

A Time of Uncertainty and Change for Nutrition and Health

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Abstract: Our food narrative, passed from expert to citizenry, has become increasingly reductionist rather than integrative, in the expectation that we could be more confident and less uncertain about the validity of the way we eat. In reality, we can bring together various ways of understanding nutritionally-related health. That said, there will still be different ways of looking at our food needs. The community-at-large does usually have a collective wisdom with intrinsic uncertainty. Guided by science and ecological experience, the food-health consensus is likely to be that a sustainable, palatable, varied and relatively intact plant-based diet with minimal animal-derived foods will be optimal, but can be different in the detail from place to place. Health care practitioners will, against this background, tailor food patterns for individuals according to their peculiar needs, but limited by the resources needed and affordability. In each and every circumstance there will be uncertainty, which is taken into account by risk assessment, communication and management. Many, however, will assume their own view of the food pattern best for them and their individual resources, whatever its sustainability. Herein lies a new challenge, namely that with growing food insecurity, ethical and equity considerations will apply.

Key words: Ecosystems, Ecnutrition, Chance, Risk management, Evidence-based nutrition, Sustainability, Affordability, Accessibility, Food security

Uncertainty and Food Choice

Although the ‘uncertainty principle’ is a concept and principle from quantum mechanics, to do with the effect of one measurement on another, and sometimes to indicate the effect of the observer on the observed, to create uncertainty, it is a part of every scientific and personal endeavour. We live with uncertainty. However, science is also about greater predictability and the reduction of uncertainty, often in the interest of risk reduction and safety.

But now, the exponential increase in knowledge, the rapid changes in our environments, our heightened expectations and our health advancements have created a sense of greater uncertainty about our future and that of our planet. This applies particularly to our food supply and how it affects us.

We are accustomed to a particular and fairly dependable narrative about our food & health, depending on our culture, living abode, the nature and

place of our work and our education. The narrative provides for a food and health literacy which gives us a measure of certainty about our food world and what to eat. We can appreciate the contribution of food to growth and development and to health maintenance; to our daily family and social affairs and to celebrations; to our personal security and livelihoods; to the avoidance or management of ill-health; and also to the food security of others. Our languages reflect this in, for example, ‘think of the starving millions’, ‘eat your greens’, ‘lollies are bad’, ‘an apple a day keeps the doctor away’, ‘food is medicine’ and they provide eating constructs, if not certainty. As helpful as these observations about food and health culture might be, they still leave us exposed to an uncertain food future as the pace of environmental change quickens and as millions of people have already been committed to unsafe and scarce food and water supplies.

Curiously, even though we cannot be certain

about our nutritional future, nutrition professionals often convey a sense of certainty on the basis that the public requires it for effective nutritionally-related health behaviour. We speak of 'nutrient deficiency', 'nutrient excess' or 'balanced diets' (and not specify what is to be balanced) when wanting to be 'scientific' and convincing about food-health relationships. In so doing, we create 'pseudocertainty'. An example is the silliness of recommending a certain intake of 'protein-rich foods' from both animal and plant sources when they are vastly different in their ecology, intrinsic biology and overall nutritional value. Evidence-based nutrition policy does not require rigid positions to be taken, but rather 'best practice', given what we know. The evidence should be of different kinds, more of a portfolio than the present hierarchical approaches, which put randomised clinical trials as number one, when they can only address a fraction of the evidence required in the food-health systems domain. Science is about measurement of varying precision and accuracy. To serve public health and clinical needs it needs to be both reductionist and integrative, but reductionism often prevails. The distillation of 'best practice' allows for the continuing quest for even better ways.

There is, nevertheless, a reluctance to pursue what may be more difficult to measure and a lack of appreciation of the food system and food patterns which underpin our health, since they have not been as measurable. Unless this reluctance is overcome, we will be less likely to identify and enjoy 'optimal food patterns' with their dependence on settings and our biology, both of which are diverse and undergoing rapid change. The pace of climate and technological change is outstripping our ability to find solutions with present evidence-based approaches. We need research methodology which enables 'best practice' decisions to be made as-we-go¹⁾. An important reason for a more dynamic approach to nutritional enquiry is the bidirectionality of us and our food system – what determines what? On this account ecosystem analysis is essential, which may be termed *econutritional*²⁾. We must go further and ask how discrete we are as a species 'Homo Sapiens'? The species paradigm is shifting as we recognise our blurred interface with our environment on several counts. One is that our regulatory endocrine system requires environmental inputs³⁾. Another is that sensory inputs of sight, sound, smell, taste and touch provide information to all body systems. Again, we are only 10% eukaryotic (nuclear) and 90%

prokaryotic (non-nuclear) genome which questions the notion of a '*species*' interface and argues for a continuum between us and our environment⁴⁾.

A flawed and over-confident conceptualisation of certainty may preclude the risk-cost-benefit analysis required for future food security. Our food security will depend on its sustainability, adequacy, quality, accessibility and affordability, as well as ethical principles which are operational at every point in the food system⁵⁻⁸⁾. As well, our entitlement to operationalise our own point of view about food and health, as in 'The Life of Pi', where the enquirer could make his or her own interpretive choice, may be constrained⁹⁾.

Uncertainty can be reduced through research which assesses predictability, incorporates macro-and micro- risk analysis, takes account of human behavioural and is systems-based. Regrettably, there is reason to be skeptical about 'human nature' and to be concerned about the increasing frequency, severity and conjunction of natural disasters as adding to future uncertainty about food security.

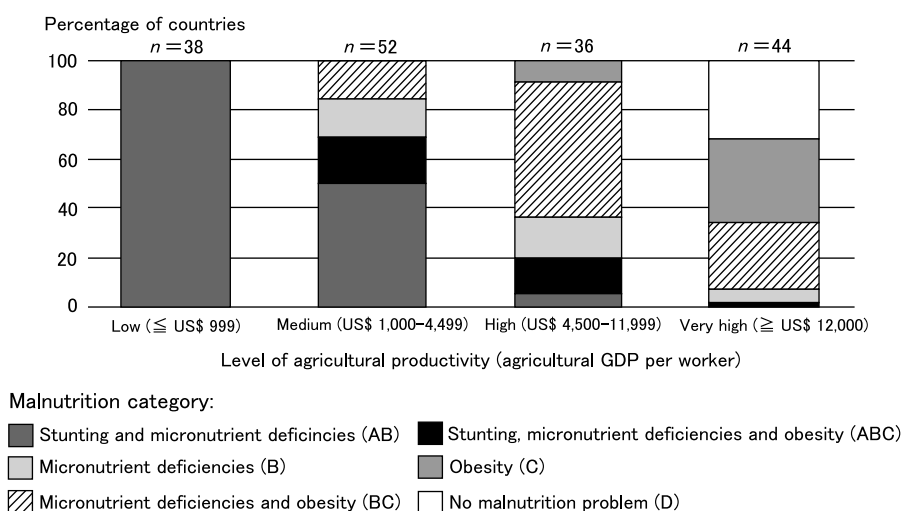
What we know best, as of now, is that biodiversity is crucial to our food security and health; that we need to engage actively with our natural environment, working, walking and recreating in it; and having inputs of many kinds from it.

Population, Urbanisation and Health

The relationship between us and the planet has become increasingly unstable with inexorable population growth since the advent of agriculture in about 10,000 BC. Our dependence on agriculture needs to be much more sustainable as the earth's resources expire.

Although Figure 1 compiled by FAO shows the difference in health patterns with different levels of agricultural productivity, it is a matter of judgement which is to be preferred – of course, none. So we must work towards a new relationship with the environment by seeing ourselves as having 'ecosystem health disorders' (EHD) to overcome⁴⁾. To reduce the uncertainty, we will need to work with a changing demography of resettlement with climate change, ageing populations (hopefully with less disability), increasing urbanisation and radically different food systems.

Some of the changes in our food systems will be reduced productivity because of water shortage and safety, loss of arable land to so-called development, soil health with critical supplies of nutrients like



Notes: n is the number of countries characterized by each level of agricultural productivity. Agricultural productivity is derived by dividing agricultural GDP (in 2010 measured in current US dollars) by the population economically active in agriculture.

Sources: Authors' calculations using agricultural GDP data from the United Nations (2012) and data on agricultural workers from FAO, 2013.

Figure 1. Malnutrition categories within countries by level of agricultural productivity

phosphorus fertilisers (and unsafe levels in them of cadmium and radionuclides)¹⁰), the temperature sensitivity of food crops especially wheat, of fewer pollinators like bees, new crop infestations like those of citrus¹¹), increasing prevalence of highly antibiotic resistance genes (ARGs) in livestock like pigs, poultry and farmed fish¹²) and more.

Ecosystems, Eiconutrition and Ecosystem Health Disorders

The articulation of the importance of ecosystem integrity to our health and well-being is recent. In 1991 at the Annual Meeting of the Medical History Society of Victoria, Melbourne University, Thursday, 12 December 1991, I observed “Of increasingly overriding importance for the world’s food supply and human health must be the integrity of the earth’s ecosystems”¹³). This has developed into an econutritional framework to develop policy²) and operationalise food and nutrition policy through food-based dietary guidelines for communities and households⁶), provide food and health security in tandem with community development⁸), and to strike a new paradigm for health as ecosystem-dependent⁴).

For these objectives to be realised, it must be possible to measure, monitor and manage ecosystem resources. This is now possible with instruments produced through the UN System^{14, 15}).

These ecological approaches to our nutritionally-related health dovetail with the biomedical and

societal domains enunciated in the New nutrition Science agenda of the IUNS (International Union of Nutritional Sciences)^{16–18}) and promulgated in the Giessen declaration of 2005.

In turn, the evolution from the MDGs (Millennium Development Goals)¹⁹) to SDGs (Sustainability Development Goals) by the UN System²⁰) during 2015 will depend heavily on an ecosystem approach.

Equity and Ethics

Difficulties ahead will present with exacerbations of already gross food and nutritional inequity²¹). Who, for example, will afford and get what food, be it fish, fruit, vegetables, dairy or even staples like grains, beans and root vegetables? There will be major ethical dilemmas across a spectrum of food security, but skewed to the insecure. This will be particularly evident with staples versus food diversity where more of the latter relative to the former is more ecologically and nutritionally optimal. This dilemma is being partly offset by programs like Harvest Plus²²) which are providing more nutritional staples through intensive plant breeding and biofortification initiatives in the public domain.

Is There Any Certainty? Just Probabilities!

- The human population is likely to decline from about 2050 with changed and precarious food-nutrition-health patterns.
- By this time there will have been massive eco-

system loss, but thereafter a new more stable ecology may emerge.

- Climate will be less hospitable with some adaptation to it through engineering and biomedical technology. However, this will be insufficient for those most vulnerable.
- The survivors are more likely to be socio-economically advantaged and live mainly in the more sustainable ecosystems.
- Chaos theory may be in evidence when natural disasters are multiple and conflict conjoins them; the level of loss of our ecological dimensions may be greater than we anticipate with current predictive methodology.

What Should We Do?

In order to manage as best we can the present and future uncertainties in our ecologically – dependent food-health status, we need to:

- Partner communities and involve households – Connected Community and Household Food-Based Strategy (CCH-FBS)
- Develop ecosystems, infrastructure & food security for communities

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