

4

Nutrition and Ageing in Development

MARK L. WAHLQVIST, WIDJAJA LUKITO, AND
BRIDGET H-H. HSU-HAGE

INTRODUCTION

By the year 2001, about 60 per cent of the human population aged 65 years and above will be those of the developing world (Andrews, 1986). This indicates a 78 per cent net increase in the age group 65 years and above in developing countries in the period 1980 to 2000. The experience of the developed world shows that the rapid increase in life expectancy of elderly people generates a disproportionate increase in medical expenses and health care costs (Ogawa, 1982). Given that we are only seven years away from the year 2001, we anticipate as much, if not greater, urgency in the consideration of health-related problems, particularly that of nutrition and ageing, besetting people 65 years and over, in the developing world.

Nutrition plays an important role in the health status of a population. Nutritional standard is a function of socio-cultural factors, food intake, and intrinsic biology, with genetic and other environmental determinants. Biological processes, such as ageing, may also be a function of nutritional status. A study of nutrition and ageing therefore needs to take account of individual and population differences in socio-cultural factors and biology.

We will consider nutrition-health relationships in the aged, and lessons from the Western Pacific, Meso-American, and IUNS (International Union of Nutritional Sciences) studies of the elderly, before arriving at general conclusions and implications for the future.

NUTRITION-HEALTH RELATIONSHIPS IN THE AGED

Derivation of the Relationships

Ageing is often accompanied by the occurrence of *illness, which may increase the risk of nutritional deficiency*. On the other hand, nutritional deficiency or excess may *contribute to the pathogenesis of a number of common diseases* of the elderly. Therefore, a description of the well-being and health status of the elderly has to take into account the nutritional status.

Nutritionally-related problems are often compounded by *diminished physiological reserve* in the elderly. Many studies have shown significant changes in different body functions while ageing. Some of the impaired functions are cardiorespiratory (Shephard, 1986), gastrointestinal (Duthie and Bennett, 1963; Webster, 1980), liver and renal (Thompson, 1963; Dontas *et al.*, 1972; Lindeman *et al.*, 1985), endocrine (Davidson, 1979; Friedman *et al.*, 1969; Riggs and Melton, 1986), and neurological (Sandman *et al.*, 1987; Bucht and Sandman, 1990)—and they may sometimes be nutritionally reversible. On the other hand, if 'nutritional reserve' is also limited (say, by reduced energy stores and nutrient stores in liver, muscle, and bone), then diminished physiological reserves of other kinds may be more critical. Thus, nutritional modulation by means of prevention and therapy represents one possible approach to the minimization of the occurrence of nutritionally-related health problems.

If we understand how to match food to biological need, and learn to identify common health problems and the nature of nutrition-health relationships while, at the same time, discerning the impact of non-nutritional factors on health, we will be in a better position to study and improve the health of the aged.

Matching Food to Biological Need

It may not be unusual to assume that *food excess* amongst the elderly in developed countries and *food deficiency* in developing countries would characterize and separate the health problems in these settings (Table 4.1). However, although obesity is more common in developed than developing countries (WHO, 1990), with advancing years, there can be in both situations a decline in lean mass with a range of fat masses. The reduced lean mass puts both groups of elderly people at potentially similar risk from disorders related to it *per se*, for instance, immunodeficiency (Saltzman and Peterson, 1987). Indeed, it may be more help-

Table 4.1 Putative role of nutrients in the pathogenesis of some diseases in the elderly

Food intake patterns	Nutrient considerations	Disease	Relative prevalence	
			Develo- ped countries	Develo- ping countries
High-energy density foods	Positive energy balance	Obesity	++	+
		Hypertension	++	++
		Non-insulin dependent Diabetes mellitus	++	+
		Hypertension	+	+
Preference of salt and/or soysauce as flavour over herbs and spices	Excess sodium intake	Cerebrovascular accident	+	+
High plant-derived foods	High-fibre diets	Volvulus	+	+
Limited food supply	Protein-energy malnutrition	Immune deficiency	+	++
		Anaemia/fatigue	+	++
		Increased infection	+	+++
Preference for animal-derived foods and/or fat	Low-fibre diets	Diverticulitis	++	+
		Constipation	++	++
Limited variety or vegetarian diet	Folate and vitamin B ₁₂ deficiency	Anaemia	+	++
		Dementia	++	++
Limited dairy products and fish	Decreased calcium and vitamin D intake	Osteopenia and osteomalacia	++	++
Low meat and cereal intake	Zinc deficiency	Immune deficiency	++	++
		Anorexia	++	++
		Poor wound healing	+	++
Low meat and/or lack of combined intake of meat, fish, and green vegetables	Iron deficiency	Anaemia	+	+++
Limited safe water supply	Hypoditisia	Dehydration	+	++
		Orthostatic hypotension	+	++
		Hypernatraemia	+	++

+ low prevalence; ++ moderate prevalence; +++ high prevalence

References: Bjorntorp, 1990; Chandra, 1982; Davidson, 1979; Flint *et al.*, 1981; Herbert, 1962; Krishnan, 1974; Meydani *et al.*, 1990; Riggs *et al.*, 1986; Rolls, 1990.

Table 4.2 Various food/body tissue deficit or excess in the elderly

	Food				Body tissue		
	Energy	Quality	Water	Saline	Lean	Fat	Bone
Deficit	+	+	+	+	+	+	+
Excess	+	-	±	+	-	+	-

+ observed in the elderly

± rarely observed in the elderly

- never observed in the elderly

ful to refer to food deficit or food excess and lean mass and/or fat mass disorders in their own rights (Table 4.2).

Problems currently related to such classification are: (1) available definitions generally apply to younger adults, for example, nutrient density of food in mass or energy value, chronic energy undernutrition is BMI less than 18.5 kg/m^2 (James *et al.*, 1988); and (2) no definitions exist or are only now being evaluated, for example, food variety score for nutritional counselling (Wahlqvist, 1989). Fortunately, food-health relationship studies, now in progress, will begin to solve these dilemmas.

Again, even 'nutritional quality' can be an inadequate descriptor if all that is nutritionally important in food is not considered. For example, dietary fibre intake varies greatly within and between the developed and developing worlds. Whereas the diet of certain developing countries may be regarded as low in dietary fibre, this may not be so for resistant starch, provided by rice and wheat noodles in an Oriental diet, where food is eaten after cooking (gelatinization of starch) and allowing it to cool somewhat (crystallization of starch). In this event, the function of dietary fibre attributable to its fermentation in the colon may be fulfilled as well, if not better, by resistant starch. But the accompaniments of dietary fibre and resistant starch may be quite different.

A cross-sectional study of Melbourne Chinese revealed that the intake of steamed rice did not alter with age. There were apparent increases in the intake of Chinese tea, Chinese cabbage, and beancurd while the consumption of bean sprout decreased with age (Hage, 1992). Although it is likely that cohort effects may be operational, with age, food preference may be for foods with less 'roughage' (dietary fibre), but no less for resistant starch (Fig. 4.1). Thus, food intake may match some biological needs, but not all, and this may change with age and in accordance with food culture and socio-economic status.

The overall *food supply*, type of food production, food technology,

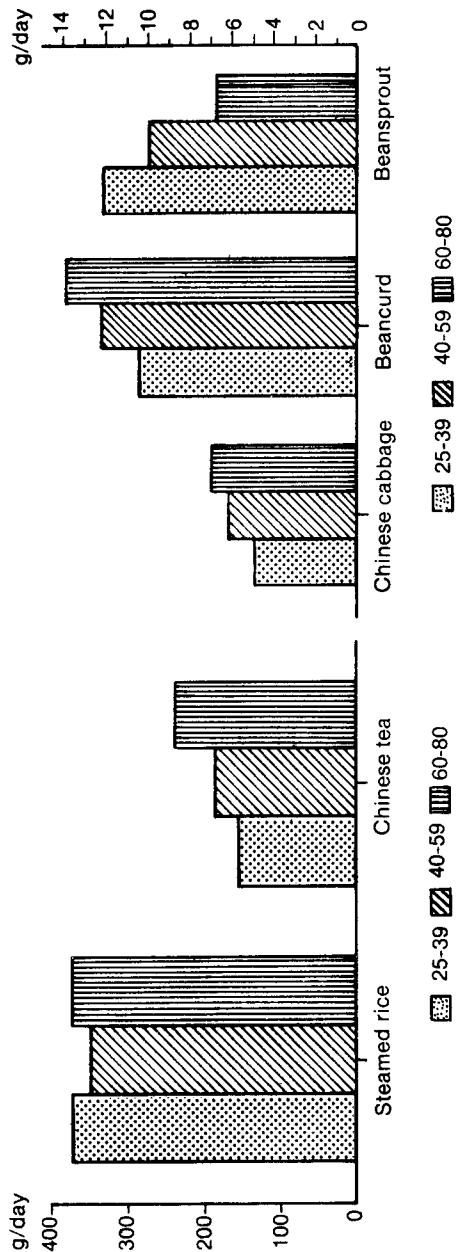


Fig. 4.1 Selected food intakes in Melbourne Chinese (different age groups)

and food storage may peculiarly benefit or handicap elderly people at different stages of development. For example, elderly people may be vulnerable, with seasonal change or famine, in one developing country in a way that is transcended by the curing and salting of food in another developing society, or by the canning and freezing of food in an industrialized society. Opportunity to manage monetary matters, and therefore food resources, can also be critical. These relate to *food security* for the elderly (Arnauld *et al.*, 1990). Once life expectancy increases, *age-related diseases* also tend to increase. These health hazards can have their own impact on nutritional status. For example, the advent of diabetes mellitus, whose prevalence increases with advancing years, can alter nutritional needs, and require dietary modifications which may include restriction in accordance with attendant risk. Wasting diseases such as cardiac cachexia, or cerebrovascular disease with disability that impairs food preparation and the ability to eat, present unique sets of food needs. The *management of disease and disability* in the aged can also contribute its own set of nutritional problems. This is particularly evident in pharmacotherapy with adverse effects of drugs on appetite and taste, and nutrient absorption and handling (Roe, 1984).

International comparisons suggest that health problems in developing countries tend to follow those of developed countries in the course of industrialization (Gopalan, 1992). However, in transition, the problems can be mixed and complex, as evidenced by concomitant abdominal obesity and protein malnutrition or nutritional anaemia. An understanding of these nutritionally-related health problems in the aged in developed countries provides an opportunity to examine future trends in global health problems.

Nature of the Relationship

Nutritional dissimilarity and commonality

It is noteworthy that in developed, transitional, and developing countries, individuals survive to old age, witnessing different nutritional problems and disease patterns. There is therefore a challenge to ensure that, with ever-changing socio-cultural and socio-economic conditions, the fundamental characteristics of food culture, which confer well-being, health, and longevity, are identified and retained (Table 4.3). It is becoming apparent that peoples of all nations with different food cultures may have comparable life expectancy and morbidity rates (Powles, 1992). The challenge is to identify those food factors and patterns in common

Table 4.3 Considerations in the retention of traditional practices, and intakes in developed and developing societies

Developed society		Developing society	
Favourable	Discouraged	Favourable	Discouraged
Live longer	Monoculture	Local food supply	Urbanization
Cultural assertiveness	Rapid change of food technology	Local food technology	Advent of electricity
	Food transport	Oral tradition	Media
	Supermarket	Road in access	Education
		Respect for the elderly	Migration
	Travel		
	Restaurants		

between cultures that confer less morbidity and lower mortality (Wahlqvist *et al.*, 1993). To make this deduction requires an analysis of food intake in terms of overall mathematical descriptors of food patterns, category of food ingested, or the unifying value of a particular component of food, either nutrient or non-nutrient. For example, the extent of food variety may be an index of a favourable food pattern and culture. Fish intake may explain how the apparently disparate food cultures of Scandinavia, the Mediterranean, and Japan, all confer longevity (Briggs and Wahlqvist, 1988). The low intake of saturated fat may be a unifying nutrient indicator of biological advantage with respect to food culture. The class of compounds with weakly oestrogenic properties may be an example of non-nutrients which benefit people in later life and across food cultures (Wilcox *et al.*, 1990; Lee, 1992).

Antecedents of being elderly and the nutrition–health relationship

The present-day elderly in the occident are peculiarly advantaged on the whole, having been provided with social welfare facilities beyond retirement, or the support of younger people, and not being subjected to the economic burden of a large aged population as they move through adulthood. The next generation of elderly in industrialized society may not be so fortunate, but rather may be more akin to the current generation in developing and transitional societies. In other words, industrialized societies may yet have something to learn from what is happening amongst the elderly in developing countries. At the same time, the transfer of food–health knowledge from grandparent (as many as all

foregrandparents) to grandchild has never been as feasible as at present, because of the major gains in life expectancy. Thus, the future generation of elderly may be unusually enriched by such knowledge, depending on the respect accorded to elders.

What constitutes 'life expectancy at birth' is an artificial aggregate of the current experience of performance in different age brackets. Therefore, we may never witness exactly the same antecedents of being elderly as at present, for example, the experience of one or two great depressions and two major wars (if not more local ones). It is difficult to gauge the success of later life, in spite of, or because of, periods of privation in earlier life and, therefore, to assess how much present food-health relationships are operative because of these antecedents. Our presumption is that what operates now amongst survivors into later life can operate again. And this may be a range of eating behaviours or patterns for comparable health (Wahlqvist *et al.*, 1993).

Urbanization is one of the most urgent changes for young and old alike, with its implications for nutrition. The UN and WHO statistical data suggest that mortality is primarily influenced by socio-economic development measures such as urbanization, industrialization, and education, and secondarily by such public health measures as access to safe water, adequate nutrition, and health services (Rogers, 1989). Moreover, in less industrialized countries, urbanization could contribute to improvement in food habits (Dupin, 1974). However, urbanization may also create structural disruption and social disintegration which contribute to a disease-prone environment (Griffin, 1975). These processes may operate in part through dislocation of the food supply. For the rural elderly, especially elderly women, who may be left behind, the urbanization of youth in search of employment, and who otherwise may have supported them, may aggravate their nutrition problems. Nutritional problems of older women in rural homes may need more attention. Sometimes economic benefit to those left behind does accrue from the younger migrant or itinerant member of the family. Collections of letters home, in which cheques have been enclosed, bear testimony to this.

Major differences are emerging between the health patterns of urban and rural areas in the developing world. For example, the prevalence of high blood pressure in both men and women is at least four times as high in the urban as in the rural areas of Ghana (Pobee, 1980). Such phenomena are caused partly by the fact that urban societies tend to perceive the new diet, similar to that of other affluent communities, as a symbol of their newly-acquired status. Where the extended family still exists,

new lifestyles and 'modern' diet may have an impact on the health of elderly people. However, presumptively, the rural elderly may be spared these changes more than their urban counterparts.

Socio-economic development in developing countries is followed by improved health care and better access to modern health technology, and these will promote the decline in mortality rate and increase in life expectancy. The dominant feature of this transition has been the progressive ageing of population. This *demographic transition* is clearly estimated by the population projection. For example, the total population of the countries of South-East Asia Region (SEAR), which stood at nearly 1053 million in 1980, is expected to increase to 1980 million by the year 2050; this represents a two-fold increase. During the same period, the number of the elderly (above 60 years of age) will increase from approximately five per cent to 11.5 per cent of the total population. In absolute terms, there will be a four-fold increase (173 million) in people older than 60 years of age in SEAR countries in the period 1980 to 2050 (Gopalan, 1992). On the other hand, during this time, the percentage of children under four years will decrease.

For developing countries, as in the developed world, the *costs of health care* for the elderly, at risk now—not only of nutritional problems previously expressed in their generational counterparts, when they were younger, but also of various chronic diseases—may be overwhelming. Experience in Japan has shown that the share of Gross National Product (GNP) required for the medical care of the elderly will rise from five per cent in 1986 to over six per cent in 2020, and the share of the national income to support this will climb from 6.3 to 8.7 per cent (Ogawa, 1982). These projections are alarming insofar as the maintenance of the health status and nutritional status of the elderly are concerned.

Even in developed countries, the elderly are vulnerable to undernutrition and specific nutrient deficiencies (Flint and Wahlqvist, 1981). In most cases, the elderly in developing countries will be more exposed to these nutritional problems. The dietaries in developing countries, for example in most Asian countries, are predominantly cereal-based, with relatively low concentrations of proteins, vitamins, and minerals. Thus, the risks of essential nutrient deficiency are extremely high. Nutrition education about nutrient-dense food and the value of food variety ought to minimize the occurrence of nutritionally-related health diseases in later life, but the food supply and its affordability in an urbanizing, mobile, and dislocated society may mitigate the effectiveness of such education. Family and social cohesion, along with de-emphasis on re-

tiement and encouraging the continuation of even a partial livelihood through personal effort, may provide sufficient network and independence to affording a reasonably adequate diet.

Work patterns and nutrition amongst the elderly

Agriculture is a major economic and social activity in developing countries. Various studies show a positive effect of nutritional intervention on agricultural production, especially for activities in which the poor, including the aged poor, are engaged. Among the sugarcane workers in Guatemala, productivity increased with improved nutrition. In Indonesia the productivity of workers who received iron supplements for two months rose to 15–25 per cent (World Development Report, 1990). A study in India showed a significant link between wages and weight-for-height among casual agricultural labourers (Khandker and Shahidur, 1989). Another study revealed that the effect was especially marked in the peak agricultural season, when more energy is required for harvesting (Ferro-Luzzi *et al.*, 1990).

Many studies show a close link between *retirement and poverty* in the aged. With longer life expectancy in women, the likelihood of poverty amongst elderly women is greater than for elderly men; over 50 per cent of aged women in the poverty bracket are widows (Kahne, 1981). Further, the period of retirement lengthens as the population ages (Leeds, 1981). These problems are accentuated by *inflation* which makes it more difficult to meet—even with a lifetime of saving—expenditure needs, including those for foods. In addition, the elderly may be less adaptable insofar as expenditure in relation to food choice is concerned. Poverty in old age may also be a function of low socio-economic status prior to retirement, depressed social status of the retired, or the relatively low level of state benefits (Walker, 1981). Whatever the cause, poverty affects food intake, nutritional status, and health.

Non-nutritional Factors Affecting Nutritional Status and Health of the Aged

Various non-nutritional factors require special consideration in the aged. These may, on the one hand, affect food habits, food practices, and therefore intake in the elderly, and on the other hand affect nutritional needs. Of particular importance are: cultural factors which include food and health beliefs; social and psychological factors; economic factors; and physical activity and substance abuse.

Cultural factors

Food habits are based in culture, and are more likely to be adhered to by the older members of the society. Again, traditional values are more widespread in developing than in industrialized countries, and within a population the oldest sector is the strongest basis of these values (Solomons, 1992). The extent to which grandchildren and great-grandchildren inherit the food beliefs and practices from their forebears will influence their ultimate nutritional status. In an extended family engaging in subsistence agriculture, the elderly often continue to work physically with favourable benefits for increased energy intake, with less obesity than might otherwise obtain, and with retention of lean mass (Wahlqvist and Kouris, 1990).

Social and psychological factors

Research has demonstrated the close links between social and psychological factors and dietary intake in the elderly. Sub-groups of an elderly population in Adelaide, Australia, identified as being at a higher risk of poor dietary intake were: men living alone, low socio-economic status groups, and the socially isolated or physically inactive (Horwath, 1983). Some of these sub-groups will equate with those in developing countries (Table 4.4). Lifestyle, as measured in terms of participation in a variety of social and physical activities, was a good predictor of dietary intake, a varied lifestyle being associated with a varied diet. Prospective studies

Table 4.4 Factors contributing to protein-energy malnutrition in the elderly

Sociological factors	Socio-economic status Housing Residency Marital status/children Erroneous belief and food faddism Season
Psychological factors	Ethnic/cultural factors Cognitive functioning Sense of control and health-related behaviour Hypochondriasis and perceived intolerance Food preference
Physiological factors	Health Motor performance and mobility Senses Dental status Chronic disease Drugs

showed that increased social activity and/or wider social network were associated with a lower mortality rate in the elderly (Olsen *et al.*, 1991; Silverstein and Bengtson, 1991). Much social activity revolves around food, which thereby assumes an important health-promoting function, aside from the provision of nutrients. Loss of spouse and bereavement also have significant effects on nutritional status and the immune system in the elderly (Davies, 1990; Chandra, 1990, 1990a).

In most developing countries, social and cultural patterns continue to protect the elderly from isolation in society. Self-care by older people themselves, and informal care by family and neighbours, can operate most effectively. WHO studies in the Western Pacific reveal that a large proportion of older persons have their needs met by their children or next of kin (Andrews, 1986). In each of these situations, food and nutrition is one of the vehicles for health benefit.

Economic factors

As discussed earlier, poverty in developing countries affects the elderly and their food intake. It operates in various ways. Restricted income limits education and health services as determinants of health status. Poverty-induced rural-urban migration may deprive elderly people of immediate support from the younger generation, notwithstanding the potential for income generation from the remote family (Andrews, 1986). Dependence on those who are still productive signifies vulnerability, however. The aged, with a limited local food supply and reduced contact, are less able to pass on their food knowledge and skill.

It is possible that the effects of poverty could be limited if there were an adaptive response to limited energy intake. It does so, in relation to seasonal fluctuations in energy balance, where adult men and women are in negative energy balance during the hungry season and in positive balance during the post-harvest season. There appear to be biological-genetic, metabolic, and behavioural mechanisms for adaptation to low energy intakes (Ferro-Luzzi, 1990). These adaptive responses are directed towards energy conservation and eventually to the restoration of energy balance. Regrettably, there is little information on this adaptive response in the elderly.

Physical activity

The role of physical activity in the maintenance of preferred nutritional status is crucial, and this is unlikely to be any more or less important in relation to development. This is principally because the decline in physi-

cal activity (Astrand, 1968), energy intake, and lean mass is more or less in parallel with advancing years (Smith *et al.*, 1988; Steen, 1988). However, it must be acknowledged that no good cross-sectional or longitudinal data on this matter exist for elderly people in developing countries. Not only should the maintenance of physical activity allow for a better body composition (more lean, less fat, more bone), but also enough energy intake from food should provide for an adequate nutrient and non-nutrient intake. Of the physical activities that can be continued into later life, walking must be one of the most accessible, but it is also true that cultural preferences for other forms of physical activity, for instance, Tai Chi amongst the Chinese, are evident.

Substance abuse

Smoking (Harris *et al.*, 1988), alcohol (Iber, 1990), medication (Roe, 1983), herbal and nutrient supplements (Wang and Ren, 1988) are among the common lifestyle factors associated with substance abuse.

The smoking habit varies greatly by gender and culture, irrespective of development (Wahlqvist, 1982). Alcohol is uncommonly used in less affluent traditional cultures, especially by women (Wahlqvist *et al.* 1993), although peri-Mediterranean communities are a typical case in point (Kouris *et al.*, 1991). Again, whether herbal or traditional remedies may be used extensively, and with a heritage to draw on, economics and pharmaceutical availability and lack of pressure may limit Western medication and nutrient supplements. Whether, and how well, these abuses are managed, or deleterious consequences avoided, will depend in part on physiological and nutritional reserve capacities.

Studying the Relationship

The study of nutrition–health relationships in the elderly in the developing world is challenging because of their socio-cultural variation. The Rapid Assessment Procedures (RAP) are a rapid ethnographic method for the assessment of nutrition and health status, with less likelihood of missing the unfamiliar or familiar (Scrimshaw and Hutardo, 1987; Messer, 1991). They allow a better understanding of socio-cultural factors influencing nutrition and health. The use of RAP to study elderly populations in the developing world is an approach where either focus group discussion, or flexible interview and observation, can allow assessment of the impact of both social and nutritional factors on the health of the target group. The application of Rapid Assessment Procedures is

inexpensive and effective in studying culturally-diversified, elderly populations (Wahlqvist *et al.*, 1989).

In the case where a standardized study protocol may be difficult to obtain in cross-cultural studies, RAP proves useful in identifying commonality in socio-anthropological determinants of food habits and other lifestyle factors. An example is the elderly populations of similar socio-economic position in the Western Pacific (Andrews *et al.*, 1986), where differences in culture and health status were considered. In the IUNS study on *Food habits in later life* (Wahlqvist *et al.*, 1993), a spectrum of elderly populations differing socio-economically as well as culturally was studied. This latter study can take into account the potential impact of socio-economic development on the nutritional status and health in the elderly in various parts of the world, using a multivariate approach.

LESSONS FROM AROUND THE WORLD

The Western Pacific

One of the few studies of a representative sample of elderly people is *Ageing in the Western Pacific: A four-country study*, which was conducted by the World Health Organization Regional Office for the Western Pacific (Andrews *et al.*, 1986). Participating countries were Fiji, the Republic of Korea, Malaysia, and the Philippines. Data are available on the basic demography, health and functional ability, mental health, use of health services, living conditions, way of life, but not on food intake. Many of the variables can be compared with other studies which have subsequently been conducted. These data provided a basic understanding of differences across various developing countries, and highlighted the extent to which socio-cultural factors may affect food habits and practices, food beliefs, nutritional status, and hence the health status of the elderly. For example, family structure and loneliness are explored. How these factors might influence the nutritional status of the elderly in the developing world has yet to be addressed. In a developed society, Horwath (1989) observed that, amongst social factors, living alone had the greatest negative impact on dietary habits and estimated nutrient intake of elderly men.

It is also interesting that in the Western Pacific study, about one-quarter of the total aged population engaged in full- or part-time work, with higher proportions being evident among men and rural dwellers. Those

elderly who continue to work are likely to benefit from food intake to match the energy expenditure.

Meso-America

In Central America, gerontological research has begun to emerge in two countries: Guatemala and Costa Rica. It is a joint initiative between the Centre for Studies of Sensory Impairment, Ageing, and Metabolism (CeSSIAM) in Guatemala and the Institute for Health Research (INISA) in Costa Rica. Some similarities exist between the two Republics. Both are Spanish-speaking countries; both have a largely agrarian society; the majority of the populations of the two nations live on highland plains; and coffee export is a major economic activity. In many ways, however, these two nations could not be more different and divergent. The racial make-up of Costa Rica is largely uniform (*ladinos*). Guatemala, by contrast, has 65 per cent indigenous population with the remaining 35 per cent being *ladinos*. Adult literacy is only 42.4 per cent, whereas Costa Ricans are virtually 100 per cent literate. In terms of health status, there is also a wide gap between the two nations: the infant mortality rate in Guatemala is 71.4 per 1000, whereas in Costa Rica it is 15 per 1000. Guatemala is classified as a less developed country, whereas Costa Rica is a nation in transition to development.

It has been reported that: (1) micronutrient deficiency states exist commonly amongst the elderly of Guatemala, and (2) in terms of body composition, both underweight (deficiency) and overweight/obesity (excess) may be observed in the elderly population of Central America. The state of nutritional excess appears to be more common in Costa Rica than Guatemala (Solomons *et al.*, 1993).

International Union of Nutritional Sciences (IUNS)

Most studies on the elderly describe the health and functional ability of the elderly and the use of health services. Little information is available on the food habits of elderly people in different countries and cultures and on the impact of presumed lifelong and current eating habits on health in later life. The International Union of Nutritional Sciences (IUNS) committee on Nutrition and Ageing, in conjunction with the World Health Organization (WHO) Global Program for the Elderly, has launched on a programme designed to test key hypotheses in relation to

food habits and health status in the elderly in developed and developing countries. The participating centres are:

1. *Australia*
 Aboriginal Australians in Junjuwa, Western Australia aged 55 years and above.
 Anglo-Celtic Melbournians (ACA), aged 70 years and above.
 Greeks in Melbourne (GRK-M), aged 70 years and above.
2. *China*
 Chinese in Rural Tianjin (CTJ-R), aged 70 years and above.
 Chinese in Urban Tianjin (CTJ-U), aged 70 years and above.
 Chinese in Beijing (CBJ), aged 55 years and above.
3. *Greece*
 Greeks in Spata (GRK-S), aged 70 years and above.
4. *Japan*
 Japanese in four districts of Japan, aged 70 years and above.
5. *Philippines*
 Filipinos in Manila (FIL), aged 55 years and above.
6. *Sweden*
 Swedes in Gothenburg (SW), aged 70 years and above.

This study aims to describe present and past food habits, lifestyles, and health status among the aged in developed and developing countries, and to determine to what extent food habits and lifestyle variables, namely, social activity, social network, exercise, activities of daily living, substance abuse, and mental function and well-being may predict the self-perceived and/or medically-defined health status of the elderly. The data provide indicators for further research and evaluation of food-health relationships in developing countries.

Definition of the 'elderly'

Chronological age is the most usual basis of the definition. Geriatric medicine now partitions the young old from the very old with a cut-off point which is progressing with time towards a later and later age. For example, in developed countries, the cut-off point is moving from 70 to 80 years, and even 85 years. In developing countries, the problems often remain that the cohort of the elderly who are over 70 years is small because of low life expectancy. For this reason, studies on health in the aged have been inclined to consider the upper decile or quintile of the representation graph of the aged. This may mean including people as young as 45 or 50. A limitation of this approach is ascertaining the base

of the population pyramid. For example, the proportion of people who are elderly can vary from society to society, depending on the birth rate and mortality rate amongst the young. An alternative for developing countries would be to consider life expectancy at birth, and examine those who had reached an age approximating at least a certain number of years into this life expectancy.

A separate issue is the question of identifying the aged on the basis of their biology as distinct from their chronology. But dependable markers of *biological age* are few, and there is insufficient agreement on how these should be synthesized to score biological age (Steen, 1993). Particular examples of biological age include voice analysis (Linville and Fisher, 1985), skin change in non-ultraviolet exposed areas (Holman, 1984), and steroid hormone profile (Walford, 1986).

It also needs to be said that *social age* has great significance, meriting documentation in studies of nutrition–health in later life. An example of the determination of women's age by society comes from a consideration of Chinese women who, after menopause, wear a different attire, namely, trouser-type garments rather than the customary dress. Thus, in a study of the aged and their food habits, it may be necessary to identify societal markers of age. Again, the number of generations that have already succeeded one—children, grandchildren, great-grandchildren—creates a common definition of age. Take an individual who has a child early in life—this young parent is more likely to be regarded as elderly than if he were childless. The designation of 'grandparent' itself connotes aged!

Methodology

Low literacy levels limit the use of self-administered questionnaires. The interviewer and other observers therefore play an important role in obtaining valid data. Preparative work using RAP has proven valuable in becoming familiar with a community, in minimizing the impact of preconceived notions, and ensuring that key points are not missed or neglected (Scrimshaw and Hutardo, 1987).

Illustrative data

Cross-cultural comparisons suggest distinct differences between study centres in terms of *food intake*, self-assessment of health, and body mass index. Legume intake was 10 g per day in old-old men (80 years and above) in rural Tianjin, and 182 g per day in their urban counterparts (Fig. 4.2). Similar variation in daily food intake has been observed in

rural-urban comparisons. Further, cross-cultural differences in intakes of certain food products were observed. For example, Beijing Chinese young-old men (those between 55 and 70 years) consumed about 10 g of milk and milk products per day and, by contrast, the Swedish young-old men (those aged between 70 and 79 years) consumed over 400 g per day (Fig. 4.3).

Self assessment of *health* also showed differences amongst study centres. Most of the elderly Greeks in Melbourne claimed to be in good health (56 per cent in young-old women to 76 per cent in young-old men), while a relatively small percentage of the elderly rural Tianjin Chinese made the same claim (7.6 per cent in young-old women to 20 per cent in very old men) (Fig. 4.4). On the other hand, if we look at comparisons on *body mass index* (BMI), elderly Greeks in Melbourne have the highest BMI (27 in old-old women to 31 in young-old men), while the elderly rural Tianjin Chinese have the lowest BMI (18 in old old men to 21 in young-old women) (Fig. 4.5).

CONCLUSIONS AND DIRECTIONS FOR THE FUTURE

Research on nutrition and health in old age has so far received low priority whilst the focus has been on problems of nutrition in childhood. Increasing longevity now establishes the need for more attention to problems of nutrition and health in the elderly. The return on *future research* into the changing nutrition-health relationships in later life with development will be greater if the likely problems are specifically addressed. For example, dependence on staples and a restrictive range of food; micronutrient deficiencies such as those of iron and zinc; osteoporosis (not only because of fracture risk, but also because of bone nutrient storage); immunodeficiency which may increase the prevalence of infectious and neoplastic diseases; abdominal obesity leading to diabetes and macrovascular disease. Such research needs to be under way before a *nutrition policy for the elderly* is settled, unless the limitations spelt out in the policy, and research is promoted as part of the policy.

There is a need to encourage growth in *geriatric nutrition as a subject for medical education* at the undergraduate and postgraduate levels. This will foster rapport between the elderly and their health care providers in a way that will be conducive to competent preventive and health care.

In *community health programmes*, community health workers will need to be equipped to advise and educate the population at large on

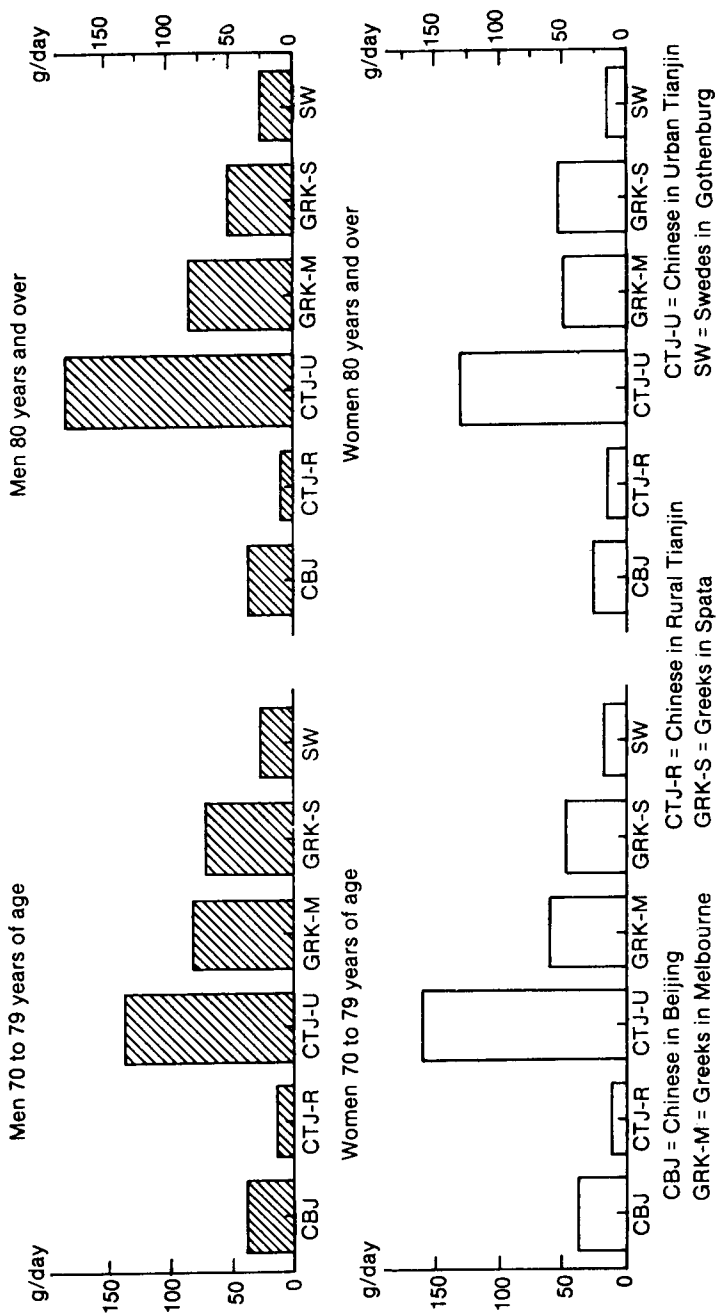


Fig. 4.2. Legume intake (g/day) by IUNS study centres (by age group, by gender)

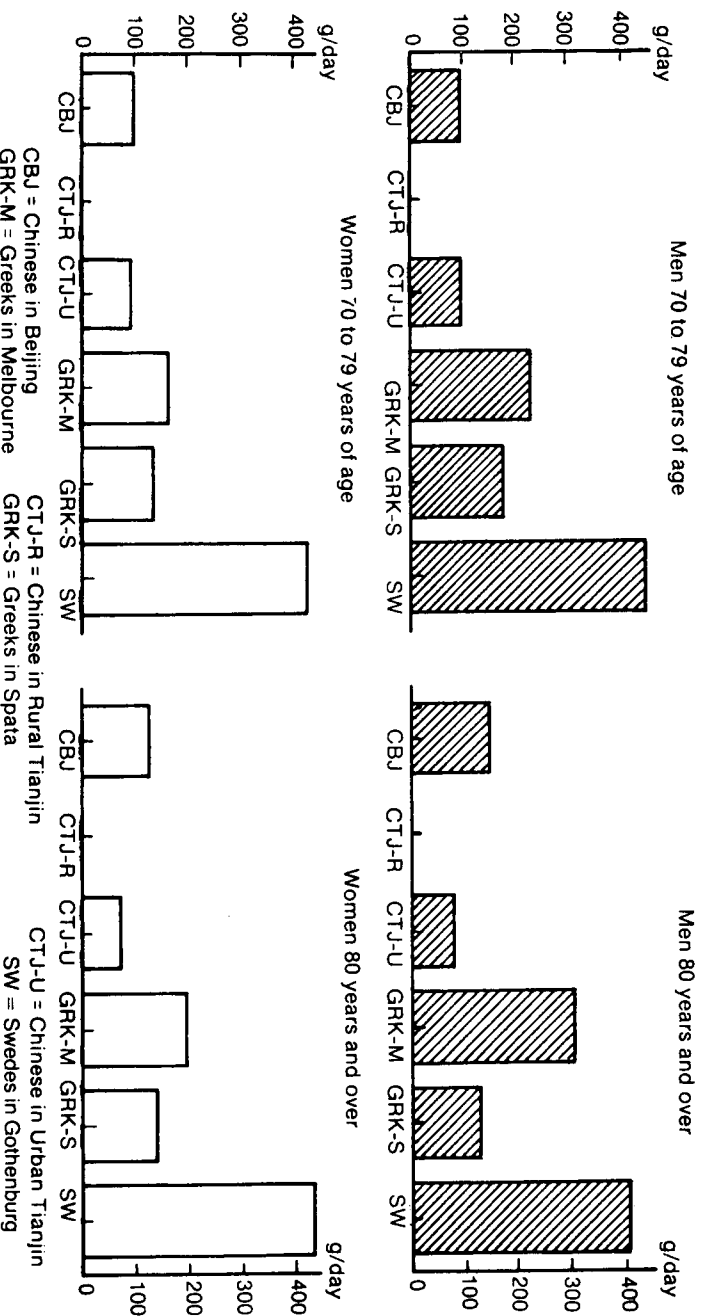


Fig. 4.3. Milk and dairy product intake (g/day) by IUNS study centres (by age group, by gender)

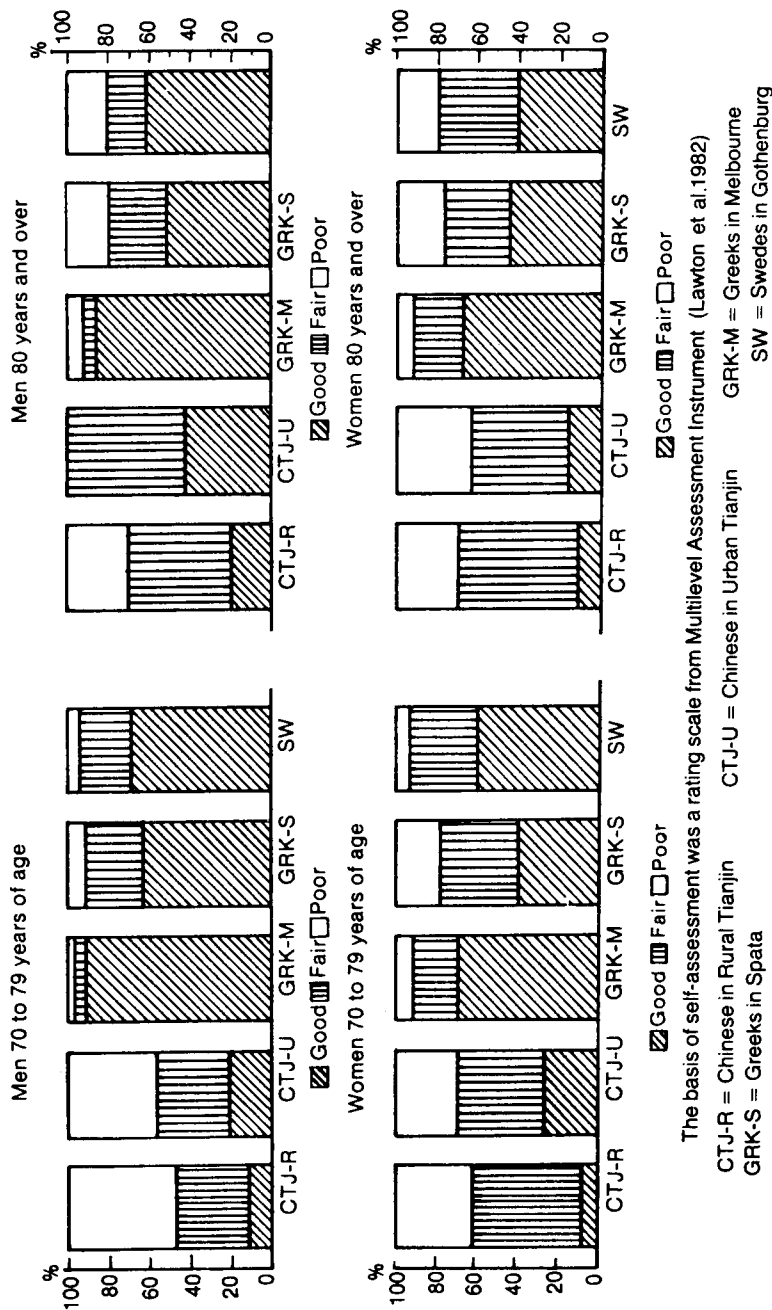


Fig. 4.4. Self-assessment of health by IUNS study centres (by age group, by gender)

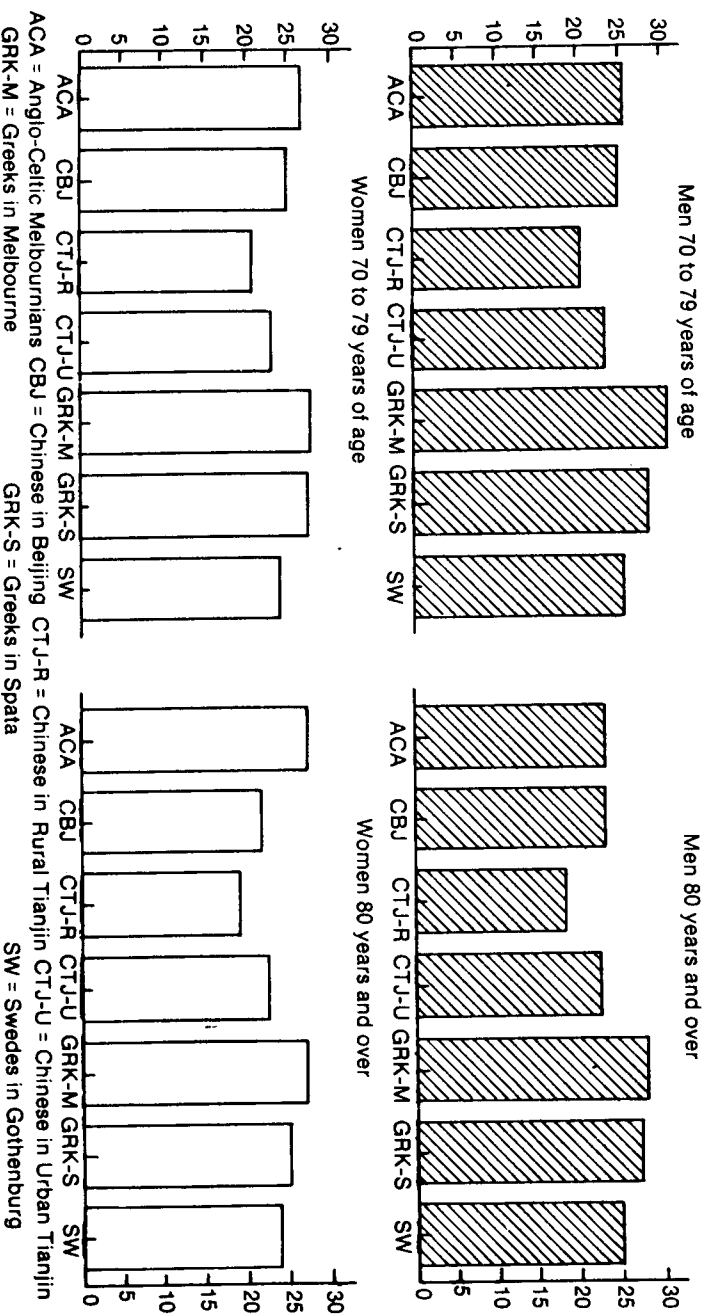


Fig. 4.5. Body mass index by IUNS study centres (by age group, by gender)

culturally sensitive and economically-viable healthy eating and related physical activities. Therapeutic nutrition and physical activity programmes may be preferred, or at least be treated as a prelude and adjunct to pharmacotherapy. Early detection of those at high risk in communities of older people through documentation of their nutritional status will facilitate prevention and correction of nutritionally-related health problems. For this purpose, instruments to assess food-health relationships, such as those of the IUNS, may need to be acquired at the local level by health workers. Such efforts will increase the prospects of the aged as valued members of their community and their nation.

REFERENCES

- Andrews, G. R., Esterman, A. J., Braunac-Mayer, A. J., and Rungie, C. M. (1986). Ageing in the Western Pacific. A four-country study. Western Pacific Reports and Studies No. 1, World Health Organization, Regional Office for the Western Pacific, Manila.
- Arnauld, J., Alarcon, J. A., and Immink, M. D. C. (1990). Food security and food and nutrition surveillance in Central America: The need for functional approaches. *Food and Nutrition Bulletin*, 12(1), 26-33.
- Astrand, P. O. (1968). Physical performance as a function of age. *Journal of the American Medical Association*, 205, 729-33.
- Bjorntorp, P. (1990). Abdominal obesity and risk. *Clinical and Experimental Hyper-Theory and Practice*, A12(5), 783-94.
- Briggs, D. and Wahlqvist, M. L. (eds). (1988). *Food Facts. The Complete No-Fads-Plain-Facts Guide to Healthy Eating*. Melbourne, Penguin Books Australia Ltd, 22.
- Bucht, G. and Sandman, P. O. (1990). Nutritional aspects of dementia, especially Alzheimer's disease. *Age and Ageing*, 19, S32-36.
- Chandra, R. K. (1990). The relation between immunology, nutrition, and disease in elderly people. *Age and Ageing*, 19, S25-31.
- Chandra, R. K. (1990a). Nutrition is an important determinant of immunity in old age. In: Prinsley, D. M. and Sanstead, H. H. (eds). *Nutrition and Aging: Progress in Clinical Biological Research*, Alan R. Liss Inc, New York, 326, 321-34.
- Chandra, R. K., Joshi, P., Au, B., Woodford, G., and Chandra, S. (1982). Nutrition and immunocompetence of the elderly: Effect of short-term nutritional supplementation on cell-mediated immunity and lymphocyte subsets. *Nutrition Research*, 2, 223-32.
- Davidson, M. B. (1979). The effect of aging on carbohydrate metabolism: A review of the English literature and a practical approach to the diagnosis of diabetes mellitus in the elderly. *Metabolism*, 28(6), 688-705.
- Davies, L. (1990). Socioeconomic, psychological and educational aspects of nutrition in old age. In: Steen B. (ed). *Nutrition and Aging. Age and Ageing*, 19(Supplement No. 1), S37-42.

- Dontas, A. S., Marketos, S. G., and Papanayiotou, P. (1972). Mechanisms of renal tubular defects in old age. *Postgraduate Medical Journal*, **48**, 295.
- Duchateau, J., Delepesse, G., Vrijens, R., and Collet, H. (1981). Beneficial effects of oral zinc supplementation on the immune response of old people. *The American Journal of Medicine*, **70**, 1001-4.
- Dupin, H. (1974). Factors influencing eating patterns in the developing world. *Impact of Science on Society*, **24**(2), 145-50.
- Duthie, H. L., and Bennett, R. C. (1963). The relation of sensation in the anal canal to the functional anal sphincter: A possible factor in anal incontinence. *Gut*, **4**, 179-82.
- Ferro-Luzzi, A., Scaccini, C., Taffese, S., Abera, B., and Demeke, T. (1990). Seasonal energy deficiency in Ethiopian rural women. *European Journal of Clinical Nutrition*, **44**(Suppl 1), 7-18.
- Flint, D. M., Wahlqvist, M. L., Smith, T. J., and Parish, A. E. (1981). Zinc and protein status in the elderly. *Journal of Human Nutrition*, **35**, 287-95.
- Friedman, M., Green, M. F., and Sharland, E. (1969). Assessment of hypothalamic pituitary adrenal function in the geriatric age group. *Journal of Gerontology* **24**(9), 292-6.
- Gopalan, C. (1992). *Nutrition in Developmental Transition in South-East Asia*, World Health Organization, Regional Office for South-East Asia, New Delhi.
- Griffin, R. M. (1975). Social structure and urban disease: Need for a broader base for health planning and research. *Urban and Social Change Review*, **8**(1), 15-20.
- Hage, B. H. H. (1992). Food habits and cardiovascular health status in adult Melbourne Chinese. Thesis, Department of Medicine, Monash University.
- Harris, T., Cook, E. F., Garrison, R., Higgins, M., Kannel, W., and Goldman, L. (1988). Body mass index and mortality among nonsmoking older persons. The Framingham heart study. *Journal of the American Medical Association*, **259**, 1520-4.
- Herbert, V. (1990). Nutritional anaemias in the elderly. In: Prinsley, D. M. and Sanstead, H. H. (eds). *Nutrition and Aging: Progress in Clinical Biological Research*, Alan R. Liss, New York, **326**, 203-27.
- Holman, C. D. J., Armstrong, B. K., Evans, P. R., Lumsden, G. J., Dallimore, K. J., Meehan, C. J., Beagley, J., and Gibson, I. M. (1984). Relationship of solar keratosis and history of skin cancer to objective measures of actinic skin damage. *British Journal of Dermatology*, **110**, 129-38.
- Horwath, C. C. (1989). Socio-economic and behavioral effects of the dietary habits of elderly people. *International Journal of Biosocial and Medical Research*, **11**(1), 15-30.
- Iber, F. L. (1990). Alcoholism and associated malnutrition in the elderly. In: Prinsley, D. M. and Sanstead, H. H. (eds). *Nutrition and Aging: Progress in Clinical and Biological Research*, Alan R. Liss Inc, New York, **326**, 157-73.
- James, W. P. T., Ferro-Luzzi, A., and Waterlow, J. C. (1988). Definition of chronic energy deficiency in adults. Report of a Working Party of the International Dietary Energy Consultative Group. *European Journal of Clinical Nutrition*, **42**, 969-81.
- Kahne, H. (1981). Women and social security: Social policy adjusts to social change. *International Journal of Aging and Human Development*, **13**(3), 195-208.
- Khandker, Shahibur R. (1989). Improving rural wages in India. Policy, Planning, and

- Research Working Paper 276. World Bank, Population and Human Resources Department, Washington, D.C., USA.
- Kouris A., Wahlqvist, M. L., Trichopoulos, A., and Polychronopoulos, E. (1991). Use of combined methodologies in assessing food beliefs and habits of elderly Greeks in Greece. *Food and Nutrition Bulletin*, 13, 139-44.
- Lawton, M. P., Moss M., Fulcomer, M., Kleban, M. H. (1982). A research and service oriented multilevel assessment instrument, *Journal of Gerontology*, 37, 91-9.
- Lee, H. P. (1992). Diet and cancer—Some results from Singapore. *Asia Pacific Journal of Clinical Nutrition*, 1, 43-6.
- Leeds, M. (1981). Inflation and the elderly: A housing perspective. *Annals of the American Academy of Political and Social Science*, 456, 60-9.
- Lindeman, R. D., Tobin, J., and Shock, N. W. (1985). Longitudinal studies on the rate of decline in renal function with age. *Journal of the American Geriatrics Society*, 33, 278-85.
- Linville, S. E. and Fisher, H. B. (1985). Acoustic characteristics of women's voices with advancing age. *Journal of Gerontology*, 40(3), 324-30.
- Messer, E. (1991). International Conference on Rapid Assessment Methodologies for Planning and Evaluation of Health Related Programmes: Interpretative summary. *Food and Nutrition Bulletin*, 13(4), 287-92.
- Meydani, S. N., Barklund, M. P., Liu, S., Meydani, M., Miller, R. A., Cannon, J. G., Morrow, F. D., Rocklin, R., and Blumberg, J. B. (1990). Vitamin E supplementation enhances cell-mediated immunity in healthy elderly subjects. *American Journal of Clinical Nutrition*, 52, 557-63.
- Ogawa, Naohiro *et al.* (1982). Japan's limits to growth and welfare. *Population Ageing in Japan: Problems and Policy Issues in 21st Century*. Tokyo, Nihon University.
- Olsen, R. B., Olsen, J., Gunner-Svensson, F., and Waldstrom, B. (1991). Social network and longevity. A 14-year follow-up study among elderly in Denmark. *Social Science and Medicine*, 33(10), 1189-95.
- Pobee, J. O. M. (1980). The status of cardiovascular disease in the setting of disease of environmental sanitation and hygiene and malnutrition: The West African (Ghana) experience. In: Lauer, R. M. and Shekelle, R. B. (eds). *Childhood Prevention of Atherosclerosis and Hypertension*, New York, Raven Press.
- Powles, J. (1992). Changes in disease patterns and related social trends. *Asia Pacific Journal of Clinical Nutrition*.
- Riggs, B. L. and Melton III, L. J. (1986). Involutional osteoporosis. *The New England Journal of Medicine*, 314(26), 1676-86.
- Roe, D. A. (ed). (1983). *Geriatric Nutrition*. Prentice-Hall Inc, New Jersey, 155-73.
- Roe, D. A. (1984). Nutrient and drug interactions. *Nutrition Reviews*, 42(4), 141-54.
- Rogers, R. G. (1989). Life expectancy in less developed countries: Socio-economic development or public health? *Journal of Biosocial Science*, 21(2), 245-52.
- Rolls, B. J. and Phillips, P. A. (1990). Aging and disturbances of thirst and fluid balance. *Nutrition Review*, 48(3), 137-44.
- Saltzman, R. L. and Peterson, P. K. (1987). Immunodeficiency of the elderly. *Reviews of Infectious Diseases*, 9(6), 1127-39.
- Sandman, P. O., Adolfsson, R., Nygren, C., Hallmans, G., and Winblad, B. (1987). Nutritional status and dietary intake in institutionalized patients with

- Alzheimer's disease and multiinfarct dementia. *Journal of the American Geriatrics Society*, 35, 31.
- Scrimshaw, S. C. M. and Hutardo, E. (1987). Rapid assessment procedures for nutrition and primary health care: Anthropological approaches to improving programme effectiveness. UCLA Latin American Center, Los Angeles, California, USA.
- Shephard, R. J. (1986). Nutrition and the physiology of aging. In: Young, E. A (ed). *Contemporary Issues in Clinical Nutrition: Nutrition, Aging, and Health*, 1-23, Alan R. Liss Inc, New York.
- Silverstein, M. and Bengtson, V. L. (1991). Do close parent-child relations reduce the mortality risk of older parents? *Journal of Health and Social Behaviour*, 32(4), 382-95.
- Smith, E. L., Smith, P. E., and Gilligan, C. (1988). Diet, exercise, and chronic disease patterns in older adults. *Nutrition Reviews*, 46(2), 52-61.
- Solomons, N. W. (1992). Nutrition and aging: Potentials and problems for research in developing countries. *Nutrition Reviews*, 50(8), 1-8.
- Solomons, N. W., Lacle, A., Mazariegos, M., and Mendoza, I. (1993). Spontaneous gerontological research initiatives in Central America. In: Wahlqvist, M. L., Davies, L., Hsu-Hage, B., Kouris-Blazos, A., Scrimshaw, N., Steen, B., and van Staveren, W. (eds). *Food Habits in Later Life: Cross-Cultural Approaches*. United Nations University Press.
- Steen, B. (1988). Body composition and aging. *Nutrition Reviews*, 46(2), 45-51.
- Steen, B. (1993). Blood pressure, biochemical analyses and cutaneous microtopography. In: Wahlqvist, M. L., Davies, L., Hsu-Hage, B., Kouris-Blazos, A., Scrimshaw, N., Steen, B., and van Staveren, W. (eds). *Food Habits in Later Life: Cross-Cultural Approaches*. United Nations University Press.
- Thompson, E. N., and William, R. (1965). Effect of age on liver function with particular reference to bromsulphalein excretion. *Gut*, 6, 266-9.
- Wahlqvist, M. L. (1982). Social toxicants and nutritional status. In: Jelliffe, E. F. P. and Jelliffe, D. B. *Adverse Effects of Foods*. New York, Plenum Press, 227-38.
- Wahlqvist, M. L., Davies, L., Hsu-Hage, B. H-H., Kouris-Blazos, A., Scrimshaw, N., Steen, B., van Staveren, W. (eds). (1993). *Food Habits in Later Life: Cross-Cultural Approaches*. United Nations University Press.
- Wahlqvist, M. L., and Kouris, A. (1990). Trans-cultural aspects of nutrition in old age. In: Steen, B. (ed). *Nutrition and Aging. Age and Ageing*, 19(supplement No. 1), S43-52.
- Wahlqvist, M. L., Kouris, A., Gracey, M., and Sullivan, H. (1989). Rapid assessment procedures and a study of the food habits and health of elderly aboriginal Australians: Junjuwa community. In: Kim, W. Y., Lee, Y. C., Lee, K. Y., J. S. J., Kim, S. H. (eds). *Proceedings of the 14th International Congress of Nutrition*, vol. II, 231-2.
- Wahlqvist, M. L., Lo, C. S., and Myers, K. (1989). Food variety is protective against macrovascular disease in type 2 diabetes. *Journal of the American College of Nutrition*, 8(6), 515-23.
- Walford R. (1986). *The 120 Year Diet: How to Double your Vital Years*, New York, Simon and Schuster.
- Wang, Z. G. and Ren, J. (1988). Pharmacology and toxicology of traditional Chinese

- medicines—A historical perspective. In: McLean, A. J. and Wahlqvist, M. L. (eds). *Current Problems in Nutrition Pharmacology and Toxicology*, London, John Libbey, 44–9.
- Walker, A. (1981). Towards a political economy of old age. *Ageing and Society*, 1(Part 1), 73–94.
- Webster, S. G. P. (1980). Gastrointestinal function and absorption of nutrients. In: Exton-Smith, A. N., Caird, F. I. (eds). *Metabolic and Nutritional Disorders in the Elderly*. Bristol, John Wright, 86–9.
- Wilcox, G., Wahlqvist, M. L., Burger, H., and Medley, G. (1990). Oestrogenic effects of plant food in postmenopausal women. *British Medical Journal*, 301, 905–6.
- World Development Report. (1990). *Poverty*. Oxford, Oxford University Press.
- World Health Organization. (1989). *Program for Research on Ageing: Executive Summary*, WHO, Geneva.
- World Health Organization. (1990). *Diet, Nutrition, and the Prevention of Chronic Disease*. Report of a WHO Study Group, WHO, Geneva.

Nutrition in the Nineties: Policy Issues

Edited by

MARGARET R. BISWAS
MAMDOUH GABR

DELHI

OXFORD UNIVERSITY PRESS

BOMBAY CALCUTTA MADRAS

1994

Oxford University Press, Walton Street, Oxford OX2 6DP

*Oxford New York Toronto
Delhi Bombay Calcutta Madras Karachi
Kuala Lumpur Singapore Hong Kong Tokyo
Nairobi Dar es Salaam Cape Town
Melbourne Auckland Madrid*

*and associates in
Berlin Ibadan*

First published 1994

© Oxford University Press 1994

ISBN 0 19 563393 8

Printed in India

Typeset by Vibrant, Rohini, Delhi 110085

Printed at Crescent Printing Works Pvt. Ltd., New Delhi 110001

*Published by Neil O'Brien, Oxford University Press
YMCA Library Building, Jai Singh Road, New Delhi 110001*