**FOOD SAFETY HAZARDS**

Food safety hazard refers to any agent with the potential to cause adverse health consequences for consumers. Food safety hazards occur when food is exposed to hazardous agents which result in contamination of that food. Food hazards may be biological, chemical, physical, allergenic, nutritional and/or biotechnology-related.

**Biological hazards**

Biological hazards occur when hazardous or pathogenic organisms are introduced to food and thus pose a food safety concern to consumers. Biological hazards include bacteria, viruses and parasites of public health significance. Other biological food safety hazards not belonging to the above mentioned categories include prions, also known as proteinaceous infectious particles, which are infectious agents made of protein.

Biological hazards can be introduced to food from the environment (e.g. soil bacteria, agricultural run-off) or from inadequate sanitation practices and cross contamination during transportation, handling, processing, and storage (e.g., poor food hygiene practices). The type and magnitude of microbial growth is determined in part by the nature of the food, package conditions and storage environment.

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| **Bacteria** | **Viruses** | **Parasites** |
| * *Bacillus cereus*
* *Campylobacter jejuni*
* *Clostridium botulinum*
* *Clostridium perfringens*
* *Escherichia coli* 0157:H7
* *Escherichia coli* 0104:H4
* *Listeria monocytogenes*
* *Salmonella* spp.
* *Shigella* spp.
* *Staphylococcus aureus*
* *Vibrio cholerae*
* *Vibrio parahaemolyticus*
* *Vibrio vulnificus*
* *Yersinia enterocolitica*
* *Cronobacter sakazakii*
 | * Enteric Virus (other than Hepatitis A and Noroviruses)
* Hepatitis A virus
* Norovirus
* Norwalk virus
* Rota virus
 | * *Cryptosporidium parvum*
* *Giardia duodenalis* or *intestinalis*
* *Taenia* spp.
* *Toxoplasma gondii*
* *Trichinella spiralis*
* *Entamoeba histolytica*
* *Entamoeba coli*
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**Chemical Hazards**

Chemical hazards occur when chemicals are present in foods at levels that can be hazardous to humans. Contamination may occur through various pathways: the environment (air, soil, water), intentional use of chemicals, such as pesticides and veterinary drugs, manufacturing processes, addition of food additives.

In the food industry, there are various types of chemical hazards, some notable ones include:

* Mycotoxins
* Natural Toxins
* Marine Toxins
* Environmental Contaminants
* Food Additives
* Processing-induced chemicals
* Pesticides/Agricultural Products and
* Veterinary Drug Residues

**Physical Hazards**

Extraneous material covers all materials (excluding bacteria and their by-products (toxins), viruses and parasites) which may be found in a food that are foreign to that particular food. These materials are usually non-toxic but are associated with unsanitary conditions of production, processing, handling, storage and distribution of food. Some examples of extraneous materials that may be found in food are insects, hair, metal fragments, pieces of plastic, wood chips and glass. Extraneous material can be considered hazardous due to its hardness, sharpness, size or shape. It may cause lacerations, perforations and wounds or may become a choking hazard.

**Allergenic Hazards**

An allergen is any protein that is capable of producing an abnormal immune response in sensitive segments of the population. Allergic reactions to food usually involve IgE antibodies. Symptoms of an allergic reaction can range in severity from a skin rash or slight itching of the mouth, to migraine headaches, to anaphylactic shock and death. The type and severity of an allergic response is determined by many factors, including dosage, route of administration, frequency of exposure, and genetic factors. This is not to be confused with a food intolerance which is an abnormal physiological response to a specific food. Symptoms of food intolerance may include cramps, diarrhoea and bloating.

Other adverse reactions to food are not IgE mediated, but can also be severe. For example, Celiac disease is an autoimmune disease in which the body produces antibodies that attack its own tissues in the presence of gluten, which results in inflammation of the gut. The inflammation and consequent damage to the gut result in a decreased ability to absorb nutrients. Individuals with celiac disease can be nutrient deficient and have a wide range of digestive symptoms. Consumption of certain grains containing gluten put these individuals at increased risk of lymphoma and osteoporosis.

**Nutritional Hazards**

This hazard is related with food fortification. The health effects related to under-fortification are generally well understood, however, over-fortification can be equally hazardous. For example, if women consume high amounts of vitamin A shortly before or during pregnancy, it can lead to birth defects.

**Biotechnology-related Hazards/Novel Foods**

The definition of biotechnology is in general is the application of science and engineering to the direct or indirect use of living organisms or parts or products of living organisms in their natural or modified forms.

The genetically modified (GM) food may cause hazard in developing allergenicity, transfer of genes from GM food to cells of the body or to bacteria in the in gastrointestinal tract.

The term novel foods mean: foods resulting from a process not previously used for food, products that do not have a history of safe use as a food, foods that have been modified by genetic manipulation, also known as GM foods, genetically engineered foods or biotechnology-derived foods.