How Healthy Are Government Dietary Guidelines?

Part 1: Origin and Evolution of Dietary Guidelines

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Abstract

Exploration of the origin and development of government dietary guidelines reveals that the aims of dietary standards and guidelines have changed over time.

Initially, they were proposed as a guide for preventing scurvy; then for preventing diseases associated with starvation; then to feed the army and the nation; then to maintain health and working capacity; then to integrate health and agriculture; and finally to maintain 'perfect' health into advanced old age.

In the last century, life expectancy has increased dramatically. This fact has changed the entire landscape for dietary guidelines. Our ancestors needed to eat enough to enable them to grow and reproduce. In Palaeolithic times, people died when they were in their mid-thirties. Now in the 21st century, we have the knowledge and technology to keep ourselves alive for well over 100 years, in spite of the fact that our environment is more toxic than it has ever been. This calls for long term nutritional strategies to minimise the development of chronic diseases, such as type 2 diabetes, heart disease and cancers.

The scientific consensus is that eating more plant foods and less animal and processed foods would best promote healthy longevity. This consensus is based on research relating dietary factors to chronic disease risks, and to observations of exceptionally low chronic disease rates among people consuming vegetarian, Mediterranean and Asian diets.

Results from National Diet and Nutrition Surveys reveal that the UK population is struggling to come close to achieving this dietary model. As a consequence, the population is suffering disproportionately from chronic diseases such as obesity, diabetes, heart disease, stroke and cancer. A similar scenario is observed in the US and other developed nations. The lack of compliance with dietary guidelines is due to a complex set of cultural, social, economic and environmental factors.

Devising and following dietary guidelines is, therefore, not just a matter of achieving scientific consensus, but also requires consideration of economic, political, social and environmental issues. Increasing plant food consumption to recommended levels would affect agriculture and the environment in complex ways, some beneficial but others likely to be undesirable. Some agricultural economists believe that the

necessary changes would be so expensive and disruptive that they will create impossible political barriers. They suggest that the food supply be improved through biotechnology, nutrient fortification and the development of 'functional' foods with added nutritional value. Such proposals raise scientific, environmental and ethical dilemmas of their own.

If public health is to be improved, a multi-faceted approach needs to be taken and new and more creative policies are required to encourage plant food consumption.

To begin with, we need direct, unambiguous dietary guidelines based on more solid scientific evidence than has been the case to date. It is 18 years since the current UK dietary guidelines were published and, in the light of new evidence, we know that some of the recommendations need changing and some need strengthening. It is concluded that a detailed review of UK dietary guidelines is urgently required.

We have learnt from experience that public health actions based on dietary guidelines may have unpredicted consequences, resulting from the complexities of biological systems, public perception, marketing, and social and behavioural changes. The desire to promote a simple message to the public must be balanced by ensuring that consideration is given to the complete dietary picture and not just a single nutrient or food type. We must not shy away from explaining complex dietary messages, such as the difference between the types of carbohydrates and their effects on blood sugar; the challenge is to do this using simple language and on a wide enough scale to effect change towards healthier eating habits at a population level.

Food and nutrition policy and guidelines need to embrace decision-making along the whole food supply chain, from supply of agricultural inputs, primary production, food processing, food distribution, food retailing and food advertising, to consumption. We need to move from a food and agriculture system driven purely by a desire to produce large quantities of cheap food, to one which also considers human health and the environment.

Introduction

An ideal diet is, by definition, one that promotes healthy longevity, low morbidity and low perinatal and infant mortality rates[1]; it prevents diseases caused by either deficiency or excess of particular nutrients and is composed of foods that are available, safe and palatable[2].

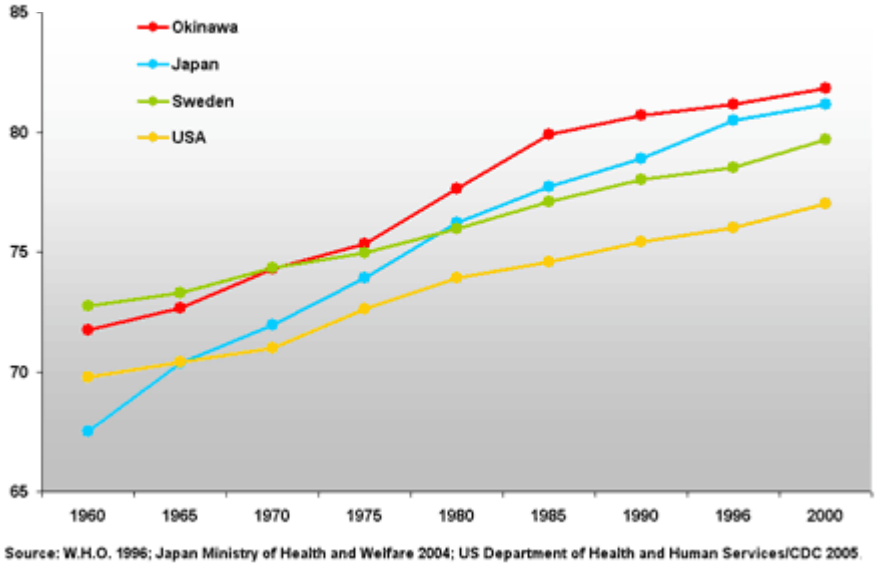
The question is – how close have we come to defining the precise composition of an ideal diet? Furthermore, has the most up-to-date scientific information on optimum nutrition been translated into the dietary guidelines issued by governments in the UK and elsewhere?

Throughout the course of evolution, human populations all over the world have developed a vast array of dietary patterns. These different dietary patterns have developed because of local variations in geography, climate, trade or economic status. The fact that diverse populations have survived to the present day indicates that their ancestral diets must have provided sufficient energy and nutrients to support growth and reproduction. Whether these diets adequately promoted adult health and longevity, though, is more debatable.

Life expectancy depends on many factors in addition to diet, including health care, educational system, safe water, sanitation and socioeconomic development. Improvements in all of these factors have led to significant increases in life expectancy in the last century. In 1900, global average lifespan was just 31 years, and below 50 years even in the richest countries. In 2005, global average lifespan reached 65.6 years, and over 80 years in some countries[3]. In spite of this, there are still substantial

variations in life expectancy, particularly healthy life expectancy, even between economically well-developed nations.[4]

Figure 1: Life Expectancy in long-lived Populations and the US



Source: W.H.O. 1996; Japan Ministry of Health and Welfare 2004; US Department of Health and Human Services/CDC 2005

Globally, the burden of non-communicable diseases, such as cardiovascular disease, type 2 diabetes and cancers, has rapidly increased. In 2001, non-communicable diseases accounted for almost 60 per cent of the 56 million deaths annually and 47% of the global burden of disease.[5]

The World Health Report 2002[6] describes in detail how, in most countries, a few major risk factors account for much of the morbidity and mortality. For non-communicable diseases, the most important risks include high blood pressure, high concentrations of cholesterol in the blood, inadequate intake of fruit and vegetables, overweight or obesity, physical inactivity and tobacco use. These risks arise predominantly from elevated consumption of energy-dense, nutrient-poor foods that are high in fat, sugar and salt; reduced levels of physical activity at school, work, and home; and smoking. Other diseases related to diet and physical inactivity, such as dental caries and osteoporosis are widespread causes of morbidity.

According to the World Health Organisation, there are now more than one billion adults worldwide who are overweight and at least 300 million who are clinically obese[6]. Among these, about half a million people in North America and Western Europe die from obesity-related diseases every year. In contrast, there are 170 million children in poor countries who are underweight, and over three million of them die each year as a result. Worryingly, however, the prevalence of overweight and obesity is increasing in developing countries and even in low-income groups in richer countries.[6]

It is clear from the statistics that, despite the importance of other factors in determining life expectancy, diet has a major influence on healthy longevity.

So, do we understand exactly how diet influences healthy longevity and, if so, is the correct dietary guidance being provided?

To explore these questions further, it is useful to consider the history and evolution of dietary guidelines.

Origin and Evolution of Dietary Guidelines

Pre-history

As early as the 3rd century BC, the Chinese had already devised dietary principles for longevity through Taoist teachings outlined in The Yellow Emperor's Classic of Internal Medicine7. It reported, for example, that a high intake of dietary salt might produce a 'hardened pulse'.

Around 400 BC, the Greek physician Hippocrates, famous for acknowledging the importance of food as medicine, advocated a frugal diet of fish, bread, fruit and vegetables and noted,

> *"In all maladies, those who are well nourished do best".*[8]

1st to 3rd Century

Galen of Pergamon (129-199 AD) practised medicine in Rome for most of his life. He conducted extensive scientific research and was a voluminous writer. Galen's medical system was based on the writings of Hippocrates and Aristotle. He was probably the first to develop a comprehensive theory of nutrition. Galen conceived nutrition as a manifestation of the "nutritive faculty" of the body, by which the usable parts of the food were altered in such a way that they could be assimilated, whereas the parts that were not usable ("superfluities") were eliminated[9]. Galen wrote in 170 AD:

> "*To prevent disease, the best foods to eat are vegetables, including herbs, cereals and pulses; also fish and lean meat of small animals*". The only parts of pigs he allowed were trotters, nose and ears, "*provided that a lot of exercise is done and overeating is avoided*".

In the third century, interest in science and medicine began to decline in Western Europe and by the ninth century, leadership transferred to Arabic-speaking people in the Middle East. Scientists such as Avicenna (980-1037) used translations of Greek works to develop the Greco-Roman scientific heritage. Avicenna's ideas on nutrition and metabolism were based on Galen's work, though differed in detail.

The Renaissance

During the Renaissance, interest in science, medicine and physiology was rekindled. Leonardo da Vinci (1452-1519) produced numerous anatomical drawings of the human body, supplemented with notes. Leonardo said,

> "*The function of nutrition is the continual renewal of destroyed body parts*".

Paracelsus (1493-1541) rejected Galen's ideas on physiology and medicine. He believed that observation of nature, rather than reading books, was more important for understanding.

Paracelsus' theory of digestion and nutrition, expounded in his book "*Volumen Paramirum*" was entirely different from traditional concepts. He assumed that a spiritual agent in the stomach, "the alchemist" appointed by the "Creator" separates "*the poisonous from the nonpoisonous parts of the food and converts the latter into useful nourishment*".[10] Paracelsus introduced chemical as well as spiritual thinking into medicine and nutrition. His ideas, especially the use of metallic substances as remedies, were more accepted in the sixteenth and seventeenth centuries.

18th to 19th century

With one exception, it was not until the "Chemical Revolution" in France at the end of the eighteenth century, with its identification of the main elements and the development of methods of chemical analysis, that old and new ideas began to be tested in a quantitative scientific way.

The one exception was the pioneering controlled clinical trial of the various treatments recommended for the disease of scurvy, which was conducted by James Lind in 1746[11]. While serving as a surgeon on HMS Salisbury, Lind selected 12 men from the ship, all suffering from scurvy, and divided them into six pairs, giving each group different additions to their basic diet. Some were given cider, others seawater, and others a mixture of garlic, mustard and horseradish. Another group of two was given spoonfuls of vinegar, and the last two oranges and lemons. Those fed citrus fruits experienced a remarkable recovery. While there was nothing new about his discovery - the benefits of lime juice had been known for centuries - Lind had definitively established the superiority of citrus fruits above all other 'remedies'.

Many of the chemists involved in the "Chemical Revolution" in France, including its most famous member Antoine Lavoisier, also had an interest in metabolism, and many valuable studies were conducted at this time. The period marked a new beginning for nutritional science, and the chemical revolution had provided the necessary tools for its development.

Writing in 1816, a young French scientist, François Magendie commented:

> *"Nutrition has often been the subject of conjectures and ingenious hypotheses – but our actual knowledge is so insufficient that their only use is to satisfy our imagination. If we could arrive at some more exact facts they could well have application in medicine".*[12]

It was controversy over the feeding of prisoners in Victorian jails that first forced the British government to investigate the link between diet and health[13]. This appears to be the first time that a modern government had felt it necessary to study such questions.

In 1823, an outbreak of disease occurred in the newly built National Penitentiary in London, which was in Millbank, close to the Houses of Parliament. This prison was a social experiment designed to reflect a "new age of enlightenment". It was supposed to serve as a reformatory by combining solitary confinement, hard physical labour and religious instruction. Meals were measured out in the kitchen and taken to the prisoners in their cells; portions were not varied according to need.[14]

Complaints that the convicts were being fed extravagantly with considerable waste led to a reduction of rations - meat was almost eliminated and potatoes were removed. In the following year, 50 per cent of the 860 inmates suffered from dysentery and scurvy. None of the 24 prisoners who worked in the kitchen was affected, so it was concluded that the problems had been brought on by under-nourishment. The meat ration was restored and each prisoner was given three oranges per day. The scurvy rapidly disappeared, although not all of the dysentery.

These and other studies conducted on prisoners at this time led to improved knowledge of nutritional needs and to the first estimate of the energetic efficiency of human muscles. The results also over-turned the dogma of nutritional science promoted by the famous German scientist Liebig.

In 1842, Liebig decided that chemistry was sufficiently advanced to form a scientific basis for nutritional science. Without conducting any physiological experiments, he published a book entitled "*Animal Chemistry or Organic Chemistry in its Application to Physiology and Pathology*" that had extraordinary influence in both Europe and the USA for at least a decade.[15]

Liebig studied protein compounds (alkaloids previously discovered by the chemist Mulder), and concluded that muscular exertion by horses or humans required mainly protein, not carbohydrate and fat. He wrote:

> *"Since only those substances that are capable of conversion to blood can properly be called nutritious, or considered to be food, the protein elements of food are the only true nutrients, that is, the only ones capable of forming or replacing active tissue".*

Liebig's dominance of chemistry was so complete that other scientists generally accepted his theoretical pronouncements about the relation of dietary protein to muscular activity without review. Furthermore, the assumption that "protein is the only true nutrient", led to the belief that any disorder known to be related to diet had to be the result of a lack of utilisable protein in the diet.

The pioneering studies in UK prisons in the mid 19th century led to the understanding that protein is not the main fuel for muscular work. They also showed that potatoes were a reliable staple for warding off scurvy when the diet contained neither fruit nor green vegetables.

It is interesting to note that this work was started well before W.O. Atwater, considered the father of nutritional science in the USA, obtained his first grant to work on the chemical composition of foods in 1879, and several decades before his group began to make measurements of human metabolism.

From 1890 to 1916, dietary guidance by the US Department of Agriculture was under the direction of Atwater and Langworthy. Both accepted Liebig's concept that protein, energy and a few minerals were the principles of a nutritionally adequate diet. Dietary advice for the public thus focused on the cheapest ways of meeting protein and energy needs.

20th century

In Britain, the Boer war starkly revealed for the first time the scale of ill health caused by poor diet. Between 1899 and 1902, faced with potential defeat by Boer farmers, recruiting sergeants found

themselves rejecting about 60 per cent of military volunteers on grounds of stunted growth, rickets, poor eyesight, deformities and weight[16]. Horrified at the newly discovered scale of ill health, the government quickly set up a series of enquiries into the nation's "physical deterioration". These investigations sparked a hot debate, still relevant today, as poor nutrition moved from being a military to a social problem. What role should the state play in influencing how people eat?

The reports from these enquiries led to the first Act on the Statute Book, which had the specific object of improving nutrition. The Education (Provision of Meals) Act of 1906 gave local education authorities power to provide meals free or at reduced charge for necessitous children. In the following year a further Education Act set up the school health service which included, as an aim, the surveillance of the nutritional status of children.

Whilst the political debate raged, scientists experimenting with animals suggested that other unknown substances in food were necessary to support health. In 1886, Christiaan Eijkman was sent to the Dutch East Indies to work on the problem of beriberi. He demonstrated that chickens fed on polished rice alone developed a paralytic disorder similar to human beriberi, and that this disorder could be corrected by a diet of unpolished rice[17]. It was soon demonstrated that the bran portion of rice contained a substance that could prevent beriberi.

In 1901, Frederick Gowland Hopkins, an academic at Cambridge who had already isolated and identified the amino acid tryptophan, conducted animal feeding studies with purified diets. He convinced others that normal growth could not be sustained on the known major constituents of diets, and that still unidentified 'accessory food factors' were needed in addition. Hopkins went one step further than his predecessors in suggesting that these accessory factors present in normal diets were one and the same as the substances needed to prevent deficiency diseases. In a lecture to the Society of Public Analysts in 1906 he said:

> "*In diseases such as rickets, and particularly in scurvy, we have had for long years, knowledge of a dietetic factor; but though we know how to benefit these conditions empirically, the real errors in the diet are to this day obscure. They are, however, certainly of the kind which comprises these minimal qualitative factors that I am considering*".[18]

Hopkins' famous paper in 1912 in the Journal of Physiology[19] – "Feeding experiments illustrating the importance of accessory factors in normal dietaries" – convinced his contemporaries that man cannot live by fat, protein and carbohydrate alone.

In the same year, Casimir Funk, working at the Lister Institute in London, identified the first accessory food factor chemically – thiamin - and coined the term 'vital amine' or vitamin[20]. After this, progress was rapid and the "vitamin hypothesis", as it was called, grew into a reality.

The discovery that diseases such as beriberi and scurvy were caused by deficiencies of unidentified factors in food rendered Liebig's notions about protein being the only true nutrient untenable. Hopkins and Eijkman shared the Nobel Prize in Physiology and Medicine in 1929 for the discovery of vitamins.

First World War

By the beginning of the First World War, the State was responsible not only for preventing and relieving famine, but also for the purity and safety of food, for surveillance of the nutritional status of children, and for discretion to supplement the diet of at least one vulnerable group. But what should these supplements contain? On this crucial point, knowledge remained limited.

In 1916, the United States Department of Agriculture (USDA) developed a food guide based on five food groups to encourage selection of diets from a wide variety of foods, thereby ensuring that both known and unknown nutrients would be consumed in adequate amounts.[21]

In 1918, the British Royal Society appointed a Food Committee during World War 1 to report on the food requirements of man[22]. The committee accepted the conclusions of Lusk, Benedict and others on human calorific requirements and recommended 3000 kilocalories per day, 70 to 80 grams of protein

per day, and not less than 25 per cent of fat. It also recommended that processed foods not make up too large a proportion of the diet and that a certain proportion of fruit and green vegetables be included in all diets. This was the beginning of concern over protective foods.[23]

After World War 1, the League of Nations Health Commission undertook extensive investigations of foods and nutrition. Between 1925 and 1935, various committees, groups and individuals studied the food of different countries, particularly the foods of Japan, and milk production and food production in the United States and Chile[24]. A number of conferences were held on food in relation to the economic crisis of 1929 to 1935 in which questions about dietary and physical standards were raised.[25]

In 1934 and 1935, as part of these studies, Étienne Burnet of France and WR Aykroyd of the UK prepared a report on nutrition and health entitled the *Physiological Basis of Nutrition*[26]. This report was discussed extensively by the League of Nations Assembly and on the basis of these discussions, three actions were taken.

First, a technical committee was appointed to review the section of the report on the Physiological Basis of Nutrition and to revise it. This committee included many eminent nutritionists.

The second action was the appointment of a 'Mixed Committee on the Problem of Nutrition' under the leadership of Lord Astor. Members included nutritionists, economists and representatives of business and agriculture.

Third, the Secretary General of the League of Nations issued a statement calling attention to:

1. The importance of an improved diet for mothers and infants, school children, inmates of institutions, industrial workers, agricultural labourers, the unemployed, and those on relief;
2. The need for examining the prevailing level of nutrition, identifying the undernourished, and examining ways of collecting and presenting such information;
3. The need for dietary standards, particularly for those whose food is provided by local authorities;
4. The need for dissemination among the public of knowledge of the principles and practices of rational nutrition.

The reports of these League of Nations Committees contain a number of quotes, which are just as pertinent today:

> *"Ignorance of the principles and main features of the modern science of nutrition is one of the commonest causes of deficiencies in nutrition".*
>
> *"Most faculties of medicine find little space for nutrition in the curriculum".*
>
> *"Education of the general public in nutrition should begin in the primary schools".*
>
> *"School meals might be used as a model for illustrating sound nutritional principles"*

In 1933, the British Medical Association appointed a committee that reviewed dietary needs and requirements[27]. This committee recommended 3000 kilocalories of energy for men and scaled this downward for women and children, with 10 to 15 per cent of calories from protein. The Committee made no special quantitative estimates of vitamin and mineral needs, but did propose appropriate diets that, on the basis of the foods selected, would provide protective factors.

Also in 1933, Hazel Stiebling of the US Department of Agriculture proposed the first set of dietary standards to take account of requirements for several vitamins and minerals, calcium, phosphorus, iron and vitamins A and C[28]. These were the first recommendations designed for maintenance of health, rather than for maintenance of work capacity. Her recommendations were based largely on the work of Sherman on human requirements[29]. It is impressive that most of the nutrients known at the time were included in the standard and that recommendations were made for various age groups and even subdivisions of age groups on the basis of their physical activity.

These developments occurred during the time that the League of Nations committees were functioning and their reports also display a shift away from concern with dietary standards just for energy and protein, and an increased concern for specific recommendations for maternity and growth. In 1936, they recommended for adults, 2400 kilocalories, less than the 3000 recommended earlier, and 1 gram of protein per kilogram of body weight. The protein recommendation was increased substantially for growing children. They discussed fat, but were not sure how much to recommend. They also discussed protective foods. Although they did not make recommendations for vitamins, they emphasised consumption of meat, milk, leafy vegetables, eggs, organ meats and fish as protective foods and raised questions about the amount of sugar, milled grain and foods low in micronutrient content that should be consumed. They also calculated the contribution of calcium, iron and iodine from the protective foods recommended.

In 1938, the Technical Committee of the League of Nations presented a report on requirements in which the concept of protective foods was developed somewhat farther[30]. At that time there were seven known vitamins and at least four essential minerals. These were the first official quantitative estimates of human requirements for essential nutrients, including the micronutrients. The Canadian Council of Nutrition published dietary guidelines in 1940[31] and the United States National Research Council/National Academy of Sciences in 1941-1943[32]. These were numerical standards from which nutritionally adequate diets could be developed scientifically. The first US recommended dietary allowances (RDAs) were described in the report as a "tentative goal, toward which to aim in planning practical dietaries".

In the USA, 1939 saw the publication of the USDA Yearbook, Food and Life[33]. This was a landmark in relation to the development of dietary standards and represented a compilation of much of the knowledge of nutrition at that time.

In the UK, the first quantitative details on the human requirement for essential nutrients were provided in the First Report of the Advisory Committee on Nutrition in 1937[34]. The report states:

> "*The average daily consumption of milk per head should, in the Committee's view, be about two pints for expectant and nursing mothers, from one to two pints for children, and not less than half-a-pint for the rest of the population....*
>
> *... The Committee recommends an increased consumption not only of fruit and green vegetables but also of potatoes - the latter in substitution for some of the sugar and highly milled cereals in ordinary diets. They also draw attention to the particular value of sea fish, as a source of protein and iodine and other mineral constituents; herring and mackerel are especially recommended as rich in Vitamins A and D.*"

Second World War

When the Second World War brought for the second time the threat of starvation due to prolonged siege by submarine warfare, the government had a sound scientific basis for food policy. As experience with scurvy showed, however, the learning of a scientific lesson does not guarantee its application.

Fortunately for Britain, the right people were in place at the right time. The Minister of Food, Lord Woolton, with the scientific advice of Sir Jack Drummond, Sir William Jamieson and John Boyd Orr, formulated a national nutrition policy which aimed to maintain *and improve* the nutritional value of the British diet.[35]

The scope of the measures taken, as well as the effectiveness with which they were applied, was remarkable. The policies included: increasing the supply of milk, particularly for expectant and nursing mothers; the provision of vitamin supplements to the same groups; expansion of the school meal service; safe-guarding national intakes of B-vitamins by addition of thiamin to flour; raising the extraction rate of flour to include as much of the germ as possible; and fortifying flour with calcium carbonate. A key element of the policy was that the main source of energy, i.e., bread, flour and potatoes, should not be rationed. Strict rationing of meat, bacon, fats, sugar and preserves was,

however, necessary, leading to a substantial fall in the per capita consumption of fats and refined sugar.

Much has been written about the success of the policy. Maternal, infant and neonatal death rates fell to their lowest levels ever. In spite of the dislocation of family life due to the evacuation of children from the towns and the destruction of housing, the rate of growth of children increased and surveys showed that the prevalence of rickets, dental caries and anaemia declined. There was also convincing evidence that the stillbirth rate actually fell more steeply during the war than in the preceding and succeeding periods and this was attributed to better nutrition.[36]

This wartime food policy was, however, based on the physical control and distribution of food supplies which amounted to the removal, to a very large extent, of consumer choice. It was therefore, by its nature, only a short-term policy, since the return to consumer choice in the post-war period was, in essence, a return to inequality.

During the Second World War, scientists in the USA developed the concept of the 'Recommended Dietary Allowance' (RDA). A committee was established by the U.S. National Academy of Sciences in order to investigate issues of nutrition that might "affect national defence". The committee was renamed the Food and Nutrition Board in 1941, after which they began to deliberate on a set of recommendations of a standard daily allowance for each type of nutrient[37]. The standards would be used for nutrition recommendations for the armed forces, for civilians, and for the overseas population who might need food relief. Roberts, Stiebeling, and Mitchell surveyed all available data, created a tentative set of allowances for "energy and eight nutrients", and submitted them to experts for review. The final set of guidelines, called RDAs or Recommended Dietary Allowances, was published in the Journal of the American Dietetic Association in 1941[38]. The allowances were meant to provide superior nutrition for civilians and military personnel, so they included a "margin of safety." Because of food rationing during the war, the food guides created by government agencies to direct citizens' nutritional intake also considered food availability.

The Food and Nutrition Board subsequently revised the RDAs every five to ten years. In the early 1950s, USDA nutritionists made a new set of guidelines that also included the number of servings of each food group in order to make it easier for people to receive their RDAs of each nutrient.

Between 1944 and 1954, after publication of the first Recommended Dietary Allowances, about ten different countries and the Food and Agriculture Organization and the World Health Organisation, all developed dietary standards.[39]

1950s to 1980s

After the war, rationing became even more extensive than before and continued until 1954. At the end of rationing there was a surge in demand for foods previously in short supply – meat, eggs, canned fruit and so on. Sugar consumption rose particularly rapidly, and by 1960 Britain had the fifth highest per capita intake in the world.

Influential nutritionists like John Boyd Orr for many years promoted the case for better integration of health and agriculture. This idea was discussed by scientists from all over the world but in 1945, the Food and Agriculture Organisation (FAO) was established primarily as a production-oriented world body, whilst the World Health Organisation set up in the following year remained locked in a medical model of health.

Perhaps nutritionists had been too successful in their initial impact and effect on social policy during the war, for there was no major role allocated to them in the reorganisation of medical and social services in the late 1940s. The politics of the establishment of the National Health Service concentrated on the medical profession's demand to retain contact between general practitioner and patient rather than a logical attempt to plan and develop an integrated social and health service. The omission of the nutritionist from the new post-war social services was surprising because in the late 1940's there was no obvious prosperity ahead. This omission may, in part, have been affected by the

fact that some of the key players who were influential in formulating war-time nutrition policy moved on to other roles.

John Boyd Orr had been Director of the Rowett Research Institute since 1914 and when he retired at the age of sixty-five, he became Director-General of the FAO. It was made clear to his successor at the Rowett Research Institute, David Cuthbertson, that the Rowett was to focus on animal not on human nutrition. The British Medical Association invited Cuthbertson to join their Nutrition Committee, but he declined.[40]

At about the same time, Jack Drummond, who was also a key adviser to the UK government on nutrition during the war, left academia for a career in research at Boots. He was murdered in France in mysterious circumstances in 1952.[41]

By the time the National Health Service had come into being, therefore, nutritional knowledge or advice could only be obtained by the public either through treatment by a general practitioner as a patient or, alternatively, through commercial advertising and the agency of the food and drug industries.

Stewart Truswell, Professor of Human Nutrition at the University of Sydney, has remarked that during the 1950s there was

> *"….a slow realisation that the major degenerative diseases of older life might at least partly be determined by something as humble, as domestic, as enjoyable as the foods we eat habitually".*[42]

The realisation that coronary heart disease might be caused by diet was primarily brought about by the work of Ancel Keys, a renowned epidemiologist and physiologist[43,44]. In his famous "Seven Countries" study, he noted that the inhabitants of Crete suffered least from circulatory diseases. He concluded that the Mediterranean diet was significantly healthier than the Northern, say Finnish, diet with its higher saturated fat content. In fact, it is not the Mediterranean diet alone that is so healthy, but a balance of nutrients and social conditions.[45]

The UK's expert committee on food and health, the Standing Committee on Nutritional and Medical Problems, which had lain moribund for some years, was revived and renamed in 1957 because of the increased interest in diet and heart disease. In its new form as the Committee on Medical and Nutritional Aspects of Food Policy (COMA), the Ministry of Health looked to this new committee for advice on health matters relating to diet. In 1959, COMA was asked to investigate the fat content of milk in relation to coronary heart disease.

Their report stated:

> *"We have reviewed much evidence, published and unpublished, on the possible relationship of dietary fat to coronary disease. Some of it is conflicting, and none of it conclusively proves that one is causally related to the other".*

In 1961, the public health nutritionist, Dr Hugh Sinclair, wrote:

> *"[W]e can now see clearly that the nutritional problems confronting the world are more urgent and serious than any others. They can be divided into two broad classes: the provision of adequate food for a rapidly increasing world population, and the disasters caused by the processing and sophistication of food in more privileged countries."*[46]

In the 1960s, COMA began to take a different stance. In 1969, it was reconstituted and the word 'nutritional' dropped from its title. The committee was now investigating a wider range of issues, including the toxicological, carcinogenic and bacterial hazards of food consumption. In 1969, COMA published a report on Nutritional Intakes of Nutrients for the UK[47]. The recommendations on nutrient intakes took the form of single figures, defined as Recommended Daily Intakes (RDIs), which carried the potential for misuse and misinterpretation. They were set deliberately high (compared to

average requirements) to minimise the risk of under nutrition due to the intention to apply them to groups of people rather than to individuals.

Following publication of a Scandinavian paper entitled "Unsaturated fats in relation to heart disease", COMA set up a panel on diet and heart disease in 1970. Its first report *Diet and Coronary Heart Disease* was released in 1974. Minutes of COMA meetings show that there was widespread disagreement on all but the most basic issues[48]. Professor John Yudkin of Queen Elizabeth College London, in particular, believed strongly that his colleagues had exaggerated the effect of dietary fat on heart disease and overlooked the effect of dietary sucrose, a thesis which he published in a book called *Pure, White and Deadly*, in 1972.[49]

The British government took little public health action to promote the findings of the 1969 guidelines or the 1974 COMA report. David Ennals, the Labour Minister responsible for the Department of Health and Social Security (DHSS) between 1976 and 1979 was asked why. He said:

> *"...it was frankly impossible to get an agreed conclusion from the panel of the Committee on the Medical Aspects of Food....they simply did not agree. It was not through any lack of trying on behalf of successive Secretaries of State, and certainly no layman can say 'This is what ought to be done; this is what the experts say', when the experts say different things."*

In 1979, COMA issued revised Recommended Daily Amounts (RDA) of food and energy nutrients for groups of people in the United Kingdom. This valuable report, while dealing with the intake of essential nutrients, excluded dietary fibre from its consideration, a topic extensively reviewed in a report from the Royal College of Physicians in 1980 and more specifically in relation to bread in the comprehensive COMA report "Nutritional aspects of bread and flour" in 1981. Like the 1969 guidelines, nutrient intakes were expressed in the 1979 COMA report as single figures, this time described as Recommended Daily Allowances (RDAs).

Amid a welter of accusation and controversy, a report entitled *A Discussion Paper on Proposals for Nutritional Guidelines for Health Education in Britain*, by the National Advisory Committee on Nutrition Education (NACNE), was published in 1983[50]. This report outlined the links between diet and a range of conditions and diseases, including constipation, bowel diseases, dental caries and coronary heart disease. The NACNE report outlined for the first time quantitative dietary targets for the prevention of a range of diseases associated with affluence. Previously, reducing the incidence of nutritional deficiencies was the main concern. The targets set in the NACNE report were for a reduced consumption of fat, saturated fat, sugar and salt by the general population. They also set targets for an increase in fibre consumption. The targets were sub-divided into:

- short term targets - to be achieved by the end of the 1980s;
- long term targets - to be achieved by the end of the century.

In 1984, a report on *Diet and Cardiovascular Disease* was published by the Committee on Medical Aspects of Food Policy (COMA)[51]. The COMA report outlined recommendations for reducing the consumption of fat and saturated fat by the population for the prevention of cardiovascular diseases. The recommendations made by COMA for fat reduction were in agreement with those in the NACNE report.

The report on *Dietary Sugars and Human Disease* published by COMA in 1989 made recommendations about sugars for the reduction and prevention of dental caries (dental decay)[52]. The report recommended that:

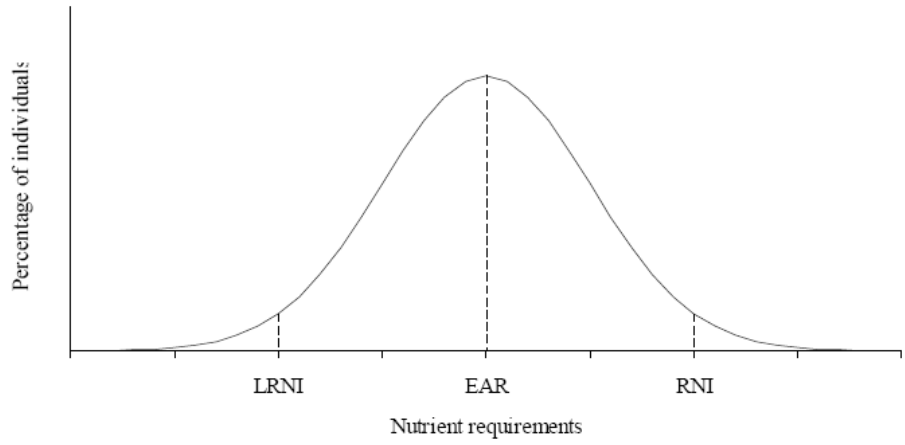
- the amount of non-milk extrinsic sugars ('added' sugars) from fizzy drinks, confectionery and other sugary foods should be reduced. These foods should be replaced by fresh fruit, vegetables and starchy foods;
- the frequency of consumption of sugary snacks should be reduced.

1990s To Present

A report on *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom* was published in 1991 by the Committee on Medical Aspects of Food Policy (COMA)[53]. This comprehensive report outlined recommendations for the intake of energy and 33 nutrients for all age groups within the United Kingdom, including fats, protein, carbohydrates, vitamins and minerals. Recommendations in the 1991 report were for the promotion of health and the prevention of dietary-related conditions, for example, iron deficiency anaemia, osteoporosis, cardiovascular diseases and some cancers. These recommendations were intended to provide a firm scientific basis for nutritional advice to the public.

To avoid potential problems associated with assigning single figures for nutrient intakes, new values called Dietary Reference Values (DRVs) were set to aid interpretation of dietary information on both groups and individuals, based on assessment of the distribution of requirements for each nutrient. They are estimates of requirements for a population, intended to provide guidance rather than recommendations. Information is usually inadequate to calculate the precise distribution of requirements in a group of individuals for a nutrient; however, it has been assumed to be normally distributed (Figure 1). This gives a notional mean requirement or Estimated Average Requirement (EAR) with the interindividual variability in requirements illustrated in Figure 1. The EAR is the best statistical approximation of the nutrient requirement for any one individual in the population. The Reference Nutrient Intake (RNI) is defined as two notional standard deviations above the (EAR). Intakes above this amount will almost certainly be adequate. The Lower Reference Nutrient Intake (LNRI) is defined as two notional standard deviations below the mean and represents the lowest intakes which will meet the needs of some individuals in the group. Intakes below this level are almost certainly inadequate for most individuals (Department of Health, 1991).

Figure 1. Assumed frequency distribution of individual nutrient requirements



The panel found no single criterion to define requirements for all nutrients, so the recommendations are based upon reliable experimental, associations and epidemiological data. **For most nutrients, the panel found insufficient data to establish any of these DRVs with great confidence.** Thus, hypothetical judgments had to be made due to the uncertainties relating to the appropriate parameter by which to assess the requirement and the questionable accuracy of dietary intake data.

Despite this, the panel attempted to set DRVs for energy, protein, fats, sugars, starches, non-polysaccharides (NSP), 13 vitamins, 15 minerals and considered 18 other minerals. They are more elaborate and distinctive than previously, clarifying potential confusion regarding reference values such as 'total sugar and non-milk sugars', 'sodium and salt', 'total fat and saturates', 'fibre and NSP'.

In 1994, COMA published a report on *Nutritional Aspects of Cardiovascular Disease* following a review of new research since the publication of the 1984 COMA report[54]. The 1994 report outlined recommendations for fat (saturated, monounsaturated, polyunsaturated and *trans* fatty acids), carbohydrates, sodium and potassium. It also referred to the role of antioxidant nutrients including carotenoids, vitamins C and E and alcohol in cardiovascular diseases. The report stated that

> *'although the recommendations are intended to reduce people's risk of cardiovascular disease... many of the nutrients... have effects on health beyond the cardiovascular system'.*

In 2001, the Scientific Advisory Committee on Nutrition (SACN) replaced COMA. Over the last eight years, SACN has produced a range of reports on different aspects of diet and health[55] but there has been no systematic revision of the 1991 dietary guidelines. It is therefore timely to question whether the guidelines, which are now 18 years old, reflect the current scientific consensus on the optimum intake of nutrients to promote healthy longevity.

The second half of this paper "Are the Current Government Dietary Guidelines Fit For Purpose?" Looks at the evidence base for the dietary guidelines, and what the UK population is actually eating, and will appear in the Winter edition of the Nutrition Practitioner.

About the Author
Jane Philpott is a Dietary Educator and Analyst as well as holding an MA (Oxon), MSc and PhD in the Life Sciences. She spent 22 years researching and working on the global production of food in academia and industry, before beginning her training to degree level as a Nutritional Therapist. Jane has also trained as a cookery teacher and runs popular "Cooking For Health" courses throughout the year in Somerset. Jane has provided training and consultancy on nutrition and healthier catering for local authorities in the south west of England. She is currently involved in a collaborative project with the local councils and the NHS Primary Care Trust in Somerset aimed at improving the nutritional quality of children's menus in independent catering businesses, funded by the Food Standards Agency. She was also responsible for implementing an in-house hot lunch service in a Somerset primary school, so has considerable expertise in children's nutrition, school food standards, food hygiene legislation and other aspects of setting up and running a catering business. Jane provides confidential, professional expertise and advice on how to transform health and well-being through implementing changes to diet and lifestyle. She is currently working towards a BSc in Nutritional Therapy, which is accredited by Middlesex University and BANT (British Association for Nutritional Therapists). For further information about the "Cooking for Health" classes, see http://cookingforhealth-uk.com or email janekphilpott@googlemail.com.

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