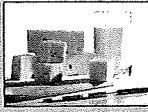



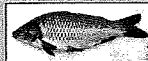





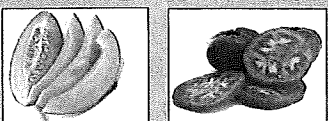



Table 2.2: Food Most Likely to Become Unsafe	
	Milk and dairy products
	Meat: beef, pork, and lamb
	Eggs (except those treated to eliminate <i>Salmonella</i> spp.)
	Poultry
	Fish
	Shellfish and crustaceans
	Baked potatoes
	Heat-treated plant food, such as cooked rice, beans, and vegetables
	Tofu or other soy protein; synthetic ingredients, such as textured soy protein in meat alternatives
	Sprouts and sprout seeds
	Sliced melons and cut tomatoes
	Untreated garlic-and-oil mixtures

To control temperature, foodhandlers must keep TCS food out of the temperature danger zone. But the reality is that TCS food is most likely going to spend some time in this range. Restaurant and foodservice workers must limit how long the TCS food actually spends in the temperature danger zone.

Like TCS food, ready-to-eat food also needs careful handling to prevent contamination. **Ready-to-eat food** is exactly what it sounds like: food that can be eaten without further preparation, washing, or cooking. Some examples of ready-to-eat foods include washed fruit and vegetables both whole and cut, deli meat, bakery items, sugar, spices, seasonings, and cooked food.

Viruses

Viruses are the leading cause of foodborne illness. Restaurant and foodservice managers must understand what viruses are and how they can make people sick. Most importantly, managers must know how to prevent viruses from making customers sick.

Viruses can survive refrigerator and freezer temperatures. They can't grow in food, but once they are eaten, they grow inside a person's intestines. Viruses can be transferred from person to person, from people to food, and from people to food-contact surfaces. Examples of viruses that can cause foodborne illness include hepatitis A and Norovirus.

People carry viruses in their feces and can transfer them to their hands after using the restroom. Food can become contaminated if hands are not washed the right way. The best ways to prevent the spread of viruses are to stay home if you've been vomiting or have diarrhea or jaundice (yellowing of skin and eyes), to wash your hands at the right times and in the right way, and to avoid using bare hands to handle ready-to-eat food.

Bacteria

Bacteria also cause many foodborne illnesses. Figure 2.4 depicts a microscopic view of bacteria.

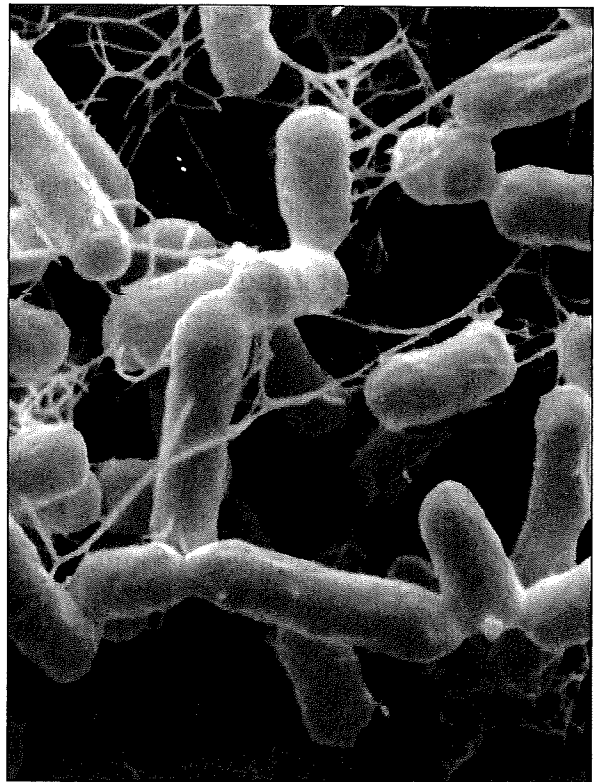


Figure 2.4: Bacteria cause many foodborne illnesses.

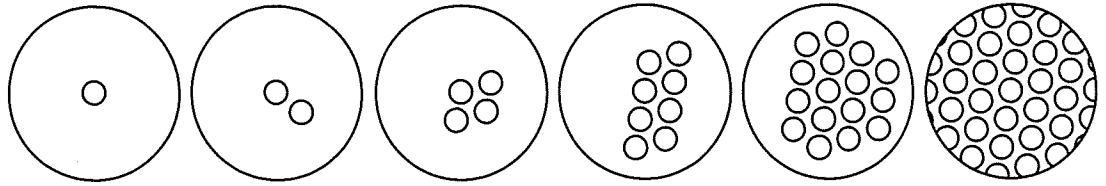


Figure 2.5: Bacteria growth at 20-minute intervals.

Knowing what bacteria are and how they grow can help you to control them. If FAT TOM conditions are right, bacteria will grow rapidly, doubling their number as often as every 20 minutes, as shown in Figure 2.5. Some bacteria, as they grow and die, create toxins (poisons) in food. Cooking may not destroy these toxins, and people who eat them can become sick. Examples of foodborne bacteria include *Salmonella* spp., shiga toxin-producing *E. coli*, and *Clostridium botulinum*.

You can control most bacteria by keeping food out of the temperature danger zone.

Parasites

In the United States, illnesses from **parasites** are not as common as those from viruses and bacteria. However, it is still important to understand what parasites are and how to prevent contamination. Figure 2.6 shows images of parasites, bacteria, and viruses.

Parasites cannot grow in food. They need to live in a host organism to grow. A **host** is a person, animal, or plant on which another organism lives and feeds. Parasites can live in cows, chickens, pigs, and fish—many types of food that humans like to eat. They also can contaminate water. Examples of parasites that can cause illness include *Cryptosporidium parvum* and *Giardia duodenalis*.

The most important measure that restaurant and foodservice managers can take to prevent parasites is to purchase food from approved, reputable suppliers.

Fungi

Fungi can cause illness, but most commonly they are responsible for spoiling food. Fungi are found in air, soil, plants, water, and some food. Mold and yeast are two examples of fungi.

Mold that is visible to the human eye is actually a tangled mass of thousands of tiny mold plants. Molds share some basic characteristics. They grow under

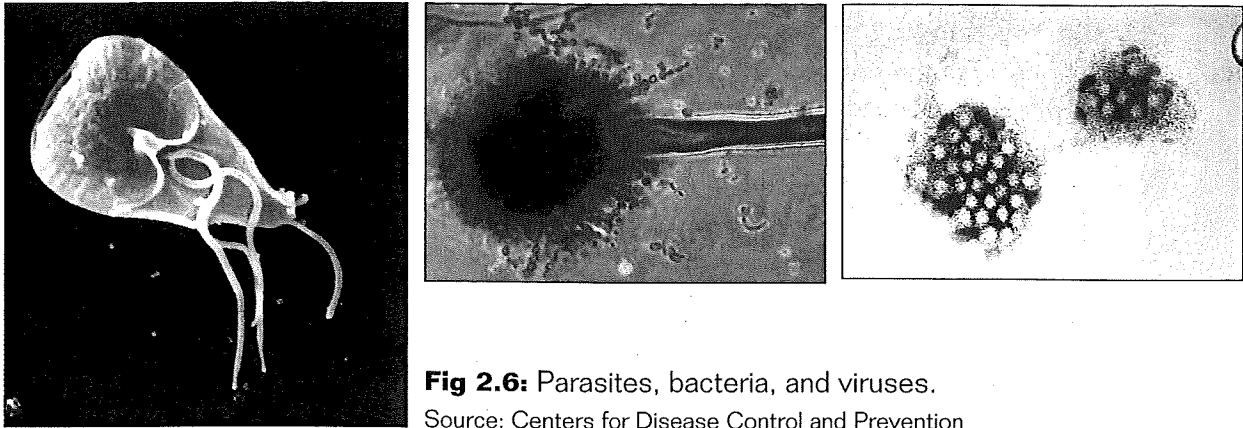


Fig 2.6: Parasites, bacteria, and viruses.

Source: Centers for Disease Control and Prevention

almost any condition, but especially well in acidic food with little moisture. Examples are jams, jellies, and cured, salty meat such as bacon. Molds often spoil food and sometimes produce toxins that can make people sick. Refrigerator and freezer temperatures may slow the growth of molds, but cold doesn't kill them. Figure 2.7 shows mold on cheese. Sometimes mold is intentionally used to affect the flavor or characteristics of a product, especially in some cheeses, such as Brie, Camembert, and Gorgonzola. Unless the mold is a natural part of the product, throw out all moldy food.

Yeast can spoil food quickly. The signs of spoilage include the smell or taste of alcohol, white or pink discoloration, slime, and bubbles. Figure 2.8 shows what yeast looks like on jam.

Like molds, yeasts grow well in acidic food with little moisture. Examples include jellies, jams, syrup, honey, and fruit or fruit juice. Throw out any food that has been spoiled by yeast.

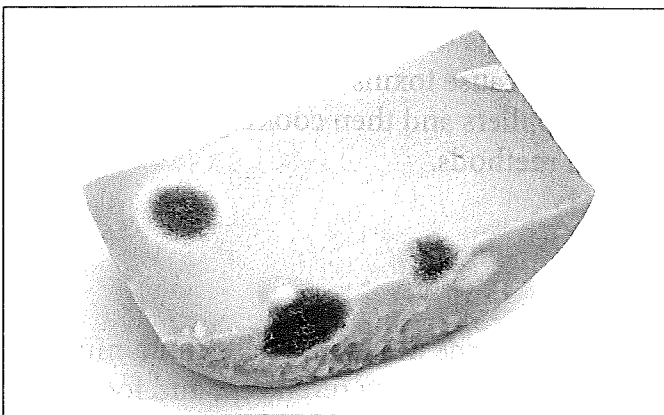


Figure 2.7: Mold is a type of fungus found on spoiled food.



Figure 2.8: Yeast can cause discoloration, slime, bubbles, and odors on refrigerated foods such as jams and jellies.

[fast fact]

Did You Know...?

Ever heard of the five-second rule? It implies that if food drops on the floor and is picked up within five seconds, it won't get contaminated with bacteria. Next time you drop food on the floor, remember that a clean-looking floor isn't necessarily clean. Any food that makes contact with the floor can pick up pathogens.

Biological Toxins

Pathogens make biological toxins, or poisons. Sometimes certain kinds of plants or animals contain toxins naturally or because that plant or animal has been contaminated itself somewhere in the food chain. Toxins can make people sick, so restaurant and foodservice managers must be aware of them.

Seafood toxins, which can contaminate fish or shellfish, make seafood unsafe. Seafood toxins may be a natural part of the food, made by pathogens on the seafood, or form when toxic algae are eaten by the fish or shellfish. When people eat contaminated seafood, they cannot taste or smell these toxins. Food-handlers cannot destroy toxins by freezing or cooking, either, once they form in food. The best way to prevent illness from this source is to purchase seafood from approved, reputable suppliers.

Most people who get sick from mushroom toxins have eaten poisonous wild mushrooms collected by amateur hunters. Many types of mushrooms look alike, and it is easy to mistake toxic varieties for edible ones. Mushroom toxins can't be destroyed by cooking or freezing. Buying mushrooms from approved, reputable suppliers is the best way to prevent illness from this source.

Illnesses from plant toxins usually happen because products were purchased from an unapproved supplier or because items weren't cooked correctly. For example, undercooking kidney beans may cause toxins to form in the beans. Purchasing from approved, reputable suppliers and then cooking and holding dishes correctly are the best prevention methods.

Chemical Contamination

Chemicals have caused many cases of foodborne illnesses. These contaminants come from everyday items that may be found in many restaurant and food-service operations.

Restaurant and foodservice chemicals can contaminate food if they are used or stored in the wrong ways. This includes cleaners, sanitizers, polishes, and machine lubricants. Store chemicals in a separate area away from food, utensils, and equipment used for food. Always follow the manufacturers' directions when

using chemicals, and be careful when using them while food is being prepared. Figure 2.9 shows an example of inappropriate chemical storage.



Figure 2.9: These chemicals are not stored properly, which can cause contamination of food.

Some utensils and equipment contain toxic metals that can contaminate acidic food. A person who then eats this food gets toxic-metal poisoning. This illness is frequently caused by using equipment with lead, copper, or zinc. When an acidic food, such as tomato sauce, comes in contact with the metal, the acid may dissolve some of the metal into the food. To prevent toxic-metal poisoning, you should only use utensils and equipment, including kettles, pots, serving ware and pans, that are made for handling food.

Physical Contamination

Physical contamination happens when objects get into food. These objects can be naturally occurring, such as the bones in fish. Others result from accidents and mistakes. Figure 2.10 shows examples of physical contaminants. Physical contaminants include the following:

- Metal shavings from cans
- Glass from broken lightbulbs
- Fingernails, hair, and bandages
- Jewelry
- Fruit pits

Most physical contamination can be prevented by inspecting food closely, practicing good personal hygiene, and following preparation procedures.

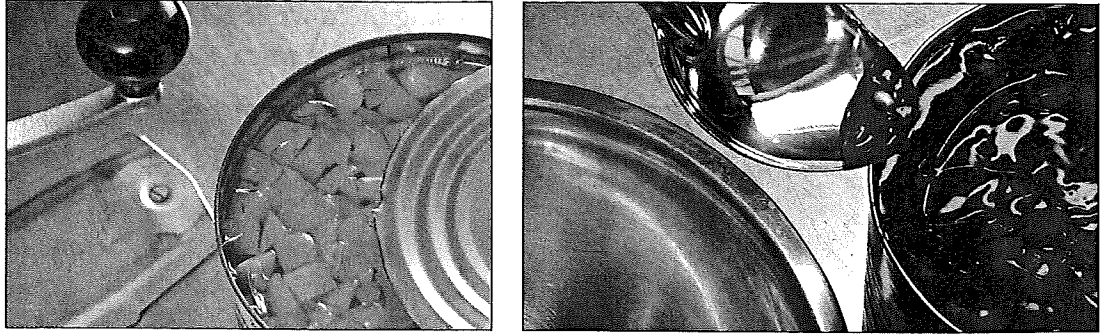


Figure 2.10: Foodservice employees must be careful to avoid physical contamination of food from metal can shavings and fruit pits.

Food Defense

The prevention measures discussed throughout this section will help prevent accidental contamination of food. But restaurant and foodservice employees also must take steps to prevent people from purposely contaminating food. Competitors, vendors, former employees, or terrorists may try to tamper with the food in your operation. Attacks might occur anywhere from the farm to the restaurant. They are usually focused on a specific food item, a manufacturing process, or a business. For example, someone might choose to target the manufacturing of a common food product, like peanut butter, because so many people would be affected.

One important way to prevent tampering is to control access to the operation's food storage and preparation areas. Uniforms and nametags help identify staff and vendors. Security badges also help ensure that only the people who belong there are in the specific food area. All employees in an operation, from busser to executive chef, should report anything that seems suspicious. As the saying goes, "If you see something, say something."

Allergens

The number of people in the United States with food allergies is increasing. A **food allergy** is the body's negative reaction to a food protein. People with food allergies can become sick or even die from eating even the smallest amount of a triggering allergen. In a restaurant or foodservice operation, managers, servers, and kitchen staff must each do their part to keep customers with food allergies safe.

The following is a list of the major allergens in the United States. They account for 90 percent of all food-allergic reactions:

- Milk and dairy products
- Eggs and egg products
- Fish

- Shellfish (crab, shrimp, lobster)
- Wheat
- Soy and soy products
- Peanuts
- Tree nuts, such as pecans and walnuts (see Figure 2.11)

Employees should be aware of these food items and the menu items that contain them.

When serving customers with food allergies, servers must be ready to answer customers' questions about any menu item. Specifically, they should be able to do the following:

- Tell the customer how each dish is made.
- Tell the customer about any “secret” ingredients that may contain allergens. While you might not want to share these recipes with the public, you still must be able to tell the “secret” items when asked.
- Suggest alternative menu items that don't have the food allergen.

Servers should never take a guess about what a menu item contains. If they don't know, they should ask someone who does, such as the manager or kitchen staff.

When preparing food for customers with food allergies, kitchen employees must make sure that allergens are not transferred from food containing an allergen to the food served to the customer. This is called **cross-contact**. Figure 2.12 illustrates the steps that kitchen staff must take to avoid cross-contact.

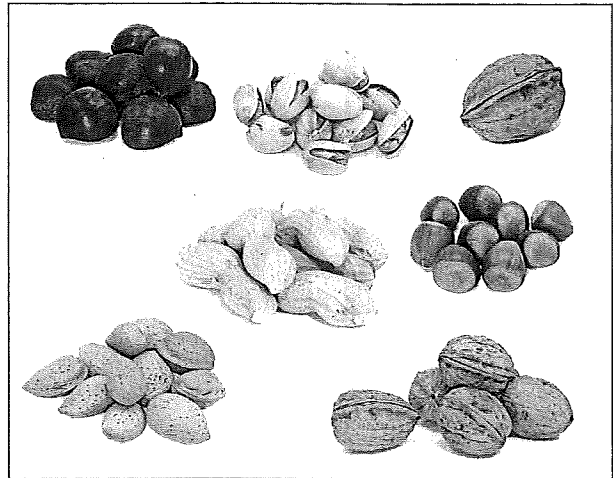


Figure 2.11: Tree nuts and peanuts are a common allergen.

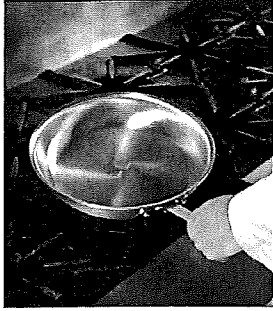
[fast fact]

Did You Know...?

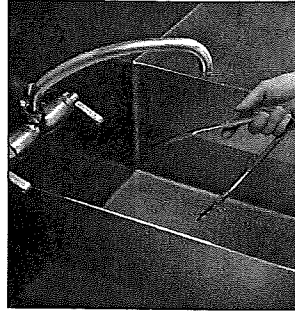
Food allergies vary from irritating to life threatening. Each year in the United States, approximately 30,000 people go to the emergency room to get treated for severe allergies. It is estimated that 150–200 Americans die because of allergic reactions to food each year.

Allergies affect 2 percent of adults and 4–8 percent of people in the United States. While there are treatments for the reactions caused by allergies, there is no cure for food allergies themselves. Signs of a food allergy reaction include hives, itching in and around the mouth, swelling of body parts, fainting, and difficulty breathing.

A severe reaction, known as anaphylaxis, is life threatening and requires immediate attention. Signs of a severe reaction include swelling of the throat, extreme difficulty breathing, shock with a drop in blood pressure, and loss of consciousness.



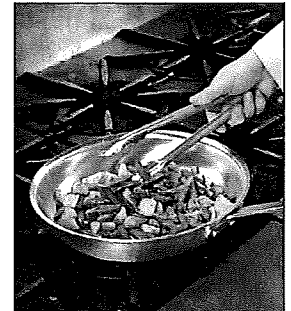
1. Make sure the allergen doesn't touch anything that is going to be served to or used by these customers, including food, beverages, and utensils, or anything that is used in preparing food for them, such as equipment and gloves.



2. Wash, rinse, and sanitize cookware, utensils, and equipment before preparing their food.



3. Wash your hands and change gloves before preparing their food.



4. Use equipment assigned only for preparing their food.

Figure 2.12: Kitchen staff must follow specific steps to avoid cross-contact.

[on the job]

Peanut Allergy and Kitchen Equipment

Food often makes a long journey before it arrives on a customer's table, from the farm or ocean to the fork. For a person with a peanut allergy, a long process presents many opportunities for food or equipment to come into contact with peanuts. More children and adults are allergic to peanuts now than at any previous time in recorded history. It is important for restaurant and foodservice operations to be aware of any peanuts in recipes and of equipment contact with peanuts. If a customer has an allergy and asks about peanuts in a menu item, the server must give accurate information. If a peanut-allergic person is exposed and has an anaphylactic response, it will be immediate and life threatening.

In the event of a peanut or other allergy problem, call 911 immediately, and get help from the people in the area. The victim should be given an injection of epinephrine (EpiPen is a very common brand of auto-injector) and an antihistamine (Benadryl) as soon as possible to help keep airways open. Some individuals carry their own and can self-administer. Do not wait or delay. Do not try to drive the person to the ER, but have an ambulance come to you. The paramedics have epinephrine in case more is needed.

Prevention of food-allergy problems is especially critical in dormitories or schools where young people eat meals daily in a foodservice facility away from home.

U.S. Regulation of Food Safety

Today, many government departments monitor food safety. In the United States, most regulations that affect restaurant and foodservice operations are written at the state level. However, federal, state, and local governments are all involved.

The Food and Drug Administration (FDA) writes the *FDA Food Code*, which recommends specific food safety regulations for the restaurant and foodservice industry. But the code is not actual law. Each state decides whether to adopt the *FDA Food Code* or some form of it as law. The laws passed at the state level are then enforced by state or local (city or county) health departments. Health inspectors from city, county, or state health departments conduct inspections in most states.

[fast fact]

Did You Know...?

According to Gallup, 71 percent of Americans have a fair amount or great deal of confidence in the federal government to ensure the safety of the food supply in the United States.

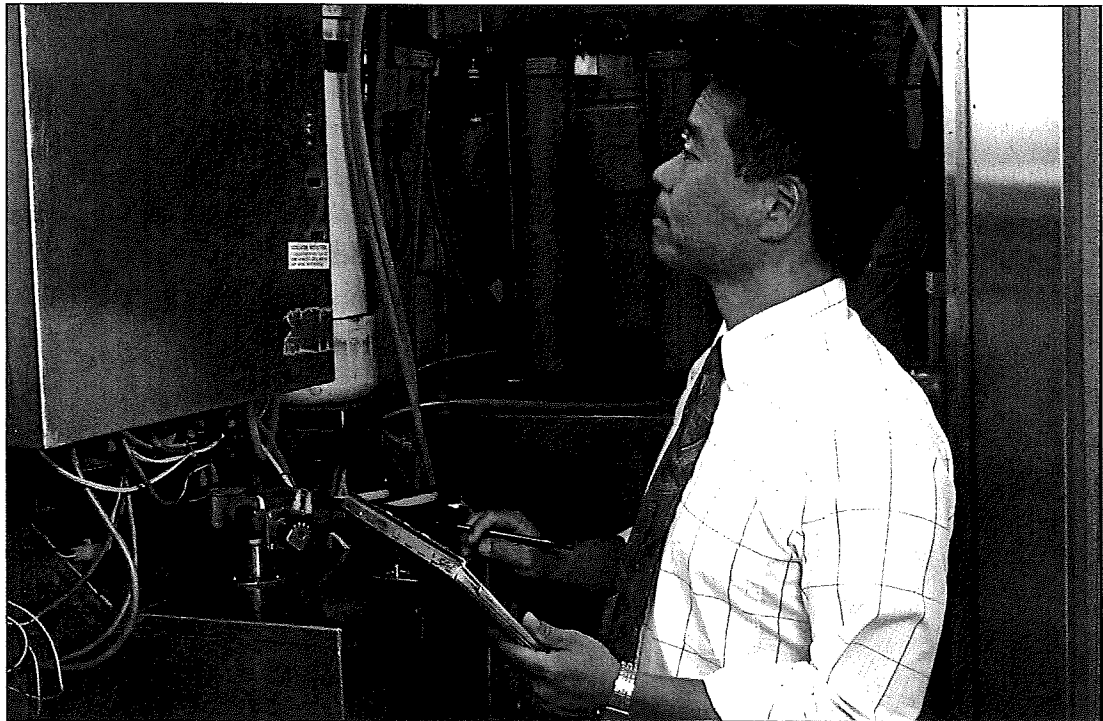


Figure 2.13: Health inspectors ensure that an operation is following all food safety laws.

An **inspection** is a formal review or examination conducted to see if an operation is following food safety laws. All operations serving food to the public, from quick-service restaurants to hospitals, nursing homes, and schools, are inspected. The most important reason for inspections is that failing to keep food safe can put the health of customers at risk. Failing an inspection could also result in an operation going out of business. Figure 2.13 on the previous page shows an inspector during an inspection.

[on the job]

Public Health Inspector

Public health inspectors play different roles, but their goal is always the same: to improve public safety. Some inspectors investigate restaurants and other foodservice facilities to make sure that all health and safety rules within the jurisdiction are being observed. Most facilities inspected fare well; the inspector identifies any concerns and educates management and employees. However, occasionally kitchens don't do well on the inspection, and the inspector finds major errors in day-to-day operations. In these instances, the health inspector has the authority to fine the business or even, if the problems are severe, close the facility. After the inspection, the inspector will write a report so that both management and the local government know the results.

Some health inspectors investigate wells and septic systems to prevent threats to the public water supply. Others may focus on environmental concerns, like air or soil pollution. And still others may investigate processing plants, such as slaughterhouses.

To become a public health inspector, a four-year degree in public health, food science, or a related field is usually required, as are a strong interest in science and good communication skills. Local governments often require prospective inspectors to pass additional examinations before they can be hired.

Successful restaurant and foodservice managers understand local food safety requirements and design policies that address them. They also conduct their own self-inspections. A self-inspection should check for the same things that a health inspector would, so that an operation is always prepared and functioning appropriately.

Summary

In this section, you learned the following:

- A foodborne illness is a disease transmitted to people by food. A foodborne-illness outbreak is when two or more people get the same illness after eating the same food.
- The costs of a foodborne-illness outbreak include financial costs to the restaurant or foodservice operation and human costs: loss of time at work, medical expenses, long-term disability, and possibly death.
- High-risk populations include people with weakened immune systems: the elderly, infants, preschool-age children, pregnant women, and people with HIV/AIDS or cancer, as well as people on chemotherapy and transplant recipients. They have a higher risk of getting a foodborne illness.
- Pathogens need six conditions to grow. These conditions can be remembered by FAT TOM: food, acidity, temperature, time, oxygen, and moisture.
- Those foods that need time and temperature control for safety, such as milk or fish, are called TCS foods. Ready-to-eat food also needs careful handling to prevent contamination.
- Contamination from biological toxins can be prevented by purchasing from approved, reputable suppliers and then cooking and holding dishes correctly.
- To store chemicals properly, you must keep them in a separate area away from food, utensils, and equipment used for food. Then follow safe storage rules.
- A food defense system helps to prevent people from purposely contaminating food. One important way to prevent tampering is to make sure access to an operation's food is controlled through use of uniforms and name tags.
- The most common allergens include milk and dairy products, eggs and egg products, fish, shellfish, wheat, soy, peanuts, and tree nuts. To prevent allergic reactions, servers must be able to answer questions about any ingredients in menu items. In addition, kitchen employees must be sure that allergens are not transferred by cross-contact.
- The restaurant and foodservice industry is monitored by many agencies. The FDA writes the *FDA Food Code*, and each state adopts the code as it sees fit. State and local health departments then enforce these laws.

Section 2.1 Review Questions

- 1 Describe the four types of pathogens that can contaminate food and cause foodborne illness.
- 2 Which populations have a higher risk of getting a foodborne illness and why?
- 3 List the three types of hazards that make food unsafe.
- 4 How can servers prepare to address the needs of customers with food allergies?
- 5 Melisa Bouchard indicates that guests expect their food to be safe. Is this something that you think about when you go out to eat? Why or why not?
- 6 Linda and Chef Jean are setting up a self-inspection for Uptown Grille. Given the situation that they faced today, where should they focus their attention?
- 7 How are the federal, state, and local governments each involved in food safety? Do you think this system works well? If not, what would you change?
- 8 A diner was eating at a restaurant. In a plate of noodles was a rather large shard of broken, off-white ceramic. Upon finding this physical hazard, the diner showed the problem to the server and requested a replacement plate of noodles. What should the manager of the restaurant do for the customer? What should the manager do to make sure this situation doesn't happen again?

Section 2.1 Activities

1. Study Skills/Group Activity: How to Work Safely

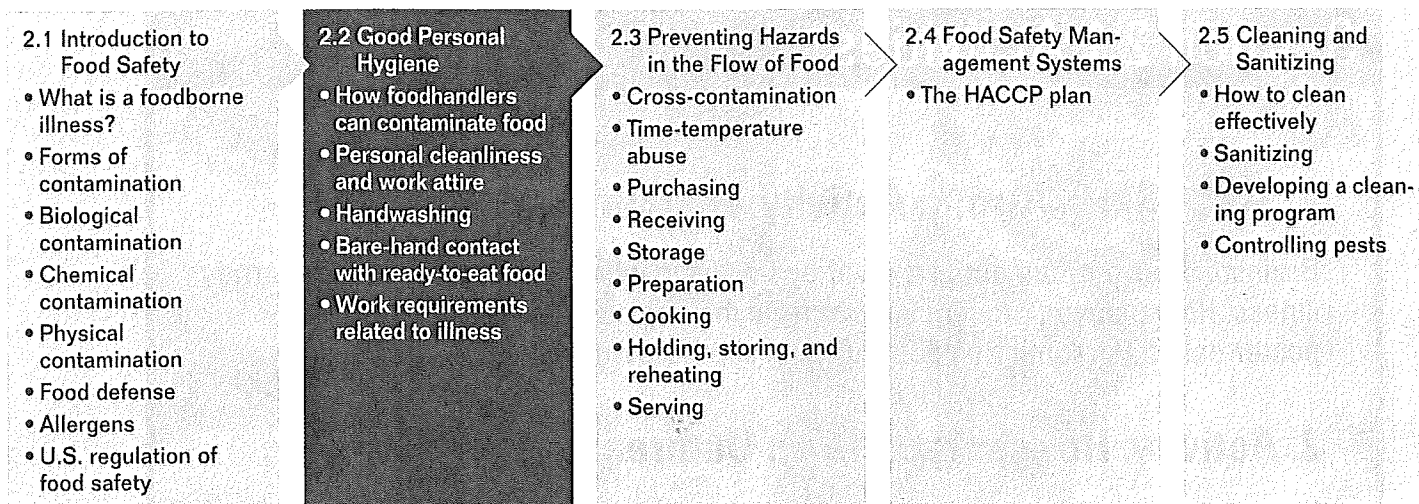
Brainstorm as a group about the various ways in which viruses cause foodborne illness. How can you prevent viruses from making customers sick? Create a poster called Personal Hygiene Rules for the Uptown Grille.

2. Activity: How to Handle an Outbreak

In recent years, there have been numerous incidents of foodborne illness making national and international headlines. Select one episode, and write two paragraphs on it, describing the source of the problem, the identity of the pathogen, the number of people affected, and the steps taken to rectify the situation.

3. Critical Thinking: Keeping Food Safe

Most restaurants go to great lengths to ensure that they serve safe food. However, this activity usually stays behind the scenes. How can foodservice establishments highlight all this effort for customers? Is keeping food safe a marketing opportunity? If you were designing a marketing campaign based on food safety, what would your focus be?



SECTION 2.2 GOOD PERSONAL HYGIENE

Good personal hygiene is a key factor in the prevention of foodborne illnesses. Any employee in a restaurant or foodservice operation can accidentally contaminate food. He or she might not even realize it when it happens. Successful managers help to make personal hygiene a priority.

Study Questions

After studying Section 2.2, you should be able to answer the following questions:

- What personal behaviors contaminate food?
- What are the steps to proper handwashing, and when should hands be washed?
- What are proper personal cleanliness practices?
- What is proper work attire?
- How should ready-to-eat food be handled?
- When should foodhandlers be prevented from working with or around food?

How Foodhandlers Can Contaminate Food

As you have learned, foodhandlers can contaminate food in a variety of situations:

- Having a foodborne illness
- Having wounds that contain a pathogen