



Food and Agriculture
Organization of the
United Nations

STRENGTHENING SECTOR POLICIES FOR BETTER FOOD SECURITY AND NUTRITION RESULTS

Food
safety



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STRENGTHENING SECTOR POLICIES FOR BETTER FOOD SECURITY AND NUTRITION RESULTS

This policy guidance note is part of a series that the Food and Agriculture Organization of the United Nations (FAO) is producing to support policy makers address the food security and nutrition situation in their country. Each note provides guidance on how to sharpen the focus of sector policies in order to achieve sustainable food security and nutrition outcomes.

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Introduction

The right to adequate food is a basic human right (FAO, 2005) and is realized when every man, woman and child has physical and economic access at all times to adequate food. Food security further enshrines these rights. The globally accepted definition of food security describes it as the state where all people at all times have physical, social and economic access to sufficient, nutritious and safe food to meet their dietary needs and food preferences for an active and healthy life (FAO, 1996).

Although the definition of food security already states that people must have access to *safe* food, all too frequently food safety is overlooked, remaining the hidden element of food security and nutrition. In places where food supplies are

insufficient, coping mechanisms to address food insecurity are often primarily focused on access to food without due considerations for safety aspects.

Food provides essential nutrients for human health, well-being and development. However, when unfit for human consumption, food can also be a source of harm as food-borne illness and reduced absorption of nutrients. In the worst-case scenario, food that is not safe can cause death.

In addition to the direct health impacts, food safety problems impose significant social and economic costs due to reduced market access, reduced national earnings, loss of household income and increased household expenses resulting from illness.

Food-borne diseases continue to pose a high burden on low- and middle-income countries (LMICs), particularly on children under five years of age, and meeting stipulated conditions for both domestic and export markets can be

→ Facts and figures (from WHO, 2015 and WB, 2018)

- The World Health Organization (WHO) global burden of food-borne diseases review indicates that the 31 hazards examined were responsible for 600 million cases of food-borne disease infections in 2010, resulting in 33 million disability-adjusted life years (DALYs), including 420 000 deaths worldwide.
- 34 percent of all deaths from food-borne diseases affect children under the age of 5 years, despite them representing only 9 percent of the global population.
- Diarrhoeal diseases cause 550 million people to fall ill and 230 000 deaths every year.

- Other major causes of food-borne disease deaths are salmonella typhi, Taenia solium, hepatitis A virus, and aflatoxin.
- The highest burden per unit population is recorded in Africa, followed by South-East Asia and the eastern Mediterranean sub-region.
- The impact of unsafe food costs low- and middle-income economies USD 95.2 billion in lost productivity and USD 15 billion in related medical expenses each year.
- For LMICs, in aggregate, the cost of unsafe food in domestic markets is estimated to exceed USD 110 billion per year. This comprises 'productivity losses' due to illness, disability or premature death (USD 95.2 billion) and the cost of treatment of food-borne illnesses (USD 15 billion).

challenging. In addition to bringing key improvements to health and nutrition, enhanced food safety and hygiene is therefore integral to the successful attainment of the Sustainable Development Goals (SDGs).

As actions to end hunger and eradicate malnutrition worldwide have intensified during the UN Decade of Action on Nutrition (2016 – 2025), sustainable approaches to ensure food safety are in the process of being globally acknowledged as essential to achievement of nutrition and food security goals.

This guidance note addresses the overarching questions of “Are food safety policies and decisions relevant to food security and nutrition?” and “How can we improve food safety decision-making to better support food security and nutrition objectives?” The note identifies a number of issues to be taken into account for improving the coherence between these policies. Such alignment can only be beneficial to achieving food and nutrition security outcomes and ensuring healthy, safe diets.

This guidance note aims to support stakeholders engaged in policy processes and programmes in different domains – including food security,

nutrition, food safety, agriculture, health and trade – in understanding the mutual benefits of establishing a more inclusive policy dialogue. This requires integrating food safety considerations into their own agenda by considering, weighing and optimizing trade-offs, building on synergies and ensuring that different sectors’ objectives are met in a complementary way.

This note will:

- Review the contribution of food safety to food security and nutrition, by reviewing the interactions among the four dimensions of food security.
- Explain key concepts underpinning food safety and national food control systems, with examples of different regulatory approaches to food safety issues, and their respective impact on food security and nutrition, introducing the concept of trade-offs.
- Propose a stepwise approach to improving policy coherence, illustrating this with different examples and identifying how trade-offs can be optimized and win-win solutions identified through a review of policy options, backed up by collected evidence.

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→ Key messages

- **“If it is not safe, it is not food”**: **food safety is an essential element of nutrition and food security**, because it contributes directly to people’s enhanced nutritional and health, by preventing and reducing the burden of diseases associated with food.
- **Food safety is often wrongly assumed to be a luxury** and therefore issues of access to food are often addressed without due consideration to safety.

- **Changes in the global food supply chains** and the emergence of new risks, including those from antibiotic-resistant pathogens, have made the food safety landscape more complex than ever.
- **Greater collaboration and communication is needed** across the domains of food safety, nutrition and food security, to contribute to a safer, healthier and more accessible food supply.
- **Data and evidence are essential** to support the policy coherence and alignment processes.

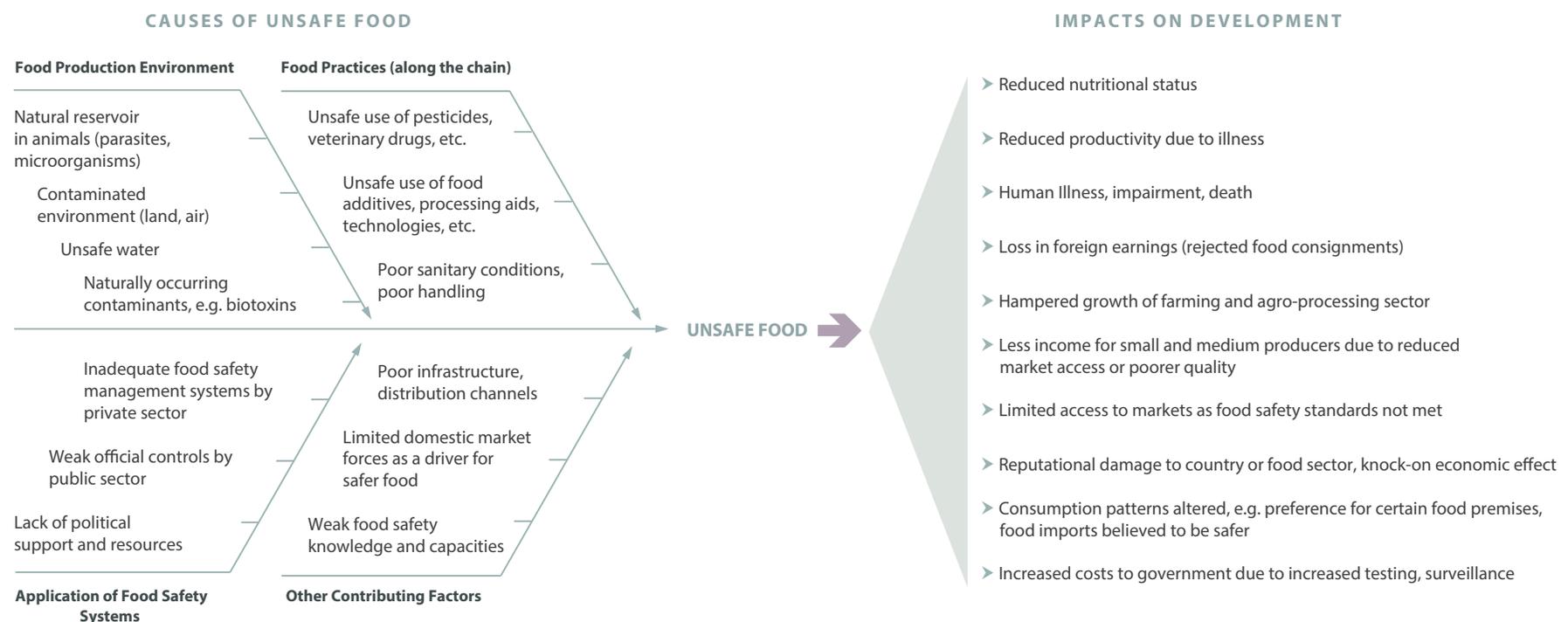
The importance of food safety for food security and nutrition

Food safety is integral to many SDGs. For example, without food safety there cannot be food security (SDG2: zero hunger). When food is not safe, good health and well-being are not attainable (SDG3: healthy lives) and only safe food can be successfully traded (SDG8: decent work and economic growth). However, food safety requires the careful management of many threats and risks. Figure 1 presents the root causes of unsafe foods and the direct health burden, the indirect social and economic implications and details that further the link with

the SDGs. At greatest risk are poorer individuals with limited education, those with more basic living conditions and those with lower food safety awareness. Box 1 provides some more insights on terms and concepts related to food safety.

Food safety references in the context of food security, and more specifically related to the disposal of food surplus, date back to the origin of the food security concept in the 1940s. Later, in the 1990s, concrete plans were defined to eradicate, or at least reduce, hunger and malnutrition significantly and the right to adequate food and nutrition was internationally reaffirmed. In 1996 the definition of food security was adopted at the World Food Summit, stressing the importance of nutritional quality and safety of food. This evolution provided a framework for food safety, food security and nutrition

FIGURE 1. Causes of unsafe food and its impact on development



Box 1

Understanding food safety

Food safety refers to the absence, or presence at acceptable levels, of microbiological, chemical or physical hazards in food to minimize risks to the health of the final consumer.

Examples of hazards are pathogens and pesticide residues or environmental contaminants. These hazards are largely invisible but in some cases consumers will know if food is unsafe or unsuitable for consumption (e.g., mouldy grains, fish with a strong odour, pest-infested dried biscuit).

Sources of food safety hazards, contributing factors and transmission routes to foods are multiple and variable. They include the food itself, production practices (including on-farm), processing and technologies, the environment, including water, unsanitary conditions, food handlers and consumers.

Food quality includes all attributes that influence a product's value to the consumer. It includes internal factors such as nutritional quality and safety aspects, and such external factors as appearance (size, shape, colour, gloss and consistency), texture and flavour. There may be negative attributes such as spoilage, discoloration, off-odours and positive attributes such as the origin, colour, flavour, texture and processing method of the food. A re-emerging area of concern for food safety regulators is **fraudulent and deceptive practices** that deceive the consumer for the purposes of economic gain (e.g., addition of water to milk and use of colourings to disguise lower quality food).

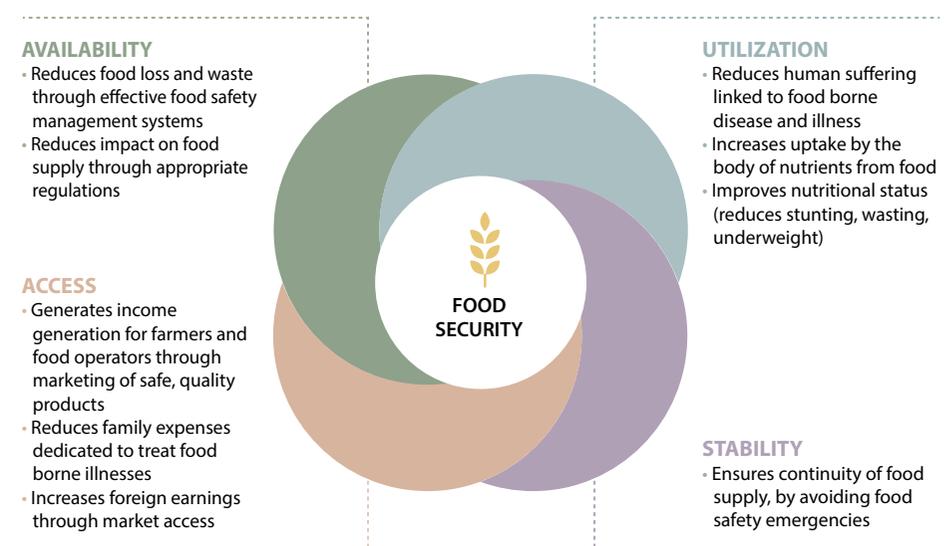
(FAO and WHO, 2003)

professionals to work towards the common goal of food security by ensuring the availability of safe, nutritious food. Coherent policy development has been further compounded by the adoption in November 2014 of the Second International Conference on Nutrition (ICN2) Framework for Action.

Food safety and food security are interrelated concepts that have a profound impact on quality of human life, and there are many external factors that affect both. This section aims to assist policy makers in understanding how food safety contributes to food security by discussing the nexus of food safety with the four dimensions of food security – availability, access, utilization and stability.

Governments play a key role in ensuring that sufficient quantities of safe food are available to feed the population. The availability of food relates to the supply of food through production, distribution and exchange and it is influenced by a combination of factors, including the efficiency of food supply chains, the ability

FIGURE 2. Examples of impact of safe food supply on food security



to prevent food loss and waste, the existence of appropriate market forces and adequate trade patterns for food imports and exports.

Intuitively, food safety can be seen as a negative driver with regard to food availability: if large quantities of food are discarded because they are deemed unsafe, there are decreased quantities of food available on the market. In addition, the sudden introduction of new food safety requirements, if particularly stringent and unexpected by stakeholders in the value chain, as for example regulatory limits for chemical contaminants or new food safety management systems that food businesses must integrate into their daily activities, could cause food shortages, disrupt market supply and promote an increase in food prices.

In cases of severe contamination of food products, as a corrective measure, governments may need to declare food unfit for consumption and withdraw it from the market in order to protect public health. However, if the food involved in the withdrawal or recall procedure is a staple, and the quantities are significant, it can have a profoundly disruptive effect on the food supply. This was, for example, the case in eastern Africa with maize heavily contaminated by mycotoxins.

Food availability may also be impacted as a result of food loss and waste, which refers to the decrease of food in subsequent stages of the food supply chain intended for human consumption. The Food and Agriculture Organization of the United Nations (FAO) estimates that one third of food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tonnes per year (FAO. 2019. <http://www.fao.org/food-loss-and-waste/en>).

Food access, both economically and physically, is linked to the ability of farmers, processors and other food business operators to produce and sell safe, good quality food. When food is unsafe, the economic status of an individual, a household or a country can be directly affected. At household or individual level, food-borne illnesses may lead to reduced productivity and income because illness prevents the affected family member from working

and redirects family expenses towards medical care, resulting in reduced accessibility to food from an economic perspective.

At the macro scale, countries' economies can be severely impacted if an important export market is lost due to non-compliance with food safety standards and importing country requirements, with a consequent loss of foreign earnings and impact on people whose incomes depend on that specific food sector.

Lack of transparency and of harmonization of food standards at a global level are serious impediments to market access and healthy development of export markets and economic opportunities. This is especially true when regulations are strictly and literally enforced. The following example, related to maximum residue limits (MRLs) for pesticides, helps illustrate this point. Most food safety systems are built on positive lists. Unless specific provisions are made for tolerances or MRLs for pesticides, such residues are considered non-permissible by default. Those tolerances are usually specific to the use of a single pesticide on a single crop. In the absence of such an MRL, regulatory systems typically use default limits, mostly at the limit of quantification (LOQ) or apply zero tolerance. Due to the costs and efforts involved to set an MRL, they are often not available for "niche" production, also termed "minor use". The default stance of zero tolerance by the importing country may result in rejections of food at borders. Such strict and categorical interpretation of food laws by the importing countries can represent a disadvantage for small producers, resulting in significant economic losses due to lack of market access.

Food safety also influences the utilization dimension of food security – which refers to the way the body optimizes use of the nutrients in food. Food-borne illnesses threaten individuals' nutritional status, in particular vulnerable sub-populations, such as the elderly, pregnant women and children.

Infectious food-borne diseases trigger the immune physiological response to infection (acute-phase response). Such a physiological state mainly causes an increase in energy and nutrient requirements because of accelerated metabolism. Moreover, the digestive absorption of nutrients can become impaired

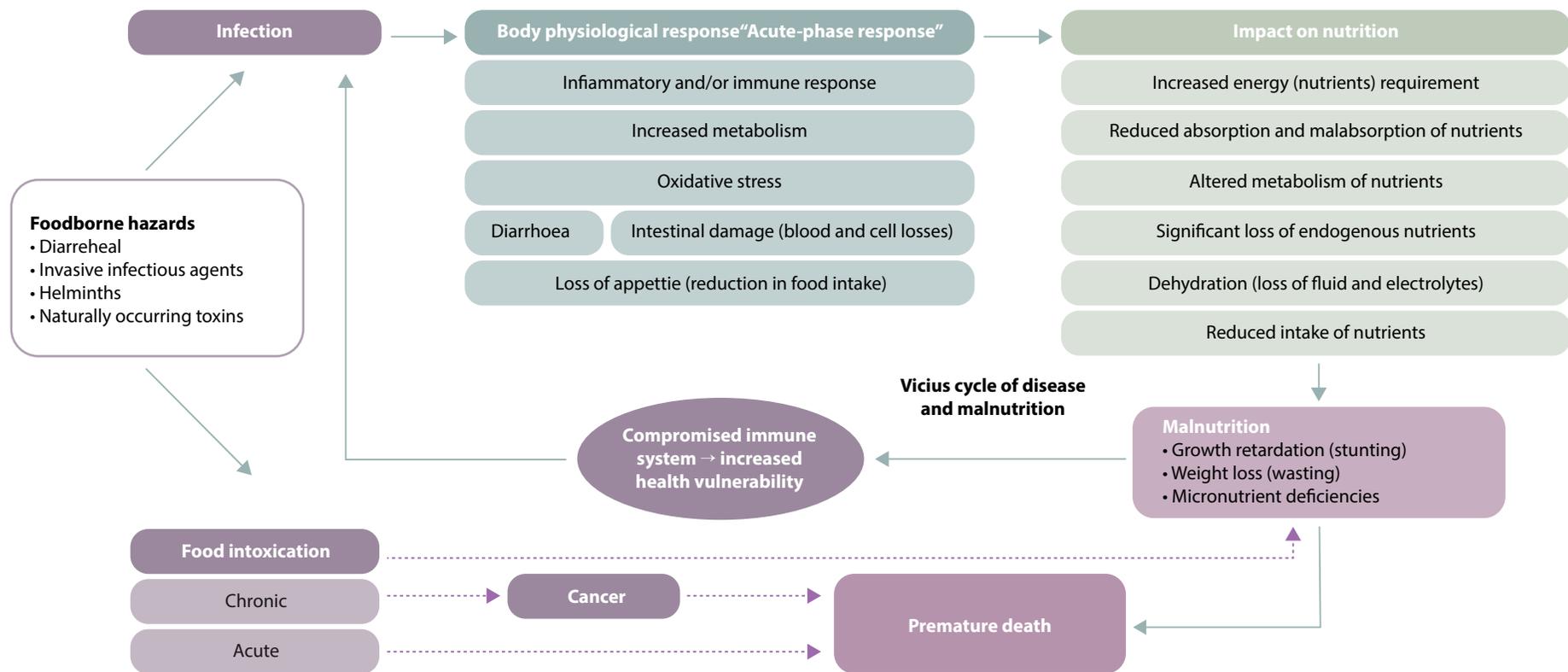
(and reduced at worst, e.g., helminth infections linked to body deprivation of micronutrients such as iron). Additionally, diarrhoea resulting from infection (including food-borne parasites) causes the body to lose its endogenous water and nutrients. Nutrient absorption is reduced and nutrient deficiencies are exacerbated. Food-borne infection can therefore lead to malnutrition in all its forms, including stunting (the impaired growth and development in children that results from poor nutrition and/or repeated infection), wasting (defined as a low weight per unit height in humans and particularly children) and other health consequences from micro- and macronutrient deficiencies.

When poor nutritional status prevails in mothers and their children, optimal functioning of the immune system is compromised (due to impaired synthesis of immune cells), leaving the body more vulnerable to other microbes or pathogens, and vulnerable to infection. A growing body of evidence also demonstrates that chronic exposure to mycotoxins in food is likely to be a key factor in impaired growth and development (stunting). Figure 3 summarizes the impact that food-borne hazards have on nutritional status.

Food fraud may also negatively affect people’s nutritional status in different ways. For example, food fraud in activities in national fortification programmes

FIGURE 3. Conceptual framework for food-borne hazards, nutrition and health nexus

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Box 2**Risks and benefits associated with smoked fish**

In many countries, fish plays a key role in the supply of animal protein, micronutrients and essential fatty acids. Fish is also an important source of income for many people in the developing world. In addition to being consumed locally, some fish and fishery products are also important business and export commodities.

In rural fishing communities, post-harvest losses of fish comprise as much as 40 percent of the total catch. The most common causes of loss include inadequate handling and processing methods, lack of knowledge and inadequate skills among producers, as well as poor access to infrastructure, equipment and services such as water, ice and electricity. Post-harvest losses therefore limit the availability of food and the incomes of fish processors.

Fish smoking and drying are preservation techniques widely used in small-scale fisheries in order to extend the availability of products over a longer period of time and limit losses. Compared with fresh or frozen fish, which require cold storage, which is largely inaccessible due to inadequate electricity supplies in many rural communities, smoked fish represents an advantage. Smoked fish consumption is particularly high in West African countries, with Côte d'Ivoire (50%), Ghana (60%), Mali (60%) and The Gambia (55%) reporting the highest percentages in the sub-region.

(such as iron in flour, or iodine in salt) may result in insufficient nutrient fortification that results in an impaired nutritional status of the consumers. Food fraud can also easily cause the (unintentional) introduction of food hazards (for example adding water to milk not only dilutes the milk and reduces its nutritional value, but may also introduce microbiological hazards

There is significant potential for the smoked fish subsector to contribute effectively to food security and improved nutrition. In addition, the subsector also contributes to job creation and ultimately to poverty alleviation and overall socio-economic development.

However, traditional smoking techniques commonly used in these countries have proved to be harmful for consumer health because the processors use basic equipment, including smoking ovens or kilns, stainless steel knives, fuelwood and plastic bags, and facilities are often dusty and unsanitary and not equipped with a good refuse disposal system. Moreover, water used to wash fish before smoking comes from public standpipes or the nearest well, river or marine shore. Smoked products also contain carcinogenic and mutagenic substances, termed polycyclic aromatic hydrocarbons (PAHs).

Besides being harmful to consumers, traditional smoking techniques can also cause serious health damage to processors, due to exposure to smoke, such as respiratory and eye illnesses, and in the worst cases cancer.

Appropriate interventions by both food safety regulators and private partners are necessary to ensure that safety requirements are met in order that consumers can enjoy the benefits of food security, nutrition and value chain development. We will see in section 3 step 4 an example of how stakeholders were engaged in policy changes taking these different perspectives into account, and resolving the apparent conflict between food safety and food security drivers.

if the water used is not safe). Other examples are use of non-food grade colourings to mask quality deterioration and inclusion of white non-food substances to increase volume of flour, milk, cottage cheese or rice. Boxes 2 and 3 provide concrete examples of food safety issues associated to important food sources, as a basis for food security.

Box 3

Improving the value chain of the pig and pork sector by reducing the burden from cysticercosis

Small and medium sized livestock, and pigs in particular, represent a viable and profitable enterprise that can easily be adopted by small-scale farmers. Pigs require less initial investment than other livestock and they are prolific. Pork meat provides high value animal protein, contributing to a more varied diet for the farm family. Pork has beneficial components, including essential amino acids, vitamins and iron, and facilitates a balanced nutrition that is especially important for young children in food-insecure regions. A functioning small-scale pig sector enhances rural development because pig production generates rapid returns to farmers, who can therefore improve livelihoods within a relatively short time frame. Throughout the supply chain, a series of activities that contributes to high local engagement in livestock production can be developed. This, in turn, will improve food security of the rural population.

Pork meat production and consumption have been rising rapidly in eastern and southern Africa (ESA) as demand for pork increases and rural and peri-urban families discover pig farming to be profitable and cost effective.

Despite the economic opportunities that these low-input systems provide, pigs kept under a free-range system are at high risk of acquiring a range of diseases, of which cysticercosis caused by *Taenia solium*

is particularly dangerous for human health. When consumed raw or undercooked, pork meat can be a vehicle for the transfer of the tapeworm *Taenia solium* to humans. Risk factors include poor sanitation, absence of latrines, unsafe water, poor husbandry practices, inadequate meat inspection and lack of knowledge about the causative parasite. The infection can have devastating effects on human health due to the tapeworm larvae developing in the muscles, skin, eyes or in more extreme cases in the brain, a condition known as neurocysticercosis. Social stigma and isolation result from epilepsy caused by neurocysticercosis.

In addition to the significant human suffering, *Taenia solium* infection can have serious economic consequences because it has the potential to reduce the market value of pigs, while there can be a loss of saleable meat due to condemned carcasses. *Taenia solium* is distributed worldwide but is particularly prevalent where pigs are raised using traditional methods, veterinary meat inspection is insufficient and sanitation is poor (Carpio, 2002).

Research and surveys conducted in United Republic of Tanzania, Kenya, Uganda, Zambia, Zimbabwe and South Africa, showed that the prevalence of porcine cysticercosis ranks among the highest in the world. In these ESA countries the disease is emerging as an important constraint on the nutritional and economic well-being of resource-poor smallholder farming communities. We will see in subsequent sections of this note how the benefits of raising pigs and of pork meat can be harnessed through appropriate food safety decision-making (see section 3 step 1).

Ensuring food safety: trends and challenges for policy making

As seen in the previous section, unsafe food can affect the four dimensions of food security.

At national level, specific authorities have the mandate to limit the impact of unsafe food on consumer health. To do so, they need to select approaches (also termed risk management measures) that, while effective on food safety, minimize economic disruptions and protect incomes and purchasing power.

In the decision-making process, competent authorities need to:

- consider a range of risk management measures (e.g., total ban, regulatory limits, proposing codes of practice to be implemented by value-chain actors);
- consider the pace at which regulatory measures are enforced (for example, issuance of progressively more stringent maximum limits, or provide time for food operators to adapt before entry into force of the measure);
- be receptive to using complementary, non-regulatory, approaches (e.g. awareness raising and training programmes, specific communication campaigns, issuance of recommendations etc.).

Balancing public health protection with economic concerns is often difficult and requires careful consideration when selecting (and possibly combining) food safety measures, taking into account specific context elements (specificity of the food safety issue, food security context, other socio-economic considerations etc.). Taking these decisions requires data and evidence, as well as a willingness to consider and weigh the effectiveness and benefits of different approaches. Box 4 provides a concrete example of balancing and measuring the impact of different food safety measures.

Box 4

Setting maximum limits for food safety chemical contaminants

Food may become inadvertently contaminated with many chemicals from the environment, naturally present or due to industrial development, or as a result of food production practices. Examples of chemical contaminants include arsenic in rice, mercury in fish, persistent organic pollutants (POPs) in milk and mycotoxins (toxic metabolites naturally produced by some fungi) in cereals.

To illustrate further, we will consider the case of aflatoxins in maize. Aflatoxins (a group of mycotoxins produced by the naturally occurring fungus *Aspergillus* spp.) are one of the most potent liver carcinogens known and even low-level chronic exposure to aflatoxins in food is a significant risk factor for liver cancer. According to the WHO estimates of the burden of food-borne diseases (WHO FERG, 2015), aflatoxins are one of the major non-diarrhoeal causes of food-borne deaths. In particular, areas with humid and warm weather are most vulnerable to elevated levels of aflatoxins, with the most affected geographic areas being sub-Saharan Africa, Southeast Asia and China.

Aflatoxins can be found in a variety of foods, with commodities such as corn, peanuts, pistachio, Brazil nuts, copra and coconut being particularly prone to contamination. High rates of dietary aflatoxin exposure are found across Africa and Asia, particularly where dietary diversity is low and reliance on a small selection of staple foods is high. Contamination can occur throughout value chains, making it difficult to target interventions. Aflatoxin is virtually indestructible because normal food processing practices do not affect contamination levels to any appreciable extent.

Box 4 (cont.)

Box 4 (cont.)

The impact and challenges of aflatoxin exemplify the interplay between food security and food safety. In terms of health and nutrition impact, evidence indicates that ingestion of food contaminated by aflatoxin is associated with stunting in children, as well as maternal anemia and mortality. Moreover, aflatoxin exposure is linked to immune system suppression and increased susceptibility to infectious diseases such as malaria and HIV/AIDS.

Such impacts translate into increased medical expenses at national level, where governments still bear a significant proportion of public health costs, but also at household level.

Effective public policies to protect the health of consumers focus on limiting the exposure of populations to the contaminants to the extent possible. In general, successful interventions rely on a combination of different approaches:

- A preventive approach: introduce good agricultural and storage practices to farmers and other stakeholders of the value chain in an attempt to prevent and limit contamination.
- A reactive approach: set up a maximum limit, monitor the food supply, withdraw from the food supply and discard the products contaminated above the threshold set up by regulations. This has the direct consequence of creating tensions on the quantitative side of the supply chain and can be costly because monitoring the contamination of products is expensive, requiring reliable laboratory support. In some cases, when governments have also opted for a compensation policy to producers or sellers whose product might be seized, this further increases the costs.

When maximum limits for aflatoxins are considered, a managed pathway towards lower consumer exposure may need to be put in place that ensures gradually increased consumer protection without creating food shortages due to market disruption. The scientific process and procedure for setting maximum limits (MLs) is well established and is used consistently in setting national and international standards. When setting an ML, more or less stringent values may be considered; each will come with an effect on the food chain (food being discarded) and on public health. In some cases, while a more stringent value results in greater non-compliance and the need to remove more grain from the market, with a significant impact on food supply, improvements in the level of health protection can be marginal. In a counter intuitive manner, differences in public health impact are not necessarily proportional to their impact on the supply chain. Therefore, when setting MLs to ensure safe food, it is crucial to consider food security in order to avoid negative consequences.

The policy options described above are not mutually exclusive. As noted, effective use of the approach of enacting MLs requires an enforcement policy put in place by the relevant official authorities, and the capacity of value chain operators to comply with good agricultural practices (GAPs) and good hygiene practices (GHPs). In the case of a staple product being heavily contaminated for natural reasons, such as aflatoxins in maize in tropical developing countries, a progressive approach of increasingly stringent MLs should be considered for adoption, to guide producers towards progress and avoid significant disruptions of the supply chain.

Food control systems: the role of governments and the private sector

Effective food safety governance requires that both public authorities and the private sector work in a coordinated manner, to ensure that food in the supply chain is safe. This is the purpose of a national food control system. Box 5 illustrates some key concepts related to food control systems.

The onus of producing safe and high-quality products is on the food producers. All actors along the chain (food production, processing, retail, distribution and preparation) need to have adequate capacities and resources to be able to meet food safety requirements to produce and trade safe food. However, public authorities have an oversight role, setting regulations consistent with the desired level of protection, ensuring law enforcement and performing food controls, supported by appropriate human, financial resources and relevant complementary infrastructure. The government's food control authorities need to provide consumers with the assurance that they have set and will enforce standards for the quality and safety of foods. These same agencies also need to work with food producers in a cooperative and collaborative manner to ensure the quality and safety of exports through appropriate inspection, testing and certification methods.

An effective food control system needs to be science-based with a strong emphasis on risk analysis, thus allowing priority, in terms of resources and activity, to be placed on the risks deemed to have the greatest potential impact. The system will also need to be proactive, aimed at preventing occurrence of risks, rather than correcting them afterwards. This is particularly important for food security because it limits the negative impact on the food supply by avoiding that food products are withdrawn, discarded or destroyed because they do not meet the regulatory requirements.

Additionally, the system of governance requires information sharing and cooperation at all levels – national, regional and international – especially when foods are internationally traded. When establishing food safety policies

Box 5

Official food control systems: key concepts

National food control system. The integration of mandatory regulatory approaches (i.e., official food control activities) with preventive and educational strategies that, along the entire food chain (including production, handling, storage, processing and distribution), ensure that food is safe, wholesome and fit for human consumption, conforms to food safety and quality requirements and is honestly and accurately labelled as prescribed by the law. While requiring collaboration and interactions with consumers, the private sector and academia, national food control systems are operated by national competent authorities.

Risk management. Within the risk analysis paradigm, risk management refers to the official government function of managing food safety risks by weighing policy alternatives in consultation with all interested parties. It is based on the assessment of the risk to public health, and other factors relevant for consumer protection and for the promotion of fair trade practices. When needed, risk managers will decide on appropriate prevention and control options to ensure food is safe.

Food value chain is the full range of farms and firms and their successive coordinated value-adding activities that produce particular raw agricultural materials and transform them into particular food products that are sold to final consumers. It therefore includes farm production, processing and/or manufacturing, storage, warehousing and distribution.

or regulations, national authorities need to take account of international and regional norms and requirements, such as the international standard setting bodies of Codex Alimentarius Commission (CAC, under the auspices of FAO and the World Health Organization, WHO), International Health Regulations (under WHO) and the agreements of the World Trade Organization (WTO). These frameworks include mandatory rules as well as voluntary standards that countries need to consider and on occasion validate and adapt to their situation.

Knowledge and standards resulting from regional and global initiatives and fora represent important scientific and technical support, and strengthen approaches to manage food safety risks, preventing and responding to food safety incidents. At the national level, science and academia play an essential role through research activities, provision of evidence and knowledge and by educating future generations of food safety experts.

12 | **Limitations to effective national food control systems**

Managing food safety risks can be complex due to the range of food safety hazards that can enter the chain at different points, varied production and processing systems and diverse food trading patterns (imports and exports) with different requirements.

There are several common context impediments to effective food control systems, including:

Inadequate knowledge of the negative effects and impacts unsafe food can have on livelihoods, market access, population health and nutritional status.

- Multiple competing priorities in which governments can invest their limited resources, food safety being placed low on the political agenda.
- The common belief that food safety is a luxury, which well-off consumers demand and deserve, and it is not a priority for food insecure populations.
- Lack of drivers and demand for food safety in the domestic market.

- Lack of government awareness or will to shift the investment of resources and policy focus from simply increasing food production to increasing production of safe and nutritious food.

The responsibility for different aspects of official food control lies with multiple ministries, and often there is weak coordination and communication, and/or competing or conflicting priorities among them in addressing food safety to achieve their differing mandates in health, agriculture and trade sectors. Lack of coordination may result in an excessive burden on the private sector due to duplication of controls, or in the worst-case scenario, a complete lack of control in specific links of the food chain. In addition, even if public authorities recognize the importance of ensuring food safety in the local food supply chain, often their interventions are only reactive to food-borne disease outbreaks.

In addition to such organizational challenges, under-investment in food control systems is a regrettable reality in many countries. To manage food safety risks in an appropriate manner, there is a need for technical and physical capacity within both public and private sectors. Very often, because capital is inadequate, food safety efforts commonly focus on food exports, while foods consumed domestically are subject to limited food safety controls, if any, and are often channelled through informal markets.

Therefore, the more limited the resources, the greater the efforts required to direct the available resources towards the most important food safety risks. However, understanding the nature of the priority risks requires technical capacity and data. The absence of data weakens the evidence base for food safety regulation, policy and decision-making, and it further limits understanding of the impact of unsafe food on key development objectives, including health and nutritional status, trade and economics and sociocultural issues. The weak capacities and gaps in expertise that hinder an accurate and periodic collection of data are challenges experienced by both the public and private sectors. Such challenges can include capacities

on scientific knowledge and technical ability and knowledge on food safety, which in turn limit the development of robust national food control systems and application of controls by food producers and processors. Non-compliance by the food industry and value chain operators can be due to poor technology, weak infrastructure and poor sanitation, among others.

Emerging challenges

A dynamic interaction of a variety of drivers of change and global trends with mixed potential to strengthen and disrupt food safety systems is shaping current food systems. Two large-scale international food safety events staged in 2019 under the theme **“The Future of Food Safety - Transforming knowledge into action for people, economies and the environment”** – *The First FAO/WHO/African Union (AU) International Food Safety Conference* held in Addis Ababa, Ethiopia on 12-13 February 2019 and the *International Forum on Food Safety and Trade* held in Geneva on 23-24 April 2019 – raised awareness of a number of policy and strategic issues affecting food safety globally and highlighted key strategic actions to address current and future challenges to food safety globally (<https://www.who.int/food-safety/international-food-safety-conference>).

A number of important challenges to food safety were highlighted:

- Population growth and rapid urbanization in developing countries, not coupled by an equal growth in infrastructures. This compromises the enabling environment for food safety, reduces the availability of and access to nutrient-dense perishable fresh produce and food from animal-origin.
- Climate variability and extremes. These pose serious threats, with the potential to impact food security and nutrition through the food safety aspect, as infections of plants and food-producing animals infected with micro-organisms harmful to humans are influenced by a number of environmental conditions. For example, humidity, water

availability and temperature affect the likelihood and degree of fungal contamination and accumulation of mycotoxins. Without efforts to understand the intensification of food safety hazards linked to climate change, food security is seriously threatened.

- Food fraud within an increasingly globalized food supply. Along with advantages of globalization, the increasingly complex agri-food trade routes and the economic motivation for more profit reveal the rising trend in food adulteration and food fraud. Food fraud is a global transnational problem with potentially significant food safety implications that may result in unfavourable consequences for consumer health, consumer trust, food losses and the agrifood economy. New technologies open the perspectives for more cost-effective verification procedures as well as big data solutions to help identify high-risk areas for authorities and stakeholders and to focus on consumer health protection and food trade facilitation. Effectively addressing food fraud requires adapted national policies and strategies, and enforcement and development of capacity for a more proactive, preventive approach. It also requires information sharing at all governance levels to prevent adulterated foods crossing borders and entering regional and global markets.
- Structural changes in food systems and economies. The development of countries transforms their food systems and economic structures. In many countries, the relative importance of the agrifood sector is increasing, with particular focus on crop diversification, value chain development, promotion of a circular economy and willingness to accept food sovereignty. Promotion of a circular economy paradigm and food production intensification cannot be successful if food safety is not considered.
- Science, innovation and new technologies. Given the need to produce more and safer food under pressure from demographic, dietary

changes and climate change, innovations such as novel analytical methods and new ways of producing food (nanotechnology, biotechnology) can help attain more efficient and resilient food systems. Novel ways of producing foods and novel applications at various stages of the chain require a regulatory response that neither stifles innovation nor puts consumers at risk. New fields of investigation focus on the role of the human gut microbiome and its interactions with non-communicable diseases (NCDs), and the possible impact of compounds of regulatory interest on the microbiome. Obstacles and opportunities for equitable implementation of key scientific advances and for responsible digitalization of food systems need to be explored from the perspective of food safety impact, accessibility and sustainability at the global level, paying attention to preparedness of regulatory frameworks and acceptance by consumers. An important role for science is in generating the best evidence to inform decision-makers, the private sector and consumers. Science-based food safety prioritization and management offer adapted options for the best use of scarce resources. It is noteworthy that innovations do not need to be complex to have impact: there are many opportunities to adapt and promote accessible and easily applicable technologies and innovations in small-scale food businesses, especially in low-income countries, which can improve the safety of food, reduce waste, reduce their environmental footprint and create further spin-off benefits such as employment (especially for women) and income generation.¹

- Digital transformation of food systems. The highly dynamic nature of ICT makes it critical to keep looking forward, to identify opportunities and challenges of the digital age in relation to food safety. For example,

¹ For example, solar driers for fruit, food-grade containers for transport, improved techniques for fish smoking, use of waste in energy production, fermentation to preserve food and reduce pathogens, or appropriate use of disinfectants.

digitalization may facilitate international trade with faster, more cost-efficient and less bureaucratic electronic certifications of internationally traded food products, coupled with increased food safety and reduced vulnerability to fraud. The increased volume of food traded by e-commerce promises low-income countries and smaller businesses a better environment in which to participate in the global market place. However, increasing online sales may result in new or altered food safety problems. Therefore, a critical view is necessary to clearly define responsibilities, regulations and controls for online traded food.

- Global governance integrating the One Health approach. Recognizing and understanding how food safety issues influence and are influenced by factors in agricultural and livestock production, environmental and broader human health issues make sound food safety governance complex and underline the importance of global capacities for monitoring, surveillance and for integrated intelligence sharing. The global fight against the spread of antimicrobial resistance (AMR) is an example of effective intersectoral collaboration. AMR related to the emergence of new or antimicrobial-resistant pathogens spread through the food chain represents an important food safety challenge. AMR is one of the most serious global public health threats, predicted to result in major economic losses and 10 million deaths annually by 2050 (O'Neill, 2014).

Call for an integrated approach and better investment

Global trends in food safety and food trade indicate that governments and food business management need to be aware of the risks and prepare for the issues that can occur. Their commitment is essential to ensure that food safety challenges are adequately met to minimize disruption resulting from failures to protect consumers and to maximize business performance. Reducing food safety risks throughout the national and global supply chains primarily

requires that industry produce safe, high quality food. Consumer protection is ensured only if all sectors in the chain operate in an integrated way, systems address all stages of the chain, and there is recognition that risk analysis is the foundation on which food control policy and consumer protection measures are based. An effective food control system requires that public authorities acknowledge the importance and convenience of preventing food safety risks of outbreaks instead of reacting to them and that governments allocate the necessary resources, including staff time, systems, training and equipment, to put standards into practice.

A shared public-private responsibility is key to ensure safe and efficient systems and improvements in consumer health protection and nutritional status. In addition, such improvements are expected to lead to increased income generation, more efficient functioning of value chains, increased foreign earnings through food trade, greater access to markets at home and externally and support to the development of a tourism industry.

The adoption of a multi-disciplinary and holistic systems-based approach to address food safety is expected to underpin many development agendas, including nutrition and food security, and calls for greater partnership, collaboration and policy coherence. To this end, there is a need for sectors understand their potential impact and the trade-offs associated with their decisions.

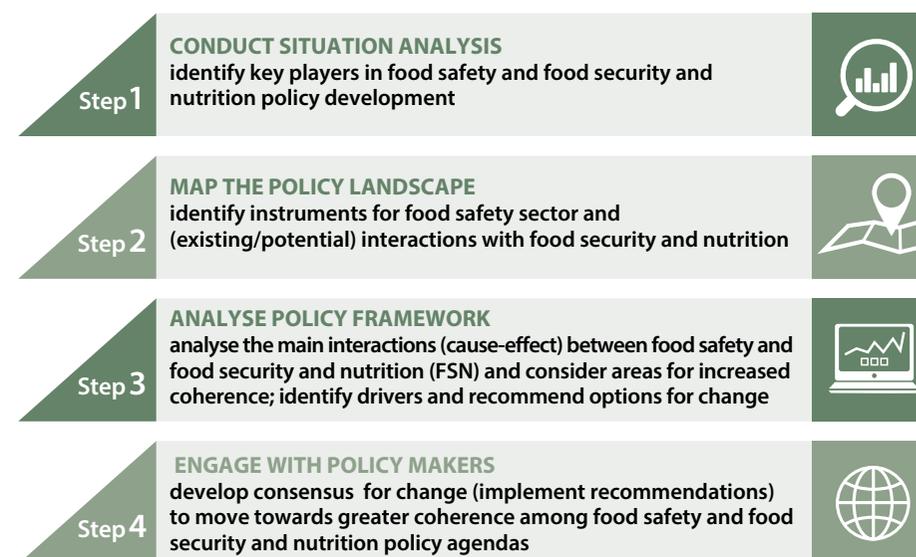
Stepwise approach: improving coherence between food safety and food security and nutrition policies

This section provides guidance to national policy makers and those supporting policy change on how to enhance policy coherence between food safety and food and nutrition security agendas by understanding their specific contexts to make informed choices. This requires preliminary identification and understanding of the synergies and trade-offs between food safety policy objectives and food security and nutrition objectives. In pursuing policy coherence, it is desirable to acquire a better knowledge of prevailing contexts that can also potentially affect food safety and nutrition, such as agriculture and rural development, economy and trade, and health.

Additionally, policy coherence needs to be pursued not only at inter-ministerial level, but also requires consideration at different levels of government. This is especially the case in large or federal states or in countries with autonomous regions.

The section is based on a four-step approach. Case materials will be used to highlight the specifics of the different steps.

FIGURE 4: Four steps for promoting holistic approaches to improve food security and nutrition through education systems



Step 1 CONDUCTING A SITUATION ANALYSIS

A situation analysis is the assessment of the current situation in terms of food safety and food security and nutrition and their relationships with other sectors. Conducting a situation analysis is fundamental to designing and updating national policies, strategies and plans.

A situation analysis for the food safety domain addresses the following issues:

- What data are available regarding the structure of food production, distribution and consumption?
- What are the key food safety risks in the country?
- How do they affect food security and nutrition and what are the consequences on other sectors?
- Which population groups are most affected?

Determining the current situation in terms of food safety in a country and how it interacts and affects the food security and nutritional status of its people depends on the availability of data and regularity with which they are collected.

To acquire a clear picture of the magnitude of food safety issues, policy makers will have to turn to the institutions in charge of data collection. Useful data related to food safety can be obtained from a variety of sources:

- epidemiological data; typically collected by the ministry in charge of health (or institute related to it) regarding public health or ministry in charge of agriculture and livestock, with respect to animal health and zoonoses;
- contamination data for food products; available typically from a variety of sources (public monitoring data by ministries with oversight function, international trade and rejection data, private sector or industry data etc.) also depending on the specific foods.

In countries where data are not readily available, instruments such as FOSCOLLAB (WHO. 2015 <https://www.who.int/foodsafety/foscollab/en/>), a global platform for food safety data and information developed by WHO, as well as global studies that provide estimates, are very useful to bridge the initial gaps.

Suitable data on food safety provide information on current characteristics and trends related to food and agricultural production and processing, as well as food imports and exports; epidemiological profiles listing the prevalence and incidence of food-borne diseases, as well as procedures for investigating and notifying food-borne diseases; laboratory capacities for food testing, including human, financial and material resource needs of food control laboratories and public health laboratories; data on the availability of food policy, laws and legislation and their enforcement, including the level of participation in setting international standards and harmonizing national standards.

The data serve as a basis to assess the key food safety risks in the country. Detailed information is compiled on the prevalence of various hazards in and

across food value-chains, the incidence and distribution of food-borne illness within communities, as well as the routes of transmission and exposure within populations. Additionally, to identify the key food safety risks, policy makers may want to look at the environmental sources of contamination, water and practices that predispose food to contamination. It is also important to understand the difference between a hazard (biological, chemical or physical agent causing an adverse effect on health, such as a pathogenic bacteria, a toxic contaminant etc.) and a risk (a function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard in food). Policy makers have to focus on the most important risks and find a way to reduce exposure of the consumer, not necessarily to completely eradicate the underlying hazard.

Population structure, in terms of both age subgroups (including ethnic groups), based on specific consumption patterns, is also an important element to take into account. Children under the age of 5, pregnant women the immune compromised and people above the age of 65 are considered to be especially vulnerable to food-borne diseases. Box 6 provides more specific gender considerations in relation to food safety.

Once identified as key food safety risks, the next step is to analyse how they affect food security and nutrition and their consequences at social and economic levels. Improving a population's nutritional status and ensuring food security is an issue often addressed through food-based approaches. Animal-source food and fresh produce are among the most nutritious foods. At the same time, these foods are responsible for most food-borne diseases and therefore government policies aimed at increasing their consumption need to also put in place measures to improve food safety. Without these measures, the burden of food-borne diseases could increase and negatively impact food safety and nutrition.

Box 7 refers to the example illustrated in Box 3, and provides evidence from a specific country case on how unsafe food can threaten food security and nutrition and the socio-economic cascade effects it might generate.

Box 6

Gender matters for food safety

Due to the highly gendered nature of women's and men's roles in agriculture and in agrifood value chains, understanding the relevance of gender for food safety is key to good policy-making.

From the point of view of food utilization and food safety, gender matters greatly both at the household level and beyond. Gender issues are integrated into the assessment and management of food safety risks. In setting food safety standards, consideration of the specific vulnerabilities of different subgroups, including pregnant women and children, to food safety hazards is addressed and analysis of sex and age disaggregated data on illnesses and deaths attributable to unsafe foods is undertaken. A gender lens is also applied in assessing food security and economic factors such as the loss of income to a household due to the burden of care in looking after sick children, ill due to consuming unsafe food. An analysis of these different factors informs policy and decision-makers in implementing solutions that benefit the health and well-being of men, women and children.

In most countries, women in the household bear the main responsibility for food preparation and nutrition. Through their responsibilities in food processing for markets and preparing food for the home, women make a range of decisions that have a substantial impact on the quality and safety of what people eat. For example, women participating in the production node of a dairy value chain will decide on the quantity and quality of milk that will be sold on the market, and of the milk that will be kept for home

consumption. The extent to which women effectively handle food safely, preventing contamination, is a decisive factor for food safety and health (Grace *et al.*, 2015).

Additionally, women play an important (though often unrecognized) role in many of the value chains (e.g., fish, dairy, livestock) that are among the riskiest in terms of pathogen transmission, as these produce, process and market animal source foods (Grace *et al.*, 2015).

However, women's access to the necessary information and knowledge about good hygiene practices and food safety requirements is constrained by a number of factors, such as their unrecognized role in value chains, social norms limiting their mobility to attend specialized training, and that many risk management interventions focus on formal value chains (FAO, 2016).

The informal sector is characterized by its highly feminized labour force (Chant & Pedwell, 2008). Moreover, as discussed in Box 10, the importance of the informal sector to food supply and security cannot be underestimated. Women make up the majority of the work force in the informal economy, worldwide. Food safety requirements that are introduced too rapidly, and in a non-participatory manner, will have a gender-differentiated impact and risk negatively impacting women to a greater extent than men. Therefore, all measures geared at creating the capacity of informal food businesses to comply with regulations and move out of informality should take into account the specific needs and constraints women experience in the sector. Generally, national food safety policies should adopt a gender-sensitive lens, considering social norms and the gendered division of labour in their formulation.

Box 7

***Taenia solium* cysticercosis in pork meat and its market impact: the case of the United Republic of Tanzania (continued from Box 3)**

The information in this box builds on box 3 and further details the collection of evidence stage, which is necessary to estimate the potential impact of unsafe food on health and identify potential and complementary policy interventions to reduce exposure to the hazard, and therefore decrease the associated risk.

As in other African countries, in the United Republic of Tanzania the consumption of pork meat has increased tremendously during the last 20 years in step with the increases in the human population. As stated in the the United Republic of Tanzania Livestock Master Plan, raising pigs helps to achieve better food security, improved population nutritional status and enable red meat exports.

In most regions of the country, however, knowledge about the parasite *Taenia solium* and its zoonotic potential is lacking, while constraints to the development of the sector related to animal health and taken into account by plans do not include *Taenia solium*. Slaughter facilities in the country lack most basic requirements, meat inspection is often poor or non-existent, and sanitation and hygiene systems to prevent infection and treatment for human and porcine cysticercosis are not readily available.

The socio-economic impact of cysticercosis is immense because it affects the health and livelihoods of subsistence farming communities by reducing the market value of pigs and in making producers more vulnerable and food insecure.

A recent study conducted by the University of Copenhagen – The societal cost of *Taenia solium* cysticercosis in the United Republic of

Tanzania. Acta Trop. 2017 – revealed that in 2012, epilepsy associated with neurocysticercosis (NCC) was responsible for an estimated 17 853 cases and 212 deaths in the United Republic of Tanzania.

The economic burden estimated for human and porcine cysticercosis in 2012 was USD 7.9 million. Of the total costs, USD 5.9 million was attributed to direct and indirect costs linked to NCC-associated epilepsy and USD 2.8 million was due to potential pig production losses. The costs per NCC-associated epilepsy case were 106 USD.

In order to meet the development objectives, ensure access to nutritious foods and at the same time avoid incurring public health-related costs by tackling *Taenia solium* infections transmitted through the consumption of pork meat, it is recommended that the responsible authority collects epidemiological data, which are essential for the adoption of effective control strategies. Additionally, under the responsibility of the Ministry of Health, large-scale control programmes for other neglected tropical diseases will have to be conducted with the aim of planning for an informed integrated approach to surveillance and control of these diseases.

At the level of small producers, it is crucial to invest in awareness raising, training and capacity building in order to tackle the lack of a clear understanding of the development and transmission cycle of the pig tapeworm.

Moreover, there is both the need to involve the local veterinary system to ensure that controls are performed and to ensure that the local authorities enforce the existing standards of meat hygiene.

Source: C. Trevisana, B. Devleeschauwer, V. Schmidt, A. S. Winkler, W. Harrison, M. Vang Johansen, The societal cost of *Taenia solium* cysticercosis in the United Republic of Tanzania, 2015. https://cgspace.cgiar.org/bitstream/handle/10568/92405/livestockMasterPlan_Tanzania.pdf?sequence=1

As part of the situation analysis, it is important to identify the most vulnerable (from a food safety perspective) population groups. Food-borne illness can affect anyone who eats contaminated food, but weaker individuals are affected to a higher degree, as shown by the latest WHO data (WHO, 2015). The burden of food-borne diseases particularly impacts the very young, especially children under the age of five, who accounted for 34 percent of deaths from food-borne diseases in 2010, the elderly, persons with compromised immune status, such as when affected by HIV/AIDS, and pregnant women. Malnourished population groups are also more vulnerable because their physical conditions are weakened by malnutrition.

When conducting a situation analysis, it is important to investigate other aspects pertaining to the country's situation, such as food production and distribution systems, general infrastructure (potable water and electricity), general availability of data on contamination along various value chains, and capacity to collect those data.

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Step 2 MAPPING THE POLICY LANDSCAPE

Once more specific information is collected and analysed on the targeted food safety issues, the affected sectors and stakeholders, and possibly the interconnections with food security and nutrition, the next step is mapping the existing policies and programmes that impact food safety and food security and nutrition.

The following set of questions provides a support for mapping relevant policies and programmes:

- What policies are currently in place to address food safety and food and nutrition security? What is their primary focus?
- Are there any differences between national and local level policies and programmes in addressing food safety and food and nutrition security? To what extent are policies implemented and enforced?
- How do they interlink? How do they relate to international /regional agendas or agreements?

Box 8

Key policies/programmes related to food safety and food security and nutrition

- National food security and/or nutrition policy/strategy.
- National single-sector policy and/or strategy (e.g. health, rural institutions, etc.) with an explicit objective to improve food security and/or nutrition.
- National Development policy/programme/strategy
- Trade policy and/or strategy.
- Private sector development policy and/or strategy.
- National Poverty Reduction strategy or action plan
- National livestock policy and/or strategy.
- National fisheries/aquaculture policy and/or strategy.
- National agricultural policy and/or strategy.
- Agriculture Extension policy and/or strategy.
- National policy and/or strategy for Cooperatives and Farmer Based Organizations
- National forestry policy and/or strategy.
- National environmental policy and/or strategy.
- Land policy and/or strategy.
- Natural Resources policy and/or strategy.
- Climate Change policy and/or strategy.
- Occupational Safety and Health policy/strategy and programme documents

In the food and nutrition domain, it is important to include in the mapping exercise any initiatives to improve local food production as a means of increasing food security, healthy diets and dietary diversity, complementary feeding programmes targeting infants and young children and specific policies to address micronutrient deficiencies. When reviewing current food safety policies, it is advisable to consider policies specifically developed to address food safety as well as policies that may have an indirect (positive or negative) impact on food safety. The food safety sector is affected by several other public policies, such as health, agricultural/rural development sector policies (aiming, for instance, at increasing production and consumption of a specific food) and trade (to increase exports).

Broader consultations with agricultural, environmental, urban and rural development and trade policy agencies allow gaining a comprehensive overview of policies and programmes that may have an indirect effect on food safety, and consequently food security and nutrition. Box 8 provides a list of policy sectors that can affect food safety and nutrition.

For each policy or programme it is important to identify information that includes the lead institution, additional partners, if any, involved (such as the private sector, civil society organizations, international organizations), objectives and timeframe to achieve them, monitoring frameworks and references to other policies and programmes.

Food safety policies are generally set at national level, but very frequently entail sections dedicated to specific organization modalities that can be rooted in a very local or subnational context as responsibilities and functions are shared among departments and agencies that operate at local level, especially in federal states. A national food safety policy needs to provide a framework within which to enhance coordination among such agencies and bring together fragmented initiatives and actions in the area of food safety. A well-conceived national food safety policy usually specifies the roles of the different government agencies and establishes mechanisms for cooperation and the means for addressing existing and emerging food safety challenges. It is therefore recommended to

Box 9

Key global and regional frameworks and initiatives relevant to the food safety agenda

The *Codex Alimentarius Commission (CAC)* and the *World Trade Organization (WTO)* are the two main bodies that contribute to the food safety debate globally. The first has the priority functions of protecting the health of consumers, ensuring fair practices in the food trade coordinating food standards work internationally, finalizing and publish international standards, codes of practice and recommendations in the *Codex Alimentarius*. The *Sanitary and Phytosanitary and Technical Barriers to Trade Agreements* (both within the WHO framework) provide a framework for international trade of food to prevent risks to human health, animal health and plant health.

Still at international level and within the framework of its *Strategy for Improving Food Safety*, FAO works partnering and supporting countries to address current critical food safety issues, as well as emerging food safety issues.

At regional level, the *European Commission (EC)* gives a high priority to food safety to ensure a high level of protection of human health. The Commission's guiding principle primarily set out in its White Paper on Food Safety is to apply an integrated approach from farm to fork covering all sectors of the food chain.

In the Africa region, in the context of the AU Malabo Business Plan for Implementation of the Comprehensive Africa Agriculture Development Programm (CAADP), the efforts go toward the adoption of a continental policy framework on sanitary and phytosanitary standards (SPS) and structures to ensure that AU member countries have robust Sanitary and Phytosanitary (SPS) measures in place, with a specific focus on food safety to achieve expanded trade.

look at how and to what extent policies are implemented through all levels of government departments and agencies because it is common that national food safety policies are not implemented in a uniform and consistent manner.

Food safety is also governed and shaped by a set of international and regional agreements, conventions and standards that governments are committed to. When mapping the policy landscape, it is important to identify the main regional and international policy and regulatory frameworks that influence how governments address food safety.

Box 9 summarizes the main regional and global multistakeholder institutions and instruments that contribute to the food safety debate, while Figure 5 describes the elements of food safety governance.

Because a food control system is more effective when the private sector, consumer groups and academia play their roles actively, it is recommended

to take them into account in this step to investigate if and how they have contributed to shaping the food safety policy, if they are fully aware of their roles and responsibilities, and how much this matters to them.

The role of national authorities is to provide governance and oversight to food chain operators through appropriate official controls. Food businesses need to implement internal food safety management systems, ensuring on a day-to-day basis that the food entering the market is safe. Finally, the role of consumers must not be underestimated. Their level of awareness and knowledge with regard to the implementation of safe food handling, storage and preparation practices is a critical part in the whole food safety system. First of all because they have a role to play in maintaining the safety of the foods they purchase, as the final link in the food chain, but also because they are citizens and as such play a role in indicating to governments how much

Box 10

FAO/WHO food control system assessment tool (FAO and WHO, 2019)

The tool is based on Codex Principles and Guidelines for National Food Control Systems (CAC/GL 82-2013) as well as other relevant Codex guidelines for food control systems. The tool is to be considered as an instrument that places Codex guidance in a practical context, and thus can help countries to implement Codex texts, taking into account their national circumstances.

The tool's primary focus is analysis of the performance of competent authorities involved in food control. It covers:

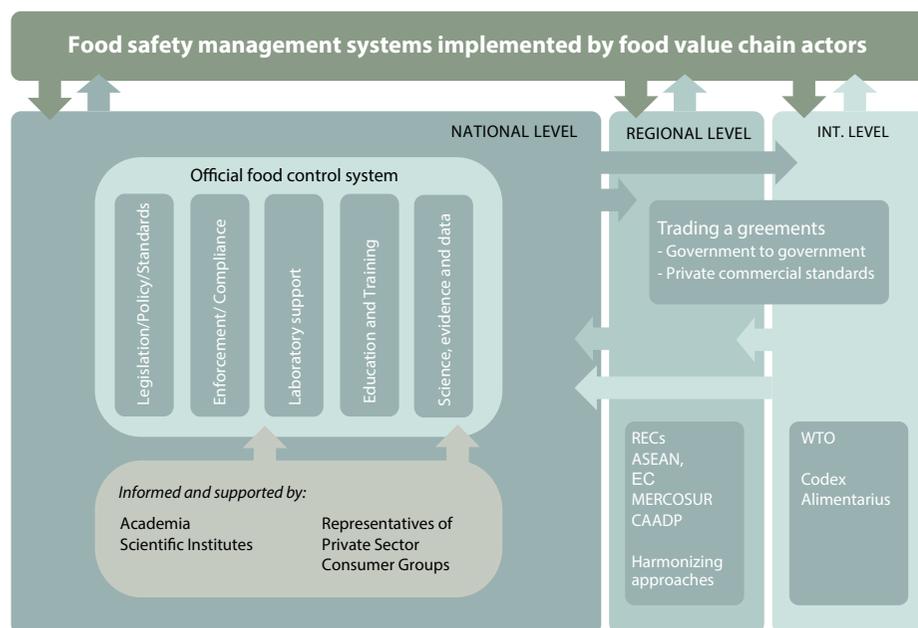
- Controls performed by competent authorities to assure the safety of food as well as mandated quality attributes as defined in the food law; and
- Non-regulatory approaches (such as capacity development, communication, etc.) that contribute to improving these attributes

of the food production. Aspects of voluntary quality certification are excluded from the immediate field of investigation of the tool.

The main objective of the tool is to propose a harmonized, objective and consensual basis to analyse the performance of a national food control system, and more specifically:

- To offer an opportunity for developing a common understanding and vision among competent authorities and other associated stakeholders (private sector, consumers, academia) (1) of the current status of the national food control system, and (2) of the priorities for progress.
- To enable, guide and measure the improvement process that would be developed and implemented by the various stakeholders, supported by a clear baseline.
- To support potentially a dialogue with external stakeholders.

FIGURE 5: Elements of food safety governance



RECs: Regional Economic Communities; **ASEAN:** Association of Southeast Asian Nations; **MERCOSUR:** Southern Common Market;

importance they place on food safety. This in turn reflects on how much emphasis and resources national authorities will place on food safety. This also sends a clear message to food producers that their customers are ready to be selective in their purchases based on that criterion. In countries where there is a low level of awareness among consumers, food businesses are not encouraged to invest in food safety management systems, and national authorities may not consider controlling and monitoring the food supply as an area worthy of significant public investment. Box 10 provides a useful reference to analyse the performance of food control systems, including policy considerations.

Step 3 ANALYSING THE POLICY LANDSCAPE

Step 3 focuses on analysing the set of policies identified in the previous step with the aim of reviewing and addressing conflicts and complementarities between objectives related to food security and to food safety. Step 3 also aims to call policy makers to identify the range of options for change that could be applied to improve coherence between national food safety and food security and nutrition policy agendas. Examples will be provided to illustrate what this could mean, although these options are largely specific to each context.

The following questions will support the analysis of the policy framework:

- Is there any coordination or cross-referencing among the existing policies?
- What are the existing conflicts and inconsistencies in the current policy framework?
- What changes are needed to reduce potential conflicts and exploit possible synergies?
- How can the food safety sector better contribute to an increase in the intake of nutritious food and healthier diets in the short and long term?

Analysing the current food safety policy and regulatory instruments provides insights into how they relate to food safety and nutrition initiatives (and vice versa) and allows assessment of how they can mutually be affected and influenced.

A starting point in the process of analysing the policy landscape is to verify whether the food safety policy is comprehensive and robust. As outlined in this note, there is a strong correlation between strengthening food safety policy and achieving food security and nutrition goals. The strength of the correlation will depend on how well food safety controls are implemented and the scope of implementation, for instance, in which value chain controls are performed, the levels of compliance, and whether implementation covers the domestic consumption, import and export. FAO and WHO have recently elaborated an instrument to assess the performance of the food control systems, including their policy component, and monitor improvements over time (see Box 7).

When analysing the existing food safety policy framework, policy-makers from other sectors should also consider additional factors that are likely to shape a food safety and quality policy. These include the national context, food production and consumption patterns, food safety management capacity among the private sector, consumer awareness and concerns, stakeholder interests, effectiveness and efficiency of various controls and methods of oversight, existing and planned government structures, coordination among authorities along the food chain, technical and scientific information, the roles of government and food business operators and best practices/models (see Step 1).

One of the common weaknesses detected in many LMICs consists of policies focusing exclusively on food exports, ignoring safety of food consumed domestically, or outside of the main well-established production and distribution channels (e.g., foods produced by SMEs, or street foods). Also it is very common that the country has adopted a comprehensive food safety policy that is not implemented or is not supported by a monitoring and evaluation strategy.

Moreover, a food safety policy might be weakened by insufficient recognition of the primary responsibility of food businesses on food safety. As detailed in the first part of this note, food safety is not only a responsibility of the competent authorities but is primarily of the food producers and retailers. Where food safety policies (backed up by a legal instrument) do not make any reference to it, food business operators might not feel obliged to comply.

Policy makers might also want to verify more broadly if the national food safety control and management systems function well and entail prevention, inspections and corrective actions for domestic food supplies.

Reviewing food security and nutrition goals, initiatives and programmes, it is also useful to understand whether there is a need for action to address food safety and set food safety priorities to improve food security further.

Box 11 illustrates how important communication across policy areas is to ensure policy coherence.

Box 11 The livestock sector in Ethiopia

Rapidly changing global livestock systems are posing serious threats to public health, livelihoods and the environment. In Ethiopia, the current density of livestock has the potential to increase the risk of zoonotic disease spread, particularly in the dairy and poultry sectors. To date, fewer than half ((42.8 percent)) of livestock keepers have at least one animal vaccinated, leaving their herds/flocks vulnerable to disease outbreaks, and increasing the risk of zoonotic disease spread from their animals to humans.

The livestock subsector is approached differently according to the mandate of the stakeholder. In the specific case of Ethiopia, the Ministry of Livestock and Fisheries is implementing the 2015-2020 Livestock Master Plan, which targets raising annual cow milk production to nearly 8 billion litres, red meat production to nearly 2 million tonnes, meat and egg production from chickens to 164 000 tonnes and 3.9 billion eggs. At the same time, in order to mitigate the serious challenges posed by waste management and greenhouse gas (GHG) emissions, the Ministry of Environment, Forest and Climate Change is implementing the Climate Resilient Green Economy (CRGE) strategy, which aims to reduce the number of cattle by at least 45 million head by 2030. In contexts where a rapid growth of a specific sector could result in major consequences for public health with obvious repercussions on food availability, building policy coherence is essential.

Source: FAO, Country Brief Ethiopia, Africa Sustainable Livestock 2050 series, 2017

Step 4 ENGAGING WITH POLICY MAKERS AND KEY STAKEHOLDERS

This step is about progressing and facilitating change in a win-win scenario across food security and nutrition and food safety policy domains. This relies primarily on enhanced collaboration and communication between policy makers that are not always used to working together. Based on the data and evidence collected through the previous steps, meaningful communication and joint work can be envisaged. Step 4 looks into the political economy behind public policy-making and implementation that affects decision-making in food safety. This influences the way sector-specific challenges to food security and nutrition are expressed, and enables the identification of promising policy options, to gain the commitment and will of major stakeholders to support change.

The following questions will help to guide the process:

- Who are the key stakeholders in food safety? What are their interests? Which stakeholders represent the specific needs and interests of the most vulnerable groups?
- How do international and regional policy agendas influence the national debate on the policy issue being analysed?
- Who are the potential policy champions? Who sets the policy agenda? Who advises/influences whom?
- What are the main obstacles to policy change when it comes to food safety and nutrition and how can they be addressed?

Understanding the political economy is key to understanding the policy context. Stakeholder mapping paves the way to analysis of what drives political behaviour, how this shapes policies and programmes, and ultimately helps to identify win-win solutions.

The final step starts with the identification of the key players who set and influence the food safety and food and nutrition policy agendas, as well as those who are influenced by them. This also includes the interest groups from public and private sectors and civil society.

Commonly, public sector responsibility for food safety is shared among a number of key ministries. These include health, agriculture and rural development, economy and trade, and consumer affairs.

In the private sector, key stakeholders are the food business operators (producers and retailers) also responsible for ensuring that only safe food reaches consumers' tables. This should include stakeholders from both the formal and informal sectors. Farmers, cooperatives and processors play a key role in determining the safety and quality of products, while cooperatives, processors and government agencies exert influence over food safety and quality as the most powerful stakeholders in the network. Stakeholder relationships in the formal sector might be more conducive to the enforcement of regulations and standards, and thus the production of better quality food, than those in the informal value chain.

Consumer organizations, and other representatives of civil society, which are also those who best represent the most vulnerable groups, also have a role to play.

Academia and research institutes should not be forgotten as they are closely connected to the process of risk analysis, pertaining to the establishment of policies and regulation setting. They can also help the private sector to implement good practices, by providing training and adapting approaches. For example, they can help the private sector identify the control points and associated control measures, to allow them to focus their efforts on implementing food safety measures where they are most effective.

Stakeholders with power and aligned interests are those (people or organizations) important to engage with fully. Usually, stakeholders with most power are the policy makers, followed by opinion leaders. On the opposite side of the grid there are those stakeholders who have great interest but little power. These might become organized into interest groups or coalitions that can lobby for change. Consumer protection associations, for instance, belong to this group. Engaging with them at national, but more importantly, at local

level, is important because they can educate consumers, investigate problems, monitor compliance with standards and advocate change on behalf of the citizens. Finally, stakeholders with great power but low interest should ideally be brought around as patrons or supporters for the proposed policy change.

When identifying the stakeholders that can potentially influence the national policy agendas, existing public-private partnerships, fora or coordination mechanisms operating at all levels should also be considered. Those collaborations might take a different shape across countries. Box 12 reports some examples relevant to food safety, nutrition and trade operating at international and regional levels.

The next step is to identify the main obstacles to policy change as entry points to create a more coherent policy landscape. In many contexts, one of the main obstacles to policy change related to food safety and food security and nutrition is the lack of awareness about the importance of food safety. In order to ensure that policies can build on solid foundations to address better the challenges posed by food safety risks and prevent disease outbreaks, it is necessary to produce and provide evidence. For industrialized countries, there is now a considerable body of research on the nature and magnitude of these food safety risks supplied with increased awareness about the socio-economic consequences of unsafe food. For developing countries, hard evidence in these areas is more limited and less accessible to policy makers, especially those who are not experts in the field. As a result, the economic case for public investment in food safety systems is generally less well understood in LMICs.

While policy analysis could yield various options for adjustments that are technically viable, these can be impossible to implement politically (for economic, social or cultural reasons for example). Communication and enhanced collaboration among the different stakeholder groups should support strengthening food security and nutrition and food safety policy domains in a win-win scenario. Box 13 provides an example of approach and practical guidance to support this dialogue and collaboration.

Box 12

Public-private collaboration to ensure safe and nutritious food

The need for, as well as the value of, ensuring safe food has pushed governments and private companies to seek mutual support and express their commitments through public-private partnerships. Currently there are three entities involved in engaging the private sector in pursuit of higher food safety standards. They are: (1) the UN Committee on World Food Security (CFS) established by the World Food Conference in 1974 and reformed in 2009 to ensure that the voices of many stakeholders, including the private sector, are heard in policy formulation; (2) the Global Alliance for Improved Nutrition (GAIN), established in 2002; and (3) the African Union Commission's Partnership for Aflatoxin Control in Africa (AUC PACA), established in 2012 to eliminate the harmful impacts of aflatoxins. The private sector engaging with GAIN includes local and multinational food companies and in particular those producing fortified foods for micronutrient-deficient populations. In the framework of the UN CFS, the Committee's Private Sector Mechanism (PSM) provides the platform for interested businesses to help shape the outcomes of the food security, nutrition and safety discussions and to help formulate recommendations for consideration by member states. PACA, in contrast, collaborates with the private sector, other international organizations and foundations and other stakeholders with the aim of protecting crops, livestock and people from the effects of aflatoxins, thereby contributing to improved food security, health and trade in Africa.

Source: Eggersdorfer M, Kraemer K, Cordaro JB, Fanzo J, Gibney M, Kennedy E, Labrique A, Steffen J: Good Nutrition: Perspectives for the 21st Century. Basel, Karger, 2016

Box 13**Evidence-informed policies and decisions, considering multiple factors**

In order to illustrate how evidence and data collected can be jointly analysed, discussed and acted upon by policy makers across sectors, FAO has developed guidance material on food safety risk management using structured and evidence-informed processes (FAO, 2017b).

The FAO guidance materials assist decision-makers from a variety of sectors in applying a multi-factor approach for selecting risk management options, supported by case studies as concrete examples of the process. By supporting and structuring this dialogue, as well as documenting the evidence used, as well as any trade-off made, it facilitates stakeholder engagement, transparency and accountability throughout the decision-making process.

In analysing the political context, and considering the different factors used in the multi-criteria approach, it is worthwhile taking into account the following:

- Willingness of the government authorities to address food safety and openly acknowledge when there is a food safety challenge in the country. Communicating on food safety risks still presents major challenges due to the concomitance of considerations related to: (1) the perception that the public associates with different risks (not necessarily proportional to the effective public health risk), (2) the possible impact on the economy and food supply, and (3) the perceived limited capacity of the government to control the issue effectively.
- Market dynamics and enabling environment to encourage the private sector to invest in improved practices for food safety and quality is

often deficient. Frequently the lack of awareness of consumers about food safety has a damaging consequence: no higher price is offered for improved safety and quality, so there is no incentive for the private sector to make dedicated efforts to improve safety and quality of food. Are there government incentives to do so nevertheless?

- Degree of current policy coherence between food safety and other sectors, and supporting environment to improve further and increase policy coherence. Is there a framework for collaboration among sectors?

To foster consensus, communication and cooperation among relevant players, some suggested actions related to institutional aspects include the following:

- Develop a framework for multi-sectoral governmental policy agenda-setting and assessment of policy interactions.
- Establish working groups among practitioners in food safety, agriculture, industry development, health protection and trade to maximize outcomes of policy programmes in food safety and food security and nutrition.
- Apply structured policy development processes using objective evidence where possible, such as the approach described in the FAO food safety and quality series issue no. 4, 2017b.
- Develop common criteria for assessing policy effects and coherence and consider using multifactor decision processes.
- Build capacity for enhancing alignment between food safety and food security and nutrition agendas.

Selecting the most appropriate options and way forward (focus of step 3) will depend on the issue under consideration and on the local or national context. Synergies and trade-offs are also very issue and context specific. Efforts to improve policy coherence will only succeed once there is evidence for the correlation and causality links between unsafe food and impaired food security and nutrition status. Figures pinpointing the attribution of

Box 14

Adopting a comprehensive and phased approach to tackle a chemical hazard in the smoked fish sector and ensure the availability of nutritious food: the case of Ghana

Nearly 80 percent of the total fish catch in Ghana is cured in various ways before consumption. The main cured fishery product is smoked fish, also used in the preparation of traditional soups and stews. In addition to being an important source of protein and ranked by more than 60 percent of fish consumers as the most preferred cured fish product in the country, the smoked fish industry also plays an important role in terms of food security, employment creation and income generation. The smoke that provides a specific colour and flavour to fish and that is generated for traditional smoking techniques contains, however, polycyclic aromatic hydrocarbon (PAHs) compounds, which are carcinogenic.

In an effort to address public health concerns but also keeping the focus on increasing levels of nutrition, the Ghanaian government, with assistance from FAO and other partners, has supported fish processors in smoking technology through the provision of ovens, to replace the old technology, and training. However, after the adoption of the ovens, tests on smoked fish demonstrated levels of PAHs several times higher than acceptable safety limits. Faced with this food safety issue, the Ghanaian Food and Drugs Authority, the Ministry of Fisheries and scientists examined different options to reduce the public health risk. In seeking the best course of action, the authorities were conscious of the need to ensure the availability of smoked fish and support an important industry

in Ghana, remaining cognizant of the potential impact on food security.

In view of this, rather than instituting an outright ban on smoked fish, key stakeholders opted for a phased approach comprising several interventions, including the introduction of the FTT-Thiaroye Processing Technique (FTT-Thiaroye), newly developed by FAO. The FTT-Thiaroye technique reduced PAHs contamination levels and also contributed to safeguarding the environment by using plant materials, such as coconut husks and shells or corncobs, as fuel.

In 2016, FAO supported the Ghanaian Food and Drugs Authority in using newly available data from a national study that analysed contamination and volumes of smoked fish consumed, a basis for assessing and characterizing risks, and strengthening risk-based approaches to minimize risks from PAHs. Throughout this exercise, food safety authorities, working closely with scientists and fish processors, considered trade-offs and synergies to build on in order to adopt broadly acceptable solutions to improve safety and support fish processors. For instance, given the cost of adoption of the new technique, its introduction needed to be supported through a number of government measures to mitigate its potential for negative effects. One of the key issues was to ensure that fish processors could afford and access this new technology by introducing appropriate national food safety standards and codes of practice and carrying out a national study on contamination levels of PAHs in smoked fish and levels of consumption among the population.

Source: FAO/WHO, Trade and Food Standards, 2017 (<http://www.fao.org/3/a-i7407e.pdf>)

public health burden, including malnutrition, to specific food safety issues are particularly helpful to convince policy makers who may not be initially receptive to engage in a multisectoral process, which is often slow and complex. Making changes happen requires an understanding of differences in interests and powers, supporting and opposing forces, and the reasons behind these conflicting drivers. It also requires commitment to recognize where policy decisions are being made that might impact food safety or food security and nutrition directly or indirectly. This process builds on the earlier step of stakeholder analysis to consult and engage with them across the four dimensions of food security, using the information and evidence collected to enable objective analysis and development of drivers and options for change.

Maintaining political will and using the momentum for change through follow-up action is essential for implementing recommendations. After the policy recommendations are formally adopted, the process of implementing recommendations needs to be supported by:

- keeping stakeholders engaged;
- developing and/or adjusting action plans, including for communication and capacity building, and setting up financial arrangements and budgets (FAO, 2010);
- moving to align related legislation and other regulatory provisions.
- recognizing (and celebrating) progress;
- reviewing and reporting on progress.

Concrete examples of policy dialogue and the identification of win-win policy options are provided in Boxes 14 and 15, further developing the case of smoked fish, and introducing changes in food safety management systems in SME and informal food sectors.

Box 15**Gradual introduction of food safety and hygiene standards in the informal sector**

Small and medium-sized food businesses are very important, providing important sources of food, supporting local economies and household income, and maintaining food traditions and culture. Along with registered businesses, food supply and distribution in several countries also take place through unregulated informal channels. As reported by the International Livestock Research Institute, ILRI (ILRI, 2014), in Africa, 39 percent of local GDP is supplied through informal channels, and more than 80 percent of the animal-source food produced is sold in informal markets. Food sold through the informal channel varies greatly in terms of ingredients, processing, methods of marketing and consumption, and reflects traditional local cultures. In addition to being an important part of the diet for many people and because most of the fresh and most nutritious food is sold through the informal sector (e.g., eggs, green leafy vegetables and fish), in many countries street food also has a socio-economic aspect, providing employment opportunities for millions of men and women with limited education or skills, especially because the initial investment is low.

However, certain street-vended food can pose a significant risk to consumers because of microbiological contamination resulting from sale in places without good sanitation, where there is no access to running water or washing facilities and toilets. Storage also represents a risk when there is limited access to electricity and refrigeration.

Whether registered or informal, food businesses bear the ultimate responsibility for assuring the quality and safety of the foods they produce and sell, while the onus on governments is of adopting and monitoring compliance

Box 15 (cont.)

with national food legislation and actively promoting food safety measures:

- Food businesses meet their food safety and quality responsibilities by implementing quality assurance systems along the food production chain. These sets of controls may include Good Agricultural Practices (GAPs), good manufacturing practices (GMPs), good hygiene practices (GHPs), Hazard Analysis and Critical Control Point (HACCP) systems. Many businesses can face challenges, but small-scale producers and traders in developing countries, which might not have the financial resources for adequate compliance with food safety requirements, need support in planning and implementing food safety management programmes in line with international requirements.
- At the international level, there are many safety requirements that have been laid down by the Codex Alimentarius Commission to provide guidance for governments on food safety measures specifically addressed to street food vendors. At national level, in many countries, laws covering food safety and environmental hygiene have been enacted but enforcement is challenging due to the large number of street food vendors, limited resources allocated to control street food safety and street vendor mobility, all of which makes performing controls very difficult. In the context where food brings both risks and benefits to a large number of communities, simply shutting down informal sector activities is not an appropriate option.

In order to improve the conditions of street food vendors and to make sure that the food they sell does not jeopardize public health, while preventing unintended repercussions for physical and economic access and utilization

of food, the primary intervention should focus on building awareness among vendors and consumers of street food.

Governments need to embrace street food vendors as a dynamic economic sector and avoid excessive regulation that could suffocate it and would transfer the problem to a new informal sector comprising those evading the regulation. It is also acknowledged that certain minimum standards, especially related to food quality, need to be enforced. To this end, vendors should receive basic training on how to prepare and store food safely. The introduction of HACCP standards should be replaced by simpler guidelines on food safety and hygiene when the context is not receptive to facilitate uptake. Additional supporting instruments could include facilitating vendors' access to microcredit to meet the costs of compliance, providing vendors with appropriate infrastructure such as access to clean water and sewage systems and encouraging them to form cooperatives.

In general, governments and competent authorities' interventions and programmes can only be successful if they do not focus on a single aspect alone but take into account not only the safety of the food sold but also the socio-economic and cultural role of the informal sector.

FAO works with national stakeholders in developing countries at national and local levels from both public and private sectors to promote the application of GHPs at all stages of the food chain, and the HACCP system. Additionally, FAO promotes the development of tools and training materials for adaptation and use in support of national training programmes with the aim of strengthening important value chains and developing sector-specific national codes of practice.

Concluding remarks

Achieving food security and improved nutrition was made a global priority by the 2030 Agenda and SDGs. Tackling hunger and malnutrition is not only about boosting food production, but also concerns increasing incomes, creating resilient food systems and strengthening markets so that people can access safe and nutritious food.

In this context, food safety is an essential element to nutrition and food security because its improvement contributes directly to enhanced nutritional status and the reduction and prevention of diseases. Furthermore, assuring the safety of food is crucial for achieving numerous other policy priorities concerning trade, and rural, urban and economic development.

However, very often food safety is wrongly assumed to be a luxury and access to food is addressed without due consideration given to safety. Moreover, resources allocated to food safety are usually limited and often aimed at ensuring the safety of exported food products to the detriment of food consumed locally. This largely occurs at the expense of the most vulnerable members of the population: infants, young children, pregnant women, the elderly and the immunocompromised. Unsafe food has severe social and economic consequences. The order of magnitude of the burden of food-borne diseases is similar to those of the big three pandemics (tuberculosis, HIV/AIDS and malaria). Almost one in ten people fall ill every year from eating contaminated food and 420 000 die as a result. Despite the preliminary estimates of WHO and the World Bank, an accurate assessment of the health impact of food-borne diseases at the global level and the economic consequences has not been done. It requires a solid foundation of epidemiological data as well as better and harmonized data collection methods.

Changes in the global food supply chains and the emergence of new risks, including those from antibiotic-resistant pathogens, have made the food safety landscape more complex than ever. Improving the level of food safety calls for renewed commitment and human and institutional capacity, especially at the production level, consideration of the opportunities offered by new technologies and innovation and digitalization. It also requires that food safety managers, in the public and private sectors, keep pace with developments.

Decision-makers from the ministries responsible for different aspects of food control, in addition to ministries responsible for related policy areas (such as agricultural production and nutrition), need to work together to improve policy coherence and balance trade-offs to minimize any negative effects on food safety and nutrition. Different priorities and lack of communication among them has led to pursuance of conflicting objectives while leaving food safety risks unaddressed. A greater understanding of how to improve synergies within the food safety sector, and synergies and trade-offs with food security and nutrition sectors, will assist countries in reaching nutrition and food security objectives.

This note calls for greater collaboration and communication across the domains of food safety, nutrition and food security, which in turn would be beneficial for a closer alignment between those agendas and contribute to a safer, more accessible and healthier food supply. Furthermore, food safety is a multidisciplinary issue that needs to be addressed while taking into account the roles of multiple stakeholders, including the food industry, governments and consumers.

Data and evidence are essential to support the policy coherence and alignment processes. Short-term and long-term vision, and associated long-term investment are necessary. It is recognized that countries will be at different stages in terms of capacity to improve policy coherence, and

there may be a need to build capacity for enhancing alignment among the agendas of food safety, food security and nutrition. Communication and consultation are essential to bind these elements together and enable policy progress in a coherent and aligned manner. Over time, and through improved policy coherence efforts, it should become more apparent when food safety is important to reach a goal, and when input is required. The importance of a gradual, supportive approach to improve food safety cannot be overemphasized.

In essence, without food safety there can be no food security: ***if it is not safe, it is not food.***



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