

- Ministry of Food: National Food Survey Committee (1951). *The Urban Working-class Household Diet 1940 to 1949*. London: H.M. Stationery Office.
- Ministry of Food: National Food Survey Committee (1953). *Domestic Food Consumption and Expenditure, 1951*. London: H.M. Stationery Office.
- Ministry of Food: National Food Survey Committee (1954). *Domestic Food Consumption and Expenditure, 1952*. London: H.M. Stationery Office.
- Readman, W. L. (1955). *Proc. Nutr. Soc.* **14**, 60.
- Woolf, B. (1953). *Proc. Nutr. Soc.* **13**, 82.

### Technique and Methods of the National Food Survey

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The annual reports of the National Food Survey (Ministry of Food: National Food Survey Committee, 1952, 1953, 1954) describe in detail changes in techniques up to 1952. During February and March 1953 the Social Survey Division of the Central Office of Information took over the sampling, field work, coding, punching and regular monthly tabulations. The sampling is based on a rigorous three-stage sample design, of which full details will be given in the 1953 annual report. The use of the 'juror index' (Corlett, 1952) in England and Wales helped to secure the correct proportions of areas of different economic status. The methods of selection of addresses from the Electoral Register at the final stage and the instructions given to interviewers regarding the use of these samples follow the Social Survey's standard practice described elsewhere (Gray, Corlett & Frankland, 1950).

During the year, addresses are selected from 1080 polling districts in the sixty parliamentary constituencies which form the first-stage sampling units. Interviews are made in half the constituencies alternately for periods of 3 weeks, during which two polling districts within each of these constituencies are sampled for 10 days each. The number of addresses to be approached by each interviewer during the first 3 days of each 10 has been reduced to 20, enabling further recalls to be made on the more elusive housewives. The Social Survey's normal practice of requiring the interviewers to work in the evening when necessary has been introduced. As a result of these changes the response rates are now higher than in previous years. During the second half of 1953, completed log-books were received from 56% of the addresses visited, compared with 43% in January-August 1952. In 1952, however, not all the chosen addresses were visited. Of addresses selected, the percentage was 37.

The tendency of the Survey sample to include an undue proportion of children has been reduced. In 1950, when national coverage was first attempted, children aged 0-9 formed 22.5% of the sample. In the 18 months following the simplification of the log-book in June 1951 the percentage was 19.8. Since April 1953 it has averaged 18.9. The true figure for the household population which the Survey aims to cover cannot be exactly determined from official sources. A value of 17% may be derived from the 1951 census for all private households (Registrar-General,

1952), but the Survey sample excludes by definition a number of persons (mainly adults) who eat fewer than sixteen meals a week at home. We do not claim, however, that this source of bias has been entirely eliminated.

The response rate is rather lower in the towns, especially in the conurbations, than in rural areas, and there is some variation in this respect between regions. Nevertheless the regional distribution of households (Table 1) conforms reasonably well to the distribution of households according to the 1951 census.

Table 1. *Distribution of log-books and response rates by region, July-December 1953*

Region	No. of log-books received	Log-books received per 100 addresses selected	Percentage of log-books received from each region	Percentage distribution of households, 1951 census
Scotland	546	56.9	10.1	9.9
Wales	287	59.8	5.3	5.2
Northern, East and West Ridings	801	55.6	14.8	14.9
North Western	755	59.0*	14.0	13.3
North Midlands and Eastern Midlands	766	59.8**	14.2	13.2
South Western	430	53.8	8.0	8.7
Counties of London and Middlesex	391	61.1*	7.2	6.1
Outer London	564	50.4**	10.4	12.5
Southern and South Eastern	266	55.4	4.9	5.7
	600	53.6*	11.1	10.4
Total or mean:	5406	56.3	100.0	100.0
Conurbations	1964	53.4**		
Other urban areas	2228	57.4		
Rural areas	1214	59.5**		

\* Deviation from mean response rate statistically significant at  $P = 0.05$ .

\*\* Deviation from mean response rate statistically significant at  $P = 0.01$ .

Households are classified into social classes according to the ascertained gross income of the head or, if this is not forthcoming, to the imputed income based on occupation or similar information. A check made on 1952 data (Ministry of Food: National Food Survey, 1954) showed that, on the average, ascertained incomes were lower than the Ministry of Labour estimates of average earnings, especially in those industries where these were high. The points of subdivision introduced in January 1950 were £4 10s., £8 and £13 per week. In January 1953 these were changed to £6, £9 and £15 per week, in view of the upward trend in money incomes illustrated by Table 2.

Table 2. *Percentage distribution of households by social class (Ministry of Food: National Food Survey Committee, 1954)*

Social class	1950*	1951*	1952*	1953*	1953†	1954 (January-June)†
A	3	7	8	9	6	7
B	13	22	27	32	23	29
C	58	47	40	36	40	37
D	26	24	25	23	31	27

\* Original income grades (see above).

† Revised income grades (see above).

An indirect use of the system of jury-qualification referred to above has been to test the representativeness of the log-keeping households in respect of economic status. In a recent period of 6 weeks, 13.9% of 2170 addresses selected in England and Wales contained a qualified juror. The corresponding proportion for the 1201 households completing log-books was 15.0%, a difference not statistically significant, and thus providing no evidence of bias.

It is hoped to provide, in the annual report for 1953, a wide selection of coefficients of variation of expenditure on, and consumption of, individual foods. A preliminary analysis of a sample of 1000 log-books dated between April and December 1953 has provided some estimates of the coefficient of variation of total food expenditure. For total household food expenditure the value was 42%, and for total food expenditure per person it was 34%. For households containing one, two, three, four and five persons the corresponding percentages were 49, 31, 27, 24 and 26. Some results for nutrient intakes (Table 3) have also been obtained from 1066 households surveyed in June 1951. The coefficient of variation of total food expenditure per person in these households was 35%, so that the 1953 estimates of coefficients of variation of nutrient intakes will probably be similar. It should be borne in mind that the Survey has been designed for the analyses of quarterly, not monthly, samples, and corresponding subsamples. Standard errors of quarterly averages are, of course, approximately three-fifths of those calculated on a monthly basis.

Table 3. *Coefficients of variation of nutrient intakes per person in June 1951*

Nutrient	Coefficient of variation (%) for household* of:						Percentage standard error of the mean (all sizes) (1066)
	One person (72)	Two persons (279)	Three persons (279)	Four persons (238)	Five persons (123)	All sizes (1066)	
Calories	44	29	21	20	20	23	0.7
Animal protein	45	30	24	21	24	28	0.9
Vegetable protein	43	39	32	31	30	33	1.0
Carbohydrate	49	36	27	26	28	30	0.9
Calcium	40	30	23	19	18	25	0.8
Iron	45	33	25	24	25	28	0.9
Vitamin A	60	52	43	40	37	45	1.4
Thiamine	44	30	24	23	25	28	0.9
Riboflavin	38	29	22	19	22	25	0.8
Nicotinic acid	55	35	28	27	28	31	0.9
Vitamin C	88	59	49	47	52	56	1.7
Vitamin D	76	61	62	76	74	72	2.2

\* Figure in parentheses is the number of households in sample.

It will be noted that vitamins A, C and D have comparatively high coefficients of variation and that the coefficients of most nutrients are relatively small for large households. This is important because of our interest in the results relating to the large families, the subsamples of which are relatively small. For example, in 1952 the number of families with three or more children was only 645, or 5% of all

households. From the nutritional aspect these families are of high importance, because they contained about a quarter of the children in all households surveyed. The annual average calcium intakes for these families can be obtained with a standard error of 0.8% so that differences between two sample annual averages must be just over 2% to achieve statistical significance at the 5% level. It follows therefore that the present sample sizes may be considered just adequate to detect long-term trends in the diet of this important section of the population. Fortunately any more or less constant bias (e.g. errors in nutrient conversion factors) has little effect on comparisons over time.

## REFERENCES

- Corlett, T. (1952). *Appl. Statist.* **1**, 34.  
Gray, P. G., Corlett, T. & Frankland, P. (1950). *The Register of Electors as a Sampling Frame*. London: The Social Survey.  
Ministry of Food: National Food Survey Committee (1952). *Domestic Food Consumption and Expenditure, 1950*. London: H.M. Stationery Office.  
Ministry of Food: National Food Survey Committee (1953). *Domestic Food Consumption and Expenditure, 1951*. London: H.M. Stationery Office.  
Ministry of Food: National Food Survey Committee (1954). *Domestic Food Consumption and Expenditure, 1952*. London: H.M. Stationery Office.  
Registrar-General (1952). *Census 1951 Gt. Britain: One Per-Cent Sample Tables*. London: H.M. Stationery Office.

**Economics, Nutrition and Family Budgets**

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*The general problem of analysis*

I wish in this paper to consider the proper contribution of the economist to the analysis of the data collected in family food budgets, in particular of the data of the National Food Survey (e.g. Ministry of Food: National Food Survey Committee, 1953). An enterprise of the scope and magnitude of the Survey certainly requires above all things the co-operation of many disciplines; and this co-operation must, if it is to be successful, begin long before there are any results to analyse. The problems that arise in the earlier stages of planning and execution, however, will be considered outside the scope of the present paper; and I shall assume that, as is indeed the case with the National Food Survey, a team of people, including nutritional scientists, economists, statisticians and administrators, is faced with a continuous flow of data from representative samples of households. That a considerable use of theoretical concepts is needed in the analysis of such data is apparent from considerations of magnitude alone. In one year's sampling it has been customary to obtain something of the order of 7000 household budgets, and about 300 primary measurements are contained in each budget. For this vast quantity of information to be comprehended most of these measurements must be consolidated