Some Comments on the National Food Survey and Comparison with the Prewar Carnegie Survey

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It might seem an extremely easy matter to obtain accurate records of food consumed. Experience shows that it is not so. At the foot of the social scale there is a residue of housewives who are incapable of keeping accurate records, even with help and supervision. The work of Dr A. M. Thomson (unpublished) on primigravidae shows that those unable to keep records are, almost certainly, worse fed than the more intelligent. In most surveys they swell the proportion of non-cooperators. But in all social and intellectual grades, vigilance is needed. Even highly intelligent scientists have been found grossly inaccurate in attempts to record what they ate the day before (Morrison, Russell & Stevenson, 1949).

There are difficulties associated with the process of measurement, illustrated by the problem of withdrawal from stocks which occurs in all surveys. It has many possible explanations, none of them, perhaps, altogether satisfactory.

The sampling involves many troubles and sources of error. Apart from the stupidly non-cooperative there are the households with women in employment or with employed members eating out, which have a less-than-normal chance of being included. This gives a slight bias towards families with young children, which, from the sociological point of view, is not a bad thing.

There are just as many difficulties in interpretation of the results. It does not seem possible to arrive at perfect solutions of these and, so long as the conventions are clearly stated, no serious misunderstanding need arise. Curious special problems emerge, like that of the elderly (and old) women living alone and of what they do with all the food they purchase. Other, more intimate, studies of the diet of old women give daily energy values seldom above 2000 Cal. and as low as 1000, even less in the senile and incapacitated. In one study the only subject with more than 2000 Cal. was obese (Pyke, Holmes, Harrison & Chamberlain, 1947).

The problem of the effect of growth of the family on food consumption involves some of the same difficulties as beset the computation of 'man values'. With detailed requirement scales and our new methods of direct comparison of nutrient supply with requirement, 'man values' have lost their immediate interest. Meanwhile the array of data on food consumption has reached such a magnitude that statisticians and economists-turned-statisticians have been tempted to make analyses involving the expression of all people in terms of a standard unit. If the analysis were restricted, in the first place, to the food budgets of families with all the adult males comparable in work output, then of course one reference adult in the equations would be enough to give an equivalent-adult scale valid for families in which the man was in that type of employment. But the equivalent-adult scale for an array of households of

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clerks must be greatly different from that for an array of households of lumbermen, because the wives and children of clerks may eat just as much as the wives and children of lumbermen.

There are other apparent misconceptions that may affect the statistical theory and the basic assumptions made. For instance, in a recent paper, Prais (1953) shows what appears to me to be a serious confusion of ideas when he writes: 'Finally, there are the various scales of nutritional requirements based on some standard of optimum health. In their simple form they generally ignore the possibility of substitution between the various nutritional elements, and cannot be regarded as reflecting the average pattern of consumption. While they may be approximately equal to specific scales, they should not be used in economic contexts without explicit justification'.

I am not sure that I have correctly interpreted the passage but there seems to be confusion of foods with 'nutritional elements', which I interpret to mean nutrients. It is easy and most certainly common practice to substitute one food for another, and it is possible to substitute one chemical source of energy for another, but that only within relatively narrow limits; other constituents of the diet cannot be substituted one for another. Further, it is the nutrients that constitute the 'must' of diet; the possible permutations and combinations of foods to supply them are endless, even within the physiological limits of bulk and appetite. They are limited mostly by commercial enterprise, income and habit. Prais's last statements as quoted above, that scales of nutrient requirements 'may be approximately equal to specific scales', i.e. scales for individual foods, has for me little or no meaning, and that 'they should not be used in economic contexts without explicit justification' merely puts the onus of proof on himself. If he used a least-squares technique as Quenouille (1950) did and applied physiologically scaled values to the men in a random sample of families, he could easily test whether the residual variability was reduced, as compared with the assumption that all men are equal. It is difficult to believe that, in any but a very narrowly limited sample, the prediction value of his equations would not be improved.

In spite of these criticisms, let us rejoice that statisticians have begun to take an interest in nutritional problems. Their manipulations can and will be used progressively more to dig out information that cannot be obtained by any simple treatment of data. Perhaps more consultation with nutrition experts would not be out of place.

Comparison of the data of the National Food Survey (Ministry of Food: National Food Survey Committee, 1953) with those of the Carnegie U.K. Dietary Survey (Rowett Research Institute, 1955) as presented in the report is not possible in any detail. The records are preserved and we still hope that other studies like that of Quenouille (1950) may be made.

Although the survey had households in all social classes, the majority were working class, and because we were concerned primarily with the welfare of working-class children at a time when there was so much unemployment, the sample was deliberately and heavily overweighted with children.

Table 1 shows the constitution of the populations studied in the two surveys.

Table 1. *Percentage distribution of the populations in (A) the Carnegie U.K. Dietary Survey (Rowett Research Institute, 1955) and (B) the National Food Survey (Ministry of Food: National Food Survey Committee, 1953)*

Age group	A Social group by expenditure on food					
	1	2	3	4	5	6
Adults, 18 years and over	28	32	40	50	57	62
Adolescents, 14–18 years	6	6	7	8	8	10
Children, under 14 years	66	62	53	42	35	28

Age group	B Social class by income			
	D	C	B	A
Adults, over 20 years	79	64	61	66
Adolescents, 14–20 years	8	8	8	7
Children, under 14 years	13	28	31	27

Only the Carnegie group 6 is comparable in composition with the National Food Survey classes A, B or C and, in consideration of social class, only group 6 and class A are fully comparable. Tables 2 and 3 show the amounts of the chief groups of foods purchased per head in these groups in 1937–9 and in 1951. In 1951 meat,

Table 2. *Amounts of food purchased per head per week by group 6 in the Carnegie U.K. Dietary Survey and by class A in the National Food Survey. Foods for which agreement between surveys was good*

Food	1937–9 Carnegie survey group 6	1951, 3rd quarter National survey class A
Liquid milk, consumed at home (pt.)	5·44	5·09
Cheese (oz.)	2·47	2·90
Fish (oz.)	10·31	10·07
Fruit (oz.)	44·76	45·70
Cereals, all forms (oz.)	79·53	71·39

Table 3. *Amounts of food purchased per head per week by group 6 in the Carnegie U.K. Dietary Survey and by class A in the National Food Survey. Foods for which agreement between surveys was not good*

Food	1937–9 Carnegie survey group 6	1951, 3rd quarter National survey class A
Meat (oz.)	37·29	27·74
Eggs (no.)	5·58	2·48
Fats: butter (oz.)	9·24	4·05
margarine and cooking fats (oz.)	5·13	5·49
Sugar (oz.)	19·47	13·44
Preserves (oz.)	9·37	5·78
Vegetables: potatoes (oz.)	56·79	44·78
fresh green (oz.)	13·26	25·44
total other (oz.)	20·28	16·06

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butter, fats, cheese and sugar were still rationed. The differences in terms of energy value total roughly 500 Cal. daily. Table 4 shows the computed nutrients. The difference is not as great as appears at first glance because the Carnegie computation represents the value of edible food purchased, the National Food Survey deducts

Table 4. *Computed nutrients obtained per head per day by group 6 in the Carnegie U.K. Dietary Survey and by class A in the National Food Survey*

Nutrient	1937–9 Carnegie survey group 6	1951 National survey class A
Calories (Cal.)	3264	2399
Protein: total (g)	90	78
animal (g)	51	43
Fat (g)	136	97
Carbohydrate (g)	399	303
Calcium (g)	0·954	1·126
Iron (mg)	15·8	13·2
Vitamin A* (i.u.)	4105	4204
Thiamine (mg)	1·67	1·24
Vitamin C (mg)	75	74

*Excludes welfare foods.

10% for waste of edible food. To estimate the importance of the difference both diets are compared in Fig. 1 with the British Medical Association: Committee on Nutrition (1950) standard of requirements applied to each population, with allowance for occupation of the workers. The 1951 class A population, in spite of rationing and the allowance of 10% waste, had 104% of its energy needs; the Carnegie group 6 bought 128% of what it needed; and the adults at least possibly ate too much.

Fig. 1 shows the general picture of supply in relation to needs, estimated on the same British Medical Association scale, prewar and in 1951. The improvement is obvious. If one remembers that the 10% allowance for waste is applied uniformly (and that no one need waste 10% of edible food) it appears certain that in 1951 there was enough food of the right sort and properly distributed. The prewar picture was very different. Assuming no waste at all, many of the poor children were underfed and lacked calcium. All the children were weighed and measured and given an exhaustive clinical examination designed to show signs of malnutrition, if such were to be found. In fact, the poor diet was reflected in slow growth and in acceleration when extra food was supplied. The extra food was computed on the basis of an initial survey, so as to make good deficiencies, quantitative or qualitative or both, and was supplied for nearly a year. Fig. 2 shows the order of the effect on height, by age and social class. The only clinical index of the sufficiency and quality of the diet was in the rate of growth or, as measured statically, in height and weight for age.

With reference to the two vitamin pictures shown in Fig. 1 it has to be said that intakes of vitamin A in the Carnegie Survey were computed in terms of 'biological values', which may or may not be the same, for man, as preformed vitamin A + one-third of the carotene in i.u. The comparison is with the B.M.A. 'mixed diet' standard of requirements. If the pure vitamin A standard is used, as in the National Food

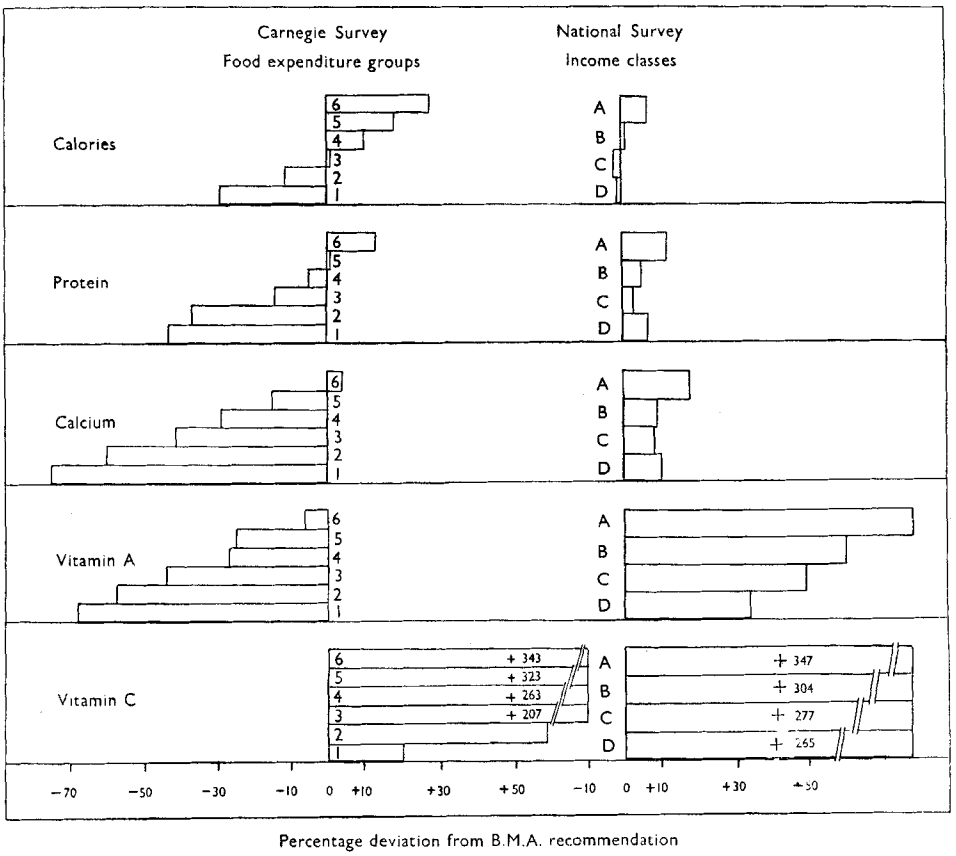

Fig. 1. Comparison of computed nutrient intakes in the Carnegie U.K. Dietary Survey and the National Food Survey with dietary allowances recommended by the British Medical Association: Committee on Nutrition (1950).

Survey, the percentages of requirement attained are, for groups 1–6: 64, 87, 111, 146, 150, and 187. The two poorest groups show deficiency. It is impossible to be certain where the true comparison lies. It has to be said also that no clear sign of deficiency of vitamin A was identified, nor was any supposed sign improved by giving halibut-liver oil; and that the colossal surpluses of vitamin C merely reflect the British Medical Association standard, reduced under the influence of the wartime scurvy experiment (Bartley, Krebs & O'Brien, 1953) to a level which seldom occurs in this country now. But it does occur, as the recent demonstration of scurvy in infants in Birmingham shows (Brailsford, 1953).

And that in itself makes very clear the need for continuing supervision of the national larder and of the distribution of its contents among the people. No doubt the Ministry of Health will continue to keep an eye on the growth and health of children. In addition we do now know so much about the relation of growth and health to diet that the Ministry of Food, through its National Food Survey, could

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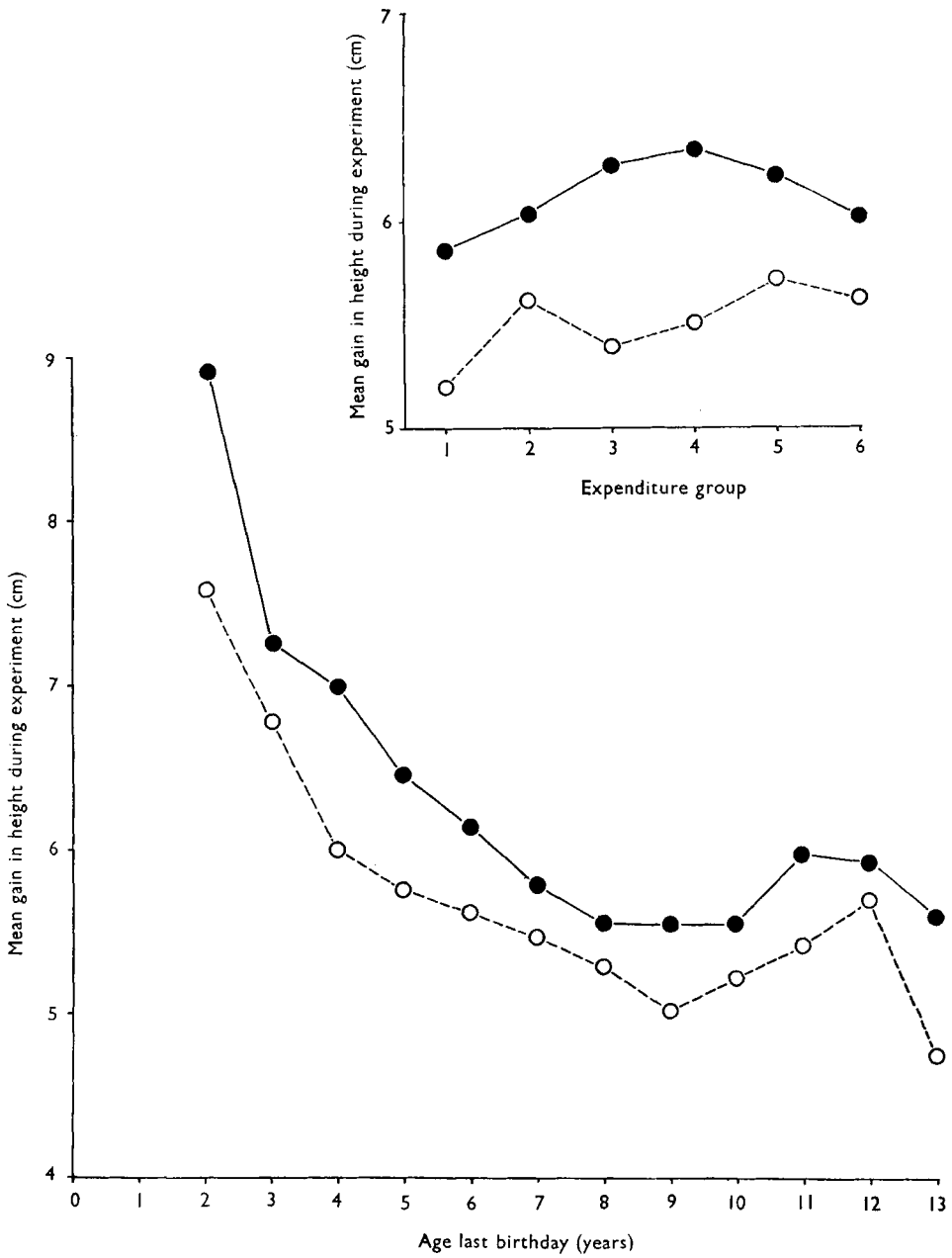

Fig. 2. Effect on height of children, by age and social class, of extra food given in the Carnegie U.K. Dietary Survey. ● —— ●, children given extra food; ○ – – – ○, control children.

at any moment give warning of relapse and indicate both where danger threatened and how it might best be remedied.

The National Food Survey is a most valuable contribution to the smooth running of our day-to-day life. I should think that producers, caterers, and traders in food

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must already have come to rely on it for guidance; and certainly economists and sociologists will give it increasing attention. Its ultimate importance lies in the safeguarding of health and fitness for work.

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