

Original article

Nutrition: the new world disorder

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Scale up 'we are what we eat' and nutrition is revealed as an aspect of world governance. The quality and nature of food systems has always tended to determine not only the health and welfare but also the fate of nations. The independence of nations depends on their development of their own human and natural resources, including food systems, which, if resilient, are indigenous, traditional, or evolved over time to climate, terrain and culture. Rapid adoption of untested or foreign food systems is hazardous not only to health, but also to security and sovereignty. Immediate gain may cause permanent loss. Dietary guidelines that recommend strange foods are liable to disrupt previous established food cultures. Since the 1960s the 'green revolution' has increased crop yield, and has also accelerated the exodus of hundreds of millions of farmers and their families from the land into lives of misery in mega-cities. This is a root cause of increased global inequity, instability and violence. 'Free trade' of food, in which value is determined by price, is imposed by dominant governments in alliance with industry when they believe they can thereby control the markets. The World Trade Organization and other agencies coordinate the work of transnational corporations that are the modern equivalents of the East India companies. Scientists should consider the wider dimensions of their work, nutrition scientists not least, because of the key place of food systems in all societies.

Key words: ecological nutrition, food systems, green revolution, liberalisation of food trade.

Introduction

More than 2000 years ago Hippocrates wrote: 'let food be your medicine, and let medicine be your food'. This sensible proposal is one basis of naturopathy, whose practitioners believe that the best way to maintain good health is to eat and live close to nature.^{1,2} The statement, made by the founder of physic, is also used by nutrition scientists as an advertisement, in their attempts to be within what is now the medical mainstream. Its implications aggrandise nutrition, but also box it inside current clinical and public health medical practice.

The theme of this article is related to broader statements. The first was made almost 200 years ago by Anselme Brillat-Savarin: 'the destiny of nations is determined by what and how they eat',³ which correctly implies that nutrition is a crucial aspect of political policy. The second was made in the same era as Hippocrates, and echoes his invocation 'first, do no harm'. Lao Tse said: 'the world is a holy vessel. Let him who would tamper with it, beware'.

The quality and nature of food systems have been determining factors not only of the health and welfare but also of the fate of nations and empires, as anybody who flies over the barren mountains of Greece and the northern Sahara can see. Greece declined after its forests were cut down to make ships, as a result of which the agriculture systems that depended on the soil retained by the forests collapsed. Rome fell after the fertile territories north of the original Sahara that grew the wheat that fed its citizens and armies became exhausted by unsustainable methods of farming, and were abandoned to the desert. These calamities, lamented by

contemporary writers,⁴ were not anticipated by Greek and Roman rulers, whose empires eventually became overwhelmed by pastoralist and nomadic invaders from the north and east, who supplemented their own relative self-sufficiency in food by loot and pillage.⁵

A difference between ancient Greece and Rome, and modern Britain and the USA, is that from its beginnings, nutrition science has been an instrument of state policy, at first as a way to win wars, and then as an aspect of colonialism in its new form, in which military conquest is usually (but not always) replaced by political and economic policies designed by blocs of high-income countries in order to control and expropriate low-income countries. Food trade and aid, and globalisation of food production, manufacture and distribution systems, are used as an instrument of the 'new world order' announced by the elder President Bush.^{6,7}

Like technology, globalisation is intrinsically neither good nor bad. All depends on what form it takes, and the uses to which it is put. Food trade globalisation in its current early crude form is having the same malign impact on human health and welfare in middle- and low-income countries, as industrialised food supplies in their early crude forms had on the British and other people in the eighteenth, nineteenth and early twentieth centuries. As George Soros writes in 2002

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'globalisation has caused a misallocation of resources between private goods and public goods'.⁸ What happened in history is being repeated, but is now accelerated, concentrated and global. The convulsions of the original industrialisation caused vast migrations from Europe to the Americas and to former colonies, such as, Australia and New Zealand. Now there is nowhere left to go.

The food being supplied and consumed in middle- and low-income countries now, is increasingly made up of processed and preprepared foods whose sophisticated and attractive packaging and branding is wrapped around sophisticated yet simplified ingredients supplied from unknown sources including laboratories. This phenomenon, known as 'burgerisation' and in Brazil as '*cola-colonização*', is disintegrating local, national and regional food cultures, and also the meal and therefore family and social life. It has the general effect of turning families into consumer units.

In cities all over the world, the increase of fast-food and of pharmacy chain stores, often side by side, is a matter of everyday observation. The impact is evident to anybody with a tape-measure or eyes to see. Increased purchases of food and of drugs are both indices of economic development, but not of improved public health. In countries like Britain or Brazil where traditional food culture has already been destroyed or else is relatively shallow and fragile compared with France or China, a heavily promoted 'universal menu', now effectively part of the deals made with the governments of client nations by the global power-brokers and money-lenders, is having an uncalculated effect on national identity and independence.

Four general beliefs that underlie nutrition science as normally practiced, are questioned in this and the accompanying article with examples that, in this article, are dietary guidelines, and rice.⁹

1. Growth means health, or to be more precise, the measure of good human health is babies and children that grow fast, and relatively tall and heavy adults.
2. Science and technology are keys to universal truth, so that policies and practices that work in one context can be imposed always and everywhere.
3. Knowledge means wisdom, meaning that good nutrition policies are generated not by philosophical or ideological convictions, but by technical expertise.
4. The purpose of nutrition science is to maintain and improve human personal and population health; it is not concerned with the living world as a whole.

This and the accompanying article take a broader view, and propose that nutrition science now should be concerned not only with personal and population human health, but also with the planet: the whole living and natural world.

Method

See the accompanying article.⁹

Discussion

When I first started to work in the area of nutrition and public health in the early 1980s, I was struck by four

qualities of nutrition scientists that they have in common with scientists from other disciplines:

1. Insulation from colleagues in other fields. This is partly because of pressure of constant publication in specialist journals, vital for progress in academia.
2. Inability to address general principles. This is partly because researchers are swamped with normal science and subject to the inquisition of peer review.
3. Inclination not to think about how their work is used and abused by government and industry. This is partly because scientists are trained to beware policy.
4. Ignorance of history. This is partly because of increased specialisation from school days and the volume of original data that have to be consumed and produced.

Thomas Kuhn writes 'there are no other professional communities in which individual creative work is so exclusively addressed to and evaluated by other members of the profession ... the most esoteric of poets or the most abstract of theologians is far more concerned than the scientist with lay approbation of his creative work'.¹⁰ These qualities may be charming and appropriate in a chess player, a musician or an astronomer. But in any scientist whose work is concerned with the world, and whose theories may change the world, they are extremely dangerous, as Albert Einstein and Robert Oppenheimer came to realise.

Causation

What are the causes of disease? Modern medicine is uncomfortable with concepts like causation, which are commonly used in disciplines that are necessarily philosophical as well as practical, such as, law. Physicians tend to talk about cause in a mechanical manner, and thus may say that an individual death was caused by a cerebrovascular event, meaning a stroke. They may go further and refer to underlying pathology, saying perhaps that the precipitating cause of death was a brain haemorrhage, or maybe an infection following surgery, but that the underlying cause was hypertension. This is the sort of language commonly used on death certificates and therefore on records of population mortality. It is one answer to a question of 'how?', but does not address 'why?'.

Nutritionists typically take one step further and ask what the cause of the disease itself was, and given their discipline, will look for nutritional causes. Thus they may say that high incidence of high blood pressure and death from stroke is itself caused among other factors by salt, or to be more precise by diets high in salt. Usually it is not possible to be certain about such factors on an individual basis, although autopsies can clearly show the damage done to the airways and lungs by regular smoking of tobacco.

However, in a social context, to say that a death is caused by a cerebrovascular event, is rather like saying that a death is caused by a bullet penetrating a brain. In a sense this may be true, but is not useful outside the autopsy room, where relevant questions include: who bought the gun, who fired it, and why? Specialists who take a broader view go further. They think not in terms of consumption but of production, not of individual diets but of food systems, and ask a

hierarchy of 'why' questions, as is done in a court of law. How deep and wide such questions can usefully go, is not so much a matter of personal opinion, but of a philosophical and political standpoint, and should include judgment of what type of proposed intervention may be most effective.

For example, it could be said that high rates of death in infancy in many low-income countries, such as in Africa, are caused by malnutrition, or infection, or inadequate breast-feeding, or lack of medical care, or famine, or fragile food systems, or poverty, or inequity, or expropriation, or dislocation, or the policies of transnational baby food companies, or warlords, or the effects of colonialism. The question 'so what?' needs to be asked in order to move towards meaningful programs designed to protect population health.

Attempts have been made to identify different types of hierarchy of causation. Thus, causes can be described as precipitating, immediate, and fundamental, or else personal, political, and historical, or else contributory, effective, and sufficient (and synonymous terms). For instance, it can be said that in a given society, high rates of death from liver cirrhosis are caused immediately by heavy consumption of alcohol, and that low taxation of alcoholic drinks is a contributory political cause. Much discussion on the causes of disease is vitiated by confusion over the typology of causation. A conference convened by relevant UN agencies in which consensus was reached after discussion involving philosophers of language and law, together with specialists from various public health disciplines, should prove useful.

Meanwhile, policy-makers concerned to implement effective programs designed to improve public health, should be cautious when faced with claims of causation that derive merely from the professional discipline or political views of those who make the claims, including influential scientists chasing large research grants. In practice it is best to be wary of people with a vested interest in any particular approach and to identify the most relevant cause; which implies the intervention believed most likely to produce the best result. This can be gauged in different ways, including cost, time, and scale. Thus, with tobacco, a fiscal, legal and regulatory approach, including high taxes on cigarettes, prosecution of smugglers, and prohibition of advertising and promotion, is known to be effective, and in practical terms suggests that the effective causes of high rates of death from tobacco-related diseases include absence of these policies.

Another salutary question is: 'what are the causes of health?'

General belief 3

Knowledge means wisdom, meaning that good nutrition policies are generated not by philosophical or ideological convictions, but by technical expertise. For example, dietary guidelines.

Nutritional apartheid

Reports including dietary recommendations have been commissioned or sanctioned by governments since the early twentieth century; and dietary regimens devised for institu-

tions and individuals have a much older history. After working with and on reports including dietary guidelines since the early 1980s, it now seems to me that in two key respects, dietary guidelines tend to be self-defeating, and even liable to have a bad effect on public health.¹¹⁻¹⁷

The purpose of dietary recommendations is to improve public health. Specifically, they are meant to promote healthy food systems, healthy food supplies, and the consumption of healthy diets, with the purpose of reducing the incidence of food-related diseases.

But reports containing dietary recommendations for adults (and for children above the age of infancy) are generally of three segregated types, produced by committees of experts who usually are ignorant of research outside their own specialist fields. One type of report has been concerned with prevention of nutritional deficiency diseases; a second type (principally for infants and young children) with strengthening resistance to infectious diseases; and a third type with prevention of chronic diseases.

Deficiency The fact that specific diseases are caused by deficiency of individual nutrients was proved in the early twentieth century, with the discovery of 'accessory food factors,' which then became known as vitamins.¹⁸ As a result, the first reports containing dietary recommendations were issued in Europe and North America in the 1930s, soon after identification of the essential role of some vitamins and some minerals and trace elements in specific essential physiological functions and the diseases caused by gross deficiency of such micronutrients.

Nutritional deficiency diseases, whose fundamental causes include inequity and poverty and other forms of deprivation including monotonous and degraded food supplies, were common in North America and Europe in the early twentieth century.¹⁸ Reports containing recommendations for 'recommended daily amounts' (RDA) of energy and protein for growth, and of the vitamins and minerals then known to prevent specific deficiency diseases, became vital instruments of national policy, particularly in Europe, because of the need for young populations who would be fit to fight wars.¹⁸

Since the creation of the UN system, its expert advisors have devised 'universal diets', containing specified amounts of energy and nutrients, designed to prevent nutritional deficiency. These have shaped world agriculture, food manufacture, and food trade policies and practices, and indeed the political and economic relationship between high-income and low-income countries. Reports including RDA (now usually known by other terms) designed to prevent deficiency diseases, are now issued all over the world, and form a basis for programs designed to reduce the incidence of such diseases, especially among population groups identified as 'at-risk', such as infants, young children, pregnant women and the elderly.

Prevention of nutritional deficiency remains important in low-income countries. For example, in Brazil, starvation fundamentally caused by poverty and food insecurity, itself the immediate cause of extreme underweight that increases

vulnerability to infection and infestation and perhaps to chronic diseases also,^{19,20} is endemic in the north and north-east regions and in rural areas.²¹ The relevant UN and other international agencies have now identified three nutritional deficiency diseases that are of special importance. These are diseases of the eye including xerophthalmia, caused by deficiency of vitamin A; goitre, immediately caused by deficiency of iodine; and anaemia and its consequences, immediately caused by deficiency of iron, folic acid and other micronutrients.¹⁹

Infection The interactions of nutrition and infection are well documented,^{22,23} if not well known, and the role of nutrition in prevention of serious infections of infants and young children, including respiratory and diarrhoeal diseases, is emphasised in many other reports, separate from those concerned with deficiency diseases.^{24,25}

While absolute and relative rates of death from infectious diseases have rapidly decreased in most low-income countries, infections of the respiratory and gastrointestinal tracts remain major causes of death among infants and young children. Protection against these infections is increased by exclusive breast-feeding for the first 6 months of a child's life²⁶ and then by appropriate complementary feeding. Vulnerability to many infectious diseases is itself increased by poor nutrition throughout life and programs, guided by expert reports, that have the effect of strengthening resistance to infection are also vitally important.^{27,28}

However, reports with dietary recommendations designed to prevent nutritional deficiencies or to prevent chronic diseases, generally make little or no mention of the interactions between nutrition and infection. Generally, they also have little to say about chronic diseases. The three types of report have remained segregated. There is no good reason for this. It is a reflection of the separation of scientific disciplines, the identification of diseases with their clinical symptoms, the competing agendas within and between relevant UN agencies and government departments, and the prevailing misperception that the world is divided into two: rich countries with chronic diseases, and poor countries with deficiency diseases and infection.

Chronic diseases The third type of report containing dietary guidelines was first issued in northern Europe, north America, and Australia and New Zealand, from the early 1960s. This was a result of evidence that the massive very rapid rise in the prevalence of coronary heart disease in high-income countries was in part caused by inappropriate diets. At first these reports focused on individual diseases. However, between the 1960s and the 1980s other chronic diseases were identified to be caused in part by the same inappropriate diets, and an integrated approach was attempted in 1990.²⁹

At least 100 authoritative reports designed to prevent chronic diseases were issued between 1961 and 1991, almost all with broadly similar dietary recommendations.¹⁴ These and more recent reports continue to show that a common dietary approach to most if not all major diet-related chronic diseases is possible and feasible.³⁰

Chronic food-related diseases vary in severity: some are debilitating, some disabling, some deadly. They affect many, perhaps all systems of the body. They certainly include dental caries, gut disorders and diseases, obesity, adult-onset diabetes, hypertension and stroke, osteoporosis, and cancers of the mouth and throat, lung, stomach, colon and rectum, breast, ovary, womb, cervix, and prostate.^{16,29} Of these, coronary heart disease and cancer are now the main cause of premature death in almost all countries in the world.^{31,32} Less serious food-related chronic diseases, very prevalent and expensive to treat, include dental caries and disorders of the gut.³³⁻³⁶

Disintegration

So what is wrong with all this activity? So many reports! Well, compiling and publishing a report is one thing but getting anything to happen as a result is quite another thing. One reason why not much happens is the separate existence of the three types of recommendation designed to prevent nutritional deficiency, infection, and chronic diseases. These are effectively in competition for the attention of policy-makers and for funds. From the point of view of a policy-maker in government, the competing demands implicit in the recommendations of different reports on what fundamentally is the same issue, food and health, are chaotic and confusing, so policy is stalled.

Dietary recommendations designed to increase resistance to infection remain segregated from those designed to prevent nutritional deficiency and chronic diseases, which themselves remain segregated from one another. This is historically understandable but is bad science and bad public health, and indefensible in low-income countries, where deficiency diseases and infection remain endemic and chronic diseases are now epidemic. These three types of disease now coexist in the same communities and the same families, in middle- and low-income countries all over the world.^{19,32}

The integration of health

The first attempt to break this habit of segregation and create an integrated approach to food-related diseases was made in Latin America after a meeting held in Caracas in 1987.³⁷⁻³⁹ The report concluded that dietary recommendations in Latin American settings should consider both nutritional deficiency and chronic diseases.

Since then there has been some move towards agreement that a broader approach, directed equally at deficiency diseases and chronic diseases, is possible and feasible.^{17,28,40} The news is not all bad. It is wrong to devise recommendations designed to prevent one type of food-related disease in isolation. Policy-makers and health professionals in low-income countries where nutritional deficiency and infection remain endemic need to know that policies and programs designed to prevent chronic diseases will also prevent nutritional deficiencies and increase resistance to many infections especially in infancy and young childhood.^{22,23}

However, to date no dietary recommendations have been published that are designed equally to prevent nutritional

deficiency, infectious diseases, and chronic diseases. Even more remarkable, no report has even simply listed all known food-related diseases grouped into the three types.

The fallacy of the supreme individual

The Caracas report also said that the family should be seen as the basic unit of consumption: 'the whole family eats from the same pot'. Here is a second reason why dietary guidelines are generally self-defeating.

Most reports including dietary guidelines are devised for societies whose culture is based on the idea of the supremacy of the individual. This is a religious and political concept devised and developed in Europe and then in north America, between the Renaissance, the Reformation, the Enlightenment and the industrial revolution. Essentially it is a Protestant concept. But Latin American culture, in common with the cultures of Africa and Asia, and indeed southern Europe, is centred on the family; and commonly not the 'nuclear' family made up of isolated couples with or without children, but the extended family either living under the same roof or in close touch with one another.

Brazilian society is changing fast with the flight to the cities. Middle class life in the big cities in Brazil is increasingly similar to that of prosperous people in any big city. But food choices taken by Brazilian people are still influenced by inherited and learned family values, with the meal as the everyday centre of family life. Key family members – usually women – make shopping and cooking choices on behalf of the family as a whole. Traditional food culture, for example, based around *arroz, feijão e farofa* (rice, beans and toasted cassava flour) remains relatively strong. The consumption of rice remains high and the consumption of beans is very high relative to most other countries.¹⁷ The shared appreciation and enjoyment of food chosen, prepared and eaten as meals in a family setting, is itself healthy, culturally and socially, as well as nutritionally.

Dietary recommendations that focus on individuals have the effect of further isolating the individual from the family. In north America and western Europe, people increasingly live alone even when under the same roof as others, and eat alone in fast food restaurants or 'graze' in the streets. At home, the meal is increasingly replaced by individual consumption of preprepared meals. 'Fast food' and street food can be healthy but, in general, these 'convenience' foods and drinks, consumption of which is in effect encouraged by recommendations for individuals, are relatively fatty, sugary and/or salty.

When discussing nutrition and food policy, scientists tend to think in terms of diets, lifestyles, and individual choices. This misunderstands the real world. Scientists are usually the type of people who can make choices for themselves and are at least need of advice on what to eat. But what the vast majority of people habitually consume is a function of supply, not of demand, and the way they live is in general a matter of necessity, not of choice. It is absurd to advise mothers that their children should be physically active, when their schools have sold their play and sports

areas and they are scared to let them out in the street for fear of traffic or violence. It is futile to advise communities to consume more locally grown vegetables and fruits, when their local shops are filled with energy-dense products made by manufacturers with marketing muscle. It is insulting to advise adults to cook nourishing food for themselves, when they are obliged to work night as well as day to pay the rent.

Root causes of disease

No strategy designed to prevent food-related diseases that focuses on dietary habits or on food consumption, can be effective. In isolation, dietary guidelines are a distraction and part of the problem, not part of the solution. The issue is not what we eat, it is why we eat what we eat.

No disease has one cause or one type of direct cause, and genetic susceptibility and the ageing process increase the chance of chronic diseases. Many are directly caused at least in part by smoking and other use of tobacco, bacterial, viral or other infectious agents, or by occupational hazards. In general, the fundamental causes of most diseases are environmental, and they are therefore preventable, at least in principle. We are all born more or less susceptible to disease, but genetic factors alone are not usually a major cause of disease. Vulnerability leads to disease when environments are pathogenic.

However, epidemic diseases are never conquered by attacks solely on their immediate causes. The assault must be on their fundamental underlying causes, which include poverty, inequity, war, dislocation, open sewers, despair and ignorance.⁴¹ It follows that changes in national, international and now global affairs, that increase any, some or all of these factors, will increase misery and will also increase disease.^{7,8}

Does this mean that the right place for nutrition scientists now is not in the laboratory but on the barricades? Well, careful experiments are essential and more research is needed. But meanwhile, scientists are also citizens and do have social responsibility. Wisdom is more than knowledge. Public policies require technical expertise, but are inspired by philosophical or ideological convictions.

General belief 4

The job of nutrition science is to maintain and improve human health; it is not concerned with the living and natural world as a whole. For example: rice.

The scope of nutrition science

A recent review submitted to the UN system proposes that the global expansion of capital markets in food, as part of the system where value is determined by price, should include among its aims:⁷

1. Minimisation of the bad effects of cheap fatty, sugary food.
2. Security of domestic food production and distribution systems.
3. Equitable land tenure and fewer destitute landless people.
4. Equity between men and women involved in cash-cropping.

5. Good working conditions in factories set up for international trade.
6. Beneficial environmental impacts that also improve human health.

Indeed, and such recommendations place nutrition science in a broader context, including the health and welfare of producers and consumers. But how? Are any of these good aims achievable as things are? For example, to take the suggestion closest to the normal practice of nutrition science, the bad effects of the increased supply of cheap fat and sugar on human health cannot be minimised, unless these commodities are used to make candles or fuel; or else tossed in the trash, buried at sea, or shot into space, with bad environmental impacts. The real issue of course, is to find ways in which the global food supply contains less fat, saturated fat, sugar and also salt.

A balance should be struck between development of capital markets, and protection of public goods, such as, peace, security, the environment, labour conditions and human rights.⁸ The force to change what is bad and to keep what is good in the world as it is now, needs a vision in which personal, population and planetary health are integrated. Correspondingly, nutrition should now be concerned not only with human health, but also with the whole living and natural world, as one whole. This will bring nutrition back to its origins, and make it a philosophy as well as a science.

The price and value of rice

Take rice. When any food system has evolved over the centuries, and given normal times when everybody has enough to eat, if the people who produce and consume the food usually do not suffer any major food-related disease, the food system and its staples are therefore reliably healthy. It has stood the test of constant trial and error over a long time.

By contrast, the abrupt replacement of any food system by another, is inherently hazardous. The risk will be increased if the new food system is untested over time, and multiplied if it is already known to be pathogenic; and the most insidious danger will be caused if the staple of the original food system is replaced by another that is assumed to be relevantly identical, but which actually is inferior.

Control of food systems has always been an instrument of dominion, within countries and throughout empires. Observing the effects of the British land enclosures and clearances designed to replace people with more profitable cows and sheep, and to turn small farmers into units of manufacture, the 18th century poet Oliver Goldsmith wrote in 'The Deserted Village' of the people who in his day were being forced off the land into the English cities or to north America: 'a bold peasantry, their country's pride/When once destroyed, can never be supplied'. What happened in Britain during 150 years of industrialisation, is happening now, very much faster and on a global scale.

The most colourful opponent of the liberalisation of world food trade was Sir James Goldsmith, younger brother

of the ecologist Edward Goldsmith, who retired from his fabulous career as an industrialist and arbitrageur, including in the food business, and dedicated the last decade of his life to save the world.

He told me a story that in one respect I find hard to believe. He said he had warned Japanese ministers that if they allowed entry into Japan of foreign food commodities whose value was determined solely by price and therefore by the governments and industry that control price, Japan would be destroyed, and this is the story he told, with elaborations. It is a story about rice.

In Asian countries, rice is part of traditional food culture, and so of traditional philosophy. An observer of Vietnam has written 'in the fields were buried the ancestors whose spirit passed through the soil into the rice, so that eating it became the ritual by which one inherited one's ancestors' souls'.⁴²

Most Japanese agriculture is now capital-intensive; but much remains traditional and labour-intensive, because Japan is mountainous. As elsewhere in Asia, rice paddies have been created over the centuries by the gradual and constant building and maintenance of terraces filled with earth carried and carted up from the valleys. These Asian agriculture systems appeal to us emotionally and spiritually because they express sustained human achievement creating harmony of the living with the natural world. Hill rice farmers and their families need to live within walking distance of their fields. From transplantation to harvest, traditional rice farming involves going over every inch of the fields at least four times by hand. As long as the community of farmers remains a closed system, almost completely self-sufficient, they are secure: except in times of war, they are well guarded against famine and pestilence.

All over the world, the more that small farmers depend on money, and move towards capital-intensive agriculture, the more vulnerable they become. As a Japanese rice farmer says: 'Fertiliser, feed, equipment and chemicals are purchased at prices fixed abroad ... with the selling price also fixed, the farmer's income is at the mercy of forces beyond his control'.⁴³ Plains farmers of any commodity, who in the Americas and Europe now, are part of an established capital-intensive system, have an economic advantage over hill farmers, and all the more so if their motive for farming is profit.

And for most people in high-income countries, the measure of value is material, expressed in terms of money. The belief that the more money you have, the better and happier you are, underlies political and economic planning all over the world.

Traditional farmers do not need much money. So they are by the current accepted definition, undeveloped. Families and communities that live in tranquillity in settled cultures may be surprised to be told they are undeveloped, but so it is. Then, if Japanese mountain rice farmers have to compete in the supermarket, and if the price of rice imported from other countries is lower, or if it is artificially lowered by manufacturers in order to seize markets and eliminate

competition, and if consumers see no difference between domestic and foreign rice, 'liberalisation' of food trade would toss the hill farmers of Japan in the trash. This has occurred all over the world.

How to turn a mountain into a desert

So what? Rice, it might be thought, is a commodity like sugar, a source of energy from carbohydrate, and the more and the cheaper the better, and indeed, the world market price of rice has dropped by 60% between 1980 and 2000,⁶ which is good news if the only perceived significance of rice is as an edible commodity, human fuel. Also, the farmers could perhaps in time find other work. A lot of country people want to move to what they believe is the better life of the cities. Besides, progress identifies winners and losers, and the fittest survive.

But now look at the general consequences not only for the farmers, but for the environment and the living and natural world. The mountain farmers of Japan would never be able to return to the land. The result of the importation of north American or other foreign rice on any massive scale into Japan, would not only ruin the mountain rice farmers, but also would destroy their land, because the terraces would crumble, and the unprotected soil would fall down into the rivers and ocean, leaving bare mountains. The land would be lost to agriculture and indeed to normal human habitation, for ever.

And what would become of the farmers? With their families, they would be pushed into cities. Without education, employment, or urban skills, they would usually live in shanties. Of their children, the boys would tend to become drifters or bandits, and the girls servants or prostitutes. Family and social life would wither. As Goldsmith said in a book that was a best-seller in France: 'Loss of rural employment and migration from the countryside to the cities causes a fundamental and irreversible shift. ... From the first world to the third, huge shantytowns have become tragic, morbid intumescences ... social breakdown in the mega-cities threatens the existence of free societies',⁴⁴ and indeed, this is exactly what has happened and is happening in every country in the world where masses of people are suddenly forced off the land into cities.

Never mind, say the food liberals, no gain without pain; if they do not learn a new trade, the obsolete farmers will die in time, their grandchildren will thrive in the cities, and the bare mountains will become tourist attractions.

This has all happened before. In the early nineteenth century, country people teemed into what were then new as well as old British cities like Liverpool, Glasgow, Manchester and London, which we know, from the writings of Frederick Engels and Charles Dickens, were just as squalid and violent as the world's mega-cities are now. Some rural landscapes made almost uninhabitable by human depredation are now seen as among the most beautiful on earth, and attract the tourist dollar, and indeed the tourist yen: the Scottish highlands and the Greek islands, for example. I drafted this article in French Catalonia, surrounded by mountains many of whose lower slopes are lined with the

remains of long-abandoned terracing systems, and some of the surviving descendants of starving rural people who were forced out of their homes and forced to emigrate to north America from European countries, such as, Scotland, Ireland, Greece and Italy, did indeed become rich and powerful.

But this tough attitude has less force now. Times have changed. Rural areas in many countries are not picturesque. Huddled masses yearning to be free are no longer welcome in the USA or Australia. People who are pushed off the land now usually have nowhere to go except the cities of their own country, or else become internal refugees. The big difference between rural exodus in the past and now, is speed and scale. The current world population of 6 billion, 10 times greater than in the period of the industrial revolution, can be sustained only if most people continue to live simple lives, using little energy and other natural resources. A bigger world population of which a greater proportion live in cities, will accelerate the exhaustion of the planet's natural capital. Humanity cannot afford to create more deserts.⁴⁵

The miraculous growth of murder

Besides, what is said and what is done in the name of the liberalisation of trade, is two different things. Nations have always tended to enforce free trade policies one way, in their favour, when they are strong enough to control markets. Trade has always been a means to transfer money and power from the poor to the rich. In the 1840s, when China banned the sale of opium by the East India Company for reasons of public health, Lord Palmerston, then British Prime Minister, ordered the bombardment of Canton and other ports, and forced the Chinese emperor to establish free trade enclaves. The raising of trade barriers by the US government in favour of US steel in 2002 is a reminder that the one-way principle of free trade remains the same. Now, the World Trade Organization does the work that was once done by the early transnationals, the East India companies.

In the case of rice, a detailed report published by Oxfam in April 2002, outlines the catastrophic impact of importation of cheap foreign rice on the rural economy and on the political, economic and social structure of three countries, Peru, Haiti and Cambodia.⁶ In the case of Haiti, small farmers and their land have been devastated by importation of rice from the USA, made artificially cheap both by US farm subsidies and commercial policy to undercut the market. The agriculture Bill backed by both parties in the Congress and the Senate in 2002 will give \$125 billion to US farmers over 10 years,⁴⁶ and overall, subsidies to agriculture in high-income countries in 1999 amounted to \$360 billion a year.⁸

A Haitian farmer interviewed in 2001 said 'while rice is so cheap, we can never find a way out of our poverty. These imports make our life impossible'. The country, once self-sufficient in rice, is now dependent on imports. The political and economic effect on Haiti is evident. The social and communal effects are not calculated.

Brazil is another example. In 1950 the population of Brazil was 50 million, mostly rural. In 2000 the population

was 170 million, of whom 80% live in cities: an increase in the urban population of over 500% in 50 years.¹⁷

There are a number of reasons for this catastrophe. One is progress in public health. In Brazil in the past half century water supplies have become safer and food supplies more secure, and so fewer babies have died; but until recently mothers still expected only half their children to survive, and so continued to bear an average of six babies.

Another reason is developments in plant nutrition science applied on a massive scale since the 1960s to agriculture policy and practice throughout the low-income world. This commonly termed 'green revolution', using 'miracle' dwarf strains of rice and wheat, has greatly increased crop yield, and in many settings has improved food security. But even if the only consideration is the nutrition of human populations, this has been at a high price. Populations have increased partly in response to the increased availability of food. But the new high-yielding types of grain are relatively poor sources of micronutrients, and have had the effect of increasing deficiencies of vitamin A and iron notably in already vulnerable mothers, infants and young children.⁴⁵

From a broader, social and communal point of view, the 'green revolution' has been and is a global disaster. The laboratory-bred types of grain depend on capital investment in machinery and chemical inputs. In Brazil, tens of thousands of already prosperous farmers have become more capitalised and thus bigger and richer, while millions of subsistence and landless farmers have become redundant and driven off the land. This has in effect recreated the latifundia system that was an outrage of colonial times.

A large proportion of Brazilian small farmers, most of whom have little education or money, and many of whom are illiterate, have been mystified by the new technology. Besides, over 4 million of Brazil's almost 5 million farmers are refused access to credit, because the banks refuse to do business with unprofitable people.⁴⁷ This is the origin of the 'Sem Terra' movement representing the many millions of Brazilians today who own no land and have been thrown off the land, made famous in the curiously glamorous photographs of Sebastião Salgado. They have indeed been tossed in the trash. In the 1970s, the Brazilian government did deals with foreign investors that 'opened up' Amazonia to internal migration, which caused further ravaging of the forests and their indigenous populations of plants, animals and people.

And also, this is one fundamental cause of the explosive growth of favelas, the shanty towns that surround all big Brazilian cities, and which have taken over old slums and bad land in the centres of Rio de Janeiro and Belo Horizonte. Most of the inhabitants of 'greater' Rio and Belo Horizonte and Recife, Fortaleza, and Brasília, live in favelas, while the middle classes live in fortresses. The number of murders in Brazil has increased from 10 000 in 1980 to 40 000 in 2000. Rates of murder in the course of armed robbery and kidnapping have rocketed, and the government recently 'declared war' on bandits. Total expenditure on security systems in Brazil is now \$US24 billion, which is good business and goes to improve the index of Brazilian economic develop-

ment.⁴⁷ However, as Amartya Sen says, gross domestic product (GDP) is not a good measure of human welfare.⁴⁸

Nutrition scientists typically do not perceive the effect of their work on the living and natural world. They watch television, read the papers, and are no doubt concerned as citizens, but they don't see the big picture and the causal chain from scientific invention to social chaos. But plant, animal and human nutrition theories that are turned into international food and agriculture policies and programs are, in effect, experiments designed without thought for any other than their direct and immediate effects within the current map of nutrition science.

The chain of causes and effects is as follows. Agriculture policies that depend on capital investment and increase food production also increase populations and drive traditional and subsistence farmers off the land. The results include a greater gap between rich and poor, more absolute poverty, and an increasingly violent and unstable society. If this happens within a country whose population is increasing also for other reasons, the process accelerates. This is exactly what is happening all over Asia, Africa and Latin America, as well as Brazil.

We should be able to see such causal links, and so should the policy planners who work for the US State Department, the International Monetary Fund, the World Bank, the US Department of Agriculture, and the Central Intelligence Agency. No doubt they do.

Uncle Sam, Uncle Ben and Uncle Abe

And now, back to the normal practice of nutrition science, within current general principles, and to rice: white rice. Textbooks state that beri-beri is a dangerous and eventually deadly disease of the nervous system caused by deficiency of thiamine (vitamin B1).⁴⁹ It is also sometimes thought that beri-beri is a disease of populations that subsist on white rice. Not true, because if so, beri-beri would have been epidemic throughout Asia for many centuries.

In fact, inasmuch as rice is implicated in beri-beri, the disease is a modern anomaly, the underlying cause of which was first identified a century ago among people in the then Dutch East Indies subsisting on white rice produced by the new labour-saving machines that polished the rice, stripping off all its outer layers leaving not much more than starch and protein. It is a disease directly caused not by white rice, but polished white rice – the type that dominates the super-market shelves. That is to say, like vitamin A deficiency, epidemic beri-beri is a disease with underlying political and economic causes: colonialism and first-stage crude industrialisation.

Traditional artisanal labour-intensive methods do not eliminate micronutrients from white rice, as settled populations who subsist on white rice know, after trial and error over the generations. Robert Knox, a model for Robinson Crusoe, was held prisoner in Ceylon by the King of Kandy for 19 years between 1660 and 1679. He noted in his memoirs that native white rice was parboiled, 'the which ... so I by experience, have found to be the wholesomest'.⁵⁰ Three hundred years

later in the 1960s, the reporter who studied the rice-centred culture of Vietnam wrote 'American rice has to be sent to Vietnam to feed those driven from the land. The people hate it: they try to sell it for pig food to get money to buy what Vietnamese rice is available'.⁴² Like wine, rice has many types and flavours. The Vietnamese peasants were disgusted by the appearance and taste of the imported rice. Germans react in a similar way to British bread.

North Americans, who are generally not familiar with the natural origins of food, and for whom rice is not a staple, may not know the difference between parboiled rice, other forms of white rice produced by labour-intensive methods, and polished rice stripped of almost everything but starch and protein, which, if it replaced the traditional types in populations that subsist on rice, would indeed cause epidemic beri-beri.

What would happen if, as a result of food trade liberalisation and the extinction of small farmers, imported polished rice replaced native rice in the most impoverished areas of Japan, whose people subsist on rice? Curiously, this would be good for business and economic development. Here is a satirical scenario. Disease would break out and even become epidemic. Beri-beri, perhaps known by local wags as Uncle Ben disease, would be confirmed by visiting epidemiologists and a multifaceted program would swing into action. Health workers would administer thiamine pills to the grateful rural population. Imported polished rice would be 'fortified' with thiamine, and new improved miracle strains would be developed, genetically modified to push thiamine into the starchy inner layers, perhaps branded as 'Uncle B Number One'. Other rice fortified or modified to contain carotenoids, perhaps branded as 'Uncle B Sunshine', designed to resolve the vitamin A deficiency discussed in the accompanying article⁹ would be doled out to the children of the rice farmers now squatting in shanties in the cities. Rice polishings would be fed to animals. Health food shops in cities would sell rice bran and germ, together with brown and parboiled rice as quasi-medicine with a big mark-up, together with vitamin B pills, to the health conscious middle classes.

Their land having become destroyed, the producers would become consumers, the peasants would become patients. Cash expenditure on rice, pills, drugs and guns would increase, and the usual indicators would show that the country was more developed. Goldsmith foresaw this scenario in Japan. It applies to any country whose staple grain is rice and it is happening even in countries where rice agriculture is naturally cheap, because trade 'liberalisation' does not stop the USA and other rich nations undercutting markets, or dumping rice on poor nations in the name of aid, which is to say, political and economic control.

Is this a fanciful scenario? If only it was. It parallels the process that occurred with another staple food, bread, in another sophisticated country, Britain, half a century ago. As outlined in the accompanying article, the standard white loaf made from stripped wheat, 'fortified' with thiamine, was championed by the leading scientists of the day, who stated that it is nutritionally practically the same as brown and

wholegrain bread.⁵¹ And the brands and slogans? Well, some clever British advertiser marketed the phrase 'the best thing since sliced bread'.

There is an aspect of Goldsmith's warning that is hard to believe. Rice has been the staple food of the Japanese people for a very long time. They do know the difference. It is hard to believe that they would accept US rice as a substitute. Moreover, Japan is a high-income country with industrial muscle, and tends politely to resist trade 'liberalisation'. In common with other Asian countries, Japan has its own culture, which despite US occupation after the 1941–1945 war, may prove more resilient than that of the West. But there again, Goldsmith has proved to be right many times, and in the case of rice is now proved right in many countries. Perhaps Uncle Ben fortified with vitamins A, B and E, branded as Uncle Abe, with an image of Abraham Lincoln in the place occupied by Colonel Sanders on another well known product, is doing a roaring trade in Japan right now.

It's the rich that gets the gravy ...

Most countries in Asia, Africa and Latin America, cannot afford to resist the free market of capital, and certainly cannot afford to refuse food aid. They need the cash to pay their debts to the international money lenders. They need to display their devastated lands and their impoverished populations, like beggars display their stumps and sores, to attract support from the international aid agencies. Like cash crops, starving and diseased people can be economically helpful, in the short term, and unfortunately, politics usually is short-term.

The prevailing policy of world food trade driven by the price mechanism is certainly having an effect not only on the health of humans, but also on the whole living and natural world. As evident at the World Social Forum congresses in Porto Alegre in Brazil in 2001 and 2002, many of the organisations and individuals opposed to globalisation are more interested in animal rights and environmental impact than in human health.

However, such issues are interrelated. For example, the cerrado (savannah) that occupies about 20% of Brazil including the central altiplano where I live and work, is naturally extremely biodiverse. It is being steadily converted into ranches for cattle and farms for soya beans grown as cattle feed. Global burgerisation will accelerate this trend; for the cerrado still contains lots of unexploited land that can be filled with capital-intensive businesses that generate profit.

Environmentalists are worried. But agronomists are also concerned, because the industrialisation of the Brazilian landscape is endangering indigenous food sources, whose relevance to human health, like that of herbs in the Amazon region, is only now becoming known (Ministério da Saúde Brasília, unpubl. data, 2002). This is indeed troublesome, because conversion of land to create new food systems, even when the climate, soil or culture proves to be inappropriate, can be irreversible.

A British working class song includes the line 'it's the rich that gets the gravy, it's the poor that gets the blame'. Early Victorian tough minded liberal politicians, observing the Irish potato famine and conditions in the cotton mills of Lancashire, decided against intervention, on the grounds that progress must involve a shake-out of the unfortunate. Modern Malthusians who administer the new world order in Washington, Geneva and other centres, may be anticipating the extinction of the world's landless classes, and reduction in the global population, with equanimity.

Brazilian policy makers are less relaxed: a substantial proportion of the tens of millions of landless people in Brazil, most of whom now live in the vast slums around and within the big cities, are becoming organised, and own guns.

Conclusion

Might new nutrition and food policies perceive the people of low-income countries as relatively more healthy, and the people of high-income countries as relatively less healthy? Might the food systems of high-income countries be generally perceived not as models but as warnings, and food systems that have evolved in response to different climate, terrain and culture in middle- and low-income countries be protected and sustained?

This all depends on who is in charge of the policies. Many nutrition scientists who are not aligned with the 'new world order' reaffirmed by the younger President Bush after the events of 11 September 2001, are committed to such approaches. The World Wide Web, an example of how globalisation in good hands is a democratising force, will make a difference. But nutrition science still remains framed by its original paradigm, which on the whole has made it a dark force.

Many countries have been wrecked by the military, political, economic and social domination of Africa, Asia, the Middle East and Latin America that began half a millennium ago by the western European and north American powers. Nutrition and food policies devised in and for high-income countries have played a part in this process, which is now accelerated. Correspondingly, most influential nutrition scientists are servants of the lords of the world. Who these lords are has changed over time. They have been monarchs and dictators or elected politicians. They are now usually controllers of international government and transnational industry.

The UN and other international agencies, industry, governments, the medical and health professions, and civil society, have a common interest in the exaggeration of malnutrition in middle- and low-income countries. The governments of economically rich and poor countries want to give and to receive food aid, an instrument of control and a vector of corruption. Farmers in low-income countries who already have the money to buy machines and chemicals thereby become more avaricious. Food manufacturers make most money from uniform branded processed products with 'value' added from fat, sugar, salt and chemicals. Populations who have been driven off the land and made destitute

are trained to expect food handouts. Civil society is usually not equipped or inclined to question standard expert estimates of poverty and malnutrition, or any other policy disguised by technical language. The drive to expand capital markets, to confuse value with price, and to make more money, has become a universal religion. The conversion of producers into consumers and consumers into patients, which is good for business, by definition makes a country more 'developed'.

The general principles and the normal practice of nutrition science fit within the political and economic plan of the financially rich nations, transnational corporations, and international agencies, to control the world and to shape middle- and low-income nations to suit their own ends. This is a clever enslavement, usually not perceived as such by the slaves. Since the 1990s and the declaration of the 'new world order' by the elder President Bush, not only food aid, but also food trade, has become an ever more powerful instrument of economic and political control. Inescapably, nutrition science itself has become ever more distorted and corrupted.

This process is now massively accelerated as a result of the globalisation of financial markets, including control of food trade by the mechanism of price, used ruthlessly by powerful governments and industry to gain their ends. This is the fundamental cause of the massive increase in production and consumption of meat, fat, fatty and sugary foods and drinks, and alcohol, that wrecks food systems throughout Asia, Africa and Latin America already made fragile by colonialism, debt and cash-cropping, which in turn cause untreatable epidemics of food-related chronic diseases in countries that suffer endemic deficiency and infection.

It is now time to reformulate nutrition science, because its general principles are inadequate, and its normal practice has insufficient relevance to the known and emerging world, and to the most important and urgent challenges facing humanity.

The world

In his lecture given in Sri Lanka in the late 1970s, cited in the accompanying article, Joseph Needham also said 'for the Chinese the natural world was not something hostile or evil, which had to be subdued by will-power and brute force, but something more like the greatest of all living organisms, the governing principles of which had to be understood so that life could be led in harmony with it'.⁵²

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