Food Safety

Public Health Significance of Foodborne Illnesses

Food Safety Programme
World Health Organization
Regional Office for the Western Pacific
Food safety: issues - public health significance of foodborne illnesses.

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Message from the Regional Director

Food safety is an increasingly important public health issue. Consumers, governments and industry have been alarmed by recent contamination scares and outbreaks. Mass media around the world have reported on numerous incidents: soy sauces contaminated with chloropropanol; meat and poultry contaminated with dioxin and veterinary drug residues; vegetables contaminated with pesticides; and fried foods, such as, chips contaminated with a potential cancer-causing chemical (acrylamide) that formed during processing.

The need for greater attention to food safety has been further emphasized by the worldwide focus on mad cow disease and the associated increase in human variant Creutzfeld Jacob Disease (vCJD). Also receiving much attention is the issue of genetically modified food. Consumers, governments and industry are debating the benefits and considering the need to adequately inform consumers of the genetically modified nature of these foods. Still, these high profile issues are less likely to have an immediate impact on the health of people in the Western Pacific than will sporadic cases and outbreaks of salmonellosis, campylobacteriosis, E. coli infections and intoxications, Vibrio infections, foodborne trematodes, typhoid, cholera and other food and waterborne diseases of microbiological origin.

The costs of foodborne illness to communities, including personal suffering, loss of family income, community health care costs and loss of industrial productivity, involve billions of dollars annually. Australia has estimated the annual health care costs alone for its relatively small population to be AU$2.6 billion. Many countries can also identify the costs of contamination in the loss of demand for their exports. Food sectors, such as beef producers, note the reduced consumption of certain products, such as red meat. Companies absorb the cost of being associated with outbreaks as their profits fall or they suffer bankruptcy.

The fifty-second session of the Regional Committee of WHO recognized the public health significance of foodborne illnesses and the importance of governments working together with consumers, producers and processors to address food safety from production to consumption. In so doing, the Committee adopted and endorsed a Regional Strategy for Food Safety. I urge you now to recognize the public health issues, to apply the identified strategies and take the necessary actions to achieve safe food for all.

Shigeru Omi, M.D., Ph.D
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WHO Regional Office for the Western Pacific
Foodborne illnesses are prevalent in all parts of the world and cause millions of deaths every year. The ingestion of biological hazards such as bacteria, bacterial toxins, viruses and helminths; physical hazards such as glass, wood and metal; and diverse toxic chemicals including mycotoxins, marine toxins, environmental pollutants, pesticides, illegal additives and toxic substances, result in numerous episodes of illness.

In industrialized countries, where many foodborne illnesses are monitored by surveillance systems, up to 30% of the population may suffer illnesses caused by biological hazards such as Salmonella, Campylobacter, Clostridium and Hepatitis A virus every year. In Australia, for example, it is estimated that every day 11 500 people suffer foodborne illness. In contrast, surveillance is weak in developing countries. Nevertheless, the information that is available indicates that prevalence in developing countries is even higher than in developed countries.

In 1988, a major epidemic of Hepatitis A in China affected some 292 000 people and killed nine people. Hepatitis A remains a significant public health issue in many other countries. Salmonellosis is a major cause of morbidity in Australia, Japan and New Zealand. Campylobacteriosis is particularly prevalent in Australia and New Zealand. Milk- and meat-associated brucellosis is endemic in Mongolia. Botulism is sporadically reported in the Region, particularly in association with fermented food and sausages. In recent years epidemics of cholera have occurred in a number of Pacific island countries, countries surrounding the Mekong Basin, China and Malaysia. Typhoid and paratyphoid fevers have been reported, particularly from Papua New Guinea and Viet Nam. Trematode infections such as opisthorchiasis in the Lao People’s Democratic Republic and clonorchiasis in China, Japan and the Republic of Korea are still prevalent in a number of countries of the Region.
Even Pacific island countries with limited capacity to monitor foodborne illnesses continue to report high rates of diarrhoea and gastroenteritis every year. Pacific island countries reporting more than 100 cases/10 000 population during the period 1996-1999 include Cook Islands, French Polynesia, Kiribati, Marshall Islands, the Federated States of Micronesia, Palau, Tonga and Tuvalu. In addition, the Philippines continues to report high rates of diarrhoea and gastroenteritis.

There is considerable evidence to show that foodborne illnesses due to biological hazards are on the increase in both developed and developing countries. Among the illnesses demonstrating a significantly increased incidence in the last few decades are campylobacteriosis, enterohaemorrhagic E. coli infections, Cyclospora infections and listeriosis. In Japan, in a cluster of cases in 1996, 11 826 individuals (mainly schoolchildren) suffered from enterohaemorrhagic E. coli infections. To these may be added infections due to new strains of Vibrio cholerae (O139) and drug resistant strains of several enteric pathogens, particularly Salmonella.

![Campylobacteriosis Notifications in New Zealand by year 1980-1998](chart)

*Increasing numbers of campylobacteriosis infection are being reported*
Foodborne illnesses associated with the consumption of toxic chemicals also remain prevalent. The recent dioxins crisis in Belgium is one example of a public health concern about chemical hazards in food that had repercussions in the Western Pacific Region.

Other concerns about chemical contamination of food centre on pesticide residues left on food by improper agricultural practices, the presence of Bovine Spongiform Encephalopathy (BSE) prions in meat products, the development of mycotoxins as a result of unsafe harvesting, storage and handling and environmental and industrial contamination with heavy metals such as lead, cadmium and mercury.

Viet Nam reports a high burden of disease associated with pesticide residues. Malaysia has reported use of illegal additives such as boric acid and formaldehyde. Mycotoxins have led to the destruction of many crops in Australia, China and elsewhere. The Republic of Korea recently stopped importation of crabs tainted with lead. In addition, marine and plant toxins that are naturally present can lead to foodborne illness. In Cambodia, for example, in 2000, 66 people were ill due to possible consumption of toxic puffer fish. In many Pacific island countries, ciguatera poisoning is prevalent. Physical hazards continue to lead to illness and injury in all countries.
Understanding the factors leading to foodborne illness

The reasons for the increasing incidence of foodborne illness are not fully understood, although it is widely accepted that changes in ways of producing, processing and preparing of food; changes to lifestyles; and increasing environmental pollution are major contributing factors:

- Increased pressures on primary production to meet the demands of an increasing world population have led to intensive farming; use of both slaughter by-products and animal waste as feed; misuse of antibiotics, pesticides and growth hormones; and mass slaughtering processes.
- Increased global demand for fishery products has sometimes resulted in unsafe aquaculture practices, harvesting of fish from polluted water and illegal use of poisons and dynamite.
- Mass processing operations and extensive distribution systems may result in contaminated foods being widely distributed.
- New packaging and processing technologies may be improperly applied to extend the shelf-life of food.
- Consumers are demanding increased access to ready-to-eat and fast foods and this has resulted in the considerable growth in the food service sector and in partially processed foods.
• Consumers in many developed countries have demanded reductions in the use of food additives, including preservatives.

• Many Pacific island communities are aware of public health concerns associated with the harvesting of particular fish at certain times but have yet to address the epidemiology, prevention and control of the marine toxins involved.

• In conditions of extreme poverty, filth, overcrowding and poor sanitation may make basic hygiene practices difficult to apply.

• Rapid urbanization leads to the poorly educated urban poor becoming involved in the food service sector and in the food processing industry and may also lead to a lack of sustainable waste disposal, safe water and sanitation facilities.

• Rural poverty can contribute to foodborne illness because access to both infrastructure and knowledge that may facilitate hygienic practice is often inadequate. This is particularly so in communities where women, who are often food handlers, have limited access to education and limited decision-making power at the household level.

• Ageing populations have led to increasing numbers of consumers with reduced immunity to disease.

• Increasing international trade in food and feeds and large-scale movements of people across national borders as tourists, refugees, and workers are internationalizing food safety concerns.

• In parallel with the increasing incidence of foodborne illness, the proportion of public sector funding spent on health is declining in many countries.

• Many countries have not established adequate regulatory control mechanisms and fail to provide adequate resources for the infrastructure necessary to implement such control.
National Food Safety Programmes in the Region

Key features of effective national food safety programmes

National food safety programmes in the Western Pacific Region will have to take account of the following key features of effective national food safety programmes. A national food safety programme may be considered to be effective if:

- it is clear in its expressed mission or policy;
- it integrates food safety with other priority governmental policies;
- it has a modern, comprehensive risk-based legislative framework that reflects international Codex Alimentarius Commission standards and other international obligations;
- it is based upon sound scientific research;
- it incorporates a food inspection system that addresses and manages food safety from production to consumption;
- it encourages and assists industry and trade to meet food safety obligations;
- it involves consumers in decision-making processes and educates them about food safety issues;
- it is able to respond to disasters and emergencies;
- it establishes a system to monitor and evaluate progress; and
- it is resourced adequately.
Current situation in the Western Pacific Region

Policies, plans of action and partnerships

Many governments in the Region have no specific written policy on food safety. Consequently, strategies and plans of action are often developed from a general health perspective and may address food safety only briefly, if at all. Thus food safety plans of action, if they exist, have often not been developed in a coordinated manner with a clearly articulated goal within the context of government policy. Integration with other areas of government such as economic development, poverty alleviation, food security and women and children is often inadequate.

A second limitation of many food safety programmes in the Western Pacific Region is the low level of coordination and cooperation among the different government departments involved in developing and enforcing legislation. There are often considerable overlaps, with different government agencies claiming the same jurisdiction in relation to food safety. As a consequence, laws are sometimes developed and used as leverage for one agency and a barrier to another agency. This has resulted in some countries having an excessively complex web of laws and regulations addressing food control. Despite such overlapping laws, these countries also often have many critical areas of the food chain unprotected by laws or regulations and standards.

In countries with food safety standards, the standards are generally adopted in accordance with the Codex Alimentarius. However, several countries are not currently actively participating in the work of the Codex Alimentarius Commission.

Efforts must be exerted to ensure that marketplaces are healthy
Inspection from production to consumption

The links between institutions such as agriculture, fisheries, veterinary services and animal quarantine, consumer affairs, commerce, standards organizations and health are often poor. Hence, coordination of inspection activities is limited, with industry either being forced to suffer multiple inspections or being free of any meaningful inspections altogether. Only a few countries currently attempt to provide production to consumption protection (based upon Hazard Analysis Critical Control Point, HACCP, principles) in relation to the majority of high risk foods.

Varying standards of enforcement, education and training among different provincial and local authorities are another key limitation.

Generally, there are insufficient numbers of inspectors to implement the national programmes effectively. Inspectors are often insufficiently trained and the system of monitoring how inspection affects food safety is limited.

In import and export inspection, many countries have well developed programmes. However, links with authorities of importing and exporting partner countries need to be improved.

Providing a sound scientific foundation for the food safety programme

National capacity to analyse food also varies across the Region, with some governments unable to isolate or identify common foodborne pathogens and chemical hazards from food. Quality assurance in analytical procedures is also often overlooked, although it is an essential element of contaminant monitoring and foodborne illness surveillance. A limited number of countries within the Region support laboratory quality assurance, accreditation and certification.

Many governments are attempting to decentralize their laboratory systems, which is resulting in numerous state, provincial and municipal laboratories. If such decentralized programmes are to be successful, each laboratory must have the necessary technical and financial resources to permit both sustainability and quality assurance. The roles and functions of each laboratory level need to be defined so that available resources are utilized most effectively.
Contaminant monitoring programmes are undertaken in a minority of the Region's countries and usually cover only a limited range of contaminants. Data on contamination with bacteria and viral foodborne illness agents or marine toxins are collected and published in only a few countries. The most regularly collected data relate to contamination with pesticides, heavy metals and mycotoxins. Several countries provide data on these to WHO's Global Environmental Monitoring (GEMS/Food) programme. Exposure assessment data are limited. Studies of a range of priority hazardous agents are still needed as dietary intake varies from country to country.

For some countries, foodborne illnesses are notifiable by law but surveillance systems are inadequately developed. For others, foodborne illnesses do not have to be notified. Only a few countries have an active foodborne illness surveillance system capable of tracking and reporting on incidence and contributory factors for illnesses such as salmonellosis, vibriosis and campylobacteriosis.

A proliferation of laboratories at local level may lead to unnecessary duplication and laboratories with limited capability and poor quality assurance systems.

Active surveillance of foodborne illnesses is required for effective risk management.
Partnership with consumers and industry

If a food safety programme is to be effective, it must actively promote the participation of both industry and consumers. However, political and economic systems do not always encourage such partnerships. In only a few countries of the Region are both industry and consumers invited to participate fully.

In addition, not enough governments have training programmes for industry personnel aimed at introducing modern food safety concepts based upon HACCP principles. There is a perception that the introduction of HACCP needs to be delayed until basic hygiene and sanitation are implemented in many businesses. The usefulness of a systematic approach such as HACCP needs further promotion as it can enable businesses and health authorities to prioritize improvements based upon risk.

Consumers, while generally considered to be an audience for training and education, are often not considered to be a source of knowledge or to be effective change agents in relation to food safety.

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<thead>
<tr>
<th>Step</th>
<th>Hazard</th>
<th>Critical Control Points</th>
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</thead>
<tbody>
<tr>
<td>1. Purchase</td>
<td>Microbial, chemical, physical hazards</td>
<td>Store products separately and ensure a minimum temperature atOrigins produced, packaging</td>
</tr>
<tr>
<td>2. Receipt of food</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check stock control and date on origin of food, check the temperature or quality</td>
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<tr>
<td>3. Storage</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
</tr>
<tr>
<td>4. Preparation</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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<tr>
<td>5. Cooking</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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<tr>
<td>6. Cooling</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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<tr>
<td>7. Hot-holding</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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<td>8. Reheating</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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<tr>
<td>9. Chilled storage</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
</tr>
<tr>
<td>10. Serving</td>
<td>Microbial, chemical, physical hazards</td>
<td>Check the food temperature or quality</td>
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HACCP can only be introduced if food businesses also have prerequisite programmes such as good hygienic practices.
Monitoring and evaluating the national food safety programme

Monitoring and evaluation of food safety programmes is limited. Few countries are able to judge their efforts against a disease reduction programme with specific targets.
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Consumer protection is the primary purpose of any food safety programme