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## Safe and Nutritious Food: everyone's business

### Sapumal Dhanapala

President, The College of Community Physicians of Sri Lanka (2019-20) and National Programme Officer, World Health Organization

Correspondence: [sapumald@gmail.com](mailto:sapumald@gmail.com)  <https://orcid.org/0000-0002-7504-2219>

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*“Food security exists when all people at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (1).*

The world's utmost goal is to ensure food security, to create a world free from hunger and malnutrition. At early stages of defining food security, more attention was paid in meeting the physical aspects of food, mainly the availability and adequacy. However, the concept of food security was evolved over the last few decades and later, food safety and nutrition were identified as integral parts of food security.

Nutrition is a key requirement of food security to trigger a positive effect on the health of people, and on economic development and productivity. The global picture of the prevalence of malnutrition is two-fold. Over 820 million people worldwide are suffering from chronic undernourishment, with five million children under the age of five years dying from malnutrition. Further, 672 million people suffer from obesity and 1.3 billion are overweight (2). The double burden of malnutrition disproportionately affects lower- and middle-income countries (3).

In the 21<sup>st</sup> century, food safety was highlighted as a major factor in securing a healthy diet as food is produced and processed in greater volumes and distributed over greater distances than ever before. Even though an array of scientific and technological advances is there in the food industry, and parallel

improvement of food control systems world-wide, food-borne diseases persist as a cause of serious concern for the consumer. Consumption of unsafe food may lead to development of both communicable and non-communicable diseases. Making food safe for consumption is further complicated with increasing global food demand and ever-changing climate.

Knowing its importance, World Health Organization (WHO)'s mandate described the need for food safety in Strategic Objective Number 9 as “to improve nutrition, food safety, and food security throughout the life-course and in support of public health and sustainable development”. The WHO Global Strategy identified three strategic directions on ensuring global food safety. They are science-based decision making, improving international and national cross-sectoral collaboration to enhance communication and advocacy, and providing leadership and assistance in the development and strengthening of risk-based integrated national systems for food safety (4). All stakeholder groups share the responsibility of ensuring food safety in a food system and the challenge is to build comprehensive food systems that ensure the continuing involvement and commitment of all concerned parties. Further, we need to maintain a similar pace in improving food safety with the rapidly changing food systems to

meet the demand for food safety among consumers. Public awareness of food safety has increased dramatically all over the world and particularly in Sri Lanka, consumers pay higher attention to emerging food safety issues. In Sri Lanka, food safety is a major public health issue, in which everybody has a role to play to make the food we eat is safe. Thus, this discussion aims to describe food safety and security in the Sri Lankan context and to define the role that everyone should play in this context.

### What is food safety?

Food safety is a major element in the public health system (5). To be considered food as safe, it should be free from hazards that could create acute or chronic health effects. Food safety hazards are the factors that food safety practice seeks to protect against, contain and eliminate from foods. Global estimates included 31 major global hazards identified in food and they resulted in an estimated 600-million food-borne illnesses and 420,000 deaths in 2010. Hazards included 11

diarrhoeal diseases, 7 invasive infectious disease agents, 10 helminths and 3 chemicals (6).

Globally increased food demand resulted in various measures to enhance the food supplies. The world population of 6.9 billion in 2010 will increase to 8.0 billion in 2050. Intensification, pesticide use, excess use of veterinary drugs in livestock, genetically modified (GM) crops and animals, excessive use of fertilizer, excessive use of hormones, improved genotypes (genetic correlations) and food processing have all been used to increase food production to cater to the ever-increasing food demand in the world (Figure 1). Many of these approaches contribute to increased food availability in the short term but they lead to food insecurity in the long term due to lack of vision towards sustainability (7). The use of advanced technology and science to meet with the world food demand also leads to issues of deforestation and global warming and the resulting climate makes maintaining food supplies further difficult. It is expected that the food security gap will widen further over the next few decades.

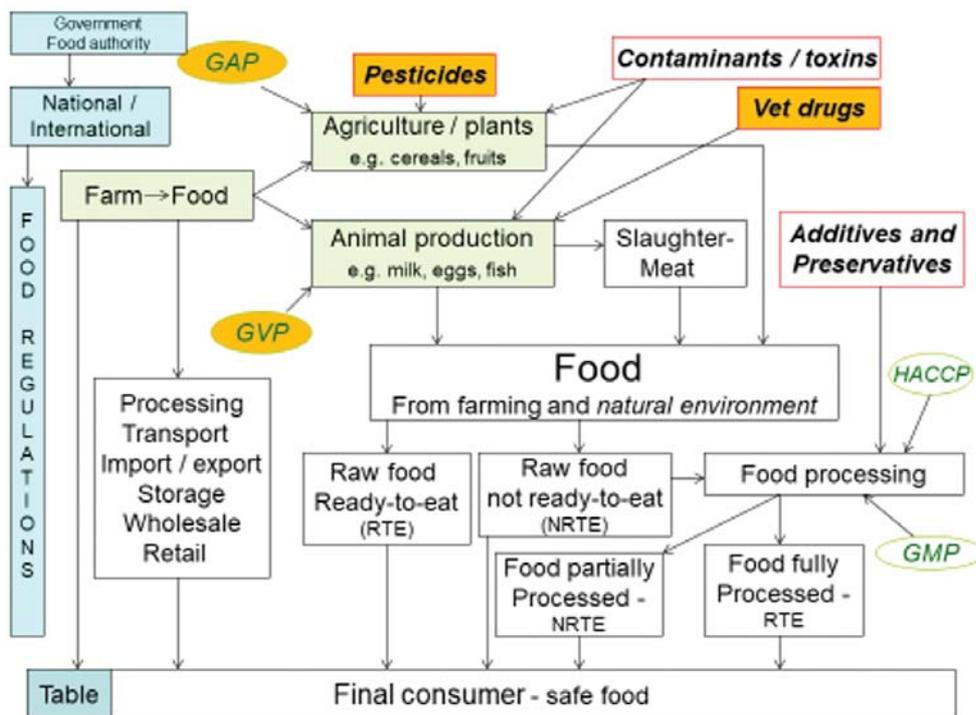


Figure 1. Network of functions from farm to table in a comprehensive food system

Consumer expectations also play a key role in determining food supplies and the food industry strives responding to changing demands for the products. Consumer interests in food products have evolved beyond affordability, to convenience and safety, nutritional characteristics, how and where foods are available, how they are produced, processed, and distributed. The shift of population from a rural setting to an urban setting, effects of globalization, and mix of cultures have made food demands further complicated.

### Food safety hazards

Food hazard is defined as a biological, chemical or physical agent or condition of food with the potential to cause an adverse effect (8) (Figure 2). These hazards may be introduced into food at any stage of the food chain during cultivation, harvesting, processing, trans-

porting, preparing, storing and serving food. Microbiological contamination take place when food is exposed to microorganisms found in the air, food, water, soil, animals and the human body. Chemical hazards can occur at any point during harvesting, storage, preparation and service, and can lead to severe health effects. Physical hazards usually result from accidental contamination and poor food handling practices in the food chain. Hazards may also result from conditions that promote their presence. Further, most of the hazards are added into food unintentionally but there are intentional hazards added to mask the inferior quality of food products, which targets marketability of food products. Common hazards include pathogenic microorganisms, food adulterants, food additives in excess amount, incorrect labelling, genetically modified food, and food beyond their expiry date (9).



Figure 2. Graphical presentation of common hazards in modern food and their inter-relationships

## Methods to improve food safety

In the present world, the responsibility of ensuring food safety remains largely with the food industry but the other major players including the government and consumers need to contribute to different aspects. The development of a comprehensive food system to ensure food safety urges the need of clarifying the roles and responsibilities of all stakeholder groups and ensure co-ordination and planning related to prevention, intervention, control, response, and communication. The government has a major role to play to ensure food security and safety through the development of regulations and standards. Enforcement of regulations pave a way to the government to control the risks of hazards from farm to table. Further, coordination efforts between agriculture, health, trade, justice and customs agencies and academia could be effectively done by the government (10).

Other than the regulations, voluntary standards are also used to manage hazards occur (reduce the likelihood of getting foodborne infections) along the food chain. Food producers, processors and traders should operate according to the principles of good agricultural/ hygienic/ manufacturing practices. Good Agricultural Practices (GAP) and Good Veterinary Practice (GVP) are applied in ensuring food quality and safety during primary productions while Good Manufacturing Practices (GMP) are applied during food processing as a prerequisite. Food production, processing and other handling operations should be analysed with a view to identifying hazards and assessing associated risks as a preventive approach following Hazard Analysis and Critical Control Point system Principles (HACCP). The advantages of having a preventive approach are that it becomes more effective in reducing or eliminating the risk of food safety hazards, requires less resources and avoids the rejections. ISO 22000, FS 22000 and BRC are food safety management systems that operate to manage food quality and safety with better integration among control functions with a preventive approach.

## Food safety and nutritious diet using the food-system approach

The food systems approach consists of activities, outcomes and stakeholders in food production, storage, processing, marketing, and consumption and its drivers and barriers. A comprehensive food system establishes the roles and responsibilities of all stakeholders in the

food chain and provides the links that are necessary to build a participatory, co-ordinated and cohesive framework for identified activities. This holistic and systematic approach is necessary to manage highly interconnected, yet diverse sectors involved in food (11). It considers the dynamic interdependence of all players and the involvement and interaction of all stakeholders in the decision-making process. The system should have adequate infrastructure and use technology appropriately for the tasks performed at each link of the food chain. It should be built into the food chain from production to consumption. The system should be science-based and integrate science and risk analysis at all levels. A food systems approach would help to strike a balance between food availability and maintaining livelihoods and more negative outcomes of environmental degradation and non-communicable diseases. Addressing one aspect of the food chain will not affect the livelihood of another group of people who are involved in another point in the chain.

At the international level, following practices are available to make food safer: identification, assessment and management of food safety risks; advice and information on nutritional requirements and healthy diets; periodic global and regional fora for food safety regulators; comprehensive approach to food safety, animal and plant health; interactive communication systems; good practices throughout the food chain; international rapid alert on food safety hazards; and international technical and financial assistance for capacity building. At the national level, capacity building through formulation of food quality, safety and nutrition programmes, institutional set up of comprehensive and effective food safety control systems – food safety policy and strategic action plan to strengthen food control system in Sri Lanka, evaluation of food consumption patterns and promotion of consumer awareness – trend analysis and networking, development of appropriate technologies throughout the food chain – better integration among different stakeholder groups will work for developing safe food systems. The local and international collaboration, resource mobilization and the political will with a clear vision enhance the systems approach in food safety.

## Food safety in Sri Lanka

Sri Lankan food control scenario is not simple. The rapid expansion of the food industry, increased

mobility of people, urbanization and changing behaviours of people have resulted in an increased focus on food safety issues (12). On the other hand, there are many measures in place to ensure safe food supplies, including HACCP based food safety management systems and legislative framework. However, there are many safety concerns about local food and consumers are more vigilant about these issues.

Presence of food adulterants specifically in palm oil, spices, chilies, tea and in milk powder, agricultural and veterinary residues – pesticide residues at the time of consumption, presence environmental pollutants in food such as lead, mercury, polychlorinated biphenyl (PCBs), dioxins in food, presence of aflatoxins, histamines, improper use of food additives, presence of process-related contaminants – acrylamide, poly-aromatic hydrocarbons, poor hygiene in food preparation, quality and safety issues in processed food, poor water quality, unsatisfactory labelling and unsafe packaging material are some common concerns in the food industry. Violation of food regulations is another observation. For example, food companies mislead consumers with labelling and advertising despite the presence of a well-defined legal framework for consumer safety.

There is a general belief that the food we eat is contaminated. We need to test our food for contaminants, and it should include both imported and domestically produced foods. Considering the public concerns on food safety, the Food Control Administration Unit of the Ministry of Health took the lead in conducting a national survey on these food safety hazards, with a view to cover wider range of food contaminants island wide. The idea was to provide evidence-based recommendations to producers, manufacturers and consumers to maintain food safety based on findings. This activity commenced in 2017 through the Food Control Administration Unit of the Ministry of Health with a small sample of fruits that we tested for pesticides. In 2018, we expanded the activity island-wide. We tested all these samples with reputed government laboratories such as food laboratories at the Government Analyst's Department, Food Laboratory at NIHS, Kalutara, Food Laboratory, Anuradhapura, NARA Laboratory and SLSI Laboratory.

In 2017, the Food Control Administration Unit of the Ministry of Health initiated a program to test a

sample of 141 fruits imported and 96 fruits in the local market for the presence of 14 commonly used pesticides in the country. In 2018, imported food items such as onions tested for heavy metals and potatoes tested for pesticides and heavy metals were not detected. With regards to imported chilies tested for aflatoxin, 108 (6.4%) out of 1677 samples in 2018 and 15 (5.1%) out of 289 samples in 2019 had levels above the permitted level of 10µg/kg and action was taken to ensure quality chilies to be imported. One limitation was that though pesticide residues were detected, we were unable to comment if the level is above the maximum residue level (MRL) due to non-availability of MRLs for some of the pesticides detected.

In 2018, random samples of commonly consumed vegetables (one sample from each district, four samples from commonly consumed varieties of fruits from each district, one sample from each variety by district for leafy vegetables) were tested for 17 pesticides. Once again due to the incomplete list of MRLs gazetted for only 65 pesticides, the results could not be interpreted while it must be noted that there are over 150 pesticides approved for use in the country although Sri Lanka has the capacity to test only 17 of those pesticides. Hence, the testing does not give a meaningful analysis for interpretation. The rice in the local market tested for heavy metals in 100 samples taken across the country detected lead (Pb) and cadmium (Cd) above the maximum level. Out of the 82 samples of red rice, 15 (18.3%) samples were detected with food dye, while 81 tea leaves samples did not detect any adulteration and 80 samples each of coconut oil, peanut, chili whole, and chili powder detected aflatoxin above 10 ppm respectively in 8 (10.0%), 9 (11.3%), 11 (13.6%) and 14 (17.5%) samples. Out of 140 samples of fish, formaldehyde was detected in 42 samples but only 3 (2.1%) samples had more than the approved level. The majority of our food establishments do not adhere to the regulations on hygienic practices and it is time that these establishments are registered by the medical officer of health according to the Food (Premises Registration) Regulation 2019.

Sri Lankan food safety system does not have an information system except for numbers. Around 1000 food safety events are reported annually which is a gross underestimation as all mild food safety events are either managed at home or through the outpatients'

system both in the public and private sector and do not get reported.

### What can we do?

A comprehensive food system should have food safety measures that consider the regulatory framework governing human, plant, and animal health. It should focus on food safety throughout the food chain and enable consumers to make informed and realistic choices for a nutritious diet and should be flexible enough to accommodate changes in consumer perception over time while providing for an appropriate level of protection which is reasonable. It should have effective control and containment of food safety hazards and respond to the crisis by not only being responsive to everyday issues but also by constructing to meet future challenges. In order to achieve this in Sri Lanka, we need to look into the safety of locally grown food by promoting minimal use of pesticides through GAP, promoting healthy options in supermarkets through “Healthy corners” and also promoting GAP among the farmers by creating a sustainable market. Creating a market demand for healthy food options and promoting food certification systems in Sri Lanka are also useful to build a healthy food system.

Sri Lanka mostly deal with “end product testing” which is the least advanced system. However, preventive approaches are important in effective control of food safety hazards. An integrated, multidisciplinary approach to food safety should be adopted, covering the whole of the food production, processing and distribution chain through better coordination among the players. Decisions often require balancing food safety priorities with resources, following multiple policy recommendations and selecting the most appropriate intervention to minimize risks. Moreover, we need to work together effectively to evolve our system gradually to third party accreditation, farm assurance schemes and other similar approaches adopted in developed countries.

Sri Lankan’s action towards food safety should follow five key principles.

- Ensure its safe – Governments must ensure safe and nutritious food for all using the regulatory system
- Grow it safe – Agriculture and food producers need to adopt good practices (GAP)

- Keep it safe – Business operators must make sure food is safe (available for sale)
- Check its safe – All consumers have a right to safe, healthy and nutritious food (food security)
- Team up for safety – Food safety is a shared responsibility (Farm to Table approach)
- Joint efforts of Government (Ministry of Health, Department of Agriculture, Department of Animal Production and Health, etc), UN partners, industry and people of Sri Lanka could lead to having a diet that is safe and nutritious.

In summary, food safety is a public health and socio-economic issue. Integration of actions along the food chain with a “Farm to Fork” approach for healthy and nutritious food based on the Sri Lanka Food-based Dietary Guidelines is recommended. It will control the prevalence of NCDs in the future and enable Sri Lankan children to remain disease-free and live a healthy life.

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