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The association between the consumption of food and human diseases was recognized very early and it was Hippocrates (460 B.C.) who reported that there is a strong connection between food consumed and human illness. Foodborne pathogens (e.g. viruses, bacteria, parasites) are biological agents that can cause a foodborne illness event. A foodborne disease outbreak is defined as the occurrence of two or more cases of similar illness resulting from the ingestion of a common food.

Foodborne illness occurs when a pathogen is ingested with food and establishes itself (and usually multiplies) in the human host, or when a toxigenic pathogen establishes itself in a food product and produces a toxin, which is then ingested by the human host. Thus, foodborne illness is generally classified into: (a) foodborne infection and (b) foodborne intoxication. In foodborne infections, since an incubation period is usually involved, the time from ingestion until symptoms occur is much longer than that of foodborne intoxications.

More than 200 different food-borne diseases have been identified. The most severe cases tend to occur in the very old, in the very young, in those who have compromised immune system function, and in healthy people exposed to a very high dose of an organism

In the European Union (EU) for the year 2015, 26 member states reported a total of 4,362 food-borne outbreaks, including waterborne outbreaks. Overall, these outbreaks caused 45,874 cases of illness (209 more than 2014), 3,892 hospitalisations (2,546 less than 2014) and 17 deaths (10 less than 2014). The overall reporting rate of food-borne outbreaks in the EU was 0.95 per 100,000 population, which represents a slight decrease compared with data provided for 2014. Most of the outbreaks reported in 2015 were caused by bacterial agents (33.7% of all outbreaks), in particular *Salmonella* spp. (21.8% of all outbreaks) and *Campylobacter* spp. (8.9% of all outbreaks), even though the reporting of outbreaks involving these agents has been declining over the recent years.

Bacterial toxins ranked second among the causative agents in food- and waterborne

outbreaks and were reported in 19.5% of the total outbreaks while viruses, which were the agents most frequently reported in 2014, accounted for 9.2% of total outbreaks in 2015. Parasites and other causative agents, in particular histamine, were reported in less than 3% of the outbreaks. Furthermore, for a third of the reported outbreaks (34%) the causative agent remained unknown.

The implicated food vehicles were mostly of animal origin, in particular eggs and egg products and pig meat (both accounting for 10% of all strong-evidence outbreaks), broiler meat (9%) and cheese (8%) followed by fish and fish products (7%), milk and dairy products (5%), bovine meat (4%) and crustaceans (3%). In 2015, *Salmonella* spp. in eggs was associated with the highest number of reported foodborne outbreaks and was among the top-5 food-pathogen combinations in terms of the overall number of cases of illness and hospitalisations in outbreaks.

However, the number of reported outbreaks caused by *Salmonella* spp. and associated with the consumption of “eggs and egg products” has been decreasing in the last 5 years. Household was by far the most frequent place of exposure. In strong-evidence foodborne outbreaks, *Salmonella* spp. was the most common agent reported in private households, whereas, “bacterial toxins other than *Clostridium botulinum* toxins”, viruses and other causative agents were more frequently reported in public settings such as canteens, workplace catering, restaurants and pubs.

Symptoms, onset of symptoms and responsible microorganisms or toxin for the major foodborne illnesses.

Approximate onset time to symptoms	Predominant symptoms	Associated organism or toxin
1-7 h, mean 2-4 h	Nausea, vomiting, retching, diarrhea, abdominal pain, prostration	<i>Staphylococcus aureus</i> and its enterotoxins

8-16 h (2-4 h if emesis predominant)	Vomiting or diarrhea, depending on whether diarrheic or emetic toxin present; abdominal cramps; nausea	<i>Bacillus cereus</i> (emetic toxin)
12-48 h	Nausea, vomiting, watery non-bloody diarrhea, dehydration	Norovirus
2-36 h (mean 6-12 h)	Abdominal cramps, diarrhea, putrefactive diarrhea (<i>Clostridium perfringens</i>), sometimes nausea and vomiting	<i>Clostridium perfringens</i>
6-96 h (usually 1-3 days)	Fever, abdominal cramps, diarrhea, vomiting, headache	<i>Salmonella</i> spp., <i>Shigella</i> spp., <i>E. coli</i>
6 h to 5 days	Abdominal cramps, diarrhea, vomiting, fever, malaise, nausea, headache, dehydration	<i>Vibrio cholerae</i> (O1 and non-O1), <i>Vibrio parahaemolyticus</i>
1-10 (median 3-4) days	Diarrhea (often bloody), abdominal pain, nausea, vomiting, malaise, fever (uncommon with <i>E. coli</i> O157:H7)	Enterohaemorrhagic <i>E. coli</i> , <i>Campylobacter</i> spp.
3-5 days	Fever, vomiting, watery non-inflammatory diarrhea	Rotavirus, Astrovirus, enteric Adenovirus
3-7 days	Fever, diarrhea, abdominal pain	<i>Yersinia enterocolitica</i>
1 to several weeks	Abdominal pain, diarrhea, constipation, headache, drowsiness, ulcers, variable—often asymptomatic	<i>Entamoeba histolytica</i>
3-6 months	Nervousness, insomnia, hunger pains, anorexia, weight loss, abdominal pain, sometimes gastroenteritis	<i>Taenia saginata</i> , <i>Taenia solium</i>

2 h to 6 days, usually 12-36 h	Vertigo, double or blurred vision, loss or light reflex, difficulty in swallowing, dry mouth, weakness, respiratory paralysis	<i>Clostridium botulinum</i> and its neurotoxins
4-28 days	Gastroenteritis, fever, oedema around eyes, perspiration, muscular pain, chills, prostration, laboured breathing	<i>Trichinella spiralis</i>
7-28 days	Malaise, headache, fever, fever, cough, nausea, vomiting, constipation, abdominal pain, chills, rose spots, bloody stools	<i>Salmonella Typhi</i>
10-13 days	Fever, headache, myalgia, rash	<i>Toxoplasma gondii</i>
Varying periods	Fever, chills, headache, arthalgia, prostration, malaise, swollen lymph nodes and other specific symptoms of disease in question	<i>Listeria monocytogenes</i> , <i>Campylobacter jejuni</i>

Source:

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