

THE BUSSELTON CHILDREN'S SURVEYS

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Summary

Children's surveys have been conducted in 1967, 1970, 1973 and 1977 as part of the Busselton Population Studies. These studies have concentrated on recording anthropometric and biochemical data. It is only recently that some attention has been given to documenting dietary data, including patterns of food consumption, which are obviously important in the development of disease risk factors in adulthood. More attention obviously needs to be given to collecting data relating to food and nutrition in future surveys of this type.

I. INTRODUCTION

The country town of Busselton, in Western Australia, has been the centre for numerous community-health related studies for over 10 years. The town and surrounding district has a stable population of about 7,000 people, largely with a common cultural background. Of the adult population, 95% were born either in Western Australia, other parts of Australia or in the United Kingdom, and 89% of the parents of these adults were of similar origins.

The first health survey was done in 1966; others have been undertaken at 3-year intervals since. The first children's survey was in 1967, with others in 1970, 1973 and 1977.

The first 3 surveys were similar. They covered the ages 6 to 17 years (years 1 to 12 at school) and sought, by means of a questionnaire, social data relating to the family as a whole and health data relating in particular to each child participating in the survey. Parents answered this questionnaire at home. Anthropometric measurements (including height, weight, mid-upper arm circumference and triceps skinfolds) were made and recorded by a survey officer at the survey centre. A blood sample was collected from each child by laboratory personnel sent from Perth and biochemical estimations were carried out at various laboratories in Perth.

The 1977 survey differed from the previous three in several respects. Though parents responded to that part of the questionnaire relating to the family, the remainder was answered by the children themselves at school. It was confined to High School students (aged 13 to 17 years) and, reflecting increasing concern at the level of physical fitness of Australians and the reported increase in smoking by young people, it included questions relating to their smoking and television viewing habits, and a measure of their physical fitness.

Because of some biochemical data obtained in the 1967 and 1970 surveys, the first planned dietary study was undertaken in 1974.

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II. DIET AND SERUM CHOLESTEROL

A study of serum cholesterol levels of Busselton children and their parents had shown a significant correlation between parents and children throughout a wide range of cholesterol values (Godfrey *et al*, 1972). It was also shown that the serum cholesterol levels of children were more closely related to those of their mothers than of their fathers, and it was suggested that the role of the mothers in controlling the family diet might explain this closer relationship. A dietary study was therefore undertaken to determine whether any differences in food consumption patterns existed among families which might influence the level of child-mother serum cholesterol levels observed (Hitchcock and Gracey, 1977).

Three groups were selected for the study, the basis of their selection being the serum cholesterol level of mother and child. In the "high" cholesterol group, mother and child had a serum cholesterol of greater than 6.21 mmol/l. In the "median" cholesterol group, the child's serum cholesterol fell between 3.89 to 5.18 mmol/l, and the mother's 5.18 to 6.23 mmol/l. In the "low" cholesterol group, the child's serum cholesterol was less than 3.89 mmol/l and the mother's less than 5.18 mmol/l.

The study showed that the three groups had food consumption patterns which were similar to each other, not perhaps surprising in view of the cultural homogeneity of the Busselton population. Table 1 indicates this similarity in terms of proportion of total daily food energy contributed by protein, by fat and by carbohydrate in the diets of the children. The proportions were of the same order in the diets of mothers in the three groups, and of families to which the group subjects belonged.

TABLE 1. Percentage of total daily food energy from protein, fat and carbohydrate in diets of Busselton children (mean and S.D.)

	Percentage from protein	Percentage from fat	Percentage from carbohydrate
"High" cholesterol group (n = 15)	13.7 ± 2.6	35.4 ± 5.5	50.9 ± 6.6
"Median" cholesterol group (n = 21)	13.6 ± 2.6	39.7 ± 6.3	46.7 ± 7.1
"Low" cholesterol group (n = 22)	13.0 ± 2.3	37.0 ± 5.7	50.0 ± 6.1

(adapted from Hitchcock and Gracey, 1977)

III. NUTRIENT CONSUMPTION

As dietitian/nutritionists are aware, there is little information available about what apparently healthy, normal Australians eat. Though the numbers involved in the diet and cholesterol study were small (211 subjects) the pooled data from it does give us insight into what quantities of nutrients some apparently healthy Australians are consuming at different ages (Hitchcock and Gracey, 1978).

Australians are frequently described as being overfed and under-exercised. It is interesting in view of this to see (Fig. 1) that the mean food energy intakes (kilojoules) of most of the age groups in this study were in fact below the level of the Australian Dietary Allowances (National Health and Medical Research Council, 1971).

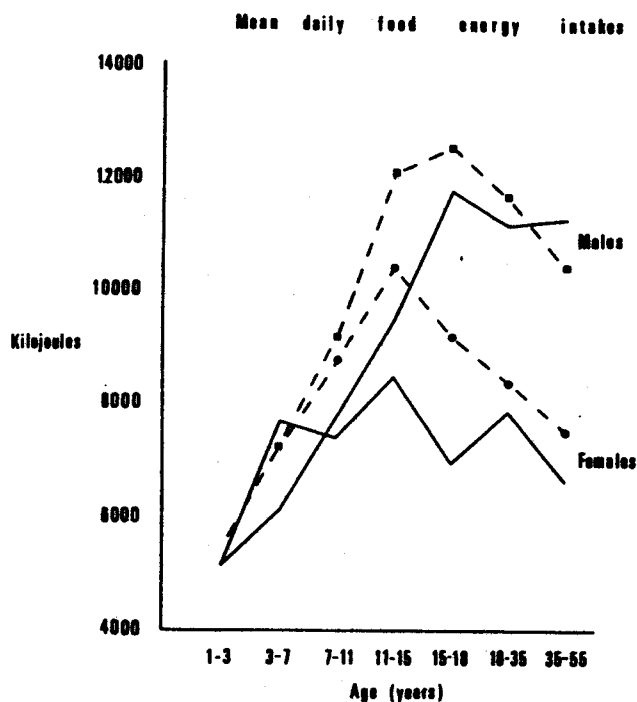


Fig. 1. Mean daily food energy intakes in Busselton males and females. The interrupted lines indicate the Australian Dietary Allowances for males (upper) and females (lower).

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This pattern of food energy intakes below those of the Australian Allowances at most age levels is reinforced by other studies in Western Australia (Gracey, 1979) and in Sydney (Zed, 1978). Yet, obesity, defined as $\geq 120\%$ of desirable weight for age and height (Jelliffe, 1966) occurred in 10% of the Busselton children in this study. Insufficient physical activity is a possible explanation. The 1977 children's survey (Gracey *et al*, *in press*) suggested that children were less active and less physically fit than children 10 to 20 years earlier, a time period during which the present Allowances were determined.

IV. THE 1977 SURVEY

Some measurements made in 1977 which are of particular interest to those concerned with nutrition and nutrition-related areas are height, body weight, fasting serum cholesterol and triglycerides. These appear in Table 2 for boys and girls aged 13 to 17 years.

TABLE 2. Height, weight, fasting cholesterol and triglyceride levels of children 13 to 17 years (mean and S.E.M.)

Age (Years)	No.	Height (cm)	Weight (kg)	Cholesterol (mmol/l)	Trigly- cerides (μ mol/l)	
Boys	13	61	156.4 \pm 1.1	47.4 \pm 1.2	5.09 \pm 0.12	602 \pm 34
	14	64	161.1 \pm 1.1	50.6 \pm 1.2	5.27 \pm 0.16	673 \pm 25
	15	64	168.1 \pm 1.1	57.7 \pm 1.2	4.71 \pm 0.11	680 \pm 37
	16	36	173.4 \pm 1.0	63.9 \pm 1.2	4.61 \pm 0.17	761 \pm 52
	17	19	173.9 \pm 0.9	64.9 \pm 1.1	4.79 \pm 0.11	690 \pm 46
Girls	13	56	155.2 \pm 1.0	48.6 \pm 1.3	5.28 \pm 0.14	684 \pm 30
	14	76	159.9 \pm 0.7	51.4 \pm 0.8	5.43 \pm 0.12	836 \pm 47
	15	62	160.9 \pm 0.8	54.8 \pm 0.9	4.97 \pm 0.13	761 \pm 38
	16	50	163.4 \pm 0.8	58.5 \pm 0.8	5.22 \pm 0.15	740 \pm 39
	17	50	161.9 \pm 0.7	59.6 \pm 1.1	5.18 \pm 0.13	765 \pm 35

(adapted from Gracey *et al*, *in press*)

These mean values for height, when compared with those of Australian reference tables at the same ages (National Health and Medical Research Council, 1975) vary from 100 to 102% of those values. But the mean body weights vary from 102 to 108% of those in the reference tables.

Cholesterol levels of boys in this study were similar to figures reported in a study of adolescent males in Sydney (Hickie *et al*, 1974). Mean cholesterol values of Busselton girls were higher than those for boys at all ages.

V. IN CONCLUSION

These children's surveys have documented some important aspects of growth and nutrition in young children and in adolescents growing up in Busselton. In conjunction with the biochemical results they provide useful information against which comparisons can be made with other groups in Australia and elsewhere. There is an immense amount of material which has already been recorded, but which has not yet been processed or published from the Busselton studies. This material will provide important retrospective data, the value of which would have been enhanced if dietary studies had been commenced earlier in these community health surveys. Some of the problems occurring in later life, such as obesity and its related diseases, frequently have their origins in childhood when lifetime patterns of living (including eating) are being established. Hence the need for increased emphasis on dietary patterns in children and adolescents in future studies.

It is to be hoped that dietary studies will take a central part in future surveys of the growth and nutrition of Australian children and adolescents.

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