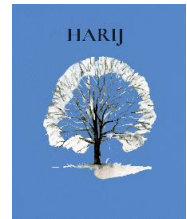




HARIJ

ISSN: XXXX-XXXX

Link: <http://harij.helu.edu.af/index.php/harij/article/view/6>

An Overview of Foodborne Diseases

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Received 10/07/2025; Accepted 14/09/2025; Available online 31/12/2025

Abstract: Foodborne diseases are health conditions caused by bacterial, viral, parasitic, and fungal agents, transmitted to humans through contaminated, improperly stored, or undercooked food. These illnesses can range from mild diarrhoea to severe complications such as kidney failure, neurological disorders, or even death. Vulnerable groups, including children, the elderly, pregnant women, and individuals with weakened immune systems, are particularly at risk. Key bacterial agents include Salmonella, Escherichia coli (E. coli), and Listeria; viral agents include Norovirus and Hepatitis A; parasitic agents include Giardia and Toxoplasma; and fungal toxins such as aflatoxins also play a significant role. Prevention strategies include proper personal hygiene, thorough appropriate cooking of food, access to clean water, and safe storage of food products. Additionally, raising public awareness and strengthening the role of international health organisations are crucial for controlling these diseases. This article aims to highlight the causes, symptoms, diagnosis, preventive measures, and the importance of public awareness regarding foodborne diseases.

Keywords: Foods, Salmonellosis, E. Coli, Campylobacteriosis, Toxoplasmosis, Mycotoxicosis and Health Risks

1. Introduction

At first glance, this topic may appear to be largely associated with academic or scientific domains. However, upon closer consideration, it becomes evident that such information is also highly relevant to the general public. Awareness of the causes of illness and understanding basic preventive measures can empower individuals regardless of their background to protect themselves from a range of diseases. By simply following proper hygiene practices, countless illnesses can be effectively avoided. This need for awareness is even more critical among individuals who are in direct contact with animals, including large-scale livestock farm owners, animal handlers, and those who keep domestic animals at home. These groups are particularly vulnerable and thus require accurate information to protect both themselves and the wider community from foodborne diseases. Foodborne illnesses are caused by the ingestion of microscopic pathogens or their toxins, which typically enter the body through the gastrointestinal tract and can subsequently reach the bloodstream, causing systemic illness (Negga et al., 2005). Clinically, affected individuals may present with symptoms such as gastrointestinal discomfort, abdominal pain, nausea, vomiting, diarrhea, fever, fatigue, and joint pain (TDI, 2021). This article broadly discusses four major categories of foodborne diseases. It begins with bacterial foodborne infections, followed by viral, parasitic, and finally, fungal diseases. The primary objective of this paper is to provide an overview of foodborne illnesses in general, with a particular focus on the basic identification and classification of bacterial, viral, parasitic, and fungal pathogens transmitted through food.

2. Materials and Method

The methodology for this review article on foodborne diseases involved a comprehensive literature search across multiple databases, including PubMed, Scopus, and Google Scholar, to identify relevant studies published in the last decade. We used keywords such as "foodborne diseases," "pathogens," "prevention," and names of specific pathogens to gather a wide range of articles, including epidemiological studies, clinical guidelines, and public health reports. Selected studies were evaluated for their quality and relevance, with a focus on identifying trends in prevalence, symptoms, and demographic impacts. Data from these studies were synthesized to provide insights into common causative agents, associated health risks, and effective prevention strategies. Additionally, the review considered national and international health guidelines to emphasize the importance of public awareness and institutional frameworks in combating foodborne diseases. The findings were then organized thematically to present a cohesive overview for the target audience.

3. Results

3.1 Introduction to Foodborne Diseases (FBD)

Foodborne diseases (FBD), also known as food poisoning, are illnesses caused by the consumption of contaminated food or beverages. These diseases are typically caused by bacteria, viruses, parasites, toxins, or chemical substances that contaminate food or drink during production, processing, handling, or storage. In many cases, foodborne illnesses are triggered by microorganisms or their toxins and often manifest as gastrointestinal disorders. The severity of symptoms largely depends on the type and quantity of the microorganisms involved, ranging from mild to severe (David, 2008). Foodborne diseases (FBDs) are illnesses caused by the ingestion of microscopic organisms or their toxins, which typically enter the bloodstream through the gastrointestinal tract, leading to various health complications (Negga et al., 2005).

To date, researchers have identified approximately 250 different foodborne illnesses. According to the U.S. Food and Drug Administration (FDA), one in every six individuals in the United States is affected by an FBD each year. This equates to nearly 48 million cases annually, with an estimated healthcare cost of approximately 17.6 billion USD (TDI, 2021). Moreover, the U.S. Centers for Disease Control and Prevention (CDC) reports that foodborne diseases result in approximately 5,000 deaths annually in the United States (David, 2008). Among the most common and severe foodborne illnesses are: salmonellosis, campylobacteriosis, *E. coli* infections, toxoplasmosis, listeriosis, norovirus infections, and hepatitis A.

Foodborne diseases can affect anyone who consumes contaminated food. However, certain groups are more vulnerable to these infections, including pregnant women, elderly individuals, young children, and people with weakened immune systems. Clinically, infected individuals may exhibit symptoms such as stomach discomfort, abdominal pain, nausea, vomiting, diarrhoea, fever, fatigue, and joint pain. These symptoms typically last 1 to 7 days. In more severe cases, complications may include bloody diarrhoea, diarrhoea lasting more than three days, high fever (up to 39°C or higher), persistent vomiting, dehydration, dry mouth, and confusion. If not properly treated in time, foodborne diseases may lead to chronic health complications, including long-term arthritis, neurological damage, and kidney failure (TDI, 2021).

3.2 The Importance of Food Safety

Foodborne diseases, which result from the consumption of contaminated food or beverages, are primarily caused by harmful bacteria, viruses, parasites, or their toxins (pathogens) present in food. There are numerous types of foodborne illnesses, each associated with specific pathogens and presenting with a variety of symptoms and health impacts. Some of the most common foodborne diseases include:

1. **Salmonellosis** – Caused by *Salmonella* bacteria, this illness typically presents with symptoms such as diarrhoea, abdominal pain, fever, and vomiting. In severe cases, it can lead to dehydration. *Salmonella* is also responsible for typhoid and paratyphoid fevers—typhoid being a more severe and potentially life-threatening condition, while paratyphoid is generally milder and less dangerous (David, 2008).
2. **Campylobacteriosis** – This infection is caused by *Campylobacter* bacteria. It commonly leads to symptoms such as diarrhoea, abdominal pain, fever, and sometimes inflammation and vomiting. *Campylobacter* is among the most common causes of gastrointestinal illness.
3. **E. coli Infection** – Certain strains of *Escherichia coli* (*E. coli*), such as *E. coli* O157:H7, can cause severe food poisoning. Its symptoms include bloody diarrhoea, abdominal cramps, and, in some cases, kidney failure and reduced kidney function.
4. **Listeriosis** – Caused by *Listeria monocytogenes*, this infection mainly affects pregnant women, newborns, the elderly, and individuals with weakened immune systems. It can cause neurological symptoms and, in severe cases, may result in septicemia and death.
5. **Norovirus Infection** – *Noroviruses* are highly contagious viruses that cause gastroenteritis. Symptoms include vomiting, diarrhea, inflammation, abdominal pain, and sometimes fever. Norovirus outbreaks frequently occur in crowded places such as cruise ships, schools, and hospitals.
6. **Hepatitis A** – Caused by the hepatitis A virus (HAV), this infection is transmitted through contaminated food and water. It affects the liver and is characterised by symptoms such as fever, fatigue, abdominal pain, nausea, and dark-colored urine. While most people fully recover, the disease can be severe in certain cases (David, 2008).

3.3 Effects on Human Health

Foodborne diseases can have various impacts on human health, ranging from mild discomfort to severe complications and even death. Generally, the common effects include:

1. Various stomach problems
2. Dehydration
3. Hemolytic Uremic Syndrome (HUS)
4. Long-term health complications (NDDIC, 2012).

3.4 Transmission Routes and Risk Factors Associated with Foodborne Diseases

Food and beverages can become contaminated through various routes by microorganisms, which can cause poisoning and lead to different illnesses. Some of these diseases are very dangerous, some moderate, and others mild. The transmission routes include contaminated food, foodborne pathogens, poor personal hygiene, continuous cross-contamination, inadequate cooking and reheating of food, improper temperature control, and contaminated water (TDI, 2021).

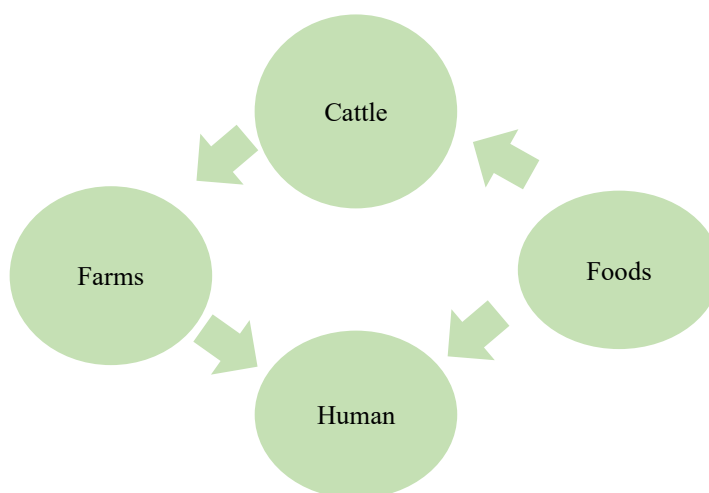


Figure 1: Cycle and Factors of Foodborne Diseases

3.5 Bacterial Foodborne Diseases

Foodborne bacterial diseases include well-known illnesses such as Salmonellosis, Campylobacteriosis, Escherichia coli (E. coli), Listeriosis (which affects humans among other animals), Shigellosis, and others. Below, we provide a detailed explanation of three of these diseases:

Salmonellosis

Salmonellosis, also known as enteric fever, is caused by bacteria of the genus *Salmonella*. First, we introduce the *Salmonella* bacteria:

3.6 Identification of *Salmonella* Bacteria

Salmonella is a type of bacteria capable of causing foodborne illness in both humans and animals. The most common species responsible for infection is *Salmonella enterica*, which can cause symptoms such as diarrhoea, stomach pain, fever, and vomiting. These symptoms typically appear 7 to 72 hours after consuming contaminated food or water and may last for several days. *Salmonella* bacteria are commonly found in the intestines of animals, especially birds, domestic livestock, and insects. Food contamination can occur at any stage of production, processing, or handling. Consuming undercooked or raw eggs, poultry, meat from domestic animals, or contaminated fruits and vegetables can facilitate the transmission of *Salmonella* to humans.

There are more than 2,600 identified *Salmonella* serotypes, which are classified based on specific antigens on the bacterial surface. The most common serotypes associated with human infections are *Salmonella Enteritidis* and *Salmonella Typhimurium* (Shu et al., 2015).

Salmonella Typhi and *Salmonella Paratyphi* are closely related bacteria in the *Salmonella* genus, both responsible for causing enteric fever commonly known as typhoid and paratyphoid fever, respectively. While both illnesses share similar symptoms and are caused by *Salmonella* bacteria, there are notable differences between them. These include variations in serotypes, differences in disease severity, distinctions in clinical manifestations, and varying levels of antibiotic resistance. *Salmonella Typhi* is typically associated with areas that have poor sanitation and inadequate hygiene practices, particularly in developing countries. It is most prevalent in regions of Asia, Africa, and Latin America. On the other hand, *Salmonella Paratyphi* is less common but can be found in the same geographic areas and presents symptoms similar to typhoid fever (Kenneth, 2020).

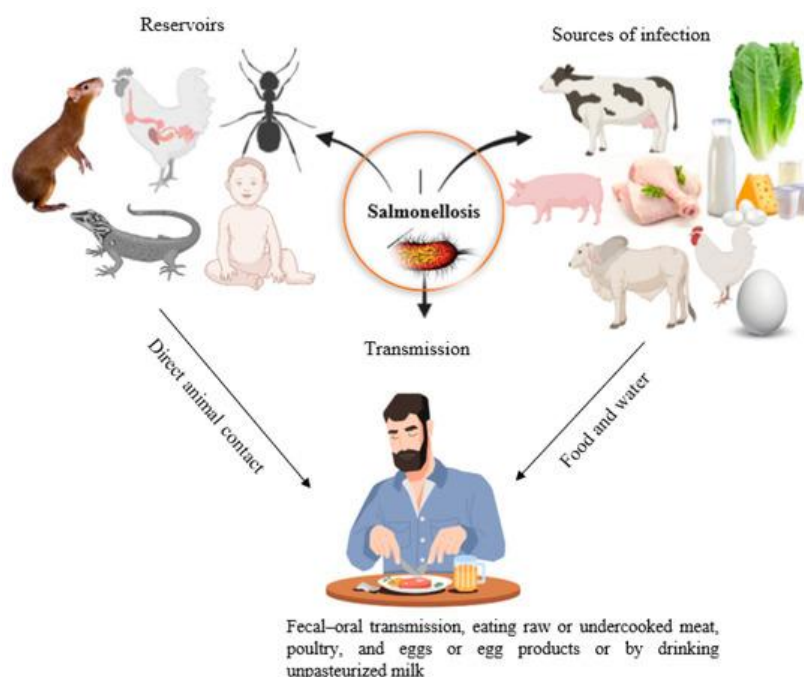


Figure 2: Sources and routes of transmission of Salmonellosis are displayed in the figure.

3.7 Clinical Signs

The common signs and symptoms of typhoid fever usually develop within 2 to 3 weeks after exposure to the bacteria. These symptoms include: high fever ranging from 39°C to 40°C, abdominal pain, headache, cough, lethargy, weakness, intestinal bleeding, poor appetite, body rash and warmth, confusion, constipation, diarrhoea, fatigue, and a swollen abdomen (Shu et al., 2015).

3.8 Diagnosis

The diagnosis of *Salmonella Typhi* infection, which causes typhoid fever, is based on clinical evaluation, medical history, and laboratory tests. A brief overview of the diagnostic approach is outlined below:

3.9 Medical History and Physical Examination:

The first and simplest step in diagnosing *Salmonella Typhi* infection is evaluating the patient's clinical signs and conducting a physical examination. Common symptoms include fever, abdominal pain, and other gastrointestinal issues such as diarrhoea, constipation, or abdominal bloating. Additionally, assessing potential exposure to the infection—such as contact with known typhoid fever patients—is an important part of the initial diagnostic process.

3.10 Blood Laboratory Tests:

Blood testing is considered the most reliable diagnostic method for typhoid fever. It involves collecting blood samples and testing them in the laboratory to detect *Salmonella Typhi*. Since the number of bacteria in the bloodstream may vary over time, these tests are often repeated to increase the chances of detection (NICD, 2022).

3.11 Stool Culture:

Stool culture can be performed, especially in acute cases, to isolate and identify *Salmonella Typhi* bacteria. For this, approximately one gram of stool is placed in 10 ml of Selenite F broth and incubated at 37°C for 18 to 48 hours to allow bacterial growth. This enables colony identification. To differentiate *Salmonella Typhi* colonies from other bacterial species, Triple Sugar Iron (TSI) agar is used during laboratory analysis (WHO, 2023).

3.12 Serological Tests

Serological tests detect antibodies produced by the immune system in response to *Salmonella Typhi* infection. These tests include the **Widal test** and **Typhidot test**, which measure the presence of specific antibodies (such as O and H antibodies) in the patient's blood. Serological testing is particularly useful for early diagnosis or in regions where blood culture facilities are limited (WHO, 2023).

3.13 Prevention and Control

As mentioned earlier in the discussion of *Salmonella Typhi* and its role in causing typhoid fever, the disease primarily results from the consumption of contaminated food and water and from poor hygiene practices. Therefore, prevention strategies focus on these three key areas:

- Ensuring access to clean food and drinking water
- Promoting good personal and general hygiene
- Providing proper sanitation infrastructure

In addition to these measures, **vaccination** serves as an important supplementary preventive tool. Receiving a typhoid vaccine can significantly help in reducing the risk of infection.



Figure 3: Preventive measures against *Salmonella* are illustrated

Access to Safe Water

To prevent the transmission of typhoid fever through contaminated water, the following measures are essential:

- **Urban Areas:** Water supply systems must be closely monitored, and safe drinking water should be provided to the public through piped networks or water tankers.
- **Rural Areas:** Wells should be tested for contamination, and if necessary, appropriate steps should be taken to purify or disinfect the water.
- **At the Household Level:** Even if the source appears to be safe, attention must be paid to water disinfection and storage. Drinking water can be made safe by boiling it for at least one minute or by adding chlorine.

3.14 Access to Safe Food

Contaminated food is another significant route for the transmission of typhoid fever. Proper food preparation and adherence to basic hygiene practices during handling and processing are critical in preventing infection (NICD, 2022).

3.15 Hygiene and Sanitation

Maintaining proper hygiene plays a vital role in reducing the transmission risk of all diarrheal diseases, including *Salmonella Typhi*. Adequate sanitation facilities for the disposal of human waste should be made accessible to all members of the community (WHO, 2023).

3.16 Sources of *Salmonella* Infection (1998–2009, USA)

Between 1998 and 2009 in the United States, the percentage of food-related *Salmonella* infections originated from the sources of; 29% from vegetables, 19% poultry, 15% eggs, 13% fruits, 8% red meat (beef, etc.), 7% from dairy products, 6% from pork, 3% from grains and legumes (Andrew, 2015).

3.17 Vaccines

Currently, two safe and effective vaccines are available for the prevention of typhoid fever:

1. Vi Polysaccharide Vaccine:

This vaccine is administered as a single subcutaneous dose and provides protection approximately seven days after administration. It is recommended for individuals aged two years and older. The vaccine is licensed and used in 92 countries across Australia, Asia, the Americas, Europe, and Africa.

2. Ty21a Oral Vaccine:

This live-attenuated vaccine is taken orally in three doses over the course of two days. Its protective effects become apparent within 10 to 14 days after administration (WHO, 2023).

3.18 *Escherichia coli* (*E. coli*) Infections

Escherichia coli (commonly known as *E. coli*) is a type of bacterium capable of causing foodborne illnesses. It naturally resides in the digestive tract of mammals, particularly in the large intestine, which serves as its primary habitat. *E. coli* exists in several strains, many of which are beneficial to the host organism by aiding in digestion and maintaining gut health. Among its many serotypes, the most well-known is **E. coli O157:H7**, which is recognized for causing illness in humans due to the consumption of contaminated food. The genome of this particular serotype contains approximately 5,000 genes, enabling it to transfer virulence factors and infect susceptible hosts (Castellani and Chalmers, 2019).

3.19 Common and Frequently Occurring Diseases Caused by *E. coli*

1. Gastrointestinal Infection:

This is a bacterial infection caused by various pathogens, including harmful strains of *E. coli*. The infection rapidly spreads throughout the digestive system, primarily affecting the stomach and small intestine. It results in severe diarrhea, vomiting, and abdominal pain. Among the various symptoms, diarrhea is typically triggered by pathogenic *E. coli*, particularly affecting young children, small mammals, or newborns. The serotype **E. coli O157:H7** is the most common and well-recognized cause of this condition. Although this illness is generally not life-threatening and often resolves on its own within a few days, in some cases, it may lead to a severe complication known as **Hemolytic Uremic Syndrome (HUS)**. If not treated promptly, HUS can have serious and potentially fatal outcomes (Francis, 2008).

2. Meningitis:

This condition refers to inflammation of the meninges (the protective membranes of the brain) and can be caused by viral or bacterial infections, including *E. coli*. It is characterised by severe headache, fever, photophobia, and muscle stiffness. In severe cases, it may lead to confusion, psychosis, or death. Timely medical intervention is therefore crucial.

3. Peritonitis:

Peritonitis is the inflammation of the peritoneum, the membrane lining the abdominal cavity. It can result from bloodstream infections or abdominal wall ruptures and is commonly caused by *E. coli* and other bacteria.

4. Mastitis:

Mastitis is an inflammation of the mammary glands in lactating animals, often caused by bacterial entry through the teat canal. *E. coli* is one of the major causative agents of this infection (Sonia et al., 2020).

5. Septicemia (Blood Infection):

This is a serious and life-threatening condition caused primarily by pathogenic *E. coli*. The bacteria enter the bloodstream and other tissues, increasing the concentration of toxins, overwhelming the body's immune response. This may lead to septic shock and eventually death if immediate treatment is not provided.

3.20 Pneumonia (Lung Inflammation):

Pneumonia occurs when the air sacs (alveoli) in the lungs become filled with pus, leading to impaired gas exchange. In some cases, the air sacs may become solidified. This inflammation can affect one lung or may spread to both lungs (Francis, 2008).

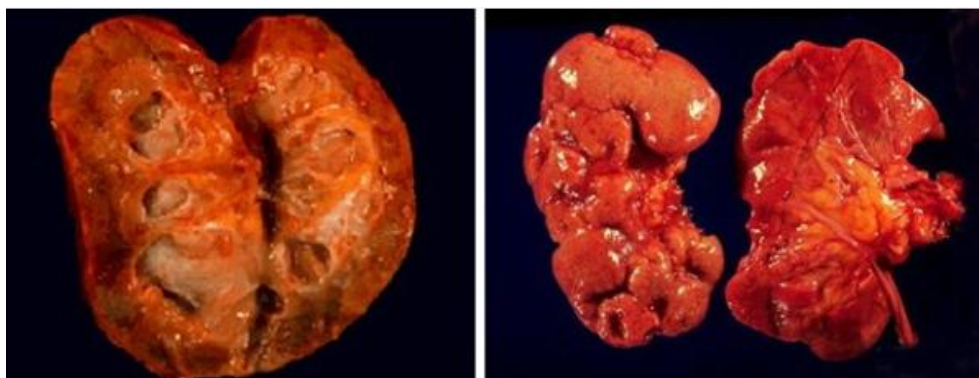


Figure 4: Lungs of a mammal showing consolidation due to inflammation caused by *E. coli*.

Factors Contributing to *E. coli*-Induced Diseases

Although most strains of *Escherichia coli* (*E. coli*) are harmless, certain pathogenic types can cause disease, particularly diarrhoea. The main contributing factors include:

Contaminated Food:

The most common and direct route of *E. coli* infection is through the consumption of contaminated food. Humans are highly susceptible to *E. coli* infections, especially from meat products derived from cattle, sheep, and goats.

Undercooked Food:

A major source of infection is undercooked or inadequately prepared food. This includes partially cooked hamburgers, rare or raw red meat, unpasteurized milk, yogurt, and cheese (Francis, 2008).

3.21 Prevention and Control of *E. coli* O157:H7 Infections

Preventing infections caused by *E. coli* O157:H7 requires strict control measures across the entire food supply chain—from crop production to retail and food service environments. Proper washing and sanitation of food intended for consumption play a vital role in controlling the spread of *E. coli* and related infections. To reduce the risk of infection, special attention must be paid to minimizing fecal contamination in slaughterhouses. Additionally, thorough cooking of meat is essential in the prevention and control of these infections (Francis, 2008).

3.22 Campylobacteriosis

Campylobacteriosis is an infectious disease caused by bacteria of the *Campylobacter* genus, with *Campylobacter jejuni* being the most common species associated with human infections. It is one of the leading bacterial causes of diarrheal illness worldwide, with millions of cases reported annually. Transmission of Campylobacteriosis typically occurs through the consumption of contaminated food, especially undercooked poultry, unpasteurized milk, and untreated water. The disease can also spread through direct contact with infected animals, particularly young dogs (puppies), kittens, or farm animals. Symptoms of Campylobacteriosis usually appear two to five days after exposure to the bacteria and may include diarrhea (often bloody), abdominal pain, fever, inflammation, and vomiting.

Effective prevention relies on proper hygiene and food safety practices. These include: thorough cooking of poultry, safe storage of raw meat, washing hands before and after handling food, avoiding the consumption of unpasteurized milk and untreated water (Facciola et al., 2017).

3.23 Foodborne Viral Diseases

Foodborne viral diseases are illnesses caused by consuming food or drinking water contaminated with viruses. Some of the most common and significant foodborne viral infections include:

Norovirus

Norovirus is one of the most common causes of foodborne illness worldwide. It is responsible for a condition often referred to as **stomach flu** or **winter vomiting disease**. The infection leads to acute gastrointestinal distress, with symptoms such as nausea, vomiting, diarrhea, abdominal pain, and occasionally fever. Norovirus can be transmitted through contaminated food, water, or surfaces and is frequently associated with outbreaks in environments such as restaurants, cruise ships, and schools. The virus can also spread via oral secretions, making it highly contagious (Bonsdorff and Koopmans, 2002).

Foodborne Hepatitis

Hepatitis A is the most common type of viral hepatitis transmitted through contaminated food and water. It is caused by the **Hepatitis A virus (HAV)** and usually spreads when a person consumes food or water that has been contaminated with the feces of an infected individual. This often occurs due to poor hygiene practices during food preparation or due to improper handwashing by food handlers. Symptoms of Hepatitis A can range from mild to severe and may include fatigue, inflammation, vomiting, abdominal pain, dark yellow urine, clay-colored stools, and jaundice (yellowing of the skin and eyes).

Hepatitis E is another viral infection that spreads through contaminated food and water, though it is less common than Hepatitis A. To prevent foodborne hepatitis, maintaining good hygiene and ensuring access to safe food and clean drinking water are essential. Preventive measures include:

- Washing hands thoroughly with soap and water before eating or preparing food,
- Ensuring food is properly cooked,
- Avoiding raw or undercooked food,
- Drinking only clean and safe water (Bonsdorff and Koopmans, 2002).

Rotavirus

Rotavirus is a virus transmitted through food and a leading cause of intestinal flu, or **stomach flu**. The disease can range from mild to severe and typically begins with vomiting two to three days after viral exposure. Other symptoms include diarrhoea and mild fever. Diarrhoea may last up to 7 days, and in some cases, it can persist for up to a month. If left untreated, rotavirus infection can lead to severe dehydration, particularly in young children between 6 and 48 months of age, potentially resulting in death. Globally, two effective vaccines, RotaTeq and Rotarix, are available to prevent rotavirus infections (Al-Daim, 2022).

3.24 Foodborne Parasitic Diseases

Although foodborne parasitic diseases occur less frequently than bacterial and viral illnesses, they remain an important public health concern globally. Notable foodborne parasitic diseases include:

- **Toxoplasmosis**
- **Trichinellosis** (*Trichinella* infection)
- **Cryptosporidiosis**

Toxoplasmosis

Toxoplasmosis is typically transmitted through the consumption of raw or undercooked meat especially from pigs, sheep, or deer. Additionally, food and water contaminated with cat feces may also carry the parasite. People infected with *Toxoplasma gondii* may not show any clinical symptoms. However, in older individuals or pregnant women, the infection may cause flu-like symptoms. Preventive measures include: thoroughly cooking meat, handwashing, and ensuring proper food and water sanitation (Dorny et al., 2009).

Trichinellosis (Trichinosis)

Trichinellosis, also known as **Trichinosis**, is a parasitic disease primarily transmitted through food. The causative agent is a roundworm called *Trichinella spiralis*, which is typically found in certain wild or domesticated animals such as pigs, bears, and wild boars. Humans become infected by consuming raw or undercooked meat from these animals. Once ingested, the parasite's larvae are released into the stomach and intestines, where they begin to invade body tissues. The clinical symptoms of trichinellosis depend on the number of larvae ingested. In severe cases, where the larvae migrate to various parts of the body, symptoms may include: vomiting, nausea, diarrhoea, abdominal pain, muscle pain, swelling (especially around the eyes), fever, fatigue, myocarditis (inflammation of the heart muscle), encephalitis (brain inflammation) and respiratory issues. As with other parasitic and viral foodborne diseases, prevention focuses on avoiding raw or undercooked meat (Dorny et al., 2009).

3.25 Cryptosporidiosis

Cryptosporidiosis is a parasitic zoonotic gastrointestinal disease caused by protozoa of the genus *Cryptosporidium*. Cattle serve as important biological reservoirs for this parasite and play a significant role in the transmission of human cryptosporidiosis. Globally, cryptosporidiosis ranks fifth among the 24 most important foodborne parasitic infections. In developing countries, *Cryptosporidium* is considered a major cause of diarrheal disease, accounting for approximately 8% to 19% of all reported cases. It affects a wide range of vertebrate hosts, including humans, and is responsible for significant health burdens (Thomson et al., 2017). *Cryptosporidium* is widespread and found in both developed and

developing countries. It is recognized as one of the leading causes of **waterborne disease outbreaks**, particularly in regions with inadequate water sanitation and hygiene systems.

Preventive strategies mainly focus on the consumption of clean and safe drinking water, as contaminated water is the primary route of transmission for this parasite (Gong et al., 2017).

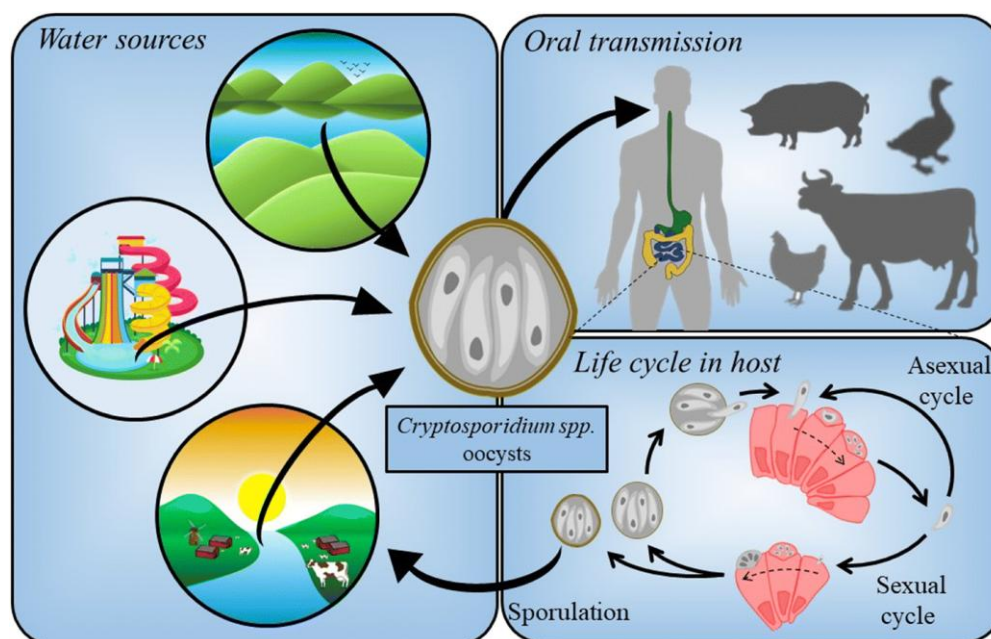


Figure 5: Transmission Pathways of Cryptosporidiosis

3.26 Foodborne Fungal Diseases

Fungal contamination of food can occur during various stages, including production, processing, storage, or preparation. Some examples of foodborne fungal diseases include **mycotoxicosis**, **aspergillosis**, **mucormycosis**, and **candidiasis**. Among these, the first two are briefly explained below:

Aspergillosis

Aspergillosis is a fungal disease primarily caused by the inhalation of spores from the *Aspergillus* genus. This fungus produces **aflatoxins**, which can contaminate various crops, including peanuts, maize, and tree nuts. When these contaminated products are consumed in large quantities, the aflatoxins can lead to serious poisoning (Benedict et al., 2016).

Mycotoxicosis

Mycotoxicosis refers to diseases caused by the consumption of food contaminated with **mycotoxins**, which are toxic substances produced by certain fungi. Various fungal genera are capable of producing mycotoxins, including *Fusarium*, *Penicillium*, and *Aspergillus*. Common types of mycotoxins include **aflatoxins**, **ochratoxin A**, **fumonisin**, **trichothecenes**, and others. These toxins can adversely affect the liver, kidneys, immune system, and other organs, depending on the type and concentration, leading to a wide range of clinical symptoms. The prevention of foodborne fungal diseases involves proper **cleaning**, **cooking**, **storage**, and **preparation** of food. Maintaining good hygiene practices also plays a critical role in reducing the risk (Benedict et al., 2016).

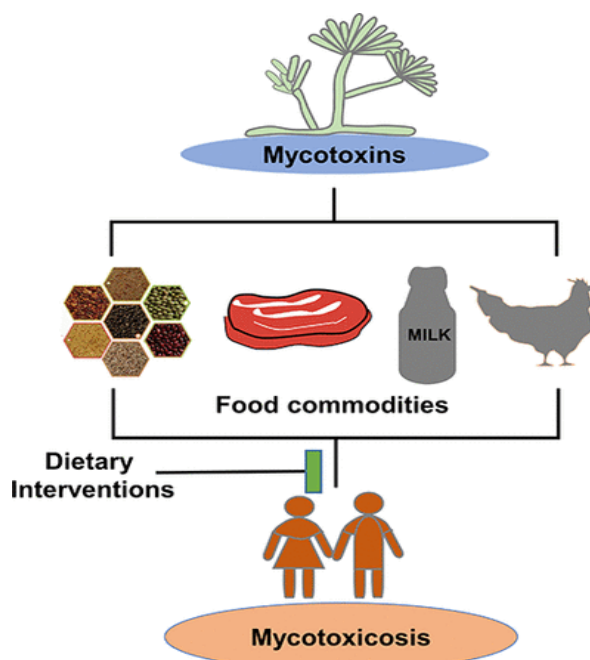


Figure 6: Transmission pathway of Mycotoxicosis is illustrated.

4. Discussion

Foodborne diseases are a major public health issue around the world. Their rates are rising due to factors like globalisation, changes in how food is produced, and shifts in what people eat. The main germs that cause these illnesses, such as Salmonella, E. coli, Listeria, and Norovirus, each bring their own challenges for prevention and control. For example, Salmonella and E. coli outbreaks often come from undercooked meats or contaminated produce, which shows why proper cooking and food safety are so important. Symptoms can range from mild stomach upset to serious problems like kidney failure, so quick diagnosis and treatment are especially important for people at higher risk.

Raising public awareness is key to reducing the risks of foodborne diseases. Education should focus on helping people improve their hygiene and learn safe ways to handle food. Teaching the public where food comes from, how to store it, and how to prepare it safely can reduce the risk of foodborne illness. Community programs and campaigns from health organizations can help spread this knowledge even further.

Because food is traded worldwide, countries need to work together to keep it safe. Stronger rules and better monitoring systems, both within countries and between them, can help spot and respond to outbreaks early. It is also important to provide food safety organisations with the tools they need to verify and enforce food safety standards.

In summary, fighting foodborne diseases takes a mix of education, strong rules, and public health efforts. Ongoing research and careful monitoring are needed to keep up with emerging germs and evolving food safety practices. Most importantly, building a culture in which people and communities value food safety will help reduce the number and impact of these illnesses.

5. Conclusion

Foodborne diseases arise from the consumption of contaminated food or beverages and are generally caused by harmful bacteria, viruses, parasites, or their toxins. To date, researchers have identified approximately 250 known foodborne illnesses. These diseases vary widely in type, each causing different health problems and presenting with a range of clinical symptoms and impacts. Some of the most common foodborne illnesses include salmonellosis, campylobacteriosis, E. coli infection, various viral infections such as Hepatitis A and E, rotavirus, toxoplasmosis, trichinellosis, cryptosporidiosis, mycotoxicosis, and aspergillosis. The effects of these diseases on human health can range from mild discomfort to severe complications and even death. Common health effects include gastrointestinal issues such as diarrhoea, vomiting, abdominal pain, dehydration, anaemia, joint pain, and respiratory problems. Food and drinks may become contaminated through various pathways, leading to poisoning by microorganisms and causing illnesses of varying severity some mild, others moderate or severe. Major transmission routes include consuming contaminated or undercooked food, poor hygiene practices, persistent contamination, insufficient cooking or reheating, inadequate temperature control, and using contaminated water. Prevention of foodborne illnesses primarily involves maintaining good hygiene, properly cooking food, and thoroughly cleaning hands after contact with animals or raw food products.

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