Some foodborne diseases are well recognized, but are considered emerging because they have recently become more common. For example, outbreaks of salmonellosis have been reported for decades, but within the past 25 years the disease has increased in incidence on many continents. In the Western hemisphere and in Europe, *Salmonella* serotype *Enteritidis* (SE) has become the predominant strain. Investigations of SE outbreaks indicate that its emergence is largely related to consumption of poultry or eggs.

While cholera has devastated much of Asia and Africa for years, its introduction for the first time in almost a century on the South American continent in 1991 makes it another example of an infectious disease that is both well-recognized and emerging. While cholera is often waterborne, many foods also transmit infection. In Latin America, ice and raw or underprocessed seafood are important epidemiological pathways for cholera transmission.

Other foodborne pathogens are considered emerging because they are new microorganisms or because the role of food in their transmission has been recognized only recently. Infection with *Escherichia coli* serotype O157:H7 (E. coli) was first described in 1982. Subsequently, it has emerged rapidly as a major cause of bloody diarrhoea and acute renal failure. The infection is sometimes fatal, particularly in children. Outbreaks of infection, generally associated with beef, have been reported in Australia, Canada, Japan, United States, in various European countries, and in southern Africa. Outbreaks have also implicated alfalfa sprouts, unpasteurized fruit juice, lettuce, game meat and cheese curd.

In 1996, an outbreak of *Escherichia coli* O157:H7 in Japan affected over 6,300 school children and resulted in 2 deaths. This is the largest outbreak ever recorded for this pathogen.

*Listeria monocytogenes* (Lm) is considered emerging because the role of food in its transmission has only recently been recognized. In pregnant women, infections with Lm can cause abortion and stillbirth, and in infants and persons with a weakened immune system it may lead to septicemia (blood poisoning) and meningitis. The disease is most often associated...
with consumption of foods such as soft cheese and processed meat products that are kept refrigerated for a long time because Lm can grow at low temperatures. Outbreaks of listeriosis have been reported from many countries, including Australia, Switzerland, France and the United States. Two recent outbreaks of *Listeria monocytogenes* in France in 2000 and in the USA in 1999 were caused by contaminated pork tongue and hot dogs respectively.

Foodborne trematodes are also emerging as a serious public health problem, especially in south-east Asia but also in Latin America, in part due to a combination of increased aquaculture production, often under unsanitary conditions, and of consumption of raw and lightly processed fresh water fish and fishery products. Foodborne trematodes can cause acute liver disease, and may lead to liver cancer. An estimated 40 million people worldwide are affected.

Bovine Spongiform Encephalopathy (BSE), a fatal, transmissible, neurodegenerative disease of cattle, was first discovered in the United Kingdom in 1985. The cause of the disease was traced to an agent related to scrapie in sheep, which contaminated recycled bovine carcasses used to make meat and bone meal additives for cattle feed. Recycled of the BSE agent led to a distributed common source epidemic of more than 180,000 diseased animals in the UK alone. The agent affects the brain and spinal cord of cattle and lesions are characterized by sponge-like changes visible in a microscope. At this time, 19 countries have reported endemic BSE cases and the disease is no longer confined to the European Community: a case of BSE has been reported in the cattle herd of Japan.

In human populations, exposure to the BSE agent (probably in contaminated bovine-based food products) has been strongly linked to the appearance in 1996 of a new transmissible spongiform encephalopathy of humans called variant Creutzfeldt-Jakob Disease (vCJD). As of January 2002, 119 people have developed vCJD, most are from the UK but five cases have been reported from France.

**Why do foodborne diseases emerge?**

New foodborne disease threats occur for a number of reasons. These include increase in international travel and trade, microbial adaptation and changes in the food production system, as well as human demographics and behaviour:

- **The globalization of the food supply**: A large outbreak of cyclosporiasis occurred in North America in 1996-7 linked to contaminated raspberries imported from South America.

- **The inadvertent introduction of pathogens into new geographic areas**: *Vibrio cholerae* was introduced into waters off the coast of southern United States when a cargo ship discharged contaminated ballast water in 1991. It is likely that a similar mechanism led to the introduction of cholera for the first time this century into South America in 1991.
• **Travellers, refugees, and immigrants exposed to unfamiliar foodborne hazards while abroad**: International travellers may become infected by foodborne pathogens that are uncommon in their countries. It is estimated that about 90% of all cases of salmonellosis in Sweden are imported.

• **Changes in microorganisms**: Changes in microbial populations can lead to the evolution of new pathogens, development of new virulent strains in old pathogens, development of antibiotic resistance that might make a disease more difficult to treat, or to changes in the ability to survive in adverse environmental conditions.

• **Change in the human population**: The population of highly susceptible persons is expanding world-wide because of ageing, malnutrition, HIV infections and other underlying medical conditions. Age is an important factor in susceptibility to foodborne infections because those at the extremes of age have either not developed or have partially lost protection from infection. Particularly for the elderly, foodborne infections are likely to invade their blood stream and lead to severe illness with high mortality rates. People with a weakened immune system also become infected with foodborne pathogens at lower doses which may not produce an adverse reaction in healthier persons. Seriously ill persons, suffering, for example, from cancer or AIDS, are more likely to succumb to infections with *Salmonella*, *Campylobacter*, *Listeria*, *Toxoplasma*, *Cryptosporidium*, and other foodborne pathogens. In developing countries reduced immunity due to poor nutritional status render people, particularly infants and children, more susceptible to foodborne infections.

• **Changes in lifestyle**: Greater numbers of people go out and eat meals prepared in restaurants, canteens, fast food outlets, and by street food vendors. In many countries, the boom in food service establishments is not matched by effective food safety education and control. Unhygienic preparation of food provides ample opportunities for contamination, growth, or survival of foodborne pathogens.

Food-borne diseases pose a considerable threat to human health and the economy of individuals, families and nations. Their control requires a concerted effort on the part of the three principal partners, namely governments, the food industry and consumers. As part of its food safety education campaign, WHO issued the 5 Keys to Safer Food and a guide on Safe Food for Travellers.