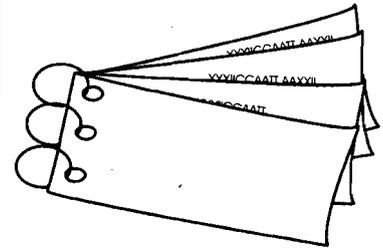


## UNIT 1 TYPES OF HAZARDS

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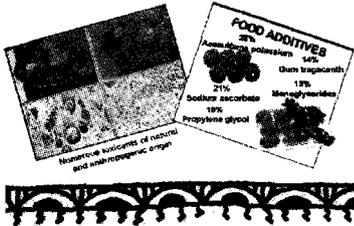
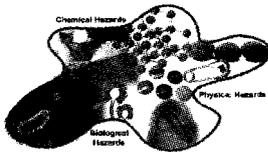
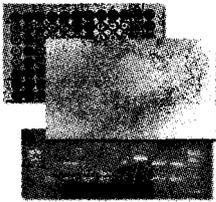
- A hazard is defined as a danger or risk. The presence of a hazard in a food decreases the quality of the food and makes it unsafe to eat.
- Hazards can be classified into microbiological (or biological), chemical and physical hazards.
- Microbiological hazards in foods include microscopic plants and animals—protozoa, bacteria, yeasts, fungi, viruses. Parasites are other microbiological hazards.
- Chemical hazards include those present in food as a result of contamination and those that have been intentionally added as adulterants/ additives.
- Physical hazards are substances that pose a threat to health by their physical presence.
- Presence of hazards in foods reduce their quality and makes them unsafe. Their consumption results in disease. The cost of treating these illnesses, the number of man hours lost during each illness episode and the generally poor health of the nation's workforce places a heavy burden on the economy.
- It is crucial, therefore, not just to understand the different types of food-borne hazards but also find ways and means of reducing them.

### 1.1 Microbiological Hazards

- Protozoa are single-celled organisms. The most important disease-causing protozoa is an amoeba called *Entamoeba histolytica* which causes amoebiasis. Poor sanitation, faeces-contaminated food and water, presence of flies, cockroaches and rodents help to spread the disease. Symptoms can range from mild diarrhoea to serious dysentery and can result in death. In a small number of individuals it can spread from the intestine to other vital organs like brain, lungs, spleen etc.
- Prevention lies in safe disposal of human excreta and simple hygienic practices of washing hands before eating and after a visit to the toilet. Water supplies need to be protected from faecal contamination. Filtering and boiling water

are more effective ways than chemical treatment with chlorine for disinfection of water. Food handlers at home or in the commercial setting (like hotels and restaurants) should be periodically examined for infection and should also be educated about basic practices of personal hygiene.

- **Bacteria** are single-celled organisms causing typhoid, cholera, diphtheria, dysentery etc. Certain bacteria also produce toxins in foods. Toxins are poisonous substances which can harm our health.
- Contamination of food with bacteria is indicative of low standards of personal and public hygiene. Food can get contaminated in a number of ways, for example if food handlers do not wash their hands or don't keep work areas clean. Cooking food at high temperatures or refrigerating food when not in use prevents bacteria from multiplying in numbers.
- **Fungi** grow on dead organic matter while others are like parasites. Toxins produced by fungi can cause various disease conditions in both animals and man. These fungal toxins or mycotoxins can even lead to death if consumed in high doses. Aflatoxicosis and ergotism are examples of diseases caused by aflatoxins and ergot alkaloids respectively.



- **Worms** are also capable of causing diseases in man e.g. roundworms, tape worms, hookworms and threadworms.
- Round worm larvae find entry into humans through improperly washed foods and dirty hands contaminated with faecal matter. General symptoms of round worm infection are loss of appetite, paleness and abdominal pain. A large number of worms can cause intestinal obstruction. Proper cooking of food can destroy eggs of the worm. Other preventive measures involve maintaining a high standard of hygiene especially when handling food.
- Tapeworm has two hosts — pig and man. Infected individuals excrete eggs of the worm in the stool. Pigs feeding on stool-contaminated food get infected. The eggs develop into embryos in the pig's intestine which pass through the intestinal wall and lodge in the muscles of the pig. Eating undercooked pork results in the embryos being released in the person's intestine and attaching to the intestinal wall. Symptoms include loss of appetite, abdominal pain and failure to grow. Preventive measures include thorough inspection and cooking of pork.
- Sanitary disposal of faecal matter and personal hygiene are very important in controlling all worm infections. Washing hands is perhaps the simplest but most important precaution in avoiding all microbial and worm infections.

## 1.2 Physical and Chemical Hazards

- A *physical* hazard is non-living, and causes physical harm e.g. pain in our teeth after biting small stones; irritation of intestine caused by husk, straw, small twigs; iron filings can get embedded in the lining of the intestine; aluminium foil is tougher to crumble and can damage the intestine. Chips of glass seriously injure the intestine.
- *Chemical* hazards are substances that are dangerous due to the reaction caused in our bodies – altering the body's metabolism or causing toxic reactions in our body.

- Industrial wastes, untreated sewage and household chemical waste disposed off in rivers or buried in dumps, exhausts and smoke into the air can contaminate water, soil and air. Toxic chemicals such as selenium, arsenic, fluoride, nitrates accumulate in plants to toxic levels. Indirect contamination of meats, milk or eggs occurs when animals consume contaminated plants. Since human beings are at the top of the food chain consuming both contaminated plants as well as animals, they are the worst affected.
- Metals are one of the most important contaminants entering the food chain e.g. arsenic, antimony, aluminium, cadmium, chromium, copper, lead, mercury, nickel, tin. Industrial pollutants contaminate soils, rivers, seas entering plants and fish. Metals may also enter food because of acidic foods dissolving the surface layer of cans, vessels and utensils used in cooking and storage of prepared foods and beverages. Some metals e.g. lead or mercury can be very toxic, damaging vital organs like brain, liver, kidneys. Additives used in manufacture of plastics such as plasticizers enter food from plastic containers or packaging material.
- Pesticides and fertilizers used leave their residue in plants. Pesticides even in small quantities can be very harmful as they tend to keep getting deposited in our bodies. They are known to cause cancer, birth defects, liver damage, reduced sperm count, sterility, miscarriage and nerve damage.
- Veterinary drugs such as antibiotics and hormones are left behind as residues in milk, meat, eggs. They can result in allergy and development of resistance to the antibiotic.
- Naturally occurring toxicants include seafood toxins, biogenic amines, alkaloids and toxic amino acids causing a range of illnesses such as shellfish poisoning, epidemic dropsy, lathyrism. Some of the chemicals arising out of consuming foods contain these natural toxins. Some of the chemicals that act as anti-nutrients are trypsin inhibitors, phytates, oxalates, tannins and cyanogenic glycosides.
- Additives and adulterants can cause allergic reactions. Non-permitted additives or adulterants can be very toxic leading to serious health consequences like epidemic dropsy, paralysis, death.

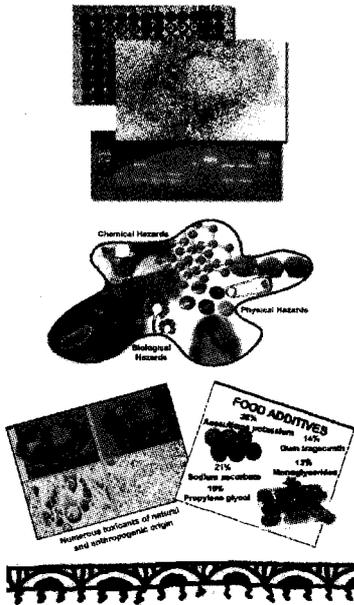
### 1.3 Ensuring Safe Food

- Let us recapitulate some common ways by which food may become contaminated or unsafe to eat. Our food may become contaminated or unfit to eat when:
  - food is not handled hygienically — dirty hands, sores, boils, coughing, sneezing on food, using dirty water, unclean pots and pans to cook or serve food;
  - insufficient cooking of foods which does not destroy all the disease-causing germs and toxins;
  - people handling food (cooking or serving) are sick and carriers of disease;
  - food is obtained from sick and unhealthy animals;

- processing or storage of the food is improper and has introduced harmful chemicals (too much of additives) into the food;
- food and water is not protected from the various chemical hazards (viz. metals, pesticides, industrial effluents, untreated sewage, etc.);
- traders wanting to make fast money adulterate food.

- The precautions we should take while handling food include:

- Special care has to be taken as far as personal hygiene is concerned. Washing hands before eating or handling food, not sneezing or coughing on food and covering any wounds, boils, sores etc. while handling food is essential.
- Using only clean potable water for cooking and cleaning of raw ingredients, and, using clean pots and pans for cooking, storing and eating food is important. Boiled water should preferably be consumed during the rainy season and epidemics.
- Raw vegetables, fruits and grains should be thoroughly washed to get rid of germs and parasites like worms. This also helps in at least partially removing pesticides.
- Thoroughly cooking the foods ensures that all germs have been killed.
- Storing foods in a cool, dry atmosphere or refrigerating them discourages microbial growth.
- People suffering from any contagious disease should not handle food.
- Food left uncovered and exposed to dust and flies should not be consumed. Similarly mouldy or foul smelling food should be rejected.
- Food should be purchased from reliable sources only to ensure that food is not adulterated.
- Good manufacturing/storage practices should be followed to ensure that food does not get contaminated with chemicals or any physical hazards during processing or manufacture/storage. The same is true for agricultural and veterinary practices.



## Key Terms

**Additives:** Substances added to foods to perform certain functions in foods e.g. preservatives to preserve food. These additives are meant to improve food quality.

**Adulterants:** Inferior substances added intentionally to food which decrease the food quality.

**Anti-nutritional substances:** Substances interfering with the way our body utilizes nutrients

**Contaminant:** Pollutant

**Disease-carriers:** Those who carry germs but do not suffer from the disease themselves

**Effluent:** Sewage or industrial waste discharged into the river or sea

**Epidemic dropsy:** Disease characterized by oedema and caused by consuming argemone oil

**Fertilizer:** Substance added to soil to make it more fertile

**Hazard:** A danger or risk

**Host:** An animal or plant having a parasite

**Lathyrism:** Disease caused by consuming the lathyrus (*kesari*) pulse and characterized by crippling of the legs

**Livestock:** Farm animals

**Microscopic:** Tiny, can only be seen through a microscope

**Parasite:** An organism living in or on another and benefiting at the expense of the other

**Pesticide:** Chemical used to destroy pests harmful to cultivated plants and animals

**Residue:** What is left over or remains

**Toxicant:** Poison

**Toxins:** Poisons

**Veterinary:** Of or for diseases and injuries of farm and domestic animals, or their treatment.



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