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Food safety

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Key facts

- Food safety, nutrition and food security are inextricably linked.
- An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420 000 die every year.
- US$ 110 billion is lost each year in productivity and medical expenses resulting from unsafe food in low- and middle-income countries.
- Children under 5 years of age carry 40% of the foodborne disease burden, with 125 000 deaths every year.
- Foodborne diseases impede socioeconomic development by straining health care systems and harming national economies, tourism, and trade.
- Food safety is a shared responsibility among different national authorities and requires a multisectoral, one health approach.

Overview

Access to sufficient amounts of safe and nutritious food is key to sustaining life and promoting good health. Unsafe food containing harmful bacteria, viruses, parasites or chemical substances causes more than 200 diseases, ranging from diarrhoea to cancers. It also creates

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a vicious cycle of disease and malnutrition, particularly affecting infants, young children, elderly and the sick. Good collaboration between governments, food producers and consumers is needed to help ensure food safety and stronger food systems.

Major foodborne illnesses and causes

Foodborne illnesses are usually infectious or toxic in nature and caused by bacteria, viruses, parasites or chemical substances entering the body through contaminated food. Chemical contamination can lead to acute poisoning or long-term diseases, such as cancer. Many foodborne diseases may lead to long-lasting disability and death. Some examples of food hazards are listed below.

Bacteria

Salmonella, Campylobacter and enterohaemorrhagic *Escherichia coli* are some of the most common foodborne pathogens that affect millions of people annually, sometimes with severe and fatal outcomes. Symptoms can include fever, headache, nausea, vomiting, abdominal pain and diarrhoea. Foods more frequently involved in outbreaks of salmonellosis include eggs, poultry and other products of animal origin. Foodborne cases due to *Campylobacter* are mainly caused by raw milk, raw or undercooked poultry and drinking water.
Enterohaemorrhagic *Escherichia coli* is often associated with unpasteurized milk, undercooked meat and contaminated fresh fruits and vegetables.

Listeria infections can lead to miscarriage in pregnant women or death of newborn babies. Although disease occurrence is relatively low, *Listeria*'s severe and sometimes fatal health consequences, particularly among infants, children and the elderly, count them among the most serious foodborne infections. *Listeria* is found in unpasteurised dairy products and various ready-to-eat foods and can grow at refrigeration temperatures.

Vibrio cholerae can infect people through contaminated water or food. Symptoms may include abdominal pain, vomiting and profuse watery diarrhoea, which quickly lead to severe dehydration and possibly death. Raw vegetablesand various types of raw or undercooked seafood have been implicated in cholera outbreaks.

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Antimicrobials, such as antibiotics, are essential to treat infections caused by bacteria, including foodborne pathogens. However, their overuse and misuse in veterinary and human medicine has been linked to the emergence and spread of resistant bacteria, rendering the treatment of infectious diseases ineffective in animals and humans.

Viruses

Some viruses can be transmitted by food consumption. Norovirus is a common cause of foodborne infections that is characterized by nausea, explosive vomiting, watery diarrhoea and abdominal pain. Hepatitis A virus can also be transmitted by food and can cause long-lasting liver disease and typically spreads through raw or undercooked seafood or contaminated raw produce.

Parasites

Some parasites, such as fish-borne trematodes, are only transmitted through food. Others, for example tapeworms like *Echinococcus* spp, or *Taenia* spp, may infect people through food or direct contact with animals. Other parasites, such as *Ascaris, Cryptosporidium, Entamoeba histolytica* or *Giardia*, enter the food chain via water or soil and can contaminate fresh produce.

Prions

Prions, infectious agents composed of protein, are unique in that they are associated with specific forms of neurodegenerative disease. Bovine spongiform encephalopathy (BSE, or so-called mad cow disease) is a prion disease in cattle, associated with the variant Creutzfeldt-Jakob disease (vCJD) in humans. Consuming meat products containing specified risk material, such as brain tissue, is the most likely route of transmission of the prion agent to humans.

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Chemicals

Of most concern for health are naturally occurring toxins and environmental pollutants.

- **Naturally occurring toxins include mycotoxins, marine biotoxins, cyanogenic glycosides and toxins occurring in poisonous mushrooms. Staple foods like corn or cereals can contain high levels of mycotoxins, such as aflatoxin and ochratoxin, produced by mould on grain. Long-term exposure can affect the immune system and normal development, or cause cancer.**
- **Persistent organic pollutants (POPs) are compounds that accumulate in the environment and human body. Known examples are dioxins and polychlorinated biphenyls (PCBs), which are unwanted by-products of industrial processes and waste incineration. They are found worldwide in the environment and accumulate in animal food chains. Dioxins are highly toxic and can cause reproductive and developmental problems, damage the immune system, interfere with hormones and cause cancer.**
- **Heavy metals such as lead, cadmium and mercury cause neurological and kidney damage. Contamination by heavy metal in food occurs mainly through pollution of water and soil.**

Other chemical hazards in food can include radioactive nucleotides that can be discharged into the environment from industries and from civil or military nuclear operations, food allergens, residues of drugs and other contaminants incorporated in the food during the process.

The burden of foodborne diseases

The burden of foodborne diseases on public health and economies has often been underestimated due to underreporting and difficulty in establishing causal relationships between food contamination and resulting illness or death.

The 2015 WHO report on the estimates of the global burden of foodborne diseases presented the first-ever estimates of disease burden caused by 31 foodborne agents (bacteria, viruses, parasites, toxins and chemicals) at global and sub-regional levels, highlighting that more than 600 million cases of foodborne illnesses and 420 000 deaths could occur in a year. The burden of foodborne diseases falls disproportionately on groups in vulnerable situations and especially on children under 5, with the highest burden in low- and middle-income countries.

The 2019 World Bank report on the economic burden of foodborne diseases indicated that the total productivity loss associated with foodborne disease in low- and middle-income countries was estimated at US$ 95.2 billion per year, and the annual cost of treating foodborne illnesses

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is estimated at US$ 15 billion.

The evolving world and food safety

Safe food supplies are essential for health, contribute to food and nutrition security, support national economies, trade and tourism, and underpin sustainable development.

Urbanization and changes in consumer habits have increased the number of people buying and eating food prepared in public places. Globalization has triggered growing consumer demand for a wider variety of foods, resulting in an increasingly complex and longer global food chain.

Climate change is expected to have considerable impacts on food safety and will likely increase the risks from existing and emerging foodborne diseases through increases in extreme weather events, increases in air and water temperatures, and changes in precipitation frequency and intensity.

These challenges put greater responsibility on food producers and handlers to ensure food safety. Local incidents can quickly evolve into international emergencies due to the speed and range of product distribution.

A public health priority – from farm to fork

Governments should make food safety a public health priority, as they play a pivotal role in developing evidence-based policies and risk-based, flexible regulatory frameworks and establishing and implementing effective food safety systems. Food handlers and consumers need to understand how to safely handle food and practice the WHO Five keys to safer food at home, or when selling at restaurants or at local markets. Food producers can safely grow fruits and vegetables using the WHO Five keys to growing safer fruits and vegetables.

Food safety is a shared responsibility among different national authorities and requires a multisectoral, one health approach, to be addressed in all the steps of the food chain.

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WHO response

WHO aims to strengthen national food control systems to facilitate global prevention, detection and response to public health threats associated with unsafe food. To do this, WHO supports Member States by:

- facilitating the implementation of the **WHO Global Strategy for Food Safety (2022–2030)** to support Member States to strengthen their national food control systems and reduce the burden of foodborne diseases through the activities of the WHO Alliance for Food Safety tacking the One Health approach;
- providing independent scientific assessments on microbiological and chemical hazards that form the basis for international food standards, guidelines, and recommendations, known as the **Codex Alimentarius**;
- assessing the performance of national food control systems throughout the entire food chain, identifying priority areas for further development, and measuring and evaluating progress over time through the **FAO/WHO food control system assessment tool**;
- assessing the safety of new technologies used in food production, such as genetic modification, cultivated food products and nanotechnology;
- helping implement adequate infrastructure to manage food safety risks and respond to food safety emergencies through the International Food Safety Authorities Network (**INFOSAN**);
- promoting safe food handling through systematic disease prevention and awareness programmes, through the **WHO Five keys to safer food** message and training materials;
- advocating for food safety as an important component of health security and for integrating food safety into national policies and programmes in line with the **International Health Regulations** (IHR 2005);
- **strengthening surveillance of and response to foodborne diseases** globally by supporting countries to improve their current foodborne disease surveillance and response activities (**including through the use of Whole Genome Sequencing (WGS)**) and integrate them into existing national surveillance and response systems required by the IHR 2005; and
- monitoring regularly the **global burden of foodborne diseases** at national, regional and international levels, and supporting countries to **estimate the national burden of foodborne diseases** or utilize existing burden estimates to inform food safety policies.

WHO works closely with the Food and Agriculture Organization (FAO), the World Organization for Animal Health (WOAH), the UN Environment Programme (UNEP) and other international organizations to ensure food safety along the entire food chain from production to consumption, in line with the One health joint plan of action (2022–2026): working together for the health of humans, animals, plants and the environment

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