

# I: NUTRITION NEEDS AND EATING PATTERNS

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## Changing eating patterns in Australia

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The era of rapid change in eating patterns in Australia dates from the arrival of the First Fleet in January 1788. Malnutrition ravaged the white community in the first few years of settlement and intermittent famine was compounded by dysentery and scurvy. Rum both added to the misery and ameliorated it, so that in 1800 some of the convicts were said to be permanently intoxicated<sup>1</sup>. After these unpromising beginnings, the nutrition of white Australians could only improve, as farms were established, and the Australian food supply was enriched with milk, meats, cheese, fruit, vegetables and bread.

The arrival of the First Fleet also marked the beginning of a decrease in health for many Aboriginal Australians. Their position, with communities fragmented, with no tradition of employment in a European society and with the lowest socio-economic status in Australia, was associated often with poor nutrition. Access to land (crucial for a hunter-gatherer population) was reduced, and they had no tradition of agriculture. Obesity, diabetes mellitus and alcoholism became common problems in adults, and poor nutrition undoubtedly contributed to high infant mortality.

In the second half of the 19th century and in the early years of the 20th century a new analytical approach to nutrition began. The proximate analysis of feedstuffs was described, the energy needs of man were defined, and dietary surveys were undertaken. In the early 20th century 'vitamins' were identified, and later separated into 'fat-soluble A' and 'water-soluble B'. With the realization that the nutrient and vitamin content of food could be measured, nutrition became a science.

The notion of a 'complete diet' containing sufficient energy and vitamins evolved. Malnutrition was considered to be synonymous with nutritional deficiency. Tables of Recommended Daily Intakes were published, with the implication that a standard optimal diet was a diet that contained enough calories, vitamins and minerals. There was good evidence that undernutrition was a major problem in the United Kingdom. For instance, in 1902 a survey of domestic budgets in England showed that upper-class families consumed about three times as much meat, four times as much milk and three times as much butter as working-class households<sup>2</sup>. Upper class children were, on average, taller than working class children. Because it was not known whether evidence of malnutrition could be found in Australia, a study of nutrition in Australia was commissioned in the late 1930s.

**The 1st national survey of nutrition.** An Advisory Council of Nutrition was commissioned by the Commonwealth Government to advise on the present state of nutrition of the Australian people, and 'the nature of any evidence that the Australian people are in any degree undernourished, or that their diet is improperly balanced or improperly prepared'. It produced a series of reports on the nutritional status of Australians and their food consumption between 1936 and 1938<sup>3</sup>.

The Council was particularly concerned that sections of Australian society, particularly the poor and those in outback Australia, were badly nourished. Their report<sup>3</sup> quoted

examples of food intake in the "interior districts" and in the cities which gave grounds for concern.

For the first time a major effort was made to define the content of Australian foods, as it was thought that these may have differed from their British counterparts. The results of proximate analysis were very similar to those reported in Britain. The choice of foods in Australia at that time seems to have been wide; over one thousand foods were analysed.

Recognizing that little was known of what Australians actually ate, the Council undertook a survey in Sydney, Melbourne, Brisbane and Adelaide (later extended to Perth). Households in each city were asked to record purchases of food for one month, each month in one book. Not only were they asked to record purchases (from the milk supplier, egg and butter dealer, grocer, greengrocer, rabbit dealer, fishmonger) but also food produced at home or obtained without purchase. The families were approached by various methods. In Brisbane there were house to house visits to recruit families (with a refusal rate of up to 75 per cent); in other cities approaches were made through baby centres, kindergartens, two schools for girls (Perth) and domestic arts centres and church groups (in Adelaide). Data from 2565 books were analysed, representing 1789 households.

Some results are shown in the following tables. The mean daily energy intake per 'adult male' (an arbitrary factor adopted to permit the conversion of adults and children of varying ages to a common numerical basis) in the five capital cities for each food group is expressed in Table 1.

On a sub-analysis of 1200 books from Adelaide, Sydney, Melbourne and Brisbane the contribution of some particular foods was estimated (Table 2).

Table 1. Mean percentage of total energy intake contributed by each food group<sup>1</sup>. The range of values shown for each group represents the range found in the capital cities.

	% of total energy intake
Bread, cereals etc.	31.4-34.8
Meat, fish etc.	13.1-14.9
Margarine, fats and oils	1.2-2.0
Milk, butter, eggs	21.9-26.5
Fruits and vegetables	14.1-14.6
Miscellaneous	12.3-14.0

Table 2. The contribution of particular foods to total energy intake. The range of values shown for each food represents the range found in the capital cities.

	% total of energy intake
Bread	19.8-22.9
Cakes, biscuits, pastry	4.0-5.3
Flour	3.5-4.5
Cereals	2.8-4.1
Beef	4.5-6.4
Mutton	3.8-5.2
Other meats and fish etc.	3.1-3.5
Margarine, fats and oils	1.3-1.8
Milk - fresh	8.3-9.2
Butter	10.5-13.7
Other milk, etc. and eggs	2.8-3.1
Potatoes	4.7-6.3
Fresh fruit	2.3-3.4
Other fruit and vegetables	5.3-5.9
Sugar	9.2-11.3
Miscellaneous	3.6-3.9

The mean daily intake per 'adult male' of protein, carbohydrate and fat in the five capital cities can be calculated from data given by the Council<sup>3</sup> — see Table 3.

The average daily fat intake per 'adult male' in each of the five food groups in the capital cities was derived (Table 4).

The 'adult male' in the five capital cities consumed per week 5.26-6.50 pints of milk, 0.74-0.97 lb butter, 5.16-6.91 eggs and 9.1-11.79 lb fresh fruit and vegetables.

This mean weekly expenditure per 'adult male' in Adelaide was 122 pence, and in the

Table 3. *Mean percentage of total energy intake contributed by protein, carbohydrate and fat. The range of values shown for each nutrient group represents the range found in the capital cities.*

	<i>% of total energy intake</i>
Protein (4 kcal/g)	11.6-12.2
Carbohydrate (4 kcal/g)	50.3-53.6
Fat (9 kcal/g)	31.9-34.9

Table 4. *Mean percentage of total energy intake contributed by fat, by food groups. The range of values shown for each nutrient group represents the range found in the capital cities.*

	<i>% of total energy intake as fat</i>
Bread, cereals etc.	9.3-11.3
Meat, fish etc.	25.5-29.4
Margarine, fats and oils	3.4-5.5
Milk, butter, eggs etc.	49.4-56.9
Fruit and vegetables	3.8-4.8
Miscellaneous	1.0-1.2

other four capital cities 141-156 pence, at a time when most families surveyed in Adelaide earned between 3 and 5 pounds per week (range from unemployed or under 2 pounds to over 6 pounds). In Adelaide, as the mean number of 'adult males' per household was 3.70, the mean weekly expenditure per household would have been 1.88 pounds, ie most commonly between one-third and two-thirds of total income per household was spent on food.

**The 2nd national survey of food consumption.** In 1944 a second food consumption survey was undertaken by the Nutrition Committee of the National Health and Medical Research Council 'to discover whether the diet of the Australian people, which in 1936-38 was found to be generally adequate had been affected by war-time conditions'<sup>4</sup>. In this survey a total of 2730 households, comprising 15 235 persons, was investigated in all six states, in both metropolitan and country areas. The survey was limited to households containing two or more children.

Information on food consumption was obtained through the co-operation of the housewife by means of the household diary method. In the household diary method, trained investigators entered the homes to take an inventory of the amount of all foods on hand on one date; they then assisted the household in keeping a record in specially prepared log-books of the cost and amount of all food brought into the household during the week under consideration. Finally, the investigator made another inventory at the end of the period to record the food still in store or not consumed from the current week's purchases. All free food such as home-grown produce, gifts, etc was also recorded. An adjustment covered meals eaten away from home or provided for visitors.

Data collected from these records were converted to give the mean daily intake for each of many foodstuffs and for specific nutrients. Mean intakes were calculated for the adult male as in 1938. The mean intake of energy from protein, fat and carbohydrate is shown in Table 5. These are not different from those obtained in the 1938 study.

Table 5. *Mean percentage of total energy intake contributed by protein, carbohydrate and fat<sup>4</sup>.*

	<i>% of total energy intake</i>
Protein (4 kcal/g)	12.8
Carbohydrate (kcal/g)	50.4
Fat (9 kcal/g)	31.7

The results of the 1944 food consumption survey suggested that, with the main exception of calcium, Australians on average obtained supplies of foodstuffs and nutrients sufficient to ensure a fully satisfactory diet. Higher levels of food intake were found for all items (except butter) than before the war (data not shown).

**The 1983 national dietary survey of adults.** Since the 1944 study<sup>4</sup> there has been a change from concerns about undernutrition and deficiency diseases to diseases of overnutrition — excess intake of food energy and of fats, salt and alcohol. Coronary heart disease, in part a disease of faulty nutrition, became the major killer of the middle years, with the death rate in Australia reaching a peak in about 1967. Over the next 18 years the death rate fell by approximately half in both men and women. The National Heart Foundation of Australia responded to the challenge of explaining these changes by instituting National Risk Factor Prevalence Studies in 1980 and 1983. These studies are cross-sectional surveys of urban Australian adults, in which the emphasis is upon the factors known to increase — or suspected of increasing — the risk of heart attack, such as cigarette-smoking, high blood cholesterol and high blood pressure.

As a number of these risk factors are associated with diet, information was sought on food consumption patterns of participants in the 1983 Risk Factor Prevalence Study. In this the National Heart Foundation was joined by the Commonwealth Department of Health. Some 6255 people between the ages of 25 and 64 living in Sydney, Melbourne, Adelaide, Brisbane, Perth and Hobart, chosen by systematic randomization from the electoral rolls, attended the Study offices in each city, having fasted for 12-16 hours to allow plasma lipids to be measured. Subjects also gave details of food intake over the 24 hours immediately prior to the fast, under questioning by a skilled interviewer. Detailed data from this study are still being analysed.

A preliminary analysis has been made of the energy derived from protein, carbohydrate and fat in the 1983 study; this is compared with similar figures from the 1944 study<sup>4</sup> in Table 6.

Table 6. *Mean daily intake for 'adult male'*. 1944: N.H. and M.R.C. Household Consumption 'adult male'<sup>4</sup>. 1983: Commonwealth Department of Health/National Heart Foundation, per caput intake for men aged 25-64 (unpublished).

	% of total energy intake	
	1944	1983
Protein	12.8	15.2
Carbohydrate	50.4	42.0
Fat	31.7	42.8
Total energy (kJ)	16 447	11 405

Taken at face value, the data in Table 6 suggest that there had been a fall in total energy intake, and a fall in carbohydrate consumption and a rise in fat consumption in the period 1944 to 1983. Before accepting this trend, it would be wise to see whether apparent consumption figures bear it out.

**Apparent consumption data.** The term 'apparent consumption' of food refers to data on consumption derived not from interviewing consumers but calculated from the production and disappearance of food. To calculate the apparent consumption in a given period one takes to production and imports of food in the period, adds opening stocks, and then subtracts that amount of food which is accounted for by means other than consumption (exports, usage for processed foods, non-food usage, wastage, ships' stores) together with the closing stocks. In Table 7 figures for protein, carbohydrate and fat intake are derived from apparent consumption data for the years 1938-39 and 1983-84 (and for other years in between).

These figures contradict the suggestion from Table 6 that there has been a marked change in overall fat consumption and total energy consumption between 1938 and 1983. The discrepancy does not seem to arise because there is an inherent systematic difference between apparent consumption data and data from a 24-hour recall of diet. A

Table 7. *Apparent consumption of food in Australia (per caput per day)*. Figures 1938-39 to 1978-79 are average of previous 3 years. 1983-84 is single year measurement<sup>5</sup>.

	1938-39	1948-49	1958-59	1968-69	1978-79	1983-84
Protein, %	11.7	11.6	11.3	12.3	11.8	11.6
Carbohydrate, %	46.3	50.0	48.3	47.0	43.3	44.3
Fat, %	37.9	33.1	35.3	32.9	38.6	37.9
Total energy (kJ)	13 048	13 584	13 801	13 835	14 635	14 370

comparison of these two kinds of data from 1983 in Table 8 does not indicate very large differences between them.

The apparent marked rise in fat consumption since 1938 that is suggested by a comparison of the results of the 1938 and 1944 surveys<sup>3,4</sup> with the 1983 national diet study may well be artefactual. As apparent consumption data suggest no such rise, as figures for fat consumption derived from the 1983 national diet study are similar to those

Table 8. *Comparison of apparent consumption and per caput data (the latter derived from 24-hour recall)*. Per caput data: Commonwealth Department of Health/National Heart Foundation National Dietary Survey of Adults 1983; age 25-64, preliminary analysis. Apparent consumption<sup>5</sup>.

	<i>Apparent consumption Per caput consumption</i>	
	1982-83	1983
Protein, %	11	15
Carbohydrate, %	45	38
Fat, %	38	42
Alcohol	6	5

derived from 1982-83 apparent consumption data, and as the methods for selecting the study populations and deriving data in 1938 and 1944 would now be considered unsatisfactory, it seems quite possible that there has been no major rise in fat consumption in Australia in the last 45 years.

There is no doubt that there had been a major change in the type of oil of fat consumed in that time. In the average 3 years ended 1938-39, according to apparent per capita consumption data<sup>5</sup>, the average Australian ate 14.9 kg butter, 0.4 kg table margarine, 1.8 kg other margarine, and 0.2 kg other oils and fats. In 1983-84 he ate only 3.2 kg butter, but 6.0 kg table margarine, 2.4 kg other margarine and 10.0 kg other oils and fats.

**Conclusions.** Quantitative data on diets and nutrition in Australia derived from the 1938 and 1944 household consumption studies are clearly suspect. It is important that we continue to build a sound data base and continue research on the nutrition of Australians in the years ahead.

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#### Note

Data from the National Dietary Survey of Adults 1983 are available in Report No.1 — *Food consumed* (Canberra: Australia Govt Ptg Service, 1986).

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