

Review

Food safety and food labeling from the viewpoint of the consumers

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Distrust of food safety has grown among the Japanese people after the occurrence of bovine spongiform encephalitis (BSE) in 2001. The Food Safety Commission was formed under the Cabinet Office and made a network among the ministries. The newly-established Consumer Agency may strengthen the quick response to emergencies. *Shoku-iku* (food and dietary education) Law is being implemented by the Cabinet Office with cooperation from relevant ministries and NGOs. Food Sanitation Law and Health Promotion Law are briefly explained, and the necessity of functional nutriology for non-nutrient biologically active substances is described. With regard to public health nutrition, a new food label showing energy balance and antioxidant unit (AOU) as a surrogate marker of fruit and vegetables has been developed for tailor-made nutrition which makes it easy for individuals to control energy intake.

Key Words: food safety, food for specified use (FOSHU), functional nutriology, functional food factor (FFF), food labelling

FOOD SAFETY COMMISSION: NETWORK BETWEEN THE MINISTRY OF HEALTH, LABOUR AND WELFARE, MINISTRY OF AGRICULTURE, FORESTRY AND FISHERY, AND CABINET OFFICE

Distrust of food safety has grown among the Japanese people, triggered by various problems beginning with the occurrence of bovine spongiform encephalitis (BSE) in 2001. In response, Japan enacted the Basic Law on Food Safety, a comprehensive law to ensure food safety for the purpose of protecting the health of the nation. Through the development of related laws, Japan has introduced a risk analysis approach as well as a precautious strategy to the food safety network (Figure 1).¹

Risk assessments are conducted by the Food Safety Commission established under the Basic Law on Food Safety. The approach aims to scientifically assess risks, expressed as the probability and degree of adverse health effects, and develop necessary measures based on the risk assessment. The Food Safety Commission is an organization that undertakes risk assessment, and is independent from risk management organizations such as the Ministry of Agriculture, Forestry and Fisheries, as well as the Ministry of Health, Labour and Welfare. Risk assessment, risk management, and risk communication are a set of solution oriented strategies conducted by exchanging information between the above Food Safety Commission and Ministries. A newly established Consumer Agency should be able to provide early response to an emergency.

THE FOOD SANITATION LAW

In 1947, The Ministry of Health and Welfare (MHLW) enacted the Food Sanitation Law as the first comprehensive law for food safety and hygiene.² All food additives

have been regulated by this law, and only additives designated as safe by the MHLW are allowed to be used in foods. At first, only chemically synthesized additives were designated, but currently, all types of additives are included under the positive list system. Currently, 345 additives and 46 substances are designated as approved food additives by the MHLW.

The Food Sanitation Law covers various responsibilities such as: the establishment of standards/specifications for food, additives, apparatus, and food containers/ packages; inspection to assess whether these established standards are met; hygiene management of the manufacture process and sale of food; and business licensing. The Abattoir Law and the Poultry Slaughtering Business Control and Poultry Inspection Law cover the regulation of livestock and poultry, including inspection systems for meat. Imported foods are inspected by 31 quarantine stations placed across Japan under the central government.

Local governments and health centres also play an important role. The local governments share responsibilities to conduct inspection of and give advice to food-related businesses.

In recent years the global food trade has been increasing, and imported foods occupy nearly 60 percent of the

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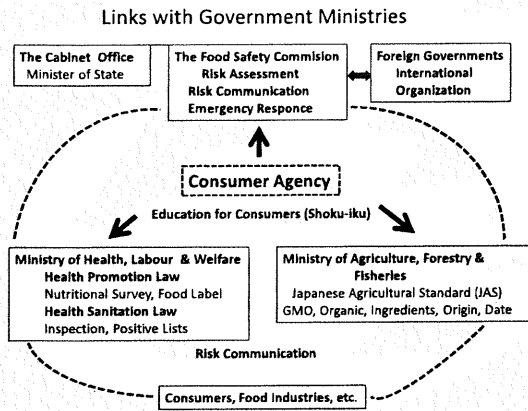


Figure 1. Safety Network of Food Safety Commission. Links between Government Ministries

Japanese market. Also, there is a growing possibility that imported foods contain food additives that are unauthorized in Japan. Safety assessments, conducted by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) will facilitate international harmonization of substances that are internationally proven safe and widely used in the world.³⁻⁶

Ingredients which make up only a small portion of a product may be omitted under JAS Law. Allergenic substances, however, require labelling under the Food Sanitation Law. Mandatory labelling is required at the distribution stage, and is mandatory for eggs, milk, wheat, buckwheat and peanuts, and recommended for abalone, squid, salmon roe, shrimp/prawn, oranges, crab, kiwifruit, beef, tree nuts, salmon, mackerel, soybeans, chicken (poultry), pork, mushrooms, peaches, yams, apples and gelatine.

HEALTH PROMOTION LAW OF MHLW

The “Healthy Japan 21” program was implemented at the beginning of 21st century to prevent life-style related diseases, such as cancer, cardiovascular disease, diabetes mellitus, and hypertension.² The Health Promotion Law

supports this program. Foods with Health Claims refers to foods that comply with the specifications and standards established by the MHLW and are labelled as having certain nutritional or health functions. These foods are categorized into two groups: Foods with Nutrient Function Claims (FNFC) and Foods for Specified Health Uses (FOSHU).

The former includes foods that contain vitamins and minerals as nutritional ingredients, and the latter are foods officially approved to claim physiological effects on the human body.

FOODS FOR SPECIFIED HEALTH USES (FOSHU)

In 1992, MHLW established “FOSHU” that allows health claims on packaging (Figure.2). Japanese researchers refer to these as “Functional foods”⁷⁻⁹ FOSHU approval requires scientific evidence of the effectiveness proved by clinical studies, additional safety studies to prove no side effects by oral intake, and exact determination of the specific effective components in foods.

Categories, functional factors and Health Claims for FOSHU are as follows:^{2,10}

1. GI (Gastro-intestinal) condition: Carbohydrate, such as oligosaccharides, dietary fiber and chitosan; “Helps maintain a good GI condition.”
2. Blood pressure: Lacto-tripeptide from fermented milk, dodecapeptide from casein, a group of peptides from sardine and soy protein; “Suitable for people with mild high blood pressure.”
3. Serum cholesterol: Soy protein, chitosan, low molecule sodium alginate and phytosterol “Helps decrease serum cholesterol level.”
4. Blood glucose: Indigestible dextrin, wheat albumin, L-arabinose etc.; “Helpful for those who are concerned about their blood glucose level.”
5. Absorption of minerals: Fructo-oligosaccharides, caseinphospho peptide; “Improves absorption of calcium.” Heme iron from hemoglobin; “Suitable for people with mild iron deficiency anemia.”
6. Blood neutral fat: Diacylglycerol and globin degradation product, EPA, DHA; “Helps reduce postprandial

The Regulation System of Food with Health Claims

	Medicine	Food	(Usual Food)
1952		(Foods for Special Dietary Uses)	
1991	Medicine	FOSHU	(So called Health Food) (Usual Food)
1995/6		(Nutrition Labeling Standards) (Foods for Special Dietary Uses)	
2001	Medicine	Food with Health Claims(FHC) (So called Health Food) (Usual Food)	
		FNFC (Nutrient Function Claim)	FOSHU (Specified Health Uses)
		(Foods for Special Dietary Uses)	
2005	Medicine	Food with Health Claims(FHC) (Usual Food)	
		FNFC (Nutrient Function Claim)	FOSHU (So called Health Food)
		Ordinary FOSHU	Newtype of FOSHU Standardized Reduction of disease risk

Figure 2. Changes of the regulation system of food with health claims.

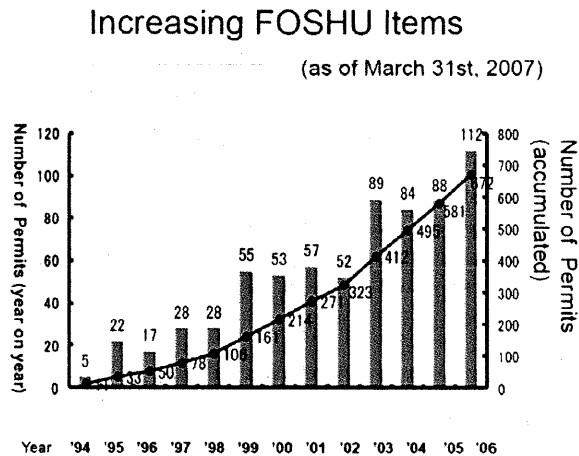


Figure 3. Increasing FOSHU items as of March 31st, 2007

blood triglyceride levels.” “Makes it difficult for fat to cling to the body.”

7. Dental health: Some sugar alcohols such as xylitol, maltitol, erythritol, and palatinose (low cariogenic). Green tea polyphenol (non-cariogenic). “This is a low- or non-cariogenic product.” “Makes teeth strong and healthy.”
8. Bone health: Microorganisms producing high quantities of Vitamin K2, and soy isoflavone. “Promote bone calcification.”

Food for Special Dietary Uses (FOSDU) refer to foods that are approved and permitted to display that the food is appropriate for specified dietary use. There are five categories of FOSDU: Formulas for pregnant or lactating women, Infant formulas, Foods for the elderly who have difficulty in masticating or swallowing, Medical foods for the ill.

NECESSITY OF FUNCTIONAL FOOD FACTOR (FFF) DATA-BASE AND FUNCTIONAL NUTRIOLOGY

The market for supplements as well as FOSHU is expanding, and more than 700 supplements are designated as FOSHU at the end of 2007 (Figure 3). Accordingly, reports of adverse effects are increasing. We made a database in NIH Safety Net containing 1956 cases of adverse effects associated with taking so-called healthy foods, in which 728 were considered to be due to allergic constitution, 456 were due to long-term or excess intake, and 334 were due to interactions with other medicine.¹⁰

Problems with supplements are differences between in vivo and in vitro effects, differences between product information and those of raw materials, variable quality of natural products due to lack of standards, insufficient data about long term use, and insufficient data about safety for diseased people.

Ingredients in FOSHU and other supplements vary, and functional substances in foods include phytochemicals, certain lipids, amino acids and peptides. Most of these are not ordinary nutrients. It is expected that insufficient intake of macro- and micro-nutrients will result in various physiological manifestations of disease, but nutraceuticals such as FOSHU are expected to have more

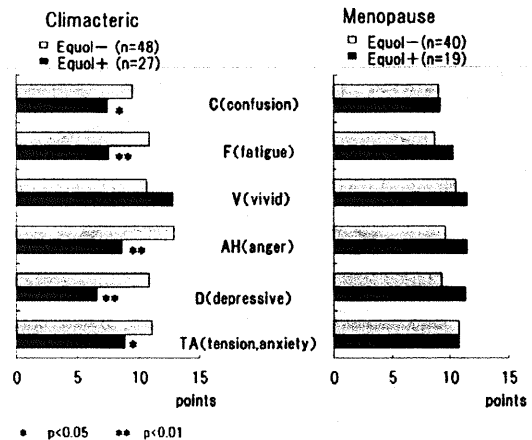


Figure 4. Profile of Mood States (POMS) feeling test scores in relation to equol producibility. Climacteric women, age 40-49.¹⁴

subtle pharmacological effects. A good example are phytoestrogens, which are believed to be beneficial for maintaining bone density and reducing climacteric symptoms.^{11,12}

Antioxidants, however, may prevent cancer and cardiovascular disease,⁹ but the necessary doses remain unknown. As with the undesirable interaction between grapefruit and warfarin, unknown interactions between nutraceuticals, drugs and macromolecules inside the body suggest a cautious approach.

Thus, we constructed a database to estimate phytochemical intake from the whole diet; current data allows more than 80 percent this intake to be classified and accounted for.¹³ Isoflavone intake by the Japanese is very high (Median=15-20 mg) compared to other nations. Recently attention has been called to the isoflavone metabolite equol, because of its stronger estrogenic action. The ability to metabolize daidzein to equol depends on the presence of a certain type of intestinal bacteria. More than half of the older Japanese population can convert daidzein to equol, but this percentage drops to 20-30 percent among the younger generation. Equol producers appear to have differential health profiles (Figure 4). Equol producers showed less severe psychological climacteric symptoms.¹⁴ Caucasians exhibit lower equol producer prevalence rates, so the expected estrogenic effect of isoflavones may differ across populations as well between individuals.

Effective doses of phytochemicals or nutraceuticals can be summarized in a standard table. Large doses of a particular vitamin may cause pharmacological effects, like vitamin C. Such evidence is conceptualized as “Functional Nutriology” in which nutritional or dietary therapy, and use of supplements, effectively makes a bridge to medical treatment (Figure 5). Food industries would benefit by developing supplements, and excluding false or dangerous so-called healthy foods from the market.

TAILOR MADE NUTITION FOR PUBLIC HEALTH

The epidemic increase of obesity in the world mostly results from over-eating of high energy density foods, although several single-nucleotide polymorphisms (SNPs) are considered to influence energy metabolism. Proper

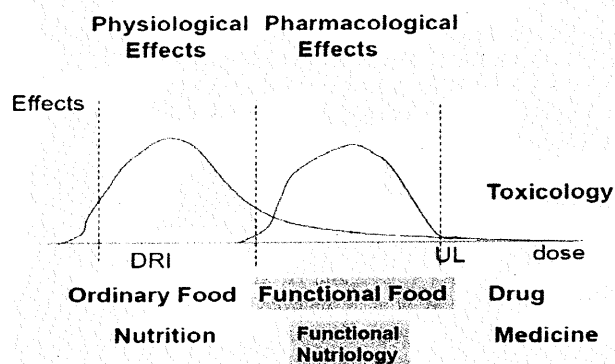


Figure 5. Concept of functional nutriology

energy intake and physical activity are the most important factors controlling obesity. If energy intake is successfully controlled, other nutrient recommendations can be easily followed. In Japan, a portion size of 80 kcal is a unit widely used for diabetic patients. We have defined a new energy unit (E-unit), as the energy required to melt 1 Kg of ice. Coincidentally it corresponds with a portion size of 80 kcal.

A healthy adult with average activity level requires [body weight (kg) x 0.4] E-units and an active person needs [body weight x 0.5] E-units. For example, a 60 kg man needs 24 E-units, so 8 E-units should be consumed at

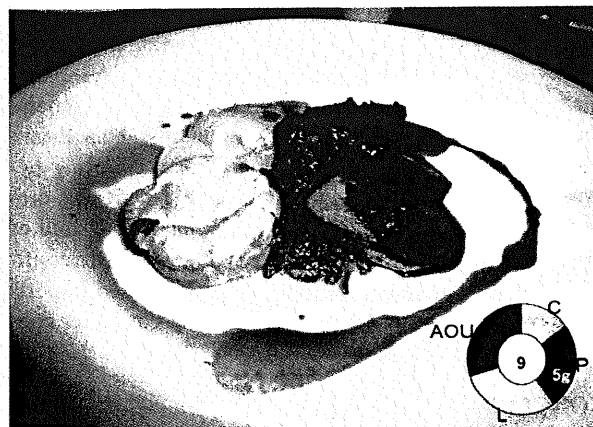


Figure 6. Food icon on the menu, showing Energy and composition of C, P, F and antioxidant unit (AOU) as a surrogate marker of fruit and vegetables. C; carbohydrate, P; protein, L; lipid, AOU; antioxidant unit.

breakfast, lunch and dinner. In children and adolescents, the body weight multiplier is 1.0 for 10-19 kg body weight, 0.9 for 20-29 kg, 0.8 for 30-39 kg, 0.7 for 40-49 kg, 0.6 for 50-59 kg, and 0.5 for 60-69 kg. The calculated values fit well with those of the dietary reference intake 2010.¹⁵ Desired body weight can be used for the calculation if an individual is overweight or underweight.

If E-units are shown on food labels and restaurant menus, and become popular, this would facilitate control

Table 1. Recommended energy intake by DRI2010 in Japan and calculated energy intake by E-unit system

	Age range	Recommended Energy Intake by PA			kg ^{*1}	Energy Intake by E-unit System		
		PAI	PAII	PAIII		Factor	b.w.*0.4	b.w.*0.5
Male	0-5M		550					
	6-8M		650					
	9-11M		700					
	1-2Y		1000		11.7	1.0	936	
	3-5Y		1330		16.2	1.0	1296	
	6-7Y	1350	1550	1700	22.0	0.9	1584	
	8-9Y	1600	1800	2050	27.5	0.9	1980	
	10-11Y	1950	2250	2500	35.5	0.8	2272	
	12-14Y	2200	2500	2750	48.0	0.7	2688	
	15-17Y	2450	2750	3100	58.4	0.6	2803	
	18-28Y	2250	2650	3000	63.0	0.5	2520	2520
	30-49Y	2300	2650	3050	68.5	0.4	2192	2740
	50-69Y	2100	2450	2800	65.0	0.4	2080	2600
70<	1850	2200	2500	59.7	0.4	1910	2388	
Female	0-5M		500					
	6-8M		600					
	9-11M		650					
	1-2Y		900		11.0	1.0	880	
	3-5Y		1250		16.2	1.0	1296	
	6-7Y	1250	1450	1650	22.0	0.9	1584	
	8-9Y	1500	1700	1900	27.2	0.9	1958	
	10-11Y	1750	2000	2250	34.5	0.8	2208	
	12-14Y	2000	2250	2550	46.0	0.7	2576	
	15-17Y	2000	2250	2500	50.6	0.6	2429	
	18-28Y	1700	1950	2250	50.6	0.5	2024	2024
	30-49Y	1750	2000	2300	53.0	0.4	1696	2120
	50-69Y	1650	1950	2200	53.6	0.4	1715	2144
70<	1450	1700	2000	49.0	0.4	1568	1960	

Recommended energy intake by physical activity (PA) is referred from DRI2010

*1 Standard body weight in DRI2010 in Japan²

Energy is expressed by calorie in the table.

of energy intake for all people (Figure 6). It may be necessary to include E-unit in the standardization and proper quality of agricultural and forestry products (JAS Law), because all consumables (food and beverages) for general consumers are subject to quality standards. This E-unit would be very useful for consumers when choosing between foods. This new energy unit and system was created in response to requests for unified and simplified of foods. This was viewed as necessary due to the diversification of food products resulting from increased imports and new foods on the one hand and rising consumer concerns about diet on the other.

CONCLUDING REMARK

The Food Safety Commission has developed a linkage between the Cabinet Office, Ministry of Health, Labour and Welfare, Ministry of Agriculture, Forestry and Fishery, and the International Organization for analysing information and scientifically assess risks. Shoku-iku (Food and dietary education throughout life) is effective to educate people. The newly established consumer agency should enable faster response to emergencies. A new food labeling system is necessary for producers, providers and consumers so that a healthier society can be formed where we would employ a new energy-unit (80 kcal) for individual energy and nutrient intake as tailor-made nutrition.

AUTHOR DISCLOSURES

Any of the authors does not have conflict with any company.

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由消費者的觀點來看食品安全與食品標示

在 2001 年發生狂牛症事件之後，日本民衆漸漸開始質疑食品的安全性。於是日本在內閣府下成立食品安全委員會並且在各部會之間組成一個連繫網路。新成立的消費者服務處加強對緊急事件的快速回應。內閣府與相關部會及非政府組織合作執行食品教育(食品及膳食教育)法。本文對日本食品衛生法及健康促進法做簡短的說明，並敘述功能性營養學的必要性，以研究非營養但具生物活性的物質。關於公共衛生營養，依個體需要而設計的營養已發展出一種新的食品標示，可以顯示熱量平衡及用抗氧化單位(AOU)作為水果及蔬菜的替代指標，這可使每個人更容易控制熱量攝取。

關鍵字：食品安全、特定保健食品(FOSHU)、功能性營養學、功能性食品因子(FFF)、食品標示

Original Article

A Food in Health Security (FIHS) platform in the Asia-Pacific Region: the way forward

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The advent of multiple global crises, especially those of climate change, economics, energy, water, food and health evident in 2008, is of considerable moment to those who are suffering their consequences and for those with responsibility and interest in the systems affected. A coalition of parties in the Asia Pacific Region who work in the food and health systems met in August, 2009 in Taiwan and instigated a Food in Health Security (FIHS) Network which might join with other like-minded networks in and beyond the region. Sustainable health has many dimensions, among which food and nutrition is often neglected; there is a wide spectrum of nutritionally-related disorders. Malnutrition remains the global concern for agricultural research and development scientists and linkage with the health sector is key to progress. The disconnect between agricultural and health sectors negatively impacts consumer nutrition and health. Ethical and equity affect food and health systems. Food and health security is attainable only when the underlying social inequities are addressed; it is an ethical issue as reflected in the UN Universal declaration of Human Rights which includes the right to food for health and well-being. Food and health security are part of the larger security agenda and merit corresponding attention. Policy recommendations with immediacy are greater investment in combined food and health research; an Asia Pacific security agenda which emphasizes planetary, human, health and food security as relevant to traditional defence security; and community and household security measures which include maternal literacy, communication technology and entrepreneurial opportunity.

Key words: human security, planetary health, agriculture, social determinants, ethics, systems, network

A NEW ERA OF INSECURITY FOR FOOD AND HEALTH

We live in a new and changing era, characterised by a conjunction of novel threats.¹ Traditional security struggles over power, religion, politics and resources persist, especially to guarantee food, water, minerals and territory. But what is now different – and critical – is a growing appreciation of the near exhaustion of many essential planetary reserves. These are needed not only to

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satisfy a global population larger than ever and predicted to increase by about a third by 2050, but one that is in some situations or places older and frailer and, in others, younger, overweight and with life expectancies which may not equal their parents, especially because of less nourishing diets. Almost everywhere, people demand, hope and expect more.^{2,3} As our numbers and consumption rise, the desirable habitats available for our peripatetic human species shrink, especially per capita. Though humans are remarkably adaptable, the high environmental cost of our habits, unless altered, seems destined to create a future environment to which it will be hard for millions, even billions, to adapt.

Complicating these issues, the ancient human practice of physical conquest has mutated to an excessive, scarcely regulated financial system. Financiers have been rewarded for transferring risk and debt to less powerful individuals and populations who are physically, financially and culturally remote.⁴ To prevent complete collapse of this financial system, most high income governments have borrowed heavily from the future. In high income countries, many vulnerable people have lost jobs, houses and savings. In low income countries many additional people have been forced into hunger and worsened nutrition. The prospects for global financial recovery remain uncertain, not only because many questionable banking excesses remain uncorrected, but because the erosion of natural stocks^{5,6} will increasingly interact with the financial crisis (Figure 1). As Margaret Atwood argues in her 2008 CBC Massey lectures,⁴ our debt is not only to the future but to the planet; it is both financial and material. While it is conceivable that more creative, substantial and strategic investment in science and technology (S&T) will ameliorate this situation⁷ our natural debt will not be cancelled.

At its best, S&T will only partly resolve our dilemma;

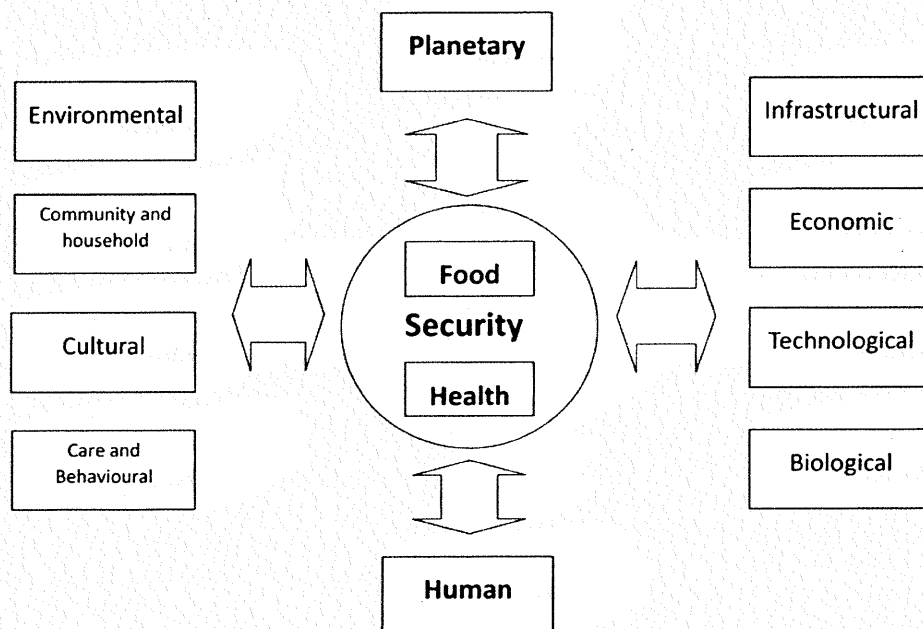
we need also good governance, community engagement, and conflict resolution.⁸ Today, personal, household and community insecurity is more widespread across national, regional and socioeconomic boundaries than at any time since the 2nd World War of the 20th century. This crisis demands problem-solving strategies which must confront the “big picture” challenges of climate change, increased global connectedness, and a stressed, near bankrupt financial system and yet provide a local household and community focus.⁹

This is particularly so for health and food security.^{10,11} Ideally, these systems could co-operate to minimize adverse health outcomes and to limit food related health risks. In reality, there is insufficient appreciation of the impending shifts in health profiles from present and future food system instability, and the likely exacerbation of associated social, nutrition and health inequities.¹¹⁻¹³

First, however, we need to review what we mean by “food security”, “health security” and “food in health security”. Connections among these are shown in Figure 1.

Health security

Health security is essential for human security. For many populations, hygiene is inculcated and sanitation provided, in order to minimise microbiological and chemical risk, and to promote food safety. In some places, environmental contamination controls co-exist with occupational safety. However, such protection depends on the existence of and the access to evidence-based, equitable and affordable preventive health, diagnostic and management measures. For many, fear of destitution due to catastrophic illness or even moderate injury is real, especially in societies that lack population-supported health systems.



Forms of Security and their Connections for FIHS

Figure 1. The connectedness of planetary and human security: related and contextual types of security for food and health

Food security

Food security is largely the converse of food insecurity. It has been defined as “physical and economic access to sufficient, safe, nutritious, and culturally acceptable food to meet dietary needs.”¹⁴ Lack of food security includes fear of running out of food or the means to buy it, and risk of reduced food intake or quality.^{12,15} Food security extends beyond safety and sufficiency to sustainability and satisfaction (food diversity and quality).¹²

Food in health security (FIHS)

FIHS can be conceptualised as “coherent and sustainable health and agricultural (food-producing) policies, at both national and international scales, guided by ethics and equity, a relevant action plan and evaluatory processes for policy improvement”. Here “agriculture” is used to mean the broad range of primary food production ranging from seed crops to livestock, agriforestry, horticulture, apiary, and aquaculture. Foods so produced may have been subject to traditional or bioengineered breeding.

Second, we explore our understanding of the role of food in regional health.^{16,17}

FROM A FIHS ROUNDTABLE TO PLATFORM TO NETWORK

Most attention to food security has been paid by the United Nations (UN) System

The UN System Network on Rural Development and Food Security (RDFS) was established in 1997 as a follow-up to the World Food Summit (1996). It comprises 20 UN organizations including FAO (Food and Agricultural Organization), the WFP (World Food Program) and IFAD (International Fund for Agricultural Development). It operates at country level in a broadly representative way (from UN organizations, governments, donors, NGOs, civil society and the private sector). It supports the International Land Coalition¹⁸ which is of increasing relevance as arable land becomes more scarce and its ownership is being internationalized¹⁹ against a changing back-drop and diverse scenarios for land reform.²⁰ Its goals are “food for all” and rural poverty reduction. There are national Thematic Groups (TGs) for rural development and food security. It has developed a Special Programme for Food Security (SPFS) and Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS). The International Alliance Against Hunger was approved at the second World Food Summit in Rome in 2002. Tracking these developments from the RDFS web-site is helpful. Of a more interactive nature, for those not organizationally or usually involved, is the FAO Food security forum web-site.¹⁸ Regionally there is the Asia-Pacific Network for Food and Nutrition (ANFN), which speaks to the particular needs of this region. There are other coalitions which have a stake in Asia Pacific food security such as APEC (Asia Pacific Economic Cooperation) and UN-ESCAP (United Nations Economic and Social Commission for the Asia Pacific Sustainable Agriculture and Food Security in the Asia Pacific).²¹

Recently, Pacific Island Health Ministers convened with WPRO-WHO in Madang, Papua New Guinea to consider food security as a vital issue in the South Pacific and “appealed to all sectors of the community to support

local food production and to demand access to a healthier range of imported foods...[and] encourage pride in local food, promote local industry, facilitate trade in healthy food, and help tackle mounting health problems arising from poor nutrition.”²²

Food security is linked to resource availability, affordability and sustainability. Natural resources that are critical for food and human security are energy,^{5,23,24} water, land, and fertilizers. Central to human security are people themselves – the human resource – and their health. Food and health security among humans is determined by wider social resources including economic growth, daily living conditions, distribution of technical developments and expression of human rights. Each of these resource security issues is part of a security matrix, and is dealt with in the FIHS papers.^{25,26}

What follows is a focus on the natural resources of energy, water, fertilizers (especially phosphorous) which are increasingly limited, notwithstanding the contribution which, social and human resources as part of the security matrix can make.

Energy

Energy is perhaps uppermost in the public mind because it must be purchased or accessed on a daily basis for food preparation, lighting, and warmth or cooling, transport and communication. But its pervasion of the entire food chain is not so apparent.

Water

In the case of water, its essentiality to food production, processing and consumption is also grossly underestimated.²⁶ The annual report by the Pacific Institute and the Water Footprint Network in California and others are speaking of “peak ecological water” and how the world is in danger of running out of “sustainably managed water” according to Peter Gleick.²⁷

David Zhang at the University of Hong Kong provides evidence that water shortage has been the basis of multiple conflicts in the past and is even more likely to be in the future as climate change accelerates. “Good water management is part of peace building.”²⁸ There is an Asia Pacific Water Forum²⁹ which provides opportunities to develop and address these concerns in the region.

The purposes to which *arable land* are put are increasingly critical. It is being lost to “development” which may be residential, industrial, or recreational (e.g., golf courses). It may grow biofuels, substances of abuse like tobacco, and betel nut (especially in Taiwan where it also accounts for loss of forest and increased risk of landslides in typhoons). The question of eco-system loss even for food and its effects on human health is much more pressing as more and more buffer zones disappear.³⁰ The efficiencies of different farming methods depend on traditional use and social structures, soil integrity, location, and proximity to markets. These situations make land ownership and reform in the interest of poverty reduction and improved security a complicated matter.²⁰

Fertilizers

Fertilizers have been essential for most agriculture which has not recycled excreta. The needs have been notably for

nitrogen (which currently comes mostly from ammonia produced from fossil fuels), phosphorus (from phosphate rock or deposits of avian excreta) and zinc (which is depleted in some agricultural regions like the Middle East, along with other minerals. The “*phosphorus* peak” may be upon us like the “fossil fuel” and “water” peaks, which means that the accessible world supply of this fertilizer is precariously low and yet it is essential for every living thing which needs ATP (adenosine triphosphate) as the ultimate energy source for cellular function.^{2,3,31} We cannot expect another fertilizer dependent “green revolution” to meet the prospective population increase by about 3 billion to 9.5 billion by 2050. Other approaches will be required, and some of them will be new food production and post-harvest salvage technologies.³² The same applies to meeting water and increased food requirements.²⁶

All the FAO initiatives support the Millennium Development Goals (MDGs) of the UN System³³ and their targets for 2015, to which a little progress has been made. The first and foremost goal is the reduction of poverty and hunger, whose linkage is well-recognized. One of the most notable achievement has been the reduction of under-5 child mortality from 1990 to 2008 by about 40 per cent world-wide, but with the slowest reductions in Sub-Saharan Africa.³⁴ Even so, progress is slower than required in many areas and has reversed for hunger, especially since 2007.

While the MDGs represent a cohesive approach to food in health security amongst the international agencies, which is further manifest by the work of the UN-SCN (UN Standing Committee on Nutrition), much more needs to be done. It now seems that several UN agencies will develop mapping, tracking, evaluatory, and response strategies conducive to FIHS. Not only does FAO have a mapping approach to food security, but WHO and the UN-SCN has a global and country “Landscape Analysis” program to accelerate action in nutrition.³⁵

Since the concurrent advent of the 2007-2008 climate change, energy, financial and food crises there have been several high level conferences, principally in the UN System, to understand and act to resolve these serious issues. The UN Secretary-General, Ban Ki-moon, established a Task Force on the Global Food Security Crisis in April, 2008.³⁶

We were stimulated to review the situation for the Asia Pacific Region, but with a health security focus. It has been apparent that the food production, processing and retail sector in the Asia Pacific region has not been working closely or with mutual appreciation of the health sector, at least in regard to the current and potential types and levels of security concern.^{1-3,7,11,13} An encouraging development has been the development of a global education network in Australia which has, amongst many topics and issues that of food security.³⁷ It involves all levels of education from school to higher education and is an example of what a platform of sound information and learning experiences might achieve.

Against this background we established a FIHS roundtable of experts and stakeholders and for which background papers were prepared around four themes- health, food, ethics and equity and security. This has provided an

informational platform and a newly aware network of motivated collaborators in the urgent quest for improved health security from a safe, sustainable, nutritious and affordable food supply.

WHAT ENABLED US TO DO WHAT WE ARE DOING?

The National Health Research Institutes in Zhunan, Taiwan has developed a Nutrition Consortium involving AVRDC-The World Vegetable Research Centre in Tainan, Taiwan, with major Universities, their hospitals, and with Academia Sinica.¹³ This provides a “Think Tank” for food and nutrition research, policy development and advocacy. It has worked to gain acceptance of EBN (Evidence Based Nutrition) in policy formulation in the Asia Pacific region³⁸ and encouraged leadership training in nutrition science and practice.³⁹ It saw the emergence of the tandem of food and health security concerns as a trigger for a high level roundtable. The background papers to this roundtable and their subsequent development on-line as a platform⁴⁰ extend this process. Those who participated have agreed to found a FIHS Network. Work is underway to enable it to interdigitate with complimentary networks and data bases.

The participants became increasingly aware that an urgent matter was to overcome the inherent lack of communication between health and agriculture professionals and for them to focus and engage on FIHS.

SETTING THE SCENE

The scene was very much set for the FIHS roundtable by the extreme global situation in which health and nutrition professionals found themselves in 2008. There were food shortages, rising food prices, shifts towards the consumption of cheaper less nutritious foods based on staples, refined ingredients, sugar, fat and salt, with little real biological variety generated by plant foods and with fish stocks in decline or, at least, more contaminated. The distinction between so-called “under-nutrition” and “over-nutrition” was increasingly blurred with a new spectrum of nutritionally-related disorders and diseases emerging.^{10,16,17}

The increasingly evident link between food security and health security needed to be addressed and acknowledged by those in both the food and health systems.

PROBLEM DEFINITION AND PROCESS IN A REGION DIVERSE ETHNICALLY AND SOCIO-ECONOMICALLY

The diverse populations and geography of the Asia Pacific Region dictate both customized and integrative approaches to problem definition and mitigation of health risks which relate to food. The diversity of cultural and philosophical traditions also increases the prospects for novel solutions to complex problems. Moreover, at a time of simultaneous fiscal system crisis, there may be a willingness to cooperate in reform and the creation of complementary approaches to sustainable resource management.

There is a wide variety of food stuffs available within the region provided major food-producing states can anticipate and manage the effects of climate change in concert with their neighbours. Yet food diversity so impor-

tant for health³⁰ and its distribution are likely to face increasing difficulties of equity in nutritionally-related health and security. While progress is evident, there is still intrinsic intransigence in meeting the MDGs.³³ Increasing apprehension about actual and impending crises is shared by several disciplines and failure to be on track with the MDGs confirms concern. Such professional anxiety needs to be tempered with a measure of optimism possible through an appreciation of regional geographic and biological resilience.

THE ASIA PACIFIC REGION

The Asia Pacific region is defined differently by different organizations. In taking an Asia Pacific view of FIHS, we did not want to be rigid, but rather inclusive, with a view to a successful outcome proliferating to the wider region and beyond.⁴¹

For the moment we have taken the region to include Northeast Asia and China,⁴² Southeast Asia⁴³ and Australasia/Oceania which is as extensive as the UN ESCAP coverage.²¹ This covers two of the world's most populous nations, China and Indonesia if we are focused on the Western Pacific; three of the four if we include the Eastern Pacific since that means the USA as well; and all four if we include South Asia since that includes India. At the same time, there are many small nations in the region, especially Pacific and Oceanic Island states subject to rising sea levels and limited food supplies if fish stocks and arable land are depleted. The range of food and health security scenarios is vast, but there are commonalities like natural disasters to do with the "Ring of Fire" with earthquakes and volcanic eruptions, with typhoons (northern hemisphere) and cyclones (southern hemisphere), dramatic differences in drought and flood depending on the El Nino ocean currents and loss of the Antarctic ozone layer. There are also major water security concerns with damming and inefficient or excessive irrigation from the regions river systems; with high dependency on shrinking ground water supplies.⁴⁴ We are dealing with global issues, but the regional interest and expertise can be marshalled for both regional and global needs.

Health

The main message is that sustainable health has many dimensions, among which one of the main and necessary factors, food and nutrition, is often neglected.

Obviously, humans are biological organisms, with a need to take in air, water and food, in order to live. Food is vital to provide energy (calories) or the fuel humans require to perform work, whether as thought, movement, or the physiological functioning necessary for life. Food is also vital to replenish elements and compounds necessary for work and repair, and which the body cannot make. Such substances include essential amino acids and fatty acids, elements such as zinc and iron, and some 13 vitamins. Excellent health also requires the frequent dietary consumption of substances of which less is known, such as phytochemicals, together with the minimisation of harmful molecules such as excessive saturated and trans fats and various contaminants.

Necessary as food is, every time we eat we take into our bodies something that is from the environment. In-

creasingly, the history, composition, sustainability, ethics and cleanliness of food is both unknown and largely unknowable at the point of ingestion. Eating therefore entails many risks – yet these are risks we must take.

Other dimensions of good health not further considered here include a plethora of interacting genetic, social and material factors, from our height potential to our capacity to obtain and pay for excellent health services.

Food security is essential for health security, but of course not in itself sufficient. In recent years the place of food in global health security has generally declined. Three forms of evidence support this. For very low-income populations hunger has increased. More than a hundred million people are now classed as undernourished compared to two years ago. There must also be many people who still consume sufficient energy, but who are forced by worsened poverty and high food prices to spend a greater proportion of their income than ever before on food, and whose nutrient intake is inferior, especially in terms of variety. Yet for many middle and high income populations, food in health security has also declined, leading to lower consumption of fruit and vegetables and greater obesity rates. Not only may nutritious foods be financially unaffordable, but the dominant culture and norms of many affluent populations is paradoxically impoverished nutritionally. Many affluent populations could learn from a rediscovery that "food is medicine and medicine food" (Confucius).

Moreover, the way we eat affects the environment and we can meaningfully do something about it.^{45,46} The way we eat affects our health through environmental integrity in a number of ways.³⁰ The Asia Pacific region is no exception in this regard where new forms of human infection like Nipah virus have skipped species with deafforestation in Malaysia for pig production and led to human encephalitis.

Food

The main message is that there is a wide spectrum of nutritionally-related disorders. However, malnutrition remains the abiding concern globally for agricultural research and development scientists and linkage with the health sector is a key factor through which progress can be made in the future. The disconnect between agricultural and health sectors negatively impacts consumer nutrition and health

The Agriculture and Health sectors, broadly defined, deal with the food chain from different ends. One group sees food production and the other nutrient sufficiency and quality, and this apparent disparity of views disconnects food production from consumption to the detriment of the general population. Neither is well linked through the existing commercial food sector that has its own-profit driven agenda which is not necessarily health-based. This has contributed to extensive global problems of malnutrition with extremes of under-nutrition and starvation as well as over-nutrition and obesity from inappropriate macronutrient, micronutrient and phytonutrient consumption. Such problems are exacerbated in many countries because responsibility for their amelioration is shared between several government Ministries and the responsibility of none. Malnutrition remains hidden and unre-

solved. Even where obesity is recognized as a national issue as in Japan, a top down government-led approach to address it has proven to be relatively unsuccessful.⁴⁷

The commercial food sector is now acting as the apparent gatekeeper for national diets and there is a disincentive for it to advocate good health measures when factors such as colour, taste, convenience and marketing can have a bigger influence on food sales and profits than nutrition and health. Agricultural suppliers are also essentially rewarded for quantity, cheapness and the cosmetic appearance of food products by the market chain and there is inadequate reward for ensuring either nutritional quality or the food safety of their products, especially in the developing world.⁴⁸ Consumers are bombarded by often superficial and conflicting health claims for different foods making it difficult to make informed dietary choices. Public sector representatives in Health and Agriculture need to adopt a more courageous and unified position than has been seen in the last decade and speak simply and openly about the importance of good nutrition and quality food products and how better regulation of the food industry can help to meet the health and nutritional requirements of a more informed consuming population.

The drivers of increasing insecurity of the global food system

Recent multiple outbreaks of (to date) minor civil unrest across the globe are evidence of a growing food security problem triggered by recent price rises.⁴⁹ Wealthy countries trying to assure their own food and energy supplies by large land procurements in the developing world have also contributed to this unrest.⁵⁰ Competition between food and energy suppliers for land resources can only be detrimental to humanity in the medium term if it is allowed to proceed unchecked. Such developments are symptomatic of the inequities of the current global food supply system and the relative vulnerability of small, poor countries when natural or man-made events disrupt normal market conditions. They also indicate that current food insecurity is more of a problem of local market failures rather than overall level of supply – but this could rapidly change.

Climate change and resource constraints are increasing overall insecurity in the global food system which is precariously dependent on only a few major crops. Climate change increases the uncertainty of agricultural production due to a plethora of newly virulent or more intense biotic and abiotic constraints. An even more important factor currently associated with malnutrition is nutrient maldistribution. Phosphate is an essential plant nutrient, but global agriculture is highly over-dependent on non-renewable and rapidly declining inorganic phosphate fertilizer resources controlled by a small number of countries.⁵¹ Such constraints will soon negatively impact global food security and health equity. These problems are made worse by the global reliance on a very small number of key staple crops and a lack of investment in reducing this risk by making more effective use of our existing great riches of biodiversity.

As in the case of the global automobile construction industry, the more interconnected and reliant on international transport the world's food system becomes, the

more vulnerable it seems to be to serious and chronic disruption. When such disruptions occur the poor inevitably pay the price.

An additional dimension of concern for diet security and health equity is the rapidly aging agricultural workforce and the relative unattractiveness of such employment to younger generations. In Taiwan for instance, the average age of farmers is 58 years old and landholding sizes continue to decline to less than one hectare.⁵² The problem also extends to educational institutions where central authorities have allowed the teaching of vital agricultural disciplines to wither away through funding neglect and lack of student demand.⁵³ Where then will the next generation of agricultural professionals capable of tackling the new pathological and entomological issues stemming from climate change be found? It is vital to re-energize the agricultural sector and make its employment opportunities more attractive and profitable for the next generation. Likewise, land security and the need for increased land-holding sizes to permit production efficiencies are key policy priorities for incumbent governments.

Some means of addressing diet insecurity and health inequity

The global population now needs to demand that agricultural production practices that are demonstrably unsustainable and the over-extraction of products or nutrients such as present marine fishing practices or slash and burn agriculture are replaced. But where there is no information, there is no problem and no action. A first step may be monitoring but it must lead to protecting essential agricultural inputs, careful choices of crops and livestock, safe production systems and promoting the consumption of healthy foods.

Most food we eat comes from the soil and its quality affects production. Poor soil quality is one of major reason for poverty.³¹ Soil erosion and nutrient depletion damage the physical, biological and chemical abilities of soil to sustain food production. Similarly genetic erosion of plant and animal species depletes the potential to grow new or existing crops under changing conditions, while in-situ conservation in well regulated marine reserves is essential for sustainable fisheries.⁵⁴

The choice of food systems needs to take into account their environmental demands. Legume proteins and plant oils can substitute for livestock food products and they are far less exploitative of existing water, nutrient and land resources.⁵⁴ If this requires further research and development of the world's existing great biodiversity riches then further investment into these areas of agricultural science should be immediate priorities. The locations in which these food resources are grown and then consumed need to be reassessed to be more logical and efficient. For example, transporting soybeans from South America to Africa to feed livestock which is then consumed as beef by a rich minority while the much larger majority of Africa's poor remain severely protein-rich food deprived remains a human conundrum that needs to be resolved.

Ensuring good agricultural practices for safe food production is a research and development area requiring much greater investment. In much of the world many foods are subject to excessive spraying with agricultural

chemicals, at risk from heavy metal and mycotoxin contamination or are marketed and prepared with polluted water supplies.⁴⁸ Food production systems can be environmentally sustainable, healthy and economic. Safe and sustainable production needs to be coupled with research and extension to reduce excessive waste of food commodities, particularly for vulnerable perishables such as fruit and vegetables. These are currently glaring problem areas yet can be relatively simple to solve.⁵⁶

The low level of fruit and vegetable consumption in many developing countries relative to the WHO daily minimum standard recommendations show that either a lack of knowledge of the link between balanced diets and health or the inability to obtain or afford such food items are serious constraints to human wellbeing. Research on how affordable supplies of fruit and vegetables can be made more easily and consistently available in the developing world should therefore be an important global priority.

New global advocacy efforts on the importance of fruit and vegetable consumption to maintaining human health are now urgently needed. This should be in the context of addressing vitamin A and iron deficiencies which are having a devastating impact on children in many developing countries. If a serious effort is to be made to address obesity, it should also be in the context of a better dietary pattern diet rather than mere macronutrient restriction. A positive message like substituting fruit and vegetables for starches and oils in diets could be loud and clear. High levels of community interest in food provide an opportunity for this lynch-pin to reconnect agriculture and health.

Ethics and Equity

The main message is that food and health security is attainable only with action to address the underlying social inequities. That food and health equity is an ethical issue is reflected in the UN Universal declaration of Human Rights which includes the right to food for health and well-being⁵⁷

“Everyone has the right to a standard of living adequate for the health and well-being of himself [herself] and of his [her] family, including food, clothing, and housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his [her] control.”

However, the full food security perspective of safety, sufficiency, sustainability and satisfactoriness in diversity and quality is not well-developed.

“The inequality between the rich and the poor – at the level of individuals, communities and nations – is becoming increasingly deeply felt in the area of health, thereby contributing to the desperation and injustice that prevail and continue to increase in other health-related fields such as food, income and education.”⁵⁸

Nutritional status and nutrition-related health is unevenly distributed in the Asia Pacific region

While improvements in nutritional status has been made among countries in the Asia-Pacific region, the region remains home to 62 per cent of the world's undernour-

ished and in several countries the total number of undernourished people has actually increased since 1990-92. Countries with high proportions of undernourished people include Afghanistan (61%), Tajikistan (34%), DPR of Korea (32%), Mongolia (29%), Bangladesh (27%), Cambodia (26%), Pakistan (23%), Timor-Leste (22%), India (21%), Sri Lanka (21%), and Armenia (21%).⁴¹ The burden of under-nutrition falls disproportionately on groups of lower socio-economic status.⁵⁹ Concurrently, a transition towards diets of highly refined foods and of animal source products containing high levels of saturated fats is occurring in many countries of the Asia Pacific. The increased dietary energy intake associated with the nutrition transition, together with marked reductions in energy expenditure through physical inactivity, has contributed to the rise in levels of obesity and associated non-communicable diseases including cardiovascular diseases, diabetes, and some cancers. Levels of overweight and obesity vary markedly between countries in the Asia Pacific region. While data in the region are relatively sparse, we know from international data that in all but the poorest countries, obesity is more commonly observed among the lower socio-economic groups especially among women.⁶⁰⁻⁶²

Demographic considerations for food in health security have also been explored within country with special relevance to nutritional quality using the dairy and concomitant food intake example by Lee et al.⁶³ It is evident from such analyses that equity in essential nutrient (macro and micro-nutrient) advantage may be inadequate for all age groups on account of disparity in education, financial status, ethnicity, locality and health seeking behaviour.

Matters of ethics and equity

There is no biological reason for the scale of difference in nutritional status and diet-related health that is observed in the Asia Pacific region. A standard of living, including nutrition, adequate for good health is a basic human right.⁵⁷ That these differences in nutrition and health exist, yet are avoidable, is unethical and inequitable, and could be considered an infringement of human rights and a marker of societal failure.

The nature and focus of the modern food production system poses ethical challenges. Ethical acts are acts within the food system that contribute to the greater good as a whole, in accordance with moral duties such as “do-no-harm”. The observed shift from a plant based diet to a diet rich in animal products, particularly in emerging economies, may be considered unethical through its associated pressures on already fragile food systems and worsening problems in global, regional and national food and health security e.g., by increasing antibiotic resistant crisis, viral infections and so-called chronic non-communicable diseases. Similarly, the environmental degradation associated with relatively high greenhouse gas emissions from animal source food production, greater consumption of natural resources and fishery exploitation could be considered unethical.^{57,64,65}

However, there is a case to be made that the introduction and availability of pastoral practices which have allowed the use of milk and dairy products have given nutritional advantage to Europeans, pastoral Africans and Asians and others. This has provided for increased stature

(not necessarily optimal) and for the prospects of better skeletal and dental health along with avoidance of certain micronutrient deficiencies (e.g., calcium, magnesium, riboflavin). Lee et al⁶⁶ find advantage in minimal dairy consumption; this raises the prospect that most of the world's population might benefit from a more equitable use of small amounts of dairy foods, rather than a minority (say 15-20%) from considerably larger intakes. Pastoral practice geared in this way, may be more sustainable than for meat production with animal slaughter. The analogy exists for poultry farming for eggs rather than flesh, not that these are mutually exclusive. But these are the type of research questions which must now be pursued in the realm of FIHS. They underscore the need to embrace quantity, nutritional quality and sustainability in food security for health.¹²

Underlying social causes of food and health security

Improving food and health security in the Asia Pacific region in an equitable and ethical manner is multifaceted and complex. It cannot be achieved without attention to the conditions of daily living that influence what people eat, as well as the large complex structural matters that shape societies institutions and social relations and influence the type, amount and nutritional quality of the food supply.¹¹

Promoting health equity through food and health security means tackling some of the fundamental political, economic and cultural influences on people's living conditions, their daily practices and behaviour-related risks. This means addressing issues of power, wealth and other social resources through matters of governance; national economic priorities; trade arrangements; market deregulation and foreign direct investment; fiscal and social policy. Poverty is a major determinant of food and health insecurity. Almost 650 million people in the Asia Pacific region live on less than one US dollar per day, even more on less than two US dollars per day. Already, those living on less than two US dollars a day have cut out health and education and sold or eaten their livestock. Those living on less than one US dollar a day have cut out protein and vegetables from their diet.⁶⁴ Policies, systems and processes that are inclusionary are important fundamental building blocks on which to create equitable food security. It is worth noting here the gendered experience of food and health insecurity – a classic example of embedded exclusionary norms, systems and processes. Historically women have been major contributors to each step in the food system. They gathered food (seeds, roots, leaves, berries, inflorescence, insects, eggs), fished with traps and nets for fin-fish and crustaceans, collected shellfish, grew foods in gardens and raised animals for family and for income, bartered and traded food in markets, carried them, stored them, and cooked them, not to mention the burden of work in fuel collection falling disproportionately to women.⁶⁷ Pervasive gender inequities are significantly associated with poverty, hunger, and poor health.

These macro level structural determinants affect the meso-level conditions of daily living. The immediate daily experiences among individuals and communities that are of particular relevance to food and nutrition security cut across the whole of the life course. The nutritional and

social experiences in early life and access to and quality of education, particularly that of females is critical.⁶⁷ The nature of urbanisation plays a significant role in determining food security – how cities are planned and designed to make a healthy food supply physically accessible plus the liveability of rural locations; as does the financial and psychosocial conditions of working life, and the degree of social protection provided. Within the food system, the type and distribution of food retail mechanisms and the consumer price of food plus the extent of exposure to marketing of energy-dense nutrient-poor foods each influence people's dietary behaviours on a daily basis.

At a much more micro level, food security is unequally distributed even within materially deprived subgroups of the population. Dubois and Girard⁶⁸ suggesting the influence of factors other than those socio-economic and structural in nature. Cognitive factors like knowledge and beliefs, a person's sensory preferences and sense of control over their nutritional intake and lives more generally are associated with food and nutrition security. Parmenter and colleagues⁶⁹ noted how every day people subconsciously use their technical and scientific knowledge concerning nutrients, foods and health and make choices from an ever increasing range of foodstuffs. Educational action is an important part of a comprehensive approach to enable people with skills necessary to make healthy choices.

Addressing the range of structural determinants, conditions and daily living and individual skills and attributes relating to food security and health inequity not only helps empower individuals and communities but also increases the resilience of national government and other key public sector institutions, thereby contributing to greater national, regional and global human security.

Making a nutritious, diverse and environmentally benign food supply available, accessible and acceptable to all – recommendations for action

Achieving food and health security in an equitable manner across the Asia Pacific region requires a comprehensive set of short, medium and long term intersectoral actions that focus on poverty alleviation; improved physical and financial access to an environmentally benign food supply; and which is supported by community-development initiatives.⁴¹ Within the food system, the key areas for action are as follows:

- Global and domestic food and agriculture policy based on principles of fair trade and sustainability, with inclusion of indigenous foods
- Managing the integration into the global agricultural market requires support and protection for local farmers. Lessons learnt from the Green Revolution highlight the need for a multifaceted approach to sustainable agriculture that combines technological solutions, services and better infrastructures and public policies.
- Transnational food corporations should be required to implement nutrition security and health commitments in Asia Pacific countries – as foreign direct investment expands within countries, there is space when negotiating these regulatory packages to include nutrition security.
- Legal architecture that enables food security for all

- Food safety regulations that take into account equity issues
- Protection of peri-urban agricultural land against property development
- Programs for edible planting in public lands and school
- Restricting advertisement of unhealthy foods
- Subsidizing healthy food production, taxing unhealthy foods
- Nutritious and environmentally kind food aid

Much of what is needed to ensure equity in food and health security sits within the social system. Some key areas for action include:

- The issue of food and health security cannot be tackled without linking it with land rights and tenure, income, work and social security. Consider Food-for-Work and employment guarantee schemes, and diversification of rural livelihoods
- Sustainable social policy based on real costs of living including good nutrition
- Female empowerment, a central component of food and health security, requires removing barriers to education and income generation. Within education this requires action to address issues of access, quality and cultural appropriateness. Measures are needed to attract quality teachers, provision of more accessible schools and classrooms, culturally relevant materials and reduce family out of pocket expenditure on school materials.

At the individual level nutrition and health education and skill development (community kitchens, cooking classes, food and nutrition education, gardening, food budgeting) form an important component of a comprehensive approach to food and health security.

The health sector has traditionally been the sector where responsibility for health security policy and practice is located. Many of the actions required to address food and health security in an equitable and sustainable manner lie outside of the health sector. Working across sectors towards a goal of food and health security requires integrated interdisciplinary working and appropriate workforce competencies. It requires adequate data and information systems to provide the necessary evidence base with which to inform action in health, agriculture, environment and social policy sectors with the aim of affecting equity in food and health security.⁶⁸ There is much more research needed that delineates the pathways between food, agriculture, social and health systems and, perhaps more importantly, seeks to understand how to effect positive change in each such that food and health security is possible for all social groups and nations.

Ensuring equitable provision of a nutritious food supply is a major global, regional and national security issue with profound implications for human development based on principles of economic, environmental sustainability and equity. Enabling all groups in society to contribute to such development is critical. So too is the endeavour to ensure that all communities and individuals have both physical access to food sources, and the financial resources required for making healthful food choices. Attention to the drivers of food and health security means

attention to underlying social conditions and their distribution. These are matters of economic, agricultural, social and health policy.

Security

The Main Message is that food in health security is intimately linked as a critical component of broader concepts of human and national security

We need to be clear about what we mean by the term *security* in this context and need to understand that even within this area it has been used in a variety of ways by different authors. The most basic distinction is between the more traditional uses of the term and more recent extensions into whole new areas of interest. Originally, the term referred to the imperative of the nation state to ensure its territorial integrity and control over its designated space, as well as safeguarding the economic and social interests of its citizens. Since, in theory at least, the state is the only legitimate user of force in the pursuit of its goals, security became synonymous with the development of the state's military capacity to defend these vital interests. More recently, however, through what is generally known as *extended security*, these interests have been expanded to include concern for a much wider range of potential threats that may impinge on the well-being of the state and its citizens. Here would be included, for example, environmental threats of various kinds. But there has also been debate about whose interests are to be protected: the human race at large, the citizens of a particular state, the individual or some specific community or region? What if these interests clash in particular circumstances, whose interests are to be paramount? The concept of *human security* has evolved to explore these complex issues, and it is probably true to say that most commentators in this field would give particular prominence to the rights of the individual. The United Nations has asserted that all people should be free from threats such as chronic disease or hunger, and from any kind of repression that threatens their safety or their ability to lead normal lives.

Thus health and food security are central to the debate about current and future threats to human security. However it is important to recognise that while food security and health security are closely linked, and both are essential elements of broader human security situations, they are not the same thing, and similarly food security and food safety are analytically distinct concepts. In much past work in this general field there has been an unfortunate separation between work on health and on food, and our approach here is to link the two areas and explore the nature of the important linkages between them, but we must be careful to understand the precise nature of the mechanisms involved. One way to develop such an analysis is to break down the concept of food security, as in the paper by McKay,¹ into three key components:

- *Food availability*: which measures the total food supply that can be accessed from local and other sources. Questions of the *reliability* of this supply are often included here as well.

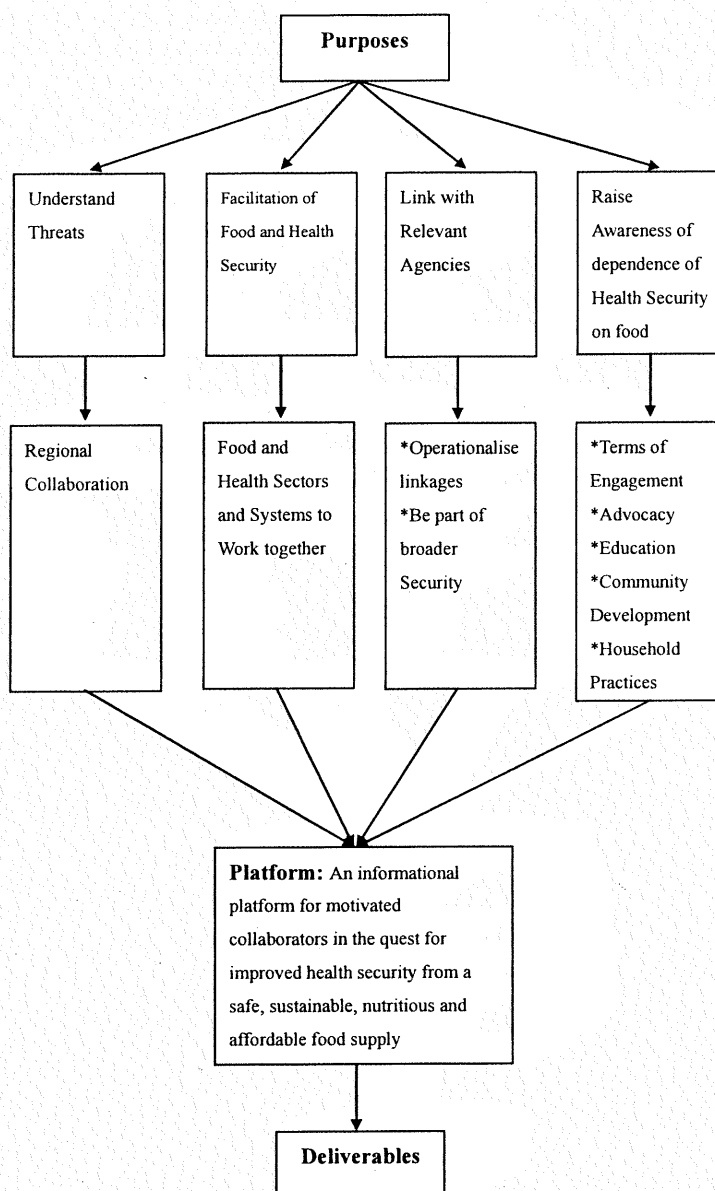


Figure 2. Conceptual network (Based on Wahlqvist ML and Kuo KN, 2009)¹²

- *Food access*: which evaluates the entitlement of people to an adequate food supply – which includes issues of power of various kinds – and their ability to access in various ways of purchase the inputs necessary to produce their own food or to buy an adequate amount of food.
- *Food utilisation*: which measures the capacity of individuals to utilise and absorb the nutrients in the food that they eat, including micronutrients. This concept raises issues of food safety and quality and evaluates the adequacy of hygiene, sanitation and food preparation facilities in local communities.

In all three of these elements the importance of *sustainability* is also included.

Clearly, various health issues can start to be explored using such a classification, but more work of a conceptual and integrative nature is needed in this area. Similarly we need to look closely at the whole area of health security and explore ways in which food and food security need to

be integrated as key elements in the future health security situation in the region. As several papers from the FHIS roundtable make clear,^{55,70,41} and in particular Chiu *et al.*, the area has so far been dominated by concerns about new kinds of infections, threats of pandemics and the alleviation of the impacts of terrorist attacks and several kinds of natural disasters. However issues of food availability and food safety are now attracting much more attention. As Chiu *et al.* and others emphasise, many of these problems can be traced back to basic issues of poverty and underdevelopment, and these can provide the ultimate link between these different areas of inquiry.

Building on such analytical work we need to develop a much better understanding of the food and health situation in the Asia Pacific region. Most evaluations of food supply adequacy have concentrated simply on food availability, with perhaps some concern for the reliability of supplies and in particular the problems of seasonal hunger. Much less attention has been given to issues of food ac-

cess, and questions of food utilisation have been rather poorly understood. Yet one of the key imperatives identified during the roundtable was the need for a diet that is nutritious and varied: indeed this is a key meeting point for the concepts of health security and food security. Participants agreed that there is an urgent need to undertake a new inventory of the food security situation in the Asia Pacific, but unlike earlier exercises of this kind the approach must link issues of food availability with those of food access and food utilisation: this would provide a much more complete picture and link food with a range of health issues.

Concern was also expressed about the possibility that food shortages and competition for scarce food resources might become so severe in the future that they might spill over into forms of instability, tension and even conflict.

Such turmoil might impact directly on the region, but perhaps the most immediate concern is that attempts by Asian governments or companies to safeguard the food supplies of their citizens by concluding land sale or leasing agreements in other regions, notably in Africa. There are already signs that such land deals can cause serious resentment, as in the recent traumatic change of government in Madagascar. Again, much more serious research and evaluation is needed to gauge the costs and benefits of these arrangements.

WHAT HAVE WE FOUND AND WHAT HAVE WE LEARNED?

We have a conceptual framework with which to link our purposes to action (Figure 2).

It reflects the decision of the round table participants to co-operate in and build a FIHS Network. This will require a dynamic knowledge platform using the increasingly competent informatics tools to process, customize, target, monitor and revise strategies in a learning and capacity-building way.

It is envisaged that this will begin in a conventional web-based fashion and rapidly evolve into a cost-effective approach. There is no illusion, however, that this is other than an initiative of a vulnerable species, *Homo Sapiens sapiens*, at a critical point in survival mode. We do take some strength from the evidence that various knowledge systems are now working together more and more effectively towards similar goals. An example with which two of us have been involved is the ICSU (International Science Council)⁷¹ initiative, the Sciences for Health and Well-Being (SHWB) which brings together all the major domains of science (earth, atmospheric, biomedical, socio-behavioural and engineering) towards this end⁷² (Jaron and Wahlqvist, personal communication).

The need for a systems approach, in this case principally food and health, was the premise of the round-table. But the required interdigitation with education, informatics, telecommunications, energy, water, town-planning, architecture, transport, environmental science, economics, socio-cultural sciences and much more is evident, demanding, supportive and refreshing.

The poor and vulnerable are ill-served by the current status quo.⁷³ Poverty alleviation with respectful and inspiring approaches to improve food security and health in general is required. This is not easy at any time and will

not be any easier as government and non-government organization budgets shrink. What seems clear is that households and communities must be enabled to build and develop irrespective of the broader difficulties; they can also network together in ways that helped community survival in the past, with household and community gardens and subsistence food production, sharing and bartering.⁹ Now, however, mobile communication technology and more available information can improve decision-making, enlarge and informally structure economic units so that they are functional and productive. We envisage that there can be "FIHS" Education into the wider community, with greater relevant literacy and empowerment of the underprivileged and vulnerable. We do not doubt that this transfer of FIHS Network capacity will be complex.

WHERE ARE WE HEADING?

We, together, at the conclusion of the FIHS round-table in Taiwan on August 5th 2009 become the foundation participants in a FIHS Network. Public and planetary good are the over-arching aspirations of the FIHS Network.

We have a "Grand Vision", against the present odds, that some simple measures, like more available, sustainable and affordable vegetable production and/or aquaculture and poultry with egg production might allow substantial gains in health protection. We would use the FIHS Network to promote this.

There will need to be better governance of food and health systems and greater inter-sectoral research and program development. Multidisciplinary collaboration will be essential to effectively advance FIHS.

Ways need to be found for markets to be more effective and for pricing mechanisms to be improved.

Publications of various kinds, as well as the quest for so-called "high impact scientific journal" papers gains recognition and makes clear the evidential base for FIHS. The Network espouses EBN.

With these various measures in place, the role of the FIHS Network in advocacy will be enhanced. It will engage in wide-ranging dialogue to develop its collaborative reach.

The FIHS Network will assist in the "Building the food and health security promotional capacity" of various academic and, community institutions, it will encourage career development and seek to inspire young people to be involved in and contribute to quality food and health systems.

Our target audiences and end users are communities, households, relevant institutions and regional authorities and agencies.

We will communicate the FIHS Network development to:

- APEC, ASEAN (Association of South East Asia Nations), APAARI (Asia Pacific Association of Agricultural Research Institutions), Asia-Pacific Network for Food and Nutrition (ANFN), UN System Network on Rural Development and Food Security (RDFS), UN-ESCAP United Nations Economic and Social Commission for the Asia Pacific Sustainable Agriculture and Food Security in the Asia Pacific, WPRO-WHO (Western Pacific Regional Office of WHO), the CGIAR system (Centres for International Agricultural Research), especially IFPRI (International Food Policy

Research) in its work with WHO and other international agencies.

- Nutrition societies, scientific unions, ICSU, IUNS, IUFOST (International Union of Food Science and Technology), and various conferences, other cognate disciplines, food producers, and health services.

We make some policy recommendations which we regard as of immediate importance:

- Greater investment in combined food and health research.
- An Asia Pacific security agenda which emphasizes planetary, human, health and food security as complementary and of considerable benefit to traditional defense security insofar as future conflict is more likely to be related to food, water, energy and health
- Community and household security measures which include maternal literacy, communication technology and entrepreneurial opportunity.

MANAGEMENT AND EXECUTION

The National Health Research Institutes and AVRDC—The World Vegetable Research Center will jointly provide the facility for the FIHS Network.

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No author has a conflict of interest in regard to the content of this paper other than Dr Greg Walsh who has interests in the Australian dairy and livestock industry or where indicated by the stated affiliation

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Original Article

A Food in Health Security (FIHS) platform in the Asia-Pacific Region: the way forward

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