

**Food Safety Curriculum for Secondary School Students****Lesson 1: Why is Food Safety Important?****Major concepts from unit:**

- Why food safety is important.
 - * Define
 - * Why Study
 - * Causes
 - * Top Ten Microorganisms
 - * Factors Affecting Growth of Microorganisms

Terminal Objective: To describe the six factors affecting microbial growth. (C-C)

Establishment of Set: Students view a skit depicting two friends who just ate at a fast food restaurant about 4 hours ago. One calls the other to ask how he/she is feeling and they start describing some typical food-borne illness symptoms.

Objective 1 – To define food-borne illnesses. (C-C)

Content	Learning Experience
1. Food-borne illness is a sickness resulting from eating food that is not safe to eat. It can be a mild illness with just a few stomach pains to something more serious with terrible diarrhea, nausea and vomiting. Food-borne illness can even be fatal in some extreme cases.	1. Students will copy definition from overhead or power point presentation. Discuss any questions they have.

Objective 2 – To explain why it is important to learn about food safety. (C-C)

Content	Learning Experience
<p>2. Food-borne illness is serious business! According to the Centers for Disease Control and Prevention, food-borne illness in the United States affects millions of people every year. It has even caused thousands of deaths. In fact, each year food-borne illnesses kill up to 9,000 people. They also cause fever, stomach cramps, vomiting, and diarrhea in almost 80 million Americans, or about 1 in 3 people every year!</p> <p>There are many things families and kids can do to keep their food safe. Education is the key to prevention. Learn what causes food-borne illness and how to prevent it from occurring. You'll need to know how</p>	<p>2. Teacher will have cut up strips of paper. She/He will need exact number of strips to number of students. On one-third of the strips of paper she/he will have marked some way. (For example, there are 21 students. You need 21 pieces of paper, with 7 of the papers marked in some way.) All papers need to be folded so students can not see if they are receiving a marked strip of paper. Teacher will pass basket with strips of paper around to class. Each student will pick a strip of paper; they are to not open the paper yet. All students will stand up, then look at their papers. If the student's piece of paper is marked, they are to sit down. Teacher will discuss that the number of students that sat represented the</p>



Food Safety Curriculum for Secondary School Students

to prevent food borne illness at home, at school and when you're eating out at places like restaurants, picnics and parties.	number of Americans who get food borne illnesses. Listen as teacher explains statistics on food-borne illness, which are on transparency. Listen as teacher explains that the best way to keep you and family safe is to be educated.
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Objective 3 - To explain what causes food-borne illness. (C-C)	
Content	Learning Experience
<p>3. Food-borne illness occurs when the food we eat becomes contaminated with microorganisms that cause us to get sick. Microorganisms are tiny living creatures that can only be seen with a microscope. Microorganisms include different kinds of bacteria, viruses, and parasites. There are many microorganisms, and some of them can even be good for us. For example, some “good” bacteria are used to make yogurt and cheese. However, when the bad microorganisms get into our food, they can end up in our body and we can get very sick. In extreme and rare cases, people can even die. Those people most at risk of getting sick from food-borne illness include very young children, the elderly, pregnant women and people who are sick already. People who are already sick have an immune system that isn't working well and they have trouble fighting off sickness.</p> <p><i>How can you tell if your food is contaminated with microorganisms?</i></p> <p>You can't! That's what makes food-borne illness such a problem. You can't see, smell or taste microorganisms. They may be on the foods when you buy them. They can get into food during preparation, serving or storage. That's why prevention of food-borne illness is so important.</p>	<p>3. Student will listen to teacher lecture. View transparencies of pictures of various microorganisms. Discuss why food-borne illness is such a problem.</p>



Food Safety Curriculum for Secondary School Students

Objective 4 – To explain the sources and symptoms of the top ten microorganism that most frequently cause food-borne outbreaks. (C-C)	
Content	Learning Experience
<p>4. <i>How can you tell if you have food-borne illness?</i></p> <p>Food-borne illness can be hard to diagnose. The symptoms are similar to those associated with having the “flu” or a “stomach bug”. Often there is nausea, abdominal pain (stomach cramps), diarrhea and/or vomiting. Most symptoms appear within 4 to 48 hours after eating the contaminated food.</p> <p>The U.S. Public Health Service has identified the following microorganisms as being the biggest culprits of food-borne illness, either because of the severity of the sickness or the number of cases of illness they cause. Beware of these pathogens: Fight BAC[®]! LEARN WHERE THEY ARE AND HOW TO AVOID THEM.</p> <p>The following table lists the names of the microorganisms and where you might find it. The table lists the microorganisms in alphabetical order, not in any order of importance or occurrence. *SEE ATTACHED CHART (Attachment B)</p>	<p>4. Student will fill in chart worksheet with information on each of the ten microorganisms from overhead transparency or power point slide as teacher presents and discusses. (See Attachment A)</p> <p>Students will play MICROORGANISM BINGO.</p>

Objective 5 – To describe the six factors affecting microbial growth. (C-C)	
Content	Learning Experience
<p>5. Now that you've seen how awful it can be to have a food-borne illness, let's talk about prevention. Just like us, bacteria need the conditions to be favorable for them to grow and multiply. For example, they need food, water and air! An easy way to remember the 6 things that bacteria need to grow and multiply is to remember the acronym FATTOM. An acronym is a series of letters where each letter stands for a word. In FATTOM, each letter stands for</p>	<p>5. Listen to teacher present introduction to FATTOM. Student will be divided into six groups. Each group will be given a large piece of paper with one of the six things that bacteria needs to grow and multiply at the top. In addition they will receive the paragraph from the content to the left to refer to as well as other resources. Each group will come up with ideas of how their piece of FATTOM contributes to the growth of bacteria. They will write ideas</p>



Food Safety Curriculum for Secondary School Students

<p>one of the conditions favorable for microbial growth.</p> <p>F = food A = acid T= time T = temperature O = oxygen M = moisture</p> <p>Food Bacteria need food to grow. They especially like moist protein-rich foods, such as meat, milk, eggs and fish. These foods are considered potentially hazardous foods; that is, they are most likely to cause food-borne illness because they can support growth of these bacteria.</p> <p>Acidity pH is the symbol for the degree of acidity or alkalinity (base) of a substance. pH is measured on a scale from 0 to 14.0. An environment with a pH of 7.0 is considered neutral--neither acid nor alkaline. Foods with a pH below 7.0 are acidic; pH above 7.0 is alkaline. The lower the pH, the higher the acidity; the higher the pH, the lower the acidity.</p> <p>Microorganisms prefer to live in a pH range between 6.6 and 7.5. Most bacteria <i>will not grow</i> at pH levels below 4.6. That is why acidic foods, like vinegar and fresh fruits (especially citrus), usually do not provide a favorable climate for dangerous bacteria.</p> <p>Time The longer that bacteria are allowed to sit in a warm, moist environment, the quicker the bacteria will grow and multiply. This is because pathogenic microorganisms reproduce by cell division. One becomes two. Two become four. Leaving a</p>	<p>on paper. They will share with the class, as teacher adds additional ideas.</p>
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potentially hazardous food (i.e. food that is moist, protein-rich and/or low acid) in the Danger Zone for very long will allow the numbers of pathogens to keep multiplying. You must restrict the time that these foods stay in the DANGER ZONE to two hours or less.

Temperature

Microorganisms like a warm environment, preferably around room temperature. Research has identified this as a dangerous temperature zone. This zone is where bacteria grow best. Keep your potentially hazardous foods out of this zone as much as possible.

The danger zone is 40°-140° F.

Oxygen

Some microorganisms need oxygen (air) to grow, that is, they are aerobic.

Leaving potentially hazardous food exposed to air increase the chances that the bacteria will grow.

When foods such as meat, spaghetti sauce or vegetables are canned, the oxygen can't get in. Therefore, growth of aerobic organisms is controlled and the food is preserved. These foods do not require refrigeration.

Some microorganisms will grow only in anaerobic conditions (without oxygen). Botulism is a rare type of food-borne illness caused by a microorganism that prefers anaerobic conditions (no oxygen). Home-canned foods that haven't been preserved properly are the most common source of this type of food-borne illness.

Moisture

Microorganisms love a nice moist environment. They grow best in this climate. That is why dry foods like crackers, breads and other foods we usually



Food Safety Curriculum for Secondary School Students

keep at room temperature are usually safe there. They do not have a lot of moisture. Foods preserved with salt or sugar, such as beef jerky or jams and jellies are not at high risk of contamination because salt and sugar deprive microorganisms of water and inhibit their reproduction. That is why these foods do not need refrigeration.

Meat, produce and soft cheeses (e.g. brie cheese, cottage cheese) have more water content, allowing any bacteria, viruses or molds present to multiply quickly.

For more information on these and other food-borne pathogens, check out the "Bad Bug Book" on the World Wide Web at: <http://vm.cfsan.fda.gov/~mow/intro.html>.

Closure – Teacher will ask and discuss the following questions with the class.

- **What is food-borne illness?**
- **Why is it important to learn about food safety?**
- **How many Americans are affected by food born illnesses each year?**
- **What causes food-borne illness?**
- **List the some of the ten microorganisms that cause food-borne illness.**
- **What are the six factors that contribute to bacterial growth and multiplication?**

Resources Needed:

- Skit
- Overhead or Power Point
- Transparency/ Slide with Definition of Food-borne Illness
- Cut strips of paper for Activity 3
- Transparency/ Slide with Statistics
- Transparency/ Slide with Pictures of Microorganisms
- Transparency/ Slide with Chart of Microorganisms
- Student Worksheet with Chart to complete of Microorganism
- Microorganism Bingo
- Six Large Pieces of Paper Labeled With One of FATTOM
- Markers(6)
- One Paragraph for Each of the Six FATTOM Concepts

TOP TEN MICROORGANISMS

(ATTACHMENT C)

What are they?	Where might they be found?
Campylobacter Jejuni	Raw and undercooked meat and poultry, raw milk and untreated water
Clostridium botulinum	Canned foods that aren't processed or stored properly
E. coli O157:H7	Meat, especially undercooked or raw hamburger, unwashed produce, raw milk, unpasteurized apple cider
Listeria monocytogenes	Unpasteurized milk, ready-to-eat foods contaminated during processing such as soft cheeses and hot dogs. Also in raw and undercooked meat, poultry and seafood
Salmonella	Raw and undercooked eggs, undercooked poultry and meat
Staphylococcus aureus	Prepared foods left too long at room temperature (e.g. cooked ham, salads, cream-filled pastries, dairy products)
Shigella	Poor hygiene causes Shigella to be easily passed from person to person. Sources: salads, milk and dairy products, and unclean water
Toxoplasma gondii	Undercooked meat, especially pork
Vibrio vulnificus	Raw or undercooked seafood
Yersinia enterocolitica	Pork, dairy products, and produce



Food Safety Curriculum for Secondary School Students

Lesson 1 Skit (Attachment A)

Mary: Hi, this is Mary calling. I just called to see how you are feeling.

Javier: I am not doing well; I have been feeling sick to my stomach since early this morning.

Mary: I am not doing well either. I wonder if it was the food we ate at that restaurant last night.

Javier: What did we eat last night, I can't even remember?

Mary: Now that I think about it, the hamburger wasn't hot, it wasn't even warm. I wonder if that got us sick.

Javier: I hope this ends quickly; I don't think I can vomit anymore.

Mary: Call me later, I need to lie down again, I guess neither one of us is going to school today.

Javier: My stomach feels like it is in knots, I am going to lie down too.