MINISTRY OF HEALTH

Reports on Public Health and Medical Subjects

No. 118

A Pilot Survey of the Nutrition of Young Children in 1963

LONDON

HER MAJESTY'S STATIONERY OFFICE

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PREFACE

Food policy, if it is to be efficient, has to be based on accurate and comprehensive information. The Committee on Medical and Nutritional Aspects of Food Policy*, recognising this, advised that a programme of nation-wide surveys of various population groups should be undertaken. The pilot survey described in this report represented the first stage.

A pilot survey was of course essential. The mounting of surveys on a national scale is a matter of some complexity, involving problems of sampling, of techniques of measurement, of obtaining public co-operation and understanding, of analysis of data, and of the preparation of up-to-date information on the nutrient contents of foods in a form applicable to the food classification used in the particular survey.

Also, the nature of the information required has changed. Between the wars, it was primarily a question of assessing want, either of calories or of nutrients, and it could be predicted with fair confidence that almost any supplement provided for those in most need would do much good. During the late war, the problem was to feed the country adequately in accord with scientific principles in the face of reductions in the range and variety of foods imported. Today, the plane of nutrition of the population as a whole is probably as high as in any country in the world, but it remains necessary to detect any retrogression either in the population as a whole or in particular sections of it, and there are sections where doubt must exist. We must also be in a position to make early predictions of the effects of changes in food policy, in economic circumstances or in feeding habits. Complacency is not justified when critical review is not regularly made, especially in the field of nutrition where definable, objective criteria of minor deficiencies are lacking.

Therefore, fundamental departures from earlier surveys may be required before the ideal tool for investigation is evolved. It was right, however, to incorporate at the outset techniques already in use, and to make use of agencies already working in this field. Currently, the National Food Survey is the most comprehensive source of nutritional information in this country; in the pilot survey described in this report the dietary information was obtained through Government Social Survey who act in a similar capacity in the National Food Survey and some at least of the procedures followed were modelled on that survey. Equally it was right to examine critically the experience gained and this report includes such examination. This was of course done in the light of the nutritional information obtained; and because this information is itself of interest, it has been included and discussed. Nevertheless it needs to be appreciated that what is reported here is primarily a methodological study.

One of the most gratifying features of the study was the interest taken, and help given, by the experts both within and outside the committee who were

*Now the Committee on Medical Aspects of Food Policy.

consulted. Some of these are listed in the report as participants in the work of the Nutrition Surveys Working Party, which was formed to advise on the practical issues encountered during the planning of the survey and subsequently. Equally gratifying was the response of the local authorities, whose medical and dental staff made a most valuable contribution to the enquiry. Finally, and most important of all, are the children and their parents who so patiently provided the information.

G. E. GODBER,

Chief Medical Officer.

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REPORT ON A PILOT SURVEY OF THE NUTRITION OF YOUNG CHILDREN IN 1963

Introduction

1. The last large scale survey of the nutritional condition of various age and sex groups in Britain was made between 1948 and 1951, when food rationing was still in force. The state of nutrition in subsequent years can to some extent be inferred from "running indices" based on material obtained by the same methods from year to year, such as the National Food Survey and the growth rate of schoolchildren; but, with the passage of time, such indices become increasingly difficult to interpret in terms of separate age/sex groups. The Chief Medical Officer's Committee on Medical Aspects of Food Policy have accordingly recommended a programme of nutrition surveys of various sections of the community which from a nutritional point of view are considered to be of special interest. One of these priority groups is pre-school children.

2. The survey described in this report was planned as a first step towards obtaining comprehensive and up-to-date information on the nutrient intakes and nutritional condition of children under the age of five. It was undertaken primarily to gain experience of the methodological problems involved in obtaining and interpreting information of this kind, making use of modern data-processing techniques, and it is hoped to apply the experience so gained in a larger scale survey covering more children in a wider selection of areas. The work already carried out, embracing as it does a fairly wide range of data collected from over 400 pre-school children, well distributed as to age, social class and locality, has proved of more than merely methodological interest, and the findings are thought to be of sufficient value to warrant the wider attention that publication allows. As methodological considerations were uppermost in the design of this exercise, however, a caveat must be entered against too conclusive an interpretation of the nutritional findings. This applies to the report generally, but with particular force to some aspects where reservations are made in the text. The procedures employed in the survey are described in some detail not only because of any intrinsic interest they may possess, but also to enable the validity of the findings to be judged. Where appropriate, reference is made to modifications of practices already familiar to nutrition survey workers which the experience of this study has suggested, and to the impact of the widened scope for data analysis afforded by the use of computers.

3. In planning and carrying out this survey, the Health Departments had the benefit of the advice of a Working Party, which included both Health Department representatives and other experienced workers in this field. A list of its members, including those co-opted to give advice or assistance on specific aspects of the work, is given at *Appendix A*. The Government Social Survey were responsible for the sampling; the dietary fieldwork was carried out under arrangements made by Government Social Survey with the British Market Research Bureau. The interviewers were trained specifically for the survey but had no special knowledge of dietetics or nutrition. The computer work was done by the London University Atlas Computer Service. Wherever parents' consent was obtained, the children were examined by local authority medical and dental officers; we are indebted to the Medical Officers of Health and their officers in the areas concerned for their co-operation in shouldering the work that this entailed.

Scope and Procedure of Survey

4. The survey was aimed at producing diet records of about 450 children living in private households. For practical reasons, those who were found to be breast-fed or who went to nursery school were excluded. In fact, 434 satisfactory and usable diet records were obtained, representing a response of 60 per cent of those within the scope of the survey (725) and 67 per cent of those interviewed (651). Details of the sampling method and an analysis of the response are set out in *Appendix B.*

5. A specimen of the dietary record book is included at *Appendix C.* This was used to record a week's consumption of food and other items of nutritional value, and was compiled by the child's mother or other responsible person in the household, under the guidance of an interviewer. The compilers were asked to record by weight each separate item of food given to the child and the amount left. Scales calibrated in units of one-third of an ounce were lent to the household for this purpose. Reference is made in *Appendix E* to some difficulties which arose in connection with the recording of diets.

6. Nutrition surveys are of much greater value as an instrument of food policy if they include the collection of data enabling findings to be interpreted in terms of socio-economic and other environmental conditions; this is because the better the information which can be obtained in this respect, the more readily can groups be identified according to salient characteristics of the child and of the household, to enable them to be studied in relation to the nutritional data. Clear identification of groups whose members are most liable to suffer from a nutritional deficiency may be a pre-requisite for any administrative action. The nature of the non-nutritional information which was obtained can be seen from the specimen of the form on which interviewers reported, included at *Appendix C.*

7. Information from a dietary survey is enhanced by information on the physical condition of the person eating the diet. When the mother was willing, the child received a medical and dental examination in the local health authority clinic. The numbers so examined are given in *Appendix B.* Arrangements were made to carry out these examinations as soon as possible after the week of dietary recording—in most cases within three weeks. Specimens of the examination record forms are included at *Appendix C.*

Processing the data

8. The dietary fieldwork and the medical and dental examinations were carried out between May and September, 1963. The four sets of records were edited and coded, and the coded results recorded on punched cards for processing by computer. All foods consumed during the survey were coded and their nutrient content calculated by reference to food tables specially prepared for this survey. Details of the principles on which these tables were based and the methods used for the calculation of nutrient content are contained in *Appendix D.*

9. The principal standpoints from which the tabulations were arranged were (*a*) the intakes of selected individual foods and food supplements, and of nutrients, (*b*) the frequency distribution of intake of different nutrients and certain basic foods, and (*c*) the inter-relationships between nutritional, socio-economic, medical and anthropometric findings. A very full tabulation programme was drawn up in advance, aimed at providing the maximum of useful information and enabling the correlations to be made which it was considered might be nutritionally significant. To the extent that this was experimental, it was to be expected both that some of the tabulations might be of little value and that the data which emerged might reveal aspects which were inadequately covered or could have been dealt with in a better way. It was, for instance, found necessary to make a subsequent, more detailed, analysis of the socio-economic facts and stature of children according to their intakes of the more important nutrients and of milk. This is described in *Appendix G*, which illustrates also the kind of uses to which information from a nutrition survey can be put.

10. Although data-processing by computer in this field introduces no fundamental changes in principle, it does enable detailed information to be stored and complicated calculations and interrelations to be made with less expenditure of time and labour than by other methods, including, for example, the conversion of items of food intake into equivalent nutrient values or the calculation of equations linking, say, growth to nutrient intakes and other factors. On the other hand, the demands of computer programming increase the amount of pre-planning and, without ready access to the computer, involve some loss of flexibility in handling the data and in following up any aspects the importance of which may not become apparent until the results begin to emerge.

Findings from the survey

11. As has been pointed out in the introductory section, the main reason for carrying out this survey was to obtain methodological experience—in the kind of response to be expected, in fieldwork techniques, in the problems of detailed diet recording and in the use of computers in processing the data—but the nutritional findings were in themselves of value, even though they must be regarded as provisional. *Appendix E* sets out briefly some of the methodological considerations which were studied by sub-groups formed from members of the Working Party, and include suggestions for ways of increasing the effectiveness of the methods that were employed. The nutritional findings are summarised, with tables and diagrams, in *Appendix F*. These two appendices should be read in conjunction. Discussion of the efficacy of the methods and of possible improvements involve a consideration of what was found and how this was used; and, conversely, the nutritional findings need to be treated with reserve where there are methodological limitations.

12. *Appendices G and H* deal in greater detail with two particular aspects. The former discusses some inferences drawn from the survey data with regard to the place of milk in young children's diets, its nutrient contribution and relationship to growth and physical condition. It exemplified the kind of study and assessment that can be made of information derived from nutrition surveys.

As tests of haemoglobin levels could not be made satisfactorily upon the children in this survey, an independent study was carried out of representative samples of children aged 1—2 years in one rural and one industrial area. The results of this study are contained in *Appendix H.*

Conclusions

13. For purposes of food policy, information is needed which is not only very detailed, involving dietary, clinical, biochemical and anthropometric investigations, but also true of the country as a whole. In other words, both depth and breadth are important. The collection of such detailed evidence on a national scale would be a formidable task, and would probably be impracticable. One alternative is to put the emphasis on breadth and to attempt to fill in the picture by independent studies in depth in localities where this can best be done. Another alternative is to make a limited number of studies in depth, the results of which might be applied to the country as a whole by the collection of information in a simpler form, but from a representative sample, concentrating perhaps on factors which have been found to be indicative of poor nutrition in the surveys made in depth.

14. In the pilot survey described in this report, the first of these approaches was tried, the study being made in breadth, but in as detailed a way as was practicable. In assessing the value of the *approach*, it needs to be remembered that some at least of the shortcomings arose from inexperience and might be avoided or reduced in future. Those which are inherent, however, are pertinent to an assessment of the value of the approach. Unquestionably, valuable information has emerged of a sort which cannot be got from the National Food Survey. Given similar information on other age-groups, the National Food Survey's data on family diets might be more readily interpreted in terms of how the food was divided within the family, though of course only an idea of what happened in the average family would emerge (the simultaneous recording of the diets of all members of a family is a task which has never been successfully achieved). The evidence obtained on the importance of milk in the child's diet and on the variations in milk consumption is of interest. But all this could probably be got from localised studies in depth with equal certitude. The relationships between stature and nutrient intake which have emerged would, for statistical validation, require large numbers of observations, such as can be got more easily in broad studies than in deep ones (though fewer subjects might suffice if the heights of parents were obtained, enabling allowance to be made for variations due to genetic influence). Finally, a study in breadth undoubtedly gives greater assurance that geographical differences in dietary pattern, if they exist, will be taken into account.

15. On the other hand, some of the defects of the study in breadth might constitute less of a problem in studies made in depth. For example, the non-responders (almost one-third of the subjects in this survey and in the National Food Survey) who may include those most at nutritional risk, might be fewer in localised studies in depth, influenced perhaps by local pride and enthusiasm and by the prestige and popularity of those in the area under whose aegis the studies are done. The effect of subjectivity in clinical examinations, which in

a broad-based survey are made perforce by many observers, should be less of a drawback in localised studies, where the use of fewer observers enables them to work more nearly to a common standard. Another drawback of the broad survey is that the biochemical findings obtained from supplementary studies cannot be directly related to the dietary and other findings. Again the reservations about the reliability of some of the figures of individual intakes (*Appendix F;* paragraphs 1, 2 and 6) stem in part from the fact that in a survey in many widely-scattered localities the interviewers cannot be so closely supervised (nor indeed because of the number required and the places to be served, can people with the most suitable experience and capabilities always be recruited as interviewers) as should be possible in studies in depth in selected areas. The latter should, accordingly, gain in accuracy.

16. Other drawbacks which have been mentioned in this report are inherent in all nutritional investigations, whether in depth or breadth. These include the uncertainty as to the extent to which the diet consumed in one week is typical, assumptions which have to be made about the composition of foods; and the paucity of scientific evidence on the requirements of nutrients and on the extent to which these vary among individuals, which would give a satisfactory basis for the assessment of the theoretical adequacy of the diets consumed.

17. This catalogue of defects should not, however, obscure the value of the findings that did in fact emerge and should emerge on a more substantial scale from the larger study which is planned. Whether the approach by means of studies in depth would be more valuable remains to be tested out in practice and depends upon the extent to which it proves practicable to apply such findings to the country as a whole. In short, reliance on one approach only is unlikely to provide the complete answer. The best combination of methods has yet to be evolved in the light of experience, to which this survey is a contribution.

APPENDIX A

Nutrition Surveys Working Party

Ministry of Health

Dr. D. Thomson* } Chairman
Dr. R. M. Shaw* } Chairman
Dr. R. H. L. Cohen } Chairman

Miss M. P. Newton* } Secretary
Mr. F. J. Downer } Secretary

Dr. W. T. C. Berry
Dr. B. Benjamin*
Dr. E. R. Bransby
Mrs. M. M. Disselduff
Mrs. J. M. Firth
Dr. P. W. Fleming*
Dr. M. A. Heasman*
Mr. J. E. King*
Dr. E. L. Murphy
Mrs. M. A. J. Pearson*
Dr. J. M. G. Wilson*

Scottish Home & Health Department

Dr. I. M. Macgregor*
Dr. M. E. Mitchell
Dr. I. N. Sutherland*
Miss M. J. Yeats*

Welsh Board of Health

Dr. D. Thomas*
Dr. M. M. Gray

Ministry of Health & Local Government, N. Ireland

Mr. W. L. Kean

Ministry of Agriculture, Fisheries & Food

Miss D. F. Hollingsworth
Miss J. Robertson

Government Social Survey

Mr. W. F. F. Kemsley
Mr. C. G. Thomas*

(*No longer serving)

Department of Education & Science
Mr. J. Rodgers

Ministry of Social Security
Dr. W. D. T. Brunyate

Medical Research Council

Miss J. W. Marr	Social Medicine Research Unit
Dr. G. Parry Howells*	Protection against Ionising Radiations Committee
Dr. A. M. Thomson	Reproduction and Growth Research Unit, University of Newcastle-upon-Tyne

Usher Institute, University of Edinburgh
Dr. J. W. B. Douglas*

Institute of Physiology, University of Glasgow
Dr. J. V. G. A. Durnin

British Market Research Bureau
Mr. J. E. Fothergill
Mr. A. Wicken*
Mr. D. Osborne*

(*No longer serving)

APPENDIX B

Sampling and Response

1. Making allowance for those who would not come within the scope of the survey and for non-responders, it was estimated on experience based to some extent on the National Food Survey, that a sample of 1,000 children under 5 years of age would be required to produce about 450 diet records. The sample was drawn by the Government Social Survey through the medium of welfare milk application records held by local offices of the Ministry of Pensions and National Insurance, as it then was, and consisted of 40 children in each of 25 randomly selected areas in the following places:—

Accrington, Lancs.
Balham
Bedford
Beverley, Yorkshire
Birmingham
Dundee
Farnworth, Lancs.
Fulham
Glasgow
Godalming, Surrey
Havant, Hants.
Kentish Town
Kingston-upon-Thames
Leeds
Leek, Staffs.
Loughborough, Leicestershire
Manchester
Middlesbrough
Nottingham
Okehampton, Devon
Rhyl
Southend-on-Sea
Stretford, Lancs.
Wallingford, Bucks.
Wishaw, Lanarkshire

The sample was stratified by age to give equal numbers in the following five age groups:—

9 months and under 1 year
1 and under 2 years
2 and under 3 years
3 and under 4 years
4 and under 5 years.

2. Of the 1,000 children selected for the sample, 275 were found to be outside the scope of the survey for the following reasons:—

Moved away	174
Temporarily away	28
Died	4
Not known at address	13
At school	44
Still breast-fed	3
Other reasons	9

725 children thus came within the scope of the survey and an interview was obtained in 651 cases (15 mothers refused an interview and 59 could not be contacted). 556 mothers agreed to keep the diet record and 434 of them did, in fact, produce acceptable diet records. In 341 cases, 79 per cent of the 434 cases in which a diet record was obtained, the child was medically examined (and another 17 were weighed and/or measured at home but did not see a doctor) and all except 27 of these (viz. 314) received dental examinations.

3. An analysis follows of the numbers interviewed, those whose diet was recorded and those who were medically examined, by the main socio-economic classifications employed in the survey.

	Total cases within scope of survey for whom there was an interview*	Cases in which a satisfactory diet record was kept		Cases in which a full medical examination took place	
		Number	(b) as % of (a)	Number	(d) as % of (b)
	(a)	(b)	(c)	(d)	(e)
All children	650	434	67	341	79
Number of children under 15 in household:–					
1	170	120	71	85	71
2	256	172	67	139	81
3	130	83	64	73	88
4 or more	94	59	63	44	75
Gross income grade (£ per week):–					
£23 10s. 0d. or more... ...	80	56	70	44	79
£14 10s. 0d. and under £23 10s. 0d.	300	221	74	174	79
Under £14 10s. 0d.	270†	157	58	123	78
Registrar-General's Social Class:–					
I and II	133	100	75	77	77
III non-manual	75	59	79	44	75
III manual	250	158	63	124	79
IV and V	138	83	60	69	83
Others ⌀	54	34	63	27	79
Age at which mother left school:–					
15 or under	477	312	65	248	80
16 or over	155	112	72	84	75
Not available	18	10	56	9	90
Whether mother working:–					
No paid work	551	389	71	311	80
Some paid work	99	45	46	30	67

*Excluding one case of a lost questionnaire
†Including one case where income not known.
⌀ Includes armed forces, unemployed and cases where the occupation was not available.

4. The proportions that this last category (those medically examined) bear to the preceding one (those whose diets were recorded) are fairly consistent throughout; this, coupled with the fact that there was no important difference

in average nutrient intake between these two categories (see Table 1; *Appendix F*) suggest that the children medically examined are representative of all the children whose diets were recorded. But the proportion of those who completed their dietary records in Social Classes IV and V, in families with four or more children, and in households where the mother did paid work, all tend to be low. The poorest response is thus among the groups in which malnutrition is most likely to be present. The proportion (over 10 per cent of those within the scope of the survey) who could not be interviewed may also be pertinent in this connection. The experience gained may help to reduce these 'losses' in future surveys, but some deficiency in representation of those who are potentially the worst nourished is probably inherent in surveys of this type. The findings from such surveys have to be used in the knowledge of, and making allowance for, defects of this nature.

APPENDIX C

Specimen Diet Forms and other forms used in survey

Sampling Area Code | 0 | | | (1 2 3)

Serial Number | | | | | | (4 5 6)

DIETS OF YOUNG CHILDREN
CONFIDENTIAL

The particulars you give will be treated in strict confidence.

APPOINTMENTS

DATE	TIME

Using the Record Book

1. Please record ALL your child has to eat or drink.
2. Please use one line for each separate item of food.
3. For each meal served, record the time in the "WHEN SERVED" column.
4. For each separate item of food say what it is and if cooked, how. For example, food should be described:

LIKE THIS:–	NOT LIKE THIS:–
Boiled beef	Meat
Fried cod	Fish
Mashed potatoes	Potatoes
Steamed spinach	Vegetables
Raw apple	Fruit
Rice pudding	Pudding
Toasted brown bread	Bread
Cream biscuits	Biscuits
Chocolate	Sweets
Raspberry jam	Jam
Evaporated milk	Milk

Drinks should be described:

LIKE THIS:–	NOT LIKE THIS:–
Cocoa powder	Cocoa
Liquid milk	
Water	
Sugar	

(To be detached in the office)

Name of child.....

Name of mother.....

Address.....

.....

Weighing or measuring the food

5. Food and drinks should be weighed at the time when they are served. Always weigh on a plate or in a cup.

6. In general the method of weighing is to put the empty plate or cup on the scales. Write the word "plate" or "cup" on a line and write in the "SERVED" column the number opposite the pointer. Then put the first item of food (or drink) on the plate (or in the cup), write down the name of the item in the "FOOD/DRINK" column and record the number now opposite the pointer. Then do the same for the next item of food (or drink), and so on.

7. Please measure out small amounts (e.g. of sugar, cocoa, jam, etc.) in teaspoons, stating the number of teaspoons in the "SERVED" column. Please **also** record the number opposite the pointer after you have put the item of food on the plate (or in the cup).

8. In foods such as stew, weigh the various solids separately as far as possible, then the liquid.

9. If your child has any meals out, we should be grateful if you could arrange for the food to be weighed as usual.

Dealing with left-overs

10. If the plate or cup is empty after the child has finished with it, please write "NONE" in the "weight; tick; fraction" column on the same line as you used for recording the weight of the plate when serving the food.

11. If any of the food or drink is left, please put the plate or cup back on the scales, and record the weight in the "weight; tick; fraction" column, opposite the weight you found for the empty plate at the start of the weighing.

12. In the case of food, but not drinks, if anything is left put ticks in the "weight; tick; fraction" column to show which kinds of food are left. Beside each tick please indicate approximately how much of the left-overs this item comes to: e.g., $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, or all. Under the heading "Notes", please make any further comments you think necessary, e.g. "Mostly crust" or "About half bone."

13. If any of the food or drink is spilt, besides weighing what is left please indicate roughly how much of the original was lost (e.g. "About $\frac{1}{4}$ spilt").

Sweets, Biscuits, Ice Cream, etc.

14. Sweets, etc., eaten in the house between meals should be recorded in detail (e.g. 4 chocolate drops, 1 ice cream cornet) and weighed. This applies also to such things as medicine (which may be measured in teaspoons full or drops). If sweets, biscuits, ice-cream or anything of this kind is eaten while the child is **away from the house**, it should be entered in the box at the bottom of the page, and need not be weighed. It is helpful, with items like bars of chocolate, if you enter the price, as we can find out the weight from this.

Bread, Butter, etc.

15. Please put aside a quantity of butter, margarine or dripping if the child usually has them on bread, toast or biscuits, etc. When you serve any of these, e.g. bread, please write down its weight, before spreading. After spreading with the fat record the weight again. If you then put on jam or some other spread, record the number of teaspoons full as well as the new weight.

FATS PUT ON ONE SIDE FOR CHILD

	Weight at beginning	Weight of additions	Weight left	R & L	F			Q	U	P
					T	O	D			
BUTTER										
MARGARINE										
DRIPPING, ETC										

PLEASE USE A SEPARATE LINE FOR EACH FOOD DAY.....

PLEASE PUT DOWN **EVERYTHING** EATEN OR DRUNK TODAY DATE.....

WHEN SERVED	FOOD/DRINK	SERVED Weight	LEFT OR SPILT Weight: tick; fraction	Notes	Please do not write below: R & L	F	Q T	Q O	Q D	U	P

SWEETS, BISCUITS, ICE-CREAM, ETC. EATEN BETWEEN MEALS

TIME	DESCRIPTION	NUMBER OR WEIGHT	LEFT										

BMRB 44017

DIETS OF YOUNG CHILDREN

TRANSFER FROM SAMPLE LIST:—

Sampling area code | 0 | | | (1 2 3)

Serial numbers | | | | | | (4 5 6 7 8)

RECORD OF PLACING CALLS

Date	Time	Result of call

APPOINTMENTS AND CHECKING CALLS

Appointment made for: Date	Time	Check actually made Date	Time	Notes

9.	10.	11.	12.	13.	14.

(to be detached in the office)

Name of child.....

Name of mother.....

Address.....

.....

0		

(Diets of young children: BMRB 44017)

INTRODUCE YOURSELF

I am .....working on behalf of the Ministry of Health (the Scottish Home and Health Department), who want to find out what sorts of foods young children are getting these days. We should be grateful if I could talk to you about.....

DO NOT MENTION RECORD BOOK OR WEIGHING

1.a) Is .....particularly easy, about average, or particularly difficult to feed?

Easy A
Average B
Difficult C

IF EASY OR DIFFICULT

b) In what ways? .....
.....
.....
.....

2.a) Is there any sort of food he/she particularly **likes**?

Yes A
No B

IF YES (b) What sort? (Any other?) .....
.....
.....
.....

3.a) Is there any sort of food he/she particularly **dislikes**?

Yes A
No B

IF YES (b) What sort? (Any other?) .....
.....
.....
.....

4.a) Is there any sort of food he/she is not **allowed** to eat for health or other reasons?

Yes 15. A
No 1

IF YES (b) What sort? (Any others?) .....
.....
.....
.....

5.a) When you make gravy, do you ever make it with flour or cornflour?

Yes A
No B

IF YES (b) Do you **always** make it with flour or cornflour, or only **sometimes**?

Always C
Sometimes D

6.a) When you serve him/her with meat including such things as bacon, do you usually make a special point of cutting off any fat?

Yes A
No B

IF YES (b) Is that for all kinds of meat or only for some kinds?

All C
Some only D

IF ONLY SOME KINDS (c) Which kinds?.....
... .

7.a) Do you ever serve him/her with baby cereal nowadays?

Yes	A
No	B

IF YES (b) Do you make it with milk and water, milk only or water only?

Milk and water	C
Milk only	D
Water only	E

8.a) Do you ever serve him/her with porridge nowadays?

Yes	A
No	B

IF YES (b) Do you make it with both milk and water, milk only or water only?

Milk and water	C
Milk only	D
Water only	E

9.a) Does he/she **regularly** have any meals away from home?

Yes	A
No	B

IF YES (b) Where? (Anywhere else?) .....
.....
.....

b) Where might he/she have occasional meals, or snacks away from home? (Anywhere else?) .....
.....
.....
.....

c) Where might he/she have sweets or ice cream away from home? (Anywhere else?) .....
.....
.....
.....

10.a) Would you say that his/her health is generally very good, about average or not very good?

Good	A
Average	B
Not very good	C

IF NOT VERY GOOD (b) In what ways? .....
.....
.....
.....

16.

11.a) During the last two weeks has he/she seen a doctor?

Yes	A
No	B

IF YES (b) What was wrong?.....
.....
.....
.....

17.

12. What was his/her date of birth?.....

18.
19.

CODE WHETHER CHILD IS .....

Boy 20.	1
Girl	2

CLASSIFICATION A

HOUSEHOLD COMPOSITION

(i) Can you tell me who else there is in your household besides yourself? (I don't mean people who cater for themselves separately). First, your family and relatives.

THE FAMILY UNIT

Code no.	Relationship to informant	Sex (M.or F)	Marital status (married, single) or widowed)	Age last birthday	Paid job? (hrs. per week) 30+	10–30	1–9	0	U	S/H
1	MOTHER				1	2	3	0	4	5
2	SELECTED CHILD				1	2	3	0	4	5
3.					1	2	3	0	4	5
4.					1	2	3	0	4	5
5.					1	2	3	0	4	5
6.					1	2	3	0	4	5
7.					1	2	3	0	4	5
8.					1	2	3	0	4	5
9.					1	2	3	0	4	5

IF MOTHER WORKS CODE WHETHER at home 1 Away from home 2

IF AWAY FROM HOME

What arrangements are made for the child's meals?.....

(ii) Is there anyone else, not related to you, (blood or marriage), who is a member of the household, that is, who is catered for with the family unit? (LIST BELOW)

OTHER HOUSEHOLD MEMBERS

10.					1	2	3	0	4	5
11.					1	2	3	0	4	5
12.					1	2	3	0	4	5

(iv) Who is the person who does most of the cooking and shopping for the household? Informant 1; Other person 2

(v) How old were you when you finished your full-time education, 15 or under 1; 16—18 2; 19—23 3; 24 or over 4; still at school or college 5

(vi) Do you (or some other member of your family you have mentioned), **own** this house/flat, or **rent** it, or do you live here **rent-free**?

Owns.....Rents.....Has rent-free.....

(vii) Which member of your family living here actually owns it/is responsible for the rent (i.e. has his/her name on the rent book)/is responsible for you (your family) having it rent-free?

This person is (code no. from above).....

COLLECT DETAILS OF THIS PERSON'S OCCUPATION
(OR HER HUSBAND'S IF SHE IS A MARRIED WOMAN)

(viii) What type of firm or organization does/did (this person) work for? (STATE TYPE OF FIRM, WHAT FIRM MAKES, ETC.).....

(ix) What job does/did (this person) actually do?.....

(x) Does/did (this person) hold any particular **position** in the organization? (e.g. 'foreman', 'typing supervisor', 'office manager', 'company secretary' etc.)

IF IN CIVIL SERVICE, FORCES, POLICE, ETC.

What rank or grade?.....

(xi) **IF PROPRIETOR OF BUSINESS OR A MANAGER:** About how big an organization is this? For instance, roughly how many people work at the place where (this person) works (incl. this person)?

25 or more.....10–24.....Less than 10 (state no.).....

21.	22.	23.	24.	25.	26.	27.	28.	29.
30.	31.	32.	33.	34.	35.	36.	37.	38.

13. Does he/she go to a nursery or day school of any kind?

Yes	A
No	B

IF YES GO TO CLASSIFICATION B

IF CHILD IS UNDER 2 YEARS OLD

Is he/she fully weaned?

Yes	A
No	B

IF "NO"

ESTABLISH WHETHER CHILD IS BOTTLE FED, BREAST FED OR BOTH

Bottle only	C
Breast only	D
Both	E

IF CHILD IS STILL BREAST FED AT ALL, GO TO CLASSIFICATION B

INVITE MOTHER TO KEEP RECORD

In order to find out exactly how much food children are getting, it is necessary to weigh what they have. We should be grateful if you would weigh all the food your child eats during a week.

Mother agreed	A
Did not agree	B

IF MOTHER DOES NOT AGREE TO KEEP RECORD

STATE REASON AND GO TO CLASSIFICATION B

IF MOTHER AGREES TO KEEP RECORD

(a) TELL HER THAT THE CHILD SHOULD HAVE USUAL MEALS

(b) EXPLAIN THAT ALL THE FOOD THE CHILD EATS SHOULD BE RECORDED, INCLUDING SWEETS AND SNACKS, WHETHER EATEN AT HOME OR ANYWHERE ELSE

(c) HAND OVER THE SCALES AND PLATE, AND ASK TO COME INSIDE TO GIVE A DEMONSTRATION

(d) COMPLETE A DUMMY WEIGHING AND GET HOUSEWIFE TO DO THE SAME

(e) ARRANGE TIME FOR FIRST CHECKING CALL AND CLOSE THIS INTERVIEW

CLASSIFICATION B

(Final interview)

ASK QUESTIONS 15–19 ONLY IF RECORD BOOK HAS BEEN KEPT

15.a) Generally speaking, would you say that during this last week he/she has been eating better, worse or about the same as usual?

IF BETTER OR WORSE (b) Why is that? .....
.....
.....
.....

Better	39.	A
Worse		B
Same		1

16.a) Has his/her health during this last week been better, worse or about the same as usual?

IF BETTER OR WORSE (b) Why is that? .....
.....
.....
.....

Better	40	A
Worse		B
Same		1

17.a) Has he/she been doing the same sort of thing as usual this week, or has he/she done anything special?

IF ANYTHING SPECIAL (b) What sort of things?.....
.....
.....

Same	41	1
Special		A

18.a) Were things much about the same as usual in the house during the last week or did anything special happen?

IF ANYTHING SPECIAL (b) What was that?.....
.....
.....

Usual	42	1
Special		A

19.a) Are there any things you have to do which other mothers, generally speaking, do not have to do, such as looking after old people?

IF YES (b) What? .....
.....
.....

Yes	43	A
No		1

ASK ALL

ASK ABOUT PERSON WHOSE OCCUPATION WAS RECORDED IN CLASSIFICATION A

20. Would you mind telling me what .....'s **net weekly** income is? (Net = after Income Tax and National Insurance).....

STATE WHETHER:—

NET	N	GROSS	G		
ACTUAL	A	ESTIMATED	E		
WEEKLY	W	MONTHLY	M	YEARLY	Y

IF NOT GIVEN SHOW CARD AND RECORD CODE NUMBER IF MENTIONED.....

44.	45.	46.	47.	48.

IF INCOME IS LESS THAN £8 NET (OR £9 GROSS)

21. (*a*) Does any one in the household have a larger income than.....? Yes A
No B

IF YES (*b*) Who has the largest income?.....

(*c*) How much is it?.....

STATE WHETHER:— Net N Gross G
Actual A Estimated E
Weekly W Monthly M Yearly Y

(d) What type of firm or organization does/did (this person) work for? (STATE TYPE OF FIRM, WHAT FIRM MAKES, ETC.).....

(e) What job does/did (this person) actually do?.....

(*f*) Does/did (this person) hold any particular **position** in the organization? (e.g. 'foreman', 'typing supervisor', 'office manager', 'company secretary', etc.)

IF IN CIVIL SERVICE, FORCES, POLICE, etc.

What rank or grade?

(g) **IF PROPRIETOR OF BUSINESS OR A MANAGER:** About how big an organization is this? For instance, roughly how many people work at the place where (this person) works (incl. this person)? 25 or more.....10–24.....Less than 10 (state no.).....

IF MOTHER SEEMS FOREIGN FROM APPEARANCE, SPEECH, OR IMPRESSION

22. (*a*) How long have you been living in this country?.....

(*b*) Which country did you come from?.....

49.	50.

ASK Q.23. ONLY IF RECORD BOOK WAS KEPT.

23. (*a*) The survey will be more useful still if the children in it can be seen by a doctor. It would be very helpful to learn how their size, weight and general health are affected by what they eat, so that in future doctors can advise mothers what children should eat to be even healthier. We would very much appreciate it if you would agree to give us this extra help.

Mother agrees to take child to see doctor A
Mother does not agree B

(*b*) Would you mind taking him/her to see a dentist, just to **look at** his teeth? (No treatment)

Agrees C
Does not agree D

IF CODED "B" ABOVE

(c) The doctor would only take about a quarter of an hour to look at him/her (No treatment)

Now agrees E
Still does not agree F

IF CODED "F"

(d) Would you mind if someone came just to weigh and measure him/her in a few weeks' time?

Agrees G
Does not agree H

IF MOTHER AGREES TO TAKE CHILD TO DOCTOR/DENTIST EXPLAIN ARRANGEMENTS AND RECORD HERE:—

APPOINTMENT MADE FOR: Date.....Time .....

Place .....

OTHER ARRANGEMENT: .....

THANK YOU FOR YOUR HELP

REMINDER IF RECORD BOOK WAS KEPT

1. Did you check that all bread entries were properly described? Yes A
   No B
   (White: milk/currant/speciality/starch reduced (slices, rolls, loaf)/Ordinary Brown: Hovis wholemeal/malt/ordinary)

2. Did you check that all milk entries were properly described? Yes A
   No B
   (Ordinary/Jersey/evaporated/condensed/ national dried/other dried)

Interviewer's Signature..... Date .....

51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
71.	72.	73.	74.	75.	76.	77.	78.	79.	80.

Confidential

NUTRITION OF PRE-SCHOOL CHILDREN
(Pilot Survey, 1963)

MEDICAL EXAMINATION

Arrangement made with mother of child, for medical examination:—

Particulars of appointment if made:—

Date .....

Place.....

Time.....

Other arrangements if appointment not made:—

.....

.....

.....

.....

Local Authority Area.....

Sampling area code | 0 | | | (1 2 3) Serial numbers | | | | | (4 5 6 7 8)

Name of child.....

Sex.....

Name of mother.....

Address.....

.....

Sampling area code | 0 | | | (1 2 3) Serial numbers | | | | | (4 5 6 7 8)

(With detachable copy to be retained by Medical Officer of Health)

STAT/NS. 1

MEDICAL EXAMINATION

Sampling area code: 0 | | (columns 1 2 3)

Serial numbers: | | | | | (columns 4 5 6 7 8)

Date of examination .....

For office use

Sex of child 55–56

Date of birth of child: month.....year..... 57–58

59

Month of exam. 60

HISTORY

1. Has the child been in hospital in the last six months? (Please ring the appropriate answer) 61

No 1

Yes

If so, please give reasons below.

.....

.....

.....

2. If the child was ill at the time of examination, please specify. 62

.....

.....

.....

MEDICAL EXAMINATION

(Full-strip examination in accordance with the procedure of the School Health Service) 63–65

1. **Height**
(Required for children of 3 years old or over) { inches* / or cm.....

Please specify the kind of apparatus used, (e.g. school measuring apparatus, measuring rod, etc).

.....

Was the child co-operative for this measurement?

.....

2. **Weight** 66–68
Nude if possible. If not, state how clothed ø { lb. ..... / or kg. .....

.....

Please specify the kind of apparatus used (e.g. school weighing machine, clinic machine, portable apparatus, etc.)

.....

*To the nearest ¼ inch.
øTo the nearest ¼ lb. or 100 grams.

The following questions should be answered by ringing the appropriate category in column 1 and inserting verbal explanations, additionally, as indicated.

	Column 1	Column 2– for office use
3. **Obesity**	Obese	1 69
	Plump	2
	Normal	3
	Thin	4
	Very thin	5
4. **Posture** (standing)		70
	Normal	1
	Abnormal:–	
	Lordosis	2
	Kyphosis	3
	Scoliosis	4
	Other	5
5. **Physique** (physical condition)		71
	Satisfactory	1
	Unsatisfactory	☐
If unsatisfactory, please specify why.		
.....		
6. **Gums** (if consent has been given to a dental examination this need not be answered)		72
(a) Do the bases of the upper incisors bleed after manual pressure?	No	1
	Yes	2
(b) Is gingivitis (not localised to one tooth) present?	No	1 73
	Yes	2
7. **Lips**		74
Is the child suffering from angular stomatitis?	No.	1
	Yes	2

	Column 1	Column 2—for office use
8. **Tongue**		75
Is the tongue normal or abnormal?	Normal	1
	Abnormal	☐
If abnormal, please specify in what manner		
.....		
.....		
9. **Scurvy**		76
Is the child suffering from scurvy?	No	1
	Yes	☐
If so, please indicate whether the diagnosis is based on evidence of:—	Major bruises	2
	Petechial haemorrhages	3
	Bleeding gums	4
	X-ray	5
	Other	6
10. **Rickets**		77
Is the child suffering from rickets?	No.	1
	Yes	☐
Is the condition active or healed?	Active	2
	Healed	3
If rickets is diagnosed, has the condition been radiologically confirmed?		78
	No	1
	Yes	2

11. **Other evidence**

If the opportunity has been taken to carry out fuller examination, additional information would be of interest and should be given below or overleaf.

Name of examining doctor .....
(in case clarification of some entry is needed).

Confidential

NUTRITION OF PRE-SCHOOL CHILDREN
(Pilot Survey, 1963)

DENTAL EXAMINATION

Arrangements made with mother of child, for medical examination:—

Particulars of appointment if made:—

Date .....

Place.....

Time.....

Other arrangments if appointment not made:—

.....

.....

.....

.....

Local Authority Area.....

Sampling area code | 0 | | | (1 2 3) Serial numbers | | | | | (4 5 6 7 8)

Name of child.....

Sex .....

Name of mother .....

Address .....

.....

Sampling area code | 0 | | | (1 2 3) Serial numbers | | | | | (4 5 6 7 8)

(With detachable copy to be retained by Medical Officer of Health)

STAT/NS. 2

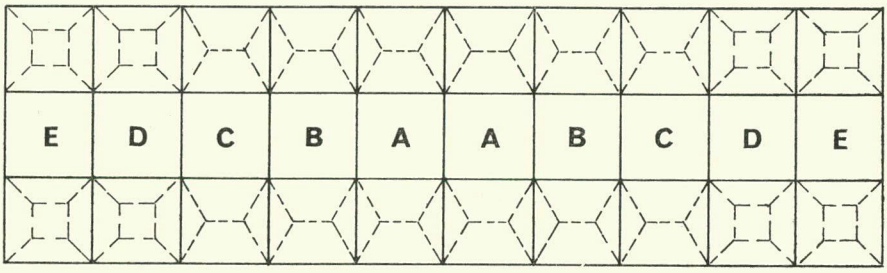
DENTAL EXAMINATION

Date of examination.....

Sex of child.....

Date of birth of child: month.....year.....

1. **Condition of teeth**
Please record the condition of the teeth on the chart below, according to the instructions overleaf.



Please complete the "score" of the above record as follows:—

Number of teeth sound .....

,, ,, ,, carious .....

,, ,, ,, filled .....

,, ,, ,, extracted .....

Total .....

2. **Condition of gums**

(a) Do the bases of the upper incisors bleed after manual pressure?..... No
(ring the answer which applies) Yes

(b) Is gingivitis (not localised to one tooth) present? .....No
(ring the answer which applies) Yes

Name of examining dental officer.....
(in case clarification of some entry is needed)

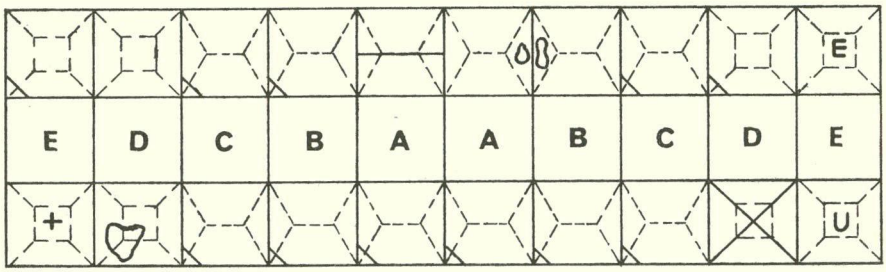
Sampling area code			Serial numbers					Teeth "score"	Gums (a)	Gums (b)	Month of examn.
0											
1	2	3	4	5	6	7	8	55	56	57	58

Instructions for completion of record of dental examination form.

The chart and symbols for recording the condition of the teeth and the type of treatment completed and/or required are shown below.

Symbols:—

Tooth present and sound/ at left hand bottom of square
Tooth missing —
Tooth recently extracted X
Tooth erupting E
Tooth unerupted U
Root present +
Cavity present 0 } According to outline
Filling present ● }



This survey is not concerned with the amount of dental treatment required but with the actual caries experience of each child past, (shown as teeth which have been filled or extracted) and present (shown as carious cavities).

In assessing active caries, no abnormality should be reported as carious unless there is an actual break of surface continuity in which the probe penetrates deeply into the dentine. In recording a cavity, the surfaces actually involved should be shown. A cavity in a proximal surface is a one-surface lesion if the occlusal surface is intact, even though its restoration will eventually involve the occlusal surface.

To ensure that the probes used are uniformly effective each one should be used for no more than 8 children.

APPENDIX D

Food Composition Tables

1. For several reasons it was considered necessary to compile new food tables for this survey. For one thing, the diet in this country has changed in character over the last few years in the direction of more processed foods (often involving new methods of processing) and more made-up composite and "convenience" foods. Again, new information has become available from various sources, including the manufacturers themselves, about the composition of many foods. Another consideration was that log books would be coded by people with no knowledge of food composition, and for this reason each made-up dish was given a single food code in the food table. For instance, minced meat cooked with vegetables could be processed as a single coding factor, instead of being broken up into a number of factors each relating to a separate ingredient.

2. The basis of the analyses used was fourfold—

(*a*) Published data, particularly those of McCance and Widdowson (1960), were used as far as possible.

(*b*) Information was sought from manufacturers and, where necessary, recalculated to correspond with the expression of nutrients in McCance and Widdowson.

(*c*) The nutrient content of many made-up dishes was calculated from representative recipes for which the moisture loss was either determined experimentally, or in some instances calculated.

(*d*) Certain foods were specially analysed at the Laboratory of the Government Chemist.

A list was compiled of all the foods which it was considered might be encountered in the survey. The individual foods were grouped into a standard list of 46 groups and a short list of 12 groups. These are set out in Table 4 (*Appendix F*). The content per ounce of each food was calculated in respect of each of the following nutrients and of added sugar:—Energy value (calories), animal protein, total protein, fat, carbohydrate (monosaccharides), calcium, iron, vitamin A potency, thiamine, riboflavine, nicotinic acid, vitamin C, vitamin D and pyridoxine.

3. A difficult question to answer in advance of the survey was the degree to which distinctions needed to be made between different foodstuffs. Lengthening the list of individual foods directly increases the work, and so the cost of the various parts of the operation (though in some respects grouping of foods may complicate the coding process). On the other hand, if too many foods of more or less similar character are grouped together, the information might be just as useful for most nutrients but perhaps not for all. Much depends on the kind of information desired from the survey. If, for example, it became important in the future to know intakes of iodine, certain food groups would need to be distinguished in the food tables in a different, and perhaps more detailed way.

4. Having regard to the experimental nature of the survey, it was decided to incline the food tables in the direction of more detail, over 1,000 separate codes being provided and about 800 actually used in the analysis. For instance milk included the following categories:—

Ordinary (includes sterilised, pasteurised and T.T.)

Jersey

Dried, National, made up

Dried, proprietary brands, full cream, made up

Dried, proprietary brands, skimmed, made up

Condensed, sweetened, full cream

Condensed, sweetened, full cream, reconstituted

Condensed, sweetened, skimmed

Condensed, sweetened, skimmed, reconstituted

Evaporated, (unsweetened), full cream

Evaporated, (unsweetened), full cream, reconstituted

(Coding dried milk on a made-up basis did not allow for differences in concentration, whether or not the proportions of powdered milk and water used in making up were recorded. Experience in this survey has shown that generally it would be practicable to obtain a dried powder weight, though there would still be some cases where, for instance because the milk was made up in bulk for the whole family, an assessment of the intake would have to be made in terms of dried powder.)

5. Bread was divided into 17 categories. The proliferation of varieties (and different names) of biscuits and other confectionery (chocolate, sweets, etc.) presented a problem, which was tackled by rigorous grouping of those of similar content under one code, though this in turn led to problems in deciding to which code some items should be assigned. Meat dishes were itemised by animal (beef, pork, lamb/mutton, poultry and game), cut (e.g. chop, steak, mince), method of cooking (boiled, roast, fried, grilled, etc.), whether lean or fat, etc., together with the various products—sausages, meat pies and puddings with certain commonly—occurring ingredients, etc. Consequently they took up a large part of the list. Welfare orange juice, rose hip syrup, cod liver oil and 13 other food supplements were listed. Inevitably, a good many foods which had been included in the list were absent, or appeared very infrequently, in the diet records—some of these might figure more prominently in a survey of adult diets; others could probably be grouped or discarded.

6. In the majority of cases the foods consumed were recorded by weight (in one-thirds ounce) and conversion into nutrient content was straight forward. Conversion of unweighed items was more complicated and in some instances could only be done on the basis of making reasonable assumptions as to quantity. Sugar was often quoted in terms of teaspoons. Other foods which were

sometimes given in spoons of various sizes included jams and preserves, fruit juices and cocoa. Fresh fruit was often not weighed but recorded as, for instance, one apple. The same applied to eggs, biscuits and sweets. Some foods such as Marmite and vitamin supplements, though rich in nutrients, are consumed in too small quantities to be weighed. All items of this kind were either converted into ounces and thence into nutrient content (as in the case of a rich tea biscuit) or directly into nutrient values by reference to the unit used (e.g. a drop of A and D liquid, a 4d. ice-cream). The factors used for calculating these conversions were obtained from test weighings, weights given in other diet records in the survey and information from manufacturers.

7. However detailed the food tables and exacting the pains taken to achieve accuracy in the identification and measurement of the foods consumed and their conversion into nutrient intakes, absolute precision can never be obtained in surveys of this kind. The factors making for inaccuracy, which were recognised and taken into account as far as it was possible to do so in compiling the food tables for this survey, can be grouped under four main heads:—

(*a*) imprecision and errors in the weighing and recording of the food and in dealing with that spilt and left over, some of which will elude all checks;

(*b*) the difficulties of distinguishing between all the wide variety of products on the market and the even wider range of domestic recipes and methods of preparation; these are increased by ambiguities in food terminology;

(*c*) seasonal variations in the nutrient content of some foods and differences in variety or due to the soil content of their place of origin; and

(*d*) continuing developments in knowledge of food composition.

APPENDIX E

Techniques learnt from the Survey

1. This question has been discussed in principle in paragraphs 13–17 of this report. The list of more detailed experience given below is not exhaustive, but serves to indicate the kind of lessons learnt.

Sample structure

2. Experience has shown that, using welfare milk application records for the sampling frame, it is not necessary to stratify the sample by age in order to obtain approximately equal numbers in each age group. In contrast, if it is important to study family size, some means of stratification has to be devised if efficiency and economy are to be combined.

3. Restriction of the youngest age group to 3 months (9–12 months) was a mistake. If each age band had been equal in length the need to weight unduly any particular group would have been avoided. A better grouping would be six months and under 1½ years; 1½ and under 2½; 2½ and under 3½; 3½ and under 4½. The inclusion of children from the age of six months would not only widen the scope of the surveys as far as nutritional data were concerned, but might provide useful information for other related purposes.

Duration and scale of survey

4. The season (early summer) of the survey was markedly different in certain respects from other seasons, and for a satisfactory picture a survey should run continuously over a year. It is estimated that not less than 200 subjects are likely to be required in any one family-size category.

Medical and dental examination and stature

5. The conjunction of medical and dietary examinations on a nationally representative sample presents problems which have not been satisfactorily solved in this study. On the one hand, the diagnosis of certain forms of sub-optimal nutrition can only be made subjectively, and a National sample has necessarily involved many different observers. On the other hand, the problems of biochemical or radiological examination of such a sample are formidable. This issue touches closely on the development of nutritional investigations as a tool of policy.

6. Dental examinations, at least of children over 18 months of age, ought to be informative, but in practice study of the various hypotheses advanced for the cariogenicity of food calls for collation and analysis of data in a way which cannot readily be accommodated within a programme suitably designed for study of the nutritional picture.

7. The relationship of height and weight to nutrient intake proved of sufficient interest to warrant special consideration being given to ways of obtaining accurate measurements in the home, thus including those children whose mothers completed a dietary record but failed to bring the children for a medical

examination, and also perhaps some who either failed or refused to complete a dietary record. Trials in the survey of apparatus to measure lying height proved satisfactory, and portable equipment for measurement in the home of lying height and of weight of young children has subsequently been devised.

Diet recording

8. Whilst the training of fieldworkers can now be improved in the light of experience, the most pressing and unresolved problem is that of rapid detection of ambiguities of record.

9. Diet record books were left by the field workers at different times of the day according to when the first interview took place. Mothers were asked to start the record the next time the child had anything to eat and the books were usually collected seven days later, if possible at about the same time of day. This could, and sometimes did, entail missing a final meal on the record, and there were complications in some cases caused, for instance, by lack of consistency in the time of day at which the main meal was taken. Arrangement of the visits to allow seven clear calendar days of diet recording would avoid these difficulties. Meals eaten away from home presented problems which emphasised the need for the instructions on diet recording in this respect to be made as detailed and explicit as possible.

10. The scales lent to mothers for use in the survey were calibrated 1–96, each marking representing one-third of an ounce, which was the basic unit of measurement. Whilst this simplified some of the subsequent data processing, it gave rise to certain difficulties with some mothers. In any case it was considered that these scales did not record small weights accurately enough and that they were difficult for many housewives to read. In future the use of scales recording in units of one sixth of an ounce and calibrated into both whole ounces and sixths of ounces is proposed. A suitable design for the scale face has been evolved.

11. The principle of cumulative weighing proved successful in practice. The empty plate was first weighed and its weight recorded. The first item of food was then placed on it and the total weight recorded, and so on with the addition of each further item. For example, a plate might be recorded as weighing 11 units empty, 14 units with meat added and 20 units with potatoes also added —which would represent 3 units (1 oz) of meat and 6 units (2 oz) of potatoes. (Drinks in cups or glasses were dealt with in the same way, a weight being taken after the addition of each component item.) The computer takes in its stride this kind of complicated individual calculation, which it would be hardly practicable to undertake on a large scale by other methods of data processing. This experience was probably one of the most useful in the pilot survey.

12. The method of dealing with food left unconsumed seemed often to be misunderstood or found impracticable. Spilt food, mashed up food and the general difficulty of relating what was left to what was offered produced many absurd answers. In these cases leftovers were recoded on the assumption that they contained the same proportions of ingredients as the original food. It was clear that the survey procedures were too complicated for mothers and coders

in this respect and that it would be more practicable to ask only for the total weight of leftovers, together with an indication of which foods were left.

Food tables

13. The information from this survey should make it possible to assess the magnitude of error that can arise if food tables are simplified by grouping several items of similar composition under a single head. This task has not yet been undertaken, and if the present food tables were to be published, this would involve the production of an extensive document, likely to be of use only to a limited number of investigators. At present the most suitable procedure seems to be to have copies available at the Ministry of Health for bona fide investigators. This would, of course, have to be subject to whatever reservations were made by manufacturers who supplied information in confidence.

APPENDIX F

Nutritional Findings

1. First, a caveat is required on the wide range of individual values which is revealed in the histograms in respect of each nutrient. This is a feature of all surveys of this nature and has never been completely satisfactorily interpreted. To some extent, no doubt, the variations reflect actual differences between individuals in, for instance, caloric requirement which largely determines the total amount of food eaten. But other factors may well be partly responsible for variations. What is eaten in one week may not always be a good index of what is eaten in other weeks, because, for instance, a child is eating less than usual due to illness or perhaps eating more in convalescence, or the child's behaviour, or the mother's, may be influenced by the fact that the food being eaten is a subject of attention. Finally, omissions, errors and ambiguities in the diet recording and perhaps some inaccuracies and false assumptions in the coding cannot altogether be avoided.

2. This difficulty of interpretation limits the use of dietary surveys as a source of information on the nutritional state of individuals, and there is need for research into the degree of variability arising from these various causes. Were it possible, from dietary determinations, to arrive at a precise estimate of the habitual intakes of nutrients by *individuals*, a meaningful comparison could be made between these and the estimates of requirements made by bodies such as the Expert Committees of FAO/WHO.

Average intakes of nutrients

3. The average consumption of nutrients is given in Table 2 and a comparison is made in Table 6 with the last Ministry of Health survey of this age group carried out in 1951 (Bransby and Fothergill, 1954). The current survey records caloric averages which are consistently 10–15 per cent lower at all ages. Intakes of total protein are also lower at all ages.

4. There are four possible reasons for the differences in caloric intake. They could be actual, reflecting a real difference in caloric expenditure (and hence intake); or they could result merely from the use of different food tables and conversion factors or from some other difference in survey procedure; or they could be due to under-recording in the present, or over-recording in the previous, survey; or they may be the consequence of differences in the sample design of the two surveys. Whether the first of these is likely is a matter for conjecture. As regards the second, the effect of using different food tables has as far as is practicable been excluded as a cause (see Table 8, which shows the results of an analysis of the total food consumed in the 1963 survey in terms of the food codes used in 1951, the nutrient intakes being calculated by reference to the food compositions assumed in each survey). Whether the caloric intakes were over-recorded in 1951 cannot be tested; and comparison with the caloric averages recorded in other surveys made in this and other countries has provided no clear indication as to which set of findings is the more likely to be correct. What the lower average caloric figures do **not** show is that children are under-nourished.

5. It does not follow from the lower recorded intakes of protein that there was a real difference between intakes in the two surveys. Table 8 indicates that, if the 1951 values had been used in the 1963 survey, the mean intakes of protein recorded would have been almost identical with those in the 1951 survey.

Range of values of intake of nutrients

6. Diagrams 1–5 show the distribution of children in each age group according to the intake per day of kcalories, total protein, iron and vitamins C and D (excluding those derived from supplements). As might be expected, the mean figures of nutrient consumption conceal a wide range of values which again may be real but no doubt is at least partially attributable to the factors mentioned in paragraph 1. It is suspected that some part of this is due to minor errors in recording or interpretation of the extreme values for caloric intake, though a special scrutiny failed to reveal this. But though the diagrams indicating the scatter of individual values need to be looked at with these reservations in mind, it was felt that they should be set out diagrammatically to drive home the point that average figures, such as are commonly reported in surveys, can conceal quite important variation below (and above) the mean, and partly because the information may be of value when surveys are made in future years.

7. The average intakes of vitamin D in the diets at ages 1 to 4 are somewhat higher than was found in the 1951 survey (Ministry of Health, *et al*, 1957). The range of intakes in 1951 was not published. At age 9 to 12 months intakes were lower than were recorded by Bransby, Berry and Taylor (1961) in an enquiry which involved specific questions being put about the consumption of foods rich in vitamin D and medicinal preparations. Such questions were deliberately avoided in the present study, which as a result probably gives a truer picture of the intakes of vitamin D from fortified foods, but in which there is no certainty that mothers invariably recorded the consumption of medicinal preparations.

Consumption of important foods

8. The consumption of milk and certain other important foods (meat, fish, eggs, cheese) was analysed separately to show the **total** intake by individuals of each, whether these appeared in the diet as the food itself or as a part of a composite item (e.g. the milk in a milk pudding, the meat in a meat pie, etc.). Diagrams 6 and 7 show the range of intakes of milk and meat respectively.

9. Relatively small amounts of fish were consumed (mean weekly intakes of 0·4 oz. in age group 9 to 12 months, 1·0 oz. at age 1, 1·4 oz. at age 2, 1·7 oz. at age 3 and 1·9 oz. at age 4) and many children ate none during the week of study.

10. For all but the lowest age group, the mean weekly intake of eggs lay between 5·3 and 5·6 ozs. (about 3 standard sized eggs per week).

Contribution of foods to average consumption of nutrients

11. Diagrams 8–14 show in respect of each age group and certain nutrients the percentage contributed to the total intake of each nutrient by the short list

food groups (i.e. classification given in Table 4) which are the main contributors to the intake of that nutrient. The role of milk in supplying a large proportion of several nutrients is obvious. (This is dealt with in more detail in *Appendix G.*)

12. Table 4A covers all the nutrients studied and shows for all age groups combined the nutrient intake contributed by each of the 46 "standard list groups" and 12 "short list groups". The companion Table 4B shows the same data in terms of percentages.

Lowest nutrient intake groups

13. It was hoped that the data on consumption of foods could be analysed in such a way that, where diets were recorded as being particularly poor in their content of one or other nutrient, the explanation might emerge in terms of low intakes of one or more sorts of food. To this end the foods consumed were coded not only separately, but in a limited number of major food groups. This proved unrewarding, owing in particular to the different water content of foods within the same group, which had the effect of obscuring important differences in dietary pattern. The problem of grouping foods in such a way as to show in terms of dietary pattern, what the typical features are of diets that are low in their content of one or other nutrient remains, therefore, to be investigated in future surveys.

Relationship between diet and clinical findings

14. Of 434 children whose diet was satisfactorily recorded, 341 (see *Appendix B*) were examined by a medical officer provided through the helpful co-operation of every local authority in whose area the survey took place. To test the possibility that this process of selection might be reflected in dietary pattern, the mean caloric and nutrient intakes of 337 of these children were compared with the intakes of the other children whose diets were surveyed; as Table 1 shows, no significant difference emerges.

15. Though the medical examiners were particularly asked to look for and report on signs of overt deficiency disease, such as rickets and scurvy, no such disease was reported. Malnutrition need not take such forms, and when encountered in the school population the most usual indication is a falling-off in general condition, manifested as thinness, stunting, pallor (not necessarily associated with anaemia), poor muscle development and tone and poor posture. Between the wars this was fairly common and was termed "poor nutritional state" but during and after the last war it became progressively rarer and, in recognition that it was not necessarily due in all cases to malnutrition, became classified by the term "unsatisfactory general condition". The medical officers were, therefore, asked to report specifically whether or not the physique of the child was, in their view, satisfactory, and though, like most clinical diagnoses, this assessment was based on subjective impressions and, as shown by Jones (1938) and Bransby & Hammond (1956), subject to substantial differences between observers, it was made in ignorance of the dietary and socio-economic findings.

16. The examining doctors recorded, in seven cases, that physique was "unsatisfactory" and in some instances specifically mentioned some of the signs and symptoms described in the preceding paragraph. The remarks made on another child indicated that she also fell in this category. Of these eight children, two only were in families of three or more children. Some had some other condition which might well have been a pre-disposing cause, e.g. mental retardation or some physical condition which made it difficult for them to eat. The nutrient intake of these children was in general below the average for the group as a whole, but not to a marked degree. The question of the eight children considered to be of "unsatisfactory physical condition" is considered in detail in *Appendix G.*

17. Three children were recorded as obese and 84 as plump. The average daily intakes of calories of the obese children were 1,346, 1,405 and 1,447 respectively, close to the mean values recorded for their age-groups. This is in keeping with general experience among older subjects. It needs to be remembered that a comparatively small excess of intake over requirements can lead to a substantial degree of overweight, and in any case obese children may be relatively inactive, with consequent lower requirements of energy. The average recorded intake of added sugar of these three children was 37 gms., 36 gms. and 81 gms., daily, respectively; the average for all children was 52 gms. daily. Thus no indication emerged that sweetstuff had predisposed them to obesity by tempting them to eat beyond the dictates of their food-regulating mechanisms.

18. Thirty-five children were recorded as thin and one as very thin. Of these, three had some disease which would be expected to impair their desire for food. Two had allergic diseases and one suffered from "nerves". Eight were "difficult". The rest had no relevant indication of ill health in their medical records. Generally, lower caloric intakes were not found in this group of children. (Indeed, the children at the extremes of the caloric intake range—Diagram 1—did not tend to be thin or fat respectively.) The average daily caloric intakes of the thin children were—under 12 months (only 2 cases) 826 calories (compared with 980 calories for all children in this age group); 1–2 years, 1,237 calories (1,117); 2–3 years 1,210 calories (1,349); 3–4 years, 1,402 calories (1,341); 4–5 years 1,526 calories (1,545).

19. The recorded average daily intakes of vitamin C, including supplements, of six children whose gums bled on pressure and/or who had gingivitis were 11, 16, 22, 40, 43, and 66 mg. As will be seen from Diagram 4, these values are much the same as those of the group as a whole, and are not of the order of magnitude which would suggest that deficiency of vitamin C was responsible for the condition of the gums.

20. Five children were reported as having angular stomatitis. Their riboflavine intake averaged 0·99 mg. (or 0·9 mg. per thousand calories) compared with the United States recommended allowance of 0·6 mg. per thousand calories (National Research Council, 1964). In adults, though this has never been proved in children, lesions at the angles of the mouth are not necessarily pathognomonic of ariboflavinosis.

21. In planning the study, it was accepted that blood should not be taken from the children. Routine x-ray of bones was held to be not suitable. It is not possible, therefore, to interpret in terms of nutritional state, the vitamin D intakes, which show a very wide range in all age groups, though they compare satisfactorily with intakes recorded in 1951. There is much uncertainty as to the amounts of vitamin D required for health, the part played by sunlight, and particularly the extent to which vitamin D ingested in the first 6 to 9 months of life (e.g. through dried and evaporated milks and certain cereal foods which are fortified with vitamin D) can serve as a reserve for later years. This evidence on vitamin D intakes is under consideration by an expert panel of the Committee on Medical Aspects of Food Policy.

22. The iron intakes compare reasonably on average with commonly recommended allowances, but there is a wide range of values. Information on haemoglobin levels obtained from an independent study by Dr. K. MacWilliam of the Ministry of Health is given in *Appendix H.*

Relationship between stature, diet, and economic characteristics of household

23. The average daily nutrient intake of all the children in the survey is analysed in Table 3 by (*a*) the gross income of the head of the household and the number of children under 15 in the household and (*b*) the age at which the mother left school. For (*a*) the percentage of calories derived from total protein, fat and carbohydrate is also given. The differences in nutrient intake between the groups are remarkably small. Even though in the low income/large family group less animal protein was consumed, this was compensated for by a greater consumption of protein from vegetable sources. The numbers are too small to form a firm basis for policy. The intake for most nutrients tends to be higher in the larger families, but the reverse is the case for vitamins A, C and D when the contribution from food supplements is included. As might be expected, the children of mothers who left school at 16 or over received less carbohydrate, but more protein and most other nutrients, than the other children; they also received more from vitamin supplements. The average age of children whose mothers left school at 16 or over was 4·2 months less than that of other children.

24. Diagram 15 is illustrative of the sorts of relationship that emerge from a comparison between protein intake and weight in the age group 3 to 4 years after adjusting for the differences in weights and food consumption which occur merely because the sample includes children at various ages between 3 and 4 years. The looseness of the correlation may be due in part to genetic differences in stature (these might to some extent have been offset had the heights and weights of the parents been recorded and taken into account) and in part to the fact that one week's intake may not be the same as another's; or it may be that a survey of larger numbers would reveal that no relationship existed.

25. Table 5 shows that the numbers in each group, when the sample is split in terms of family size and age, are too small to reveal any consistent relationship, if it exists, between stature and family size. It is important to test whether such relationships exist, because they consistently appear in samples of school children where they have been sought and any sample of pre-school children

that did not show them would be suspect of bias. In this survey, the measuring of children under 3 was optional. As the same table shows, differences in height emerge with consistency in relation to the age at which the mother left school. The relationship between stature and milk consumption is dealt with elsewhere in this report.

Relationship between nutrient intake and dental caries

26. No clear relationship emerged from a study of the data. It is difficult to process dietary information in such a way as to enable any hypothesis of the causes of caries to be tested, and is even more difficult when several hypotheses are put forward for investigation. It may well be that the most effective procedure might be to have diets "scored" in terms of their hypothetical cariogenicity, by assessors unaware of the dental findings. Even then not many theories of the cause of dental caries can be tested in a survey of this nature, for there are limits to the accuracy with which mothers are willing, or can be relied upon, to record the amount and times of consumption of various foods and the extent to which other, possibly mitigating, foods were consumed before, or after, or at the same time.

TABLE 1

*Comparison between average daily nutrient intake of children who had a full medical examination and children who did not have a full medical examination**

		Children who had a full medical examination	Other Children
Number of children		337 (†)	75
Nutrient intake excluding supplements:—			
Energy value	cals.	1269	1256
Animal protein	g.	26·8	29·3
Total protein	g.	37·7	39·9
Fat	g.	56	57
Carbohydrate	g.	163	156
Calcium	mg.	717	711
Iron	mg.	7·3	7·4
Vitamin A	i.u.	2286	2396
Thiamine	mg.	0·65	0·65
Riboflavine	mg.	1·14	1·16
Nicotinic acid	mg.	5·8	6·1
Vitamin C	mg.	28	27
Vitamin D	i.u.	126	144
Pyridoxine	mg.	0·62	0·65
Added sugar	g.	53	48
Nutrient intake including supplements:—			
Vitamin A	i.u.	2725	2643
Vitamin C	mg.	39	37
Vitamin D.	i.u.	172	169

* 17 children who were measured and/or weighed but who did not have a full medical examination are excluded.

† Of the 341 cases in col. (d) of the table in Appendix B, 3 were not included in the computer analysis because they were medically exceptional children (e.g. one epileptic) and one other case was left out.

TABLE 2

Average daily nutrient intake and standard errors; analysis by age*

	All children	Age 9 months and under 1 year	Age 1 and under 2 years	Age 2 and under 3 years	Age 3 and under 4 years	Age 4 and under 5 years
Number of children	429	86	88	92	84	79
Nutrient intake excluding supplements:—						
Energy value ... ... cals.	1262 (17)	980 (26)	1117 (30)	1349 (38)	1341 (28)	1545 (39)
Animal protein ... ... g.	27·2 (0·4)	24·5 (0·9)	25·7 (0·9)	28·8 (1·0)	27·2 (0·8)	30·1 (1·0)
Total protein ... ... g.	38·0 (0·5)	32·2 (1·0)	34·5 (1·0)	40·3 (1·2)	39·1 (1·0)	44·3 (1·2)
Fat ... ... g.	56 (1)	42 (1)	51 (2)	61 (2)	58 (2)	68 (2)
Carbohydrate ... ... g.	161 (2)	125 (4)	137 (4)	170 (6)	176 (4)	201 (6)
Calcium ... ... mg.	716 (13)	838 (40)	708 (27)	696 (25)	641 (20)	697 (22)
Iron ... ... mg.	7·3 (0·2)	8·0 (0·5)	7·2 (0·5)	7·1 (0·3)	6·4 (0·2)	7·5 (0·2)
Vitamin A ... ... i.u.	2322 (68)	2031 (112)	2125 (119)	2505 (206)	2313 (140)	2655 (143)
Thiamine ... ... mg.	0·65 (0·01)	0·62 (0·03)	0·63 (0·04)	0·64 (0·02)	0·63 (0·02)	0·72 (0·03)
Riboflavine ... ... mg.	1·14 (0·02)	1·23 (0·06)	1·09 (0·04)	1·13 (0·04)	1·08 (0·03)	1·19 (0·05)
Nicotinic acid ... ... mg.	5·8 (0·1)	4·4 (0·2)	5·4 (0·4)	6·0 (0·3)	6·2 (0·2)	7·1 (0·3)
Vitamin C ... ... mg.	28 (1)	20 (1)	25 (2)	29 (2)	29 (2)	36 (2)
Vitamin D ... ... i.u.	131 (7)	222 (24)	134 (14)	110 (9)	88 (9)	98 (7)
Pyridoxine ... ... mg.	0·62 (0·01)	0·51 (0·02)	0·56 (0·02)	0·65 (0·02)	0·65 (0·02)	0·74 (0·02)
Added sugar ... ... g.	52 (1)	34 (2)	43 2)	57 (3)	60 (2)	68 (3)
Nutrient intake including supplements:—						
Vitamin A ... ... i.u.	2740 (108)	2487 (176)	2706 (191)	3002 (256)	2400 (143)	3109 (381)
Vitamin C ... ... mg.	38 (2)	33 (2)	34 (2)	45 (5)	38 (3)	43 (3)
Vitamin D ... ... i.u.	175 (11)	271 (27)	197 (21)	163 (18)	98 (10)	143 (35)

* Standard errors are shown in brackets and are ± the figure given for average daily nutrient intake.

NOTE Some minor differences between the figures given in this table and in subsequent tables for the average daily intake by all children of certain nutrients are due to rounding in the computation.

TABLE 3

Average daily nutrient intake and percentages of calories from total protein, fat and carbohydrate; analysis of both by net income and size of family and analysis of nutrient intake by age at which mother left school

	All children	Analysis by net income of head of household and number of children in household				Analysis by age at which mother left school*	
		Income £14.10.0 or over		Income under £14.10.0		15 and under	16 or over
		1 or 2 children	3 or more children	1 or 2 children	3 or more children		
Number of children	429	196	79	93	61	309	110
Average age in months	30·9	31·0	31·7	29·9	30·8	32·0	27·8
Nutrient intake excluding supplements:—							
Energy value cals.	1262	1231	1314	1259	1298	1272	1242
Animal protein g.	27·2	27·6	27·2	27·5	25·7	26·6	29·1
Total protein g.	38·0	37·8	38·6	37·9	38·0	37·7	38·8
Fat g.	56	55	58	56	54	55	57
Carbohydrate g.	161	155	170	160	174	165	152
Calcium mg.	716	720	742	697	702	695	778
Iron mg.	7·3	7·2	7·0	7·2	7·9	7·2	7·2
Vitamin A i.u.	2322	2367	2436	2316	2038	2274	2448
Thiamine mg.	0·65	0·64	0·68	0·64	0·66	0·64	0·66
Riboflavine mg.	1·14	1·11	1·20	1·15	1·15	1·12	1·20
Nicotinic acid mg.	5·8	5·6	6·2	5·8	6·3	5·9	5·6
Vitamin C mg.	28	28	31	27	25	28	28
Vitamin D i.u.	131	123	137	135	140	124	142
Pyridoxine mg.	0·62	0·62	0·64	0·62	0·60	0·61	0·65
Added sugar g.	52	51	52	54	54	54	47
Nutrient intake including supplements:—							
Vitamin A i.u.	2740	2825	2630	3073	2103	2615	3113
Vitamin C mg.	38	43	39	34	29	35	49
Vitamin D i.u.	175	172	159	217	146	160	214
Mean percentage of calories derived from:—							
Total protein %	12·0	12·3	11·8	12·0	11·7		
Fat %	39·9	40·2	39·7	40·0	37·4		
Carbohydrate %	47·8	47·2	48·5	47·7	50·3		

* There were 10 cases where the mother's school leaving age was not given.

TABLE 4A

Average daily intake of nutrients from diet and supplements, by food groups and supplement groups, for all children (quantities)

All Foods	Energy value (cals.)	Animal protein (g.)	Total protein (g.)	Fat (g.)	Carbo-hydrate (g.)	Calcium (mg.)	Iron (mg.)	Vitamin A (i.u.)	Thiamine (mg.)	Ribo-flavine (mg.)	Nicotinic acid (mg.)	Vitamin C (mg.)	Vitamin D (i.u.)	Pyrid-oxine (mg.)	Added sugar (g.)
	1259.	27·2	37·9	56	161	715	7·2	2733	0·65	1·15	5·8	38	175	0·62	52
STANDARD LIST FOODS—FOOD GROUP NUMBERS SHOWN IN BRACKETS															
Cereals—															
breakfast, dry ... (1)	45	—	1·0	—	11	2	0·4	—	0·07	0·11	0·8	—	—	0·01	1
breakfast, made up ... (2)	7	0·2	0·3	—	1	6	0·1	6	0·01	0·01	—	—	—	0·01	—
baby, dry ... (3)	11	—	0·4	—	2	22	0·7	—	0·05	0·03	0·1	—	19	—	—
baby, tinned ... ... (4)	5	—	0·1	—	1	4	0·2	7	0·01	0·01	0·1	—	—	—	—
misc. made up ... (5)	2	—	0·1	—	1	—	—	2	—	—	—	—	—	—	—
Bread ... ... (6)	110	—	3·7	1	23	39	0·7	1	0·07	0·02	0·7	—	—	0·03	—
Biscuits ... ... (7)	91	0·1	1·3	3	15	31	1·0	1	0·04	0·03	0·5	—	23	0·02	3
Cakes, etc. ... ... (8)	46	0·4	0·8	2	7	13	0·2	33	0·01	0·01	0·1	—	4	0·01	2
Pastry ... ... (9)	11	—	0·1	1	2	2	—	10	—	—	—	—	1	—	—
Puddings, milk ... (10)	61	1·5	1·5	3	9	51	0·1	58	0·02	0·06	0·1	—	1	0·02	4
Puddings, misc. ... (11)	12	0·2	0·2	—	2	4	0·1	9	—	—	—	—	1	—	1
Preserves ... ... (12)	81	—	—	—	22	1	—	—	—	—	—	—	1	—	20
Confectionery ... ... (13)	78	0·7	0·9	3	12	23	0·3	7	—	0·03	0·1	—	—	—	10
Potatoes ... ... (14)	69	—	1·1	2	12	5	0·4	22	0·05	0·02	0·5	8	2	0·09	—
Pulses ... ... (15)	11	—	0·7	—	2	5	0·2	12	0·01	0·01	0·1	1	—	0·01	—
Root vegetables ... (16)	1	—	—	—	—	2	—	234	—	—	—	—	—	—	—
Green vegetables ... (17)	—	—	0·1	—	—	4	0·1	21	—	—	—	1	—	0·01	—
Vegetables, misc. ... (18)	2	—	0·1	—	—	1	—	27	—	—	0·1	1	—	0·01	—
Fruit—															
raw ... ... (19)	22	—	0·3	—	6	3	0·2	16	0·02	0·02	0·1	9	—	0·05	—
fruit juice,tinned/bottled (20)	9	—	0·1	—	3	2	0·1	18	—	—	—	1	—	0·01	1
cooked & made up dishes(21)	10	—	0·1	—	2	3	—	8	—	—	—	—	1	—	—
dried and made up dishes (22)	1	—	—	—	—	—	—	2	—	—	—	—	—	—	—
nuts ... ... (23)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE 4A (*continued*)

		Energy value	Animal protein	Total protein	Fat	Carbo-hydrate	Calcium	Iron	Vitamin A	Thiamine	Ribo-flavine	Nicotinic acid	Vitamin C	Vitamin D	Pyrid-oxine	Added sugar
Beef and products ...	(24)	43	3·2	3·4	3	2	4	0·8	26	0·01	0·03	0·7	—	1	0·04	—
Lamb and products ...	(25)	11	0·8	0·8	1	—	1	0·1	2	—	0·01	0·2	—	—	0·01	—
Pork and products ...	(26)	47	2·1	2·1	4	1	2	0·3	1	0·06	0·02	0·4	—	—	0·04	—
Poultry and game ...	(27)	2	0·4	0·4	—	—	—	—	—	—	—	0·1	—	—	0·01	—
Offal	(28)	4	0·4	0·5	—	—	—	0·3	414	—	0·05	0·2	—	—	0·01	—
Meat dishes, baby, tinned	(29)	8	0·3	0·4	—	1	3	0·1	50	0·01	0·01	0·1	—	—	0·01	—
Fish, white	(30)	7	1·0	1·0	—	—	2	—	—	—	0·01	0·2	—	—	0·01	—
Fish, white, smoked ...	(31)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fish, fat and products...	(32)	5	0·5	0·5	—	—	2	0·1	3	—	—	0·1	—	7	0·01	—
Fish dishes, baby, tinned	(33)	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—
Eggs/egg dishes ...	(34)	45	2·8	2·8	4	—	14	0·6	258	0·02	0·07	—	—	39	0·06	—
Milk and cream ...	(35)	245	11·4	11·4	15	18	426	0·3	570	0·14	0·54	0·3	5	13	0·14	—
Cheese/cheese dishes ...	(36)	15	0·9	0·9	1	—	28	—	56	—	0·02	—	—	1	—	—
Fats	(37)	89	—	—	10	—	2	—	399	—	—	—	—	7	—	—
Soups	(38)	7	0·1	0·3	—	1	3	0·1	20	—	0·01	0·1	—	—	—	—
Beverages—																
dry powder	(39)	4	0·1	0·1	—	1	1	0·1	—	0·01	—	0·1	—	7	—	—
milk	(40)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
minerals, lemonade, etc.	(41)	14	—	—	—	4	—	—	—	—	—	—	—	—	—	3
concentrated extracts	(42)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Alcohol	(43)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sauces and misc. ...	(44)	7	0·1	0·2	1	1	3	0·1	6	—	—	—	—	—	—	—
Supplements—Welfare	(45)	—	—	—	—	—	—	—	133	—	—	—	3	13	—	—
Supplements—Other ...	(46)	—	—	—	—	—	—	—	284	0·01	0·01	—	7	31	—	—
SHORT LIST FOODS—STANDARD LIST FOOD GROUP NUMBERS SHOWN IN BRACKETS																
1 (1—5)		72	0·2	1·9	1	15	36	1·3	15	0·14	0·15	1·0	—	20	0·02	1
2 (6—9)		259	0·5	5·9	7	47	85	1·9	46	0·12	0·07	1·3	—	28	0·06	6
3 (10—11)		73	1·7	1·8	3	11	54	0·1	67	0·02	0·06	0·1	—	2	0·02	6
4 (12—13)		160	0·7	0·9	3	34	24	0·3	8	—	0·03	0·1	—	1	—	30
5 (14—18)		85	—	2·1	2	15	17	0·7	317	0·07	0·04	0·7	11	2	0·11	—
6 (19—23)		45	—	0·5	—	11	8	0·3	46	0·03	0·02	0·2	10	1	0·06	2
7 (24—29)		117	7·3	7·6	8	3	10	1·5	495	0·08	0·12	1·7	1	2	0·12	—
8 (30—33)		13	1·5	1·5	1	—	5	0·1	6	0·01	0·01	0·3	—	8	0·02	—
9 (34—37)		395	15·2	15·2	30	18	469	0·9	1284	0·16	0·63	0·3	5	61	0·20	—
10 (38)		7	0·1	0·3	—	1	3	0·1	20	—	0·01	0·1	—	—	—	—
11 (39—44)		27	0·2	0·3	1	5	5	0·1	7	0·01	0·01	0·2	—	7	—	3
12 (45—46)		—	—	—	—	—	—	—	417	0·01	0·01	—	11	45	—	—

TABLE 4B

Average daily intake of nutrients from diet and supplements, by food groups and supplement groups, for all children (percentages)

		Energy value	Animal protein	Total protein	Fat	Carbo-hydrate	Calcium	Iron	Vitamin A	Thiamine	Ribo-flavine	Nicotinic acid	Vitamin C	Vitamin D	Pyrid-oxine	Added sugar
All foods		100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
STANDARD LIST FOODS—FOOD GROUP NUMBERS SHOWN IN BRACKETS																
Cereals—																
breakfast, dry ...	(1)	3·6	—	2·7	0·2	6·6	0·3	4·8	—	10·8	9·9	13·5	—	—	1·3	2·3
breakfast, made up ...	(2)	0·6	0·6	0·8	0·5	0·6	0·9	0·7	0·2	1·1	0·6	0·2	0·1	—	1·3	—
baby, dry	(3)	0·9	—	1·1	0·2	1·5	3·1	9·4	—	8·3	2·3	1·6	—	10·9	—	0·3
baby, tinned ...	(4)	0·5	0·1	0·3	0·5	0·5	0·6	2·2	0·3	1·6	0·6	1·8	0·1	0·3	0·4	0·3
misc. made up ...	(5)	0·2	—	0·2	0·1	0·3	—	0·2	0·1	0·1	—	0·2	—	—	0·2	0·1
Bread	(6)	8·8	—	9·7	1·6	14·5	5·5	9·9	0·1	10·8	2·0	12·2	0·5	—	5·4	—
Biscuits	(7)	7·2	0·3	3·3	5·8	9·4	4·4	13·2	0·1	5·7	2·9	8·6	—	12·9	2·5	6·5
Cakes, etc.	(8)	3·7	1·3	2·0	3·3	4·5	1·8	2·7	1·2	1·9	1·2	1·4	—	2·4	1·7	5·1
Pastry	(9)	0·9	0·1	0·4	1·0	0·9	0·3	0·4	0·4	0·5	0·1	0·3	—	0·6	0·3	0·9
Puddings, milk ...	(10)	4·9	5·6	4·1	4·5	5·4	7·1	0·7	2·1	2·7	5·4	0·8	0·8	0·5	3·3	9·1
Puddings, misc. ...	(11)	1·0	0·6	0·6	0·7	1·4	0·5	0·7	0·3	0·3	0·2	0·2	0·1	0·5	0·2	2·9
Preserves	(12)	6·5	—	—	—	13·5	0·2	0·3	—	—	—	—	0·7	0·6	—	38·5
Confectionery	(13)	6·3	2·4	2·4	5·9	7·6	3·2	3·6	0·3	0·6	2·2	1·0	—	—	0·2	20·3
Potatoes	(14)	5·5	—	3·0	3·7	7·7	0·7	5·3	0·8	6·9	1·6	8·1	20·2	1·2	15·0	—
Pulses	(15)	0·9	—	1·9	0·3	1·2	0·7	3·3	0·5	1·8	0·7	2·0	1·2	—	0·8	0·8
Root vegetables ...	(16)	0·1	—	0·1	—	0·2	0·2	0·3	8·6	0·4	0·2	0·3	0·6	—	0·2	—
Green vegetables ...	(17)	0·1	—	0·2	—	—	0·6	0·7	0·8	0·4	0·2	0·2	3·0	—	0·8	—
Vegetables, misc. ...	(18)	0·2	—	0·3	0·2	0·2	0·2	0·5	1·0	0·7	0·3	0·8	3·2	—	1·1	—
Fruit—																
raw	(19)	1·8	—	0·7	—	3·5	0·5	2·1	0·6	3·2	1·3	1·8	23·1	—	8·3	—
fruit juice, tinned/bottled	(20)	0·8	—	0·1	—	1·6	0·2	1·6	0·7	0·5	0·2	0·6	2·5	—	0·7	2·9
cooked and made up dishes	(21)	0·9	—	0·3	0·6	1·2	0·4	0·4	0·3	0·4	0·1	0·3	1·1	0·4	0·4	1·9
dried and made up dishes	(22)	0·1	—	—	—	0·2	—	0·2	0·1	0·1	—	0·1	—	—	0·3	0·2
nuts	(23)	0·1	—	0·1	0·1	—	—	—	—	—	—	0·4	—	—	0·1	—

TABLE 4B (*continued*)

		Energy value	Animal protein	Total protein	Fat	Carbo-hydrate	Calcium	Iron	Vitamin A	Thiamine	Ribo-flavine	Nicotinic acid	Vitamin C	Vitamin D	Pyrid-oxine	Added sugar
Beef and products ...	(24)	3·4	11·8	8·8	4·6	1·1	0·6	10·5	1·0	1·6	3·0	12·5	0·3	0·4	6·2	—
Lamb and products ...	(25)	0·9	3·0	2·2	1·5	0·1	0·1	2·0	0·1	0·6	0·8	2·8	—	0·1	1·8	—
Pork and products ...	(26)	3·8	7·7	5·6	7·3	0·3	0·3	3·4	0·1	8·6	1·7	6·0	—	0·1	6·6	—
Poultry and game ...	(27)	0·2	1·4	1·0	0·2	—	—	0·5	—	0·1	0·2	1·2	—	—	2·0	—
Offal	(28)	0·4	1·6	1·2	0·5	—	—	3·8	15·2	0·7	4·0	3·6	0·6	0·2	1·0	—
Meat dishes, baby, tinned	(29)	0·7	1·2	1·2	0·6	0·6	0·4	1·1	1·8	0·8	1·0	2·1	0·6	0·1	1·9	—
Fish, white	(30)	0·6	3·5	2·6	0·7	0·1	0·3	0·5	—	0·6	0·5	3·0	—	—	1·9	—
Fish, white, smoked ...	(31)	—	0·1	0·1	—	—	—	—	—	—	—	0·1	—	0·1	0·1	—
Fish, fat and products	(32)	0·5	1·7	1·3	0·6	0·2	0·3	0·6	0·1	0·5	0·4	2·2	0·1	4·2	1·3	—
Fish dishes, baby, tinned	(33)	—	—	—	—	—	—	—	0·1	—	—	—	—	—	—	—
Eggs/egg dishes ...	(34)	3·6	10·3	7·4	6·7	—	2·0	7·7	9·4	3·2	6·2	0·3	—	22·5	9·3	—
Milk and cream ...	(35)	19·5	42·1	30·2	26·0	10·9	59·5	3·6	20·9	20·9	47·2	4·4	12·7	7·5	22·1	0·1
Cheese/cheese dishes ...	(36)	1·2	3·2	2·3	2·3	0·1	3·9	0·4	2·1	0·3	1·5	0·1	—	0·3	0·3	—
Fats	(37)	7·1	0·1	0·1	18·0	—	0·2	0·3	14·6	—	—	—	—	4·2	—	—
Soups	(38)	0·6	0·3	0·7	0·5	0·6	0·4	0·8	0·8	0·5	0·5	1·2	0·5	0·1	0·4	—
Beverages—																
dry powder	(39)	0·4	0·3	0·4	0·2	0·5	0·2	0·8	—	1·6	0·1	2·4	—	4·0	—	0·4
milk	(40)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0·1
minerals, lemonade, etc.	(41)	1·2	—	—	—	2·5	—	—	—	—	—	—	0·1	—	—	7·0
concentrated extracts	(42)	—	—	—	—	—	—	0·1	—	0·2	0·2	0·4	—	—	0·2	—
Alcohol	(43)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sauces and misc. ...	(44)	0·6	0·3	0·4	0·9	0·4	0·4	0·6	0·2	0·3	0·2	0·4	0·1	0·2	0·3	0·1
Supplements—Welfare	(45)	—	—	—	—	—	—	—	4·9	—	—	—	8·9	7·6	—	—
Supplements—Other ...	(46)	—	—	—	—	—	—	—	10·4	1·2	0·4	0·6	18·7	17·9	—	—
SHORT LIST FOODS—STANDARD LIST FOOD GROUP NUMBERS SHOWN IN BRACKETS																
1 (1—5)		5·8	0·8	5·0	1·5	9·6	5·0	17·2	0·6	21·8	13·4	17·3	0·2	11·2	3·2	3·1
2 (6—9)		20·6	1·7	15·5	11·8	29·4	11·9	26·2	1·7	18·8	6·2	22·6	0·5	15·9	9·9	12·5
3 (10—11)...		5·9	6·3	4·7	5·1	6·8	7·6	1·4	2·5	3·0	5·6	1·0	0·9	1·0	3·6	12·0
4 (12—13)...		12·7	2·4	2·5	5·9	21·1	3·3	3·8	0·3	0·6	2·2	1·1	0·7	0·7	0·2	58·8
5 (14—18)...		6·8	—	5·5	4·3	9·2	2·4	10·2	11·6	10·1	3·1	11·5	28·2	1·2	18·0	0·9
6 (19—23)...		3·6	—	1·3	0·8	6·5	1·2	4·3	1·7	4·2	1·7	3·2	26·7	0·4	9·9	5·0
7 (24—29)...		9·3	26·7	20·0	14·7	2·1	1·4	21·3	18·1	12·4	10·6	28·2	1·7	0·9	19·5	—
8 (30—33)...		1·1	5·4	4·1	1·2	0·3	0·6	1·2	0·2	1·1	0·9	5·3	0·1	4·4	3·2	—
9 (34—37)...		31·4	55·8	40·0	53·0	11·1	65·6	12·0	47·0	24·4	54·9	4·8	12·7	34·6	31·7	0·1
10 (38)		0·6	0·3	0·7	0·5	0·6	0·4	0·8	0·8	0·5	0·5	1·2	0·5	0·1	0·4	—
11 (39—44)		2·2	0·6	0·8	1·1	3·4	0·6	1·6	0·3	2·1	0·6	3·2	0·2	4·3	0·5	7·5
12 (45—46)		—	—	—	—	—	—	—	15·3	1·2	0·4	0·6	27·5	25·5	—	—

TABLE 5

Heights and weights of children analysed by (a) age at which mother left school: (b) number of children aged under 15 in household

	HEIGHT analysis—children aged					WEIGHT analysis—children aged				
	9 months and under 1 year	1 and under 2 years	2 and under 3 years	3 and under 4 years	4 and under 5 years	9 months and under 1 year	1 and under 2 years	2 and under 3 years	3 and under 4 years	4 and under 5 years
Number of children with heights (or weights) recorded										
Total	42	49	66	66	64	72	70	75	70	65
In households with numbers of children under age of 15: 1	17	18	17	7	16	27	25	18	7	16
2	10	17	26	32	31	20	27	29	34	31
3	8	10	15	13	14	14	12	18	14	15
4 or more ...	7	4	8	14	3	11	6	10	15	3
Age at which mother left school: 15 and under	27	35	46	49	53	47	49	54	52	54
16 or over ...	13	13	17	17	9	22	20	18	18	9
Not known ...	2	1	3	—	2	3	1	3	—	2
Mean heights (or weights)	cm.	cm.	cm.	cm.	cm.	kg.	kg.	kg.	kg.	kg.
All children	75·4	81·7	92·7	99·2	105·5	10·3	11·3	14·2	15·4	17·4
In households with numbers of children under age of 15: 1	76·2	81·8	92·6	98·1	107·9	9·9	11·4	13·7	15·1	17·4
2	75·1	81·2	93·2	99·8	104·9	10·8	11·3	14·4	15·7	17·3
3	75·1	81·9	92·8	98·4	104·5	10·5	11·7	14·1	15·2	17·6
4 or more ...	73·9	82·5	91·5	99·3	104·0	9·9	10·2	14·5	15·2	16·8
Age at which mother left school: 15 and under	75·2	81·7	92·2	98·9	105·3	10·2	11·3	14·2	15·4	17·5
16 or over ...	75·9	81·8	94·1	100·2	106·3	10·5	11·5	14·1	15·4	17·0
Standard deviations of heights (or weights)										
Children in households with numbers of children under age of 15: 1	3·8	5·4	4·7	3·8	3·8	1·4	1·5	1·7	1·8	1·5
2	2·9	4·7	5·6	4·2	5·3	1·2	1·4	2·2	1·9	2·3
3	3·0	4·8	6·7	2·1	4·7	1·4	1·9	2·6	0·6	2·2
4 or more ...	2·5	2·4	5·4	4·5	2·7	1·5	0·7	2·4	2·1	1·9
Age at which mother left school: 15 and under	3·6	5·2	5·8	3·9	5·0	1·5	1·7	2·4	1·9	2·0
16 or over ...	2·5	3·6	5·0	3·6	3·9	1·1	1·0	1·9	1·2	2·3

TABLE 6

Average daily intake of nutrients (excluding supplements) and their standard deviations
Comparison with Bransby and Fothergill Survey, 1951

		Age 9 months and under 1 year*		Age 1 and under 2 years		Age 2 and under 3 years		Age 3 and under 4 years		Age 4 and under 5 years	
		a†	b†	a	b	a	b	a	b	a	b
MEANS											
Energy value	cals.	980	1080	1117	1330	1349	1540	1341	1590	1545	1730
Animal protein	g.	24·5	28	25·7	25	28·8	27	27·2	27	30·1	28
Total protein	g.	32·2	38	34·5	41	40·3	46	39·1	47	44·3	51
Fat	g.	42	46	51	59	61	69	58	70	68	76
Carbohydrate	g.	125	131	137	160	170	185	176	194	201	214
Calcium	mg.	838	970	708	750	696	720	641	730	697	760
Iron	mg.	8·0	6·7	7·2	7·8	7·1	8·3	6·4	8·3	7·5	9·0
Vitamin A	i.u.	2031	2160	2125	2340	2505	2290	2313	2320	2655	2380
Thiamine	mg.	0·62	0·58	0·63	0·65	0·64	0·69	0·63	0·70	0·72	0·77
Riboflavine	mg.	1·23	1·18	1·09	0·99	1·13	1·02	1·08	1·01	1·19	1·03
Nicotinic acid	mg.	4·4	2·7	5·4	4·4	6·0	5·4	6·2	5·8	7·1	6·6
Vitamin C	mg.	20	14	25	21	29	24	29	26	36	28
STANDARD DEVIATIONS											
Energy value	cals.	244	290	281	430	364	410	256	380	346	370
Animal protein	g.	8·5	7	8·1	9	9·6	8	7·2	9	8·6	8
Total protein	g.	9·3	12	9·0	16	11·1	16	9·1	16	11·1	15
Fat	g.	12	15	18	20	18	18	14	19	17	19
Carbohydrate	g.	37	44	33	55	53	60	38	51	52	51
Calcium	mg.	368	220	251	270	243	230	183	250	195	190
Iron	mg.	4·8	3·5	4·9	4·1	2·9	3·4	1·7	2·3	2·2	2·3
Vitamin A	i.u.	1037	910	1113	820	1974	930	1281	870	1268	840
Thiamine	mg.	0·29	0·16	0·37	0·23	0·24	0·20	0·18	0·18	0·24	0·17
Riboflavine	mg.	0·54	0·27	0·35	0·32	0·38	0·29	0·32	0·31	0·42	0·26
Nicotinic acid	mg.	2·1	1·2	3·3	1·7	2·5	1·7	2·2	1·9	2·7	2·1
Vitamin C	mg.	11	8	16	12	24	16	16	15	21	18

* Children in this group in the Bransby and Fothergill Survey were aged 6–12 months.
† (a) Health Departments Survey, 1963.
(b) Bransby and Fothergill Survey, 1951.

TABLE 7

Average weekly consumption of foods: comparison with the food patterns of the Bransby & Fothergill Survey*, 1951

Food pattern according to Bransby & Fothergill Survey grouping of foods	Food consumed per head per week	
	1951 survey oz.	1963 survey oz.
Bread	18·4	10·4
Breakfast cereals	7·0	6·2
Cakes & biscuits	11·7	7·9
Cheese	0·7	0·8
Cheese dishes	0·2	0·4
Eggs	5·6	5·8
Fats	5·4	2·9
Fish	2·7	2·0
Fruit & nuts	14·3	16·5
Meat, bacon, sausages, stews, puddings, pies & rissoles	9·7	12·3
Milk	83·8	86·8
Potatoes	15·8	13·0
Preserves	2·0	0·7
Soup (thin) & gravy	4·8	1·4
Sugar...	5·7	4·4
Sweets, puddings & milk sauces	15·9	12·3
Sweets	6·5	8·8
Vegetables, green	2·9	1·5
Vegetables, other	5·9	10·7
Others (pickles, sauces etc.)	—	0·1
Foods in 1963 survey which cannot be allocated to Bransby & Fothergill codes	—	9·7
Total weight of food per head per week...	219·0	214·6

* This comparison is only approximate because it was not possible in all cases to make accurate assignment from one food code list to the other.

TABLE 8

Comparison of nutrient content of the food consumed during the survey week by all the children in the* 1963 *survey using (a)* 1963 *codes and food composition tables and (b)* 1951 *codes and food composition tables*

Food groups (as used in 1951 survey)	Total food consumption in 1963 survey (oz.)		Nutrient content of food consumption using (a) 1963 codes & food composition tables (b) 1951 codes & food composition tables											
			Energy value (1000 cals.)	Animal protein (g.)	Total protein (g.)	Fat (g.)	Carbohydrate (g.)	Calcium (g.)	Iron (mg.)	Vitamin A (1000 i.u.)	Thiamine (mg.)	Riboflavine (mg.)	Nicotinic acid (mg.)	Vitamin C (mg.)
Bread	4,493	(a)	332	13	11,008	2,668	69,944	117	2,131	5	210	67	2,122	533
		(b)	344	—	11,595	2,441	69,271	139	2,373	—	286	133	1.970	—
Breakfast cereals	2,708	(a)	196	512	5,285	1,574	42,756	97	3,347	18	403	450	2,687	116
		(b)	170	—	6,363	1,637	32,335	59	4,247	—	99	43	488	—
Cakes & biscuits	3,411	(a)	413	1,341	6,099	15,284	67,197	133	3,533	106	149	144	1,782	25
		(b)	383	—	8,286	13,616	56,841	89	1,599	—	102	78	830	—
Cheese	352	(a)	40	2,375	2,375	3,374	35	74	51	135	3	46	9	—
		(b)	41	2,501	2,501	3,452	—	81	70	130	3	49	35	—
Cheese dishes ...	164	(a)	7	268	316	443	593	10	30	36	2	7	10	33
		(b)	7	136	275	489	375	7	3	12	1	8	—	—
Eggs	2,532	(a)	137	8,486	8,488	11,404	116	42	1,688	783	64	214	53	3
		(b)	102	7,934	7,934	7,452	512	39	1,845	664	76	321	6	—
Fats	1,237	(a)	270	113	113	29,987	—	5	66	1,199	—	—	—	—
		(b)	262	111	111	29,100	—	5	12	1,317	—	—	—	—
Fish	867	(a)	41	4,346	4,581	2,041	1,233	13	257	17	21	30	926	76
		(b)	45	4,603	4,603	2,573	882	24	255	7	14	30	498	—
Fruit, nuts ...	7,141	(a)	126	12	1,488	1,160	28,911	25	974	201	86	67	646	32,756
		(b)	88	97	787	476	19,974	33	1,095	242	70	25	5,031	27,042
Meat, bacon, sausages ...	3,543	(a)	293	18,954	19,426	21,454	5,984	18	3,867	1,265	216	303	4,062	826
		(b)	305	19,299	20,613	22,560	4,714	49	4,413	892	175	292	3,162	204
Milk & cream ...	37,676	(a)	747	34,882	34,882	44,079	53,565	1,297	789	1,734	416	1,648	786	14,820
		(b)	969	51,570	51,570	56,648	66,890	1,851	523	2,286	673	2,326	523	15,658
Potatoes & chips	5,651	(a)	209	4	3,360	6,143	36,936	14	1,154	66	136	55	1,420	23,326
		(b)	173	—	3,132	3,142	33,197	9	928	—	136	57	1,130	7,620
Preserves ...	322	(a)	24	4	27	—	6,428	2	36	—	—	1	3	756
		(b)	23	—	—	—	5,762	1	108	—	—	1	5	270

TABLE 8 (*continued*)

Food groups (as used in 1951 survey)	Total food consumption in 1963 survey (oz.)		Nutrient content of food consumption using (a) 1963 codes & food composition tables (b) 1951 codes & food composition tables											
			Energy value (1000 cals.)	Animal protein (g.)	Total protein (g.)	Fat (g.)	Carbo-hydrate (g.)	Calcium (g.)	Iron (mg.)	Vitamin A (1000 i.u.)	Thiamine (mg.)	Ribo-flavine (mg.)	Nicotinic acid (mg.)	Vitamin C (mg.)
Soup (thin) and gravy ...	593	(a)	2	58	86	49	221	1	93	2	3	8	126	34
		(b)	5	—	178	—	1,186	1	356	—	5	2	—	—
Stews, puddings, pies & rissoles	1,789	(a)	57	2,880	3,385	3,140	4,106	11	743	204	28	61	868	1,024
		(b)	62	6,137	6,486	3,097	2,194	9	1,361	174	16	39	672	343
Sugar	1,910	(a)	212	—	—	—	56,710	1	19	—	—	—	—	—
		(b)	206	—	—	—	51,574	—	—	—	—	—	—	—
Sweets, puddings & milk sauces	5,351	(a)	231	4,242	5,311	9,282	33,457	152	935	275	95	161	590	1,660
		(b)	205	2,728	5,152	7,453	29,749	145	197	112	65	111	167	—
Sweets	3,818	(a)	320	3,533	4,507	13,053	49,160	114	962	30	57	139	622	249
		(b)	318	1,086	2,354	12,278	49,654	15	1,142	21	30	70	247	—
Vegetables, green	648	(a)	3	1	311	23	334	13	172	66	8	10	44	3,477
		(b)	1	—	221	—	197	9	157	66	4	9	10	4,126
Vegetables, other	4,624	(a)	83	279	3,494	2,725	11,843	33	1,071	846	57	52	683	3,034
		(b)	52	—	3,540	695	7,856	19	1,074	901	93	37	423	2,529
Other (pickles, chutney, sauces etc.)	59	(a)	3	4	76	186	364	1	20	7	1	—	13	38
		(b)	2	—	36	6	409	—	12	32	2	1	36	178
All types of food	88,889	(a)	3,746	82,307	114,618	168,069	469,893	2,173	21,938	6,995	1,955	3,463	17,452	82,786
		(b)	3,763	96,202	135,737	167,115	433,572	2,584	21,770	6,856	1,850	3,632	15,233	57,970

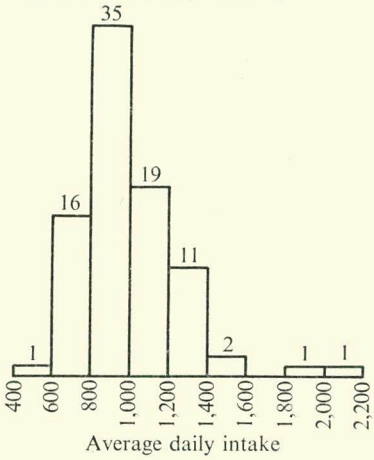
* This comparison is only approximate because it was not possible in all cases to make accurate assignment from one food code list to the other. Approximately 4% of the total intake has been excluded because the 1963 food codes could not be allocated to appropriate 1951 food codes.

DIAGRAM 1

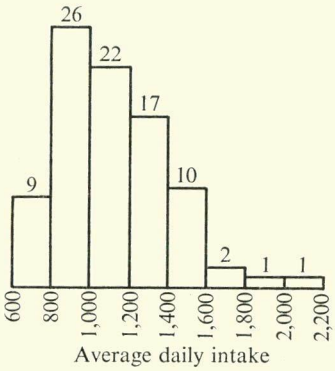
CALORIES—FREQUENCY DISTRIBUTIONS OF AVERAGE DAILY INTAKES

Number of children per 200 calorie intake group given at the head of each column

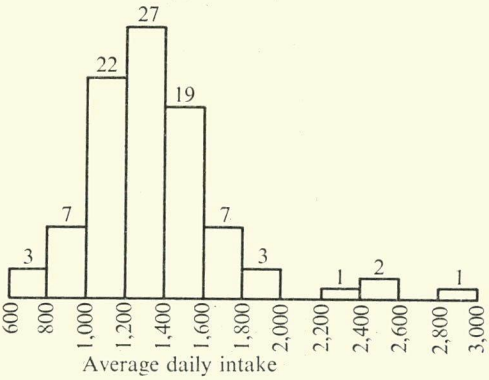
9 months and under 1 year
Mean 980 kcal.
S.D. 244 kcal.(25% of mean)



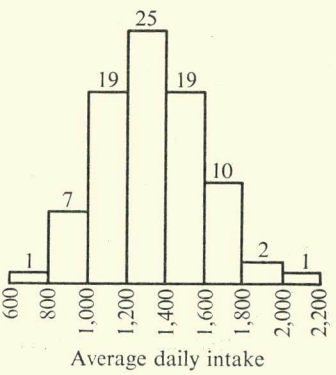
1 and under 2 years
Mean 1,117 kcal.
S.D. 281 kcal.(25% of mean)



2 and under 3 years
Mean 1,349 kcal.
S.D. 364 kcal.(27% of mean)



3 and under 4 years
Mean 1,341 kcal.
S.D. 256 kcal.(19% of mean)



4 and under 5 years
Mean 1,545 kcal.
S.D. 346 kcal.(22% of mean)

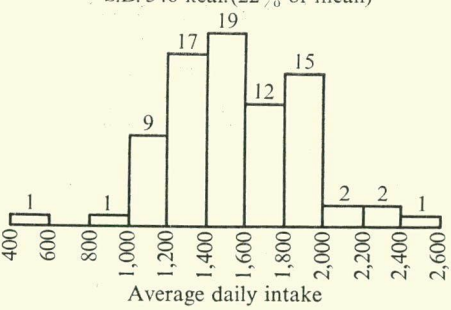
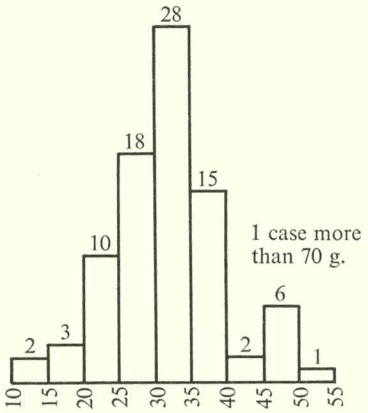


DIAGRAM 2

TOTAL PROTEIN—FREQUENCY DISTRIBUTIONS OF AVERAGE DAILY INTAKES

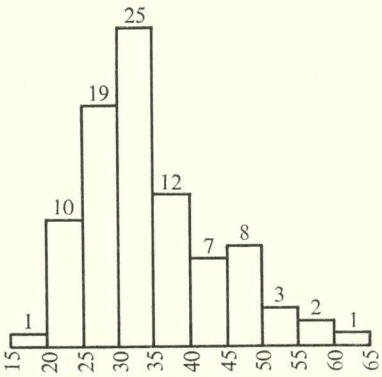
Number of children per 5g. intake group given at the head of each column

9 months and under 1 year
Mean 32·2 g.
S.D. 9·3 g.(29% of mean)



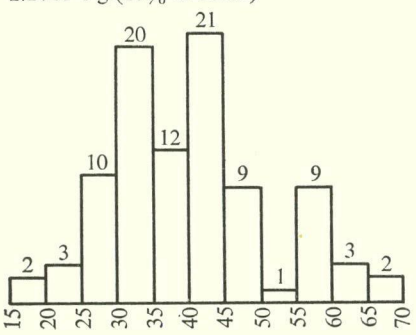
Average daily intake in g.

1 and under 2 years
Mean 34·5 g.
S.D. 9·0 g.(26% of mean)



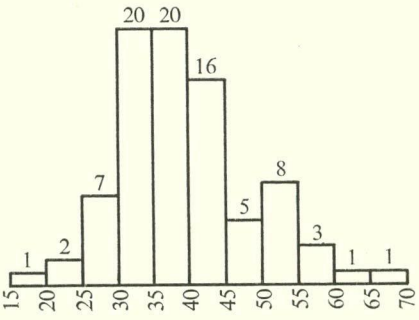
Average daily intake in g.

2 and under 3 years
Mean 40·3 g.
S.D. 11·1 g.(28% of mean)



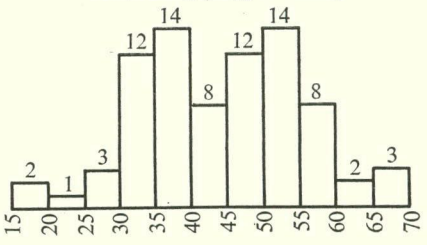
Average daily intake in g.

3 and under 4 years
Mean 39·1 g.
S.D. 9·1 g.(23% of mean)



Average daily intake in g.

4 and under 5 years
Mean 44·3 g.
S.D. 11·1 g.(25% of mean)



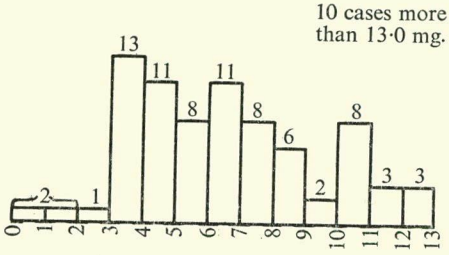
Average daily intake in g.

DIAGRAM 3

IRON—FREQUENCY DISTRIBUTIONS OF AVERAGE DAILY INTAKES

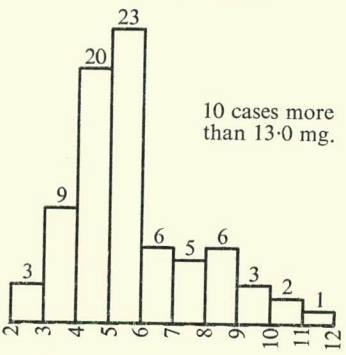
Number of children per mg. intake group given at the head of each column

9 months and under 1 year
Mean 8·0 mg.
S.D. 4·8 mg.(60% of mean)



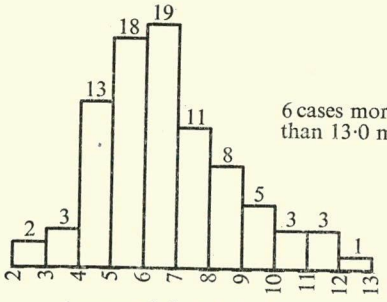
Average daily intake in mg.

1 and under 2 years
Mean 7·2 mg.
S.D. 4·9 mg.(68% of mean)



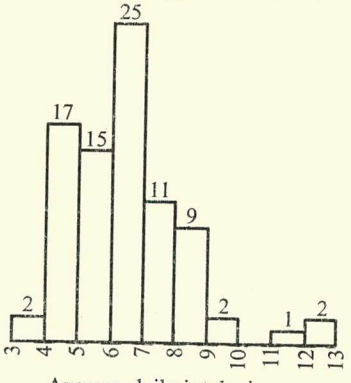
Average daily intake in mg.

2 and under 3 years
Mean 7·1 mg.
S.D. 2·9 mg.(41% of mean)



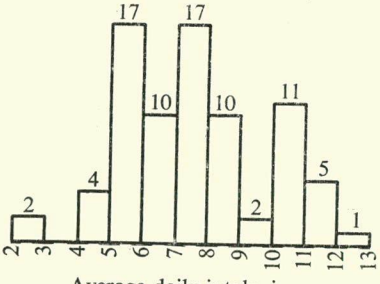
Average daily intake in mg.

3 and under 4 years
Mean 6·4 mg.
S.D. 1·7 mg.(27% of mean)



Average daily intake in mg.

4 and under 5 years
Mean 7·5 mg.
S.D. 2·2 mg.(29% of mean)



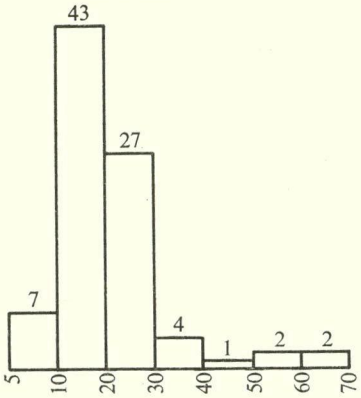
Average daily intake in mg.

DIAGRAM 4

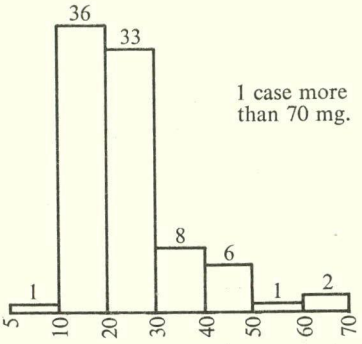
VITAMIN C (EXCLUDING SUPPLEMENTS)—FREQUENCY DISTRIBUTIONS OF AVERAGE DAILY INTAKES

Number of children per 10 *mg. intake group given at the head of each column*

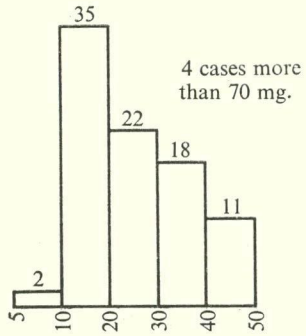
9 months and under 1 year
Mean 20 mg.
S.D. 11 mg.(55% of mean)



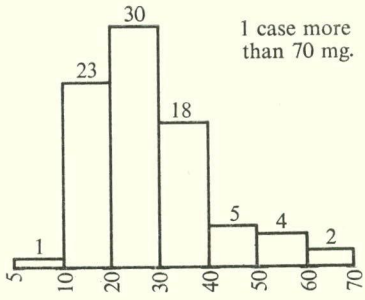
1 and under 2 years
Mean 25 mg.
S.D. 16 mg.(64% of mean)



2 and under 3 years
Mean 29 mg.
S.D. 24 mg.(83% of mean)



3 and under 4 years
Mean 29 mg.
S.D. 16 mg.(55% of mean)



4 and under 5 years
Mean 36 mg.
S.D. 21 mg.(58% of mean)

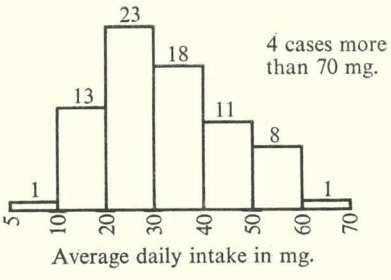
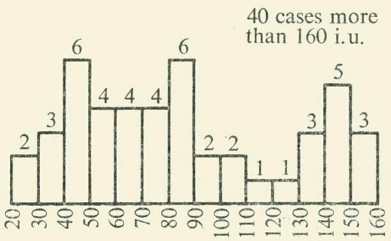


DIAGRAM 5

VITAMIN D (EXCLUDING SUPPLEMENTS)—FREQUENCY DISTRIBUTIONS OF AVERAGE DAILY INTAKES

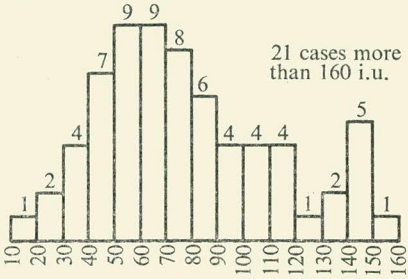
Number of children per 10 *iu. intake group given at the head of each column*

9 months and under 1 year
Mean 222 i.u.
S.D. 221 i.u.(100% of mean)



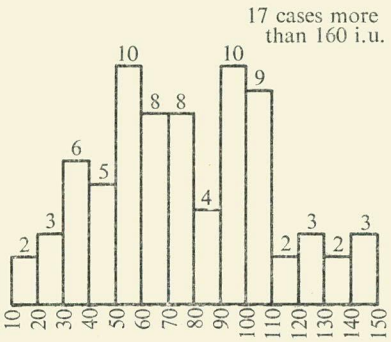
Average daily intake in i.u.

1 and under 2 years
Mean 134 i.u.
S.D. 132 i.u.(99% of mean)



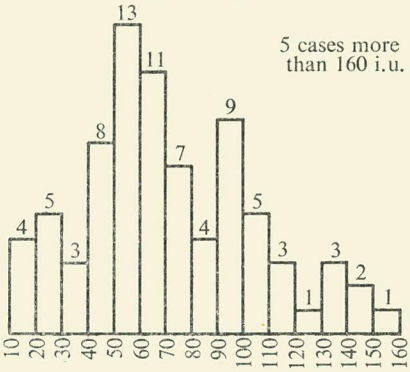
Average daily intake in i.u.

2 and under 3 years
Mean 110 i.u.
S.D. 88 i.u.(80% of mean)



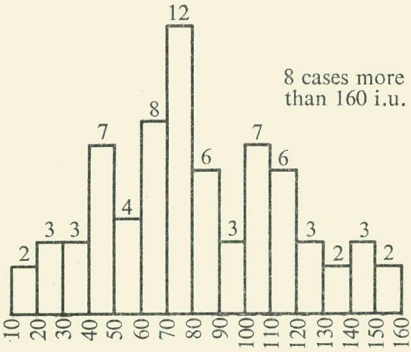
Average daily intake in i.u.

3 and under 4 years
Mean 88 i.u.
S.D. 80 i.u.(91% of mean)



Average daily intake in i.u.

4 and under 5 years
Mean 98 i.u.
S.D. 62 i.u.(63% of mean)



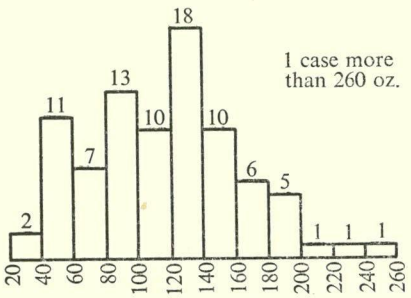
Average daily intake in i.u.

DIAGRAM 6

MILK—FREQUENCY DISTRIBUTIONS OF TOTAL INTAKES PER WEEK

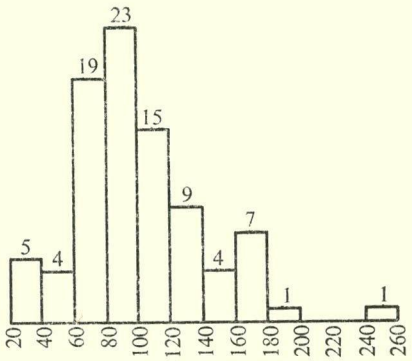
Number of children per 20 oz. intake group given at the head of each column

9 months and under 1 year
Mean 117 oz.



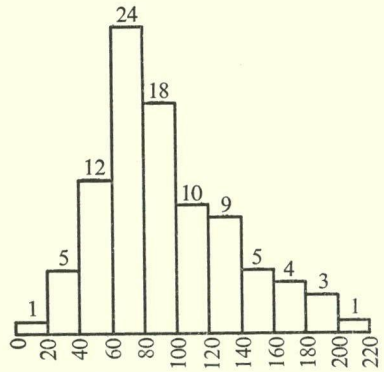
Total weekly intake in ounces

1 and under 2 years
Mean 100 oz.



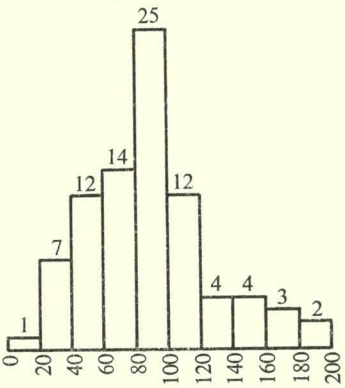
Total weekly intake in ounces

2 and under 3 years
Mean 92 oz.



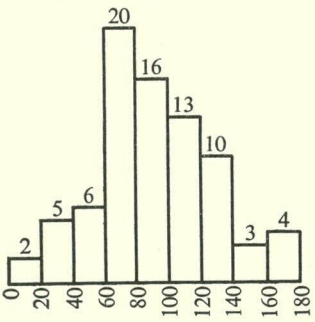
Total weekly intake in ounces

3 and under 4 years
Mean 88 oz.



Total weekly intake in ounces

4 and under 5 years
Mean 91 oz.



Total weekly intake in ounces

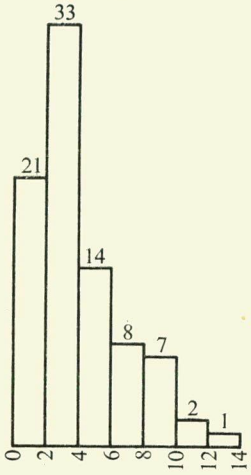
These diagrams include all types of milk (fresh, dried, etc.) from all sources (drunk as milk, milk used in puddings, ice-cream etc.). The weight of all the milk is in terms of full cream liquid milk.

DIAGRAM 7

MEAT—FREQUENCY DISTRIBUTIONS OF TOTAL INTAKE PER WEEK

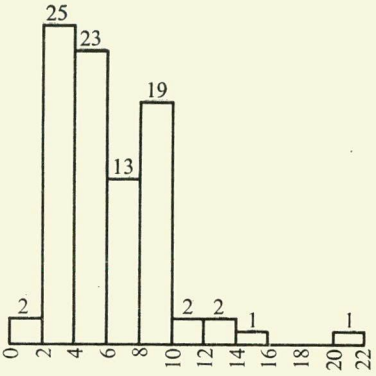
Number of children per 2 oz. intake group given at the head of each column

9 months and under 1 year
Mean 3·5 oz.



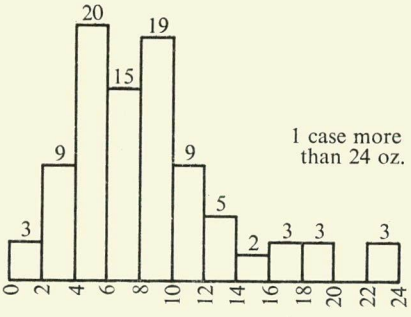
Total weekly intake in ounces

1 and under 2 years
Mean 5·7 oz.



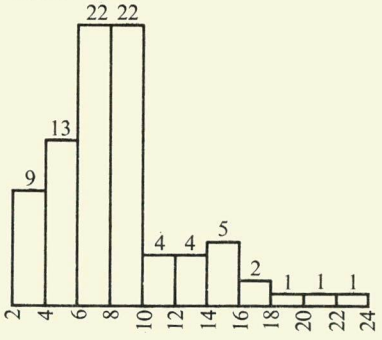
Total weekly intake in ounces

2 and under 3 years
Mean 8·4 oz.



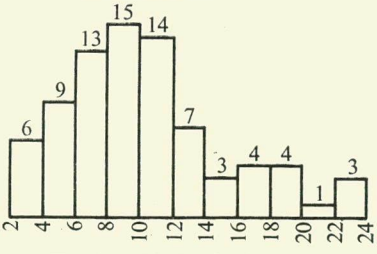
Total weekly intake in ounces

3 and under 4 years
Mean 8·0 oz.



Total weekly intake in ounces

4 and under 5 years
Mean 9·8 oz.



Total weekly intake in ounces

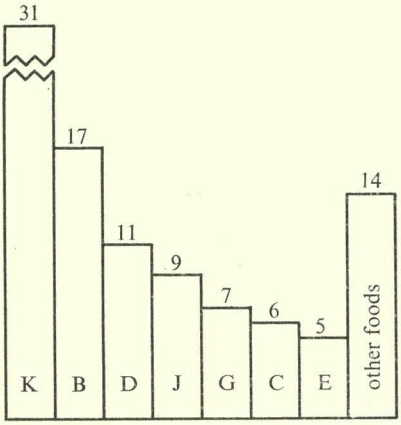
These diagrams include meat from all sources (roast, grilled etc. and meat in pies etc.).

DIAGRAM 8

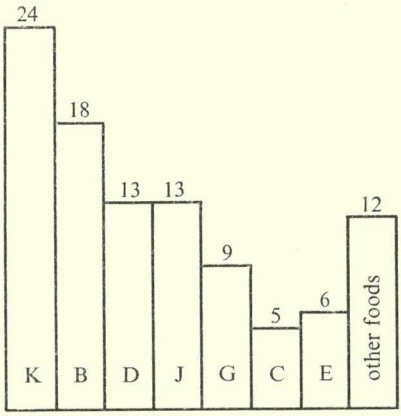
PER CENT OF CALORIES DERIVED FROM VARIOUS FOODS

Percentages of each food group given at the head of each column

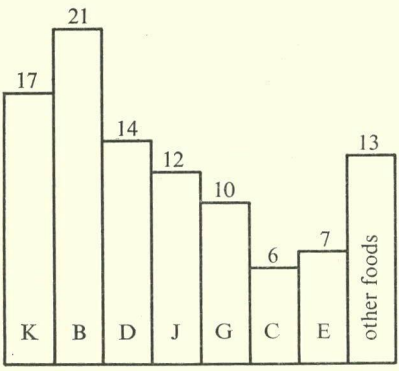
9 months and under 1 year



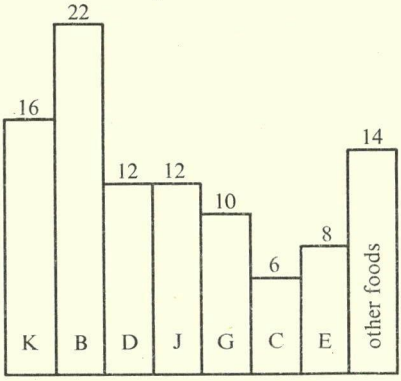
1 and under 2 years



2 and under 3 years



3 and under 4 years



KEY

K	Milk and cream
B	Bread, biscuits, cakes, pastry etc.
D	Preserves and confectionery
J	Eggs, cheese and fats
G	Meat and meat products
C	Puddings
E	Vegetables (including potatoes)

4 and under 5 years

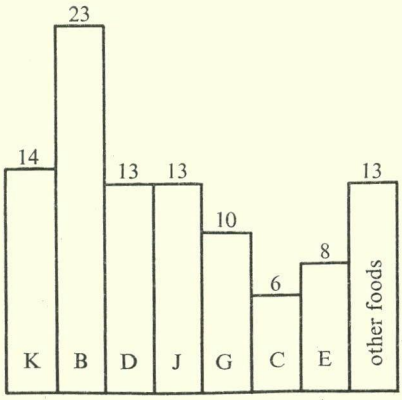
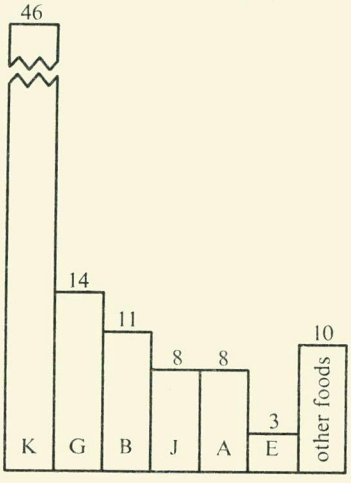


DIAGRAM 9

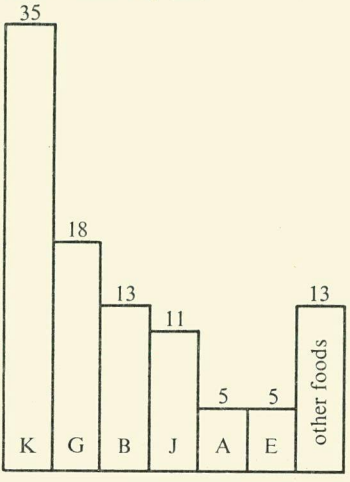
PER CENT OF TOTAL PROTEIN DERIVED FROM VARIOUS FOODS

Percentages of each food group given at the head of each column

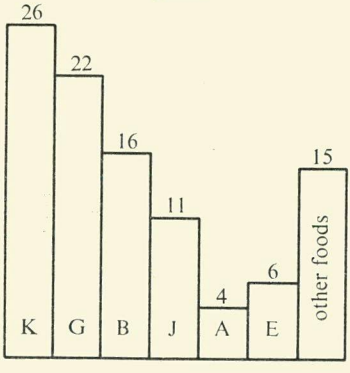
9 months and under 1 year



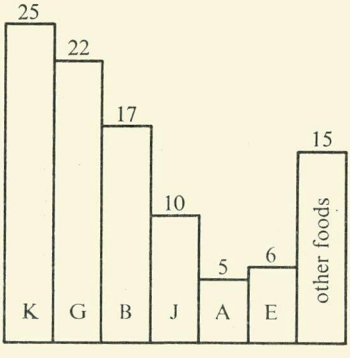
1 and under 2 years



2 and under 3 years



3 and under 4 years



KEY

K	Milk and cream
G	Meat and meat products
B	Bread, biscuits, cakes, pastry etc.
J	Eggs, cheese and fats
A	Cereals, baby and other
E	Vegetables (including potatoes)

4 and under 5 years

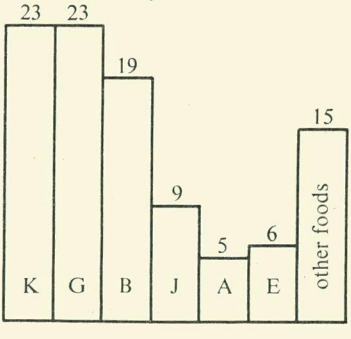
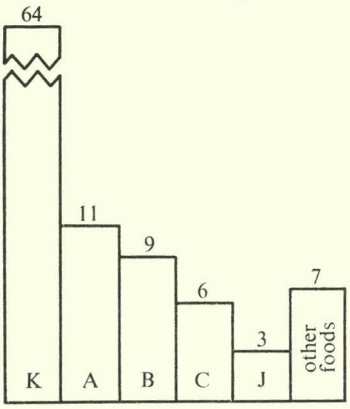


DIAGRAM 10

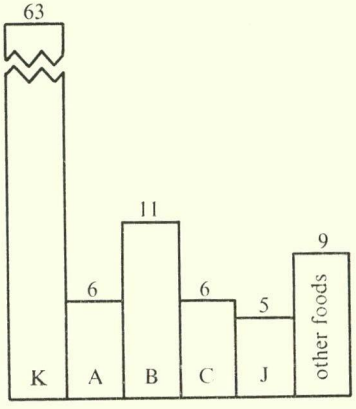
PER CENT OF CALCIUM DERIVED FROM VARIOUS FOODS

Percentages of each food group given at the head of each column

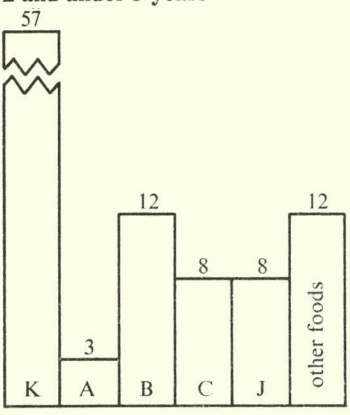
9 months and under 1 year



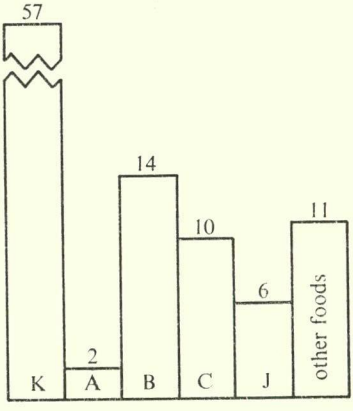
1 and under 2 years



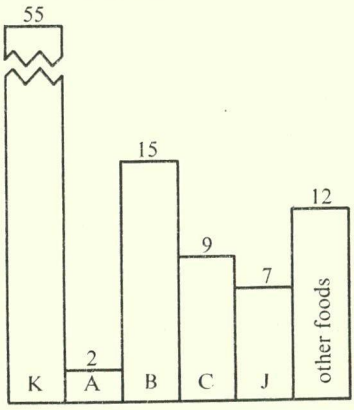
2 and under 3 years



3 and under 4 years



4 and under 5 years



KEY

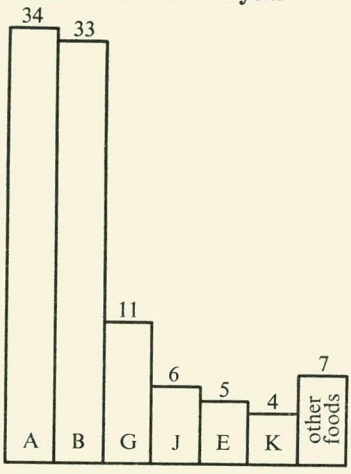
K	Milk and cream
A	Cereals, baby and other
B	Bread, biscuits, cakes, pastry etc.
C	Puddings
J	Eggs, cheese and fats

DIAGRAM 11

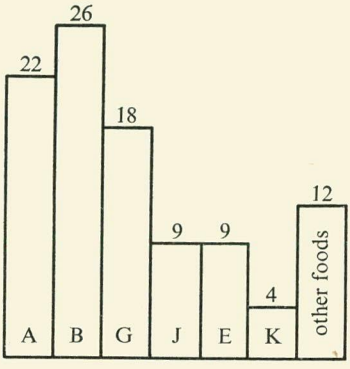
PER CENT OF IRON DERIVED FROM VARIOUS FOODS

Percentages of each food group given at the head of each column

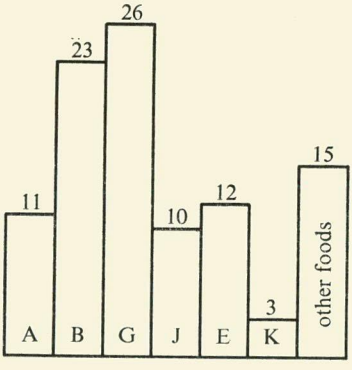
9 months and under 1 year



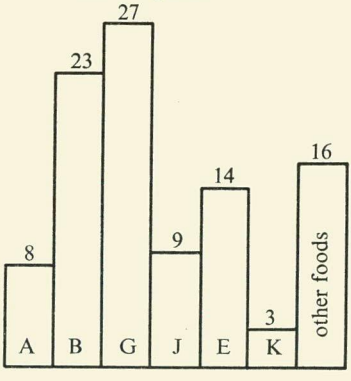
1 and under 2 years



2 and under 3 years



3 and under 4 years



KEY

A	Cereals, baby and other
B	Bread, biscuits, cakes, pastry etc.
G	Meat and meat products
J	Eggs, cheese and fats
E	Vegetables (including potatoes)
K	Milk and cream

4 and under 5 years

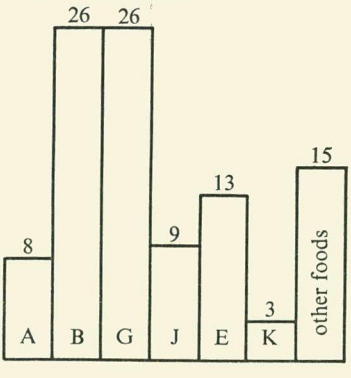
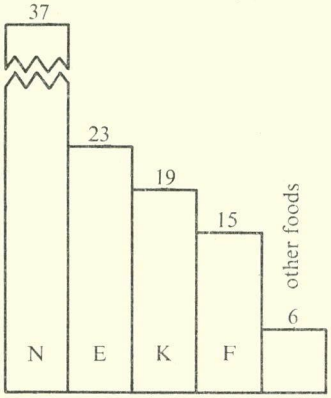


DIAGRAM 12

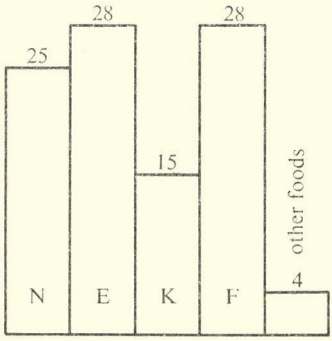
PER CENT OF VITAMIN C DERIVED FROM VARIOUS FOODS AND SUPPLEMENTS

Percentages of each food group given at the head of each column

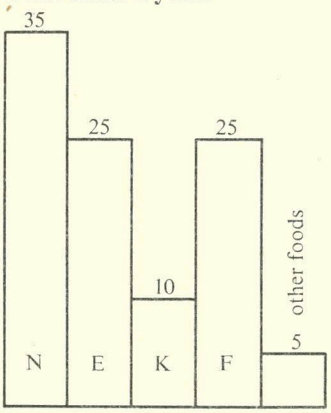
9 months and under 1 year



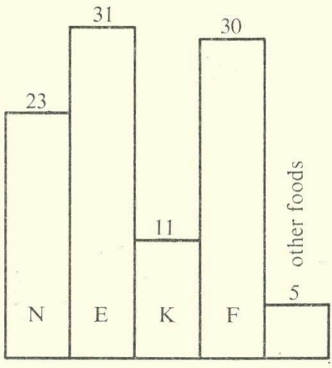
1 and under 2 years



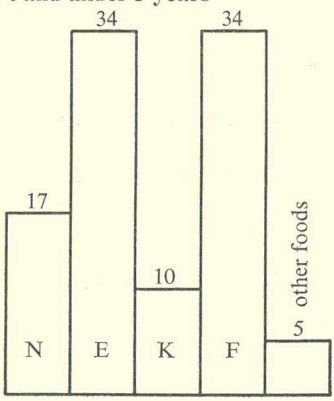
2 and under 3 years



3 and under 4 years



4 and under 5 years



KEY

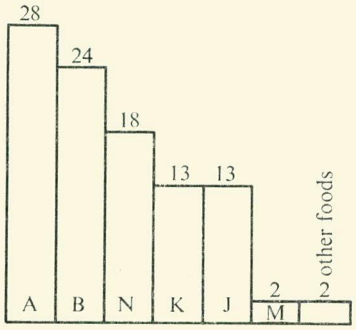
N	Supplements
E	Vegetables (including potatoes)
K	Milk and cream
F	Fruit and nuts

DIAGRAM 13

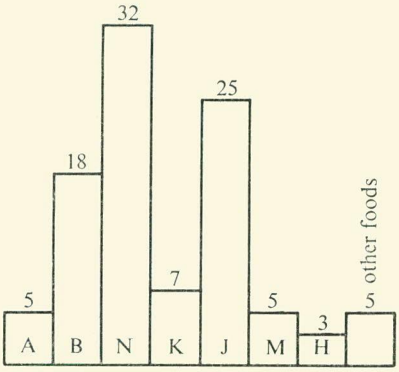
PER CENT OF VITAMIN D DERIVED FROM VARIOUS FOODS AND SUPPLEMENTS

Percentages of each food group given at the head of each column

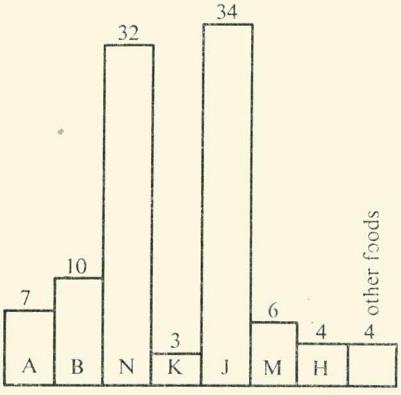
9 months and under 1 year



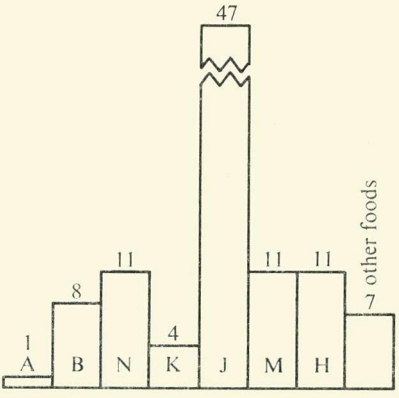
1 and under 2 years



2 and under 3 years



3 and under 4 years



KEY

A	Cereals, baby and other
B	Bread, biscuits, cakes, pastry etc.
N	Supplements
K	Milk and cream
J	Eggs, cheese and fats
M	Beverages and sauces
H	Fish

4 and under 5 years

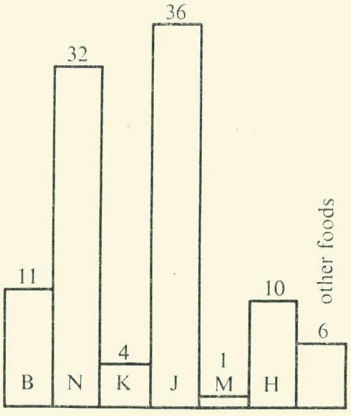
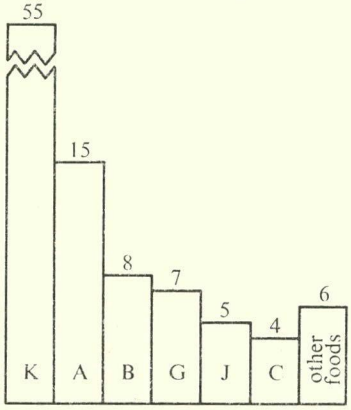


DIAGRAM 14

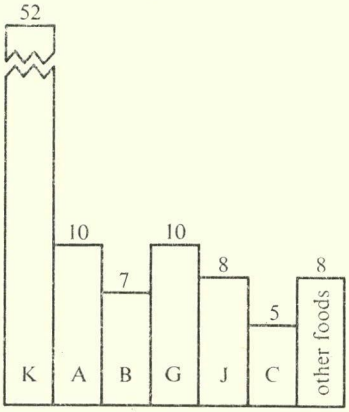
PER CENT OF RIBOFLAVINE DERIVED FROM VARIOUS FOODS AND SUPPLEMENTS

Percentages of each food group given at the head of each column

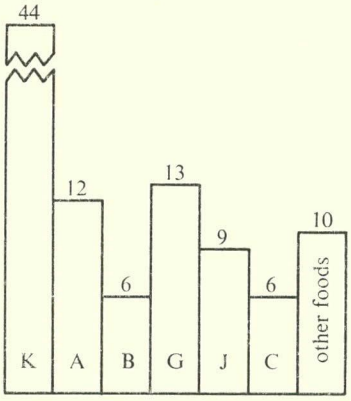
9 months and under 1 year



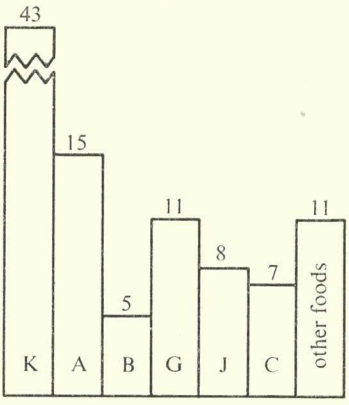
1 and under 2 years



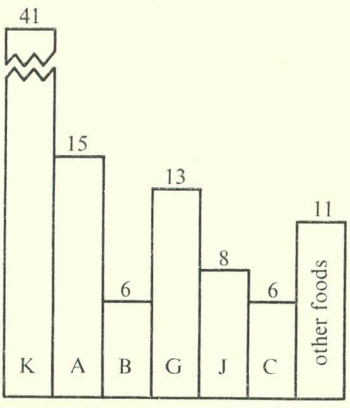
2 and under 3 years



3 and under 4 years



4 and under 5 years

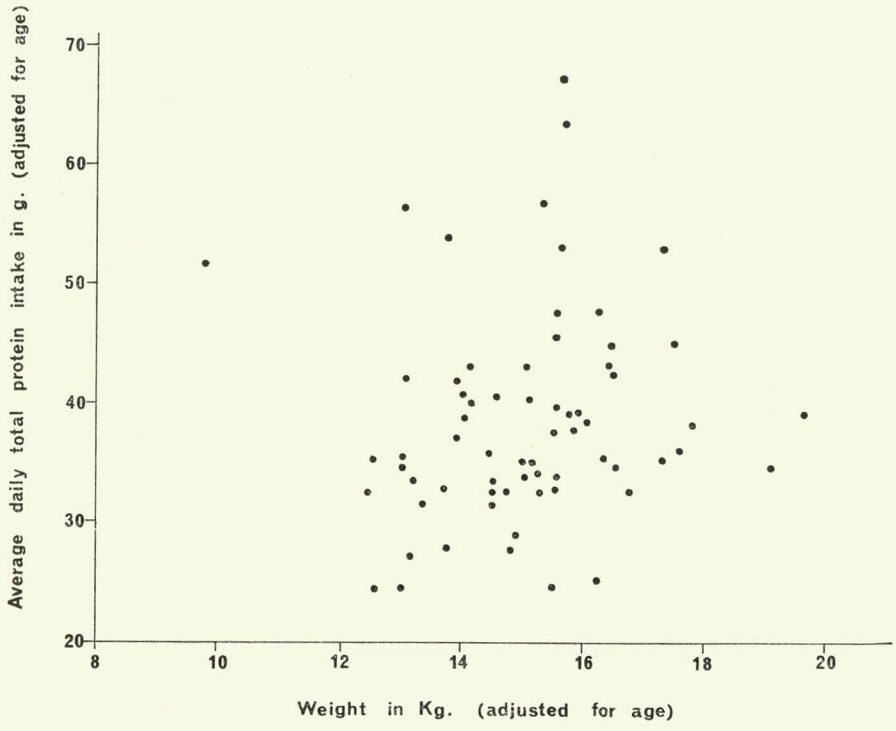


KEY

K	Milk and cream
A	Cereals, baby and other
B	Bread, biscuits, cakes, pastry etc.
G	Meat and meat products
J	Eggs, cheese and fats
C	Puddings

DIAGRAM 15

Children 3 years and under 4 years; relationship between total protein intake and weight.



APPENDIX G

The Place of Milk in the Diets of Pre-school Children

1. As is clear from Diagram 6 (*Appendix F*), the intakes of milk recorded during the survey week varied widely from child to child, and the average consumption was less than one pint per day even though, under the Welfare Food Scheme, each child under the age of 5 years is entitled to a pint of milk at half price and other evidence (National Food Survey records) indicates that over 90 per cent of this entitlement is taken up. Nevertheless, the milk that is consumed makes a major contribution to intakes of protein, calcium, and riboflavine as is clear from Diagrams 9, 10, and 14 (*Appendix F*).

2. Two important questions which were studied were why the intakes of milk of certain children were so low, and whether this might lead to malnutrition. Relevant to the first question was the fact that the survey was made in early summer, and some weeks were definitely hot. This may have depressed some intakes (other fluids being perhaps drunk instead). The proportion of children who were ill or indisposed was no higher among those who drank little milk than among those who drank much. Analysis by income group and family size (Table 14) showed, interestingly, that those who drank least milk were no more preponderant among the families with many children and low incomes than among others. The data of Table 14 might very well be interpreted as meaning no more than that some children do not like milk and that this occurs in all socio-economic groups. An alternative hypothesis that might be suggested is that in the large families where the likelihood is greater of there being more than one child entitled to Welfare Milk, the total of cheap milk coming into the family was, in the view of the parents, sufficient to meet the demands of all without obviously stinting the children. Some of the children who drank least milk ate other protein-rich food in larger amounts. But the effects in general of low milk consumption upon nutrient intakes is clear from Table 11.

3. The hypothesis that low milk consumption might be associated with malnutrition was considered in the light of three pieces of evidence:—

(*a*) The nutrient intakes were analysed of those whose diets contained different amounts of milk. Table 11 shows that the low-milk diets contained less of various nutrients than did the diets of other children, and the recorded intakes of protein, calcium and riboflavine (of which, as has been said, milk is an important contributor) were markedly lower than the average for the groups as a whole, and below the Recommended Allowances for protein and calcium of the British Medical Association's Committee on Nutrition (British Medical Association, 1950). But the "B.M.A. Allowances" are considered to include substantial margins of safety, and there is a considerable gap between them and the requirement figures at pre-school ages set by the Expert Groups on Requirements for Protein and for Calcium (set up by the Food and Agriculture and World Health Organizations of the United Nations) reporting in 1965 and 1962 respectively. FAO/WHO have recently published an Expert Committee Report (1967) giving recommended

intakes, which are not necessarily identical with requirements, for riboflavine. The averages recorded for the lowest quarter of milk drinkers compare adequately with the FAO/WHO figures for all three nutrients. These committees made the best estimates of requirements that they could on the available evidence, and their estimates are stated in the case of protein to allow for an additional safety margin to accommodate individuals with abnormally high needs. (The same may be inferred in the case of calcium from the text of the Expert Committee's Report). The British Working Party on Requirements of Man for Protein defined an "area of ignorance" above which they were certain that intakes were adequate, and below which they were certain that in some individuals nutritional harm would result. Their lower limit was slightly higher than that of the FAO/WHO requirement figure for children, and their upper limit somewhat lower than the "B.M.A. Allowances", but nevertheless the "area of ignorance" amounts to about 75 per cent of the lower limit. There are other recommended allowances and estimates of requirements which do not agree with those referred to above. The diversity of pronouncements in this field is a reflection of the fact that, although the world's knowledge of requirements for nutrients is slowly improving thanks to research of which the current investigation is an example, it is still far from exact.

(*b*) The milk intakes of each of the eight children considered by the doctors to be of "unsatisfactory physical condition" are listed at the end of this Appendix, together with the nutrient intakes and other salient facts. Of these eight children, seven had caloric consumptions somewhat below the average of their age group and five of these had a somewhat lower than average protein consumption. Only two had lower than average consumption of calcium, and three lower than average consumptions of riboflavine. These eight children can be divided into two categories; the first (children Nos. 1, 4 and 5 and possibly 7) were suffering, or had suffered, some illness which directly (or indirectly because of an effect upon the child's appetite) had probably caused a falling off in general condition. All of these four were consuming higher than average amounts of milk, and it could well be that if and when the concurrent illness ceased, their general condition would return to normal. In contrast children Nos. 3, 6 and 8 were all taking very small amounts of milk and, although in one instance (child No. 8) the examining doctor obviously wondered whether an element of mental retardation existed (this is not infrequently associated with feeding problems), these three should probably be interpreted as examples of a very mild deficiency in energy and/or protein for which no completely adequate predisposing cause has been found. The available evidence is not sufficient to indicate why they should have drunk so little milk. Had they been given their full pint of milk, each would have obtained around 9 gm., of protein and 190 kcalories more energy daily, which may well have been all that was needed to rectify their condition. Child No. 2 is difficult to interpret and both the doctor's notes and the dietary evidence indicate that the trouble, whatever it was, was over at the time of examination.

Average daily nutrient intake (excluding supplements (1)) of

Child No.	(a) Age group (b) Exact age when medically examined	Remarks on medical examination form or questionnaire	Energy Value cals.	Animal protein g.	Total protein g.	Fat. g.	Carbo-hydrate g.	Calcium mg.	Iron mg.	Vitamin A. i.u.
1	(a) 9-12 months (b) 1 year	Large cavernous angioma upper lip. Thin child. Recently had thrush. Mucous membrane rather pale. Flabby muscles. Eats well.	858	28·3	33·1	42	91	1,128	6·6	2,338
2	(a) 1–2 years (b) 1 year 10 months	Physically very slow . Late in walking but now improving. I.Q. seems average.	1,387	36·0	43·7	70	155	825	5·9	2,232 (18–W.)
3	(a) 2–3 years (b) 2 years 2 months	Not really showing good nutrition though not under-nourished. Not interested in food. Bad cold week of survey.	1,283	23·8	33·7	62	157	526	5·1	2,304
4	(a) 3–4 years (b) 4 years	Flabby—had measles and otitis and lost weight but not unduly thin.	1,141	25·2	32·2	48	155	648	4·5	2,101
5	(a) 2–3 years (b) 2 years 4 months	Tonsils + + . Difficulty in swallowing. Very slim. Otherwise satisfactory. (4).	1,240	25·8	33·7	48	178	758	8·2	1810 (1257–N.W.)
6	(a) 2–3 years (b) 2 years 1 month	Underweight—Pale—Ant. fontanelle still patent. Good appetite. Not very good health generally.	707	13·0	17·7	34	87	294	2·7	1,215
7	(a) 2–3 years (b) 2 years 11 months	Benign hypotonia—steadily improving. Premature.	1,203	27·2	36·0	44	176	880	3·4	1,550
8	(a) 4–5 years (b) 4 years 4 months	Slightly backward with a partial speech defect. Bruises easily and investigated as failure to gain weight. "Dwarfism" still under yearly observation. Slight umbilical hernia. Thin and small appetite. Difficult to feed.	1,433	25·5	39·2	68	178	707	10·5	1,635

Notes:—
(1) Additional nutrient intake from supplements shown in brackets. W—welfare vitamin supplement. N.W.—non-welfare vitamin supplement.
(2) Income of head of household.
(3) Including survey child.
(4) Not specifically diagnosed as of "unsatisfactory physical condition".

children regarded as of "unsatisfactory physique"

Thiamine mg.	Ribo-flavine mg.	Nicotinic acid mg.	Vitamin C. mg.	Vitamin D. i.u.	Pyridoxine mg.	Added sugar g.	Gross income grade (2) £/wk.	Whether mother works	No. of children under 15 in household (3)	Registrar General's Social Class	Age at which mother left school	Amount of milk (oz. daily)	Whether amount of milk is above or below average for age
0·62	1·61	1·8	13	246	0·37	23	9–14·5	No	1	III manual	Under 16	24·3	Above
0·57	1·35	4·6	24 (19.–W.)	75 (188–W.)	0·71	59	14·5 –23·5	No.	1	III manual	Under 16	19·7	Above
0·50	0·86	4·1	12	101	0·43	62	9–14·5	Yes (p.t.)	2	III manual	Under 16	9·7	Below
0·45	1·00	3·4	17	94	0·50	67	9–14·5	Yes (p.t.)	2	III non-manual	16–18	14·3	Above
0·44	1·17	3·7	20	63 (126–N.W.)	0·53	89	9–14·5	No.	4	V	Under 16	18·1	Above
0·23	0·44	1·6	7	100	0·35	35	Under 9– (Nat. Asst.)	No.	1	Unem-ployed	Under 16	6·1	Below
0·69	1·60	5·6	16	62	0·42	61	9–14·5	No	3	III manual	Under 16	20·6	Above
0·70	1·19	9·2	16	264	0·53	49	14·5– 23·5	No	2	I	Under 16	11·6	Below

(*c*) The heights and weights of all children who were weighed and measured have been averaged for those falling in each quarter in respect of milk consumption. (Table 12). Though the numbers involved are far too small to be convincing, there appears to be a relationship at least between height and milk consumption. Whether this relationship, if real, is causal is another matter. It could be that, irrespective of socio-economic grouping, those whose milk intakes are least have also the least conscientious mothers and that their growth is slower because of some other aspect of maternal care. (It can be confidently asserted that the reason for the observed relationship is not that, all else being equal, small children spend fewer calories and therefore eat less food overall. The difference in height between averages of the lowest quarter and of all children measured is of the order of 2 per cent. The difference in caloric consumption is about 14 per cent (Table 11) and these two could be considered to be interrelated effects. But the reduction in milk consumption is of the order of 50 per cent, so that there obviously has been an alteration in the pattern of the diet, not merely in the quantity of food consumed).

The relationship between growth rates, diets, and wellbeing in children is a matter of some uncertainty. In animal experiments the most relevant works are those of Widdowson & Kennedy (1962), McCance & Widdowson (1960), and Slonaker (1931 a, b & c, 1935 and 1938). The latter found that in rats there was an optimal "richness" of dietary intake below which not only was growth slower, but reproductive performance, voluntary activity, and longevity (all of which may be regarded as indices of wellbeing) were less. With diets above this optimum "richness", these last mentioned indices of wellbeing also tended to be reduced, but the rate of growth continued to increase.

Widdowson and her colleagues found that rats undernourished during the suckling period continued to grow slowly even when they were supplied with unlimited food after weaning, and they became small adults. Comparison with faster growing rats did not support the contention that nutritionally retarded growth promotes longevity as had been suggested by earlier work (see for example McCay, Crowell & Maynard, 1935; McCay, C.M., *et. al.*, 1939).

Obviously, more work is needed on several fronts before the cause and significance of difference in growth rates of children in this country are known.

TABLE 9

Children in four groups by total protein intake: average milk intakes*

	Number of children	Average daily intake of total protein g.	Average daily intake of milk† oz.
9 months and under 1 year ∅			
All children	86	32·2	16·7
Group (1)	22	22·9	10·0
„ (2)	22	30·1	15·9
„ (3)	21	33·9	19·0
„ (4)	21	44·1	23·7
1 and under 2 years			
All children	88	34·5	14·3
Group (1)	22	24·5	10·4
„ (2)	22	30·5	12·6
„ (3)	22	35·5	13·9
„ (4)	22	47·3	20·1
2 and under 3 years			
All children	92	40·3	13·1
Group (1)	23	27·6	8·6
„ (2)	23	35·7	12·6
„ (3)	23	42·1	14·4
„ (4)	23	55·6	17·0
3 and under 4 years			
All children	84	39·1	12·6
Group (1)	21	29·0	9·4
„ (2)	21	35·3	11·1
„ (3)	21	40·5	13·1
„ (4)	21	51·6	16·6
4 and under 5 years			
All children	79	44·3	13·0
Group (1)	20	30·3	8·1
„ (2)	20	40·2	12·3
„ (3)	19	48·7	15·3
„ (4)	20	58·2	16·1

* Group (1) Below lower quartile
(2) Between lower quartile and mean
(3) Between mean and upper quartile
(4) Above upper quartile.

† All forms of milk from all sources, including made-up dishes.

∅ In this table and tables 10–12, the figures quoted in respect of "All children" in the age group nine months to one year exclude a few items of food consumed by three children which were inadvertently omitted from the computer analysis, but which are included in the figures on which the averages for the quarters are based.

TABLE 10

Children in four groups by total protein intake: average heights and weights in relation to age*

	Height			Weight		
	Number measured	Average age when measured months	Average height† cm.	Number weighed	Average age when weighed months	Average weight† kg.
9 *months and under* 1 *year*						
All children weighed/measured	42	12·2	75·4	72	12·0	10·3
Group (1)	13		73·8	19		9·7
,, (2)	10		75·8	19		10·2
,, (3)	9		76·0	18		10·5
,, (4)	10		76·0	16		10·5
1 *and under* 2 *years*						
All children weighed/measured	49	19·4	81·7	70	19·1	11·3
Group (1)	16		81·0	20		11·0
,, (2)	10		80·7	18		11·0
,, (3)	10		81·8	17		11·6
,, (4)	13		83·3	15		11·9
2 *and under* 3 *years*						
All children weighed/measured	66	31·4	92·7	75	31·4	14·2
Group (1)	16		90·3	20		13·4
,, (2)	20		92·8	21		14·3
,, (3)	16		93·3	18		14·0
,, (4)	14		94·8	16		15·0
3 *and under* 4 *years*						
All children weighed/measured	66	44·0	99·2	70	43·8	15·4
Group (1)	17		97·0	18		14·8
,, (2)	20		99·3	20		15·5
,, (3)	14		101·9	15		15·7
,, (4)	15		99·1	17		15·5
4 *and under* 5 *years*						
All children weighed/measured	64	54·1	105·6	65	54·1	17·4
Group (1)	16		104·7	15		16·3
,, (2)	16		104·1	18		17·0
,, (3)	16		105·8	16		18·0
,, (4)	16		107·2	16		18·1

* See table 9.

† The average heights (weights) of children in the 4 intake groups have been adjusted to the average age of all children in the age group at the time they were measured (weighed)

TABLE 11

Children in four groups by milk intake: average intakes of milk and certain principal nutrients*

	Number of children	Average daily intake of milk† oz.	Average daily intake			
			Total protein g.	Calcium mg.	Riboflavine mg.	Energy value cals.
9 *months and under* 1 *year*						
All children	86	16·7	32·2	838	1·2	980
Group (1)	22	8·6	25·0	515	0·8	854
,, (2)	22	14·3	30·4	750	1·2	941
,, (3)	21	19·0	35·0	924	1·3	1,064
,, (4)	21	26·9	40·6	1,237	1·7	1,099
1 *year and under* 2 *years*						
All children	88	14·3	34·5	708	1·1	1,117
Group (1)	22	8·0	28·6	489	0·8	938
,, (2)	22	12·0	30·9	600	1·0	1,072
,, (3)	22	15·0	36·0	738	1·1	1,158
,, (4)	22	22·0	42·3	1,003	1·5	1,302
2 *and under* 3 *years*						
All children	92	13·1	40·3	696	1·1	1,349
Group (1)	23	6·6	33·9	469	0·8	1,167
,, (2)	23	10·4	37·6	576	1·0	1,335
,, (3)	23	14·0	42·3	748	1·2	1,378
,, (4)	23	21·4	47·2	993	1·5	1,517
3 *and under* 4 *years*						
All children	84	12·6	39·1	641	1·1	1,341
Group (1)	21	6·1	31·9	426	0·8	1,178
,, (2)	21	11·0	40·0	603	1·0	1,363
,, (3)	21	13·6	39·6	670	1·0	1,367
,, (4)	21	19·6	45·0	864	1·4	1,455
4 *and under* 5 *years*						
All children	79	13·0	44·3	698	1·2	1,545
Group (1)	20	6·6	35·6	478	0·8	1,321
,, (2)	20	11·1	41·2	617	1·1	1,425
,, (3)	19	14·6	48·5	771	1·4	1,682
,, (4)	20	19·6	52·1	927	1·6	1,758

* See table 9

† All forms of milk, from all sources, including made up dishes.

TABLE 12

Children in four groups by milk intake: average heights and weights in relation to age*

	Height			Weight		
	Number measured	Average age when measured months	Average height† cm.	Number weighed	Average age when weighed months	Average weight† kg.
9 *months and under* 1 *year*						
All children weighed/measured	42	12·2	75·4	72	12·0	10·3
Group (1)	11		74·1	18		10·2
,, (2)	12		75·1	19		9·8
,, (3)	10		75·9	17		10·6
,, (4)	9		76·2	18		10·4
1 *and under* 2 *years*						
All children weighed/measured	49	19·4	81·7	70	19·1	11·3
Group (1)	11		79·8	19		11·1
,, (2)	15		80·8	18		11·0
,, (3)	8		82·5	15		11·6
,, (4)	15		83·2	18		11·8
2 *and under* 3 *years*						
All children weighed/measured	66	31·4	92·7	75	31·4	14·2
Group (1)	18		92·0	18		14·2
,, (2)	14		91·8	18		13·6
,, (3)	18		93·3	20		14·5
,, (4)	16		93·7	19		14·3
3 *and under* 4 *years*						
All children weighed/measured	66	44·0	99·2	70	43·8	15·4
Group (1)	17		97·5	17		14·8
,, (2)	21		99·3	21		15·1
,, (3)	15		100·7	16		15·7
,, (4)	13		99·6	16		16·1
4 *and under* 5 *years*						
All children weighed/measured	64	54·1	105·6	65	54·1	17·4
Group (1)	14		105·7	14		17·4
,, (2)	15		103·2	16		15·7
,, (3)	16		105·2	16		17·5
,, (4)	19		107·3	19		18·6

* See table 9

† The average heights (weights) of children in the 4 intake groups have been adjusted to the average age of all children in the age group at the time they were measured (weighed)

TABLE 13

Children in four groups by milk intake, socio-economic distribution of children*

	Number of children	Registrar General's Social Class					Income under £14 10s. 0d. p.w.		Income over £14 10s. 0d. p.w.	
		I and II	III non-manual	III manual	IV and V	† Others	1 or 2 children in household under 15 years of age	3 or more children in household under 15 years of age	1 or 2 children in household under 15 years of age	3 or more children in household under 15 years of age
All ages										
All children	429	99	59	156	82	33	93	61	196	79
Group (1)	108	22	12	38	25	11	26	14	51	17
,, (2)	108	26	15	40	21	6	26	18	48	16
,, (3)	106	22	22	37	15	10	20	17	49	20
,, (4)	107	29	10	41	21	6	21	12	48	26
9 *months and under 1 year*										
All children	86	20	6	36	18	6	20	11	37	18
Group (1)	22	6	1	9	4	2	5	2	10	5
,, (2)	22	3	3	8	7	1	6	3	9	4
,, (3)	21	5	1	11	4	—	5	4	9	3
,, (4)	21	6	1	8	3	3	4	2	9	6
1 *and under* 2 *years*										
All children	88	25	9	30	19	5	18	13	47	10
Group (1)	22	5	3	5	8	1	4	5	12	1
,, (2)	22	6	2	11	2	1	5	3	12	2
,, (3)	22	7	3	6	3	3	5	3	12	2
,, (4)	22	7	1	8	6	—	4	2	11	5
2 *and under* 3 *years*										
All children	92	18	13	34	17	10	23	14	37	18
Group (1)	23	2	4	8	5	4	8	4	9	2
,, (2)	23	6	1	11	4	1	5	5	8	5
,, (3)	23	4	7	6	2	4	5	2	10	6
,, (4)	23	6	1	9	6	1	5	3	10	5
3 *and under* 4 *years*										
All children	84	18	16	32	12	6	15	13	36	20
Group (1)	21	3	3	9	3	3	5	1	11	4
,, (2)	21	7	5	4	4	1	3	7	7	4
,, (3)	21	4	5	10	2	—	3	4	8	6
,, (4)	21	4	3	9	3	2	4	1	10	6
4 *and under* 5 *years*										
All children	79	18	15	24	16	6	17	10	39	13
Group (1)	20	6	1	7	5	1	4	2	9	5
,, (2)	20	4	4	6	4	2	7	—	12	1
,, (3)	19	2	6	4	4	3	2	4	10	3
,, (4)	20	6	4	7	3	—	4	4	8	4

* See table 9

† No answer, forces, etc.

APPENDIX H

Haemoglobin Levels in Young Children

A report of a survey in Buckinghamshire and Newcastle-upon-Tyne

by

Kathleen MacWilliam, M.D., M.R.C.P.E., Ministry of Health

1. The survey was designed to ascertain the distribution of haemoglobin levels in young children in one rural area and one industrial city in Britain. The rural area chosen was Wolverton Rural District in Buckinghamshire and consisted of three villages, Wolverton, New Bradwell and Newport Pagnell. The industrial area was Newcastle-upon-Tyne, a city near the east coast of England with a population of 260,750.

Sampling

2. The Buckinghamshire sample included all the children aged between 12 and 24 months at the time of the survey, who had been resident in the district since birth. One hundred and eighty seven children were thus selected, but the parents of twelve refused testing. Fourteen agreed but failed to attend, one child was in hospital and for one, a foster child, consent was unobtainable. Three others were rejected for technical reasons, so that haemoglobin levels were available on 156 children, 71 girls and 85 boys.

3. The Newcastle children, aged 14 to 27 months, were a random sample from the birth register. Two hundred and ninety nine were selected for testing, the parents of 62 refused, and 40 agreed but failed to attend. This left a total of 197. Unfortunately, after completion of the first specimens in Newcastle, readings on the machine were found to have been unreliable and only 135 specimens, 69 girls and 66 boys, read on a different machine have been included in the results. There was nothing to suggest, however, that the rejected samples were in any way atypical of the whole group.

Method

4. The anterior aspect of the thumb was pricked using a disposable lancet, and 0·02 ml. of blood was diluted in 5 ml. of Drabkin's solution. The Buckinghamshire specimens were read in a Gallenkamp photoelectric colorimeter, and the Newcastle specimens in an S.P. 600. A.B.D.H. standard of cyamethaemoglobin was used for comparison.

Results

5. The mean haemoglobin levels and standard deviation for the two areas are as follows:—

	No.	*Mean Hb gm %*	*S.D.*
Buckinghamshire			
Boys	85	12·14	0·99
Girls	71	12·16	0·96

	No.	Mean Hb. gm %	S.D.
Newcastle			
Boys	66	11·95	1·07
Girls	69	12·09	1·03

The small difference between the means for the two areas was not statistically significant either in the boys or the girls.

The haemoglobin showed no relationship to age in either of the areas, nor to the weights and birth weights of 52 Buckinghamshire children for whom these were known.

Social Factors

6. The relationship between mean haemoglobin level and Registrar General's Social Class is as follows:—

	Boys		*Girls*		*Children*	
	No.	*Av. Hb.*	*No.*	*Av. Hb.*	*No.*	*Av. Hb.*
Buckinghamshire						
Classes I and II ...	5	12·4	7	13·0	12	12·8
Class III	65	12·1	51	12·1	116	12·1
Classes IV and V ...	12	12·0	12	11·8	24	11·9
Newcastle ...						
Classes I and II ...	12	12·2	17	12·3	29	12·3
Class III	33	11·8	29	12·2	62	12·0
Classes IV and V ...	16	12·0	18	11·8	34	11·9

The consistently higher mean haemoglobin level in classes I and II as compared to classes IV and V would suggest that the social gradient was real despite its small size. No association was found between the haemoglobin level and family size in Buckinghamshire, the only area where this comparison was made.

Discussion

7. The WHO study group on iron deficiency anaemia (WHO Technical Report series No. 182, 1959) arbitrarily assumed a level of less than 10·8g/100 ml as constituting anaemia in children 0·6—4 years of age. By these standards about 10% of the children in this survey would have been classified as anaemic. The existence of a social gradient would also suggest that improvement was possible.

8. The cause of the low levels is not certain. No dietary history was taken in this survey, but in the nutrition survey described in the other parts of this report, no clear relationship was found between Registrar General's Social Class and intakes of either iron or meat. The extent to which non-nutritional conditions such as infections contributed to the anaemia found is however unknown.

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