Reshaping the Food System for Ecological Public Health

A Background Paper for the Conference:

Food Systems and Public Health: Linkages to Achieve Healthier Diets and Healthier Communities

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Summary

The paper explores current debates about food and health. An overview is given for food’s impact on health, the role of supply in shaping health, and the role of culture in mediating demand. The US food system is used as a focus in the paper, but its dynamics and challenges are placed in a global and historical context. In the 19th and to the early 20th century, US food’s impact on health was primarily associated with under-consumption, but today there is a coincidence of under-, mal- and over-consumption, with resulting more complex health patterns. The USA epitomises a global trend towards a high incidence of diet-related non-communicable disease.

The mid 20th century policy commitment to increase supply to address problems of insufficiency, affordability and quality was evidence-based at the time and has been successful in raising output but, paradoxically, has created new health problems in place of (or sometimes alongside) the old. Part of the challenge that now faces proponents of better food and health is cultural – the battle to reshape the social meaning of food.

This analysis raises some old but still pertinent themes in food and health policy such as questions of food rights and responsibilities, agency and capacities in the food system, and the role and relative power of various sectors.

21st century food and health policy now looks likely to face even more complex demands than policy-makers faced in the past. Their agenda will be shaped by ‘new fundamentals’ such as climate change, water stress, energy pressures, demographic change, and a host of societal and environmental considerations.

The paper concludes with seven issues for the future.

First, the conceptual basis for food and health needs to be reasserted as Ecological Public Health. This locates human health within its environmental context. Health is seen holistically and as linking different levels of existence: material, bio-physiological, social and cultural. Ecological public health helps integrate the food challenges ahead: better nutrition in a low carbon sustainable food economy.

Secondly, Ecological Public Health needs to be built into the core of the business model of food supply chains. Too often, current business see health or environment as bolt-on extras rather than the lifeblood of supply.

Thirdly, the inequalities of power which characterise the food system shape food’s impact on public health and the environment. Reducing inequalities is a priority. Strategies based on individualisation are unlikely to deal with the enormity of the Ecological Public Health challenge.
Fourthly, consumers can be helped by reformulating and, to some extent, de-emphasising choice as the prime mover of better food and health. Appropriate levers for change may be upstream too, via choice-editing.

Fifthly, the policy and institutional architecture has grown into a multi-level framework of governance: global, regional, national, state and local. Even within that complex structure, different sectors vary in their power and reach.

Sixthly, the fissure in public policy between health on the one hand and sustainability on the other is unacceptable. To start delivering a food system which is both healthy and sustainable requires is a priority. A world which already requires consumers to consume well for bodily health well now requires them to eat well for the environment. But it is not quite clear what a sustainable diet is. There are tensions in how health and sustainability mesh.

Finally, from all of the above, new research questions emerge. Achieving a food system which maintains rather than mines ecological public health will require huge research effort. Research programmes can help individual researchers feed into the collective good.

Addressing these issues suggests an ambitious approach: a refocus of core values. It could be argued that to sketch such a vision for food and health might be unrealistic at this time of national and global financial uncertainty. Not to do so, however, would be irresponsible and would deny evidence which warrants policy response. Daring to face seemingly insurmountable challenges has always been a shared strength of health and food thinkers, researchers and champions. Working together is an essential feature of good policy-making. The common task is addressing realities while helping face the future.
Introduction: could the food system become healthier?

This conference is being held at an extraordinary time. The world – not just the USA - has entered a period of economic recession which might become a fully fledged depression. Indicators could go either way. One view argues that the dramatic actions already taken by Governments around the world to bolster their banking systems will be painful (not least in the form of debt) but will stabilize economies and return economies to business-as-usual or near enough. Another view counters that good money is being thrown after bad, and that the lessons of the 1930s are of only limited use in 21st century globalised economies. A further view warns that climate change, energy pressures and water stress will reshape how economies work, and that the sooner these are addressed the less additional pain there will be.

Such debates about the state of national and international economies are highly pertinent to the topic of this paper - the interface of food and health. How we fund our healthcare and public health infrastructure reflects our values and cultural priorities. Is health an investment or a failsafe? Is it a ‘bolt-on extra’ to be afforded when personal or public finances allow it, or is it an essential without which no economy or society can function to its full and optimum potential?

How one answers such questions depends on one’s assumptions and one’s notion of progress. Only in myths do health or food cost nothing. Their affordability and how they are delivered (or not) characterises all societies, developed and developing, rich and poor. Like many developed countries, the USA has a rich and long history of policy debates about both food and public health. The Obama presidency has begun at a critical moment for our collective thinking while, at the global level, the World Health Organisation (WHO) has made important contributions in the form of two Commissions, one on the Macro-economics of Health and the other on the Social Determinants of Health. At the same time, the Food and Agriculture Organisation (FAO) has voiced deep concern about the implications for food production of using land to grow biofuels, and many voices are raised suggesting that more policy coherence is needed, if we are both to feed people, do it healthily and sustainably.

How can we make sense of this difficult world? One response is the separate food from health, to argue that food is best left to markets and health is something for which individuals are responsible. The three reports by the UN bodies referred to above disagree. The two on health make new versions of an old case for why health matters: it is better to invest in health protection now than pay for crises later. This is the familiar ‘upstream’ versus ‘downstream’ policy distinction. The case for investing in food and health to make economies more efficient probably needs little exploration at this conference, but we should note that it can lead into choppy policy and theoretical waters. The hard fact, however, is that Governments, the people and corporations often have to pay in a crisis yet are harder to convince of the value of investing in health when the risk appears slight or distant or ‘nothing to do with them’. In food, it often takes food safety crises for supply chains to be improved.
As is discussed later, food and health raise big questions about power. There are often powerful vested interests deeply opposed to change, and the public interest may get lost in battles for policy leverage. This has frequently happened in the USA, as policy boundaries between markets and public goods, between needs and wants, between sensible prevention and excessive protection are tussled over. The ebbs and flows over food and health are not the preserve of the US alone. In mid 19th century UK, Edwin Chadwick, one of the ‘fathers’ of modern public health with his 1842 Report on Sanitary Conditions, met stiff opposition when trying to clean up the water supplies. Thomas Wakley founder and editor of The Lancet together with his food analyst Arthur Hassall also faced stiff political opposition to their exposés of routine food adulteration in the grocery trades.

They triumphed, but their stories should not lead us into thoughtless hero-worship. It often requires social not just medical movements to win food and public health gain. And sometimes, people even do the right thing but informed by the wrong theories. Chadwick, for example, subscribed to the miasma theory of contagion: that disease was spread by foul air. As a follower of Riccardian economics, Chadwick was hardly an opponent of market discipline, but he was convinced that the public interest had to take priority when making policy decisions about the shape of society and its public health infrastructure.

Bearing all these issues in mind, this paper suggests that, whatever the ideological discussions might be about the role and financing of food and public health, the edifice of food and health policy is already in serious difficulty. Diet’s toll on non-communicable diseases is now immense, placing huge burdens on society and individuals. Heart disease may be being contained – by drugs, physicians and awareness – but obesity has risen in its place. A pattern of eating and living appears to keep throwing up consequences which are problematic even for rich societies like the US to bear, let alone developing countries which follow our pattern. The cost of diet-related ill-health is enormous whichever level of governance we look at - global, regional or national – and whichever approach to efficiency we espouse – financial, social, ecological, energy, or moral.

At the heart of the debates about food and health – in the past and today – is a strand of concern about agency. Who should act: the state, individuals, commercial interests? In the name of which moral and political principles? With what effect on responsibilities? Alongside these questions of ‘who?’ and ‘why?’ sits the question of ‘how?’: is it better for action to be regulated or self-regulated, voluntary or legislated, through information or, in modern parlance, ‘choice-edited’ before the consumer even sees the food?

The present monetary economic crisis is thus an opportunity to take stock of what a rich, developed country like the US is doing about its food and public health policy. We can – in a conference such as this one – go back to first principles and ask: what is the problem? Is there one? If so, for whom? And what can be done about it?
What's the problem?

Health

The long view of food and health is that the condition of both in the US has improved. Life expectancies have risen. Food supply has increased. Problems have been tackled. For anyone living in an industrialised or industrialising country, the 20th century was a period of remarkable health gain. Better hygiene and perinatal services cut maternal and infant mortality. Vaccination prevented diseases and pharmaceutical discoveries such as penicillin reduced infections. Improved healthcare reduced mortality and morbidity. Tobacco was exposed as a bane (but still grown).

Understandably, medical science staked its claim as the driver behind these advances, but that view was most famously questioned by Thomas McKeown, himself a physician and epidemiologist, who countered that the key factor was improved diet. That assessment was in turn rejected by Robert Fogel, Nobel Prizewinner for economics, who showed the key variable was incomes rather than food supply. Others since have proposed that the health advance was more complex, not least being shaped by the 19th century investment in physical infrastructure which characterised European and US public health’s great impact on macro-economics.

That infrastructural investment began reluctantly with familiar arguments about burdens on the state (taxpayers) and moral questions about rights and responsibilities, but was accelerated when opposition was silenced by fear that there was no escape. If contagion affected all classes and if wealth was no protection, investment in prevention for all becomes a more acceptable course of action. A policy calculus thus emerged: infrastructural as well as social investment engenders health improvement, which in turn enhances market efficiencies, which save costs in the long run. This calculus runs throughout Western late 19th and early 20th century policy discourse about the massive expenditure on systems of drainage, clean water, housing, health and food control.

We now know this engineering approach to health did contribute to improved hygiene and population health. Medical advances, of course, contributed but, as we face the need today to push for another round of investment in food and health, we must remember how crucial the improving food supplies was in the past. The significance of the improvements were not just matters of hygiene and quantity but prices and quality, key factors for ordinary working families.

Whether food was the key factor or just one element of the wider prioritisation need not deviate us here, and can be left to the important and vibrant debate among historians. Certainly, without the clean-up of food adulteration and hygiene, the economic potential
of western industrial societies would have been held back; that much we can observe from what happens in too many developing countries today.\textsuperscript{5} Without improvements to the physical environment and decent food controls, healthy urban settlements fit for commercial life would not have been possible.\textsuperscript{23-25}

According to the food-focussed narrative, Upton Sinclair’s 1906 exposé of the lamentable state of the Chicago meat yards and factories in his book *The Jungle*,\textsuperscript{26} deserves a special place in the pantheon of US public health. His book illustrates that ‘shock tactics’ have on occasions led to public health improvement.\textsuperscript{1} Sinclair’s book so troubled President Theodore Roosevelt that he instigated a secret inquiry which confirmed Sinclair’s findings and precipitated two important pieces of legislation in that same year, the 1906 Meat Inspection Act and the Pure Food and Drug Act.

International commitments to improve health, and to see health as a shared international task (not least because disease knows no borders), had first been negotiated under the auspices of the League of Nations, created after World War 1. By the 1930s the League of Nations was an important repository of national experience about the effect of economics on health, with the 1930s depression providing ample evidence of how poverty and income disparities stunted lives and life expectancy.\textsuperscript{27,28} Researchers like John Boyd Orr, Director General of the Food & Agriculture Organisation shortly after it was founded in 1945,\textsuperscript{29} proposed that public health would only improve if diets improved.\textsuperscript{30} The role of public policy, Boyd Orr and his contemporaries argued, ought to be to raise food output, to ensure it was equitably and efficiently distributed and thus to improve health by population measures.\textsuperscript{31}

Ostensibly, this was the policy framework put in place from the 1940s.\textsuperscript{32} It was to be a happy partnership of investment in agriculture, improved facilities down the supply chain (notably to reduce waste from poor storage) and improved distribution, with welfare safety nets in place just in case matters went wrong. This has been called the productionist paradigm, the way of thinking about food and health which gives primacy to increased supply as the means of delivering health.\textsuperscript{33} In a world marked by scarcity, it made (and makes) sense but in a market characterised by over-supply, as in rich countries such as the USA today, it can create new problems.

The productionist vision of improved public health through improved food supply came to dominate US and most world food policy thinking in the mid 20\textsuperscript{th} century.\textsuperscript{34} But even as it was being worked through to farm level, new evidence emerged from an unexpected quarter. In work begun in the 1950s but finalised by 1970, the great US epidemiologist Ancel Keys (1904-2004) showed how diet has an impact on diseases of the circulatory system, and how in particular the emergence of heart disease owed much to inappropriate fat intake and the raising of LDL-cholesterol levels.\textsuperscript{35-37}

Slowly but inexorably over the following three decades, right up to the present, evidence has mounted that a combination of inappropriate diets and reduced physical activity –

\textsuperscript{1} In media-saturated societies today, the capacity to do this is probably limited, although Al Gore’s climate change documentary *An Inconvenient Truth* might be a candidate.
sometimes merged as ‘poor lifestyle’ – are prime factors in the huge toll of non-communicable diseases (NCDs), from strokes, diabetes, and heart disease to cancers. This data has been summarised in a number of authoritative reports at global level by the WHO,\textsuperscript{38,39} and in the US by reports from the Surgeon General.\textsuperscript{40} Specific diet and disease reports for cancer have confirmed that general picture.\textsuperscript{41,42}

Figure 1 (on the next page) gives the WHO’s estimates for global number of deaths for men and women, attributable to the main known risk factors such as blood pressure, tobacco, cholesterol, weight, physical activity, etc. It should be noted that food is a common issue across a number of these factors.

Table 1 (below) gives the key diet and activity recommendations from the World Cancer Research Fund / American Institute for Cancer Research on the prevention of cancer. Tobacco, the greatest risk, is not on the table which gives only the diet and activity risks.

Whereas thirty years ago, the medical evidence pointed just to diet – sometimes summarised as the ‘Mediterranean Diet’ – today, the advice is about activity, too. The net result is that a broad consensus exists about desirable directions for the US population to take with regard to food and health. Very simply, it is: eat a better diet; take more exercise; live differently to how most do. These are familiar public health messages, known for a considerable time, yet marred by a failure of delivery. In short, we have a gap between evidence and policy delivery.

### Table 1. General recommendations on diet, physical activity and cancer prevention

<table>
<thead>
<tr>
<th>Issue</th>
<th>Advice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body fatness</td>
<td>Be as lean as possible within the normal range of body weight</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Be physically active as part of everyday life</td>
</tr>
<tr>
<td>Food &amp; drinks that promote weight gain</td>
<td>Limit consumption of energy-dense foods. Avoid sugary drinks.</td>
</tr>
<tr>
<td>Plant foods</td>
<td>Eat mostly foods of plant origin</td>
</tr>
<tr>
<td>Animal foods</td>
<td>Limit intake of red meat and avoid processed meat</td>
</tr>
<tr>
<td>Alcoholic drinks</td>
<td>Limit alcoholic drinks</td>
</tr>
<tr>
<td>Preservation, processing, preparation</td>
<td>Limit consumption of salt. Avoid mouldy cereals (grain) or pulses (legumes)</td>
</tr>
<tr>
<td>Dietary supplements</td>
<td>Aim to meet nutritional needs through diet alone</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td>Mothers to breastfeed. Children to be breastfed</td>
</tr>
<tr>
<td>Cancer survivors</td>
<td>Follow the recommendations for cancer prevention</td>
</tr>
</tbody>
</table>

Source: WCRF / AICR 2007\textsuperscript{42}
Figure 1

World

Deaths in 2000 attributable to selected leading risk factors, by sex


Source: WHO 2002

Number of deaths (000s)

Blood pressure
Tobacco
Cholesterol
Underweight
Unsafe sex
Fruit and vegetable intake
High Body Mass Index
Physical inactivity
Alcohol
Unsafe water, sanitation, and hygiene
Indoor smoke from solid fuels
Iron deficiency
Urban air pollution
Zinc deficiency
Vitamin A deficiency

Female
Male

Source: WHO 2002
If there is this kind of unanimity of scientific thinking, should not food and health policy-making merely follow suit? ‘Evidence-based policy’ is the often stated aspiration. In truth the relationship between evidence and policy is more problematic; we can observe many a policy at odds with relevant evidence, others based on partial evidence, and others where there is evidence but no apparent policy response. The aspiration to make evidence, policy and practice more consistent and coherent is nonetheless a noble aim, although there is, as the saying goes, many a slip ‘twixt cup and lip.

In the US, for instance, despite evidence of the need to do otherwise, the population has grown heavier in weight. In 2008, the Centers for Disease Control (CDC) reported that no US state was meeting the official target of reducing to 15% the proportion of adults who are obese.\textsuperscript{43,44} The good news was that the seemingly inexorable and rapid rise in US overweight and obesity trends has levelled off but it has not dropped, which is what is needed to improve public health.\textsuperscript{45} In 2007, only one state – Colorado - had a prevalence of obesity less than 20%. Thirty states had a prevalence equal to or greater than 25%.

Despite evidence of the need to behave differently, physical activity is not being built adequately into US everyday life.\textsuperscript{46} There are reverse pressures, as reliance on motorised transport has been engineered into life, a pattern which is being emulated world-wide. Instead of walking or bicycling to work, shop or school, the norm is characterised by high dependency on four wheels driven by non-renewable fossil fuels. The public health message is to reverse that and to burn off food-derived calories by walking, running or bicycling.

Again, despite evidence that more equal societies are healthier (above a $5,000 per year average income level),\textsuperscript{47-49} US inequalities have long been known to shape health outcomes.\textsuperscript{50} These effects are mediated by gender, ethnicity and income.\textsuperscript{51} The USA is, of course, not alone in such effects; the UK, for one, has long betrayed not dissimilar gaps between evidence and policy.\textsuperscript{52,53}

In sum, the really big challenge in food and health appears to be not so much ‘is causation adequately understood?’ as ‘are we prepared to do enough to make a difference?’ Food and health policy-making and delivery mechanisms are often locked-in to partial solutions, seeking quick fixes, when more complex, long-term, holistic approaches might be required.

**Supply**

Even if we could wish away the above picture of diet-related ill-health, change in how we eat and live is almost certainly required for environmental reasons. The 20th century’s food system – nowhere more obviously than in the US – has been based on cheap energy and other inputs whose environmental costs now loom large. Future food systems will not be able to rely on cheap (or plentiful) oil. To make artificial fertilizers (and also
pesticides), for example, is very energy intensive, and fertilisers have been estimated to account for approximately 37% of US agriculture’s energy use.54

There is growing agreement that 21st century food and health policy will have to be based on ‘new fundamentals’, pressures such as energy, climate change, water, eco-systems support. The geo-physical challenges will have to be faced alongside unprecedented social, cultural and demographic pressures. Global population is currently 6.7 billion but looks set to rise to 9 billions by 2050.55 With oil approaching ‘peak’, and water systems and available land due for greater stress, at best, and shrinkage, at worst, it is little wonder that some apocalyptic thinkers are resurrecting the ghost of Thomas Malthus, the English cleric who first prophesised that while population can grow geometrically, the capacity to increase food supply can only be grown arithmetically.56 Optimists counter that a sense of history is warranted and allows for proportion. Measured in calories, supplies are currently sufficient to feed the world adequately. The problem has long been one of distribution.57 It should be recognised, however, that the 1950-90s rise in food production and the effect of the ‘green revolution’ of plant breeding plus artificial fertilisers (which won Norman Borlaug the Nobel Peace Prize) has slowed down.6 58 So what does the future hold?

A policy fissure has emerged over technology with, on one side, those who see a new ‘green revolution’ in the form of genetic modification and nanotechnology and, on the other, those who prioritise sustainable agriculture. The World Bank / UN backed International Assessment of Agricultural Science and Technology Development Knowledge, for example, concluded that investment in small scale farmers in developing countries will yield greater benefits faster than any technical fix, but did not rule out the potential of GM.59 Running through such debates are complex issues of power and control: GM might have the potential to help production, but its main uses so far appear to have been for cotton and soya largely fed to animals rather than for food produced directly for human consumption. Proponents argue that this will come from second or third generation GM.

While such issues are hotly debated, it is important for us in the developed world to appreciate how the nature of food has altered in the last two centuries. Almost everything has been touched by revolutions in what is grown, how, where and what form. These modern changes are in fact but the latest in 10,000 years of new direction for the food system, redrawing the relationship between diet and health. Table 2 (on the following two pages) summarises some of these key transformations in supply. All have their effect and interplay with culture – how we eat, the meaning of food for us, etc – and thus an impact on health. The 20th century is thus only the most recent in a series of revolutions – no other word can convey the transition. Nevertheless, the scale and range of the change in the last century has been unprecedented. Since World War 2 it has yielded handsomely. More food has been produced globally. More mouths have been fed. Supply chains and trade routes have grown. Nowhere has this picture of advance been clearer than in the USA. Total supplies, measured in calories, rose over the 20th century. The US food system has been characterised by over-supply rather than under-supply. When measured against its already generous starting point, the 20th century yielded even more.
## Table 2. 10,000 years of agricultural and food revolutions, and their links with farming, culture, and food-related health

<table>
<thead>
<tr>
<th>Era/revolution</th>
<th>Date</th>
<th>Impact on</th>
<th>Implications for Food-related health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farming</strong></td>
<td><strong>Culture</strong></td>
<td><strong>Food-related health</strong></td>
<td></td>
</tr>
<tr>
<td>Settled agriculture</td>
<td>From 8500 BCE on</td>
<td>Decline of hunter-gathering; greater control over food supply but new skills needed</td>
<td>Fixed human habitats; division between “wild” and “cultivated”</td>
</tr>
<tr>
<td>Iron age</td>
<td>5000–6000 BCE</td>
<td>Tougher implements (plows, saws)</td>
<td>Emergence of technology; spread of artistic expression</td>
</tr>
<tr>
<td>Feudal and peasant agriculture (not in some regions, e.g., North America)</td>
<td>Variable, by region/continent</td>
<td>Spread of enclosed land (parceling up of formerly common land by private landowners); use of animals as motive power; marginalization of nomadic practices</td>
<td>Division of labor; settlement around land-based production and village systems</td>
</tr>
<tr>
<td>Industrial and agricultural revolution in Europe and U.S.</td>
<td>Mid-18th century</td>
<td>Land enclosure; rotation systems; rural labor leaves for towns; emergence of mechanization</td>
<td>Growth of towns; emergence of industrial working class with no access to land; rise of democratic demands</td>
</tr>
<tr>
<td>Chemical revolution</td>
<td>Begins in 19th century in developed world, spreads thereafter</td>
<td>Fertilizers; later pesticides; emergence of fortified foods (e.g., Liebig’s beef extract)</td>
<td>New applications such as packaging; emergence of large-scale food processing; population gradually increases with wealth</td>
</tr>
<tr>
<td>Mendelian genetics</td>
<td>1860s; applied in early 20th century</td>
<td>Plant breeding gives new varieties with “hybrid vigor”</td>
<td>Beginnings of biological science in everyday life, e.g., enzymes</td>
</tr>
<tr>
<td>The oil era</td>
<td>20th century</td>
<td>Animal traction replaced by the tractor; spread of modern, intensive agricultural techniques</td>
<td>Car use and supermarkets rise; emergence of large-scale food processors; modern mass consumerist food culture and brands take off</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Green Revolution in developing countries</td>
<td>1960s and after</td>
<td>Systematic plant breeding programs on key regional crops (rice, potatoes) to raise yields</td>
<td>Concentration of farming in larger holdings and more commercialized, intensive agriculture</td>
</tr>
<tr>
<td>Modern livestock revolution</td>
<td>1980s and after</td>
<td>Growth of meat consumption creates “pull” in agriculture; increased use of cereals to produce meat</td>
<td>Rising incomes as more low-income countries achieve affluence; meat consumption rises (in meat-eating cultures); food suitable for humans (e.g., soya) is redirected to animals</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>End of 20th century</td>
<td>New generation of industrial crops; emergence of “biological era”: crop protection, genetic modification, genomics</td>
<td>Debate about drivers of progress, patent ownership; consumer information becomes central to management in “risk society”</td>
</tr>
</tbody>
</table>

Source: Lang 2006 60
By 1994 an extra 300 calories per person per day were being produced in the US – even allowing for spoilage and waste – than in 1904 (see Fig 2); and this for a larger populus.

Fig 2. Calories available, USA, 1909-1998

Source: USDA ERS 2000

In the 20th century, US farms revolutionised in what they did, and how they grew what they grew (see Table 3). The range of crops grown on farms dropped. Markets concentrated. Farm size grew. The rural population fell. Yet more mouths were fed.

Table 3. A century of structural change in US agriculture, 1900-2000

<table>
<thead>
<tr>
<th></th>
<th>1900</th>
<th>1930</th>
<th>1945</th>
<th>1970</th>
<th>2000/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farms (millions)</td>
<td>5.7</td>
<td>6.3</td>
<td>5.9</td>
<td>2.9</td>
<td>2.1</td>
</tr>
<tr>
<td>Average farm size (acres)</td>
<td>146</td>
<td>151</td>
<td>195</td>
<td>376</td>
<td>441</td>
</tr>
<tr>
<td>Average number of commodities produced per farm</td>
<td>5.1</td>
<td>4.5</td>
<td>4.6</td>
<td>2.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Farm share of population (percent)</td>
<td>39</td>
<td>25</td>
<td>17</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Rural share of population (percent)</td>
<td>60</td>
<td>44</td>
<td>36(1950)</td>
<td>26</td>
<td>21</td>
</tr>
<tr>
<td>Off-farm labour*</td>
<td>n/a</td>
<td>100 days</td>
<td>27</td>
<td>54</td>
<td>93</td>
</tr>
</tbody>
</table>

* 1930, average number of days worked off-farm; 1945, percent of farmers working off-farm; 1970 and 2000/02, percent of households with off-farm income.

Source: USDA ERS 2005
The capacity to produce more food was driven by the spread of agrichemicals and mechanisation. In 1945, for instance, US farms had 12 million horses and mules, and just over 2 million tractors. Just 15 years later, by 1960, the animals were down to 2 million and the tractors had doubled. By any standards this change was rapid. More importantly, for the wider US economy, this combination of technical and economic changes, both on and off the farm, facilitated the fall in the proportion of disposable income that US consumers spent on food, even while the actual expenditure rose (see Figures 3 and 4).

Fig 3. US food expenditure, 1929-1998

![Graph showing US food expenditure, 1929-1998](source: USDA ERS 2000)

Source: USDA ERS 2000

Fig 4. US spending on food, average disposable income on total, at home, away from home food, 1929-1998

![Graph showing US spending on food, 1929-1998](source: USDA ERS 2000)

Source: USDA ERS 2000
This pattern shift in food production and costs is almost always interpreted as progress, particularly for people on low incomes. Its appeal to US consumers was modernity, enabling them to ‘trade up’, to eat foods previously the preserve of the affluent. Meat and dairy products, for example, could become everyday foods rather than just feast-day special foods. Figure 5 gives the growth of US consumer expenditure on various types of meat from the 1930s to today. Figure 6 gives the growth of fats added both by the consumer, for instance on bread, and in the factory, for instance in cookies. This doubled in the US food system 1909-98. The result is that economic advance generated health problems, to be paid for by people’s health, insurance premiums, and healthcare burdens. It contributed in effect to a mismatch between supply and health.

Fig 5. US Meat Consumption, 1909-1999: game, fish, poultry, red meat

![Fig 5. US Meat Consumption, 1909-1999](source: USDA ERS 2000)

Fig 6. Total added fats, US foods, 1909-1998

Culture

The emergence of new supply chains and new foods, indicated in the previous section as success and modernity, also carried threats. In *The Hidden Persuaders*, his 1957 classic account of the role of marketing industries in shaping modern food demand, Vance Packard told of the worries food industry people had about the uptake of processed convenience foods by American women whose identity saw cooking as a core family role. 63 Presenting the new food products as modernity was a significant appeal, but it was equally important to build into their design and formulation an element of active engagement, some task which enabled US women to feel ‘real women’. That was the key to industry creating new processed food markets. The cake mix which required an egg not just water to be added symbolised this transition.

Not without reason have food and health specialists had to engage more forcibly with food culture. Food is not just nutrients but social meaning. The normalisation of inappropriate diets is part of the health challenge. This is why public health bodies from the National Institutes of Health to public interest groups now engage with marketing, both generally and in relation to specific food categories such as fast food. The research evidence shows that branding of foods and beverages does influence young children’s taste perceptions. 64 Advertising does affect their food behaviour. 65

As this cultural aspect has come to the fore in public health, some food industry voices declaim that they are being falsely pilloried as ‘the new tobacco’ when food is not tobacco. Tobacco and food are different, but the moulding of cultural appeal for both may be closer than is apparent. 66 It is why health demands for better regulation of marketing food and drink products targeted at young children have become increasingly mainstream. Reviews of children and the consciousness industries - advertising, marketing, and other media message shapers - have fairly consistently called for a range of measures from tougher controls to active literacy programmes. 67-69 The awe at marketers’ effectiveness (and deep funds) has also led some health advocates to support social marketing (‘branding for health’) as a powerful tool for shifting eating behaviour. 66

Given the international reach of large food corporations and media conglomerates, any attempts to re-balance their power probably requires international co-ordination, although the reality is that some countries will make advances, while others are held back. The WHO has pointed to global frameworks such as the UN Convention on the Rights of the Child as the moral touchstone here, 70 but nations do tend to value international policy advice differently, using or ignoring it opportunistically.

A general picture is that as populations get wealthier and are subject to powerful marketing and changed availability of foods, their pattern of diet changes. Feast day foods become everyday foods. Meat and dairy consumption rises. Sugary drinks replace water. This process has been termed the nutrition transition by Barry Popkin of the

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ii This study by Robinson et al was funded by the Robert Wood Johnson Foundation.
University of North Carolina. He and colleagues have conducted a series of country profiles which has confirmed that the nutrition transition follows quickly alongside the process of economic development. Overall, diets shift from traditional staples to processed foods which are fattier, saltier and sweeter, and from simple to sugary soft drinks.

The term nutrition transition in fact covers three parallel changes, in supply, culture and health. Investment and commercial strategies shape changes in developing countries’ agriculture and food import - export patterns. The arrival of foreign brands to a developing country can have a dramatic effect. The high status of foreign foods can be both ‘push’ and ‘pull’ for reshaping food expectations and what is deemed normal food culture. In the name of choice, highly processed energy dense foods reshape indigenous culture, not that we should necessarily be romantic about it. The advantage of rising incomes is that severely restricted diets can expand in range and intake. The disadvantages are if that process is driven straight into dietary patterns that are undesirable for long-term population health. Industrialised foods, made to consistent recipes in tightly controlled factory conditions, can bring safety advantages; but they can also bring in their wake a more dubious legacy such as use of additives and colourants to bring cosmetic appeal. Popkin and colleagues have documented how calorie intake rises with this shift in food culture. The NCD pattern follows later.

One aspect of the normalisation of elements of the Western diet around the world is packaging. Figure 7 gives the amount of disposable income spent on food in different country income bands. In high income countries, a far higher proportion of packaged compared to fresh foods is consumed than in low income countries. Low income countries do more cooking. High income countries have more food pre-cooked in factories. Retail sales of categories such as ready-meals have grown consistently in the USA and UK. This is significant if, as we see later, public policy places emphasis on consumers to take responsibility for their dietary intake.

**Fig 7. Overall expenditure on food, contrasting use of packaged / nonpackaged foods, by country income level**

![Fig 7](source: Regmi & Gelhar 2005)
If control for product formulation is at the US factory, the question to be addressed is: how can US consumers influence what is in the food? They require help, clearly, but is the standard response labelling adequate or effective? It may be more influential in persuading a food processor to reformulate their product than in actually providing information which changes a consumer’s eating patterns, or nutrient intake.

The inequality of messages to eat ‘unhealthy’ foods such as candy and snacks in the US, compared to public health messages supporting increased consumption of fruit and vegetables such as 5-a-day is remarkable. A 2005 report by Consumers Union and the California Pan-Ethnic Health Network found that in 2004 $11.26 billion was spent on advertising by the combined US food, beverage, and restaurant industries compared to a mere $9.55 million spent on communications for the federal as well as California’s 5-a-day marketing programmes. Similar inequalities have been noted in other countries with lightly regulated food advertising régimes.

The consciousness industries are intelligent and nimble, and the huge effort now going on modern marketing methods is testament to the dynamic features of the consumer-market interface. Viral, virtual, text and other methods now routinely accompany ‘traditional’ forms of reach such as TV, radio and print media, as well as sponsorship, educational materials and funding.

Important though these are, marketing and advertising are not the sum of what public health proponents should consider as shapers of food culture. We need to think of food culture broadly, as how humans relate to food, where and how we shop, our tastes, the experience, how we get to and from the food point of contact, our conceptions of quality and normality, our aspirations. Social science teaches us how all these are mediated by social distinctions such as income, gender, ethnicity and social class. Table 4 (on the next page) gives an overview of how patterns of food purchasing, type, format and meaning have changed in developed societies such as the US.

One cultural issue which is receiving more – and long deserved – health policy attention is the consumption of meat and animal products. As McMichael and colleagues have shown, the US and rich countries lead the upward trends in kilocalories (energy) sourced from animal produce per day. They suggest a global target of only 90grams per day might be ecologically sustainable, and in line with nutrition advice, dramatically lower than the current industrial society average of c. 200-250 g per person per day.

Currently animal farming uses a third of agricultural land, and a third of arable land. The farming of animals has a considerable environmental footprint when measured in use of land, cereals and water, as the FAO’s 2006 Livestock’s Long Shadow report summarised. The 2007 report by Nicholas Stern, a former World Bank chief economist, calculated that animals are responsible for 31% of world greenhouse gas emissions while fertilizers such as nitrous oxide are responsible for even more, 38%.
Table 4. Some features of affluent society’s food purchasing in the 19th, 20th and 21st centuries

<table>
<thead>
<tr>
<th>Factor shaping food purchasing</th>
<th>19th century</th>
<th>20th century</th>
<th>21st century?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Format</strong></td>
<td>Markets plus small diverse speciality shops</td>
<td>Supermarket</td>
<td>Mixture of giant hypermarket + speciality stores</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>Walk, bike or animal-drawn</td>
<td>From mass transit to personalised car</td>
<td>mixed</td>
</tr>
<tr>
<td><strong>Energy source for logistics</strong></td>
<td>Feedstuff (animals) + human</td>
<td>Oil</td>
<td>Hydrogen, electric, solar or human?</td>
</tr>
<tr>
<td><strong>Majority food labour</strong></td>
<td>Farm</td>
<td>Factory</td>
<td>Service</td>
</tr>
<tr>
<td><strong>Retail experience</strong></td>
<td>Service at front of shop counter</td>
<td>Self-service</td>
<td>Self-service plus speciality</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Local</td>
<td>Distant</td>
<td>Distant (time rich) + home delivery (affluent but time poor)</td>
</tr>
<tr>
<td><strong>Food sourcing</strong></td>
<td>Seasonal</td>
<td>a-seasonal</td>
<td>Return of ‘seasonal’?</td>
</tr>
<tr>
<td><strong>Food range</strong></td>
<td>Limited within shops but variety of shops</td>
<td>Enormous</td>
<td>Shaped by climate change, energy and water costs</td>
</tr>
<tr>
<td><strong>Where the consumer’s money goes</strong></td>
<td>Farmers</td>
<td>Processors</td>
<td>Retailers</td>
</tr>
<tr>
<td><strong>Quality concerns</strong></td>
<td>Crude adulteration</td>
<td>Scientific adulteration</td>
<td>Low carbon + high nutrient</td>
</tr>
<tr>
<td><strong>Food market</strong></td>
<td>Local</td>
<td>National/ regional</td>
<td>Global, regional, local</td>
</tr>
<tr>
<td><strong>Time taken</strong></td>
<td>Daily local shopping</td>
<td>Weekly one-stop shop</td>
<td>Monthly + fresh weekly</td>
</tr>
<tr>
<td><strong>Domestic expenditure</strong></td>
<td>High percentage cost for majority</td>
<td>Falling costs</td>
<td>Cost internalisation means price rises</td>
</tr>
<tr>
<td><strong>Information sources</strong></td>
<td>Print</td>
<td>Radio + TV</td>
<td>Text + internet</td>
</tr>
<tr>
<td><strong>Characteristic technology</strong></td>
<td>Margarine</td>
<td>Barcode scanning</td>
<td>Internet shopping</td>
</tr>
<tr>
<td><strong>Contentious technology</strong></td>
<td>Bread adulteration</td>
<td>Agrichemicals + biotechnology</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td><strong>Food supply chain dominant player</strong></td>
<td>Farming</td>
<td>Food manufacturers then retailers</td>
<td>Farming + retailers?</td>
</tr>
<tr>
<td><strong>Overarching goal</strong></td>
<td>Sufficiency</td>
<td>Value-for-money</td>
<td>Values-for-money</td>
</tr>
</tbody>
</table>

Source: Lang, Barling & Caraher 2009
The cultural issue here, as Popkin and others have shown, is that as populations become more affluent – unless checked by cultural rules such as religion – they tend to consume more animal produce and fats. If that has both an environmental and health impact, harnessing and altering the cultural dimension of consumer behaviour will be important for public health.

Figure 8 gives the FAO’s current world regional data past and projected on consumption of livestock products per person. If the projections are accurate, public health proponents will have an important task ahead to lower them. But we must, as the 2008 WCRF/AICR reports discussed earlier have indicated.

**Fig 8. Trends in consumption of livestock products per person (milk, dairy products, and eggs, excluding butter)**

What could we do?

The picture of food and health painted in the previous pages is both daunting and exciting. The new public health approach to food has to engage with more than just sufficiency of nutrients – the 20th century’s challenge. This century has to address that still but within a more complex picture of under-, over- and mal-consumption. Even a country like the US has well documented pockets of food insecurity. But that picture of food and health – dominated by hunger politics – now needs to be fused with the new politics of how food is grown; how the supply chain works; how well as whether it gets to the consumer; how and whether consumers ‘burn off’ the calories; how sustainable the food supply chain from farm to consumer is; and so on.

In this new analysis, our conception of the role of public health has to be carefully judged. The influences on health attributable to food are not just a matter of food supply but of culture and social values; not just an issue for individual but societal choices; not just about availability of resources but their sustainable management. Delicate issues of politics run throughout the policy terrain of food and health, from issues of accountability to questions of collective versus individual responsibility.

We can have confidence, however, that the new complex analysis of food and health is based on sound science. The contribution to the new era of food and health policy can and should be robust. Summative reports like the 2008 International Assessment of Agricultural Science and Technology Development Knowledge (IAASTD) can draw upon huge data sets of knowledge. Like the scientists working on the reports of the Intergovernmental Panel on Climate Change (IPCC), the IAASTD team of 400 scientists recognized the need for robust data and advice to policy-makers. The stakes for an era which will have to address structural issues such as climate change, energy and water, can also draw upon physiological understanding being transformed by genomics.

What difference does this broader picture make? At one level, anyone’s work in and about food and health is shaped by whatever our jobs are: professional disciplines and circumstances shape what we can do. We can only do what we can do. But the challenge that emerges from this new analysis does offer new pointers for our collective ‘direction of travel’. The rest of this paper now discusses some salient ones.

1. View food & health through an Ecological Public Health lens

Getting the conceptual framework right has never been more important. It is the lens through which we view everything. Food supply, culture and health need to be located within, not apart from, the new fundamentals on which food production is based. Issues such as climate change, soil preservation, water management, biodiversity and eco-systems support, urbanisation, population and demographic pressures, inequalities of purchasing power, all have to be overlaid onto other fundamentals of land use, labour,
capital investment and scientific knowledge. These new fundamentals have to be coursing through food and health policy.9192

Ecological thinking within public health is not per se new; the word ‘ecology’ was invented by Haeckel in the mid 19th century.93 But it is being translated or re-articulated for the 21st century. The word ‘ecological’ is used in two senses. One sees issues and actions as the result of relationships, actions in a web. Public health is here conceived as human actions to protect or enhance health. The other meaning highlights the connection between people and planet. We humans are reliant on the environment, not least because human activity is both based on and alters those ‘natural’ processes.9495 Our food systems have to look after the thin membrane of biomass that surrounds the surface of Planet Earth.

But how can we make sense of all this complexity? One articulation of Ecological Public Health for food and health policy-makers proposes that four dimensions or ‘worlds’ of existence need to be engaged with, distinguished thus:96

- the physical or material world, by which is meant the world of nature and transformed nature – the built environment, the urban or rural space – and the extractive relationship with the environment, i.e. nature as the reserve on which existence draws;
- the physiological world, by which is meant the importance of biology and the bodily processes that transform food – not just calories but micronutrients too – into bodily manifestation; food’s biological impact is shaped by inherited genetic potential;
- the social world, by which is meant the human relationships and all the societal institutions and interactions that frame how humans live, our domestic and working and everyday lives;
- the cognitive world, by which is meant the interpretive structures within the human mind that are necessarily personally experienced and yet have meanings that others may share.

This Ecological Public Health approach requires cross-disciplinary involvement. We know already, from historical experience, that a range of policy ‘levers’ is almost always required to make a difference in food and health. To focus just on the bio-physiological domain of existence, at the expense of the social or cognitive worlds, would deny the role of key shapers of human behaviour. To improve hygiene and contain infections, for instance, requires not just biochemical knowledge but social and cultural action. Changing how humans behave is always part of public health campaigns. Tackling tuberculosis, for instance, involved changing cultural mores about spitting in public, washing hands, and so on. Stopping food-borne infections requires food handlers to change how they work.

Policy is only likely to succeed in tackling NCDs if it introduces actions which reshape each level of existence. Equally, as environmentalists have discovered, there is no point focusing on the material and biological world or on ‘nature’ without taking account of humans and our meanings.97 Policy action on only one level of existence – however good or well-evidenced - is likely to be counteracted by actions in the others.
This ecological way of thinking about food and health is going to be needed if policy is to make sense of linking nutrition to climate change. If nutritionists say populations need to eat fish for their essential fatty acids, yet environmental analysis of the seas point to fish stocks being at danger levels, how are consumers to behave? Which evidence takes priority? As is obvious, both are true. Yet where does this leave Guidelines for America? We cannot realise this consumer dilemma if we remain locked into either our ‘nutrition’ or ‘environmental’ intellectual boxes.

2. Build Ecological Public Health into the Business Model

Just as environmentalists have been trying to reformulate what is meant by efficiency for an era moulded by climate change and energy pressures, so Ecological Public Health needs to be championed and injected into the food business model. Table 5 gives one account of the dynamic needed. It gives a broad set of actions which ought to be undertaken to address the interface of food and health from an ecological public health perspective. The table outlines how evidence about a variety of issues (the new fundamentals) require action across the entire food supply chain using the whole range of possible policy ‘levers’ to alter behaviour by a variety of actors in the food system to deliver public goods.

This needs to be translated into the business model – how the food system works, its profit and loss account. US agriculture, as we have seen, has been built on seemingly limitless resources of land, water and energy (gasoline). But even the captains of the present US food system are now becoming aware of how fragile their reliance is. Hurricane Katrina, for instance, famously brought Wal-Mart CEO Lee Scott to the point of realising that his corporation needs to engage with climate change and GHG reduction. Other food sector leaders realise this too. But can this be left to market forces? Some standard features are needed.

Carbon footprint audits are beginning to feature in corporate finance accounts, but audits are only a first step towards reducing the GHGs. Pressure to change the business model is rising. Just as all food supply chains need to be audited for their carbon footprint, not just the willing few, so the public health impact of food products needs to be addressed. There is a long way to go before health and carbon / GHGs come together in food business. In 2004, governments and companies agreed to engage with the agenda mapped out in the WHO’s Global Strategy on Diet and Health. Yet an audit conducted subsequently showed a very low level of engagement with the new health agenda by the world’s top 25 food companies. Of these, the top 10 retailers were even weaker in their responses than the top 10 manufacturers or top 5 foodservice corporations.

The Ecological Public Health perspective could be dismissed as too complex or challenging for US food business, yet this is what the evidence suggests is needed.
Patience is needed. New ways of farming were seen as too difficult in the 1930s, only for the dustbowl, recession and world wars to bring them to the fore ultimately. As we have seen above, the public health support for increasing food production in the mid 20th century was evidence-based in its time. Winning business to health-focused change required opportunism, hard work and perseverance across the education and research worlds. The role of extension services, for instance, was critical in agricultural advance. Is there not room for them to champion Ecological Public Health today?

From the global perspective, huge increases in food supply will be necessary if 9 billion people are to be healthily and sustainably fed by 2050. This case justifies continued effort to increase productivity on the land….but not at all costs. 21st century food production will have to be low carbon and water efficient; it will have to use land sustainably, enhance (not just stop destroying) biodiversity, and protect soil structure, and much more. The long supply routes, profligate energy use, and distorted price structures for nutrients – which have successfully delivered cheap calories while failing adequately to internalize the cost of environmental and health burdens – will have to be reworked. 107

3. Tackle the inequalities of power

One feature of food and health policy is the existence of extremely powerful lobbies. The astonishing inequalities of information sources about US food and health have already been noted. Commercial interests dominate food messaging ‘space’. Junk food can too easily triumph. The ubiquity of processed high calorie, high salt foods normalises what ought to be exceptional. 108 Power in the food system needs to be rebalanced.

The trend in the 20th century was for power to shift along food supply chains, from farmers to manufacturers and ultimately, and over the last 30 years to retailers and traders, with the wholesalers also seeing an erosion of their position in many product supply chains. 34 Foodservice has transmogrified from being primarily a domestic service for the rich and the new 19th century middle classes to being a massive high street global presence; it has in many countries by far the largest employee force within the food system. The influence of the consciousness industries (marketing and advertising) has grown, too.
Table 5. New Goals for Food & Health Policy in an Era of Ecological Public Health  
Source: Lang, Barling and Caraher 2009, chapter 2

<table>
<thead>
<tr>
<th>A new direction of travel is emerging shaped by...</th>
<th>...evidence on problems in issues such as these...</th>
<th>....requiring action by institutions covering these supply chain sectors...</th>
<th>...using policy levers (‘soft’ to ‘hard’)....</th>
<th>...to alter behaviour by food system actors...</th>
<th>... using managerial measures to reshape....</th>
<th>...in line with new ecological public health goals to deliver</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISSUES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Water</td>
<td>• Agriculture &amp; rural affairs</td>
<td>• Labelling</td>
<td>• Input industries</td>
<td>• Standards</td>
<td>• Sustainability (social, environmental and economic)</td>
<td></td>
</tr>
<tr>
<td>• Energy</td>
<td>• Environment</td>
<td>• Education</td>
<td>• Agriculture</td>
<td>• Labour process &amp; skills</td>
<td>• Energy efficiency, waste – minimisation and closed loop systems</td>
<td></td>
</tr>
<tr>
<td>• Climate change</td>
<td>• Health</td>
<td>• Public information</td>
<td>• Transport &amp; infrastructure</td>
<td>• Markets &amp; products</td>
<td>• Capacity building (for nature, people &amp; economy)</td>
<td></td>
</tr>
<tr>
<td>• Land use</td>
<td>• Social welfare</td>
<td>• Endorsements</td>
<td>• Processing</td>
<td>• Production and processing</td>
<td>• Resilience to shock</td>
<td></td>
</tr>
<tr>
<td>• Human health</td>
<td>• Trade</td>
<td>• Welfare support</td>
<td>• Distribution and logistics</td>
<td>• Distribution</td>
<td>• Eco-dietary advice</td>
<td></td>
</tr>
<tr>
<td>• Social justice</td>
<td>• International development</td>
<td>• Product standards</td>
<td>• Full cost pricing</td>
<td>• Life cycle analysis</td>
<td>• Fairness and equitable access</td>
<td></td>
</tr>
<tr>
<td>• Labour process</td>
<td>• Foreign affairs</td>
<td>• Licensing</td>
<td>• Retail</td>
<td>• Culture: from niche to mainstream</td>
<td>• Confidence &amp; trust</td>
<td></td>
</tr>
<tr>
<td>• Demographics</td>
<td>• Industry</td>
<td>• Subsidies</td>
<td>• Catering &amp; foodservice</td>
<td>• Targets/metrics</td>
<td>• Accountability (political &amp; financial)</td>
<td></td>
</tr>
<tr>
<td>• Food availability &amp; stocks</td>
<td>• Finance</td>
<td>• Competition rules</td>
<td>• Traders</td>
<td></td>
<td>• Evidence-building for policy</td>
<td></td>
</tr>
<tr>
<td>COMMENTS</td>
<td></td>
<td>• Taxes &amp; fiscal measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interdisciplinary thinking is required to face competing evidence</td>
<td>The challenge is to improve coordination across these interests with all actors in the food system: Companies, Governments &amp; NGOs</td>
<td>Policy has suffered a ‘lock-in’ which favours ‘soft’ interventions and focuses on consumers rather than upstream prevention</td>
<td>Globally, retailers and traders tend to hold power but the situation varies by country and sector</td>
<td>These are managerial foci</td>
<td>These are the new directions of travel for the food system; but subject to constant feedback loop and scrutiny....</td>
<td></td>
</tr>
</tbody>
</table>

DIRECTION OF TRAVEL WITH FEEDBACK LOOP
One feature of this power transfer is the shift from producer-driven to buyer-driven supply chains. Value has become increasingly captured near the consumer by retail buyers rather than the primary producer, the farmer/grower. However, there has been a further shift in the buyer-driven aspects in that the dominant position of food manufacturers has given way to the retailers/supermarkets which have been able to dictate the terms of contracts and act as gatekeepers to the large majority of food consumers, threatening non compliant suppliers with delisting and the ending of access. Adapting von Schirach-Szmigiel, Table 6 maps the century-long shift.

Part of the re-balancing needed will entail public health forces agreeing to push back the boundaries of policy solutions. For decades, the prevailing ethos in societies espousing market mechanisms for social and health policy failings, has been to rely on soft health policy measures such as labeling, health education, advice, and therapeutics which can be individualized rather than on population-wide or hard measures such as fiscal or regulatory (see Table 5 above).

More emphasis is needed on ‘upstream’ causal drivers than on ‘downstream’ consumer behaviours, yet the US norm has been the latter. Acting Surgeon General RADM Galson, for instance, stipulated four US priority areas: disease prevention, elimination of health disparities, public health preparedness and improving health literacy. In practice, the US approach has emphasised individual responsibility and education. Initiatives such as Steps to a Healthier US, and the Small Steps Campaign are pitched to encourage households to take small, manageable steps within their current lifestyle. The guidance expressly warns against “drastic changes”. The nutrition advice verges on the bland: (1) be physically active each day; (2) eat a nutritious diet; (3) get preventive screenings; (4) avoid risky behaviours. What is required, surely, is more emphasis on why this doesn’t happen.

Historically, considerable US environmental public interest group attention has been given to the farm lobby while health bodies have tended to focus more on after the farm gate activity and value-adding. With the vast expenditure of the Farm Bill, this split focus is not surprising, but Table 6 suggests that equal attention deserves to be given to all actors in the food system. With such a high proportion of food eaten outside the home, the role of foodservice is critical, for instance.

Looking ahead, not least due to the recession making millions more Americans unemployed, there will need to be renewed emphasis on addressing social inequalities in the food system. The US community food security movement has played a remarkable and vital role in highlighting attention on food-related inequalities in US public policy, and certainly the policy response needs to be more than just at the local level. The next Farm Bill will be a major opportunity to press for rebalancing of social interests.
## Table 6. Shifting domination in 20th century Western food value-added chains

<table>
<thead>
<tr>
<th>Period</th>
<th>Farmers</th>
<th>Manufacturers</th>
<th>Wholesalers</th>
<th>Logistics</th>
<th>Retailers</th>
<th>Foodservice</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 1900</td>
<td>Dominant</td>
<td>Minor</td>
<td>Major in a few trades</td>
<td>Dominant</td>
<td>Very Minor</td>
<td>Dominant (domestic)</td>
<td>Minor</td>
</tr>
<tr>
<td>1900- 1950</td>
<td>Declining (except WW2)</td>
<td>Dominant</td>
<td>Major in many trades</td>
<td>Declining</td>
<td>Minor</td>
<td>Declining (except WW2)</td>
<td>Emerging (USA only)</td>
</tr>
<tr>
<td>1960- 1970</td>
<td>Rebuilding (subsidized)</td>
<td>Dominant</td>
<td>Dominant</td>
<td>Rebuilding</td>
<td>Emerging</td>
<td>Minor</td>
<td>Emerging</td>
</tr>
<tr>
<td>1980- 2000s</td>
<td>Declining</td>
<td>Declining</td>
<td>Rapidly Declining</td>
<td>Linked to retail dominance</td>
<td>Dominant</td>
<td>Emerging</td>
<td>Important</td>
</tr>
<tr>
<td>2000- 2010</td>
<td>Returning?</td>
<td>Uncertain</td>
<td>Minor</td>
<td>Squeezed</td>
<td>Dominant</td>
<td>Uncertain</td>
<td>Important</td>
</tr>
</tbody>
</table>

Source: Lang, Barling & Caraher 2009 34 reworking von Schirach-Szmigiel 2005 110
4. Help the consumer by reformulating choice

The US rightly prides itself for its constitutional as well as historical commitment to freedom and choice. Yet the imbalance of power in the food system suggests we need to debate the realities there very carefully. Some argue that public health proponents can learn from the food industry, while others believe it must do things differently. Advocates of social marketing argue that public health can harness the experience and techniques of the advertising industry.

As was shown by Consumers Union /CPEHN 2005 *Out of Balance* report, referred to earlier, the imbalance is so immense that any likelihood of public health having sufficient financial muscle to outmanoeuvre the capacity of large food corporations must be judged carefully. Such decisions have to be contextualised within the debate about the relative advantages and disadvantages of food control versus food democracy. Democracy is ‘messy’ and takes time. Control is neater but harsher and riskier.

In food and health policy, there tends to be an ideological lock-in around consumerism and choice. We favour choice, yet choice in fact means different things to different people. Even in prisons where choice is seriously restricted, there are choices. Figure 9 presents choice as a dimension, with the consumerist ideal of unrestricted choice at the left end of the dimension illustrated here, while poorer consumers remain closer to the limitations of choice experienced in total institutions such as prison. Wealth means consumers can move along the dimension of choice.

**Fig. 9. Rethinking choice for the Era of Ecological Public Health**

![Diagram](image)

Source: Lang, Barling & Caraher 2009

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As the 20th century has defined it, progress has come to mean aspiration to emulate the rich. The paradox is that this is costing the earth. There are probably not enough planets to feed the world on as rich as diet as Americans or Europeans enjoy,¹⁰⁷ or not enough are discoverable that are habitable in time! Thus food and health policy in the era of Ecological Public Health will probably have to engage research into how consumer aspirations can be tamed while reframing the future as more sustainable and better. The advantages of simplicity and consuming less might be greater if the benefits are clearer.⁹⁷ This discourse will be central in the new politics of choice in the 21st century.

A common reflex of governments and industry (and some campaigners) is to rely on labelling and information as the mode of response to evidence of the need for change, yet ‘choice-editing’ before the consumer even sees a food product might be more relevant. Choice-editing refers to the process, conventionally made by retailers, of deciding the nature and substance of food productions and, indeed, the range of goods to offer to consumers. Choice-editing is the term used within the trade to suggest the process of framing choices. Choice-editing is made through decisions made without consumers’ conscious involvement by actors further upstream. With food markets in many US states dominated by few retailers, category buyers in those retail chains have considerable power over product features as well as their price. Choice-editing is conducted by contracts and product specifications. The issue for food and health policy is how health and sustainability can be injected into or otherwise engage in that process.

5. Use the appropriate policy architecture

US food and health policies sit in a five level food governance system of global, regional, federal, state, and community institutions.

Within the US, food and health policy-making operates on three levels: national, state and local. From the global perspective, there are two further levels of policy which have an impact on US policy-making: the global and the regional. The US food system now operates within a fast evolving regional context. The North American Free Trade Agreement (NAFTA) sits alongside other emerging power players such as the European Union (EU), the Association of South East Asian Nations (ASEAN) and the Latin American trade agreement Mercosur.

This multilevel governance structure both offers potential for better public health learning and adds further difficulties to already complex terrain. One important fissure is due to the fact that, globally, food and health issues are caught in the long-standing tension between the United Nations (UN) bodies with its panoply of bodies – WHO, FAO, UNESCO, and ancillary conferences and treaties - and the Bretton Woods institutions of the World Bank and International Monetary Fund (IMF). The addition of the World Trade Organisation (WTO) which was created in 1994 to oversee the General Agreement on Tariffs and Trade (GATT), adds further complexity.
The ecological public health agenda adds further complexity to this multi-level world in that it requires analysis and action across four domains of existence: the material and physical world, the bio-physiological world, the cognitive-cultural world and the social-experiential world. The good news, however, is that at all levels, there are existing policies, measures and opportunities for engagement. Table 7 gives some examples from the global level only, suggesting grounds for utilising commitments which could be applied at other levels of policy-making. Some of these commitments are weaker or stronger than others: some are merely declarations and resolutions.

Table 7. Key features of major world commitments on Food, post World War 2

<table>
<thead>
<tr>
<th>Occasion</th>
<th>Date</th>
<th>Nutrition</th>
<th>Safety</th>
<th>Sustainable food supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal Declaration of Human Rights</td>
<td>1948</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>UN Covenant on Economic, Social and Cultural Rights</td>
<td>1966</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stockholm Environment &amp; Development</td>
<td>1972</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>World Food Conference</td>
<td>1974</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Convention on the Rights of Child</td>
<td>1989</td>
<td>+</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Innocenti Declaration on Breastfeeding</td>
<td>1991</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UN Conference on Environment and Development &amp; Rio Declaration, UN Framework Convention on Climate Change and on Biological Diversity</td>
<td>1992</td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>International Conference on Nutrition</td>
<td>1992</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>World Conference on Human Rights, Vienna &amp; Vienna Declaration and Programme of Action</td>
<td>1993</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>UN 4th World Conference on Women &amp; Beijing Declaration and Platform for Action</td>
<td>1995</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>World Food Summit</td>
<td>1996</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>UN Habitat 2 &amp; Istanbul Declaration</td>
<td>1996</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>UN General Comment on the Right to Adequate Food iii</td>
<td>1999</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>World Health Assembly (Resolutions 53.15, 51.17, 53.18)</td>
<td>2000</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Millennium Development Goals</td>
<td>2000</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>World Food Summit (Rome)</td>
<td>2002</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>World Summit on Sustainable Development (Johannesburg)</td>
<td>2002</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>WHO Global Strategy on Diet, Physical Activity and Health</td>
<td>2004</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>FAO High-level conference on World Food Security</td>
<td>2007</td>
<td>+</td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

The implications of the multilevel world for proponents of food and health improvement are considerable. It means we have to ensure that the appropriate level is being targeted; that the right allies are in place; and that lines of communication are not restricted to existing power brokers but across the food system.

If we do want to improve diet, more judicious targeting of the key players might be appropriate. Table 8 gives an indicative list of possible policy responses to nutrition-related concerns, invoking ‘soft’ to ‘hard’ measures, across the food system.

Table 8. Some possible policy responses to nutrition-related concerns

<table>
<thead>
<tr>
<th>Policy sector</th>
<th>Goal is to ensure nutrition included in</th>
<th>Means available</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing</td>
<td>Food supply</td>
<td>Contracts &amp; specifications</td>
<td>Product reformulation. Change fat content in meat regulations</td>
</tr>
<tr>
<td>Retail</td>
<td>Improving access to health-enhancing foods</td>
<td>Retail and town planning</td>
<td>Food pricing. Location of stores through Town Planning.</td>
</tr>
<tr>
<td>Culture</td>
<td>Change thinking about food to reshape demand</td>
<td>Health education. Marketing. Social marketing</td>
<td>Public education on obesity. Controls on marketing at children.</td>
</tr>
<tr>
<td>Society</td>
<td>Equitable access and re-balancing circumstances</td>
<td>Welfare system.</td>
<td>School meals.</td>
</tr>
</tbody>
</table>

Source: author

6. **Link health more effectively to the sustainability agenda**

A theme of future food and health will be how to link the strong evidence on public health nutrition with equally strong evidence on the environmental attributes of eating. The possibility of all humanity being able to eat a diet such as that consumed by many Americans, high in calories and intensive in energy use, is remote. Rich, developed countries such as North America and Western Europe will have to lower their food system’s carbon footprint.

Now that the new US administration is set to engage with the climate change treaties – notably the revision of the Kyoto agreement due to take place in Copenhagen in December 2009 - and is once more prepared to focus on exploring political not just technological approaches which were the hallmark of the previous administration, the
possibility of the US food system engaging likewise has improved. The chances of this happening quickly will be greatly enhanced if there is unity of voice from food and health movements and organizations. Public health and food movements and professions now have a golden opportunity to push for progressive change, and will have an important role in either bringing business to see the importance of the Copenhagen agreement, or shaming them if they do not. Some are already highly involved.

The evidence of the need to reshape the food system everywhere is strong. The policy response is, however, still weak. Yet the potential to face shocks from climate change, oil shortages, water stress, land pressures, labour restructuring, demographic changes such as urbanisation and rural decline, is considerable. Thus far, policy attention has tended to be on how to help developing countries adjust. Given the close relationship between income levels and security of supply, this policy emphasis is understandable. The weak are always the ‘canaries’. Yet, it is the food systems of developed countries such as the US which are heavily oil-dependent. US food production is reliant on oil for mechanisation, agrichemicals and fertilisers.\textsuperscript{116}

Even by the 1970s this was recognised as a source of insecurity and fragility; it was part of the rationale for the Commission on Critical Choices for Americans.\textsuperscript{117} Middle East politics assuaged the early 1970s oil crisis, but today the possibility of ‘peak oil’ has resurfaced. Whether that peak is here, imminent or some way off is almost besides the policy point. US and EU commitments to biofuels as a fossil fuel substitute – aided by fiscal support and political targets - have already shown the capacity of developed country land use policies to alter world food prices and to destabilise finely tuned commodity markets.\textsuperscript{6 118 119} The volatility of basic commodity prices in 2005-08 sent shock waves through the system.\textsuperscript{6}

The general case for tighter links between the public health and sustainability agenda is clear. Humans inhabit an ecological niche on a crowded, delicately balanced planet where our actions threaten imbalance. Proponents of better food and health therefore have to engage with the urgent requirement to make the food system more sustainable. But what do we mean by sustainable?

The UK government response to this question is to focus on nutrition and GHG reduction.\textsuperscript{103 120} How can that be articulated? How can it be delivered? Some argue that this requires a new form of dietary simplicity – eating less, consuming fewer pre-processed foods, cooking more from raw, seasonal ingredients. Others counter that only highly centralised food production units (ie factories) can sufficiently control ingredients, portion size and energy use to deliver those goals. Either way, consumers need help to shift behaviour fairly dramatically. As has been stated above, the evidence for consuming fish (especially oily fish) is strong. But equally, the evidence that stocks of many key species are at risk is also strong. So to which advice should consumers listen?

One response of public health authorities can be to ignore the question of sustainability. Not our problem! Pragmatists can argue that the US pyramid was already enough of a site for politicking by lobbies as much as nutritionists themselves,\textsuperscript{121} without adding further
confusion with trying to integrate it with guidelines for sustainable eating. This cannot be fudged. Thus far, the question has been championed by thoughtful academics but it is surely time for the US, with others, to sort this out at government and national level.

7. Research the right questions

This paper has highlighted considerable problems for food and health thinking and policy. Huge problems loom, which need policy and practical research clarification. For example, how could prices internalize the costs of environmental and health externalities at the same time? There is already a vibrant debate about the potential of taxing fat, but should it be about taxing calories? A different policy route is being explored for carbon reduction in the EU, tried by the US for acid rain, that of trading emissions. The emphasis is on providing financial incentives to cap, reduce and contain the ‘bad’ by linking it to ‘goods’, monetary gain. But it is not clear whether such trading schemes will deliver.

In this new Ecological Public Health era, cross-disciplinary work will be essential. The likelihood of economists or any other single discipline delivering requisite change fast enough is a moot point. We need research to produce better understanding of what works. In the case of obesity and weight reduction, ‘stomach stapling’ and bariatric surgery can be effective in reducing a person’s food intake and weight loss, but does that make this a sensible or affordable policy route to tackle all? Almost certainly not.

The research agenda suggested by the issues and arguments explored in this paper implies that research programmes as a whole should ideally have the following characteristics; they should:
- address both short and long term behaviour change
- help narrow the gap between evidence and policy
- locate health within the sustainability agenda
- to lower the US food system’s GHG / carbon equivalent footprint
- address all the domains of existence: material, bio-physiological, social and cultural
- be cross-disciplinary
- help narrow the socially determined gaps between Americans
- take a whole supply chain approach from farm (and inputs) to consumption
- point to appropriate levels of governance with which to formulate policy responses

No single research projects can be expected to tick all such ‘boxes’, but research programmes must collectively do that. A priority must undoubtedly be given to clarifying what a sustainable diet is and how supply chains can deliver it. Will this be the same everywhere? This is highly unlikely. The principles might be, however.
Conclusion

This paper has proposed that creativity must be unleashed at all levels of governance. This requires clearer policy ‘direction of travel’, and renewed vigour from those committed to public health improvement through food. The food price crisis of 2005-08 and the current crisis in international and national financial markets has upset the intellectual rigidities of the last 25 years.

This is the context for the challenge that has emerged from public health nutrition, environmental science and food policy analysis. Just when big changes are required for health and sustainability reasons, political and public policy attention is locked onto ‘higher’ economic priorities. This must not be allowed to marginalise the challenge of food and health.

Boldness has often been the hallmark of food and health policy. We need clarity and courage today to debate rationally and to send clear messages both to political leaders and captains of industry, on the one hand, and to the ordinary consumers and players in the food system, on the other hand. Indeed, the economic crisis gives a chance to act, based on careful thought, evidence and discussion. Future generations will not thank us if we deny that chance to engage, or fail to be as ambitious as the evidence suggests policy needs to be.
References


