

**Requirements for Healthy Nutrition:
Integrating Food Sustainability, Food Variety and Health**

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ABSTRACT

Until recently, the criteria for healthy nutrition were couched principally in terms of a combination of some form of *Recommended Dietary Intakes (RDIs)* for energy (calories/kilojoules) and for nutrients recognized as essential, along with *Dietary Guidelines* (since the late 1970s in various countries). In Cyprus, in 1995, WHO and FAO advocated *FBDGs* (Food Based Dietary Guidelines); these allow for food cultural difference, population genetic difference, and the broad non- nutrition roles of food (eg. social discourse); and, especially, the physico-chemical properties and phytochemicals which confer human biological advantage.

Measures of the total cuisine (eg. of the traditionality of the Greek diet) and its transportability to other localities (eg. Food Habits in Later Life and SENECA studies) in relation to health also indicate that the contribution of diet to health is more than the sum of its chemical components.

Food Diversity (or *Variety*) (including food processing variety) is a predictor of health outcomes and of Food Security. Here, it is also relevant that, for every 1% in increase in dietary diversity there is a 1% increase in per capita food consumption for poor and middle-income countries.

Food variety also reflects *biodiversity* and environmental security. In the future, it can be expected that the environmental costs of food production will need to be taken into account in the formulation of nutrition requirements and related policy and in food choice.

1. Criteria for Healthy Nutrition

The criteria for Healthy Nutrition, insofar as food intake is concerned, constantly evolve with an understanding of food-health relationships. They are summarized in Table 1.

Table 1. Criteria for Healthy Nutrition in regard to Food Intake

- Recommended Dietary Intakes
- Energy and Nutrient (component) Density
- Recommended Nutrient Densities
- Dietary Guidelines
 - Food-based dietary guidelines (FBDGs)

The limitation of RDIs (Recommended Dietary Intakes) or their counterparts is that they are indicative of the health properties of food, without being comprehensive.

This is more and more in evidence as food chemistry and physico-chemistry advances and feeding studies or clinical nutrition trials evaluate these emerging characteristics.

Hence the increasing need to speak about "food components" and not simply the known nutrients. The development of phytochemistry is an example of how a new wave of food and nutrition science is leading to a new paradigm of food and health, one which requires a more integrative science over and above the reductionist approach (Wahlqvist and others 1998).

WHO and FAO have endeavoured to capture this trend towards integrative "Healthy Nutrition" with FBDGs (Food Based Dietary Guidelines) (Table 2 and 3) (Wahlqvist 1999; Wahlqvist and others 2002; WHO 1997; WHO 1998).

Table 2. Food-Based dietary Guidelines (FBDGs)

FOOD

Nutrients, Phytochemicals, Zoochemicals



CUISINE

Represented by:

- Traditional, nouvelle, and modern/new foods
- Food patterns and beliefs
- Food availability
- Sustainable food production

Table 3. Food-Based Dietary Guidelines (FBDGs)

These guidelines allow for:

- Food cultural difference
- Population genetic difference
- Broad non-nutrition roles of food (eg. social discourse)
- Physico-chemical properties and phytochemicals

With declining physical activity and ageing populations, guidelines on food component density (FCD) are also required (Table 4).

Table 4.

$$\frac{\text{Energy (in Cal or kJ)}}{\text{Mass of food (in g or kg)}}$$

Nutrient Density (ND) or Food Component Density (FCD)

Mass of nutrient or food component (eg. mg)

Energy (eg. 100 kJ)

It is now time to re-categorize the food properties which account for health (Table 5), what they confer and how we provide for them in traditional and newer cuisines.

Table 5. Food properties and health

FOOD PROPERTIES

- Chemical
 - Macronutrient
 - Micronutrient
 - Phytochemical

- Physico-chemical

CONFERRING

- Palatability
- Socio-cultural acceptability

PROVIDING FOR

- Cuisine
(Traditional and Newer)

2. Cuisine Measurement and its Predictive Power

Once measurement of cuisine, even by straightforward food scores (which may be additive, synergistic or complementary), is available, the validity of the measurement can be evaluated, not only on the basis of current food and nutrition science, but also by their prediction of health outcomes in cohort and intervention studies. Examples of the former are the IUNS (International Union of Nutritional Sciences) FHILL (Food Habits in Later Life) and the European Union SENECA (Survey in Europe on Nutrition and the Elderly, a Concerted Action) (Haveman-Nies and others 2002) studies of older people in different cultural settings; and, of the latter, the Lyon Heart Studies of de Lorgeril and colleagues (de Lorgeril 1999). Here it is clear that integrals of the Mediterranean diet (notably Greek and French) demonstrate its predictive power for survival advantage. Such benefit is not as evident for nutrients or food alone. However, certain food categories like pulses (lentils) and fish do characterize advantageous diets (Wahlqvist and others 1989; Wahlqvist and others 2003).

3. Food Diversity and Health

Several studies of disease-specific and of general health and survival demonstrate that a varied diet confers advantage (Wahlqvist and others 1989; Wahlqvist and other 1989; Hodgson and others 1991; Hodgson and others 1994, Hsu-Hage and Wahlqvist 1996, Kant and other 1993; Kant and others 1995). This is a significant shift in nutritional thinking away from staples as a basis for the preferred human diet.

4. Food Diversity and Food Security

From time to time failure of staple food crops leads to hunger, starvation and death. Food diversity, achieved through local food production and/or trade can minimize this risk (Wahlqvist and Specht 1998).

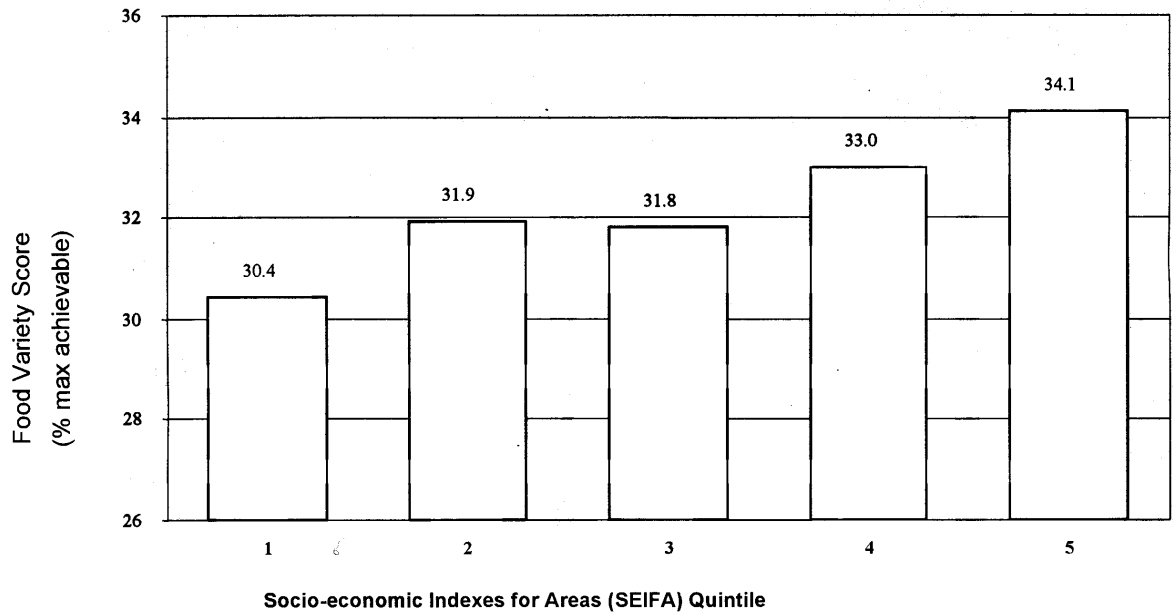
As a consequence, every set of dietary guidelines developed in recent times (WHO 1998; WHO 1997; Wahlqvist 1999; Wahlqvist and others 2002) has championed are for food variety. This is especially so since (apart from the first 6 months of life when exclusive breast feeding is the benchmark) a wider spectrum of food stuffs helps ensure food component intake adequacy and quality.

Recently, Haddimott and Yohannes (Haddinott and Yohannes 2002) reported that "for every 1% in increase in dietary diversity, there is a 1% increase in per capita food consumption for poor and middle-income countries". This is a clear indication of the importance of food diversity in food security.

National nutrition monitoring also can assess how well food variety is achieved in the population at large and its role in food security (Hardinsyah 1996).

This is also exemplified by recent Australian data which show that, even within an economically advantaged nation, socio-economic status (SEIFA) and food variety are inter-linked (Figure 1) (report available on www.healthyeatingclub.com).

Figure 1. Socio-economic Status and Food Variety
(Australian 1995 National Nutrition Survey)



5. Eco-Nutrition

The increasing awareness of the environmental bases of disease, especially insofar as how and what food is produced, is represented by a new coalition between the food, nutritional and environmental sciences (Wahlqvist and Specht 1998; Wahlqvist 2002; Wahlqvist 2002; Wahlqvist 1999). The IUNS has an Eco-Nutrition Task Force to support this coalition. It is recognized that the "double burden of nutritionally-related disease", which reflects problems in both food adequacy and quality, must inform a new order of public health policy for sustainable community development (Table 6).

Table 6. Public health Policy and Sustainable Community Development

KEY ELEMENTS

- Taking account of antecedent generations
- Starting at conception
- Recognising that women are pivotal
 - their economic status, literacy and health
- Including the whole community
- Taking a whole of life and whole community approach to chronic or eco-disease

6. Conclusion

Healthy nutrition requires not only policy and action in regard to known nutrients, but an appreciation of the broader properties of food, its production and consumption, in ways that are socio-economically acceptable and environmentally sustainable.

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