

soilSHOP Health Education Planning Guide



Screening, Health, Outreach, and Partnership



U.S. Department of
Health and Human Services
Agency for Toxic Substances
and Disease Registry



Health Education Planning Guide

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Introduction

What is soilSHOP?

The Agency for Toxic Substances and Disease Registry (ATSDR) developed the soil Screening, Health, Outreach, and Partnership program (soilSHOP). soilSHOP is an innovative community health education program that unites environmental scientists and health educators. The program uses their expertise and skills to provide one-on-one health education to U.S. communities. To protect public health, soilSHOP raises awareness about the hazards of lead and how to avoid exposures to lead in soil.



How does a soilSHOP work?

1. Community members collect soil samples from their yards and bring them to a soilSHOP event for free soil screening.
2. soilSHOP staff screen samples for lead and provide same-day results.
3. Health educators provide one-on-one education to community members about their specific soil results.
4. Community members leave a soilSHOP event with information, soil sample results, and actionable steps to reduce risk of exposure to lead.

About this Guide

Health education is essential to soilSHOP work because it raises community awareness about lead. Health education helps health professionals, like you, better understand the community's environmental health concerns, interests, and needs. This guide provides detailed information on soilSHOP target populations, health education strategies, and tools to engage community members in lead prevention efforts.

This guide provides health educators with information on the soilSHOP program, including

- Scientific research used to develop soilSHOP
- Materials for soilSHOP community education and health promotion
- Guidance on preventing lead exposure, developing safe gardening practices, and including these practices in soilSHOP events

Health Educators and soilSHOP



The purpose of health education is to positively influence the health behavior of individuals and communities, as well the living and working conditions that influence their health. Educating communities on ways to reduce exposures to lead in soil is a key component of soilSHOP events.

As a health educator, you play an important role by

- Forming connections with participants
- Providing health education on ways to reduce exposures to lead
- Coordinating health education at soilSHOP events
- Developing materials to meet the specific needs and concerns of the community
- Evaluating health education at soilSHOP events

For additional information on soilSHOP and the role of a health educator, refer to our [soilSHOP Tutorial Series](#).

soilSHOP Goals

Health Education

- To determine and target the neighborhoods at highest risk for lead contamination
- To inform, educate, and empower individuals and communities to take preventive action to avoid lead exposure in soil
- To mobilize community partnerships that identify and address environmental health problems
- To collaborate with local health agencies or departments, organizations, and other partners to promote soilSHOP as a prevention strategy for environmental health
- To provide community-based agencies and organizations with the necessary tools to link their communities to appropriate lead poisoning prevention and resources

Health Communication and Promotion

- To promote awareness of soil lead poisoning
- To encourage communities to take actions to prevent lead poisoning when gardening and playing in soil outdoors
- To promote the importance of soil lead screening
- To promote the use of lead-safe practices when gardening and playing outdoors

Health Outreach

- To conduct community outreach efforts and ensure that lead and soilSHOP information is provided at community locations
- To promote and coordinate community education to increase awareness of the dangers of lead poisoning and create awareness of the “safe gardening” concept
- To educate parents about how to make their homes safe and prevent lead poisoning in their children
- To provide primary lead prevention education and outreach to community gardeners

Educating for Behavior Change

The following section provides a brief background on the elements of education for behavior change at soilSHOPs. This section also includes strategies for presenting information to multiple audiences. When you plan a soilSHOP event, first consider the learning needs of the audience and how to best meet them. Understanding your audience includes considering the language used (e.g., what language they speak and their education level) and the interests and needs of the audience. Planning also involves evaluating the information presented, the sources the audience trusts, and any barriers (e.g., language, limited income, and access to resources) that may affect how they receive information.

soilSHOP Health Education Goals for Behavior Change

Health education is the key to community level primary prevention. It empowers community members to understand the value of safe gardening and safe play areas. Health education also helps community members develop motivation to use lead poisoning prevention methods. The goals for soilSHOP health education are

1. To increase awareness of the hazards of lead in soil
2. To increase the use of safe gardening and play area practices
3. To increase awareness of local resources available to assist with lead exposure and remediation

Health education provided at soilSHOPs fosters the development of knowledge, skills, and attitudes that will contribute to a community's healthy lifestyle. Community members engaged in soilSHOPs will learn concepts that increase awareness of the hazards of lead and provide health perspectives for gardening or interacting with children's play areas. These perspectives help empower community members to make informed decisions and promote positive interactions when gardening and in play areas.

Elements of Educating for Behavior Change

The key elements of educating for behavior change include

- Identifying the health problem or issue
- Identifying the target audience
- Identifying the desired behavior or environmental practice and the theory or model that supports it
- Identifying key messages and materials to convey messages

Throughout this guide, we provide information on health problems, desired behaviors and theories supporting them, and key messages. A worksheet for developing your soilSHOP education strategy is available in [Appendix A](#).

Identify the Problem or Issue

The first step is to identify the problem or issue in your community before the soilSHOP event. An example of a problem or issue is a community's lack of awareness or knowledge about the hazards of lead in soil and their effect on community health.



Identify the Target Audience

Think about who will receive the message about the problem or issue. The target audience is made up of the people you want to perform the ideal behavior.

Once you have identified the audience, learn as much as possible about them (e.g., their culture, their likes, dislikes, and motivations). Consider conducting a needs assessment, or determine if one already exists, to learn about the audience. Try to understand the supports and barriers for this audience. For example, consider partnering with a local organization that already has information about the community. That organization could tell you whether most families in the area are low income and face financial and transportation barriers that would prevent purchasing supplies for a raised bed garden. You could use this information to prepare specific messages that highlight low-cost solutions such as using supplies found in most homes. Learning about your audience will help you understand and determine the kinds of materials and messages to present at your soilSHOP event. To learn more about needs assessments, visit <https://www.cdc.gov/publichealthgateway/cha/index.html>.

Identify the Ideal Behaviors or Environmental Practices

The next step is to identify desired behaviors or environmental practices that will demonstrate a change in behavior—a single, observable action that meets the objective. Choose an action for the target audience to perform, not one done for or to them. [Health theories and models](#) can guide the process for behavioral change programs, like soilSHOP. Since you want to increase awareness or knowledge about the hazards of lead in soil and possible health effects, an appropriate behavioral goal for community members would be practicing hand washing after gardening or playing in soil in their yards.

Identify Target Messages and Materials to Convey Messages

Once you have identified the target audience and ideal behaviors, the messages will be easier to develop. Focus on creating simple, clear, and compelling materials that show the actions needed for the audience to protect their health and the benefits of that action. The more action-oriented, the better. People are more likely to change their behavior if you give them a specific action to perform. When developing materials, consider both the benefits to the target audience and the changes in their perception if they take the intended action.

Answer these questions when targeting a message

1. What action should the target audience take?
2. What benefit will the audience find most rewarding?
3. What are realistic outcomes for them?
4. How can we persuade the target audience to change their behavior effectively?
5. What materials can they take home that will best reinforce the messages?

Soil Contamination: What do we know?

Gardening Prevalence and Benefits

In the past decade, household gardening has increased as families and community members choose to grow their own fruits and vegetables, engage in healthy behaviors, and improve their health. National campaigns aimed at decreasing obesity and increasing healthy eating and physical activity have further encouraged gardening. Individuals, local community and organizations, schools, and early care and education programs start gardens. One in three households, or approximately 42 million people, participate in food gardening (National Gardening Association, 2014). Gardening benefits community members in many ways.

The Benefits of Gardening to Communities



Positive physical and mental health outcomes
(e.g. improved body mass index, less depression and anxiety)



Access to fresh fruits and vegetables



Energy conservation



Youth education and interpersonal development



Local economic improvement



Urban greening
(e.g. public landscaping, urban green spaces reserved for parks or community gardens)



Social capital



Exposure to cultural foods



Physical activity



Personal and community empowerment



Crime Prevention

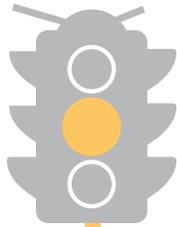
Soil Lead Contamination Burden

Soil is contaminated with lead in communities throughout the United States. Past uses of lead in paint, leaded gasoline, and industry have exposed soil to lead over time (Laidlaw et al., 2017). Even though leaded paint and gasoline are no longer used, lead remains in soil for a long time. Lead in soil is most common in urban areas that have been exposed over time and are closer to industry, roadways, and other sources. Some isolated areas may have high levels of soil contamination. Such areas likely have older housing, are close to roadways, or are close to current or historical industries (Schwarz et al., 2012).

With 42 million people in the United States participating in gardening, educating community members about potential soil contamination may increase preventive knowledge and behaviors. Additionally, because many children and families spend time in backyards, school yards, or community spaces, they may be exposed to contaminated soil in more than one location.

People can be exposed to lead in soil through ingestion (eating) or inhalation (breathing). Exposure may occur where soil is located, such as gardens or play areas, or anywhere the soil is tracked. Soil is often tracked inside on shoes, clothes, or pets. Children are more likely to be exposed because of their proximity to the ground and their hand-to-mouth behaviors (Laidlaw et al., 2017). Children who are most at risk include those who live in older or poorly maintained housing, near highways, or in former mine or smelter communities (AAPCEH, 2016).

Some plants may absorb lead from lead-contaminated soil, others do not. A variety of factors can affect whether and how much lead a plant absorbs.



Plants That May Absorb Lead

Be cautious and follow [recommendations](#)

Plants with edible leafy vegetables may absorb lead

Examples: Lettuce, kale, cabbage

Herbs may absorb lead

Examples: Basil, cilantro, fennel

Root vegetables may absorb lead

Examples: Carrots, beets, onions, radishes



Plants That Do Not Absorb Lead

There is likely no concern

Edible parts of fruiting plants do not absorb lead

Examples: Strawberries, peppers, tomatoes, apples

Potential Effects of Lead Exposure

Young children are most susceptible to the effects of lead exposure. There is no safe blood level of lead exposure for children. Exposure can seriously harm a child's health, resulting in the following effects

- Damage to the brain and nervous system
- Damage to the kidneys
- Slowed physical growth and development
- Learning and behavior problems
- Hearing and speech problems

Secondary effects may include

- Lower IQ
- Decreased ability to pay attention
- Underperformance in school

The lifetime effects of lead exposure during childhood can be significant. The permanent cognitive effects of childhood lead exposure can result in the need for special education services, reduced graduation rates, low-paying occupations, lower lifetime earnings, increased potential for engagement in violent crime, and overall reduced economic productivity.

In pregnant women, lead exposure can lead to

- Slow development of the unborn baby
- Low birth weight
- Damage to the baby's brain, kidneys, and nervous system
- Risk for miscarriage

The duration and level of exposure can also influence the severity of health effects. Even though children are more susceptible to lead exposure, adults are not immune to the health effects. For example, long-term or high levels of exposure can lead to high blood pressure or kidney damage in adults.

At-risk Populations

Some populations are more affected by lead in soil, so be aware of these groups when considering community needs.

Urban populations

Lead in soil is most common in urban areas, which have been exposed to lead over time and are closer to historical sources of lead.

Urban areas also tend to put people at higher risk for exposure through layout and design. For example, there are limited garden and play spaces away from buildings. In addition, compared to outlying communities, buildings and houses are generally more tightly packed together with smaller lots.

Low-income populations

Lead in soil may be higher in areas with predominantly low-income populations. These areas are more likely to have older housing and be located in the inner-city near busy roads.



Ethnic and racial minority populations

Several studies have suggested that lead may be higher in soil in areas most occupied by minority populations. In these studies, areas occupied by African Americans, Hispanics, and other minority populations tended to have historically large traffic flows, older housing, smaller properties with crowded housing, and a legacy of pollution that may have contributed to higher soil lead levels. In contrast, areas occupied by non-Hispanic white populations tended to be on the outskirts of the city, or in suburbs, and did not have the conditions that are more likely to result in lead in soil. Further research is needed to fully understand the factors that put these populations at higher risk and the social and structural determinants of health lead to these factors.

Children

Children are most vulnerable to the health effects of lead. Children under 6 years old are especially at risk because of their rapid growth and their behaviors, such as putting their hands to their mouths.

Pregnant women

Lead can pass from a mother to her unborn baby. This can lead to problems for the unborn baby and risk of miscarriage.

Awareness

Many studies indicate that people who garden are largely unaware of soil contamination. Conducting a community needs assessment can measure awareness and other key factors. The assessment can identify the need for a soilSHOP in a specific community. Research on urban and community gardeners and farmers shows existing barriers to reducing and preventing exposure to lead and support the need for intervention. These barriers include

- Lack of awareness about soil contamination or remediation
- Lack of knowledge about health susceptibility to lead contamination and the severity of lead contamination
- Low or neutral confidence in ability to screen soil
- Personal, social, and economic barriers to screening and remediation

soilSHOP Solution

Interventions that reduce or eliminate potential exposure to lead in soil have been shown to reduce blood lead levels in children. Removing soil is an example of such an intervention. There are recommended strategies that can reduce or eliminate potential exposure to lead in soil:

- Build physical controls (e.g., using grass, groundcovers, or mulch) to prevent contaminated soil from migrating
- Use raised bed gardens or in-ground planting in clean soil
- Grow groups of crops in appropriate areas
- Remediate soil
- Practice good personal habits when gardening
- Practice and encourage good outside play habits for children

soilSHOPS help solve the public health problem of exposure to lead soil contamination through access to free soil screening and health education. The “Health Belief Model” is an evidence- and theory-based guide to help you

- increase awareness of the hazards of lead in soil,
- increase use of safe gardening and play areas practices, and
- increase awareness of local resources available to assist with lead exposure and remediation.

Health Belief Model

A behavior theory or model helps to predict or explain behavior change and can be used in research or practice. This Health Education Guide uses the [Health Belief Model \(HBM\)](#) as its guiding framework to encourage individual behavior change. This guide's purpose is not to provide extensive background on the HBM, but to provide additional tips and tools to use in one-on-one education to promote change in health behaviors.

The HBM suggests that people are more likely to participate in a healthy behavior or preventive action if there is a cue or trigger or if they feel

- Susceptible—or responsible for someone who may be susceptible—to potential harm to health
- The health risk is serious
- They will benefit by taking recommended action
- The benefits outweigh any perceived barriers or costs of taking action
- An action can reduce the susceptibility to or severity of the health risk

Table 1: Champion & Skinner Health Belief Model
[An explanation for accessibility is on page 30.](#)

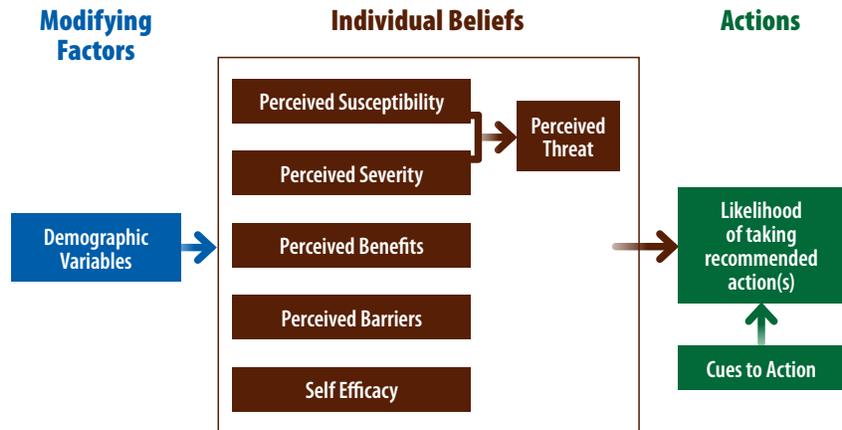


Table 2 lists the HBM's social constructs or concepts, along with some application tips and examples to help you use the model. Using these tools can encourage community members to act and engage in specific health behaviors.

The HBM is used in soilSHOP because we believe that people will adopt safer behaviors if they learn that lead is present in their soil samples. We also want to meet soilSHOP participants where they are, so they feel empowered to act if their soil is contaminated with lead—even if the action is as simple as washing their hands after contact with soil.

The HBM, when used in soilSHOPS, offers a framework that may help you plan for effective health education at soilSHOPS.

Table 2. HBM constructs with definitions and examples of applying this model.

Construct: What is in the model?	Application: How do you apply this to your one-on-one health education consultations?	Example: What is an example you might encounter during your one-on-one health education consultations?
Demographic Variables Data relating to the population and groups within it.	<ul style="list-style-type: none"> ■ Conduct a needs assessment before a soilSHOP event to better gauge audience needs and demographics. 	Age, gender, ethnicity, income, etc.
Perceived susceptibility: A person's beliefs about the likelihood of suffering harmful health effects from lead exposure.	<ul style="list-style-type: none"> ■ Explore each individual's perceived risk. ■ Personalize messaging based on individual's perceptions compared to actual risk. ■ If perceived risk is low, educate and message to heighten awareness. ■ Revise misunderstandings about susceptibility. 	<p>Situation: Danielle's daughter is four years old. Danielle is not concerned about lead exposure because she believes that it afflicts mainly older people. She is less likely to act to protect herself and her daughter.</p> <p>Intervene: Explain to Danielle that children under six are most at risk. This will help correct misunderstandings and heighten her perception of susceptibility.</p>
Perceived severity A person's beliefs about the seriousness of health effects related to lead exposure.	<ul style="list-style-type: none"> ■ Teach the specific consequences of the condition, rather than broadly citing "health effects." ■ Be clear and unambiguous. Use familiar words your audience understands. ■ Correct misunderstandings about severity of lead exposure effects, including probabilities of life-long health effects. 	<p>Situation: Jorge understands that his young child is more susceptible to the health effects of lead, but he thinks the health effects are minor. He does not realize that lead exposure can permanently impact his child's Intelligence Quotient (IQ).</p> <p>Intervention: Provide Jorge specific examples of potential health effects of exposure rather than citing broad "health effects." This specific information will help clarify the severity.</p>
Perceived benefits A person's beliefs about the benefits of avoiding or reducing lead exposure.	<ul style="list-style-type: none"> ■ Provide specific actions to take (what, how, where, and when). ■ Explain when benefits may occur if the audience takes the actions. ■ Emphasize positive messages about reducing susceptibility and severity. 	<p>Situation: The Brooks family doesn't want to get their soil tested for lead because they don't see what is in it for them. They love their garden, and this seems like an unnecessary burden.</p> <p>Intervention: Explain to the Brooks family that free-soil screening at a soilSHOP will provide benefits for their family.</p> <ul style="list-style-type: none"> ■ They will have peace of mind knowing soil sample results. ■ If their sample is high, they can prevent exposure and stay healthy through simple actions. ■ Finally, through those same simple steps, they can continue to garden safely as a family.

Continued...

Construct: What is in the model?	Application: How do you apply this to your one-on-one health education consultations?	Example: What is an example you might encounter during your one-on-one health education consultations?
Perceived barriers A person's beliefs about barriers to avoiding or reducing lead exposure, including negative consequences.	<ul style="list-style-type: none"> ■ Explore personal perceived barriers. ■ Individualize recommendations for actions based on barriers. ■ Correct misinformation. ■ Provide reassurance. ■ Provide referrals for resources when applicable. 	<p>Situation: After seeing a poster at the soilSHOP, Shauna searched for raised bed gardening supplies on her smart phone. They are too expensive! There's no way she can take action to reduce exposure to lead. She doesn't want to give up her favorite hobby of gardening. She isn't a child, so she believes her health will be fine.</p> <p>Intervention: Take time to ask Shauna more about her personal barriers; provide other options to take action that work best for her, and correct the misunderstanding that exposure only affects children. Working with barriers and giving individualized recommendations helps motivate action more than providing blanket recommendations.</p>
Self-efficacy A person's confidence in his or her ability to successfully perform a recommended action for avoiding or reducing lead exposure.	<ul style="list-style-type: none"> ■ Establish a realistic action goal. ■ Give verbal reinforcement. ■ Model desired behaviors. ■ Provide skill development stations. 	<p>Situation: Celia and Rick don't think they can build a raised bed garden. It sounds really complicated, and they don't think they have the skills it takes.</p> <p>Intervention: Break the overall task down into smaller tasks</p> <ul style="list-style-type: none"> ■ Emphasize the simplicity of building a raised bed garden. ■ Provide a skill development station that allows community members to try building a small raised bed garden. ■ Staff it with a volunteer who provides verbal praise and reinforcement. ■ Encourage Celia and Rick to check out the skill development station if they have time, if they do not have the time provide them with a copy of the soilSHOP raised bed garden poster and contact information in case they have questions.
Cues to action Any cues that can trigger action on recommendations, such as media publicity, social pressure, or free-soil screening.	<ul style="list-style-type: none"> ■ Provide information in a how-to format. ■ Provide take-home materials. ■ Nudge change in practical ways, such as marked calendars, email reminders, how-to charts, goal setting forms, etc. 	<p>Situation: Pat is almost at the end of his one-on-one health education consultation and has already received feasible action steps to take.</p> <p>Intervention: Help Pat trigger action once he reaches home by giving him a take-home goal handout. It can remind him of the specific action goals established during the one-on-one consultations and the goal date by which Pat intends to complete action.</p>

Providing Health Education at soilSHOP



Lead Health Education Messages

Health messages are written or oral communication tools that you can use to inform your target audience. The messages use plain language to highlight important public health issues of which they should be aware. At soilSHOP events, health messages are used to encourage the target population to engage in behaviors that reduce their exposure to lead in soil and promote positive health outcomes.

Before attending soilSHOP events, adapt and test health messages for the local population. Some examples of health messages used for soilSHOP include

There is no safe blood lead level.

- Lead is highly toxic to people, particularly to children.
- In children, even low blood lead levels have been shown to cause harmful health outcomes (e.g., effects on IQ, ability to pay attention, and academic achievement).

Note to Health Educator: If community members bring a child under the age of 6, encourage them to schedule an appointment with a pediatrician to get their child's blood lead level tested. Also, inform them of local resources available. It may be helpful to prepare a list of local resources prior to the event. Use our [soilSHOP Resource Sheet Template](#) to help you. Inform parents and caregivers that a blood lead test is the only way you can tell if your child has an elevated blood lead level. Most children with elevated blood lead levels have no symptoms. The health care provider can help recommend treatment if your child has been exposed to lead.

Lead exposure and lead poisoning is preventable.

People can take steps to prevent exposure and lead poisoning. The steps are highlighted in "Prevention Recommendations for Community Members" below.

Lead can be found in soil.

- Lead is commonly found in soil in or near urban areas, roadways, areas with older housing, areas close to industry (current or historical), and former mine or smelter communities.
- Soil lead levels may vary in different areas of yards and gardens.

Note to Health Educator: If community members bring only one soil sample, encourage them to attend another soilSHOP in the future with two to three samples from different areas of their yards or gardens.

Exposure to lead can seriously harm children's health.

- Children's exposure to lead can lead to brain damage, slowed growth and development, difficulty learning, behavioral problems, and hearing and speech problems.
- In pregnant women, lead exposure can lead to low birth weight; preterm labor; damage to the developing baby's brain, kidneys, and nervous system; and miscarriage.

You can take action to prevent lead exposures.

People can take simple actions to reduce the risk for exposure to lead in soil. See the "Prevention Recommendations for Community Members" section below for more information.

Prevention Recommendations for Community Members

To assist you as the health educator, the following recommendations have been written directly for community members, based on the Environmental Protection Agency's (EPA) recommendations for growing gardens in urban areas and safe gardening practices.



Safe Gardening Practices

Practice good gardening habits.

- Wear gloves when gardening.
- Wash hands after gardening and before eating or drinking.
- Take care not to track dirt from garden into house. Avoid bringing or cleaning tools, gloves, and shoes indoors. Put highly soiled clothes in a bag before bringing them indoors and wash them promptly in a separate load.
- Wash fruits and vegetables before storing or eating. Peel root crops and remove outer leaves of leafy vegetables.
- Teach and model good gardening behaviors for children.

Plant fruits and vegetables above ground.

- Build raised bed gardens, sided beds, container gardens, green walls, or rooftop gardens, or use hydroponics (cultivating plants in water).
- You can build alternative above ground gardens from low cost material or material you already have at home. You can use such materials as wood, synthetic wood, stone, concrete, blocks, and bricks.

Build physical controls to prevent contaminated soil from moving into clean soil.

- Build your garden away from existing roads or build a perimeter around your garden to reduce windblown contamination from busy streets.
- Cover existing soil and walkways with mulch, landscape fabric, stones, or bricks.
- Use mulch in your garden beds to reduce dust and soil splash back.
- Add topsoil or clean fill from certified soil sources (bagged soil) to ensure soil is safe for handling.
- Use a thick layer of organic material, such as compost or mulch.

Grow produce in safe areas.

- Do not plant root or leafy green vegetables or herbs in contaminated soils. These groups of produce are **more** likely to take up lead.
- Grow fruiting crops (i.e. peppers, berries,) where raised beds or container gardens are not possible. These groups of produce are **less** likely to take up lead.



Soil Remediation

Contact experts if you are interested in remediating your soil.

- You may want to get comprehensive soil assessment if you are concerned and considering remediation.
- Work with your local environmental or public health agency for more information on soil assessments and remediation.

Note to Health Educator: It may be helpful to prepare a list of local resources for community members interested in more comprehensive soil assessments and/or remediation. You can use our [soilSHOP Resource Sheet template](#) to prepare.

Outside Play Areas for Children

Practice and encourage good outside play habits for children.

- Provide a grass play area for children or an area covered by mulch, wood chips, or sand. Keep children from playing in bare dirt.
- Keep children away from areas where paint is peeling or chipping, such as old porches, fences, or houses.
- Do not allow children to eat in areas with bare soil.
- Watch children carefully when they are playing outside; do not let children put toys, dirty hands, paint chips, or other items into their mouths. Watch over small children to stop them from eating soil through hand-to-mouth play.
- Wash children's hands when they come inside. Wash off dirty toys before bringing them inside.

Screening and Communicating Lead Level Reading Recommendations

While the soilSHOP screening approach is helpful in screening soil lead levels, it does have limitations:

- The soilSHOP soil screening procedures are not designed to identify sources of lead or to characterize an entire yard or area of soil.
- Field-based X-ray Fluorescence (XRF) screening is not as accurate as laboratory analysis.
- The screening level data from the soilSHOP may not be scientifically or legally defensible as it is only a screening and not a full assessment.
- Sample interpretations and screening data are not designed, or of an appropriate data quality, to drive public health decisions.

As mentioned in the prevention section, community members may wish to seek further assessments to confirm their soil screening results. Prior to the event, create a list of local resources to refer community members to affordable certified labs and environmental contractors for further soil assessment.

Despite these limitations, soilSHOP events provide a positive, interactive, and informative activity that supports one-on-one communication between you and community members about lead health concerns and best practices to reduce exposures. For more information on soil screening at soilSHOPs, visit the [soil screening](#) section of the soilSHOP website.

Collaborate with your local or state health agency or environmental agency to determine ranges of lead in soil for estimating risk

Ranges differ based on area use (e.g., child play areas, gardens). Because there is no safe level of lead, no federal agency provides official recommendations for acceptable concentrations of lead in gardening and play areas.

For additional resources on screening ranges, refer to the [Environmental Protection Agency's Technical Review Workgroup Recommendations](#).



Beyond Knowledge Gain: One-on-one Consultation Guidance and Tips



As the HBM reminds us, behavior change is complex. Even after receiving information and messaging, community members may not be ready to take recommended actions to reduce exposure to lead. One-on-one consultation gives us the opportunity to meet each individual or family where they are, address any barriers, personalize recommendations, and motivate toward behavior change.

The following tips are adapted from health and wellness coaching strategies and tenets of the HBM to assist with exploring and reducing barriers, building self-efficacy, and providing simple at-home cues for action. Taking a little extra time to explore and individualize health education with community members may empower them to take action to prevent lead exposures in their own yards or gardens.

Individualize Recommendations for Behavior Change

The soilSHOP messaging previously provided will give you a start on educating community members; however, everyone's situation will vary. Learning more about each situation will help you provide the most individualized recommendations. For instance, you may need to focus more on play areas rather than gardens, or you may need to vary recommendations because of personal barriers to action (e.g., a limited budget). You can provide more applicable recommendations by asking about the individual's situation, introducing recommendations in a conversation, and exploring barriers and solutions to a recommended action.

Use open-ended questions

Ask **open-ended questions** to learn more about community members' context and baseline knowledge. Open-ended questions can't be answered with a "yes" or "no"; they keep the conversation going and lead to a fuller discussion. These questions help you avoid providing irrelevant recommendations or information that causes community members to tune out. Begin with the following words to help you form open-ended questions:

- **What...**
- **Where...**
- **When...**
- **How...**
- **Who...**
- **Tell me/Can you tell me...**

Tip: Try to avoid "why" questions, which can be perceived negatively. Below are additional examples specific to soilSHOP.

Learn about the soil sample context to better direct your recommendations. You can ask the following questions:

- **Where did your soil sample come from?**
- **What do you use that area for?**
- **What can you tell me about that area?**
- **Who uses that area? How often?**

Variations:

- **Can you tell me about the area that this soil came from?**
- **What do you use the soil/area for?**
- **What is near/around that area?**

Learn more about garden context:

- **Tell me more about who is at [home, school, community garden] and how they are involved in the garden.**
- **What do you like to grow in your garden?**

Learn more about outside play area context:

- **Tell me more about who is at [home, school, community play area] and how they like to play in the yard/area.**

Learn about what the community member already knows or is doing to prevent exposure:

- **What do you already know about how you can prevent exposure to lead in soil?**
- **What do you know about how [washing hands, etc.] can affect your risk for exposure to lead in soil?**

Have a conversation about recommended behavior

How information is presented can affect how it is received. **Present recommendations for action as a choice rather than a directive** and have a conversation about actions to motivate behavior change. Instead of saying that a community member “should” or “needs to” or “has to” engage in a particular action, try out one of these strategies to offer recommendations:

Ask permission:

- **If you are interested, I have a recommendation for you to consider. Would you like to hear it?**
- **Do you mind if we talk about [insert recommendation topic]?**
- **Are you interested in learning more about [insert recommendation topic]?**

Offer advice:

- **Based on my experience, I encourage you to consider [insert recommendation].**
- **Based on what I’m hearing from you, I encourage you to think about [insert recommendation].**

Elicit response and change talk. Introduce recommendation, then ask,

- **What do you think about this suggestion?**
- **How do you think this might fit you/your family?**

Address urgent need for change. If a community member has a soil sample with a very high lead level reading, and urgent action is needed, a stronger statement may be helpful:

- **As an environmental health professional, I urge you to consider [insert recommendation] to protect yourself/your family.**
- **In my professional opinion, consider [insert recommendation] as soon as possible.**

Explore and Address Barriers

Barriers are common when working toward behavior change. Some barriers are external and are more common with recommendations that require community members to obtain resources. For example, building a raised bed garden or building physical controls around garden. Limited income and access to resources are common external barriers. Some barriers are internal, like motivation to change. Once you identify any challenges, you can work to address them and modify recommendations, if applicable.

Explore barriers

Some ways to explore barriers with individuals include

- **What challenges do you think you might face in trying to [insert recommended action]?**
- **What might keep you from [insert recommended action]?**
- **What might be hard about [insert recommended action]?**
- **Tell me what might make completing [insert recommended action] hard for you.**

Address barriers with potential solutions

Once you work with community members to identify barriers, explore some potential solutions so community members leave empowered to overcome them. Some ways to explore solutions include

- **Let's talk about that. Can you think of any way to [use plain language to summarize barrier]?**
- **That does sound hard [or alternative acknowledgement of barrier]. I think I might have some options to help address those problems. Do you want to hear about them?"**

Assess and build self-efficacy

Assess self-efficacy

Self-efficacy is a construct of the HBM that is not addressed through risk and health messaging. Assessing and addressing community members' self-efficacy for change is important to assure they leave a soilSHOP event confident they can perform a given behavior. Community members who are equipped with knowledge, but don't have the confidence to perform a behavior, are less likely to act.

First, assess community members' confidence to engage in a recommended action:

- **How are you feeling about [recommended action]? On a scale of 1 to 10, how easily do you think you can do this (0 being "It sounds hard," and 10 being "I think I can do this easily.")**

If score is 6 or less, explore what would help community member become more confident:

- **What would make this task easier for you?**
- **Tell me more about why you said, "Hard".**

If score is 7-10, affirm the high self-efficacy:

- **You sound confident. I think you will do great with [insert recommended action]. What do you think about setting a goal for that?**

Build self-efficacy

Normalize barriers: If community members express lack of confidence because of challenges or barriers, acknowledge and normalize their feelings before transitioning into verbal persuasion toward a recommended action.

- **[Insert barrier] is a common challenge for many people.**
- **[Insert recommended action] can be a concern for a lot of people.**

Engage in verbal persuasion: Emphasize your confidence in community members' ability to perform actions. The following are simple strategies to persuade community members:

- **Encouragement:** Provide words of encouragement and affirmation of the community member's ability to act.
- **Story:** Share your stories or stories of other community members to demonstrate their ability to take the action and decrease its potential intimidation.

- **Evidence:** Share local data to shift a community member's perception of an action.
- **Testimonials:** Provide statements from other community members who have had success with the action.
- **Past achievements:** Acknowledge positive actions the community member has already mentioned taking.

Set goals: Recommend actions that are realistic for community members to perform and send them home with goals for those actions. Giving community members too much to do can overwhelm them and decrease their confidence. But giving them a reasonable number of feasible tasks to accomplish can help increase their confidence that they can achieve these actions. Setting SMART goals can help:

- **Specific.** Goals specify who, what, where, and when.
- **Measurable.** Goals include a measurement to determine whether they meet their goal.
- **Achievable.** Goals are realistic and attainable.
- **Relevant.** Goals make sense within the broader soilSHOP goal.
- **Time-bound.** Goals have a target date for completion.

Example of a SMART goal:

- I will build two raised bed gardens to replace my in-ground garden within one month.
- I will develop two or three of the following habits to follow after gardening: washing my hands, leaving soiled tools outside, checking for tracked soil in the house, and washing produce every time I garden.

Break down complex tasks: Break down any complicated processes into realistic steps. Simple tasks such as hand washing after gardening will not need further explanation. Multi-step processes like building a raised bed garden will seem less daunting and difficult if they are broken down into smaller steps.

- Use the [Raised Bed Gardening Poster](#) to show the steps in the process of starting a raised bed garden.

Provide the opportunity for mastery experience: Provide skill development stations that offer community members the opportunity to practice more complex behaviors. This allows them to master a skill before going home. For example, you could add a station to practice building a small raised bed garden.

Model desired behaviors: If possible, staff any skill development station with a volunteer from the community who can **model behaviors**. This can help community members grow in confidence through **vicarious experience**.

Send community members home with cues to action

Once community members leave the soilSHOP, a reminder at their home may be helpful to encourage the action. Nudge action in practical ways:

- Encourage individuals to mark their calendars with the action item.
- Follow up with an email reminder.
- Provide how-to charts or informational sheets.
- Provide a take-home goal setting form.

The Community Member Action Sheet in the Appendix is a resource that you can fill out in collaboration with an individual during a one-on-one health education session. Then give them the action sheet to take home and use as a cue to action.

With the information provided throughout this guide, you can start preparing to deliver health education at soilSHOPS. Consider using our resources to help you plan activities and messages that motivates community members towards positive behavior change.

Appendix





Appendix A: Health Education Planning Worksheet

How to use this worksheet: Complete this worksheet during the soilSHOP planning phase. This will help you identify the community health problem, your target audience, ideal behaviors, targeted messages, health education materials and activities needed for the event, and local resources. During the event, use the worksheet to guide you and keep you on track with the messages you want to deliver to your community.

Identify Problem

What is the problem that needs to be addressed in the community and what are the misconceptions about the issue?

Problem:

Example: Lack of knowledge about the hazards of lead in soil.

Misconceptions:

Example: The community misconception that lead exposure can't happen to them.

Identify Target Audiences—Primary and Secondary

Who are the people that we will be reaching and educating?

Primary:

Example: Parents of young children, family, and community gardeners.

Secondary:

Example: Skilled gardeners.

Identify Ideal Behavior or Environmental Practice

What is the ideal behavior or environmental practice that will reduce exposure to lead?

Example: Practice hand washing after interacting with soil in their yard.

Continued...



Identify Targeted Messages

What message(s) do I need to convey to my target audience to encourage healthy actions to reduce exposure to lead in soil?

Lead Hazard Prevention/Reduction—*Example: There is no safe blood lead level. Lead exposure and lead poisoning is preventable.*

Health & Learning Effects—*Example: Exposure to lead in children can lead to damage to the brain, slowed growth and development, difficulty learning, behavioral problems, and hearing and speech problems. It is important to encourage safe outdoor play habits.*

Safe Gardening/Play Areas—*Example: Practice good gardening habits. Practice and encourage safe outdoor play habits with children.*

Identify Education Materials Needed

What communication/education materials do I need to develop?

Example: soilSHOP Raised Bed Garden Poster, Lead Factsheet, Childhood Lead Prevention Factsheet

Continued...



Identify Education Materials Needed

What communication/education materials do I need to develop?

Example: soilSHOP Raised Bed Garden Poster, Lead Factsheet, Childhood Lead Prevention Factsheet

Identify Activities Needed

What are some activities I can plan to better engage the target audience?

Example: soilSHOP Raised Bed Garden Demonstration Table, Kid Station

Identify Local Resources

What local resources can I compile for community members for more in-depth soil screening, soil remediation, and blood lead level screenings?

Soil screening resources—*Example: Local Environmental Health Department.*

Soil remediation resources—*Example: Local remediation services for soil.*

Blood lead level screening resources—*Example: Local Health Department.*



Appendix B: Exploring Change Tip Sheet On-the-Go

The following provides tips for one-on-one health education consultations with individuals and families during soilSHOP events. Use these tips to motivate behaviors to prevent exposure to soil in lead.

Use Open-Ended Questions

Ask open-ended questions to learn more about community members' needs to provide a more relevant consultation. Start with the following words to help you form open-ended questions:

- **What?:** What do you know about what you can do to prevent exposure to lead in soil?
- **Where?:** Where did your soil sample come from? What can you tell me about that area?
- **When?:** When did you start your garden?
- **How?:** How concerned about you about avoiding exposure to lead in soil?
- **Who?:** Who helps in the garden?
- **Tell me/Can you tell me?:** Tell me about what you plant in your garden.

TIP: Try to avoid "why" questions, which can be perceived negatively.

Have a Conversation about Recommended Behaviors

Present recommendations for action as a choice rather than a directive and have a conversation around actions. This can help motivate behavior change. Try one of these strategies to offer recommendations:

- **Ask permission:** *"Do you mind if we talk about [insert recommendation topic]?"*
- **Offer advice:** *"Based on my experience, I would encourage you to consider [insert recommendation]."*
- **Elicit response and change talk:** Introduce recommendation, then ask *"What do you think about this suggestion?"*
- **Address urgent need for change:** If there is a sample with a very high lead level and an urgent need to act, use a stronger statement such as *"As an environmental health professional, I would urge you to consider [insert recommendation] to protect yourself and your family."*

Explore Barriers and Address Potential Solutions

Explore: Barriers are common to behavior change. It's important to understand what might hinder behavior.

Some ways to explore barriers include:

- *"What barriers/challenges do you think you might face in trying to [insert recommended action]?"*
- *"What might prevent you from [insert recommended action]?"*
- *"What might be difficult about [insert recommended action]?"*

Address: Explore solutions so community members leave empowered to act.

Some ways to explore solutions include:

- *"Let's talk about that. Can you think of any solutions to [summarize barrier]?"*
- *"That does sound difficult [or alternative acknowledgement of barrier]. I think I might have some alternatives that might help address those barriers. Do you want to hear about them?"*



Assess and Build Self-Efficacy

Assess and address community members' self-efficacy for change to assure they leave a soilSHOP event confident they can perform a given behavior.

Assess community members' confidence to engage in a recommended action:

"I'd like to understand how confident you are that you can [insert recommended action]. On a scale of 0 to 10, with 0 being not confident at all and 10 being extremely confident to [insert recommended action], where would you be on this scale?"

If score is 6 or less, explore what would help community member become more confident:

- *"What do you think it would take for you to go from [insert answer] to a higher number?"*
- *"Tell me more about what made you say [repeat score]."*

If score is 7-10, affirm the high self-efficacy:

- *"It sounds like you are pretty confident. I think you will do great with [insert recommended action]. What do you think about setting a goal for that?"*

Or, rather than asking community members to rate their confidence, simply ask:

- *"How confident are you that you can [insert recommended action]?"*

Build confidence to engage in recommended action:

Normalize barriers: Acknowledge and normalize feelings. For example, *"[insert barrier] is a common challenge for many people."*

Verbally persuade: Emphasize your confidence in the community member's ability to perform actions.

Break down complex tasks: Break down any complicated processes into realistic steps.

Provide opportunities for mastery experience: Provide skill development stations that allow community members to practice behaviors, such as a raised bed garden station.

Model desired behaviors: Have staff or volunteers' model desired behavior.

Set goals: Recommend actions that are realistic for community members to perform and send them home with goals for those actions. Set SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound).

Provide Cues to Action

Once community members leave the soilSHOP, it can be helpful for them to have a reminder at their home to encourage the recommended action. Nudge action in practical ways, such as:

Calendar reminder



Email reminder



Informational sheet



Goal setting form





Appendix C: Take Home Action Worksheet

Purpose: Tool for health educator and community member to work together during one-on-one consultation to outline barriers to action, strategies to overcome barriers, benefits of taking action, and actions to take to reduce exposure to lead. This tool can serve as a reminder for community members on items discussed during one-on-one session. Health educator can use this sheet to record their interactions and use the print copy available on [Appendix D](#) with community members.

The action(s) I plan to take to prevent lead exposure:

The most important reason(s) to act:

Some potential barriers I might face:

How I plan to address barriers:

Additional resources/local resources to support lead prevention actions:



Appendix D: ATSDR soilSHOP— Take Home Action Sheet

The action(s) I plan to take to prevent lead exposure:

The most important reason(s) to act:

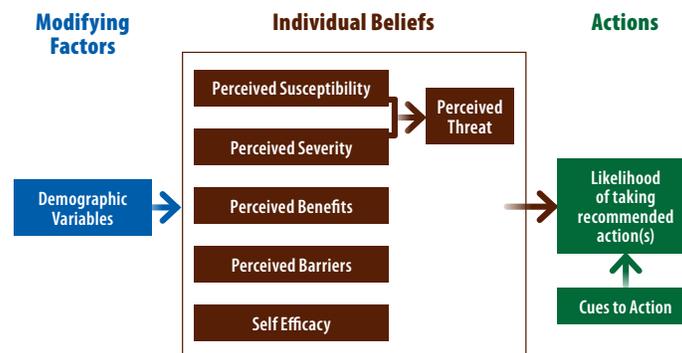
Some potential barriers I might face:

How I plan to address barriers:

Additional resources/local resources to support lead prevention actions:



Appendix E: Explanation of Champion and Skinner Health Belief Model



The Health Belief Model (HBM) shown in table 1 suggests that a person’s belief in a personal threat of an illness or disease together with a person’s belief in the effectiveness of the recommended health behavior or action will predict the likelihood the person will adopt the behavior.

The HBM comes from a psychological and behavioral theory with the foundation that the two components of health-related behavior are 1) the desire to avoid illness, or desire to get well if already sick; and, 2) the belief that a specific health action will prevent, or cure, illness. An individual’s course of action often depends on the person’s perceptions of the benefits and barriers related to health behavior. The table shows the six constructs of the HBM and how they are connected to the individuals.

1. Perceived susceptibility—This refers to a person’s subjective perception of the risk of acquiring an illness or disease. There is wide variation in a person’s feelings of personal vulnerability to an illness or disease.
2. Perceived severity—This refers to a person’s feelings on the seriousness of contracting an illness or disease (or leaving the illness or disease untreated). There is wide variation in a person’s feelings of severity, and often a person considers the medical consequences (e.g., death, disability) and social consequences (e.g., family life, social relationships) when evaluating the severity.
3. Perceived benefits—This refers to a person’s perception of the effectiveness of various actions available to reduce the threat of illness or disease (or to cure illness or disease). The course of action a person takes in preventing (or curing) illness or disease relies on consideration and evaluation of both perceived susceptibility and perceived benefit, such that the person would accept the recommended health action if it was perceived as beneficial.
4. Perceived barriers—This refers to a person’s feelings on the obstacles to performing a recommended health action. There is wide variation in a person’s feelings of barriers, or impediments, which lead to a cost/benefit analysis. The person weighs the effectiveness of the actions against the perceptions that it may be expensive, dangerous (e.g., side effects), unpleasant (e.g., painful), time-consuming, or inconvenient.
5. Cue to action —This is the stimulus needed to trigger the decision-making process to accept a recommended health action. These cues can be internal (e.g., chest pains, wheezing, etc.) or external (e.g., advice from others, illness of family member, newspaper article, etc.).
6. Self-efficacy—This refers to the level of a person’s confidence in his or her ability to successfully perform a behavior. Self-efficacy is a construct in many behavioral theories as it directly relates to whether a person performs the desired behavior.



References

7. Agency for Toxic Substances and Disease Registry (ATSDR). (2019). *Toxicological profile for Lead (Draft for Public Comment)*. Atlanta, GA Retrieved from <https://www.atsdr.cdc.gov/toxprofiles/tp13.pdf>
8. American Academy of Pediatrics Council on Environmental Health. (2016). Prevention of Childhood Lead Toxicity. *138(1)*, 1-15. doi:10.1542/peds.2016-1493 %J Pediatrics
9. Datko-Williams, L., Wilkie, A., & Richmond-Bryant, J. (2014). Analysis of U.S. soil lead (Pb) studies from 1970 to 2012. *Sci Total Environ*, 468-469, 854-863. doi:10.1016/j.scitotenv.2013.08.089
10. Draper, C., & Freedman, D. (2010). Review and Analysis of the Benefits, Purposes, and Motivations Associated with Community Gardening in the United States. *Journal of Community Practice*, 18(4), 458-492. doi:10.1080/10705422.2010.519682
11. Finster, M. E., Gray, K. A., & Binns, H. J. (2004). Lead levels of edibles grown in contaminated residential soils: a field survey. *Sci Total Environ*, 320(2-3), 245-257. doi:10.1016/j.scitotenv.2003.08.009
12. Gould, E. (2009). Childhood Lead Poisoning: Conservative Estimates of the Social and Economic Benefits of Lead Hazard Control. *117(7)*, 1162-1167. doi:doi:10.1289/ehp.0800408
13. Grosse, S. D., Matte, T. D., Schwartz, J., & Jackson, R. J. (2002). Economic gains resulting from the reduction in children's exposure to lead in the United States. *110(6)*, 563-569. doi:doi:10.1289/ehp.02110563
14. Hunter, C. M., Williamson, D. H. Z., Gribble, M. O., Bradshaw, H., Pearson, M., Saikawa, E., . . . Kegler, M. (2019). Perspectives on Heavy Metal Soil Testing Among Community Gardeners in the United States: A Mixed Methods Approach. *Int J Environ Res Public Health*, 16(13). doi:10.3390/ijerph16132350
15. Kelder, S. H., Hoelscher, D., & Perry, C. L. (2015). How Individuals, Environments, and Health Behaviors Interact. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health Behavior: Theory, Research, and Practice* (pp. 161). San Francisco, CA: Jossey-Bass.
16. Kim, B. F., Poulsen, M. N., Margulies, J. D., Dix, K. L., Palmer, A. M., & Nachman, K. E. (2014). Urban community gardeners' knowledge and perceptions of soil contaminant risks. *PLoS One*, 9(2), e87913. doi:10.1371/journal.pone.0087913
17. Laidlaw, M. A. S., Filippelli, G. M., Brown, S., Paz-Ferreiro, J., Reichman, S. M., Netherway, P., . . . Mielke, H. W. (2017). Case studies and evidence-based approaches to addressing urban soil lead contamination. *Applied Geochemistry*, 83, 14-30. doi:<https://doi.org/10.1016/j.apgeochem.2017.02.015>
18. Lovell, S. T. (2010). Multifunctional urban agriculture for sustainable land use planning in the United States. *Sustainability*, 2(8), 2499-2522.
19. Makri, A., Goveia, M., Balbus, J., & Parkin, R. (2004). Children's susceptibility to chemicals: a review by developmental stage. *J Toxicol Environ Health B Crit Rev*, 7(6), 417-435. doi:10.1080/10937400490512465
20. McClintock, N. (2012). Assessing soil lead contamination at multiple scales in Oakland, California: Implications for urban agriculture and environmental justice. *Applied Geography*, 35(1), 460-473. doi:<https://doi.org/10.1016/j.apgeog.2012.10.001>
21. Mielke, H. W., Gonzales, C. R., Powell, E. T., & Mielke, P. W. (2013). Environmental and health disparities in residential communities of New Orleans: the need for soil lead intervention to advance primary prevention. *Environ Int*, 51, 73-81. doi:10.1016/j.envint.2012.10.013
22. Mielke, H. W., Wang, G., Gonzales, C. R., Powell, E. T., Le, B., & Quach, V. N. (2004). PAHs and metals in the soils of inner-city and suburban New Orleans, Louisiana, USA. *Environ Toxicol Pharmacol*, 18(3), 243-247. doi:10.1016/j.etap.2003.11.011



23. National Center for Environmental Health (NCEH). (July 30, 2019). Childhood Lead Poisoning Prevention. Retrieved from <https://www.cdc.gov/nceh/lead/prevention/health-effects.htm>
24. National Gardening Association. (2014). *Garden to Table: A 5-Year Look at Food Gardening in America*. Retrieved from <https://garden.org/special/pdf/2014-NGA-Garden-to-Table.pdf>
25. Raes Harms, A. M., Ricks Presley, D., Hettiarachichi, G. M., & Thien, S. J. (2013). Assessing the educational needs of urban gardeners and farmers on the subject of soil contamination. *Journal of Extension*, 51(1).
26. Reyes Jessica, W. (2007). Environmental Policy as Social Policy? The Impact of Childhood Lead Exposure on Crime. In *The B.E. Journal of Economic Analysis & Policy* (Vol. 7).
27. Rollnick, S., Miller, W. R., & Butler, C. C. (2007). *Motivational Interviewing in Health Care: Helping Patients Change Behavior (Applications of Motivational Interviewing)*. New York, NY: The Guilford Press.
28. Schwarz, K., Pickett, S. T., Lathrop, R. G., Weathers, K. C., Pouyat, R. V., & Cadenasso, M. L. (2012). The effects of the urban built environment on the spatial distribution of lead in residential soils. *Environ Pollut*, 163, 32-39. doi:10.1016/j.envpol.2011.12.003
29. Skinner, C. S., Tiro, S., & Chamption, V. L. (2015). The Health Belief Model. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health Behavior: Theory, Research, and Practice* (5th ed., pp. 75-94). San Francisco, CA: Jossey-Bass.
30. Skinner, C. S., Tiro, S., & Chamption, V. L. (2015). The Health Belief Model. In K. Glanz, B. K. Rimer, & K. Viswanath (Eds.), *Health Behavior: Theory, Research, and Practice* (5th ed., pp. 75-94). San Francisco, CA: Jossey-Bass.
31. Soga, M., Gaston, K. J., & Yamaura, Y. (2017). Gardening is beneficial for health: A meta-analysis. *Prev Med Rep*, 5, 92-99. doi:10.1016/j.pmedr.2016.11.007
32. Trasande, L., & Yinghua, L. (2011). Reducing The Staggering Costs Of Environmental Disease In Children, Estimated At \$76.6 Billion In 2008. 30(5), 863-870. doi:10.1377/hlthaff.2010.1239
33. United States Environmental Protection Agency (US EPA). (2011a). *Brownfields and Urban Agriculture: Iterim Guidelines for Safe Gardening Practices*. Chicago, IL Retrieved from www.epa.gov/brownfields
34. United States Environmental Protection Agency (US EPA). (2011b). *REUSING POTENTIALLY CONTAMINATED LANDSCAPES: Growing Gardens in Urban Soils*. Washington, DC
35. United States Environmental Protection Agency (EPA). (2014). *Technical Review Workgroup Recommendations Regarding Gardening and Reducing Exposure to Lead-Contaminated Soils*. Washington, DC
36. White, R. F., Diamond, R., Proctor, S., Morey, C., & Hu, H. (1993). Residual cognitive deficits 50 years after lead poisoning during childhood. *Br J Ind Med*, 50(7), 613-622. doi:10.1136/oem.50.7.613
37. Wong, R., Gable, L., & Rivera-Nunez, Z. (2018). Perceived Benefits of Participation and Risks of Soil Contamination in St. Louis Urban Community Gardens. *J Community Health*, 43(3), 604-610. doi:10.1007/s10900-017-0459-8
38. Wuana, R. A., & Okieimen, F. E. (2011). Heavy Metals in Contaminated Soils: A Review of Sources, Chemistry, Risks and Best Available Strategies for Remediation %J ISRN Ecology. 2011, 20. doi:10.5402/2011/402647
39. Wu, J., Edwards, R., He, X. E., Liu, Z., & Kleinman, M. (2010). Spatial analysis of bioavailable soil lead concentrations in Los Angeles, California. *Environ Res*, 110(4), 309-317. doi:10.1016/j.envres.2010.02.004
40. Zahran, S., Mielke, H. W., Weiler, S., & Gonzales, C. R. (2011). Nonlinear associations between blood lead in children, age of child, and quantity of soil lead in metropolitan New Orleans. *Sci Total Environ*, 409(7), 1211-1218. doi:10.1016/j.scitotenv.2010.11.036