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EDITORIAL

Food security, food systems and food sovereignty in the 21st century: A new paradigm required to meet Sustainable Development Goals

'. . . We envisage a world free of poverty, hunger, disease and want, where all life can thrive. We envisage a world free of fear and violence. A world with universal literacy. A world with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being are assured. A world where we reaffirm our commitments regarding the human right to safe drinking water and sanitation and where there is improved hygiene; and where food is sufficient, safe, affordable and nutritious. A world where human habitats are safe, resilient and sustainable and where there is universal access to affordable, reliable and sustainable energy.'

In the current socio-political climate, these words may sound like the opening to a fairy tale. They are, in fact, an excerpt from the vision of the United Nations' Sustainable Development Goals (SDGs),[1] recently endorsed by heads of state and government, and high representatives at the United Nations (UN) headquarters in New York. It is noteworthy that the 2015 meeting at which the SDGs were affirmed also marked the 70th anniversary of the UN. The SDGs follow on from the Millenium Development Goals (MDGs)[2] that were adopted by world leaders at the Millennium Summit held in September 2000. The MDGs were quantified targets for addressing extreme poverty in its many dimensions, including income poverty, hunger, disease, lack of adequate shelter and exclusion—while at the same time, promoting gender equality, education and environmental sustainability. By 2015, progress towards meeting the MDGs had been uneven.[3] Notably, in Africa and least developed countries, some of the MDGs remain off-track, in particular those related to maternal, newborn and child health and to reproductive health.

Through the SDGs, the UN recommits itself to the full realisation of all the MDGs, including the off-track ones, by providing focussed and scaled-up assistance to least developed nations, in line with relevant support programmes. The SDGs seek to complete what the MDGs did not achieve, particularly in reaching the most vulnerable. Importantly, the SDGs hold all countries to account. The seventeen SDGs, with their 169 associated targets, focus on human rights—the rights of each person on the planet to food, health, education, shelter and security—as well as equity.

The goals and targets represent a supremely ambitious and transformational vision which will require cooperation not only between governments of different countries and regions, both north and south, but also between sectors such as agriculture, health, technology, economic development and climate change. The global issues of hunger, food poverty and undernutrition are common themes within both the MDGs and their successor SDGs. In the context of food security, the SDGs challenge nutrition professionals and policy makers to think broadly about potential solutions that encompass non-traditional approaches.

This first issue of the *Nutrition & Dietetics* for 2016 focuses on food security. As an introduction to the broad spectrum of papers contained therein, this review will consider current definitions of food insecurity and then go on to discuss how to address the determinants of food insecurity (Table 1)[4] within a new paradigm defined by the SDGs, as follows:

- **People** (end poverty and hunger);
- **Planet** (ensure sustainability of resources and arrest climate change);
- **Prosperity** (encourage equity and promote technological advancement); and
- **Peace Partnership** (strengthen global solidarity).

The review will also consider training and educational needs for public health nutritionists and dietitians to become competent in this complex and multidimensional area of practice.

Food and nutrition security: definitions and concepts

Food security is commonly defined as the physical, social and economic ability to access sufficient, safe and nutritious food.[5,6] The four pillars of food security that are intrinsic to this definition are availability of food, stability of the food supply, access to adequate food and utilisation of food (Table 1). While not always explicit, each pillar contains nutrition considerations and components crucial to the links in the chain between national food economies, households and individual well-being.

Undernourishment may be considered 'an extreme form of food insecurity', defined as the state 'when caloric intake is below the minimum dietary energy requirement'.[7] Hunger, on the other hand, may be described as 'the uneasy or painful sensation caused by a lack of food . . . the recurrent and involuntary lack of access to food'.[8] 'Hidden hunger' is the term used to refer to micronutrient deficiencies which affect around 2 billion people worldwide.[7]

The term nutrition security is sometimes used interchangeably with food insecurity,[6] but in fact the definition is

Table 1 Four pillars of food security[4]

Pillar	*Determinant factors*
Availability (of food supplies)	• Domestic production • Import capacity • Food stocks • Food aid
Accessibility (physical and economic access to food)	• Purchasing power • Income of population • Transport and market infrastructure
Utilization (of food)	• Food safety • Hygiene and manufacturing practices applied in: primary agricultural production, harvesting and storage; food processing; transportation, retail, households • Diet quality and diversity: meeting needs in terms of energy, macro- and micronutrients
Stability (of food supply and access)	• Weather variability • Price fluctuations • Political factors • Economic factors

Adapted from: http://www.unicef.org/albania/Food_Security_ANG.pdf. Accessed 18 December 2015.

much broader. Food security is necessary, but not sufficient for nutrition security.[6] Nutrition security considers care, health, and hygiene practices in addition to food security. The Food and Agriculture Organization (FAO) defines nutrition security as 'A situation that exists when secure access to an appropriately nutritious diet is coupled with a sanitary environment, adequate health services and care, in order to ensure a healthy and active life for all household members'.[7]

It has been proposed that the two terms should be brought together as 'food and nutrition security' to better reflect the importance of nutrition's role in sustainable food security and make the explicit distinction between quantity (energy) and quality (dietary diversity) at the individual level. In this regard, the conceptual framework proposed by the Food Insecurity and Vulnerability Information and Mapping System (FIVIMS)[9] provides a useful guide for intervention points for inter-sectoral nutrition activities to address food insecurity (Figure 1). FIVIMS is an inter-agency initiative, with FAO acting as a secretariat, set up to monitor progress in achieving the World Food Summit goal for eradicating hunger and achieving food security. Similar to the UNICEF conceptual framework for causes of malnutrition[10,11] in women and children, the FIVIMS model includes health and care components but includes all population sectors, with specific emphasis on the role of the food economy. The FIVIMS framework promotes food and agriculture-based strategies to increase access to and consumption of adequately diversified diets. However, it also takes cognisance of the fact that improved availability, stability and access to food at aggregate levels does not necessarily imply improved energy and nutrient intake at individual levels. The inter-connectedness between links in the chain is clearly demonstrated by this framework.

A new paradigm to address food insecurity

People: end poverty and hunger: There is little doubt that poverty is the major contributor to food insecurity. It is estimated that 1.2 billion people live in extreme poverty and about 870 million are undernourished globally.[12] Strategies to improve livelihoods and income of the poorest sectors of communities are essential to achieve food security for all.

Who is at risk of food insecurity in Australia? While Australia and other OECD countries may enjoy a relatively high standard of living, and there is widespread availability of sufficient food, in terms of quantity, there is evidence that some sectors are unable to access healthy foods required for a nutritious diet. The affordability of food can be assessed by costing a specific selection of healthy items, and expressed as a percentage of total household income. Information collected using healthy food basket surveys can be compared against the Consumer Price Index (CPI) for the same period, to account for changes in inflation and to assess relative affordability of nutritious foods. There are a number of healthy food basket surveys conducted across states and territories in Australia. While specific food items included within the various basket surveys may differ slightly, they generally reflect the Australian Guide to Healthy Eating. For example, the biennial Illawarra Healthy Food Basket survey that has collected data since 2000 consists of a basket of 57 foods, designed to meet the weekly nutritional requirements of a family of five in the region. The healthy food basket cost $345 per week in 2011, representing a 71% increase from 2000, which was equivalent to 34% of average weekly earnings, or 36% of welfare payments. Over a 10-year period between 2000 and 2010, increases in the cost of a healthy food basket remained in line with the CPI, as well as with increases in average weekly earnings and welfare benefits, which indicates that healthy food choices remained affordable.[13] However, disproportionate increases in fruit and vegetable prices during that time period made healthy food choices difficult for low income families.

Even within one local government area, prices of healthy food baskets can differ. In Victoria, accessibility to healthy food decreased significantly between inner, middle and outer suburbs, with outer suburbs using proportionately more of their income on the food basket.[14] Food prices are known to be even higher in remote and rural locations where residents may rely largely on a single local store for food purchases and may have limited food choices, in terms of variety and quality, particularly for fresh produce, accompanied by transportation difficulties. In these areas, the cost of healthy foods has risen more than the cost of some less nutritious foods, making the latter relatively more affordable.

In Queensland, in 2010, the cost of the Healthy Food Access Basket in *very remote* areas was 26–31% higher than in major cities, while the cost of fruit, vegetables and

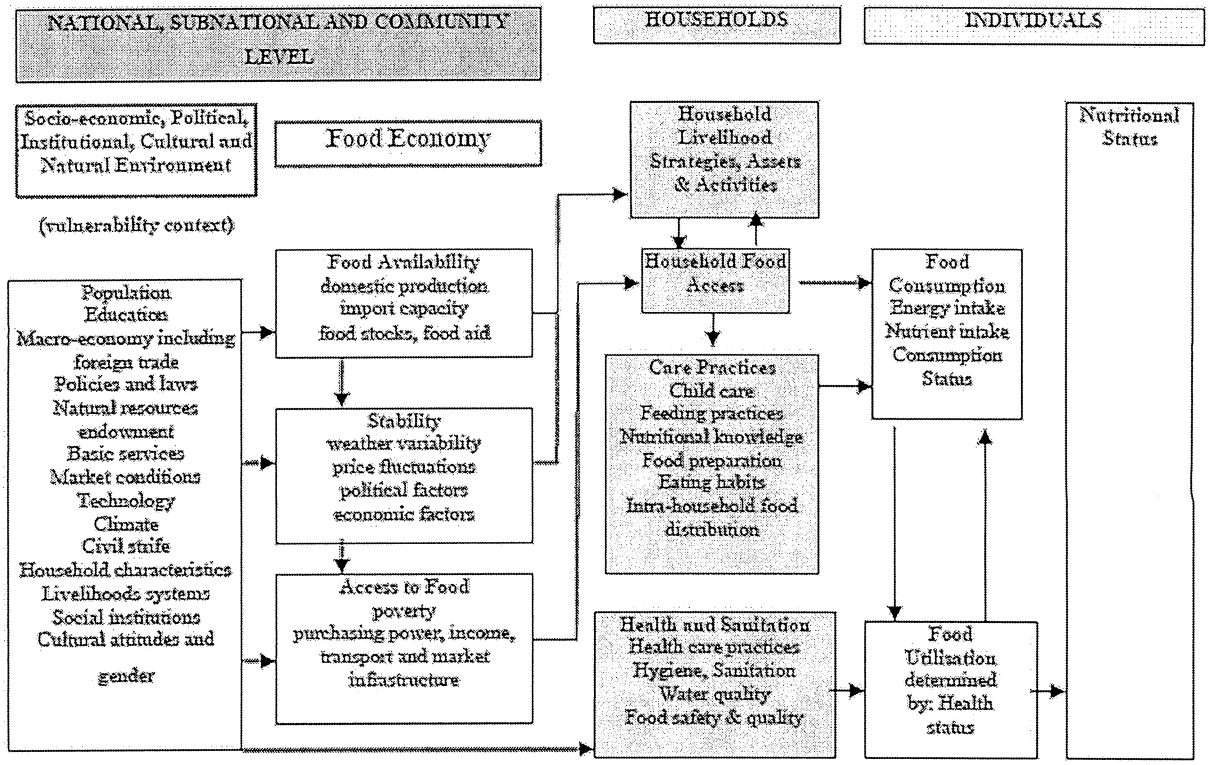

Figure 1 Food and Agriculture Organization/Food Insecurity and Vulnerability Information and Mapping System framework of food security: Development context, food economy, household and individual level impacts[9]
Reprinted with permission from FAO.[9] (Available from: http://www.fao.org/fileadmin/user_upload/fsn/docs/FIVIMS_Framework_of_Food_Security.pdf, accessed 23 December 2015).

legumes in the basket was 35–38% higher.[15,16] In Northern Territory communities, 34% of the family income is needed to purchase a healthy food basket[17] in remote stores, compared to 22% in the major city of Darwin. On average, the food basket in remote stores was 53% more expensive than in the city. Indigenous Australians living with disabilities in rural and remote areas are considered to be at particularly high risk of food insecurity. A qualitative study conducted in the West Kimberley region of Western Australia identified that food insecurity is extremely complex for this group.[18] Participants reported that in times of economic stress, food is the first commodity that aboriginal people with disabilities would forgo.

One of the proposed 'Close the Gap' equity targets is for 90% of indigenous families to be able to access a healthy food basket for under 25% of their income by 2018.[19] Progress towards this goal is slow. In the most recent Australian National Nutrition Survey (2011–2012),[20] more than one in five (22%) aboriginal and Torres Strait Islander people were living in a household that, in the previous 12 months, had run out of food and had not been able to afford to buy more. This was dramatically higher than food insecurity reported in the non-indigenous population (3.7%)[21] which demonstrates wide inequities in the country.

Older adults are another sector of the population who may be at high risk of food insecurity and may have significant adverse health outcomes associated with being food insecure. Population ageing in all regions of the world will result in an increase in the number of older adults living to advanced ages and present a burden to already stretched health and social services. In low-middle income countries, most adults enter old age after a lifetime of poverty and deprivation, poor access to health care and a diet that is usually inadequate in quantity and quality.[22] Even in a middle-upper income country that provides a non-contributory old age social pension, households that are headed by older persons experience higher food insecurity than those headed by younger persons, except in the case of small households comprising one or two people who do not need to share their pension with other family members.[22] The adverse impact of being food insecure on health and quality of life has been demonstrated in the Australian Blue Mountains Eye cohort study (n = 2642). Using a comprehensive 12-item food security instrument, those older adults that were classified as being food insecure had worse reported physical and mental health status.[23]

People on special diets may too be at risk of inadequate intakes because of increased costs associated with their

therapeutic diet. Lambert and colleagues[24] report that, compared to a regular healthy food basket, a gluten free option was considered unaffordable for three of the four common family types in regional Australia. Families on welfare who have a member requiring a gluten free diet may be particularly vulnerable to food insecurity. The authors propose creation of a national subsidised medical foods program to enable equitable access to affordable gluten free staple foods via prescription.

Migrants, asylum seekers and refugees are vulnerable to food insecurity, particularly when they first arrive in their country of settlement.[25–28] The principle exacerbating factor is the delay in receipt of benefits.[26] Other causes include inadequate income, feeding children first, feeling shame over using emergency relief, inadequate access to emergency relief, lack of culturally appropriate foods and the psychological consequence of the refugee experience. In order to develop culturally appropriate programs to increase health and nutrition literacy, and thereby improve food and nutrition security among migrant groups, insights into perceptions about their health-seeking behaviours are required. A qualitative study of sub-Saharan African migrants residing in Melbourne identified three distinct themes with regard to perceptions related to diabetes.[29] Participants did not pay much attention to the threat of type 2 diabetes, considered the disease to be outside of their control and being a disease associated with culture and life style of rich industrialised countries. Diabetes was regarded as a disease of the wealthy, caused by intake of too much sugar and sedentary behaviour.

Development of strategies to address the needs of different sectors of the population that are at highest risk of food insecurity will require consideration of the underlying determinants of inadequate food intake in each of these groups. Poverty alleviation and economic development is core to addressing the needs of low income families, indigenous communities and migrants and refugees. However, changes to the food system including food pricing and infrastructure (roads and transport) are needed for those living in remote and rural areas, while older adults may require social services support in order to maintain an adequate dietary intake.

Planet: ensure sustainability of resources and arrest climate change: Solving the world's food insecurity problem requires a far-reaching comprehensive strategy that includes consideration of biodiversity and sustainability. The debate is no longer just about producing enough food, but also about ensuring equity and access, including for future generations. This is not a new message. Over a decade ago, the New Nutrition Science project[30] identified the need for a conceptual framework that incorporated social and environmental dimensions into the biological construct of nutrition science. The new nutrition science was concerned with personal and population health, but also with planetary health—a revolutionary concept at the time, and one which left nutrition professionals feeling uncomfortable and ill equipped.

Climate change is now front and foremost of the sustainability debate, with firm commitment under the Paris climate agreement from 195 countries to take action to limit the global temperature rise to below 2°C. This will require reductions in greenhouse gas emissions of between 40% and 70% by 2050 and complete decarbonisation of the world economy by 2100.[31] Australia had already stated that it will reduce greenhouse gas emissions by 26–28% by 2030 compared to 2005 levels.[32] But under the Paris agreement, this is insufficient. Emission reductions of 4% each year to 2050 are needed—which represents approximately 45% reductions by 2030.

One of the key differences between the 2015 Paris agreement and that of the Clean Development Mechanism of the 1997 Kyoto Protocol[33] is the lack of a formal distinction between the responsibility of developed (upper income) and developing (lower-middle income) countries. The new mechanism intends to support new policies, activities and programs such as financial support to improve energy efficiency in the building sector of a country or to introduce and implement a renewable energy policy. Notably, the new mechanism requires a reduction in global emissions, rather than simply offsetting emissions.

Many of the proposed changes relate to the energy production sector, with a move from fossil fuels (coal) to renewable energy mechanisms. It remains to be seen how agricultural and farming practices, both large and small-scale, will need to change to contribute to significant carbon reductions. Changes to the food systems of countries, combined with individual pro-environmental dietary choices, also have the potential to contribute to reduced carbon and mitigation of climate change.

The environmental impact of food commodities has attracted much attention, and no food more so than beef. This is because beef cattle have low efficiency in converting natural resources to edible products and require higher water use and land use than any other livestock systems.[34] Beef supply chains are estimated to emit about 40% of all livestock greenhouse gas emissions, using a life-cycle approach.[35] Reducing the consumption of meat and increasing the proportion that is derived from the most efficient sources offer an opportunity to feed more people. Integration of a sustainability component into nutrition policies and national dietary guidelines has already been achieved in Qatar[36] and Brazil.[37] In other countries, resistance from corporate interests prevents the concept from being advanced.[38] In addition, evidence from Australia indicates that consumers are unwilling to adopt a more plant-based diet because of perceived barriers that include lack of dietary information, lack of desire to change habits, lack of options when eating out and health concerns.[39,40] The SDGs however will provide global pressure for future iterations of dietary guidelines to take into account the sustainability of dietary patterns that are being recommended, particularly in the case of frequency and serve sizes of meat and animal products.

Global supply chains place great demands on ecosystems and natural resources, and the distance between where food is produced and consumed in often taken as evidence of an unsustainable food system. Fish and seafood are some of the

most widely traded food commodities worldwide,[41] with the US and Japan importing 60% and 54%, respectively, of their seafood consumption.[42] Seafood sustainability debates tend to focus on over-fishing, stock depletion, coastal management regimes and bycatch mechanisms.[43] Australia is in the enviable position of having been ranked in the top five countries for fisheries management[44] and the majority of commercial fish stocks in Australia are assessed as sustainable.[45] However, 72 % of seafood consumed in Australia is imported[46] and this aspect of sustainability is often overlooked. A comparison of the carbon footprint of three domestic wild-capture products with imports provided surprising results.[47] It was found that the distance that food travelled was not the main determinant of food sustainability and that meals made from imported seafood had a similar carbon footprint as those meals made from domestically sourced seafood.

Another link in the food system chain that relates to food insecurity relates to food wastage. Approximately one quarter of all food supplied for human consumption is wasted across the food supply.[48] In high income countries, the biggest contributors to waste are losses at the distribution and household consumption stages, whereas in lower income countries, much of the food waste occurs at the agricultural and post harvest stages.[49] In Australia alone, it is estimated that households throw away AU$5.2 billion worth of food[50] (AU$616 per household) each year.

Different strategies are required to tackle the two types of waste. In low-middle income countries, public investment in transport infrastructure would reduce the opportunities for spoilage, whereas better-functioning markets and the availability of capital would increase the efficiency of the food chain, for example, by allowing the introduction of cold storage.[51] In high-income countries such as Australia, greater attention to ways in which households, food outlets and supermarkets dispose of food waste is needed to target individual behaviour change strategies and challenge social norms, for overall positive environmental outcomes.[48]

The food environment plays a large role in consumer food choices and is the main driver under the pillar of availability in the food security definition. A short-term example of this can be seen in an investigation of healthy food purchasing intentions and behaviours among patrons attending a large festival. Even those patrons who did not intend to purchase food, or planned to buy healthy food, reported that they bought mostly unhealthy foods, presumably because of availability.[52] Another example is provided by an assessment of 156 children's food products available in Australian supermarkets that identified 62.2% of the products to be classified as 'less healthy' using the Food Standards Australia New Zealand nutrient profiling scoring criterion.[53] This indicates a need for such products to be identified as discretionary (non-core) choices that do not contribute significantly to nutrient requirements but that do provide energy. Shift workers[54] provide an interesting case study of a group that is dependent on their work environment for access to food. In paramedics, their food choices are unique to the nature of their shift work, which include the meal break structure and being based out of an ambulance for the majority of their shift. This results in extended periods of not eating or 'opportunistic eating' which has implications for their ability to make 'healthy food choices'. This data supports the development of workplace interventions for improved food and nutrition security.

In summary, the impact of climate change on agricultural production and food insecurity is difficult to quantify; however, the downstream effect on health has been estimated to be vast.[55,56] An analysis of over 70 000 births over a 20-year period from some of the poorest and most climatically vulnerable countries in sub-Saharan Africa demonstrated that ambient temperature and precipitation are significant factors in birth weight. An increasing number of hot days and decreasing rainfall correlated to higher rates of low birth weight (<2500 g).[57] It was estimated that a combination of combined warming and drying would decrease average birth weight by 4.3%, a magnitude similar to the effect of socioeconomic indicators such as access to electricity or education status.

It is clear that a change in the food system is required in order to provide an equitable and sustainable supply of food to meet the nutritional needs of the world's growing population. In this regard, a policy formulation tool developed by Lawrence *et al.*[58] provides an 'Orders of Food Systems Change' schema to identify, assess and propose policy options to redesign food systems.

Prosperity: encourage equity and promote technological advancement: Anti-poverty policies that target the poor are successful in addressing food insecurity. Many countries use food subsidies, cash transfers and income generating strategies to target low income households. In the world's most populous nation, India, the National Food Security Act, 2013 (or Right to Food Act) that became law on September 12, 2013, aims to provide subsidised food grains to approximately two-thirds of its 1.2 billion people. However, targeting of such strategies that are based on household income criteria may not capture food insecurity. Households not classified as low income but that have special needs, such as those headed by single parents or those that include a disabled member,[59] may be missed. Undoubtedly, the poverty–food insecurity nexus[60] exists but is not the sole determinant.

In South Africa, household food poverty rates (i.e. inability to afford a basic subsistence diet; 43%) in 1995 differed by ethnicity and gender of household head (highest among households headed by Africans and among female-headed households), and rose with decreasing income, increasing household size and rurality.[61] In other settings such as urban Indian slums,[60] household size may actually reduce the risk of food insecurity because of economy of scale for food purchases, and less vulnerability to shocks such as the death or illness of a bread winner.[62] The gender dimension of food insecurity, however, is undisputed and has been reported in countries such as India, Bangladesh, Panama and Kenya.[60] Women who are uneducated that work in urban informal sectors face an added disadvantage because of low wages, longer working hours and job insecurity, coupled with

compensatory provision of their food share to other family members.[63] Anti-poverty policies need to be complemented with gender empowerment and human capital investment strategies to be most effective in addressing food insecurity.

Poverty eradication in the poorest countries requires protection of sustainable livelihoods. Achieving food security and economic growth while maintaining biodiversity, mitigating climate change and providing freshwater resources may appear contradictory. The water–energy–food nexus[64] framework provides an approach to natural resource use within the context of social needs and economic development. Two successful examples are provided in the paper of Biggs *et al.*.[64] Cambodian government policy seeks to intensify rice production in response to poverty reduction, however, this has implications for the Tonle Sap lake system that is an important socio-ecohydrological system. Application of the water–energy–food nexus approach would include regulation of pesticide use through farmer education and integrated pest management approaches, in-field water management accompanied by in-field fish refuges and reservoir and pond aquaculture. This would encourage livelihoods to be sustained, in line with ensuring environmental sustainability. The other example relates to policy formulation on coastal flooding and erosion in low-lying small island developing states. In Lami Town, Fiji, rehabilitation of mangrove swamps allowed for improved water quality maintenance and food production. Restoration of the ecosystem allowed reestablishment of nursery grounds for subsistence and commercially available fish species. However, trade-offs that result in successful policies such as these require intense political will to ensure multi-sectoral co-operation.

In order to feed the predicted 9 billion people in 2050, recent studies suggest that the world will need to produce 70% to 100% more food.[1,18] This scale of sustained increase in global food production is unprecedented and requires substantial changes in methods for agronomic processes and crop improvement. This cannot be achieved without technological advancements that result in increased crop yield but that have reduced agricultural inputs, especially those of nitrogenous fertilizers.[65]

Peace partnership: strengthen global solidarity: The Paris climate change agreement is an excellent example of global solidarity towards a common goal that reaches into the future and crosses all geographical and socio-political boundaries.

On the other hand, food trade laws that were developed to encourage economical development have the potential to reduce equity and increase the rich–poor divide between regions and countries. Rapidly changing food environments are commonplace in many countries, particularly low-middle income countries undergoing the nutrition transition. The greater availability and accessibility of cheap, imported, energy dense nutrient-poor foods contributes to the problem of obesity and diet-related NCDs, amidst the disease burden associated with micronutrient deficiencies and infectious diseases. The South East Asia Pacific region provides a good case study of the effects of economic growth[66] and increased trade on an adverse transformation of the food system.[67] Globalisation of food systems is associated with a shift from minimally processed diets rich in staple foods of vegetable origin to diets high in meat, vegetable oils and processed foods and these tend to be high in refined sugars, sodium, and saturated and trans-fats. Such reliance on processed foods destabilises traditional dietary practices and provides a major risk for food and nutrition insecurity. It could be argued that global solidarity is required to stem the transfer of unhealthy food products to already disadvantaged countries with emerging economies.

Global solidarity could also help address the many diseases related to poor nutrition that are common in indigenous communities[68] and that contribute to an increased burden of disease compared to the non-indigenous peoples living alongside them.[69,70] In the case of indigenous Australians, life expectancy is even shorter than that of the indigenous peoples of Canada, the USA and New Zealand.[69] Compared with the non-aboriginal population, aboriginal people in Western Australia have nine times the mortality rate for diabetes; twice the mortality rate for circulatory diseases; and 12 times the incidence of treated end stage renal disease.[71]

Promoting food security in remote and rural areas that include largely indigenous populations needs to consider food sovereignty. The food sovereignty movement (Table 2) was La Via Campesina's response to liberalisation of free trade and has been taken up widely by communities across the global South. The *Declaration of Nyeleni*[72] states that food sovereignty is the right of peoples to healthy and culturally appropriate food, produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems. The movement encourages small-scale food producers to grow and distribute food within local food systems, the polar opposite mindset of multinational corporations.

It has been argued that food sovereignty promotes the restoration, maintenance and preservation of indigenous food systems and the cultural reproduction of indigenous knowledge about food production, distribution and nutrition.[73] In Australia, food sovereignty debates relate most to traditional land owners whose food knowledge and traditions are practised in order to alleviate food insecurity, through accessing local lands and country to go fishing or crabbing. The food sovereignty model has merit in strengthening the social and ecological perspectives of the discourse on the food system; however, it also contains conceptual and operational difficulties, as described by Agarawal.[74] There are possible contradictions in the pursuit of national food sufficiency, and in terms of individual farmer's choices, expectations of farmers' groups, gender issues and national development concerns as food sovereignty rejects the use of food as a commodity for international agribusiness.

Another way in which global solidarity may address food insecurity is the widespread creation of social awareness related to fair trade. Consumer demand for sustainably produced foods is required for global economies to flourish, although this is likely to be driven by the more financially

Table 2 Food Sovereignty movement: Key principles

Principle	*Explanation*
Focus on Food for People	The right to sufficient, healthy and culturally appropriate food for all individuals, peoples and communities, including those who are hungry or living under occupation, in conflict zones and marginalized. Food sovereignty rejects the proposition that food is considered a commodity for international agribusiness.
Values Food Providers	Values and supports the contributions, and respects the rights, of women and men, peasants and small scale family farmers, pastoralists, artisanal fishers, forest dwellers, indigenous peoples and agricultural and fisheries workers, including migrants, who cultivate, grow, harvest and process food; Rejects policies, actions and programs that undervalue these groups and threaten their livelihoods.
Localizes Food Systems	Brings food providers and consumers together in common cause, placing them at the centre of decision-making on food issues; protects consumers from poor quality and unhealthy food, inappropriate food aid and food tainted (*sic*) with genetically modified organisms; and resists governance structures, agreements and practices that depend on and promote unsustainable and inequitable international trade and give power to remote and unaccountable corporations.
Makes Decisions Locally	Seeks control over and access to territory, land, grazing, water, seeds, livestock and fish populations for local food providers. Promotes use and sharing of these resources in socially and environmentally sustainable ways which conserve diversity. Promotes positive interaction between food providers in different regions and different sectors to resolve conflicts. Rejects privatization of natural resources through laws, commercial contracts and intellectual property rights regimes.
Builds Knowledge and Skills	Builds on the skills and local knowledge of food providers and their local organizations that conserve, develop and manage localized food production and harvesting systems. Develops appropriate research systems to support this and facilitate transfer to future generations. Rejects technologies that undermine, threaten or contaminate these, e.g. genetic engineering.
Works with Nature	Uses the contributions of nature in diverse, low external input agro-ecological production and harvesting methods that maximize the contribution of ecosystems and improve resilience and adaptation, in the face of climate change. Rejects methods that harm beneficial ecosystem functions, that depend on energy intensive monocultures and livestock factories, destructive fishing practices and other industrialized production methods, which damage the environment and contribute to global warming.

Adapted from: http://viacampesina.org/en/index.php/organisation-mainmenu-44/what-is-la-via-campesina-mainmenu-45 Accessed 18 December 2015.

advantaged sectors of society. A study that compared the views of low socioeconomic individuals and food system representatives of community-based food systems, such as farmer's markets, community-supported agriculture schemes and fruit and vegetable box schemes, reported a disconnect.[75] Low SES consumers tend not to access these initiatives because of a perception of increased price of the products and lack of convenience. There appears to be a burgeoning socioeconomic divide associated with access to these more sustainable food systems that are provided closer to source.

There are mechanisms which could encourage consumers to convert their pro-environmental predispositions into daily pro-environmental habits, particularly within the purchasing environment.[76] These may include awareness-raising strategies such as SMS messaging or social media, or through distinct labelling or cues provided on packaging. At the regulatory level, pricing policies which favour pro-environmental food products at the expense of environmentally harmful products (i.e. bottled water and sugar sweetened beverages) may be more effective and far-reaching strategies to encourage behaviour change.[77]

In a similar vein, policies that promote the consumption of healthier foods through pricing mechanisms require data on the relative price and affordability of 'less healthy' and 'healthy' foods and diets. The global INFORMAS coalition proposes a step-wise monitoring framework for this purpose. 'Minimal' data collection will assess the differential price of 'healthy' and 'less healthy' foods; 'expanded' monitoring will assess the differential price of 'healthy' and 'less healthy' diets; and the 'optimal' approach will also monitor food affordability, by considering household income. This initiative will provide robust data on the costs of healthy diets around the globe, and provide benchmarks to inform economic and fiscal policy responses.[78]

Yet another example of global solidarity that would encourage food and nutrition security is agreement between governments on acceptable maximum limits of harmful components allowed in imported or branded foods. The salt content of the same branded products differ dramatically between countries, as do the recipes of fast food meals that are marketed under the same outlet. For example, a *Pepperoni Lover's Pan Pizza*™ (22.2g salt/pizza) from Pizza

Hut™ in the USA is reported to provide over three times more salt than the same product sold by the franchise in New Zealand (6.6g salt/pizza).[79]

The increasing migration of displaced persons and refugees because of natural disasters, political instability, war or terrorist activities also necessitates global solidarity regarding humanitarian issues, and provision of food and emergency aid. In the longer term, ensuring food and nutrition security is central to successful resettlement.

Future needs of nutrition professionals to address food and nutrition insecurity

The new paradigm of sustainable food and nutrition security poses major challenges to nutrition practice. The proposed multi-sectoral approach will require nutrition professionals to acquire new skills sets and have a greater appreciation of non-traditional fields. Hughes *et al.*[80] report on consensus reached among public health nutrition (PHN) workforce development stakeholders regarding the functions of PHN practitioners and the level of competency required to perform each of these functions. Many of these functions relate to food security, at each of the three levels of practice, namely analytical (needs assessment, monitoring and evaluation), capacity building (leadership, partnership building and organisational capacity development) and intervention management. Strong advocacy skills are necessary across all three levels, yet this is glaringly missing from most educational programmes at present. Even nutrition professionals working in the academic research sector need to become better advocates. The current focus of major national health and medical research bodies is on translational research. In lay terms, this may be explained as how to make things happen, either be taken up as policy or practice, or both, once they have been shown to work, in principle (usually under highly controlled experimental conditions that bear little resemblance to real life experiences). Translational research, by its very description, thus requires a component of advocacy.

Also missing from many nutrition curricula are the topics of agriculture, ecology, biodiversity, climate change science, sustainability, economics and community development. This excludes nutrition professionals from entering the sustainability debate in a meaningful way, which is a major disadvantage to the discipline.

In the 21st century, the world is faced with a host of complex global challenges, including mitigation of climate change, ensuring global health, coping with massive migration, preventing terrorism, ensuring cybersecurity and preventing abuse of human rights. Multi-stakeholder responses to these global challenges require a concerted effort, not only from governments, but also civil society, the private sector, international organisations, private philanthropies and individuals. Ensuring food and nutrition security will be key to meeting many of the United Nations Sustainable Development Goals by 2030.

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