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Building Community Capacity Through Soil Screening, Health, Outreach, and Partnership (soilSHOP) Events

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Editor's Note: As part of our continued effort to highlight innovative approaches to improve the health and environment of communities, the *Journal* is pleased to publish regular columns from the Agency for Toxic Substances and Disease Registry (ATSDR) at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment, its impact on human health, and how to protect public health.

The findings and conclusions in this column are those of the author(s) and do not necessarily reflect the views or official position of ATSDR or CDC. The authors declare no conflicts of interest, financial or otherwise.

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Background

Lead, a naturally occurring and toxic metal in the earth's crust, is commonly used in the production of batteries and metal products (e.g., solder, pipes). Lead is present throughout the environment, including air, water, and soil, and is often found at elevated levels in contaminated soil. Lead adsorbs strongly to most soils and does not degrade in the environment. People can be exposed to lead in soil by ingestion, dermal contact, and inhalation. Lead can impact nearly all organs

or systems in the body, with the nervous system being the primary target of lead toxicity, especially during early childhood development (Agency for Toxic Substances and Disease Registry [ATSDR], 2020).

Children are more vulnerable to the adverse effects of lead exposure than adults because their nervous systems are still developing. The Centers for Disease Control and Prevention has not identified any safe blood lead level in children. Even low levels of lead in blood can affect children's learning, ability

to pay attention, and academic achievement (Centers for Disease Control and Prevention, 2024). To protect community health, the Agency for Toxic Substances and Disease Registry (ATSDR) promotes safe places for gardening and recreation by informing communities about how to prevent or reduce exposures to lead in soil. Through Soil Screening, Health, Outreach, and Partnership (soilSHOP) events, ATSDR (2024a) helps build community capacity about the risks and hazards of exposure to lead in soil.

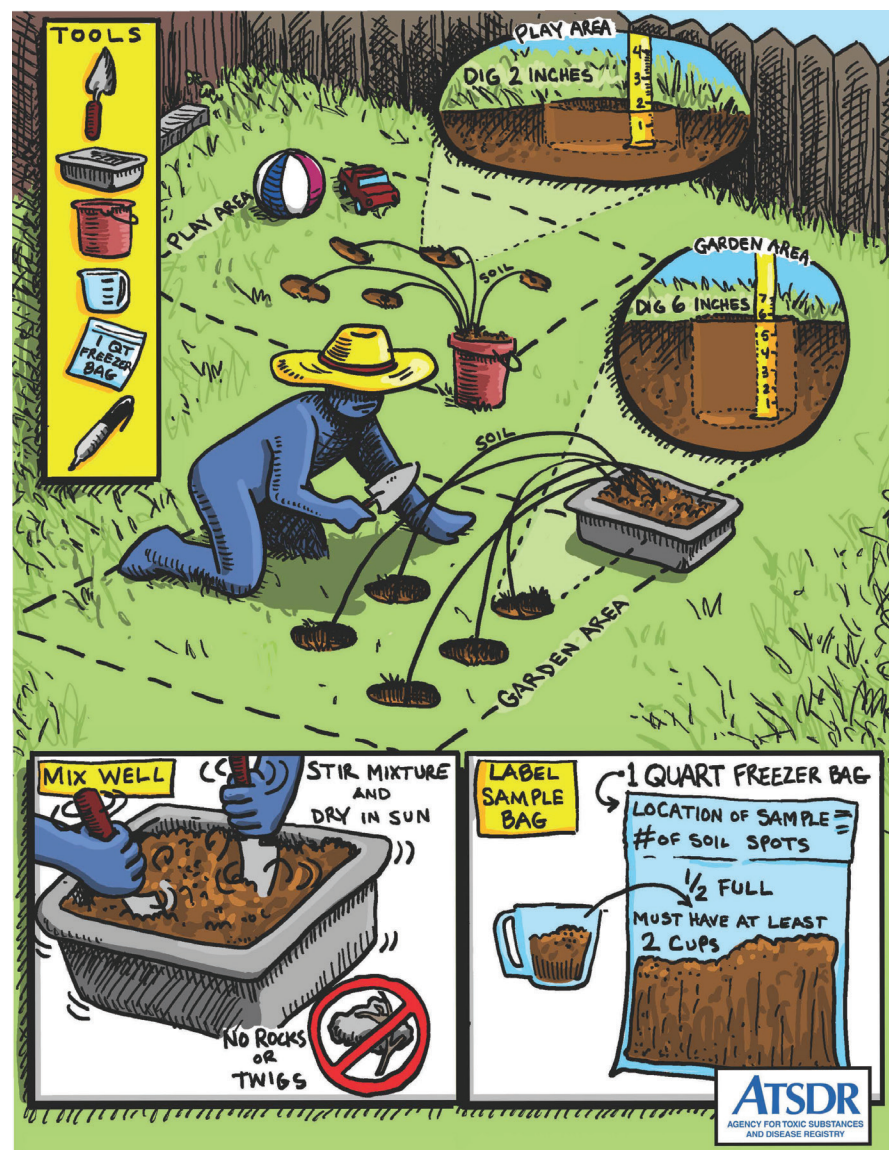
soilSHOP Events

Due to the widespread presence and known health effects of lead, especially in children, community members often have concerns about potential lead contamination in their garden or play area soils. ATSDR and partner organizations host soilSHOP events to provide free soil screenings for lead and health education on preventing lead exposure. Community members can collect and dry soil samples from their garden or play areas and bring them to the soilSHOP event. During the event, they can obtain same-day soil screening results and receive health education on keeping themselves and their children safe from exposure to lead.

During soilSHOP events, ATSDR and partners screen dried soil samples using a handheld X-ray fluorescence (XRF) spectrometer device that produces a soil screening result in just a few minutes (Binstock et al., 2008; Borges et al., 2020; U.S. Environmental Protection Agency, 2004). While XRF devices can screen soil for many metals, soilSHOP events primarily focus on lead, as it is found throughout the environment and can profoundly impact children's health. The soil

FIGURE 1

Soil Sampling Cartoon in the soilSHOP Toolkit



Note. soilSHOP = Soil Screening, Health, Outreach, and Partnership.

screening is not the same as a full yard soil assessment with validated sampling methods and protocols, and laboratory testing conducted by federal, state, and local environmental agencies, or commercial laboratories.

The soil screenings at these events lead to subsequent one-on-one consultations and health education with community members. The consultations aim to increase community member understanding of lead in the environment, potential health risks of lead

exposure, safe gardening tips, and how to reduce or prevent exposure.

Community engagement is an important part of soilSHOP events. As the cornerstone of environmental and public health, community engagement involves communication and collaboration across broad partnerships that work together to improve health. During soilSHOP events, ATSDR and partners share information about soil lead contamination and tips for reducing potential exposures.

These events provide health education directly to communities as well as opportunities for proactive community engagement.

soilSHOP Toolkit

As the interest in soilSHOP events expanded, ATSDR developed a soilSHOP Toolkit to help state and local partners and communities plan their own events (ATSDR, 2024b). The Toolkit includes:

- A 5-part tutorial series on the steps to plan a soilSHOP
 - » Background and overview
 - » Planning and preparation
 - » Log in/registration staff
 - » Soil screeners
 - » Health educators
- Four videos introducing soilSHOP
 - » What Is a soilSHOP?
 - » Outreach and Partnership Are Key
 - » Health Education: Developing Your Message
 - » The Albany soilSHOP
- Planning, Preparation, and Logistics
 - » Planning checklist
 - » Staffing and roles sheet
 - » Materials list
 - » Health and safety checklist
 - » Final checklist
 - » Log in forms in English and Spanish
 - » Sample label template
- Outreach and Partnership
 - » Communication planning guide
 - » Outreach flyer template
 - » Soil sampling cartoons (Figure 1)
 - » Promotional factsheet
- Soil Screening
 - » Soil screening guide
 - » XRF factsheet
 - » Screening result cards
- Health Education
 - » Health education planning guide
 - » Trifold brochures in English and Spanish
 - » Raised bed gardening poster
 - » Internal evaluation tool
- Follow-Up
 - » Steps for soilSHOP organizers to complete an evaluation and summary of outcomes to share with ATSDR

soilSHOP Events Are Popular!

Since 2014, ATSDR has assisted in soil screening events across the country and in the Navajo Nation, Puerto Rico, and Hawaii.



Photo 1. Benton Harbor Soil Screening, Health, Outreach, and Partnership (soilSHOP) events in 2019 (left) and 2023 (middle and right). Photos and permissions courtesy of the Agency for Toxic Substances and Disease Registry.

ATSDR and state partners host soilSHOP events, and some have shared their event summary information. For example, highlights from 35 soilSHOP events in 14 states in 2023 and 2024 include:

- 7,677 attendees
- 3,427 health education materials distributed
- 560 samples screened
- 2,010 one-to-one consultations between residents and public health professionals
- 734 referrals for more information

These highlights represent a subset of soilSHOP events from partners who provided their event summary information to ATSDR.

soilSHOP Event Success Story: Benton Harbor

The city of Benton Harbor is in Berrien County, Michigan, in the Lake Michigan watershed. From 2018 to 2021, routine water testing of Benton Harbor's drinking water exceeded the Lead and Copper Rule from the U.S. Environmental Protection Agency (U.S. EPA). Community concerns led the Michigan Department of Health and Human Services and the Berrien County Health Department to provide the community with water filters to reduce lead in tap water. Subsequently, U.S. EPA extensively tested water filter effectiveness and identified sources of lead in plumbing lines (Tully et al., 2023).

In 2019, community leaders reached out to ATSDR to provide lead education for community members. ATSDR partnered with local organizations to hold a soilSHOP event during a farmers market. Multiple craft vendors and organizations participated, and the local healthcare partner provided children's blood lead screening and outreach about

lead exposure. ATSDR screened 84 soil samples for lead.

By May 2023, the city had replaced all water service lines (Michigan Department of Environment, Great Lakes, and Energy, 2023). As a step toward rebuilding trust, local leaders asked ATSDR to provide environmental health training to increase community capacity related to environmental health. ATSDR partnered with Benton Harbor Team Solutions, Project NEED Foundation, and the National Environmental Health Association to provide a half-day Environmental Health and Land Reuse Training on risk communication (ATSDR, 2024c). After the training, the local organizations hosted a community educational event. Partners from U.S. EPA facilitated a soilSHOP event with ATSDR. The Berrien County Health Department and the Michigan Department of Health and Human Services provided information on safe drinking water, radon testing kits, and other resources. U.S. EPA screened 25 samples during the 2023 soilSHOP event.

Images of the 2019 and 2023 Benton Harbor soilSHOP events are shown in Photo 1. In both events, ATSDR and partners provided individual consultations and resources for lead-safe gardening practices. ATSDR also provided resources for confirmatory laboratory soil lead testing, with a link to U.S. EPA-certified laboratories, for people concerned about their XRF soil lead screening results. The Benton Harbor soilSHOP events helped build trust and environmental health capacity within the local community.

Benefits of soilSHOP Events

The most important benefits of soilSHOP events are health education, engagement, and

outreach for communities. The soilSHOP events offer one-to-one consultations about lead exposures and referrals for more information. These events are forums that foster in-person community engagement and are valuable opportunities to share information about lead prevention and intervention, as well as a host of other related environmental and public health topics. They increase collaboration and capacity in understanding environmental health among community members and organizations focused on improving the environment and health.

Each community is unique, and so are their soilSHOP events. The soilSHOP events are often held in combination with other events, such as health fairs, which broaden the outreach and partnerships in communities. The soilSHOP events increase community engagement opportunities while offering health education about promoting safe gardening practices and ways to reduce exposure to lead.

To learn more about soilSHOP, visit www.atsdr.cdc.gov/soilshop. 🌸

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References

Agency for Toxic Substances and Disease Registry. (2020). *Toxicological profile for*

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

Agency for Toxic Substances and Disease Registry. (2024a). *About soilSHOP*. <https://www.atsdr.cdc.gov/soilshop/about/>

Agency for Toxic Substances and Disease Registry. (2024b). *soilSHOP resources: The soilSHOP toolkits*. <https://www.atsdr.cdc.gov/soilshop/resources/>

Agency for Toxic Substances and Disease Registry. (2024c). *Environmental Health and Land Reuse Class Training overview*. <https://www.atsdr.cdc.gov/land-reuse-health-program/php/classroom-training/index.html>

Binstock, D.A., Gutknecht, W.F., & McWilliams, A.C. (2008). Lead in soil by field portable X-Ray fluorescence spectrometry—An examination of paired in-situ and laboratory ICP-AES results. *Proceed-*

ings of the Annual International Conference on Soils, 13(1). <https://hdl.handle.net/20.500.14394/43586>

Borges, C.S., Weindorf, D.C., Nascimento, D.C., Curi, N., Guimarães Guilherme, L.R., Carvalho, G.S., & Ribeiro, B.T. (2020). Comparison of portable X-ray fluorescence spectrometry and laboratory-based methods to assess the soil elemental composition: Applications for wetland soils. *Environmental Technology & Innovation*, 19, Article 100826. <https://doi.org/10.1016/j.eti.2020.100826>

Centers for Disease Control and Prevention. (2024). *CDC updates blood lead reference level*. <https://www.cdc.gov/lead-prevention/php/news-features/updates-blood-lead-reference-value.html>

Michigan Department of Environment, Great Lakes, and Energy. (2023, December 6).

Benton Harbor marks second year of meeting state and federal lead standards. <https://www.michigan.gov/egle/newsroom/mi-environment/2023/12/06/benton-harbor-marks-second-year-of-meeting-state-and-federal-lead-standards>

Tully, J.S., Shilling, S., Bosscher, V., Schock, M., & Lytle, D. (2023). *Benton Harbor drinking water study* (EPA/600/R-22/269). U.S. Environmental Protection Agency. https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=CESER&dirEntryId=357597

U.S. Environmental Protection Agency. (2004). *XRF (X-ray fluorescence) answers to frequently-asked questions*. <https://www.epa.gov/superfund/lead-superfund-sites-guidance#faq>

Did You Know?

October 9 is Children's Environmental Health Day. The observance increases the visibility of children's environmental health issues and empowers action to create a healthier, safer, and more equitable world for all children. Learn more at <https://cehday.org>.



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