



Best Practices for Food Production in Areas Suspected of Contamination

Safe gardening and farming

Urban food production offers significant opportunities for access to fresh produce, improved community health, and ecological benefits. However, because cities may have histories of contamination, there can be risks that come along with gardening in the urban environment. Research suggests that with proper precautions in site selection, assessment, sampling, management, and education, gardeners can minimize these risks and increase the benefits of food production.

Where do the risks come from?

There are dozens of different classes of contaminants found in urban environments. Some stem from past industrial and commercial operations, energy generation, and poor waste handling practices; others result from fires, spills, and historic use of products now known to pose environmental and health risks, such as lead paint, asbestos, and certain pesticides. Though contaminants may appear alarming, if proper steps are taken, exposures can be minimized, and the benefits of urban agriculture can be substantial.

In choosing safe standards, experts examine the ways that people can be exposed to contaminants through gardening. In urban gardening, this can happen in three ways: inhalation of dust; skin contact; and ingestion of soil or garden-grown produce. This handout outlines the best practices to keep gardeners, farmers, consumers, and families safe.

10 best practices to minimize on-site exposure

1. Test the soil.

Many tests examine general soil health, such as pH or organic content, but it is important to test for specific contaminants based on the researched history of the site. This may include a complete metals panel or tests for any other contaminants known to be in the area or on-site. See Groundwork USA's **Knowing Your Soil** handout for more information.



Photo: outlier*. Flickr Creative Commons

2. Incorporate clean soil, compost, or manure each year.

This adds healthy nutrients and binds metals, making them less biologically accessible to plants and consumers. Replenish compost in soil each year to ensure continued supply of nutrients, as metals from nearby sources can blow into the soil.

3. Maintain soil pH at near-neutral (6.5 or more).

A neutral pH reduces availability of most heavy metals in soils. Increasing pH can be done through addition of limestone or other amendments. (Cadmium and cobalt may be an exception to this rule and may require further protection.)

4. Wear gloves when handling soil, especially if it is believed to have contaminants.

Keeping hands clean is an important way to prevent hand-to-mouth exposure.

5. Build raised beds with clean soil, and use landscape fabric under beds.

Raised beds and landscape fabric covering the ground can help prevent roots from entering contaminated soil. Avoid treated lumber/rail ties in raised beds, and be sure that the soil comes from a clean, uncontaminated source, as even purchased soil may contain contaminants.

6. Grow plants that are less likely to take up contamination.

Certain plants and parts of plants are less likely to take up contaminants, while others are more likely. Lead uptake has been studied most frequently, but many heavy metals are believed to follow similar patterns:

- **Less likely to take up contaminants:**
Vegetable fruits (such as tomatoes, eggplants, peppers) and seeds, as well as berries and tree fruits
- **More likely to take up contaminants:**
Root crops, green leafy vegetables, broccoli, and cauliflower

7. Grow food away from areas adjacent to buildings.

Lead exposure is typically highest near buildings, where lead is likely to have entered the soil from paint, as well as near roads, where lead from gasoline is likely to have entered the soil historically.

8. Mulch walkways and areas where food and plants aren't being grown.

Covering the ground in mulch will help bind dust contaminants and prevent inhalation or dust from blowing onto crops.

9. Plant perennial shrubs, bushes, and trees around the garden.

Buffers will slow contaminated runoff and help filter air from roads and other sources of pollution.

10. Use special care with children, pregnant women, and environmental justice communities.

Watch young children carefully, and teach them to avoid hand-to-mouth soil contact. Test soil near children's play areas, when possible – and ensure that pregnant women work to minimize exposures. Environmental justice communities may face burdens of multiple types of exposures, and extra caution should be considered with vulnerable communities in areas where there are many types of contaminants (see **Children, Pregnant Women, and Environmental Justice Communities** on page 3 for more information).



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Personal practices off-site from the garden

There are important practices to follow *outside of the garden* to support health and reduce exposures, too:

Leave shoes at the door.

After getting home from the garden, take off shoes, use a doormat, and clean floors with a damp mop, as needed, to avoid tracking dirt.



Photo: K. Hurley. Flickr Creative Commons

Wash off the dirt!

- Wash hands and other exposed skin that comes in contact with the soil.
- Wash and peel vegetables to remove soil or contaminants before cooking or eating for an easy way to reduce exposure and risk.
- Wash children's hands and toys, as well as pets that may have gotten dirty while in the garden.

Eat healthy foods rich in vitamin C, calcium, and iron.

Healthy eating can help mitigate exposure to contaminants such as lead. The US EPA recommends dietary measures for people (particularly children) in areas with high lead exposures. Vitamin C, calcium, and iron, among other nutrients, can help reduce absorption of lead and protect the body from damage. Many fruits and vegetables contain these nutrients. ng contaminated soil. Avoid treated lumber/rail ties in raised beds, and be sure that the soil comes from a clean, uncontaminated source, as even purchased soil may contain contaminants.

Animal uptake of contaminants: milk, meat, and eggs

Like humans, animals may face exposure to lead and heavy metals, which can be stored in their muscle tissues. Contaminants may pose a concern to animal wellbeing, and it is possible for humans to be exposed secondhand to lead and other heavy metals indirectly via consumption of meat, milk, and eggs produced in cities. However, because humans typically eat these products as only a small portion of overall food consumption, it is unlikely that urban-produced meat, milk, and eggs will present a significant risk.

For people raising urban chickens for eggs, the following strategies are recommended to reduce exposures¹:

- Evaluate and test gardens for potential sources of lead to understand areas of risk.
- Amend the soil to cover areas where chickens run/forage. Adding clean soil or mulch helps gardeners reduce chickens' contact and ingestion of contaminated soil.
- Provide chickens with feed in contained feeders rather than scattering feed on ground that may be contaminated.
- Avoid feeding chickens unwashed garden scraps from areas where the soil has high concentrations of lead.
- Offer a calcium supplement to chickens. This reduces the amount of lead that gets into chickens' eggs.

Children, Pregnant Women, and Environmental Justice Communities

While all gardeners should take precautions to protect themselves from contaminants, risks from environmental contaminants are not distributed uniformly. Several groups of people are at higher risk.

Children and pregnant women carry increased physical vulnerabilities to contaminants. Children are more sensitive to the impacts of contaminants because they are in the growing stages of life, physically and neurologically, which leads to higher susceptibility. They are also smaller, and they tend to have more hand-to-mouth contact, which leads to greater exposure and risk. Pregnant women have high transferability to the fetus when they are exposed to contaminants.

People of color and low-income urban residents often face environmental injustices when contaminants disproportionately impact their communities. They may have a higher likelihood of living near environmentally hazardous facilities, an increased cumulative burden of different types of contaminants, and less access to health care.



Photo: Groundwork Lawrence

Residents of environmental justice communities—particularly children and pregnant women who may bear multiple exposures—should be sure to prioritize best practices and protective measures, both on- and off-site, to ensure safety and reduce risks.

Spliethoff, H., Mitchell, T., Ribaud, L., Taylor, O., Shayler, H., Greene, V., Oglesby, D. (2014.) Lead in New York City Community Garden Chicken Eggs: Influential Factors and Health Implications. *Environ. Geochem Health*. 36:633-649.