State College of Florida HUN # 2201 Fundamentals of Nutrition

Class 12 Food Safety and Water Purity Chapter 19

**\*Food Safety** involves three things: the safety of the food itself, the safety of the production and transportation of food and the safety of food preparation in homes, restaurants and anywhere food is served or sold to the public.

Food Safety is important to **prevent food borne illness** . The main symptoms include fever, vomiting and diarrhea. **Symptoms** can occur within 4 to 24 hours, although the average is about 4-5 hours.

**Possible causes** include **Bacteria,** p**esticides, additives.** . Other causes are **mold,**

**oils** that have deteriorated, outdated products, **old food,**  food kept at **room temperature**

that is supposed to be refrigerated.

**\*Agencies** in the US that **monitor**  the food supply are described on page 624.

**\*FDA**  Food and Drug Administration Responsible for: the Safety of the food,

 medicines and supplements for people in the US

 In March 2011, I read in the Herald Tribune newspaper that the FDA advised people not to take a certain vitamin formula, Soladek as it had unsafe levels of vitamins A and D. It was made in the Dominican Republic. As it was not made in the U.S and at that time, that was all that the agency could recommend. Since then, in November 2010 new federal legislation called the Food Safety Modernization Act was passed by the House and Senate. In January, 2013, rules to implement the law were issued. This law (Herald Tribune) requires that food producers and processors register with the FDA and file details of their food safety plans. The FDA can now also establish more strict standards of food safety and could order producers to recall foods if contaminated. These rules do not apply to meats, poultry or eggs. It is directed toward preventing the spread of salmonella and e-coli to other foods. It also requires all food producers and processors to record from whom they received food and to where they sent it. Some companies are going beyond the requirements and have developed a system, through a company called Harvest Mark, that can give some of this travel information to consumers. They have created a two dimensional bar code sticker, which has a number, that can be entered into the Harvest Mark website for further information. Planned is the rectangular scanning symbol that consumers will access from their cell telephones. Waiting to be finalized are rules regarding imported foods.

**\*USDA**  US Department of Agriculture Responsible for: the quality of meat, poultry,

 eggs and dairy

**\*EPA**  Environmental Protection Agency Responsible. for the safety of pesticides and

 water

**\*CDC**  Center for Disease Control Monitors illness from whatever cause

\* 2 **International Agencies** that promote food safety standards throughout the world are the **FAO**, the Food and Agriculture Organization and **WHO** the World Health Organization that are part of the United Nations.

SCF HUN # 2201 Fundamentals of Nutrition Class 12

**Bacterial Infections** See the table in the textbook (Whitney 625) that lists bacteria that have been found in our food supply. It lists sources, symptoms to watch for and preventive measures to be taken. If you or someone you care for has become ill from food borne bacteria from a restaurant you can report this to the local County or State Health Department. If you see a doctor, they should report the illness to the Center for Disease Control and the FDA. See a Doctor to document the illness and especially if a child has a fever or is ill for more than one day or an adult for more than 2 days. See other symptoms of food borne illness on page 625. (Whitney)

In the US, milk is **pasteurized.**  It is heated to destroy bacteria. This process was discovered and publicized by a Frenchman, Louis Pasteur. A problem is that, in this process, B vitamins are decreased. However, it is believed to be worth the price of bacteria that could make people sick.

Some known bacteria found in foods are: **e-coli** , **salmonella,**  and **lysteria.**  Some other serious bacteria are **Campylobacter** and **Botulism**. Campylobacter pylori bacteria is sometimes found in undercooked chicken. Chicken and all poultry should be fully cooked and not pink. Salmonella bacteria is mostly found in poultry and eggs. Botulism can grow in old food, even in the refrigerator. Some botulism spores have been found in honey and should never be given to children under 1 year of age, before their intestinal system is fully developed.

**Hepatitis,** a virus, can be found in raw shellfish, especially clams and sometimes in other foods, as in the outbreak of chili peppers several years ago. Raw **fish,** as in sushi, also has a high rate of contamination. It is safer to eat **clams s**teamed or **cooked**. To prevent bacteria and virus, it would help if people who work **in the growing fields**  had adequate bathroom facilities to prevent the spread of hepatitis.

 To prevent bacterial infections in food from spreading, cold food needs to be **refrigerated**, people need adequate **good bacteria,** acidophilus and bifidus, in their intestines, and food needs to be **cooked and prepared properly**. \*The most concern in food safety is with **poultry, dairy, eggs** and **seafood**. So, take special care with these foods.

We can handle some bacteria in our food. Most people can not handle high amounts of bacteria. **Healthy people** can handle more bacteria. Sugary foods feed bad bacteria.

Vitamin C, including hot peppers help against bad bacteria.

**Food Preparation**

**Food prepared** to be served or **sold to the public**, as in restaurants, hospitals, schools, prisons, senior citizen centers, must be examined by the **County or State Health Department.** It must be stored in clean places and prepared according to **HACCP** , commonly referred to as HACCIP. The letters stand for:

\***Hazard Analysis Critical Control Points**.

It means that foods have to be cooked and kept at the **correct temperatures** before being served to prevent bacteria in the food.

SCF HUN #2201 Nutrition Class 12

HACCP means that:

 **\* Frozen food** must be kept **at 0 degrees Fahrenheit**

 **\* Hot foods**  must be kept **at 140 degrees**

 **\* Refrigerated foods** must be kept **at 40 degrees**

Kitchen Workers have to take the temperature of the food, with special digital forks and then write down **when** they **tested** the temperature of the food and **what the temperature** was. This is so if a problem is found later, they can look back in the preparation or transportation **to see where the problem happened**, so it can be corrected.

**Food Production**

 **Batches** are **numbered**. This includes supplements. This is also so that if there is a problem, it can be traced to a certain batch of food that was produced in a certain place and time. There are also **safety seals**  on wrappers and packages. Do not buy a product that is opened. Bacteria could be developing from being exposed to room temperature or criminal tampering or poisoning could have occurred. **Dented cans** are chancy because if there is an opening in the can the food will likely be contaminated. Restaurants are supposed to check for these things too and not use them if they are outdated. Check “Best used by” dates on all products.

 Food and supplements that are sold and **served**  to the public need to be prepared in clean places. Once per year the local or state Department of Health **inspect**s to make sure there are no insects around and that procedures are clean. People’s hands who handle food should **not also** be handling **money** as Bacteria could spread. Foods need to be cooked properly, especially meats to kill bacteria and parasite eggs. **Meat and dairy** should not be prepared on the same surfaces so bacteria from one will not contaminate the other. You will notice in a deli that **separate slicers** are used for slicing meats and cheese.

**Counters** should be **washed** after raw meats, poultry, fish or dairy touch the surface with hot soapy water. **Separate plates** should be used for raw and cooked meats, poultry and fish.

 Frequent **hand washing**  helps too. Everyone should wash their hands after using the bathroom, including under the nails, before preparing food.

**Other health concerns from food**

You might not want to buy a **pre-stuffed turkey** . It has a high rate of bacteria growing. When preparing food, if it smells bad, don’t eat it. It could have bacteria growing. **Food from other countries**  where sometimes they have less sanitary practices or bacteria in their water, often have bacterial problems. See the table on page 631 that lists **Safe times** to leave foods in the refrigerator. You can see that after 2 months, clean everything out and do not use it. Generally, most foods can be refrigerated for up to three days. **When traveling** to other countries, you may choose not to drink the water and be careful about intestinal parasites when you return. You also may not want to buy food from street vendors, especially if they do not have refrigeration.

SCF HUN #2201 Nutrition Class 12

**Irradiation** can reduce bacteria but causes altered H & O atoms or free radicals when you eat them, for which you need more iodine and antioxidants to prevent cancer. See the list on page 633 (Whitney) of foods that are already approved for irradiation.

**Farm raised fish**  are given **oils** that have toxins like PCBs , PolyChlorinated Biphenols that promote growth in the fish. Florida citrus must be sprayed by law.

Polluted air and water used to grow vegetables or farm raised fish results in **metals** entering the food chain. The food chain involves plants in the water of rivers and oceans are eaten by fish. Larger fish and people eat the fish and take in any pollutants entering the food along the way.

 See the list of **wild fish** on page 636 for which there is concern for **mercury** contamination. These are large fish like tilefish, swordfish, king mackerel and shark. Tuna is sometimes on the government lists, although remember that it also contains selenium, which helps to get mercury out of the body.

**Pesticides** destroy insects in the field or garden but can have heavy metals like mercury or toxic chemicals that could result in cancer when they accumulate in people. Since January 2008 foods from other countries sold in stores should have some information about where they came from.

Since 2007, in Florida, pesticides in landscape products have special regulations. They must have less nitrogen and be time release. There are also special rules for using pesticides and fertilizers near water where it runs off into water supplies.

In 2012, residues of arsenic in rice was discovered, especially in rice grown in the south- eastern United States.

**Insecticides**  destroy insects by destroying the insect’s nervous system by depleting their Vitamin B 6. This can cause Parkinson’s and other nerve damage in people. It becomes a problem when they accumulate in the ground and in the people who breathe them or eat them by small amounts in the food over a lifetime. Schools and public places are often sprayed with insecticides as well.

**Preservatives**

They prevent mold and bacteria in processed foods. Use organic foods more quickly. **Nitrites** are used in food to preserve them like in deli meats and bacon, They make the product pink. They increase the risk of bladder cancer. **BHT** , is a common synthetic preservative. **Additives**

The FDA approves some **Additives.**  **GRAS** foods or products are **Generally Regarded as Safe** and do not require FDA approval. The FDA standard is the **Delaney Clause**. It states that an additive must not have been found to be a **carcinogen**  in any test on animals or humans. Exceptions must carry a warning on the label. This is a much debated process as to whether it is too strict or too liberal. It means not a **carcinogen** for adults. Children are more susceptible to bacteria and toxins. Toxins can accumulate from exposure to toxins and over a lifetime. Artificial **colors**  and **flavorings** are known to cause problems in children. **MSG** , a flavor enhancer, is known to cause allergic reactions and to decrease brain activity. It is hidden in some foods under other names.

SCF HUN # 2201 Nutrition Class 12

**Intentional Additives**

Chemicals and synthetic Vitamins are sometimes added to foods for a purpose. There is a list on page 646. (Whitney) This includes:

 **Antibacterials**  such as salt, sugar and nitrates and nitrites.

 **Antioxidants** Vitamin C and Vitamin E, sulfites and BHT

 **Appearance promoters**  artificial and food based colors, spices

 **Taste enhancers** artificial and food based flavors, salt, sugar, spices & MSG

 **Thickeners** artificial and food based

 **Nutrient promoters** synthetic vitamins A, B,C, and D, folate, calcium, iron, iodine

**Indirect Additives**

Some chemicals enter foods during the processing of foods. These include:

 **Acrylamide** a carcinogen from the high heating of oils as in French fries

 Baked chips and baked foods in general are less of a problem.

 **Active packaging** that is used during the cooking process would absorb the

 plastic, metal or cardboard chemicals

 **Decaffeinated** coffee and tea Try to avoid those that use a chemical in the processing.

 Look for labels that say “natural or water processing”

 **Dioxins** Look for products that have non-plastic or plastic lined

 Packaging or change them into glass containers at home if

 they have lipids in them

 **Hormones** in meats and milk Choose naturally raised. This is different

 from “minimally processed”

 **Antibiotics** Choose products that say on their labels, that they do not use them.

 Sometimes that information is on the company’s website, for

 example in the brand Bell & Evans chicken.

**What to do?**  Eat **organic** when you can. Eat wild fish when you can get it. Don’t eat the skin or outer layer of foods. **Grow some** of your own food in a small garden. Wash all fruit and vegetables with grapefruit seed extract or a baking soda and water formula. **Wash** your hands between touching one food and another, so bacteria from one food is not transferred to another. Do not serve cooked foods on plates that have had raw meats or poultry on them. **When traveling**, take extra care about foods rinsed in water but not cooked. Salad, fruit . See page 640 (Whitney) for more suggestions.

 Pesticide **residues remain** in animal fats, so cut off visible fat from meats and don’t eat the skin of poultry. Don’t eat the peel of fruits unless it is organic? Peel potatoes and carrots unless they are organic. Pesticides that were outlawed in the U.S., such as DDT and chlorine based fertilizers, have been sold to other countries. Wash rice before cooking, add extra water to cook rice in and pour extra water off after cooking.

 **Avoid chlorine** as it promotes dioxin, a carcinogen and estrogen. Exposure to high amounts of estrogen and dioxin increase the risk of cancer. An alternative to fertilizers is using **vegetable compost,** which draws bacteria away from the plant into the soil.

SCF HUN# 2201 Nutrition Class 12

Some growers apply pesticides on an as needed basis instead of preventively, which lowers the overall amount of pesticides. Choose Earth Wise foods in Publix and organic foods when you can afford them.

 The **FDA collects** samples of food grown in the fields and buys food in supermarkets. Then it is analyzed for pesticide residue and the presence of heavy metals. They also inspect food processing in plants. Their success has not been perfect. They say they do not have enough funding for enough inspectors.

Try eating **fish every other week** or less often. Choose **moderate size**d fish like cod, haddock, salmon and pollock(decreasing) soon after preparation. Small amounts of nutrients are emitted into the air when vegetables are cut or shredded. Cook vegetables by **steaming** or microwaving to reduce the B vitamins from going into the cooking water. Or refrigerate and **reuse the vegetable cooking water** for soups stews and gravies. Bottled Soy sauce, without MSG, can be used to make gravy.

**Water in the Environment**

**Sources of Water** Most water comes from rivers, reservoirs or home wells. All of these sources are referred to as **groundwater**. Water is **necessary and beneficial** to all plants, humans and other animals. We need to **keep** it **pure** for the future health of everyone. Unfortunately, **contaminants** may make water impure or **unsuitable for drinking**. **Pesticides** such as **herbicides** and **insecticides** and **industrial chemicals** get into the air and fall into the water. These contaminants plus **bacteria** from the soil travel underground into the streams, rivers and the oceans. **Plants absorb** these toxins. Plants include fruits and vegetables and grains plus sea plants that grow with the water. Fish eat plants, animals and people eat fish and plants. If the **water is healthful,** then the people and **animals** will be healthy.

An additional source of **water pollution** occurs when **medicine, chemical soaps & shampoos** go down or are poured down the drain that gets into our water systems. They should be sent to landfills where they would be filtered through the ground soil first, to lessen the impact on the water sources. Chemicals in the environment often end up in the water systems.

**Water Systems and Regulations**

**Mercury**  is a problem especially in the ocean waters. It is a **neurotoxin,**  a nerve toxin, that affects the brain, including vision, hearing, coordination and thinking processes. **Industrial factories** especially coal fired plants, put mercury into the air through their tall exhaust stacks. The **smoke blows East** in the wind and lands in lakes, rivers and reservoirs. Acid rain it is called. Also, when the Coast Guard changed the buoy batteries they dropped the old ones into the ocean. They deteriorated and gave off mercury and lead. It is believed that they are all picked up now, so we should have less mercury in waters off the US coasts. All batteries should be recycled. Some stores are drop-off sites, such as Home Depot and Sears. In the Gulf of Mexico, insecticides and fertilizers from farms wash down from the Mississippi River . These help to grow **Red Tide** and transport their nerve toxins. It results in fish and people having breathing difficulties. A suspected cause of Red Tide is human and animal waste.

SCF HUN # 2201 Nutrition Class 12

The **EPA,** the Environmental Protection Agency is responsible for ensuring pure water in the US. Their Safe Water Hotline is: (800) 426-4791 This is regulated under the federal legislation called the Safe Drinking Water Act. Inspectors take samples of many waters on a regular basis to test for contaminants. Some rivers become polluted by **Chlorine** used in **paper production.** The chlorine that gets out into nearby streams and then flows into rivers and settles in soil along the banks is called **Dioxin,** which is a known **carcinogen.**. Chlorine is an estrogen promoter and increases the risk of estrogen based cancers as well as toxin based cancers, especially bladder and colon cancer. When added to water systems it should be after the water has been screened of soil and other debris, so there will be less chlorine residue in the final purified water. Try to avoid exposure to chlorine and other chemicals that are estrogen promoters.

 Recently, a procedure called Hydraulic fracturing, or referred to as Hydrofraking, has been used to extract natural gas from underground. This involves the injection, under high pressure, a mixture of water, sand and chemicals that opens fissures in the rocks. It stimulates the release of oil and natural gas. Sometimes it contaminates underground water sources. People may need to move away from their land?

 **Fluoridated water** helps protect the teeth against cavities but is damaging to people who are forming new bone because it produces only inner trabecular bone, not solid bone. Fluoride can be helpful if applied topically as it forms a coating which protects teeth from sugar and decreases cavities.

**Home Water Treatments**

Adding a **carbon filter**  to your tap water is helpful in screening out chlorine, heavy metals, and sediment. Reverse osmosis filters are more powerful. Whole house treatment systems are also more powerful but require monthly maintenance costs.

**Hard water** that which contains high calcium, magnesium and sulfur and other minerals. These are all good nutrients in moderation, however, too much calcium coats pipes and they then clog and break. Sulfur water smells badly. **Phosphate mining** digs down deep into the ground which releases radiation, altered Hydrogen and oxygen. So even if the water is “recycled” it is irradiated water. There are unknown consequences.

**Public Water**

**Mineral Water** All water should have minerals. Some has more than others. \* **Spring water** usually contains more minerals than other natural waters. Check the label of your water bottles, as to where it comes from and for the amount of sodium. Seltzer water has some sodium and high **carbonation.** Flavors added may be natural or chemical. **Perrier water** has natural carbonation. The small bubbles come out of a spring in France. Saratoga water is high sodium. A German company makes (sans Pellegrino) and an Italian company makes ( Late). Poland Spring is from Maine in the US. These are special carbonated mineral waters. They are all believed to have **high in major and trace minerals.**  Check labels of bottled water for their water source.

SCF HUN # 2201 Nutrition Class 12

**Airline Water**

 It is well known that airline water, their own, not those sold in bottles, has had **high bacteria** of some kind in their water. We don’t usually have the opportunity anymore to have coffee or tea supplied by airlines anymore anyway. In making coffee, water flowing over coffee grounds in a chlorine bleached coffee filter, is absorbing a little of that chlorine. There are some filters that do not use chlorine. Marcal and Seventh Generation brands use an oxygen method to produce paper products without chlorine.

**Cruise ship Water**

Cruise ships are notorious for “food borne illness”. These types of illness are called Norwalk or **Norwalk type illnesses.** It is my understanding that it is in the water. More specifically, in the **water tank**. They really need to empty the water tank, clean it of bacteria and get new water. So, if you are on a cruise, drink bottled water and eat less of foods washed with water. Illness should be reported to the CDC. Check their website for ship ratings.

**At Home**

To decrease bacteria, water can be **boiled**, heated to 212 degrees Fahrenheit. Although if it is chlorinated water, the chlorine will be more concentrated after boiling. Sunlight and air dissipate chlorine as in an outdoor pool. **Grapefruit seed extract, chlorine tablets and iodine tinctures** are used in small amounts to reduce bacteria in water. Home water systems can use an oxygen or light system. Iodine is used to purify some town water systems.

You may wish to join with others to help keep water clean. You can study environmental science or support activists who try to maintain or improve clean air and water laws. For example, the group organizations **Food and Water, NYCAP, New York Coalition against Pesticides, MassPirg** , a fundraising organization that stands for Public Interest Research Group. The **Sierra Club** and other groups help to protect our waters. Maybe someday, one of you will figure out how to inexpensively **desalinate** sea water.

**Highlight: Biogenetic Engineered Foods**

On page 652 there is a glossary of terms used in Biotechnology.

**\*Genetic engineering** of foods is **altering the seeds** of plants to change the plants and foods. The result is foods that contain Genetically Modified Organisms, abbreviated GMO on a label. This is different from combining two growing plants to grow a new plant called breeding or hybriding. Genetically modification was promoted to make plants that were resistant to damage from pesticides. It turns out that the plants are not **resistant to most pesticides** except one made by Monsanto, Roundup. This is the company that developed this technology.

 There are some **concerns** with these new foods. The new foods do not contain any or very few seeds. Seeds are sometimes therapeutic, especially in fruit seeds. Now there are **no seeds** to be saved by farmers to plant in the next season. Farmers need to buy new seeds from Monsanto supported companies.

SCF HUN # 2201 Nutrition Class 12

There are also concerns because the new plants get **mixed in with non-genetically modified** plants. Sometimes, wind blows the newly planted seeds to nearby fields. Also, birds eat those seeds and their droppings put some seeds into other fields.

As a result of some biogenetic engineering/modification of corn plants, some Mexican and Native American **varieties**  of corn are becoming **extinct**. There is great concern for their nutritious blue corn. There are also **health concerns**. The new foods should be researched again as we do not know the **nutritional value** of these **new plants**. Do these plants have more nutrients? Golden rice **never happened to help the Asian people have carotenoids.** Golden cauliflower does exist (Whitney 653) and **Lactaid milk** does have the enzyme lactase added. This is called **biofortification.**

 **\*\***There is some information that some chemical companies are developing foods that are drought resistant, but not necessarily genetically modified. These would be a hope for the future of healthful food.

Discussion Questions

Do farmers need increased yields to feed the poor? Do we have plants that make their own pest resistance in their leaves?

Do we need plants with an extended shelf life? It would be good to stop the practice of picking food early and then gassing the food in the truck while transporting it with the gas continuing to ripen in our refrigerators!

Initially the FDA opposed this genetic engineering. Gradually it seems to have accepted it. See Table H19-1, (Whitney 656) for several Arguments in support of it and in opposition to biogenetic engineering. If it continues we will need to redo considerable nutritional research to see if the foods contain vitamins and minerals or not.

List of References

Herald Tribune, 01/18/13, p 10A.

Whitney, E., Rolfes, S.,(2013) *Understanding Nutrition,* 13th edition, Belmont CA:

 Wadsworth Cengage Learning.