Public Health Nutrition: 8(6A), 695–698 DOI: 10.1079/PHN2005820

The principles, definition and dimensions of the new nutrition science

Christopher Beauman[1], Geoffrey Cannon[2,*], Ibrahim Elmadfa[3], Peter Glasauer[4], Ingrid Hoffmann[5], Markus Keller[5], Michael Krawinkel[5], Tim Lang[6], Claus Leitzmann[5,*], Bernd Lötsch[7], Barrie M Margetts[8], Anthony J McMichael[9], Klaus Meyer-Abich[10], Ulrich Oltersdorf[11], Massimo Pettoello-Mantovani[12], Joan Sabaté[13], Prakash Shetty[4], Marco Sória[14], Uwe Spiekermann[15], Colin Tudge[16], Hester H Vorster[17], Mark Wahlqvist[18] and Mariuccia Zerilli-Marimò[2]

All authors contributed in a personal capacity. [1]European Bank of Reconstruction and Development, London, UK: [2]World Health Policy Forum: [3]Institute of Nutrition, University of Vienna, Austria: [4]Food and Agriculture Organization of the United Nations, Rome, Italy: [5]Institute of Nutrition, Justus-Liebig University, Giessen, Germany: [6]Department of Food Policy, City University, London, UK: [7]Museum of Natural History, Vienna, Austria: [8]Department of Human Nutrition, University of Southampton, UK: [9]Institute of Epidemiology and Population Studies, Canberra, Australia: [10]Department of Philosophy, University of Essen, Germany: [11]Federal Research Centre for Nutrition and Food, Karlsruhe, Germany: [12]Department of Paediatric Nutrition, University of Foggia, Italy; also World Health Policy Forum: [13]School of Public Health, University of Loma Linda, CA, USA: [14]Department of Experimental and Clinical Medicine, Magna Graecia University, Catanzaro, Italy: [15]Institute of Economic and Social History, Georg-August University, Göttingen, Germany: [16]Department of Philosophy, London School of Economics, London, UK: [17]Department of Physiology and Nutrition, North-West University (Potchefstroom campus), South Africa: [18]Asia Pacific Health and Nutrition Centre, Monash University, Victoria, Australia

Abstract

Objective: To specify the principles, definition and dimensions of the new nutrition science.

Purpose: To identify nutrition, with its application in food and nutrition policy, as a science with great width and breadth of vision and scope, in order that it can fully contribute to the preservation, maintenance, development and sustenance of life on Earth.

Method: A brief overview shows that current conventional nutrition is defined as a biological science, although its governing and guiding principles are implicit only, and no generally agreed definition is evident. Following are agreements on the principles, definition and dimensions of the new nutrition science, made by the authors as participants at a workshop on this theme held on 5–8 April 2005 at the Schloss Rauischholzhausen, Justus-Liebig University, Giessen, Germany.

Result: Nutrition science as here specified will retain its current 'classical' identity as a biological science, within a broader and integrated conceptual framework, and will also be confirmed as a social and environmental science. As such it will be concerned with personal and population health, and with planetary health – the welfare and future of the whole physical and living world of which humans are a part.

THE NEW NUTRITION SCIENCE PROJECT

Keywords
The new nutrition science
General theory of nutrition
Principles of nutrition
Definition of nutrition
Dimensions of nutrition
Purpose of nutrition

What is nutrition? Like all sciences nutrition can be defined; it works within a frame of dimensions; and in its policy and practice it is governed and guided by principles. But this is not necessarily to say that its definition is agreed or even known; nor that its dimensions or principles are explicit; these may be assumed or implied without being stated.

Discussion

Indeed, there seems to be no current agreed definition of the science of nutrition, or even alternative definitions with general currency; and there seems also to be no specification of its dimensions other than that it is a biological (or 'life') science. There are also no generally

*Corresponding authors: Email ClausLeitzmann@aol.com, geoffreycannon@aol.com

agreed explicit overall general principles to govern and guide its work and application as food and nutrition policy.

Given this, the issue is not just one of definition, but of direction. Currently, nutrition lacks a general theory. As Kurt Lewin, a founder of systems theory as applied to science, states: 'A science without a theory is blind, because it lacks that element which alone is able to organize facts and give direction to research. Even from a practical point of view the mere gathering of facts has very limited value. It cannot give an answer to the question that is most important for practical purposes – namely, what must be done to obtain a desired effect in concrete cases'[1].

Current definitions

So what definitions are given for nutrition? Two leading recent and current textbooks[2,3] do not include any definition. A rather circular English language dictionary definition is: 'The branch of science that deals with (*esp* human) nutrients and nutrition'[4]. A mid-twentieth century definition in a UK government manual is: 'The science of nutrition entails the study of all processes of growth, maintenance and repair of the living body which depend upon the intake of food'[5]. Forty years later this became: '…the study of all processes of growth, maintenance and repair of the living body which depend upon the digestion of food, and the study of that food' – followed by definitions of 'food' and of 'diet'[6].

Dictionaries in French, German, Italian and Spanish define nutrition as a biological process concerning all living organisms, both animals and plants (although in German it seems to be a prerogative of humans and animals, as suggested by the word *Körper*). In these definitions, nutrition as a science is usually restricted to human beings or to higher animals, and 'nutrition' itself is biological or biochemical. There are no references to behavioural, social or environmental aspects or dimensions. In Spanish *nutrición* is recognised as a biological function, not as a science. In French *nutrition* has been acknowledged as a science only recently. Italian has a specific word (*nutrizionistica*) and German has different words for *nutrition* as a science and *nutrition* as a research discipline. Nutritionists in Italy, France and Spain evidently require medical qualifications.

Historically dietetics has been defined very broadly[7]. However, a mid-twentieth century definition is relatively narrow: 'The science of applying the hitherto discovered facts about food and its uses in the body to the feeding of the individual, the family, and the nation'[8]. A later edition of the same textbook gives a broad definition of nutrition as: 'The study of food and drink in all its aspects', as distinct from dietetics, which there is taken to mean '…the use of this study in curative medicine'[9].

A valedictory definition of nutrition was given in a plenary lecture at the 17th International Congress of Nutrition in Vienna in 2001 with the theme 'A vision for the nutritional sciences in the third millennium'. This was: 'The study of the totality of the relationship between the functional (metabolic, behavioural) characteristics of the organism and its dietary environment', adding 'emphasis is given to nutrients and to the diet as a whole'[10].

In 2005 the editorial of a leading journal[11] included what in effect were notes towards a definition of nutrition, in an attempt to relate physiology, biochemistry and pathology to broader dimensions. The discussion was of obesity, which: '…has increasingly encompassed public health, social, cultural, behavioural and political dimensions, as well as the strictly biological'. What can nutrition science do? 'The issue is best addressed by defining the landscape covered by the "biology of obesity"… This landscape encompasses the following areas, some of which are at the core of nutritional science: (i) the fundamental mechanisms of energy balance and its regulation… (ii) the biological basis for the development of obesity… (iii) adipose tissue function… (iv) the biology of the obese state… (v) the pathological consequences of obesity… (vi) the physiological basis of treatment strategies'. The editorial goes on to commend genomic approaches, and mentions specialist descriptive topics including adipokines, appetite, endocrine factors, energy expenditure, genes, lipid metabolism, lipidomics, mechanistic bases, neurobiology, nutrient partitioning, physiological adaptation and substrate flux, as well as behavioural, nutritional and pharmacological interventions.

A current definition of nutrition science used in teaching in the UK[12] is: 'The study of the ways in which the interaction between the intake of food, providing energy and nutrients, and the metabolic demands of the body that are required to establish and maintain function. This interaction takes place against a wide range of environmental factors'. And the definition given by the British Nutrition Foundation is: 'The study of nutrients in food, how the body uses nutrients, and the relationship between diet, health and disease'. And: 'Nutritionists create and apply scientific knowledge to promote an understanding of the effects of diet on health and wellbeing of humans and animals'[13].

The biological dimension

These definitions and descriptions are notable for what they include, what they assume, imply and suggest, and what they exclude. In general, the recent definitions are of a biological science whose descriptive aspects are physiological and biochemical and now also genomic, and whose prescriptive aspects are medical. The context of health (taken to mean the absence and presence of disease) is assumed. They suggest a focus on the human species, directly or indirectly. They mostly indicate that food and the organism on which food acts can be taken out of other contexts.

There is slight reference to any social or environmental dimension. There is for example no reference to food as

https://doi.org/10.1079/PHN2005820 Published online by Cambridge University Press

a resource, or to where food comes from. Also, there is almost no explicit reference to contexts, even to time and place. Such definitions are reflected in the main structure of textbooks of nutrition science, which in recent editions do however include some public health aspects as well as some ancillary material on other topics[2,3].

If nutrition is accepted as a biological science, with physiological, biological, genomic and medical aspects, and is concerned with humans and the living world as this serves humans, a working definition of current conventional nutrition, and its application as food and nutrition policy, would be as follows:

- Nutrition science studies the interactions of constituents of food and of diets as a whole, with human and other biological systems.
- The application of nutrition science as food and nutrition policy is designed to prevent disease and sustain health in individuals and populations.

Proposal

Nutrition as an integrated science

However, *The New Nutrition Science project* proposes – for reasons indicated below and elaborated in associated papers[7,14–27] – that nutrition is and will remain a biological science, and at the same time, to meet the circumstances of the twenty-first century, is already becoming and should now be identified also as a social and environmental science.

Indeed, as reflected in older definitions[7], nutrition science, and its predecessor discipline of dietetics, traditionally and indeed until recently in history has always had social and environmental dimensions, and a new definition will acknowledge this. Seen ecologically, the distinctions between society, the environment and biology are somewhat artificial, and a new definition should also indicate this.

The Giessen Declaration[27], agreed by the authors of this paper, states that the world in which we now live is very different from the world in which nutrition as a science was framed. Humankind is faced with unprecedented challenges: general, and also directly relevant to nutrition science and food policy. The Declaration states that: 'Nutrition science can address these challenges; but can do so successfully only by means of integrated biological, social and environmental approaches. These are also essential if nutrition science is to play its part in addressing the general challenges that now face the human species'.

Again as stated above and below, the proposal with the most profound implications for the science of nutrition identifies it not as centred on the human species, but on the ecosphere and within this the biosphere[28]: the physical and living world of which humans are one part.

The proposals made below in quotations and in bulleted points are from *The Giessen Declaration*[27].

General principles

'All sciences and all organised human activities are and should be guided by general principles. These should enable information and evidence to be translated into relevant, useful, sustainable and beneficial policies and programmes.

- 'The overall principles that should guide nutrition science are ethical in nature. Its principles should also be guided by the philosophies of co-responsibility and sustainability, by the life-course and human rights approaches, and by understanding of evolution, history and ecology'.

Definition

The following working definition of the current conventional science of nutrition as a biological discipline can readily be adapted and developed to include the proposed co-equal social and environmental aspects; the sense that these are all parts of one system; and the involvement of the science with the whole physical and living world.

- 'Nutrition science is. . .the study of food systems, foods and drinks, and their nutrients and other constituents; and of their interactions within and between all relevant biological, social and environmental systems'.

Purpose

- 'The purpose of nutrition science is to contribute to a world in which present and future generations fulfil their human potential, live in the best of health, and develop, sustain and enjoy an increasingly diverse human, living and physical environment'.

The Declaration goes on to state: 'Nutrition science should be the basis for food and nutrition policies. These should be designed to identify, create, conserve and protect rational, sustainable and equitable communal, national and global food systems, in order to sustain the health, well-being and integrity of humankind and also that of the living and physical worlds'.

Conclusion

The Giessen Declaration concludes: 'There remains much work to be done in the biological dimension of nutrition science. Much other important work now has to be carried out also in the social and environmental dimensions: this will require a broad, integrated approach. . . [T]he most relevant and urgent work to be done by professionals working in nutrition science and in food and nutrition policy is in its three biological, social and environmental dimensions all together'.

The principles, definition and dimensions of nutrition science specified here should be accepted as work in progress, subject to further consultation, discussion and testing in working conditions.

https://doi.org/10.1079/PHN2005820 Published online by Cambridge University Press

Declaration

The principles, definition and dimensions proposed for the new nutrition science are the joint responsibility of all the authors, who are the authors and signatories of The Giessen Declaration. *Thanks are due to Anna Maria Bedford of the London School of Hygiene and Tropical Medicine, UK, for work on current definitions.*

References

1 Lewin K. *Principles of Topological Psychology*. New York: McGraw Hill, 1936. See also http//:www.psy.vu.nl/kli/info/htm/
2 Garrow J, James WPT, Ralph A, eds. *Human Nutrition and Dietetics*, 10th ed. Edinburgh: Churchill Livingstone, 2001.
3 Bowman B, Russell R. *Present Knowledge in Nutrition*, 8th ed. Washington, DC: ILSI Press, 2001.
4 *New Shorter Oxford English Dictionary*. Oxford: Clarendon Press, 1993.
5 Ministry of Agriculture, Fisheries and Food (UK). *Manual of Nutrition*, 4th ed. London: Her Majesty's Stationery Office, 1955.
6 Ministry of Agriculture, Fisheries and Food (UK). *Manual of Nutrition*, 10th edition, 5th impression. London: Her Majesty's Stationery Office, 1995.
7 Cannon G. The rise and fall of dietetics and of nutrition science 4000 BCE–2000 CE. *Public Health Nutrition* 2005; **8**(6A): 701–5.
8 Mottram V, Graham G, eds. *Hutchison's Food and the Principles of Dietetics*, 9th ed. London: Edward Arnold, 1944.
9 Mottram V, Graham G, eds. *Hutchison's Food and the Principles of Dietetics*, 10th ed. London: Edward Arnold, 1956.
10 Young VR. A vision of the nutritional sciences in the third millennium. In: Elmadfa I, Anklam E, König J, eds. *Modern Aspects of Nutrition*. Basel: Karger, 2003; 24–9.
11 Trayhurn P. Obesity: what role for nutritional science? *British Journal of Nutrition* 2005; **93**(1): 1–2.
12 Available at bmm@soton.ac.uk
13 http://www.nutrition.org.uk
14 Cannon G, Leitzmann C. The new nutrition science. *Public Health Nutrition* 2005; **8**(6A): 673–94.
15 McMichael AJ. Integrating nutrition with ecology: balancing the health of humans and biosphere. *Public Health Nutrition* 2005; **8**(6A): 706–15.
16 Tudge C. Feeding people is easy: but we have to rethink the world from first principles. *Public Health Nutrition* 2005; **8**(6A): 716–23.
17 Popkin B. Using research on the obesity pandemic as a guide to a unified vision of nutrition. *Public Health Nutrition* 2005; **8**(6A): 724–9.
18 Lang T. Food control or food democracy? Re-engaging nutrition with society and the environment. *Public Health Nutrition* 2005; **8**(6A): 730–7.
19 Meyer-Abich KM. Human health in nature – towards a holistic philosophy of nutrition. *Public Health Nutrition* 2005; **8**(6A): 738–42.
20 Beaudry M, Delisle H. Public('s) nutrition. *Public Health Nutrition* 2005; **8**(6A): 743–8.
21 Pettoello-Mantovani M. The social and environmental aspects of nutrition science. *Public Health Nutrition* 2005; **8**(6A): 749–52.
22 Leitzmann C. Wholesome nutrition: a suitable diet for the new nutrition science project. *Public Health Nutrition* 2005; **8**(6A): 753–9.
23 Vorster HH, Margetts BM, Venter CS, Wissing MP. Integrated nutrition science: from theory to practice in South Africa. *Public Health Nutrition* 2005; **8**(6A): 760–5.
24 Wahlqvist ML. The new nutrition science: sustainability and development. *Public Health Nutrition* 2005; **8**(6A): 766–72.
25 Uauy R. Defining and addressing the nutritional needs of populations. *Public Health Nutrition* 2005; **8**(6A): 773–80.
26 Leitzmann C, Cannon G. Dimensions, domains and principles of the new nutrition science. *Public Health Nutrition* 2005; **8**(6A): 787–94.
27 The Giessen Declaration, *Public Health Nutrition* 2005; **8**(6A): 783–6.
28 McMichael A. Disease patterns in human biohistory [Chapter 1]. In: *Human Frontiers, Environments and Disease. Past Patterns, Uncertain Futures*. Cambridge: University Press, 2001.