Food safety – a pressing public health and economic issue

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The German word for food is *Lebensmittel* which literally translates a *substance that supports life*. Unfortunately, food is not always life supporting; if contaminated, food may acquire health damaging or even life destroying properties; one of the reasons being that food contains substances that are not only nutritious for people but may, under certain circumstances, also support the growth of a number of pathogens. Therefore, to fulfil its role of supporting life, it is of paramount importance that food is not only available, but also nutritious and *safe*.

Mankind has long recognized the importance of food availability for survival and wellbeing: it is the concept of *food security*. Not surprisingly, this concept has been captured by the Universal Declaration of Human Rights³, where food availability is identified as a basic human right. However, it is extremely surprising that the concept of *food safety*, that is the absence of health and life damaging or destroying properties, has not been emphasized in the Universal Declaration of Human Rights. Neither has it been mentioned 30 years later in the Health for All / Primary Health Care paradigm⁴. One of the basic components of primary health care (PHC) refers explicitly to the ‘promotion of food supply and proper nutrition’. The masterminds behind the PHC paradigm must have felt at the time that the notion of safe food was implicit in the component ‘promotion of food supply and proper nutrition’. This implicity turned out, however, to be an unfortunate omission, as will be shown later, and the correction of it had to wait yet another 14 years. The FAO/WHO International Conference on Nutrition⁵, in 1992, was the first major inter-governmental event that referred explicitly to safe food and declared the *« access to nutritionally adequate and safe food as a right of each individual »*. (Emphasis added)

Where do we stand today? It is obvious that this human right, as so many others, is not yet enjoyed by many of our fellow-citizens. However, considering the role of food safety in health and development, as detailed below, it is obvious that it needs to be substantially

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³ Article 25, 1948
strengthened if its potential to contribute to the Millennium Development Goals\(^6\) is to be realized.

### The health consequences of unsafe food

In every part of the world people wage a constant battle against food contamination, foodborne diseases, and food wastage. Efforts to reduce these survival-threatening, devastating consequences of food contamination certainly started in prehistoric times. Cooking, smoking, simple sun drying, and fermentation were probably the first methods used. Despite considerable advances in food science and technology, the safety of our food supply is, at the beginning of the third millennium, still a cause of concern.

In 1983, a group of internationally renowned experts, convened jointly by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), concluded that illness from contaminated food was perhaps the most widespread health problem in the contemporary world and an important cause of reduced economic productivity\(^7\). In 1992, the FAO/WHO International Conference on Nutrition\(^5\) recognized that hundreds of millions of people suffer from communicable diseases caused by contaminated food and drinking water. In the same year, the UN Conference on Environment and Development\(^8\) recognized that food was a major vehicle for the transmission of environmental contaminants, both chemical and biological, to human populations throughout the world, and urged countries to take measures to prevent or minimize these threats. In 2000, the World Health Assembly, the supreme governing body of WHO, unanimously adopted a strongly worded resolution that recognizes food safety as an essential public health function\(^9\).

A wide range of biological and chemical agents (hazards) causes foodborne diseases, with varying degrees of severity, ranging from mild indisposition to chronic and/or life-threatening illness.

Not only has epidemiological surveillance during the last three decades shown an increase in the prevalence of foodborne illness in many countries, there have also been devastating outbreaks of diseases such as salmonellosis, cholera, enterohaemorrhagic \textit{Escherichia coli} (EHEC) infections, and hepatitis A in both developed and developing countries. Furthermore, cholera and other diarrheal diseases, particularly infant diarrhea, traditionally considered to be spread by water or through person-to-person contact, were shown to be largely foodborne. In several industrialized countries, epidemiological studies showed an

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\(^{6}\) Road map towards the implementation of the United Nations Millennium Declaration. New York, NY, United Nations, 2002 (United Nations General Assembly document A56/326)


unexpectedly high annual prevalence of foodborne disease in 10% to 15% of the population. In the late 1990s, more accurate data from the US suggested that this figure may be as high as 25%\(^\text{10}\). While comparable data from developing countries are lacking, one can safely assume that this figure is higher and the health (and resulting economic) consequences even more severe. Infant diarrhoea is probably the most important food safety related disease in developing countries, the morbidity of which has remained virtually unchanged during the last 20 to 25 years\(^\text{11}\).

It is certain that contaminated food will continue to plague mankind in the twenty-first century, especially as several global trends continue to negatively influence the safety of food and drinking water. Such trends include population growth, uncontrolled urbanization, increase in international trade in food and animal feed, and other factors.

**Biological contaminants**, largely bacteria, viruses, and parasites, constitute the major cause of foodborne diseases. In developing countries such contaminants are responsible for a wide range of disease (e.g., cholera, campylobacteriosis, *Escherichia (E.) coli* gastroenteritis, salmonellosis, shigellosis, typhoid and paratyphoid fevers, brucellosis, amoebiasis, poliomyelitis, and so on. Taken together, diarrheal diseases, especially infant diarrhea, are the dominant problem and indeed one of massive proportions.

Annually, some 1.5 billion episodes of diarrhea occur in children under the age of five, resulting in some 1.8 million deaths. While traditionally it was thought that contaminated water supplies were the main source of pathogens causing infant diarrhea, it is now estimated that up to 70% of diarrheal episodes may be foodborne\(^\text{12}\). Various pathogens have been identified as a cause of diarrhea. These include bacteria such as *E. coli*, *Shigella spp.*, *Salmonella spp.*, *Vibrio cholerae O1*, and *Campylobacter jejuni*; protozoa such as *Giardia lamblia*, *Entamoeba histolytica*, and *Cryptosporidium spp.*; and also enteric viruses such as rotavirus, hepatitis A and E viruses and calici viruses. Infections due to pathogenic *E. coli* are the most common cause of infant diarrhea. Complementary (weaning) food contaminated with pathogenic *E. coli* causes up to 25% of all diarrheal episodes in infants and children. Campylobacteriosis and shigellosis account for 5% to 15% and 10% to 15%, respectively, of diarrheal disease episodes in infants and children\(^\text{12}\).

The seventh pandemic of *Vibrio cholerae O1* biotype El Tor, which started in 1961 in Indonesia, spread in 1991 to South and Central America and Mexico. In 2001, 58 countries had officially notified WHO for a total of 184 311 cases and 2 728 deaths. The actual number of cases is considered to be much higher because of poor surveillance systems and frequent underreporting, often motivated by fear of trade sanctions and lost tourism. WHO


estimates that the officially reported cases represent only around 5% – 10% of actual cases worldwide\textsuperscript{13}. Food is frequently implicated in the transmission of cholera.

Infections due to helminths are also a worldwide public health problem, particularly affecting developing countries. Examples are Trichinella spiralis, Taenia saginata, and Taenia solium, which are acquired through consumption of undercooked or uncooked meat. Ascariasis is one of the most common parasitic infections and is estimated to affect some 1 000 millions people. Trematodes such as a Clonorchis spp., Fasciola spp., Opisthorchis spp., and Paragonimus spp. infect some 40 million people, particularly in Asia, Africa, and Latin America. More than 10% of the world’s population is at risk of becoming infected by these parasites, which are transmitted through the consumption of raw or inadequately processed freshwater fish, shellfish, or aquatic plants\textsuperscript{14}.

Although the situation regarding foodborne diseases is serious in developing countries, the problem is not limited to those countries. Industrialized countries have experienced a succession of major epidemics. It has been estimated that foodborne diseases in the US cause approximately 76 million illnesses, 325 000 hospitalizations, and 5 000 deaths annually\textsuperscript{10}.

With today’s improvement in standards of personal hygiene, development of basic sanitation, safe water supplies, effective vaccination programs (especially against poliomyelitis), food control infrastructure, and the wide application of food-processing technologies, many foodborne diseases (e.g., poliomyelitis, brucellosis, cholera, typhoid and paratyphoid fevers, milkborne salmonellosis) have been either eliminated or considerably reduced in industrialized countries. Nevertheless, most countries experienced an important increase in several other foodborne diseases.

Salmonellosis is of particular importance in many countries. Raw meats, poultry, eggs, milk and dairy products, fish, shrimp, frog legs, yeast, coconut, sauces and salad dressing, cake mixes, cream-filled desserts and toppings, dried gelatin, peanut butter, cocoa, chocolate, and other foods have been identified as being contaminated with Salmonella spp, and, subsequently, serving as vehicles for the transmission of this disease. As a result of industrialization and mass production, large outbreaks have been reported.

In 1985, a salmonellosis outbreak involving up to 197 000 people (16 000 confirmed cases) in six US states was caused by pasteurized but recontaminated milk from one Chicago dairy\textsuperscript{15}. Also in the US, another large salmonellosis outbreak associated with nationally distributed ice cream products occurred in 1994. While the exact number of ill people is not

\textsuperscript{15} Ryan, C.A. et al. Massive outbreak of antimicrobial-resistant salmonellosis traced to pasteurized milk. JAMA, 258 : 3269, 1987
known, the number of persons exposed to contaminated products may have been substantial, as approximately 400,000 gallons of the implicated products were distributed throughout the US\textsuperscript{16}.

In addition, many industrialized countries are experiencing outbreaks of diseases due to relatively new types of foodborne pathogens such as \textit{Campylobacter jejuni}, \textit{Listeria monocytogenes}, and \textit{E. coli O 157:H 7}. Campylobacteriosis has increased to such an extent that it is now the leading foodborne disease in several industrialized countries. As in the case of \textit{Salmonella}, the main vehicles for the transmission of \textit{Campylobacter} are poultry meat and unpasteurized milk.

\textit{Listeria monocytogenes} (L.m.) causes severe foodborne infections, with a high fatality rate in susceptible individuals. The fatality rate, especially in neonates and immunocompromised adults, is in the range of 27\% to 30\%. Although diseases caused by L.m. are rare, this microorganism has been implicated in several important outbreaks involving different types of food such as milk, cheese, vegetables, and meat products\textsuperscript{17}. L.m. in hot dogs and other meat and poultry products resulted in several large product recalls in the US. At present there is no full understanding of its ecology, but it is known to be able to grow at refrigeration temperatures and at a wide range of pH; it is thus of major concern to food industries producing products that support the growth of L.m. and which have an extended shelf life at refrigeration temperatures.

Outbreaks of \textit{E. coli O157: H 7} are causing concern in many countries, because the pathogen causes severe damage to health, even death, particularly in children. Outbreaks have been reported from Australia, Canada, Japan, the US, the UK, and many other European countries. In 1993, a major outbreak of \textit{E. coli O157: H 7} infection affected some 500 people in the northwestern states of the US. Many children developed hemolytic uremic syndrome (HUS), and four died as a result. Another large outbreak caused by this pathogen occurred in Africa in 1992, affecting probably thousands of people, with an undocumented number of cases of HUS. Drinking water and cooked maize were the vehicles of transmission. In 1996, in an outbreak of \textit{E. coli O157: H 7} in Japan, 6309 schoolchildren and 92 school staff members were affected, resulting in two deaths. The epidemiological investigation identified fresh radish sprouts (kaiware-daikon) as the probable cause. This was the largest outbreak ever recorded from this pathogen. Another important outbreak of \textit{E. coli O157:H 7} occurred in Scotland between November 1996 and January 1997. Some 400 people were affected, and about 20 elderly people died as a consequence. The outbreak was traced to cold cooked meat (loose or in sandwiches) bought from a local butcher\textsuperscript{18}.


Another emerging problem is diarrheal illness due to *Cyclospora cayetanensis*. In the US and Canada, three large outbreaks occurred in 1996, 1997 and 1998. They were attributed to the consumption of imported fresh raspberries, probably contaminated through water. The route of transmission of cyclospora needs to be further elucidated, but it is believed that the parasites may be transmitted indirectly via the fecal-oral route\(^9\).

Hepatitis A is common all over the world: some 10 to 300 persons per 100,000 are affected annually. Shellfish grown in contaminated water have often been recognized as a source of this disease\(^20\). An epidemic of shellfish-borne hepatitis A in China in 1988 affected some 292,000 persons (with 32 fatalities) and was related to the consumption of contaminated clams\(^21\). Food contaminated by infected food handlers and not subsequently sufficiently heated may also transmit the disease. Therefore, many cases of hepatitis A are known to be restaurant associated.

Except for a few diseases, such as botulism, brucellosis, listeriosis, and typhoid fever, foodborne diseases are often viewed as mild and self-limiting. Although this may be true in a number of cases, in many other cases the health consequences are serious, even life threatening. This false perception has, in part, contributed to the lack of attention paid to the problem. Foodborne diseases vary in their health consequences depending on the disease agent, the stage of treatment, and the duration of the illness, in addition to the age and susceptibility of the individual. Acute symptoms include diarrhea, vomiting, abdominal pain, cramps, fever, and jaundice. In the case of many foodborne diseases, healthy adults recover within a few days to a few weeks from acute health effects.

Some foodborne diseases can, however, cause serious and chronic sequelae on the cardiovascular, renal, articular, respiratory, or immune systems. Examples of health complications associated with foodborne illness are reactive arthritis and rheumatoid syndromes, meningitis, endocarditis, Reiter's syndrome, Guillain-Barré syndrome, and hemolytic uremic syndrome (HUS). For example, salmonellosis has been reported to cause reactive arthritis in some subjects. In the milkborne salmonellosis outbreak that occurred in Chicago in 1985 (see above), some 2% of patients developed reactive arthritis as a result. It is estimated that up to 10% of patients with enterohemorrhagic *Escherichia coli* (including *E. coli O 157*) infection may develop HUS, with a case-fatality rate ranging from 3% to 5%. The manifestations of listeriosis may include septicemia, meningitis, encephalitis, osteomyelitis, and endocarditis. Infection caused by *Vibrio vulnificus* may be present as fulminate septicemia, often complicated with necrotizing cutaneous lesions. According to some studies, the case-fatality rate for patients with preexisting liver disease is 63% and for those without liver disease 23%. Cysticercosis, an infection with the larval stage of *Taenia solium*, common particularly in South America, may lead to cerebral lesions. The liver flukes *Opisthorchis viverini* and *Clonorchis sinensis* cause mechanical obstruction of the biliary tract and recurrent pyogenic cholangitis, and are carcinogenic to humans.

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In certain groups e.g., the elderly, infants, young children, pregnant women, the malnourished, and immuno-compromised individuals, these health effects may be even more serious. For example, in pregnant women listeriosis can lead to abortion, stillbirth, or malformation of the fetus; the overall fatality rate is about 30%. In an outbreak of listeriosis in pregnant women in Western Australia, the fatality rate of infected fetuses was as high as 50%\textsuperscript{22}.

Transplacental infections with *Toxoplasma gondii* may occur in some 45% of infected pregnant women. In 10% to 20% of nonfatal morbidity, the infants may suffer from damage to the central nervous system and retinochoroiditis, leading to blindness. It is believed that infected but asymptomatic infants may also develop some sequelae later in life, most commonly retinochoroiditis. It is estimated that, worldwide, in about 3 out of every 1 000 pregnancies the fetus/infant is affected by toxoplasmosis\textsuperscript{23}. In the US, toxoplasmosis is considered the most expensive foodborne disease.

Foodborne diseases are one of the most important underlying factors for malnutrition and, indirectly, for respiratory tract infections. Repeated episodes of foodborne diseases over a period of time can lead to malnutrition, with serious impact on the growth and immune system of infants and children. An infant whose resistance is suppressed becomes more vulnerable to other diseases (including respiratory tract infections) and is subsequently caught in a vicious cycle of malnutrition and infection. Many infants and children do not survive under these circumstances.

The contamination of food by chemical hazards is also a public health concern worldwide. Contamination of foods may occur through environmental pollution of the air, water, and soil, as is the case with toxic metals, polychlorinated biphenyls (PCBs), and dioxins. The use of various chemicals, such as food additives, pesticides, veterinary drugs, and other agro-chemicals can also pose hazards if such chemicals are not properly regulated or appropriately used. Other chemical hazards, such as naturally occurring toxicants, e.g. mycotoxins, may arise at various points during food production, harvest, storage, processing, distribution, and preparation. Furthermore, accidental or intentional adulteration of food by toxic substances has resulted in serious public health incidents in both developing and industrialized countries. For example, in Spain in 1981-82, adulterated cooking oil killed some 600 people and disabled another 20 000, many permanently. In this case, the agent responsible was never identified in spite of intensive investigations\textsuperscript{24}.

Over the past 50 years, the widespread introduction of chemicals in agriculture and in food processing has resulted in a more abundant food supply and considerable efforts have been


\textsuperscript{24} WHO : Toxic oil syndrome : current knowledge and future perspective. WHO Copenhagen, Denmark 1992, Regional Publication, European Series Nr. 42.
undertaken to ensure its safety. At the international level, two joint FAO/WHO committees have, over a period of four decades, evaluated more than 1500 food chemicals. The Joint FAO/WHO Expert Committee on Food Additives (JECFA) evaluates food additives, contaminants, and veterinary drug residues, and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) evaluates pesticide residues. Recommendations are made on Acceptable Daily Intake (ADI), on Maximum Residue Levels (MRLs) in the case of pesticides and animal drugs, and on Maximum Levels (MLs) in the case of food additives. In the case of contaminants, JECFA may establish a Provisional Tolerable Weekly Intake (PTWI) to protect consumers against the chronic health hazards usually associated with the long-term intake of these chemicals. JECFA and JMPR may also establish an acute reference dose (acute RfD) for a chemical that may cause adverse health effects after short-time exposure, such as one meal or one day.

Based on the recommendations of JECFA and JMPR, the Joint FAO/WHO Codex Alimentarius Commission (CAC) and its member governments establish international food standards, guidelines, and other recommendations. Since its inception in 1963, CAC has adopted more than 240 commodity standards, 3500 MRLs for various pesticide and veterinary drug/commodity combinations, 780 food additive standards, and 45 codes of hygienic or technological practice. The World Trade Organization (WTO) refers to Codex standards, guidelines, and recommendations in the arbitration of trade disputes involving health and safety requirements. The Global Environment Monitoring System/Food Contamination Monitoring and Assessment Program (GEMS/Food) of WHO provides information on the levels of contaminants in food and on time trends of contamination, enabling preventive and control measures. Data from GEMS/Food and from surveys undertaken in industrialized countries suggest that the food supply in developed countries is, from the chemical viewpoint, largely safe, because of the extensive food safety infrastructure (i.e. legislation, enforcement mechanisms, surveillance, and monitoring programmes), and the cooperation of the food industry. However, data from developing countries are largely lacking. Accidental contamination or adulteration does occur in both industrialized and developing countries. Such contamination causes international concern because of extensive media coverage and the global nature of today’s food supply.

**Genetically modified foods** (GMFs), produced with the help of modern (i.e. DNA) technology, are hotly debated in several industrialized countries. In principle, the food safety considerations of such GMFs should be basically of the same nature as those that might arise from other ways of altering the genome, such as conventional breeding, or using chemicals or radiation to induce mutations. The question is not whether GMFs are inherently less safe than foods produced by traditional genome modification techniques (e.g., animal/plant breeding, induced mutation), which they are not, but whether a country has the capacity to assess the safety of all foods, and to enact and enforce up-to-date food legislation to address all pertinent food safety questions. In countries where this is the case, such as the US, no adverse health effects related to the consumption of GMFs have been observed. However, the mere fact that many consumers in a number of countries appear to
be concerned with GMFs will necessitate appropriate risk communication strategies, including consumer education.

In this context it should be noted that GMFs are of particular importance for developing countries, which look at this technology as one means of addressing the need to produce sufficient quantities of nutritionally adequate and safe food for their growing populations. In addition, this technology offers the possibility of reducing the need for certain agrochemicals, in particular pesticides, with potential health, economic, and environmental benefits.

The developmental aspects of food safety

Developing countries, in order to reduce poverty and to improve the standard of living of their populations, have to develop their economies. Most of their economies are agriculturally (including fishing and aquaculture) based, although a large number of developing countries have also a sizable tourist industry or the potential to develop a tourist industry. For both industries, i.e. agro-food industry and tourism, food safety is of paramount importance. The following example is illustrative of this statement: During 1991, when cholera broke out in Peru, more than US$ 700 Million were lost because the country could not any longer find buyers for its fish and fishery products. In addition, in the three months following the start of the epidemic, another US$ 70 Million were lost due to the closure of food establishments and decrease in tourism.

For the agro-food industry to generate employment and revenues that can be ‘recycled’ into the national development process, primary or value-added food and/or food products have to be produced and sold in the international market. However, already centuries ago, people realized that there was a link between trade and health. In the 14th century, Italian city-states like Venice began to develop quarantine systems to guard against the importation of bubonic plague, which they believed came to them through trade.

When the major international organizations were set up some 50 years ago, after the end of World War II, the founders recognized this linkage as well. The original General Agreement on Tariffs and Trade (GATT), which was instituted in 1947 and still remains an integral part of GATT 1994, includes provisions for countries to apply measures “necessary to protect human, animal or plant life or health”, if they do not unjustifiably discriminate between countries where similar conditions prevail, or act as a disguised restriction on international trade. For its part, the World Health Assembly, back in 1949, called attention “to the need

27 United Nations : General Agreement on Tariffs and Trade, article XX(b). UN New York, 1947, pp.188-316.
for eliminating quarantine restrictions of doubtful medical value which interfere with international trade and travel”\(^{28}\).

Therefore, there is a reciprocal understanding that health must be protected over and above business interests, but that health protection measures should not intrude on commerce without justification\(^{29}\).

**Food production – safety first**

The possible use of health protection measures to restrict trade has been a concern since the beginning of multilateral trade negotiations. However, it was nearly 50 years before trading partners concluded the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS agreement, see below) in 1994. By that time, international trade in food had reached an unprecedented volume, representing some $ 294 billion. As the scale of international trade in food further increases (1997: $ 458 billion), there is growing threat from foodborne pathogenic microorganisms\(^{30}\). In addition, hazards to human health may also occur in the form of mycotoxins, pesticide residues and other substances, the presence of which may lead to rejection or destruction of consignments by importing countries\(^{31}\).

Despite the risk to health related to international food trade, this international trade is essential as it has at least a two-fold benefit: (i) it introduces a wider variety of foods into the diet by providing consumers in importing countries with a bigger and better choice of products, thus contributing to better nutrition; and (ii) it provides food exporting countries with foreign exchange, which is indispensable for the economic development of many countries, and thus for an improvement in the standard of living of their people.

Tariff and non-tariff barriers at the national border, however, can impede international trade in foods. Some of them are required to protect the health of consumers; others are simply detrimental to international trade. To address this concern, the Joint FAO/WHO Codex Alimentarius Commission (Codex in short) was established in 1963 to protect the health of the consumers and, at the same time, to ensure fair practices in food trade. The Codex has been working since and has elaborated a number of food standards, guidelines and recommendations (see above). However, while member governments of the Codex, prior to 1995, have been asked by FAO and WHO to formally accept these standards, it has been


left to governments to decide whether they should or should not implement them, given that Codex texts have not been directly linked to an international trade scheme such as GATT.

*What has changed with the establishment of the World Trade Organization in 1995?*

The Uruguay Round of Multilateral Trade Negotiations was concluded in April 1994 by the signing of the Marrakech Agreement and it gave birth to a number of multilateral trade agreements, to which all Members of the World Trade Organization (WTO) - established in January 1995 - are committed. One important outcome of the Uruguay Round was that countries agreed to reduce tariff barriers for many agricultural commodities so as to further encourage free trade. As a result, non-tariff barriers became a real concern because they could undermine the promotion of international trade if put into practice in an arbitrary or discriminatory way.

To address some of these concerns, the WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) was drawn up to ensure that countries apply measures to protect human and animal health (sanitary measures) and plant health (phytosanitary measures) based on the assessment of risk, or, in other words, based on science. The SPS Agreement incorporates, therefore, safety aspects of foods in trade.

It is important to mention still another WTO agreement: the Agreement on Technical Barriers to Trade (TBT Agreement). This agreement, which had been in existence as a plurilateral agreement since the Tokyo Round, was revised and converted into a multilateral agreement through the Uruguay Round. It covers all technical requirements and standards (applied to all commodities), such as labelling, that are not covered by the SPS Agreement. Therefore, the SPS and TBT Agreements can be seen as complementing each other.

One of the main objectives of the SPS Agreement is to protect human and animal health as well as the phytosanitary situation in all WTO Member countries. This is to be addressed through the establishment of a multilateral framework of rules and disciplines that will guide the development, adoption and enforcement of sanitary and phytosanitary measures and minimize their negative effects on trade. As a natural consequence, the SPS Agreement recognized the standards and related texts of the Codex Alimentarius Commission as international points of reference. Today, the SPS Agreement is regarded as being a strong instrument which will further the goal of the Codex, that is to harmonize food standards worldwide in order to protect human health and to facilitate international trade in food.

Likewise, international standards established by the International Office of Epizootics (OIE) and the relevant international and regional organizations operating within the framework of the International Plant Protection Convention (IPPC) have been recognized in the SPS Agreement as providing references with regard to animal and plant life or health.

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In order to comply with the provisions of the SPS Agreement, it may often be necessary to strengthen national food control systems. This may require both manpower and financial investment. To address these particular difficulties, which may be encountered by many developing countries, the SPS Agreement also includes provisions for technical assistance to be provided by other countries, or through international organizations. The SPS Agreement thus provides an ideal opportunity for developing countries to build modern food control and safety schemes, or to upgrade existing ones. It also enables countries, which don’t have the financial and/or scientific resources to develop their own risk-based food standards, by accepting Codex standards as their national standards, to comply with the food safety related WTO requirements: Codex standards and related texts are deemed necessary to protect human health. As long as a country employs these standards, its measures are presumed to be consistent with the provisions of the SPS Agreement. Harmonization with Codex will also eliminate the necessity of one country having to provide other countries with justifiable reasons as to why the measures they are applying are necessary in order to protect human health. In this way, countries are no longer subject to arbitrary measures imposed by their trading partners, but have a fair chance, as long as their foods comply with Codex recommendations, to participate in and to benefit from the international food trade. In other words, it is not any longer the ‘right’ of the more powerful trading partner to dictate its conditions to the less powerful one. International trade in food follows jointly elaborated risk-based rules, i.e. Codex recommendations, that assure health protection.

As indicated above, tourism is an important industry, providing employment for millions of people and playing an important factor in the economy and thus in the development process of many countries. And as also has been pointed out, safe food is of paramount importance for a flourishing tourist industry. The reason being that a country or a particular company with a poor reputation regarding the safety of the food they provide to their clients (tourists) will have difficulties to attract clients.

The role of food safety in tourism is dual:

(i) People travelling to distant places are often at greater risk of foodborne illness than in their own country. Attack rates range from 10% in southern Europe to over 50% in destinations in Latin America, North Africa, India and Nepal

(ii) Travellers contribute to the trans-national spread of foodborne illness and thus mitigating efforts made to prevent foodborne illness. For instance, it is estimated that a majority of cases of salmonellosis in Scandinavian countries are ‘imported’ by returning tourists, whereas these countries are making major efforts to prevent foodborne illness.

On the other hand, in countries where an effort is made to improve food safety in the tourism sector, a double benefit may be expected: (i) travellers are better protected and this

country will be a more attractive destination for them and (ii) the local population also benefits from the higher food safety standard. A case in point is Tunisia whose efforts have led to a significant reduction in travellers’ diarrhoea. In this country, as a result of intensive education of food handlers, the incidence of diarrhoeal diseases among tourists has been reduced by about one third\textsuperscript{35}.

In summary, the role of food safety in health and development is unquestionable. However, in order for food safety to make its best possible contribution to the Millennium Development Goals, there needs to be a paradigm shift: food should not only to be considered as an agricultural and/or trading commodity but also as a \textit{public health issue}. Therefore, food safety has to be seen by the public health community as an \textit{essential public health function}, as recently acknowledged by the World Health Organization\textsuperscript{9}. Consequently, food safety has to be integrated along the entire food chain, from \textit{farm to table}, with the three sectors (i.e. governments, industry and consumers) \textit{sharing responsibility}. If the US already in 1997 conservatively estimates the medical costs and productivity losses for just 7 specific pathogens in food to be in the range of annually between US$ 6.5 and 35 Billion\textsuperscript{36}, then time for action is overdue.


\textsuperscript{9} Food Safety from Farm to Table : a national food safety initiative. Report to the President, May 1997.