repair, and painting firms to be EPA-certified. These requirements became fully effective April 22, 2010.

Local: Belonging or relating to a particular area, neighborhood, or community.

Non-Governmental Organization: Organizations that are independent of the government.

National Health and Nutrition Examination Survey: The National Health and Nutrition Examination Survey (NHANES) is a program of studies designed to assess the health and nutritional status of adults and children in the United States. The NHANES program began in the early 1960s and has been conducted as a series of surveys focusing on different population groups or health topics. In 1999, the survey became a continuous program that has a changing focus on a variety of health and nutrition measurements to meet emerging needs. Data from this survey will be used in epidemiological studies and health sciences research, which help develop sound public health policy, direct and design health programs and services, and expand the health knowledge for the nation.

Appendix A: Glossary

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National LFC Network: A forthcoming national learning and support network of communities working on lead elimination activities, which simultaneously supports local progress and serves as a catalyst for progress on a larger scale. Once implemented, the National LFC Network will provide a forum for communities to learn from technical experts, connect with each other to discuss successes and challenges, and access resources useful to the implementation of Lead-Free Communities activities.

Point-of-Use: Point-of-Use (POU) treatment devices treat only the water intended for direct consumption (drinking and cooking), typically at a single tap or limited number of taps.

Primary Prevention: Primary prevention is the removal of lead hazards from the environment before exposure to lead occurs. It is the most effective way to ensure that children do not experience harmful long-term effects of lead exposure.

Secondary Prevention: Secondary prevention includes blood lead testing and follow-up care and referral. It remains an essential safety net for children who may already be exposed to lead.

Surveillance: Public health surveillance is the ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice.

Targeted Screening: Some children are more likely to be exposed to lead than others. These include children who live or spend time in a house or building built before 1978, are from low-income households, are immigrants, refugees, or recently adopted from less developed countries, and live or spend time with someone who works with lead or has hobbies that expose them to lead.

All children who are at risk for lead exposure should be tested for lead poisoning. Parents should talk to their child’s healthcare provider about whether their child needs to be tested for lead. The child’s healthcare provider may ask questions to see if the child is at risk for lead poisoning. The best way to know if a child has been exposed to lead is to have their blood tested.

Appendix A: Glossary

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Technical Assistance: Also known as “TA” and commonly referred to as consulting, technical assistance is the process of providing expertise or support to an organization

Water Infrastructure Improvements for the Nation Act (WIIN): The [Water Infrastructure Improvements for the Nation Act \(WIIN\)](#) was enacted by Congress in 2016. The public law has several sections focused on providing support to decrease lead in drinking water throughout the nation.

Appendix B: Abbreviations and Acronyms

ATSDR	Agency for Toxic Substances and Disease Registry
BLL	Blood Lead Level
BLRV	Blood Lead Reference Value
CDC	Centers for Disease Control and Prevention
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
HUD	U.S. Department of Housing and Urban Development
LCR	Lead and Copper Rule
LERI	Lead Exposure Risk Index
LFC	Lead-Free Communities Initiative
NGO	Non-Governmental Organization
NHANES	National Health and Nutrition Examination Survey
NSF	National Sanitary Foundation
POU	Point-of-Use
RRP	Lead Renovation, Repair, and Painting Program

Appendix C: Action Plan Template

An LFC Action Plan can serve as a community’s roadmap for becoming lead-free, so it is important to ensure that the plan is clear and contains all pertinent information. It is useful for a local LFC Action Plan to be made available to the public and may consist of the components described below. Communities may need to update or change their Action Plan over time; periodic reviews and evaluations of the plan will help ensure it remains accurate and relevant to implementation efforts within a community.

Click [here](#) to get started on your LFC Action Plan

Appendix D: Federal Resources

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The U.S. Federal government implements various approaches to reducing lead exposures throughout the nation. For an overview of this whole-of-government approach, we recommend that you review the [Federal Lead Action Plan](#) developed by the [President's Task Force on Environmental Health Risks and Safety Risks to Children](#).

Provided below is some additional information about the Federal agencies mentioned throughout the Toolkit and how they support lead poisoning prevention.

Appendix D: Federal Resources

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[Agency for Toxic Substances and Disease Registry \(ATSDR\)](#): The Agency for Toxic Substances and Disease Registry is a Federal agency within the U.S. Department of Health and Human Services.

ATSDR protects communities from harmful health effects related to exposure to natural and man-made hazardous substances. We do this by responding to environmental health emergencies; investigating emerging environmental health threats; conducting research on the health impacts of hazardous waste sites; and building capabilities of and providing actionable guidance to state and local health partners.

ATSDR provides a [toxicological profile of lead](#), which succinctly characterizes the toxicology and adverse health effects information of lead.

[Centers for Disease Control and Prevention \(CDC\)](#): The Centers for Disease Control and Prevention is a Federal agency within the U.S. Department of Health and Human Services.

CDC is the nation's leading science-based, data-driven, service organization that protects the public's health. For more than 70 years, we've put science into action to help children stay healthy so they can grow and learn; to help families, businesses, and communities fight disease and stay strong; and to protect the public's health.

[CDC's Childhood Lead Poisoning Prevention Program](#) is dedicated to reducing childhood lead poisoning as a public health problem through strengthening blood lead testing, reporting, and surveillance, linking exposed children to recommended services, and targeted population-based interventions.

[Consumer Product Safety Commission](#): The U.S. Consumer Product Safety Commission (CPSC) is charged with protecting the public from unreasonable risk of injury or death associated with the use of thousands of types of consumer products. CPSC protects the nation from exposure to lead by issuing and enforcing mandatory standards, banning consumer products, and obtaining recalls for consumer products. Federal law prohibits any person from selling products subject to a Commission ordered recall or a voluntary recall undertaken in consultation with the CPSC.

Appendix D: Federal Resources

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[National Institute for Occupational Safety and Health](#): The Occupational Safety and Health Act of 1970 established NIOSH as a research agency focused on the study of worker safety and health, and empowering employers and workers to create safe and healthy workplaces. NIOSH is part of the U.S. Centers for Disease Control and Prevention, in the U.S. Department of Health and Human Services. It has the mandate to assure “every man and woman in the Nation safe and healthful working conditions and to preserve our human resources.” NIOSH has more than 1,300 employees from a diverse set of fields including epidemiology, medicine, nursing, industrial hygiene, safety, psychology, chemistry, statistics, economics, and many branches of engineering. NIOSH’s [Adult Blood Lead Epidemiology and Surveillance \(ABLES\)](#) program examines U.S. trends in adult workplace lead exposure to identify where exposures occur. ABLES helps state health departments monitor workplace lead exposure trends within their state and find ways to prevent these lead exposures.

[U.S. Environmental Protection Agency](#): The Environmental Protection Agency is a Federal regulatory agency whose mission is to protect human health and the environment. EPA regulates and enforces lead in drinking water, air emissions, and soil. Additionally, EPA coordinates the [Renovation, Repair, and Painting Program \(RRP\)](#) and remediation of lead contamination at Superfund sites.

[U.S Food and Drug Administration \(FDA\)](#): The Food and Drug Administration is a Federal agency within the U.S. Department of Health and Human Services. FDA is responsible for protecting the public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, and medical devices; and by ensuring the safety of our nation's food supply, cosmetics, and products that emit radiation. FDA monitors and regulates levels of lead in foods, dietary supplements, foodwares, as well as in cosmetics. FDA’s [Closer To Zero](#) action plan identifies actions the agency will take to reduce exposure to lead and other heavy metals from foods eaten by babies and young children—to as low as possible.

[U.S. Department of Housing and Urban Department \(HUD\)](#): The Department of Housing and Urban Development is a Federal regulatory agency that administers federal housing and urban development laws. HUD’s mission focuses on housing and community development and dedication to equity, inclusive communities, and quality, affordable homes for all. [HUD’s Office of Lead Hazard Control and Healthy Homes](#) provides funds to state and local governments to develop cost-effective ways to reduce lead-based paint hazards. In addition, the office enforces HUD’s lead-based paint regulations, provides public outreach and technical assistance, and conducts technical studies to help protect children and their families from health and safety hazards in the home.

Appendix E: Additional Resources

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Federal Action Plans

- US Environmental Protection Agency (EPA) - Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts. https://www.epa.gov/sites/default/files/2018-12/documents/fedactionplan_lead_final.pdf#:~:text=The%20Federal%20Action%20Plan%20to%20Reduce%20Childhood%20Lead,communities%2C%20along%20with%20businesses%2C%20property%20owners%20and%20parents.
- White House Fact Sheet: The Biden-Harris Lead Pipe and Paint Action Plan. <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2021/12/16/fact-sheet-the-biden-harris-lead-pipe-and-paint-action-plan>

Federal Lead Regulations

- EPA – Lead and Copper Rule. <https://www.epa.gov/dwreginfo/lead-and-copper-rule>
- EPA – Proposed Revisions to the Lead and Copper Rule. <https://www.epa.gov/ground-water-and-drinking-water/proposed-revisions-lead-and-copper-rule>
- EPA - Regulations for Lead Emissions from Aircraft. <https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-lead-emissions-aircraft>

Appendix E: Additional Resources

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National Resource Hubs

- CDC/National Center for Environmental Health (NCEH) – Sources of Lead. [Preventing Childhood Lead Poisoning | Childhood Lead Poisoning Prevention | CDC](#)
- EPA – Lead. <https://www.epa.gov/lead>
- Lead Service Line Replacement Collaborative (LSLRC) – Home Page. <https://www.lslr-collaborative.org/>
- National Institute of Environmental Health Sciences (NIEHS) – Lead. <https://www.niehs.nih.gov/health/topics/agents/lead/index.cfm>
- US Department of Housing and Urban Development (HUD) - Office of Lead Hazard Control and Healthy Homes. https://www.hud.gov/program_offices/healthy_homes
- US Center for Disease Control (CDC) – Advancing Health Equity in Chronic Disease Prevention and Management. [Health Equity Science: Research and Evaluation | Advancing Health Equity in Chronic Disease | CDC](#)

Health Risks of Lead Exposure

- CDC - Agency for Toxic Substances and Disease Registry (ATSDR) – Toxicological Profile for Lead. <https://www.atsdr.cdc.gov/toxprofiles/tp13.pdf>
- CDC/NCEH - Health Effects of Lead Exposure. [Lead Exposure Symptoms and Complications | Childhood Lead Poisoning Prevention | CDC](#)
- NIEHS - Report on Carcinogens: Lead and Lead Compounds. <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/lead.pdf>

Appendix E: Additional Resources

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Childhood Lead Exposure

Prevention and Response

- Pew Charitable Trusts – 10 Policies to Prevent and Respond to Childhood Lead Exposure. <https://www.pewtrusts.org/en/research-and-analysis/reports/2017/08/10-policies-to-prevent-and-respond-to-childhood-lead-exposure>
- Egan KB, Cornwell CR, Courtney JG, Ettinger AS. Blood Lead Levels in U.S. Children Ages 1-11 Years, 1976-2016. Environ Health Perspect 2021 Mar;129(3):37003. doi: 10.1289/EHP7932. Epub 2021 Mar 17. <https://pubmed.ncbi.nlm.nih.gov/33730866/>
- Fact Sheet: Blood Lead Levels in Children. [Blood lead levels in children \(cdc.gov\)](https://www.cdc.gov/bloodlead/factsheet/index.html)
- Caldwell KJ, Cheng P-Y, Jarrett JM, Makhmudov A, Vance K, Ward CD, Jones RL, Mortensen ME. Measurement Challenges at Low Blood Lead Levels. Pediatrics 2017 Aug;140(2):e20170272. doi: 10.1542/peds.2017-0272. Epub 2017 Jul 17. <https://pubmed.ncbi.nlm.nih.gov/28771411/>

Blood Lead Reference Value

- CDC/NCEH Childhood Lead Poisoning Prevention Program - Blood Lead Reference Value. [About the Data: Blood Lead Surveillance | Childhood Lead Poisoning Prevention | CDC](https://www.cdc.gov/leadpoisoningprevention/about-the-data/blood-lead-surveillance-childhood-lead-poisoning-prevention/cdc)
- CDC – Updated Blood Lead Reference Value. https://www.cdc.gov/mmwr/volumes/70/wr/mm7043a4.htm?s_cid=mm7043a4_w

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Data and Tracking Resources

Mapping Resources

- CDC/ATSDR - Environmental Index. <https://www.atsdr.cdc.gov/placeandhealth/eji/index.html>
- CDC - Environmental Dashboard. <https://ephtracking.cdc.gov/Applications/ejdashboard/>
- CDC - Lead Exposure Risk Index (LERI) – *Currently being validated and finalized by CDC.*
- US Department of Housing and Urban Development – Deteriorated Paint Index by Tract. <https://hudgis-hud.opendata.arcgis.com/datasets/87d27659ef1d4194a4fa706b72eec698/explore?location=16.499245%2C0.315564%2C1.73>

Guides to using GIS and Data Mapping

- CDC/NCEH – Using GIS to Assess and Direct Childhood Lead Poisoning Prevention. <https://www.cdc.gov/nceh/lead/publications/UsingGIS.pdf>
- Zartarian et al. Lead Data Mapping to Prioritize US Locations for Whole-of-Government Exposure Prevention Efforts: State of the Science, Federal Collaborations, and Remaining Challenges. American Journal of Public Health, September 2022. <https://ajph.aphapublications.org/doi/10.2105/AJPH.2022.307051>

Mapping Resources

- CDC/NCEH - National Health and Nutrition Examination Survey (NHANES): Blood Lead Levels in the U.S. Population. [National Health and Nutrition Examination Survey | Childhood Lead Poisoning Prevention | CDC](#)
- National Environmental Public Health Tracking Network. <https://ephtracking.cdc.gov/>

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Cross Sector Partnership Building

- National Center for Healthy Housing – Health Department Strategies for Implementing Health in All Policies to Reduce and Prevent Lead Exposure. [fact sheet health-department-strategies-for-implementing-hiap-to-reduce-and-prevent-lead-exposure.pdf \(nchh.org\)](#)
- The Partnering Initiative – 12 Steps towards successful cross-sector partnerships – <https://archive.thepartneringinitiative.org/wp-content/uploads/2018/12/12-steps-.pdf>
- American Public Health Association – Health in All Policies – <https://www.apha.org/topics-and-issues/health-in-all-policies>

Lead in Paint

Informational Resources

- CDC/NCEH - Lead in Paint. [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)
- EPA - Public Service Announcement on Lead Based Paint. <https://www.youtube.com/watch?v=pNuFDd9UThY>

Amelioration and Removal

- Angi - Paint remediation cost estimates. <https://www.angi.com/articles/how-much-cost-removing-lead-paint.htm>

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Lead in Drinking Water

Informational Resources

- CDC/NCEH - Lead in Drinking Water. [About Lead in Drinking Water | Childhood Lead Poisoning Prevention | CDC](#)
- EPA – Basic Information about Lead in Drinking Water. <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#:~:text=The%20most%20common%20sources%20of,of%20lead%20in%20the%20water>
- EPA - 3Ts (Training, Testing, and Taking Action) for Reducing Lead in Drinking Water. <https://www.epa.gov/ground-water-and-drinking-water/3ts-reducing-lead-drinking-water>
- National Sanitary Foundation - Lead in Schools and Older Homes. <https://www.nsf.org/consumer-resources/articles/lead-schools-older-homes>
- Pieper, Kelsey J., Katner, Adrienne, Kriss, Rebecca, Tang, Min, and Edwards, Marc A. 2019. Understanding lead in water and avoidance strategies: a United States perspective for informed decision-making. Journal of Water and Health 17(4): 540-555 <https://pubmed.ncbi.nlm.nih.gov/31313993/>

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Lead Service Line Replacement

- EPA – Lead Service Line Replacement. <https://www.epa.gov/ground-water-and-drinking-water/lead-service-line-replacement>
- EPA - Strategies to Achieve Full Lead Service Line Replacement. https://www.epa.gov/sites/default/files/2019-10/documents/strategies_to_achieve_full_lead_service_line_replacement_10_09_19.pdf
- LSLRC - Introduction to Lead and Lead Service Line Replacement. <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>
- LSLRC - Launching a Lead Service Line Replacement Program. <https://www.lslr-collaborative.org/getting-started.html>
- LSLRC - Using Existing Data to Start an LSL Inventory. <https://www.lslr-collaborative.org/preparing-an-inventory.html>
- LSLRC - Visually Identifying Service Line Materials. <https://www.lslr-collaborative.org/identifying-service-line-material.html>

Lead in Plumbing and Fixtures

- EPA - How to Identify Lead Free Certification Marks for Drinking Water System & Plumbing Products. https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=NRMRL&dirEntryId=307388&CFID=75935423&CFTOKEN=29803342
- Massachusetts Water Resource Authority – Lead and Faucets. https://www.mwra.com/04water/html/Lead_Faucets.htm
- National Sanitary Foundation – Faucets and Plumbing Products. <https://www.nsf.org/consumer-resources/articles/faucets-plumbing-products>

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Lead Reduction through Filtration and Flushing

- EPA - Best Practices for Flushing to Improve Water Quality. https://www.epa.gov/sites/default/files/2018-09/documents/flushing_best_practices_factsheet_508.pdf
- EPA - Consumer Tool for Identifying Point of Use (POU) Drinking Water Filters Certified to Reduce Lead. https://www.epa.gov/sites/default/files/2018-12/documents/consumer_tool_for_identifying_drinking_water_filters_certified_to_reduce_lead.pdf
- National Sanitary Foundation - List of Water Filters Certified for Lead Reduction. http://info.nsf.org/Certified/DWTU/listings_leadreduction.asp

Lead in Private Wells

- EPA – Private Drinking Water Wells. <https://www.epa.gov/privatewells>
- EPA - Testing Wells to Safeguard Your Water. <https://www.epa.gov/privatewells/protect-your-homes-water#welltestanchor>

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Lead in Soil

Informational Resources

- CDC/NCEH - Lead in Soil. [About Lead in Soil | Childhood Lead Poisoning Prevention | CDC](#)
- EPA - Lead in Soil. <https://www.epa.gov/sites/default/files/2020-10/documents/lead-in-soil-aug2020.pdf>

Identifying Safe and Unsafe Locations

- CDC/ATSDR - Choose Safe Places for Early Care Education. <https://www.atsdr.cdc.gov/safe-places/index.html>
- EPA – Search for Superfund Sites Where You Live. <https://www.epa.gov/superfund/search-superfund-sites-where-you-live>

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Lead in Consumer Products

Lead in Food

- CDC/NCEH – Lead in Food, Cosmetics, and Medicines. [About Lead in Foods, Cosmetics, and Medicines | Childhood Lead Poisoning Prevention | CDC](#)
- US Food and Drug Administration (FDA) – Lead in Food, Foodwares, and Dietary Supplements. <https://www.fda.gov/food/metals-and-your-food/lead-food-foodwares-and-dietary-supplements>
- FDA - Closer to Zero Action Plan on Baby Food. <https://www.fda.gov/food/metals-and-your-food/closer-zero-action-plan-baby-foods>
- FDA - FDA Takes Step to Limit Lead in Juice to Further Reduce Exposure to Toxic Elements in Food. [FDA Issues Draft Guidance to Industry on Action Levels for Lead in Juice | FDA](#)
- Hore, Paromita PhD, MPH; Alex-Oni, Kolapo MPH; Sedlar, Slavenka MA; Nagin, Deborah MPH. A Spoonful of Lead: A 10-Year Look at Spices as a Potential Source of Lead Exposure. Journal of Public Health Management and Practice: January/February 2019 - Volume 25 - Issue - p S63-S70 doi: 10.1097/PHH.0000000000000876. https://journals.lww.com/jphmp/fulltext/2019/01001/A_Spoonful_of_Lead_A_10_Year_Look_at_Spices_as_a.11.aspx
- US House of Representatives Committee on Oversight and Reform, Subcommittee on Economic and Consumer Policy – Staff Report: Baby Foods are Contaminated with Dangerous Levels of Arsenic, Lead, Cadmium, and Mercury. [Oversight Subcommittee Staff Report Reveals Top Baby Foods Contain Dangerous Levels of Toxic Heavy Metals | The Committee on Oversight and Accountability Democrats \(house.gov\)](#)

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Lead in Cosmetics

- FDA - Lead in Cosmetics. <https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/lead-cosmetics>

Lead in Kitchenware

- FDA - Guidance for Industry: Safety of Imported Traditional Pottery Intended for Use with Food and the Use of the Term "Lead Free" in the Labeling of Pottery/Proper Identification of Ornamental and Decorative Ceramicware. <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/guidance-industry-safety-imported-traditional-pottery-intended-use-food-and-use-term-lead-free#IV>
- FDA – Questions and Answers on Lead-Glazed Traditional Pottery. <https://www.fda.gov/food/metals-and-your-food/questions-and-answers-lead-glazed-traditional-pottery>
- Graziano JH, Blum C. Lead exposure from lead crystal. Lancet. 1991 Jan 19;337(8734):141-2. doi: 10.1016/0140-6736(91)90803-w. PMID: 1670790. <https://pubmed.ncbi.nlm.nih.gov/1670790/>

Information on Recalled Products

- Consumer Product Safety Commission – Recalls. <https://www.cpsc.gov/Recalls>

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Take-Home Exposure to Occupational Lead Hazards

- CDC National Institute for Occupational Safety and Health (NIOSH) – How You Can Keep Yourself and Your Family Safe from Lead. [Leave lead at work | NIOSH | CDC](#)
- CDC/NIOSH - Take-Home Exposures and Reproductive Health. [About Take-Home Exposures | Reproductive Health and The Workplace | CDC](#)

Certified Contractors, Inspectors, and Laboratories

- American Association of Poison Control Centers – Poison Centers. [American Association of Poison Control Centers \(poisoncenters.org\)](#)
- EPA - Contact Information for Certification Programs and Certified Laboratories for Drinking Water. <https://www.epa.gov/dwlabcert/contact-information-certification-programs-and-certified-laboratories-drinking-water>
- EPA - Lead Renovation, Repair, and Painting Program. <https://www.epa.gov/lead/lead-renovation-repair-and-painting-program>
- EPA – Locate Certified Lead Inspection, Risk Assessment, and Abatement Firms. [How can I find a certified renovation firm in my area? | US EPA](#)

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Funding Lead Programs

- CDC/NCEH - Pay for Success: A How-To Guide for Local Government Focused on Lead-Safe Homes. [A how-to guide for local government focused on lead safe homes \(cdc.gov\)](#)
- CDC/NCEH - Sustainability of Funding Toolkit for Childhood Lead Poisoning Prevention Programs. [Sustainability of Funding Toolkit for Childhood Lead Poisoning Prevention Programs \(cdc.gov\)](#)
- Green and Healthy Homes - Lead Funding and Financing Toolkit. https://www.greenandhealthyhomes.org/wp-content/uploads/Lead-Funding-and-Financing-Toolkit-5-29-19_final.pdf
- Lead Service Line Collaborative - Community Access to Funding. <https://www.lslr-collaborative.org/community-access-to-funding.html>

Educational and Outreach Materials

- CDC/ATSDR - Soil Screening, Health, Outreach, and Partnership (SHOP) Toolkit. <https://www.atsdr.cdc.gov/soilshop/toolkit/index.html>
- California Department of Public Health - Lead Education Materials. <https://www.cdph.ca.gov/Programs/CCDCPHP/DEODC/CLPPB/Pages/edmatls.aspx#nutrition>

Models for Municipal Action

- New York City - LeadFreeNYC. <https://www1.nyc.gov/content/leadfree/pages/initiatives>

End Notes and Citations

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- 1 [BILLS-117hr3684enr.pdf \(congress.gov\)](#)
- 2 [Federal Action Plan to Reduce Childhood Lead Exposures and Associated Health Impacts, December 2018 \(epa.gov\)](#)
- 3 <https://www.fda.gov/cosmetics/potential-contaminants-cosmetics/lead-cosmetics>
- 4 <https://ntp.niehs.nih.gov/ntp/roc/content/profiles/lead.pdf>
- 5 [Lead Exposure Symptoms and Complications | Childhood Lead Poisoning Prevention | CDC](#)
- 6 <https://www.niehs.nih.gov/health/topics/agents/lead/index.cfm>
- 7 https://stacks.cdc.gov/view/cdc/113072/cdc_113072_DS1.pdf
- 8 [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)
- 9 <https://www.lslr-collaborative.org/intro-to-lsl-replacement.html>
- 10 <https://www.epa.gov/ground-water-and-drinking-water/basic-information-about-lead-drinking-water#:~:text=The%20most%20common%20sources%20of,of%20lead%20in%20the%20water>
- 11 <https://www.epa.gov/ground-water-and-drinking-water/lead-service-line-replacement>
- 12 [Preventing Childhood Lead Poisoning | Childhood Lead Poisoning Prevention | CDC](#)
- 13 [About Lead in Foods, Cosmetics, and Medicines | Childhood Lead Poisoning Prevention | CDC](#)
- 14 [About Lead in Jobs, Hobbies, or Other Activities | Childhood Lead Poisoning Prevention | CDC](#)

End Notes and Citations

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17 https://www.epa.gov/sites/production/files/2018-12/documents/fedactionplan_lead_final.pdf

18 <https://www.pewtrusts.org/en/research-and-analysis/reports/2017/08/10-policies-to-prevent-and-respond-to-childhood-lead-exposure>

19 [Blood lead levels in children \(cdc.gov\)](#)

20 [About the Data: Blood Lead Surveillance | Childhood Lead Poisoning Prevention | CDC](#)

21 [Update of the Blood Lead Reference Value — United States, 2021 | MMWR \(cdc.gov\)](#)

22 [Using GIS to assess and direct childhood lead poisoning prevention; guidance for state and local childhood lead poisoning prevention programs \(cdc.gov\)](#)

23 [Environmental Index \(EI\) \(cdc.gov\)](#)

24 [Health Equity Science: Research and Evaluation | Advancing Health Equity in Chronic Disease | CDC](#)

25 [hip_childhood_lead_poisoning_report.pdf \(pewtrusts.org\)](#)

26 <https://www.angi.com/articles/how-much-cost-removing-lead-paint.htm>

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27 https://www.epa.gov/sites/production/files/2019-10/documents/strategies_to_achieve_full_lead_service_line_replacement_10_09_19.pdf

28 [American Association of Poison Control Centers \(poisoncenters.org\)](#)

29 [soilSHOP Toolkit | soilSHOP | ATSDR \(cdc.gov\)](#)

30 [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)

31 National Environmental Public Health Tracking Network Query Tool - <https://ephtracking.cdc.gov> has map information on houses built before 1979 based on 2010 census

32 [Deteriorated Paint Index by Tract | Deteriorated Paint Index by Tract | HUD Open Data Site \(arcgis.com\)](#)

33 [Deteriorated Paint Index by Tract | Deteriorated Paint Index by Tract | HUD Open Data Site \(arcgis.com\)](#)

34 [Lead Renovation, Repair and Painting Program | US EPA](#)

35 [About Lead in Paint | Childhood Lead Poisoning Prevention | CDC](#)

36 [Preventing Childhood Lead Poisoning | Childhood Lead Poisoning Prevention | CDC](#)

37 Pieper, Kelsey J., Katner, Adrienne, Kriss, Rebecca, Tang, Min, and Edwards, Marc A. 2019. Understanding lead in water and avoidance strategies: a United States perspective for informed decision-making. *Journal of Water and Health* 17(4): 540-555

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