

Overview of Foodborne Disease



HIGHLIGHTS

- Foodborne disease is common but largely preventable.
 - An estimated 2.2 million cases of foodborne illness occur annually in Canada.
 - The actual number of cases of foodborne disease, particularly those considered to be enteric illnesses, is underreported.
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INTRODUCTION

Foodborne disease refers to illnesses acquired by the consumption of contaminated foods or beverages. More than 250 different foodborne diseases have been identified, the majority of which are infections caused by bacteria, viruses and parasites that can be found in food.¹ Foodborne disease can also result from other contaminants including poisonous chemicals or other harmful substances.

There are four types of hazards in food that can cause illness, injury and even death: biological hazards, physical hazards, chemical hazards and allergens. Biological hazards are living organisms including bacteria, parasites, viruses and moulds. Physical hazards are substances that can cause choking or internal injury. These include items such as glass, metal, wood chips and jewellery. Chemical hazards include cleaners, sanitizers, pesticides, paints and other chemicals that can make food dangerous to eat. Allergens are substances that can cause an allergic reaction and can include fish, shellfish, nuts, eggs, dairy products, sulfites, soy products, sesame seeds, wheat, and others.²

This report will focus on common biological hazards. Biological hazards are living and growing organisms found everywhere. Most are so tiny that a microscope is needed to view them. Their small size also means they can easily attach to living and non-living things such as dust, clothing, hands and other objects. Once attached to an object, these hazards can contaminate food products which, if consumed by people, can lead to a foodborne illness.

A number of the pathogens that can be transmitted through food can also be transmitted in other ways. Many foodborne diseases can also be spread from one person to another if hands are not thoroughly washed with soap and water after using the washroom.

Microorganisms or toxins that enter the body through the gastrointestinal tract usually result in initial symptoms occurring there. Common symptoms include nausea, vomiting, abdominal cramps and diarrhea. An individual can, however, be infected with a foodborne pathogen and not exhibit any symptoms, but still have the ability to transmit the pathogen to others.

The symptoms that an individual may experience are dependent on the type and quantity of microbe that is ingested. Once the microbes are ingested, there is a period of time (incubation period) which can range from hours to days before an individual will begin to feel any symptoms. The microbes pass through the stomach to the intestines where they attach to the cell lining of the intestinal walls and begin to multiply. Some microbes may stay in the intestine, while others can invade deeper into body tissues.¹ Some microbes produce a toxin that is absorbed into the bloodstream. Illnesses generally last from one day to one week and symptoms can include fever, headache, nausea, vomiting, cramps and dehydration that may lead to death.

Some foodborne infections also have a risk of complications such as kidney failure (verotoxin-producing *Escherichia coli* (VTEC)), systemic infections (amebiasis, salmonellosis and yersiniosis) and immune system problems (campylobacteriosis, salmonellosis and yersiniosis).

FOODBORNE BIOLOGICAL HAZARDS

Bacteria

Bacteria are single-celled microorganisms that live in air, water, soil or in the bodies of humans or animals. Foodborne disease can occur when food or water contaminated with bacteria or their toxins is ingested.

Parasites

Parasites are small organisms that live in and on animals and humans. Some, including protozoa, cryptosporidia and cyclospora, can also be found in unclean water. Food poisoning from waterborne parasites can occur when the water containing the parasites is used to irrigate or wash raw fruits and vegetables which are eaten without being fully cooked.

Prions

Prions are small proteins which can cause neurological illness in animals and humans. A prion linked to Mad Cow Disease (Bovine Spongiform Encephalopathy) in cattle is believed to cause new-variant Creutzfeldt-Jacob Disease (nvCJD) in humans who have eaten meat from infected cattle.² Foodborne prion diseases are rare and are not included in this report.

Moulds

Moulds are often visible to the naked eye and grow in moist conditions. Some moulds have an invisible filament which can inject a toxin as much as two inches below the surface of a product. Consumption of the mouldy product can then make the individual ill, even once the visible mould has been removed.²

Viruses

Viruses are among the smallest of microorganisms. In order to grow and survive, they must invade a living organism. Viruses cannot multiply in food but can be transported in food and some can survive freezing and normal cooking temperatures. They can also be spread by food handlers and/or servers.²

Biological hazards in food can have four possible effects:

They can:

- be present in food without causing foodborne illnesses or affecting people (i.e., inert);
- be beneficial in food production (e.g., yeast);
- cause food to spoil without causing illness in humans (i.e., food spoilage organisms); and
- be pathogenic (i.e., can cause illness and death). These microorganisms grow by absorbing available food around them and can double in number very rapidly (e.g., at room temperature every seven to 20 minutes). Food affected by a pathogenic virus may look and smell fine but is unsafe for human consumption.²

This report will focus on the most common foodborne diseases caused by bacteria, parasites and viruses.

FOODBORNE DISEASE IN CANADA AND ONTARIO

Health Canada estimates there are 2.2 million cases of foodborne illness annually in Canada.³

The costs of foodborne disease are difficult to estimate but include the costs of: medical care; lost productivity; loss of leisure time; pain, grief or suffering; death; investigations (i.e., epidemiologic, laboratory, administrative action including public warning); loss of business; legal action; and travel to receive medical care and visit relatives.⁴

In Ontario, the occurrence of several foodborne diseases—primarily enteric illnesses—is monitored through the Reportable Diseases Information System (RDIS). For the purpose of this report, some of the most common enteric illnesses under surveillance, including campylobacteriosis, salmonellosis, verotoxin-producing *Escherichia coli* (VTEC) infections, giardiasis, amebiasis, yersiniosis, shigellosis and hepatitis A, are examined.

Most reported cases of enteric illness are based on laboratory diagnosis, as these illnesses all tend to have similar clinical symptoms making it difficult to tell one disease from another. Because many milder cases are not diagnosed or reported, the actual number of infections in the community is much greater than reported.

In Ontario during 1996 to 2000, there were 62,255 sporadic cases of illness reported that were attributable to eight enteric pathogens, namely *campylobacter*, *salmonella*, VTEC, *yersinia*, *shigella*, *Giardia lamblia*, *Entamoeba histolytica* and hepatitis A. This number compares to 78,783 during the previous five-year period (1991 to 1995). Over the combined ten-year period, almost half of the cases (44%) occurred during the four months June through September.