



# Emerging food-borne diseases: a global responsibility

**F**OOD-BORNE DISEASES ARE among the most widespread public health problems. Yet only a small proportion of these illnesses come to the notice of health services, and even fewer are investigated. It is estimated that the reported incidence of food-borne disease represents less than 10 percent, and maybe less than 1 percent, of the real incidence (Motarjemi and Käferstein, 1997). In developing countries even fewer cases are counted, primarily because of poverty and lack of resources for food safety management and food control services. In spite of underreporting, increases in food-borne diseases in many parts of the world and the emergence of new or newly recognized food-borne problems have been identified. These growing problems may be biological or chemical by nature.

## Emerging food-borne problems

Emerging, or in some cases re-emerging, food-borne problems are commonly considered to be those problems that have recently appeared in a population; have

extended to new vehicles of transmission; have started to increase rapidly, in incidence or geographic range; have various causes (e.g. ecological, environmental, food production or demographic factors); and have been widespread for many years but only recently identified because of new or increased knowledge or methods of identification and analysis of the disease agent.

The following factors play a role in the epidemiology of emerging food-borne problems:

- *Changes in the pathogens.* Microbial adaptation through natural selection is a key process in the emergence of pathogens. The therapeutic use of an antimicrobial agent in human or animal populations creates a selective pressure that favours survival of bacterial strains resistant to the agent.
- *Development.* Economic and technical developments have introduced new foods. New production systems or environmental changes increase access to certain foods. The food chain has become longer and more complex, thus increasing opportunities for contamination. Lack of

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knowledge and negligence on the part of food handlers, together with an increase in mass catering, are important factors in food-borne illnesses.

- *Poverty and pollution.* Environmental contamination, poor social conditions and lack of safe food preparation facilities are interrelated factors that lead to food-borne illnesses.
- *Dietary habits.* Dietary preferences and practices (e.g. for raw or hazardous foods) and some cultural beliefs and rituals can increase the risk of illness.

while elsewhere a very high birth rate often goes hand-in-hand with poverty and malnutrition.

- *Travel and migration.* Hundreds of millions of people crossing borders are at high risk of food-borne disease. Travellers can spread disease rapidly to new and distant environments, while immigrants also introduce new foods and dietary habits into new regions.
- *Trade in food, animal feed and animals.* Globalization, facilitated by the liberalization of trade, has led to an

increasing number of cases where the rapid movement of food of plant and animal origin has contributed to the spread of food-borne problems to new areas.

- *New food vehicles of transmission.* An array of new food vehicles of transmission have been identified, including street foods. While undercooked foods of animal or marine origin were traditionally implicated in outbreaks of food-borne illnesses, increasing attention is now being focused on items such as fruit, vegetables and apple cider.

## Environmental contamination, poor social conditions and lack of safe food preparation facilities are interrelated factors that lead to food-borne illnesses

Food consumption is changing as the result of a variety of factors: dietary habits may be altered by nutritional recommendations and campaigns; higher living standards have led to greater consumption of animal products; environmental changes can lead to increased access to certain foods; habits may be influenced by food policy, production systems and urban life styles; and there is an increase in prepacked “convenience” foods, street-vended foods and meals consumed in food service establishments.

- *Health sector.* Many governments are under increasing pressure to reduce staff and decentralize and privatize their health systems. Rapid changes and public sector austerity are having immediate, dramatic effects on health. Food safety education is being replaced by an emphasis on other important health concerns. Vulnerability to food-borne diseases is increasing as immune systems are compromised by HIV infection; and malignancy and immunosuppressive treatments have also increased.
- *Demographic changes.* The proportion of the population susceptible to food-borne problems is increasing. In more affluent domains, life expectancy is increasing,



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## Biological or chemical agents

Control measures for food-borne problems necessitate a thorough understanding of the causative agents. While the most prominent emerging problems are of microbial origin, other biological as well as chemical agents are a cause for concern.

### Bacteria

***Escherichia coli* O157.** Referred to as enterohaemorrhagic *E. coli* (EHEC), this pathogen produces toxins known as verotoxins. Cattle appear to be the main reservoir. Transmission to humans is principally through the consumption of contaminated foods, such as raw or undercooked meat products and raw milk. Fresh-pressed apple juice or cider, yoghurt, cheese, salad vegetables and cooked maize have also been implicated. Faecal contamination of water and foods, as well as cross-contamination during food preparation, can lead to infection, as can person-to-person contact. It is a major cause of bloody and non-bloody diarrhoea and often leads to long-term complications such as haemolytic uraemic syndrome.

**Enteroaggregative *Escherichia coli*.** Enteroaggregative *E. coli* (EAEC) has increasingly been recognized as an agent of a watery mucoid diarrhoea – especially in children – in developing and, recently, industrialized countries. It is particularly associated with persistent diarrhoea (lasting for more than 14 days), a major cause of illness and death. It is thought that EAEC adheres to the intestinal mucosa and elaborates enterotoxins and cytotoxins, which result in secretory diarrhoea and mucosal damage. Recent studies support the association of EAEC with malnutrition and growth retardation in the absence of diarrhoea.

***Listeria monocytogenes.*** This ubiquitous microorganism has been isolated from various environments, including decaying vegetation, soil, animal feed, sewage and water. It is resistant to diverse environmental conditions and can grow at

temperatures as low as 3°C. It is found in a wide variety of raw and processed foods – such as milk and cheeses, meat (including poultry) and meat products, and seafood and fish products – where it can survive and multiply rapidly during storage. *L. monocytogenes* is responsible for opportunistic infections, preferentially affecting individuals whose immune system is perturbed, including pregnant women, newborn babies and the elderly. It primarily causes meningitis, encephalitis or septicaemia and, when pregnant women are infected, it can lead to abortion, stillbirth or premature birth.

**Multidrug-resistant *Salmonella typhimurium* DT 104.** This microorganism has been isolated from cattle, poultry, sheep, pigs and horses. Antimicrobial therapy is used extensively to combat *S. typhimurium* infection in animals, and the evolution of a strain resistant to the commonly used antibiotics has made infections with *S. typhimurium* in food animals difficult to control. The primary route by which humans acquire infection is through the consumption of a large range of contaminated foods of animal origin.

***Salmonella enteritidis.*** This bacterium is the dominant cause of human salmonellosis in many parts of the world.

Poultry, eggs and egg products, in particular, are contaminated, but the microorganism has also been found in other foodstuffs such as ice cream. Cross-contamination, undercooking and inadequate cooling procedures promote the spread and growth of salmonella during processing and handling. One important characteristic of *S. enteritidis* is its ability to contaminate the contents of intact egg shells. Manifestation of illness includes invasive disease and reactive arthritis.

***Campylobacter jejuni.*** Most sporadic infections with this pathogen are associated with improper preparation or consumption of mishandled poultry products. Most *C. jejuni* outbreaks, which are far less common than sporadic illnesses, are associated with the consumption of raw milk or unchlorinated water. Campylobacteriosis may lead to Guillain-Barré syndrome, a cause of flaccid paralysis. The reservoirs of this organism include poultry, cattle, swine, sheep, rodents and birds.

***Vibrio vulnificus.*** The consumption of raw molluscan shellfish that are contaminated with this microorganism, which is a normal inhabitant of some marine environments, often leads to primary



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septicaemia and death. Individuals most susceptible to infection with this agent include those with chronic liver disease or chronic alcoholism, or those who are immunosuppressed in some way.

*Streptococcus parasanguinis*. Pure isolates of this bacterium were recovered from two

contaminated food and the agent is shed in the faeces for more than three weeks.

*Toxoplasma gondii*. The primary hosts of this protozoan are cats, and human infection takes place when contact is made with their faeces. It can also occur through the ingestion of raw or undercooked meat

caused by *A. simplex* are more problematic because this agent penetrates the gastrointestinal tissue and causes disease that is difficult to diagnose. The primary hosts are warm-blooded marine mammals such as seals, walruses and porpoises. Their larvae pass via krill to fish such as cod, pollack, halibut, rockfish, salmon and herring.

## For human health and the economy, mycotoxins are by far the most important contaminants of the food chain

sheep in Spain during a recent bacteriological survey for determining the prevalence of subclinical mastitis. As this bacterium has been associated with the development of experimental endocarditis, its presence at relatively high concentrations in apparently healthy sheep's milk may pose a health risk in persons with predisposing heart lesions.

### Viruses

**Hepatitis E.** The hepatitis E virus (HEV) usually enters the body through water or food, especially raw shellfish, that has been contaminated by sewage. Anti-HEV activity has been determined in the serum of a number of domestic animals in areas with a high endemicity of human infection, indicating that this may be an emerging zoonosis.

**Norwalk virus and Norwalk-like viruses.** These agents cause mild to moderate disease with gastrointestinal symptoms. Outbreaks have been associated with the consumption of contaminated drinking-water and food, especially raw or undercooked shellfish.

### Protozoa

*Cyclospora cayatanensis*. This coccidian parasite occurs in tropical waters worldwide and causes a watery, and sometimes explosive, diarrhoea in humans. It was initially associated with water-borne transmission but has also been linked to the consumption of raspberries, lettuce and fresh basil. The incubation period is one week after the ingestion of the

from intermediate hosts, such as rodents, swine, cattle, goats, chicken and birds. Toxoplasmosis in humans often produces mononucleosis-type symptoms, but transplacental infection can result in foetal death if it occurs early in pregnancy. In immunocompromised individuals infection can cause pneumonitis, myocarditis, meningoencephalitis, hepatitis, chorioretinitis or combinations of these. Cerebral toxoplasmosis is often seen in AIDS patients.

*Cryptosporidium parvum*. The mode of transmission of this coccidian protozoan is faecal to oral, including water-borne and food-borne means. The reservoirs include humans and domestic animals, including cattle. Oocysts can survive in the environment for long periods; they remain infective and are capable of resisting chemicals used to purify drinking-water. They can, however, be removed from water supplies by filtration. Symptoms of cryptosporidiosis in humans include fever, diarrhoea, abdominal pain and anorexia. The disease usually subsides within 30 days, but may be prolonged and continue to death in immunodeficient individuals.

### Helminths

**The genus Anisakis.** Anisakiasis is an infection of the human intestinal tract caused by the ingestion of raw or undercooked fish containing larval stages of the nematodes *Anisakis simplex* or *Pseudoterranova decipiens*. Infections caused by the latter roundworm are not a serious threat to human health, but those

## Unconventional agents

### Prions

Transmissible spongiform encephalopathies in animals and humans are caused by an unconventional virus or prion. These conditions include scrapie in sheep, bovine spongiform encephalopathy (BSE or mad cow disease) in cattle and Creutzfeldt Jacob disease (CJD) in humans. It is commonly accepted that BSE was first caused in the United Kingdom when cattle were fed carcass meal from scrapie-infected sheep. It is also accepted that humans contracted the non-classic form of CJD after consuming cattle meat, in particular nerve tissue.

### Mycotoxins<sup>1</sup>

Mycotoxins are the toxic products of certain microscopic fungi which, in some circumstances, develop on or in foodstuffs of plant or animal origin. They are ubiquitous and widespread at all levels of the food chain. Hundreds of mycotoxins have been identified and are produced by some 200 varieties of fungi. The most important ones from the food safety point of view are discussed individually in the following sections. In terms of their implications for human health and the economy, mycotoxins are by far the most important contaminants of the food chain.

Of particular importance in current toxicological studies are the combined and possible synergistic effects that some of the mycotoxins may have on human and animal life.

<sup>1</sup> See *Food, Nutrition and Agriculture* 23, which is devoted to mycotoxins.

**Fumonisin.** Fumonisin is a group of fusarium mycotoxins occurring worldwide in maize and maize-based products. Their causal role in several animal diseases has been established. Available epidemiological evidence suggests that there is a link between dietary fumonisin exposure and human oesophageal cancer in some locations with high disease rates. Fumonisin is mostly stable during food processing.

carcinogenic, the potency varying markedly among species and sexes. It is also teratogenic and immunotoxic.

#### **Pesticide residues**

Restrictions are now being placed on some of the older organochlorine pesticides because of their environmental persistence and their potential accumulation in fatty tissues. Although exposure to these pesticides is usually below acceptable daily

contaminate the environment as a result of industrial activities. From the environment, these chemicals may enter the food chain via plants or animals and cause a variety of health problems. These are considered as emerging problems in countries that are in the early stages of industrialization.

#### **Biotechnology**

The production of genetically modified foodstuffs offers tremendous opportunities

## Emerging food-borne problems will not be solved by individual countries acting in isolation, no matter how high their levels of expertise and food control

**Zearalenone.** This fungal metabolite is mainly produced by *Fusarium graminearum* and *F. culmorum*, which are known to colonize maize, barley, wheat, oats and sorghum. These compounds can cause hyperoestrogenism and severe reproductive and infertility problems in animals, especially in swine, but their impact on human health is difficult to evaluate.

**Trichothecenes.** These mycotoxins are produced by many species of the genus *Fusarium*. They occur worldwide and infect many different plants, notable of which are the cereal grains, especially wheat, barley and maize. There are over 40 different trichothecenes, but the most well known are deoxynivalenol and nivalenol. In animals they cause vomiting and feed refusal, and also affect the immune system. In humans they cause vomiting, headache, fever and nausea.

**Ochratoxins.** These compounds are produced by *Penicillium verrucosum* and by several species of *Aspergillus*. The major dietary sources are cereals, but significant levels of contamination may be found in grape juice and red wine, coffee, cocoa, nuts, spices and dried fruits. Contamination may also carry over into pork and pig blood products and into beer. Ochratoxin is potentially nephrotoxic and

intake (ADI) levels, breastmilk in both developed and developing countries has occasionally been found to contain relatively high levels of organochlorine pesticides. It has also been found that, although there may be a high variability in residue levels of pesticides in individual units of commodities, this is unlikely to cause any direct adverse health effects.

#### **Veterinary drugs**

The intake of veterinary drug residues in food at levels below the ADI is also considered to be safe. In recent years, however, growing concern has been expressed about the development of antimicrobial drug resistance. Some important contributing factors to the development of this resistance are the widespread use of veterinary drugs, the misuse of such drugs and the feeding of low doses to animals in order to promote weight gain and improve feed efficiency. Resistant microorganisms may be passed on to humans via food originating from the animals that harboured them. In addition, the development of resistance may also lead to the application of larger and larger therapeutic doses to food producing animals.

#### **Environmental contaminants**

Chemicals such as dioxins, chlorinated biphenyls, furans and heavy metals may

and benefits for future food production. However, the emergence of this new technology has also given rise to a number of problems, although such problems are often regarded as potential or perceived, rather than real. The concerns that have been expressed relate mainly to changes in the nutritional quality of food, an increase in toxicity or hazards with respect to food intolerances or food allergies, and the development of antimicrobial resistance.

#### **Other agents**

Other food-related problems or agents, such as cholera, "aeromonas" and rotavirus may be added to the list, but differences of opinion as to what is regarded as emerging will not have any impact on the basic issues at stake.

### The next 20 years

It is likely that the importance of emerging food-borne problems will increase, rather than diminish, in the coming years. Virtually all the factors that have contributed to the current problems are still present.

Food-borne problems that are well recognized in many areas of the world may be regarded as emerging in others. An increase in the consumption of seafoods may lead to a greater awareness of marine toxins. Biological, chemical or nuclear warfare or nuclear accidents may necessitate increased food control measures

in this regard. Further mutations of microorganisms and the emergence of new biological hazards – including food-borne zoonoses – are also expected.

Emerging food-borne problems will have implications for the health status and economies of individual countries, as well as affecting international trade and the agreements that govern it.

## Developing countries

Food-borne illnesses have an impact in both developing and developed countries. However, most of the annual 1.5 billion episodes of diarrhoea in children under three years of age (Käferstein, 1997) occur in developing countries. A significant proportion of diarrhoeal cases are food-borne in origin, and the more than 3 million resultant deaths per year are an indication of the magnitude of this problem. Such diseases take a heavy toll in human life and suffering, particularly among infants and children, the elderly and other susceptible groups. They also create an enormous social, cultural and economic burden on communities and their health systems.

## Constraints

In developing countries where financial resources are scarce, food control issues usually receive low priority in public health programmes. Food-borne illnesses are

perceived as mild, self-limiting diseases and their health and economic consequences are often overlooked. A lack of information leads to underestimation of the health significance of unsafe food; at times, no resources at all are assigned to food safety, and food control measures and food-borne disease investigation and surveillance are neglected. As no data on food-borne illnesses or other health and economic effects of unsafe food are generated, policy-makers continue to give the subject low priority, and so the cycle continues.

When there is a serious food-borne disease outbreak, food control matters receive attention for a few days and are highlighted by the media. Once the emergency is over, however, it is soon forgotten and the experience gained is not translated into management decisions.

## Food production

In many developing countries food-borne problems have their origin in the farming methods practised. Many farmers are uneducated and follow methods of production that are centuries old. Their farms are very small or they share communal property. They live in very close contact with their animals, thereby increasing the likelihood of food-borne zoonoses. There are few if any animal disease control or eradication programmes.

Methods of harvesting and storing grain increase the likelihood of problems caused by toxic seeds and mycotoxins. When veterinary drugs and pesticides are available, there may be scant control over their sale and use. Irrigation water is often polluted. Distances to markets or processing centres are often long and transport is inefficient. The technology to prevent the contamination of agricultural products is absent, thereby rendering such products unsuitable for export.

## Food industry

The food industry, especially in developing countries, includes many small concerns that are not well informed about food safety issues or their own responsibilities in this regard. Knowledge of modern technologies, good manufacturing practices, hygiene, Hazard Analysis and Critical Control Point (HACCP) systems and quality control are often limited or absent. Storage facilities, including cold storage, may be inadequate, and the water used in food processing facilities may not be of a suitable quality. Many of the labourers who handle food in factories and on farms are illiterate and untrained.

## Consumers

In some societies, diarrhoea is not perceived as a symptom of disease and may even be considered as a normal, natural condition. Many consumers may be carriers of food-borne pathogens, which they take with them to their places of work. In many countries food fermentation is a common household food technology, but the inherent hazards are not understood. Poor household food handling and storage practices that cause food-borne illness create a drain of funds that could have been used for development.

Many food-borne illnesses have their origin in the household kitchen, and it is at this level that the most effective controls can often be applied. This emphasizes the importance of consumer education and of the communication of information on emerging food-borne hazards to consumers. Consumer associations, where



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they exist, may not have sufficient knowledge or experience in food science, food safety and food-borne illnesses to provide consumers with the information and advice that they require.

### **Governments**

Many countries do not have an infrastructure that is capable of recognizing and reacting to food-borne problems.

**Data.** There may be a lack of data on food-borne illness surveillance, food monitoring and food intake, especially with regard to infants and children. Even when food-borne illnesses are notifiable, many cases are not reported. Patients are often discouraged from visiting health centres unless their symptoms are serious or persistent. The emphasis is on treatment and there are no resources or incentives to identify the pathogens or other causes of the illness. Even when these are identified, the results are not always communicated to the food control agencies.

**Laws, regulations and standards.** Food safety legislation may be absent, rudimentary, fragmented, outdated and not in harmony with Codex standards and related texts. It may take an excessive amount of time to elaborate and publish regulations. Food law enforcement, including import control, is fragmented and uncoordinated. There are no national food safety monitoring or surveillance systems or databases, and there is poor communication between government agencies and the food industry.

Some developing countries are unable to participate in international bodies such as the Codex Alimentarius Commission (CAC) and the World Trade Organization (WTO), and this can result in a lack of understanding of national obligations.

**Resources.** Food safety personnel are scarce and not optimally trained. Food control may be fragmented among a number of different agencies, with poor interagency collaboration. Research facilities and the skills to identify pathogens or other causes of food-

borne illness are often lacking. In some cases, food laboratory services are uncoordinated and not up to meeting the requirements of international standards, neither are methods of sampling and analysis.

## **Recommendations**

Emerging food-borne problems will not be solved by individual countries acting in isolation, no matter how high their levels of expertise and food control. Emerging food-borne problems are a global issue, and a unified and joint approach by all countries and the relevant international organizations is a prerequisite for the identification and control of all emerging food-borne problems that threaten human health and international trade.

### **Surveillance**

A global information system should be elaborated and implemented with respect to emerging food-borne problems. "Surveillance" refers to the systematic collection and use of epidemiological information for the planning, implementation and assessment of disease control. The objectives of food-borne illness surveillance – which are applicable at the global level – are to determine the magnitude of the problem and monitor trends; identify problems at an early stage so that timely remedial action can be taken; determine the extent to which food acts as a route of transmission for specific pathogens, and identify high risk foods, food practices and populations; and assess the effectiveness of food safety programmes and provide information for formulating health policies, including preventive strategies.

With the exception of cholera, there is no obligation to report food-borne diseases internationally. Attempts to provide a global picture of food-borne diseases are usually hampered by differences in national surveillance systems, where such systems exist. In addition, the reported diseases are not presented in a uniform manner. Global surveillance of emerging food-borne problems can play a very important role in the early detection, early warning, rapid

investigation and control of such problems, and can help limit the extent and distribution of the problem. Serious consideration should be given to establishing an international information system on emerging food-borne problems. Such a system would include the elaboration of uniform international methods of surveillance and would provide assistance to developing countries in setting up national focal points for data collection.

Consideration should also be given to the submission of food monitoring data, as these can provide useful information on specific emerging food-borne agents, even in the absence of actual cases of illness.

### **Research**

International research into emerging food-borne problems should be promoted and coordinated. One critical need is for techniques that will identify and characterize food-borne hazards more rapidly and accurately. Many emerging food-borne pathogens cannot be detected easily, and some cannot be detected at all in foods. Other microorganisms, previously thought to be innocuous, have emerged as virulent. Ideally, food control interventions are guided by risk assessment, data for which are often insufficient. Areas that require research include: improved detection methods; a better understanding of microbial resistance; a better understanding of antibiotic drug resistance; prevention techniques (pathogen control, reduction and elimination); and food handling, distribution and storage.

Governments should find the necessary resources for such research. The international information system could coordinate research and disseminate its results.

### **Sampling and analysis**

Methods of sampling and analysis in respect of emerging food-borne problems should be established and communicated, and developing countries should be assisted in their efforts to detect such problems.

The early detection of food-borne problems is an important factor in their



control. Although many countries may be aware of problems that have occurred elsewhere, they may not possess the knowledge that is necessary for the correct sampling of foodstuffs and the laboratory analysis to determine the agent. These facts mitigate against efforts to curb the introduction or spread of the problem.

FAO and the World Health Organization (WHO) should determine which methods of sampling and analysis need to be elaborated in order to identify specific emerging problems – chemical as well as biological. They must then elaborate methods for global application, for example for the detection of *Cyclospora*. This important information could then be distributed globally through the proposed international information system.

### Food control systems

Measures that encourage and assist all countries in designing and implementing efficient national food control systems should be qualified, quantified, coordinated and intensified.

A number of countries intend to design and implement new and modern national food control systems. The exact nature of these measures may vary, but all countries aim to achieve a high level of protection which is at least equivalent to that of their trading partners. A number of developing countries have made some progress in this regard, but much work still remains to be done.

Apart from facilitating the export of food, all countries need an efficient national food control system to enable them to fulfil their roles in identifying and controlling emerging food-borne problems. This cannot be done by a few major powers on their own. The fact that some countries have few or no food exports may not prevent food-borne problems, especially pathogens, from spreading beyond national borders. Countries may become reservoirs constituting a threat to global food safety.

### International organizations

The Agreement on the Application of Sanitary and Phytosanitary Measures, part

of WTO's Uruguay Round of multilateral trade agreements, makes provision for technical assistance and for special and differential treatment of developing countries, especially least-developed countries. However, current efforts need to be coordinated. The appropriate international organizations, with the assistance of their members, need to elaborate a plan of action for global food safety control to encourage and assist countries in developing acceptable and efficient food control systems, while simultaneously indicating the minimum or basic parameters or requirements for such purpose. Such parameters should include the ability to apply the three elements of risk analysis – assessment, management and communication.

### Risk analysis

Capacities for risk assessment should be strengthened at both the national and the international levels. Risk assessments provide information for identifying and characterizing food hazards. Risk assessment information is useful in determining which hazards are of such a nature that their prevention, elimination or reduction to acceptable levels is necessary. The information is also useful in determining the most effective intervention strategies.

The application of Codex General Principles of Food Hygiene and of the HACCP system should be promoted as key elements to enhance the control of emerging food-borne problems.

There are many points at which food can be contaminated, and numerous factors that make some groups of people more susceptible than others. No single preventive measure will ensure the safety of all foods. An initiative designed to improve the safety of the food supply should focus on the hazards and foods that present the greatest risks to public health, and should emphasize development and implementation of preventive control of those risks. Such an initiative should seek opportunities for control through a collaborative process with the responsible sectors of the food industry and all other stakeholders. The “farm-to-fork” concept should be enhanced by building safety into the production, handling, processing and storage of food.

### Communication

The use of information, education and communication (IEC) should be encouraged as a tool for the control of emerging problems. Governments, industry and academia must all share in the responsibility for devising and applying risk analysis, with emphasis on risk communication. Consumers should be encouraged to make use of the many efforts that are normally made by governments and educational institutions to increase their knowledge of food safety issues. This is especially important in the case of emerging problems where hygienic household practices or other measures may play an important role in the prevention of food-borne illness.

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## Emerging food-borne diseases: a global responsibility

Food-borne diseases are among the most widespread public health problems. Trends indicate the emergence of new or newly recognized food-borne problems which may be biological or chemical in nature. Emerging, or in some cases re-emerging, food-borne problems are those that have appeared recently in a population; extended to new vehicles of transmission; started to increase rapidly in incidence or geographic range; or been widespread for many years but only recently identified through new or increased knowledge or methods of identification and analysis of the disease agent.

The most prominent emerging problems stem from bacteria, viruses and protozoa. Other food safety problems include mycotoxins, pesticide residues, veterinary drugs and unconventional agents such as prion (associated with transmissible spongiform encephalopathies) and environmental contaminants. The factors that play a role in the epidemiology of emerging food-borne problems include changes in the pathogens; development, urbanization and new lifestyles; cuts in health systems; existing knowledge, beliefs and practices; demographic changes, travel and migration; trade in food, animal feed and animals; and poverty and pollution.

It is likely that emerging food-borne problems will become even more significant over the coming years.

Emerging food-borne problems will not be solved by individual countries acting in isolation, no matter how high their levels of expertise and food control. These problems are a global issue that requires a unified and joint approach by all countries. In order to achieve global food safety control, the appropriate international organizations, with the assistance of their members, need to elaborate a plan of action to encourage and assist countries in developing acceptable and efficient food control systems, while simultaneously indicating the minimum or basic parameters or requirements for such a purpose. Such systems should apply the three elements of risk analysis – assessment, management and communication. An initiative designed to improve the safety of the food supply should focus on the hazards and foods that present the greatest risks to public health and should emphasize development and the implementation of preventive control of those risks.

## Les nouvelles maladies transmises par les aliments: une responsabilité mondiale

Les maladies transmises par les aliments sont parmi les problèmes de santé publique les plus répandus. Les tendances actuelles révèlent l'émergence de problèmes, nouveaux ou récemment constatés, liés aux denrées alimentaires, pouvant être de nature biologique ou chimique. Ces problèmes, qui font leur apparition ou, dans certains cas, leur réapparition, sont ceux ayant touché récemment une population; s'étant étendus à d'autres vecteurs de transmission; étant devenus rapidement plus fréquents ou plus répandus sur le plan géographique; ou ayant été généralisés pendant de nombreuses années, mais n'ayant été identifiés que récemment grâce à des connaissances ou à des méthodes d'identification et d'analyse de l'agent pathogène nouvelles ou améliorées.

Les problèmes actuels les plus marquants sont imputables à des bactéries, des virus et des protozoaires. D'autres problèmes concernant l'innocuité des aliments comprennent les mycotoxines, les résidus de pesticides, les médicaments à usage vétérinaire, les agents non conventionnels comme le prion (associé aux encéphalopathies spongiformes transmissibles) et les polluants de l'environnement.

Les facteurs jouant un rôle dans l'épidémiologie des problèmes récents liés aux aliments sont les suivants: évolution des agents pathogènes; développement, urbanisation et nouveaux modes de vie; déclin des systèmes de santé; connaissances, croyances et pratiques; évolution démographique, voyages et migration; commerce des denrées alimentaires, des produits d'affouragement et des animaux; et pauvreté et pollution.

Il est probable que, dans les prochaines années, au lieu de diminuer, l'importance des nouveaux problèmes liés aux aliments ira en grandissant.

Ces problèmes ne pourront pas être résolus par des pays agissant seuls, quel que soit leur niveau de compétences techniques et de contrôle des produits alimentaires. Ces problèmes se posent à l'échelle planétaire et nécessitent une approche unifiée et conjointe de tous les pays. Pour obtenir l'innocuité des

aliments au niveau mondial, les organisations internationales compétentes doivent, avec l'aide de leurs membres, élaborer un plan d'action visant à encourager et à aider les pays à mettre au point des systèmes acceptables et efficaces de contrôle des aliments, tout en indiquant les paramètres ou les prescriptions minimums ou élémentaires nécessaires à cette fin. De tels systèmes devraient appliquer les trois éléments de l'analyse des risques – évaluation, gestion et communication. Toute initiative conçue pour assurer l'innocuité des disponibilités alimentaires devrait être axée sur les hasards et les aliments qui présentent les risques les plus graves pour la santé publique, et devrait mettre l'accent sur l'élaboration et la mise en œuvre de méthodes préventives de contrôle de ces risques.

## Enfermedades emergentes transmitidas por los alimentos: una responsabilidad mundial

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Las enfermedades transmitidas por los alimentos son uno de los más difundidos problemas de salud pública. Se observa una tendencia a la aparición de patologías de esta índole, nuevas o de identificación reciente, que pueden ser de carácter biológico o químico. Estas enfermedades que se perfilan o reaparecen como problemas emergentes pueden surgir por vez primera en una población; extenderse a nuevos vehículos de transmisión; en ciertos casos son enfermedades que ya existían pero cuya incidencia o distribución geográfica se amplía rápidamente por distintos motivos o bien puede tratarse de patologías difundidas desde hace muchos años pero que sólo recientemente han podido identificarse, gracias a la disponibilidad de conocimientos nuevos o al desarrollo de los métodos de identificación y análisis del agente que las produce.

Los problemas emergentes de mayor importancia son provocados por bacterias, virus y protozoos. Otras cuestiones de inocuidad de los alimentos se relacionan con las micotoxinas, los residuos de plaguicidas, los medicamentos veterinarios, y agentes no convencionales como el príon (vinculado a las encefalopatías espongiformes transmisibles) y los contaminantes ambientales.

Los factores que desempeñan un papel importante en la epidemiología de los problemas emergentes transmitidos por los alimentos comprenden cambios relacionados con los agentes patógenos, el desarrollo, la urbanización y los modos de vida, recortes de los sistemas de atención de salud, modificaciones de los conocimientos, creencias y prácticas, y también cambios demográficos, los viajes y las migraciones, el comercio de alimentos, piensos y animales, así como la pobreza y la contaminación.

En los años venideros, la importancia de los problemas emergentes transmitidos por alimentos probablemente no disminuirá sino que tenderá a crecer. Para resolverlos no será suficiente que los distintos países actúen de manera aislada, independientemente del nivel de conocimientos técnicos y control de los alimentos de que dispongan. Los problemas emergentes relacionados con los alimentos constituyen una cuestión de alcance mundial que debe abordarse mediante un enfoque unificado y conjunto de todos los países. Para un control mundial de la inocuidad de los alimentos es necesario que las organizaciones internacionales apropiadas, con la asistencia de sus miembros, elaboren un plan de acción a fin de alentar a los países a desarrollar sistemas aceptables y eficientes de control de alimentos y prestarles ayuda en esta tarea, indicando al mismo tiempo los parámetros o requisitos mínimos o básicos para tal fin. Esto debe incluir la capacidad para aplicar los tres elementos del análisis de riesgos, a saber, evaluación, gestión y comunicación. Una iniciativa que se proponga aumentar la inocuidad del suministro alimentario debe centrarse en los peligros y en aquellos alimentos que comporten un riesgo mayor para la salud pública, y hacer hincapié en el desarrollo y en la aplicación de medidas de control para prevenir tales riesgos.