

1 Nutrition: does it matter?

Summary

Food has functions other than the provision of nutrients; social and psychological roles are especially important. The provision of food, whether plant or animal, must not so adversely affect the environment that man's ultimate well-being is in jeopardy.

Although life expectancy has increased in Australia and is greater than in many countries, there is more to gain. Many still die prematurely. Chronic ill health is often a problem and not reflected in life expectancy. The chief nutritionally related problems of Australia are obesity, diseases related to hardening of the arteries (such as heart attacks), large bowel cancer, alcohol abuse and dental decay. These can be regarded as problems of affluence, but certain groups are at risk from under-nutrition in Australia: Aboriginals, the elderly, alcohol abusers, the unemployed and other socio-economically disadvantaged persons.

Food has several functions

The production, collection, storage and use of food is basic to man's survival and forms an integral part of his culture. Because much ritual and social intercourse had grown up around food, it is not possible to consider it simply as a source of nutrients. Australian cultural diversity—Aboriginal, European, Asian and Middle Eastern—adds to the complex social functions of food.

Ecology: the study of biology that relates a living organism to its environment is relevant to the study of the food intake of that organism, in this case man.

Nutritional ecology*

Man is part of an ecosystem and the extent to which he modifies nature by way of deforestation for agriculture or through domestication of selected animals for food may ultimately affect his survival. For example, much desert is man-made. The extent to which limited energy and other resources are used in food production is likely to assume more importance with time.

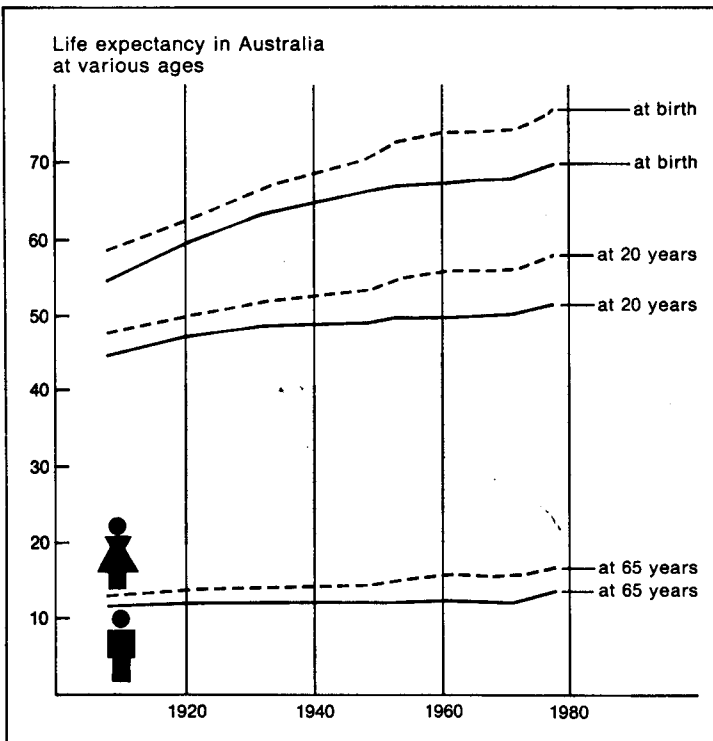
Since pressures on the world food supply come from population growth and from over-consumption, it is important to understand the determinants of population growth and over-consumption.

Food, nutrition and health

Health is dependent on correct nutrition. Health is difficult to define. The World Health Organization (WHO) defined it in 1947 as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'. It is difficult to measure well-being and so most assessments of health are the negative ones of disease and death.

Life expectancy has increased progressively in Australia so we must be doing something right. However, Australian life expectancies are lower than those in many other industrialized and European nations (figure 1.2). Clearly there is more to gain. An examination of causes of death in Australia indicates that most are attributable to diseases related to hardening of the arteries,* especially heart attacks and strokes, and to cancers,* especially of the lung, breast and digestive tract. A group of causes of death can be related to alcohol abuse:* motor vehicle accidents, cirrhosis of the liver* and 'alcoholism' (figure 1.3). In all of these deaths, nutritional factors may play a role. Obesity* does not feature as a cause of death, although it is known that the obese die prematurely. But they do so for a variety of reasons including heart disease, cancer and accidents.

The number of ways in which food and beverage consumption might contribute to the principal health problems of Australian society are shown in table 1.1.



Atherosclerotic vascular disease: this is the disorder usually referred to as 'hardening of the arteries'.

The uncontrolled proliferation of body cells constitutes a 'neoplasm' which may be relatively benign or malignant. Malignant neoplasms are commonly called 'cancers'.

Alcohol abuse and alcoholism: all who abuse alcohol are not necessarily alcoholics. An alcoholic is one who is physically and mentally dependent on alcohol.

Liver cirrhosis: when the liver is sufficiently damaged by infection, chemicals or alcohol, it may be cirrhotic: many of the liver cells have been lost, so a regeneration has taken place, but the liver is scarred.

Obesity: this term is used where the excess body tissue constitutes a risk to health; generally the body weight is 120 per cent or more of ideal weight.

Figure 1.1 How life expectancy has changed in Australia for different age groups

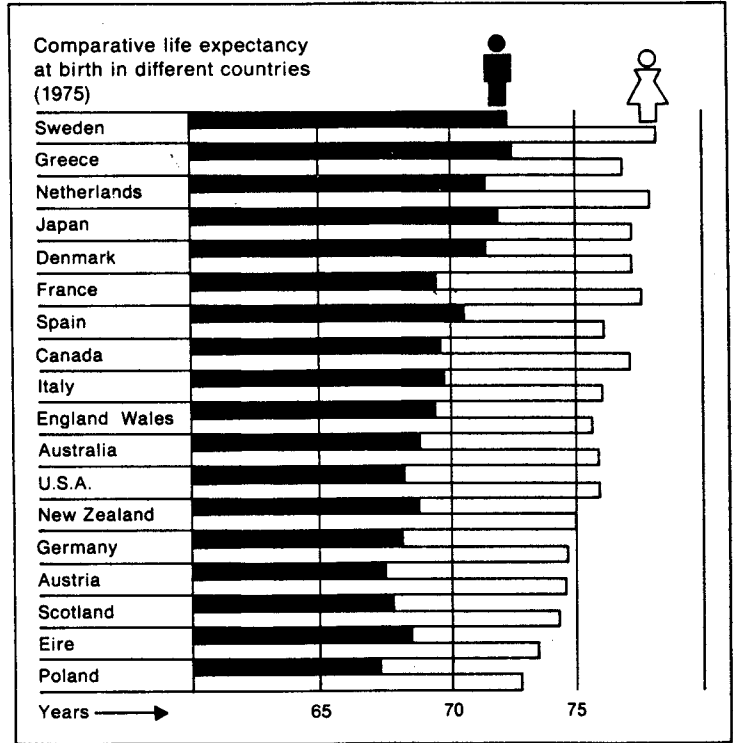


Figure 1.2 Australia ranks behind several other industrialized nations as far as life expectancy at birth is concerned

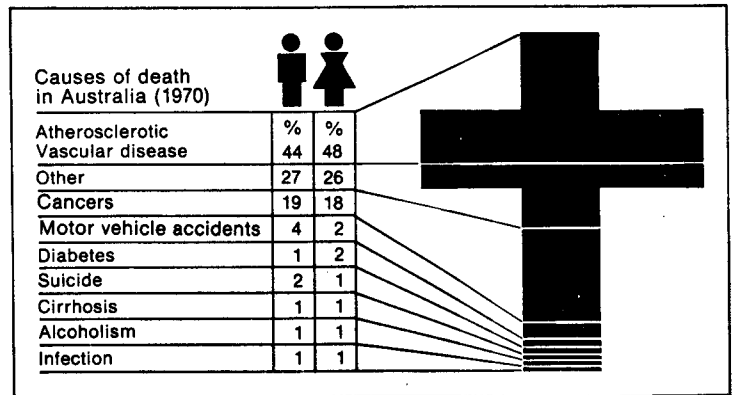


Figure 1.3 The most important causes of death in Australia are atherosclerotic vascular disease and cancer, both of which may lead to premature death

The causes of excess death and disease in Australia are similar to those in other industrialized or affluent societies. The food patterns are also similar. While the particular food factors responsible for a disease have not been clearly established in all cases, an overall food intake pattern can be discerned. Furthermore, the pattern appears to be common to several disorders.

Table 1.1 Suggested pathways by which food factors may produce disease in Australia

<i>Food factors</i>	<i>Suggested pathway</i>	<i>Possible end result</i>
<i>Excess energy intake from fat, protein, carbohydrate and alcohol</i>		<i>Obesity</i>
<i>Excess energy intake</i> <i>Type of dietary fat</i> <i>Excess sodium intake</i> <i>Insufficient dietary fibre</i>	<i>Obesity</i> <i>Blood fats</i> <i>High blood pressure</i> <i>Platelet aggregation</i>	<i>Atherosclerotic vascular disease</i>
<i>Excess dietary fat</i>	<i>Bile acid metabolism</i>	<i>Large bowel cancer</i>
<i>Excess dietary cholesterol</i>		
<i>Insufficient dietary fibre</i>	<i>Gut microflora</i>	
<i>Insufficient indoles from cruciferous vegetables</i>	<i>Indoles stimulate enzymes that break down some carcinogens</i>	
<i>Alcohol</i>		<i>Cirrhosis of the liver, heart failure, brain damage, nerve damage, vitamin deficiencies, pancreas damage</i>
<i>Carbohydrate, especially sucrose</i> <i>Retention time of food in mouth</i> <i>Snacking</i>		<i>Dental caries</i>

Life-style and nutrition

It is often difficult to separate a single food intake pattern from a total life-style. Life-style is a reflection of socio-economic factors, occupation, family attachments, circle of friends and education. It includes physical activity, recreational pursuits, cigarette smoking, alcohol consumption and use of medications. For these reasons, an individual causative factor may be difficult to identify.

The automobile in many ways exemplifies the inter-relationships between food, life-style and nutritional well-being (figure 1.4).

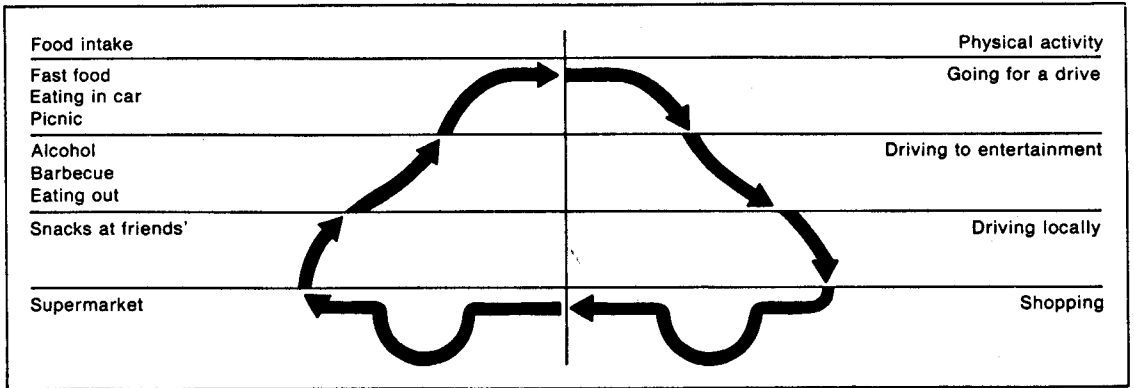


Figure 1.4 The car can affect nutritional status by altering food intake patterns or physical activity

Although food is abundant in Australia and we live in an affluent society, there are many nutritionally vulnerable groups in Australia today. They include:

1. Aboriginals;
2. the economically disadvantaged;
3. the handicapped;
4. the hospitalized;
5. the pregnant teenager; and
6. the elderly.

While the food is available, some groups, because of their lifestyles, which may be imposed on them, are unable to obtain it.

Brian has an armful of tattoos and twenty years on the clock. He has not worked in a long time. A couple of weeks ago the SEC cut off the electricity and Brian would lie on his bed in the afternoon and wait for dark. Sometimes a friend would lend a transistor and he would listen to 3XY trying to give away cars. He gets \$52 a week on the dole, plus another \$6 to attend an educational programme in Flemington. His room costs \$25 and he is behind with the rent. Brian has court convictions and finds it difficult to pay fines. He smokes a lot, but doesn't eat much.

'Maybe I get a good meal twice a week,' he said. Welfare workers made him an egg pie on Tuesday. Brian hadn't eaten since the previous Friday.

Damien Murphy, 'Life of the Urban Nomads.' *Age*, 24 October 1980

What we need to know about food

In an enlightened society it would seem reasonable to know the composition of the things we eat. Food is made up not only of water, protein, carbohydrate, fat, vitamins, minerals and dietary fibre, but also of numerous other chemicals that occur in nature, as well as those which may be added, to bestow colour, flavour and texture. There are natural food toxicants as well. Agricultural chemicals now also appear in our food supply. Preservatives and other food storage techniques have contributed greatly to the maintenance of our food supply across seasons.

However, nutrition is much more than the components of food. Nutrients can interact with each other and the effects of intact food and overall food intake patterns on man are what is important. The

term 'intact' reminds us that food is more than just a group of chemicals.

Some people talk about a 'balanced diet' when what is meant is an adequate diet.* Without specifying which aspects of balance one is talking about (for example, energy, one trace element with another, polyunsaturated with saturated fatty acids), the concept of balance is elusive.

There are various ways of grouping foods.* Probably the most customary is the 'good' and 'bad' categorization with its moralistic overtones. This approach has led to the 'junk food' concept. It is worthwhile to consider how useful this is. What makes a hamburger, salad and bread roll junk food? Or a piece of fried chicken? Or a pizza and salad? Or a carbonated sweetened cool drink? Or a milkshake? Or salted potato crisps? An analysis of how these items might or might not relate to the nutritional problems of Australia and at what level of consumption and at what level of physical activity of the individual consuming them might be more helpful.

Another means of grouping foods is according to the 'five food groups' approach. The food groups and allowances are listed below.

1. Cereals: some bread and/or cereal foods are needed each day; the amount depends on the energy needs of the body (three or four servings or more).
2. Dairy products: daily needs are for
 - (a) Children, 600 ml
 - (b) Adolescents, 600 ml
 - (c) Adults, 300 ml
 - (d) Pregnancy, 600-900 ml
 - (e) Lactation, 600-900 ml
 (300 g cheese is equivalent to 200 ml milk.)
3. Meat, fish, poultry, eggs, cheese, soya beans or other dried beans, dried peas, lentils, nuts: daily needs are one to two servings.
4. Fruits and vegetables: daily needs are at least four servings, including a good source of vitamin C.
5. Fats (butter and margarine): daily needs are 15-30 g.

This approach grew out of a commercial system of butchers, milkmen and dairy outlets, and green grocers, and an Anglo-Saxon food pattern. It has been modified little as food outlets and products have changed and as Australia has become multi-cultural. Are all fruits the same nutritionally? Why should legumes be included in a 'meat' group? How is vegetarianism catered for? To what extent do the groupings relate to the current nutritional problems of Australia? If the basic principle of the 'five food groups' system is to encourage an intake of as wide a variety of foods as possible, could this be accomplished in another way?

Another way of grouping foods is according to meal: breakfast, lunch, dinner or snack. This is something which is a real part of the daily experience of Australians.

Another way of grouping foods is to consider them as more or less energy-dense and more or less nutrient-dense (figures 1.5, 1.6). This may well be a useful approach when one considers that the

Adequate diet: an adequate diet is one that allows growth and development to proceed normally, maintain body weight when growth is complete and prevent any specific nutrient deficiency from emerging.

Food groups: when there may be scores of different foods consumed by an individual it is helpful to classify or group foods if they have characteristics in common.

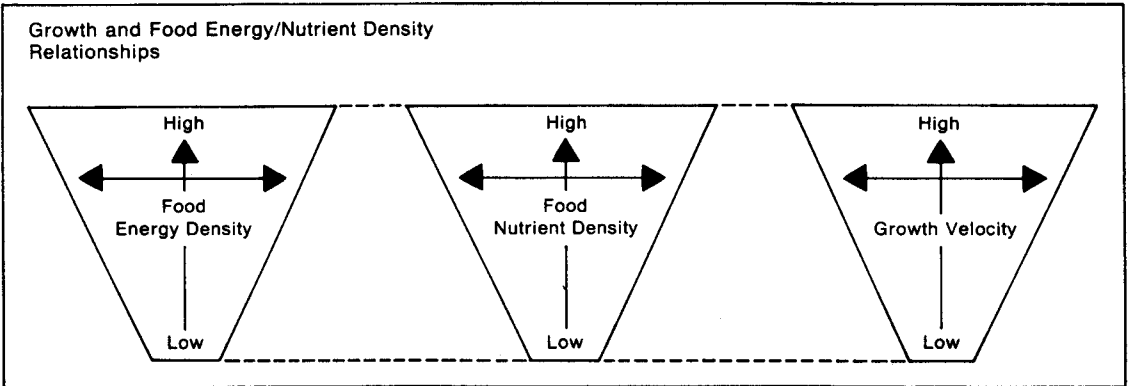


Figure 1.5 Needs for energy and nutrients during growth will be greatest when growth velocity is greatest

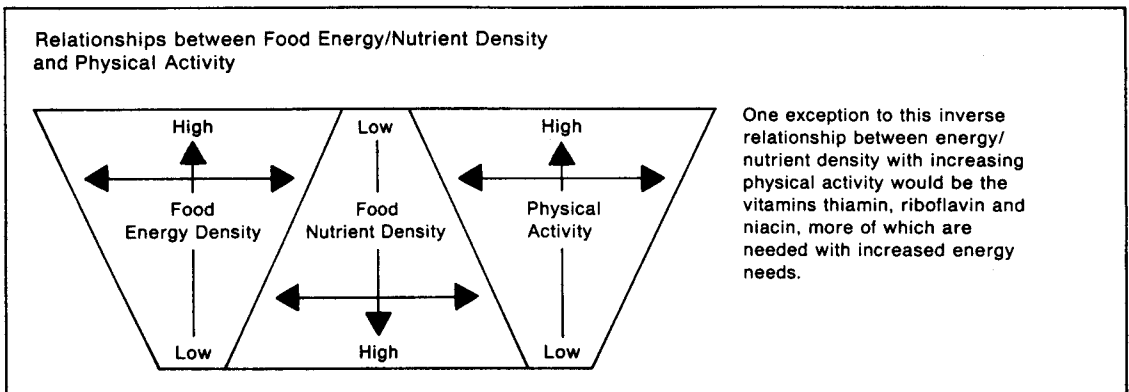


Figure 1.6 The more physically active person can be more flexible in his or her food intake inasmuch as energy-dense foods can be eaten and weight control achieved. Physical inactivity means that food intake must be limited to nutrient-dense foods and, sometimes, hunger cannot be satisfied without an increase in weight.

most prevalent of all Australian nutritional problems is obesity, which reflects excess energy intake or decreased physical activity or both. The less physically active the individual the more nutrient-dense his food must become.

When the nutritional relationships of health problems have come into better focus, it is likely that the joys and social function of food will be restored to their rightful place. The study of food and nutrition does not escape the extremes of hedonism and asceticism.

Table 1.2 Energy density of foods

<i>kJ/100 g</i>	<i>Very low</i> (less than 200)	<i>Low</i> (200–399)	<i>Medium</i> (400–999)	<i>High</i> (1000–1999)	<i>Very high</i> (more than 2000)
<i>kcal/100 g</i> <i>or 100 ml</i>	(less than 50)	(50–99)	(100–249)	(250–499)	(more than 500)
	<i>Apricots</i>	<i>Apple</i>	<i>Boiled egg</i>	<i>Beans (raw</i>	<i>Biscuits (cream</i>
	<i>Beans (French</i>	<i>Avocado</i>	<i>Bread</i>	<i>haricot)</i>	<i>filled)</i>
	<i>runner)</i>	<i>Creamed soup</i>	<i>Fried fish</i>	<i>Biscuits (plain)</i>	<i>Butter</i>
	<i>Beer</i>	<i>Custard</i>	<i>Grilled lamb</i>	<i>Cakes (plain)</i>	<i>Cooking oil</i>
	<i>Broccoli</i>	<i>Fruit salad</i>	<i>(lean)</i>	<i>Cheese</i>	<i>Margarine</i>
	<i>Carrot</i>	<i>(canned)</i>	<i>Grilled rump</i>	<i>Confectionery</i>	<i>Nuts</i>
	<i>Marrow</i>	<i>Jelly</i>	<i>steak (lean)</i>	<i>Cornflakes</i>	
	<i>Milk (skimmed)</i>	<i>Milk (whole)</i>	<i>Jam</i>	<i>Fried mushrooms</i>	
	<i>Mineral water</i>	<i>Potatoes</i>	<i>Moussaka</i>	<i>Grilled lamb</i>	
	<i>Pumpkin</i>	<i>Steamed fish</i>	<i>Rice (boiled)</i>	<i>(fat)</i>	
	<i>Raw mushrooms</i>		<i>Roast chicken</i>	<i>Grilled rump</i>	
	<i>Soup (clear)</i>		<i>Shepherds pie</i>	<i>steak (fat)</i>	
			<i>Spaghetti (boiled)</i>	<i>Grilled sausages</i>	
			<i>Tinned salmon</i>	<i>Honey</i>	
				<i>Sugar</i>	
				<i>Spirits</i>	
				<i>Weetbix</i>	

Foods are listed in alphabetical order, not ranked in order. Note that in considering the overall effect on energy balance of an item of a particular energy density, the portion of serving size and the frequency of consumption must be taken into account.

Table 1.3 Nutrient density of foods*

<i>Very low</i> (0–1)	<i>Low</i> (2–3)	<i>Medium</i> (4–5)	<i>High</i> (6–7)	<i>Very high</i> (more than 7)
<i>Butter</i>	<i>Apples</i>	<i>Bread (white</i>	<i>Beans (boiled,</i>	<i>Eggs</i>
<i>Rice, boiled</i>	<i>Beer</i>	<i>and whole-</i>	<i>haricot)</i>	<i>Green leafy</i>
<i>(polished)</i>	<i>Margarine</i>	<i>meal)</i>	<i>Cheese</i>	<i>vegetables</i>
<i>Soft drinks</i>	<i>(poly-</i>	<i>Chicken</i>	<i>(Cheddar)</i>	<i>Liver</i>
<i>Spirits</i>	<i>unsaturated)</i>	<i>(roast)</i>	<i>Oranges</i>	<i>Milk</i>
<i>Sugar</i>		<i>Fish (fried)</i>	<i>Pork (roast)</i>	<i>Oysters</i>
<i>Wine</i>		<i>Rump steak</i>		<i>Yellow</i>
		<i>(grilled)</i>		<i>vegetables</i>

*Number of nutrients which for every 100 kJ of the food eaten exceed the Australian dietary allowance for a moderately active 18–35 year old man of 70 kg for whom the energy allowance would be 11 500 kJ (e.g. more than 0.61 g protein in 100 kJ).

Foods are listed in alphabetical order, not ranked in order.

For the purposes of 'nutrient density' only those nutrients for which Australian dietary allowances exist and essential fatty acids have been considered. Water and dietary fibre have not been considered.

For Australian dietary allowances see chapter 25, Food composition tables and recommended dietary allowances. In the case of essential fatty acids, 1 to 2 per cent of daily energy needs as linoleic acid has been suggested.

1 kilojoule (kJ) = 0.001 megajoule (MJ)
1 megajoule (MJ) = 1000 kilojoules (kJ)

Further reading

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Yearbook Australia No. 63, 1979. Australian Government Australian Bureau of Statistics, Canberra, 1979.

Questions

1. Identify significant nutrients in some of the items you eat each day and assess their 'nutrient density'.
2. To what extent would variety allow those nutrients present in amounts of less than 20 per cent of the recommended dietary allowance per 100 g (or per 1000 kJ as an alternative) to contribute to the overall nutritional status of the individual? (Use food composition tables and dietary allowances for calculation.) Such an approach would be an alternative to one which relates need for nutrient density to energy need (fraction of the daily nutrient allowance required in, say, 100 kJ for the total daily nutrient allowance to be obtained in the total daily energy intake).
3. What functions of foods other than to provide energy and nutrients can be considered?
4. Are there foods which are both energy and nutrient dense? Give examples.
5. Even if a food or beverage, like beer, fulfilled the acceptable criteria for energy and nutrient density, other factors may limit its use. What would these be?

FOOD & NUTRITION IN AUSTRALIA

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Methuen Australia Limited
44 Waterloo Road, North Ryde, New South Wales, 2113
Melbourne Adelaide Brisbane Perth

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Patricia A. Crotty, Delia M. Flint, Gwyn P. Jones, Richard S. D. Read,
Ingrid H. E. Rutishauser, Boyd J. Strauss, 1981

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Methuen Australia Pty Ltd.

First published 1981
Revised edition 1982
Reprinted 1983
Cover design by Kim Falkenmire
Illustrated by Neville Todd
Set in 10/11 Garamond by B & D Modgraphic, Adelaide
Printed and bound by Koon Wah, Singapore

National Library of Australia
Cataloguing-in-Publication Data
Food and nutrition in Australia.

Rev. ed.

Previous ed.: North Ryde, N.S.W.:

Cassell, 1981

For senior secondary school students.

Bibliography.

Includes index.

ISBN 0 454 00414 1.

1. Food. 2. Food—Composition. 3. Nutrition.

I. Wahlqvist, Mark L.

641.3'00994

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