Food Safety: Today's Challenges for Safe World

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Global population is more concerned about Food Safety and Food Quality. Food safety is the assurance that food will not cause any harm, illness or injury to the consumer when it is prepared or eaten. Food safety is a method to prevent contamination at different stages of food supply chain. It involves various challenges during preparation, handling and storage of food. Some of the food contaminants are mentioned below.

1. **Physical Contamination:** It occurs when a physical object enters to the food at any stage. Physical objects in a food can be a choking hazard and often introduce chemical as well as biological contaminants. Common examples of physical contaminants include- hair, fingernails, jewelry, broken glass, plastic wrap etc.
2. **Chemical Contamination:** Chemical contamination is an indication of the presence of chemicals where they should not be present or present in an amount that is in a higher concentration than the amount that is attributed as safe. Chemicals are present in food at a high level that can be hazardous to human. For example- chemical preservatives in high dose, synthetic colourants, synthetic added flavours, formalin for fish freshness etc.
3. **Biological Contamination:** Biological contamination is occurred when pathogenic organisms are present in food and when consumed that lead to serious illness and health issues. For example: infectious bacteria such as E. coli, Clostridium botulinum, Salmonella spp., viruses such as Norovirus, Rotavirus etc.
4. **Environmental Contamination:** Environmental contaminants are impurities that are either introduced by human or occurring naturally in water, air or soil. Some examples include lead, arsenic, mercury, cadmium and non-degradable wastes like polyethylene, aluminum foil, polyester etc.

Sources of Transmission

Contaminants can be transmitted to the food by various sources. Those are given as follows:

- Poor personal hygiene or improper handling of food by infected individuals.
- Soil, water, and air containing pathogens that contaminate food.
- Contamination from animal waste or infected animals.
- Improper use or contamination of food additives.
- Pesticides and herbicides residues from agricultural practices.
- Chemicals and wastes from manufacturing or industrial processes that contaminate water and soil.
- Contaminants from packaging materials such as plastic, glass, cardboard etc.
- Metal shavings from machinery, glass fragments, plastic pieces due to improper processing and handling.
- Improper storage of food like placing raw and cooked foods together.
- Using same utensils or cutting boards for different types of foods without proper cleaning.
- Failing to maintain proper temperatures for food storage and cooking.
- Inadequate hand washing, improper cleaning of equipment, and poor sanitation practices.
- Contaminated water used in food processing or irrigation.
- An emerging threat to food safety possibly comes from the increasing use of nanomaterials, which are already used in packaging materials, even though their toxicity remains largely unexplored.

Solutions for Achieving Food Safety

Cleanliness

- All equipment and surfaces are regularly cleaned with hot, soapy water.

- Fresh fruits and vegetables are rinsed with running water.
- Gloves and hairnets are used during processing or preparing food.
- Approved sanitizers and disinfectants are used.
- Food handlers are properly trained on hygiene practices.

Supply Chain Management

- The raw ingredients are purchased from reputable suppliers.
- Different traceability systems are used to track food products through the supply chain.
- Regular audits of suppliers are performed for compliance with food safety standards.

Safe Food Handling Practices

- Raw and cooked foods are kept separately to prevent cross-contamination.
- Foods are stored at appropriate temperatures to prevent bacterial growth.
- Different colour-coded cutting boards and utensils are used for different food types.

Temperature Control

- Refrigerators and freezers are kept at safe temperatures (refrigerators at or below 40°F/4°C and freezers at 0°F/-18°C).
- Foods are cooked to their recommended internal temperatures.
- Temperature monitoring systems are implemented.

Pest Control

- Integrated pest management programs are implemented.
- Regular inspection of facilities for signs of pests is conducted.
- Different traps, baits, and other control methods are used as per the requirement.

Water Quality

- Clean and safe water is used for washing, processing, and cooking food.
- Water sources are regularly tested for any type of contamination.

Packaging and Labeling

- Various packaging materials are used that protect foods from contamination.
- Products are clearly labelled with ingredient information, expiration dates, and storage instructions.
- The labels are complied with food safety regulations.

Food Safety Management Systems

- Different systems like HACCP, GMP, GHP, SSOPs are implemented to identify and control potential hazards.
- ISO 22000, ISO 9001, ISO 14001 or other recognized food safety management standards are followed during handling and processing of food products.
- Food safety plans and procedures are regularly reviewed and updated.

Food safety is a critical global issue that faces numerous challenges today. These challenges include increasing global trade, which complicates the monitoring and regulation of food products across borders, climate change which affects food production and safety.The emergence of new pathogens, antibiotic resistance and the complexity of modern food supply chains make tracing of contamination more difficult. Additionally, consumers also play a crucial role by staying informed and following safe food practices at home. Advances in technology and stringent government regulations offer promising avenues to tackle these challenges. By working together, we can build a safer food system that protects public health and promotes a secure food future for everyone.

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