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Food and water contamination

Food and water contaminants are foreign substances that have been unintentionally added to food or water from the environment or during processing or handling. Certain contaminants are harmful to our health, and exposure to unsafe levels of these substances is associated with more than 200 health conditions, ranging from mild stomach upset to serious long-term health complications such as cancer.

Types of food and water contaminants

	 **Biological contaminants** Living organisms, also referred to as microbes (e.g., bacteria, parasites), that are capable of causing disease in humans (pathogens). When present at unsafe levels, biological contaminants can cause food spoilage and foodborne illness.	 **Environmental toxicants** Compounds that can harm animals, humans, or plants. Toxicants are often human-made industrial waste pollutants, but they can also be natural toxic substances, such as the heavy metal arsenic.	 **Natural toxins** Poisonous chemicals produced by algae, fungi, molds, and certain plants.	 **Process contaminants** Compounds formed during certain food processing techniques including drying, fermentation, high-temperature cooking (e.g., grilling), and smoking. Emissions of process contaminants can be deposited in soil and water and become environmental toxicants.
Contaminant examples	*Escherichia coli*, *Norovirus*, *Salmonella*	Approved pesticides, North American banned organochlorine pesticides (e.g., DDE, DDT, PCBs), synthetic polymers (plastics), heavy metals (e.g., lead, mercury), glyphosate (Roundup)	Aflatoxins, allergens, aquatic biotoxins, mycotoxins, poisonous mushrooms	Polycyclic aromatic hydrocarbons (PAHs)
Short-term health risks	Fever, gastrointestinal upset (e.g., abdominal pain, vomiting), meningitis	Eye and skin irritation	Acute inflammation, allergic symptoms (e.g., hives, itching, sneezing), gastrointestinal upset	Eye and skin irritation, gastrointestinal upset
Long-term health risks	Brain and nerve damage, chronic arthritis, kidney failure	Cancer, metabolic syndrome, diabetes, obesity, organ damage, developmental, hormonal, immunological, neurological, reproductive, and respiratory disorders	Cancer, coma, immune deficiency, mortality	Cancer, organ damage, developmental, immune, neurological, and reproductive disorders
Common sources of exposure	Poor sanitation practices, untreated water, unwashed fresh produce, raw or lightly cooked eggs, and raw or undercooked meat, poultry, and shellfish	Fat and skin of meat, poultry, and seafood, unwashed produce, plastic packaging (e.g., bottled water), polluted water	Moldy food, shellfish, and unidentified wild plants and fungi	Cereals, leafy vegetables, polluted water, and dried, grilled, and smoked meats, fish, and seafood

High-risk populations

Certain individuals are more sensitive to food and water contaminants than others; highly susceptible groups are more likely to become ill, remain ill for longer periods of time, undergo hospitalization, or die from the illness.

Pregnant women, infants, and children

Pregnant women, infants, and young children are more susceptible to foodborne illness due to reduced immunity. Young children are also particularly vulnerable to environmental toxicants, including pesticides. These chemicals may impact children's neurological and behavioral development, especially when harmful levels of exposure occur before the age of five.

Did you know?

Many of the chemical pesticides that build up in the body can be transferred from mother to baby while in utero or through breast milk.

Individuals with compromised immunity

The elderly, transplant patients, and individuals with certain chronic illnesses, such as cancer or diabetes, may have weakened immune systems that make them more susceptible to foodborne illnesses caused by biological contaminants. Older individuals are also more likely to experience negative health effects from environmental toxicants, such as pesticides. Most pesticides accumulate in fat tissue and begin to cause negative health implications as we age. Coupled with weaker organ function due to age, the liver and kidneys are not able to remove pesticides from the body as efficiently.

Tips to limit contaminant exposure

Hazardous contaminant exposure generally occurs at very low levels; however, repeated exposure can lead to negative health effects. The following tips can help minimize the consumption and impact of potentially harmful substances in food and water.

Consume a balanced diet

Eating a balanced diet that is rich in fruits, vegetables, and whole grains supports the immune system and protects against various chronic diseases. The nutrients in a healthy diet support immune cells. Dietary fiber is an essential component of a healthy diet, and evidence suggests that a fiber-rich diet decreases the risk of certain cancers, including breast cancer and colon cancer. Fiber also supports detoxification by binding to metabolized toxins in order to safely remove them from the body.

Adequate hydration is another way to support toxin removal from the body. Proper functioning of our kidneys and liver, the body's natural detoxification organs, relies greatly on balanced water intake. Water may also be a source of dietary minerals, which can help prevent the absorption of heavy metals.

Eat organic whenever possible

Buying organic produce can help reduce your exposure to herbicide and pesticide residues, as even after washing, peeling, or scrubbing, residues can still be found in many foods. Certified organic foods are grown and processed according to federal guidelines set by the U.S. Department of Agriculture (USDA). These guidelines address many factors, including soil quality, animal raising practices, and the use of additives and synthetic pesticides.

Though ingestion of any pesticide can be harmful, synthetic pesticides may be especially concerning due to their persistence in the environment and the human body. DDT (dichloro-diphenyl-trichloroethane), one of the first modern synthetic pesticides, was banned in the United States and Canada in 1972 due to its adverse environmental and health effects. Decades later, residues of this chemical may still be found in crop soils and water supplies.

Using data collected from the USDA, Consumer Reports summarized the relative risks of pesticide exposure of various fruits and vegetables. The table below displays the risk categories of conventionally grown produce from various countries. Use this table to make informed decisions about purchasing organic or conventionally grown produce.

Conventional produce

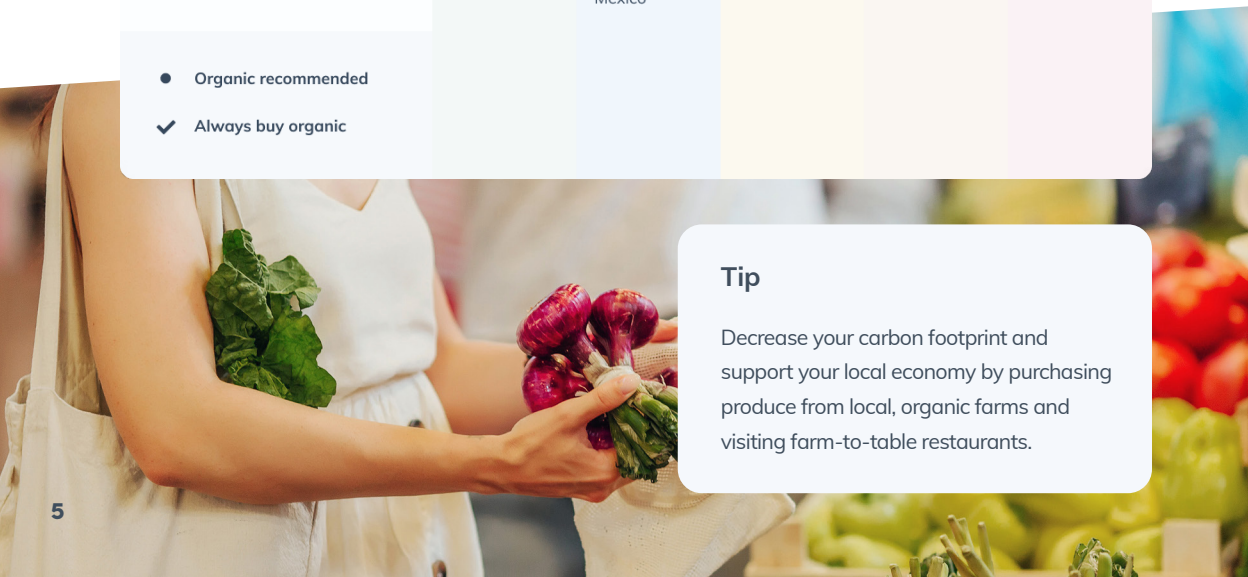
Buy conventional produce from countries with low or very low risk, and choose organic produce from countries with medium, high, or very high risk.

Produce	Buy organic	Very low	Low	Medium	High	Very high
Apples	●		New Zealand		USA	
Avocado	●	Chile, Mexico, Peru				
Blueberries	●	Uruguay	Argentina, Canada, Chile, USA			
Broccoli	●	USA	Mexico			
Cantaloupe	●	Honduras, Mexico	Costa Rica, Guatemala		USA	
Carrots	✓			Canada, Mexico, USA		
Cherries	●		USA			
Cranberries	✓			USA		
Cucumbers	●		Canada		Mexico, USA	
Grapes	●		Chile, Mexico, Peru, USA			
Green beans	✓			Guatemala	Mexico	USA
Hot peppers	✓				USA	Mexico
Kale	●		Mexico	USA		
Lettuce	●		Mexico, USA			
Mangoes	●	Mexico	Guatemala	Brazil		
Nectarines	✓			USA	Chile	

Produce	Buy organic	Very low	Low	Medium	High	Very high
Onions	●	Peru, USA				
Oranges	●		Chile, South Africa, USA			
Peaches	✔				Chile, USA	
Pear	●		Argentina, USA			
Pineapple	●	Costa Rica, Ecuador, Mexico, USA				
Raspberries	●		Mexico, USA			
Strawberries	✔				USA, Mexico	
Sweet bell peppers	✔				USA	Mexico
Sweet corn	●	Mexico, USA				
Sweet potatoes	✔				USA	
Tomatoes	●		Canada	USA	Mexico	
Watermelon	●	Guatemala	Honduras, Mexico, USA			
Winter squash	●	Guatemala	Honduras, Mexico		USA	

● Organic recommended

✔ Always buy organic



Tip

Decrease your carbon footprint and support your local economy by purchasing produce from local, organic farms and visiting farm-to-table restaurants.

Follow food safety procedures

According to the Centers for Disease Control and Prevention (CDC), one of every six people contract foodborne infections each year. Practicing food safety is an important aspect of preventing foodborne illness that begins at the grocery store.

Choose

- Fresh, local produce when possible
- Items that do not appear bruised, moldy, or otherwise damaged (e.g., dented can, torn packaging)
- Refrigerated items that are cold, and frozen items with no signs of thawing

Keep

- Raw meat, poultry, seafood, and eggs away from other foods in your shopping cart, bags, and fridge
- Your refrigerator below 40°F (4°C)
- Leftovers for no more than four days

Clean

- Your hands thoroughly before and after touching food
- Fruits and vegetables under running water by gently rubbing with your hands or scrubbing with a produce brush
- Your counters and cooking utensils immediately after use
- Your refrigerator and storage areas regularly

Cook

- Meat after trimming visible fat, as many residues are fat soluble
- With a thermometer to ensure foods meet their minimum temperature
- Beef, pork, lamb: 145°F (63°C)
- Fish: 145°F (63°C)
- Ground beef, pork, lamb: 160°F (71°C)
- Turkey, chicken, duck: 165°F (74°C)

Exercise regularly

According to the CDC, adults should get at least 150 minutes of moderate exercise or 75 minutes of vigorous exercise each week. That's just 30 minutes of moderate exercise or a minimum of 15 to 30 minutes of vigorous exercise per day, five days per week. Daily exercise can support toxin elimination through sweating, which can help the body excrete heavy metals.

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This handout was developed and medically reviewed by Fullscript's Integrative Medical Advisory team.
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