# NUTRITIONAL ASSESSMENT IN MAN

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## Summary

The rationale and techniques of nutritional assessment in developed nations have been neglected for many years because these countries have not perceived themselves as having problems of undernutrition. Although the problems of undernutrition and overnutrition may co-exist as 'dysnutrition', particular developments are required to adapt traditional nutrition assessment techniques and to formulate new ones. Nutritional assessment can be applied to the assessment of individual health and well-being, and community and national food supply and health status, as well as to the understanding of the aetiology or pathogenesis of nutrition-related disease. Methods of nutritional assessment include an evaluation of socioeconomic and cultural factors affecting food intake, food intake itself, anthropometry, clinical history and examination, and various laboratory investigations. Much work is still required in the area of validation of food intake data, at once potentially the most powerful tool of nutrition investigation and the least satisfactorily developed. As attention is paid to groups vulnerable to nutritional problems in the community, it can be anticipated that a reduction in the burden of major diseases affecting affluent society and an improvement in nutritional support techniques to modify the outcome of disease will take place.

## I. INTRODUCTION

As the systems of food production, processing and utilisation undergo change in a changing social, economic and cultural framework, better ways of measuring those aspects of health arising from nutrition will be required. Not only will the techniques need to be directed more specifically to the nutritional problems encountered, but also they will need to be available to a wide variety of individuals with different kinds of training and they will need to be relatively inexpensive. Thus, whilst a systematic treatment of nutrition assessment techniques is desirable, their specificity, reproducibility, validity and practicality will need to be kept in mind.

## II. REASONS FOR NUTRITIONAL ASSESSMENT

The primary reason for nutritional assessment is to relate an aspect of food or nutrient intake, whether oral, enteral or parenteral, to the health and well-being of the community or the individual. Implicitly, this means relating intake to a particular function or set of functions. However, nutrition assessment often falls short of measuring actual function and tells us about something that may or may not lead to an abnormality. For example, does this individual with overweight or obesity actually have, say, impaired respiratory function; or does this individual with a low plasma ascorbic acid concentration simply fall below the third percentile and constitute a member of the normal population or does he have a problem related to ascorbic acid deficiency such as abnormal collagen formation? (Jelliffe 1966; Flint et al. 1980; Isaksson 1980; Wahlqvist 1981a; Wahlqvist and Flint 1981; Baghurst 1981). In the case of

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a comparison of nutrient intake data with recommended dietary allowances, does a short-fall in nutrient intake represent inappropriate interpretation of dietary allowance recommendations, inadequate food intake data, erroneous or misinterpreted food compositional data, altered bioavailibity or a genuine problem intake?(NHMRC 1979; Committee on Dietary Allowances, Food and Nutrition Board 1980). Although the adequacy of nutrient intake is an important question posed by nutritional assessment, there remain a number of known nutrients where such an assessment is difficult (Flint et al. 1980; Sinclair 1980; Smith 1980). These would include certain vitamins, trace elements and dietary fibre. This leaves aside many components of food which may well interact with the classical nutrients.

The assessment of an individual's health and well-being is the most usual reason for nutritional assessment. The skills of such an assessment need to be learned by medical students, dietetic students, nurse trainees and probably other student health professionals.

Of concern to community and national health care planners are those techniques which will allow an overall assessment of the nutritional status of a population. This assessment will have implications for agriculture, the food industry, the health system and the education system, not only in times of peace but also in preparedness for times of disaster. Baseline data from which serial observations can be made are crucial to Government, although this is not always appreciated.

The nutrition-related problems of affluent Australian society extend well beyond the more historical interests of nations like ours in under-nutrition, contemporary as these problems are for our near neighbours. The nutritional risk factors for the development of obesity, atherosclerotic vascular disease, neoplastic disease, the consequences of alcohol abuse, bowel dysfunction, food sensitivity, microbial food poisoning and dental caries require definition and this is an aspect of nutritional assessment. Here, techniques are required not only to assess nutritional status, but also the disease process, so that the two can be related. The monitoring of disease processes is not always easy as, for example, the serial observation of atherosclerotic vascular disease. Brain function, as it relates to nutrient intake or meal pattern, is also of growing interest to nutritionists, but assessment is difficult and collaboration with experts in other fields required.

## III. METHODS OF NUTRITIONAL ASSESSMENT

An understanding of the socioeconomic and cultural background of the community or individual to be assessed in many cases pre-determines the nature of other assessment procedures.

For example, food intake data might have to be obtained first by dietary record unless knowledge of the particular food culture is available.

There are broadly three ways in which food intake data might be obtained (Bazarre and Myers 1979). These are

(i) apparent food consumption from food balance sheets,
(ii) household expenditure, and
(iii) individual data:
  (a) dietary record (menu diary, household measures or weight)

(b) dietary recall (24-hour recall, diet history, frequency questionnaire).

Workers often seek to validate a particular food intake method by comparing it with another method. The difficulty with this approach is that one erroneous method may be compared with another erroneous method. Ideally, no one method should be used in isolation. As far as possible, the food intake data should be validated by comparison with a laboratory investigation of nutritional status or index of nutrient function.

The limitations of food composition data are not always appreciated (Wahlqvist et al. 1981). Average figures are given in food composition tables and are based on a limited number of analyses. The nutrient content of a particular food can vary according to species of origin, agricultural practice, climate and season, storage and food preparation technique. For example, the great climatic variation from one part of Australia to another would be likely to affect the nutrient composition of particular foods.

The most commonly used techniques of anthropometry include weight for height relationships (Wahlqvist and Flint 1981), body circumferences and skinfold thicknesses (Baghurst 1981). In most circumstances, these are reliable and useful techniques. Problems do arise, however, in the obese where skinfold thicknesses are more difficult to determine accurately so that deductions about changing muscle mass with changing protein nutrition become more difficult. In the elderly and handicapped, too, it is not always possible to make an accurate assessment of height (Wahlqvist and Flint 1981).

A clinical history and examination, with an index of suspicion based on a knowledge of nutritional problems, remains one of the most important aspects of nutritional assessment.

Laboratory investigations include not only biochemical measurements of nutrients (Wahlqvist and Flint 1981), but also haematological and immunological evaluations.

It will not always be possible to relate the same nutrient dysfunction to a particular nutrient deficiency in the diet. An example of this would be difficult with dark adaptation suggesting retinol deficiency which actually arose from a zinc deficiency because of the role of zinc in mobilising retinol from the liver and in its activation in the retina. As nutrition assessment becomes more sophisticated, nutrient dysfunctions and biochemical abnormalities may come to be related to lifestyle problems (Baird and Schutz 1980), food patterns, food items and nutrient clusters rather than single nutrients. The chemical complexity of food is often forgotten.

## IV. NUTRITIONAL ASSESSMENT OF SPECIAL GROUPS

It will often be necessary to be aware of the particular group from which individuals are drawn if their nutritional problems are to be identified upon nutritional assessment. Groups which might be nominated for attention are these (Wahlqvist 1980; Wahlqvist 1981b) :

(i) Special age groups, such as infants and the elderly
(ii) Aboriginal Australians
(iii) Migrants
(iv) Those with high-risk profiles for nutritionally related diseases

such as ischaemic heart disease and diabetes mellitus
(v) Alcohol abusers
(vi) The institutionalised
(vii) Lower socioeconomic groups.

Migration may bring in its train both favourable and unfavourable nutritional changes as evidenced by studies of southern European and Asian migrants to Australia (Kosmidis et al. 1981; Manderson and Mathews 1981). It may be helpful to identify 'marker foods' for particular food cultures or, indeed, 'marker nutrients' such as dietary fibre (Wahlqvist et al. 1981).

There are special difficulties in assessing alcohol intake and, in general, it has to be recognised that this is underestimated (Roe 1979). Nevertheless, the nutritional implications of alcohol abuse by way of its contribution to energy intake and the generation of nutrient deficiencies is of particular importance.

## V. IMPLICATIONS FOR NUTRITIONAL MANAGEMENT

One of the most important implications of nutritional assessment is that it should allow a reduction of nutrition-related risk factors for disease in individuals and in the community at large. For example, a growing recognition of the association between higher intakes of green leafy and yellow vegetables, or higher levels of serum retinol, and lower rates of lung cancer (Wall et al. 1980), might lead to recommendations about the intake of such foods with regard to prevention of this disease. Such advice need in no way detract from non-nutritional intervention strategies.

Appropriate nutrition support techniques, too, arising from more adequate nutrition assessment profiles, are leading to a reduction in operative morbidity and mortality in hospitals (Mullen et al. 1980).

## VI. NUTRITIONAL SELF-ASSESSMENT

Nutritionists must also consider ways in which individuals can make a self-assessment of nutritional status. In the first place, this would derive from a more adequate knowledge of food, its composition and its nutritional value. It will also depend on a greater public awareness of Australia's major nutritional problems. Simple techniques to assess the adequacy of diet, whether or not it is prudent, and anthropometry by, for example, inspection for fatty bulges, a pinch test for skinfold thickness and weight/height relationships could go a long way towards a greater nutritional awareness by individual Australians.

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