Meals for the Elderly

A report on meals on wheels and luncheon clubs in two North London boroughs.

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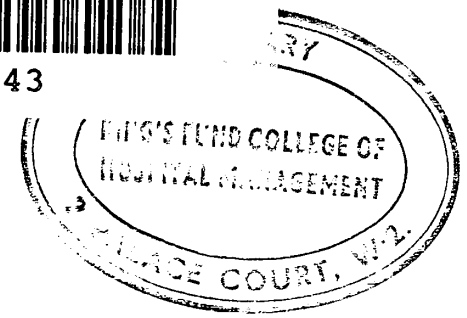

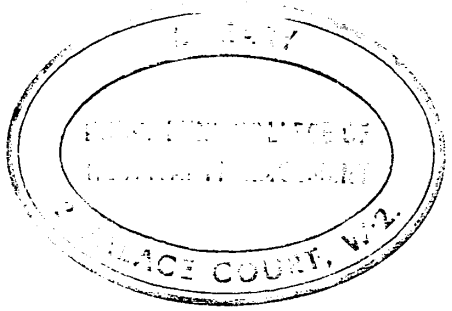

Meals for the Elderly

A report on meals on wheels and luncheon clubs in two North London boroughs.

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Foreword by W G Harding MRCP MRCS DPH, Medical Officer of Health and Principal School Medical Officer, London Borough of Camden

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Foreword

When we provide a social service, such as meals on wheels, are we at risk of being complacent about it, or priding ourselves on a service without adequately checking its effectiveness and the smoothness of its running?

What quality checks do we undertake at source, and – even more important – at the point of delivery? Do we pay periodic visits to the recipients, or do we at least encourage those who deliver meals to bring back the comments of the recipients?

Meals for the Elderly presents a challenge to all connected with meals on wheels services. It summarises a most carefully executed and evaluated study by Miss B R Stanton, dietetic adviser to King Edward's Hospital Fund for London, to whom many of us in the field of health and social services have reason to be grateful for help rendered both collectively and individually.

I very much hope that Miss Stanton's valuable review of an important social service will cause us all to take stock of local situations – not just at this moment in time, but as an on-going exercise.

Wilfrid G Harding
London 1971

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Summary

A meals on wheels service was started in the 1930s and since the war a vast network has grown up. By 1969, some 13 000 000 meals were being provided for over 100 000 people in their own homes.

The nutritive value of meals for 107 elderly people supplied by six kitchens and two luncheon clubs, has been studied. Ninety-one people answered a questionnaire designed to give their opinions of the meals and some information as to their socio-economic background.

Three-quarters of the elderly people lived alone and less than half of those with sons or daughters were visited by them regularly. Only 15 per cent of these old people shopped for themselves yet 80 per cent lived within five minutes walk of shops. Few had satisfactory storage for perishable foods and only four possessed refrigerators, but most had adequate cooking facilities: 70 per cent had a separate kitchen and 85 per cent had a gas or electric cooker in working order.

More than half of them had received meals for over a year and more than a quarter for more than two years. Of the 91 who answered the questionnaire, 84 received meals on five days weekly; four had meals on seven days and the three others on four, three and two days respectively.

Half of those questioned liked the meals and, if those who gave a qualified 'yes' are included, two-thirds could be regarded as reasonably content. One-third, however, did not like the meals. A pattern of likes and dislikes emerged from their answers. All of them liked meat, and roast meat was particularly popular. Fried fish was more popular than fish cooked in any other way. Less than a quarter would accept cheese dishes in place of meat. Green vegetables and salads were liked by some but about a third found raw vegetables

difficult to chew. Canned and dried pulse vegetables were generally disliked. Many showed enthusiasm for the first time when puddings were discussed.

The size of portion offered was enough for the majority but nearly a quarter said that they could eat more of four out of five items.

There appeared to be little or no opportunity for recipients to make known their likes and dislikes to those supplying meals. Few wished to select meals from a menu a day or two beforehand.

Luncheon clubs have many advantages over meals on wheels but three-quarters of the elderly people studied were incapable of getting to clubs unaided.

Midday meals were delivered over a period of two to two-and-a-half hours, starting before noon. The majority was content with the time of delivery but those who wanted to change would have liked to receive their meals between midday and one o'clock. Forty-seven of them kept their meal for varying lengths of time before eating it; some kept it for the evening meal or, occasionally, overnight.

The average nutritive value of meals supplied by the various kitchens differed markedly. The highest protein, iron and vitamin C contents were double those of the lowest. Reasons for these quite large differences could be found partly in portion size, partly in how often certain foods were served, and partly in cooking method. For example, iron content was influenced mainly by the amount of meat, especially liver; vitamin C content by the types of fruits and vegetables and the way in which these were cooked and served.

During the summer, the meals studied could supply a third to a half of the recommended vitamin C intake; and even in winter, when old potatoes would be used, meals could provide a third or more of the day's needs, but only if vegetables were well chosen and cooked. However, far too many meals contained only dried pulses as a second vegetable. These are not only devoid of vitamin C but were also disliked.

Portion weights of certain foods are suggested which together are large enough to make a significant contribution to the day's diet.

Waste of food was found to be high. Eighty per cent wasted some

part of the meal regularly and a few wasted almost the entire meal every day. Some reasons for this waste are suggested in the report. Meals on wheels supplied for five days a week were found to be of major nutritive importance for a quarter of those studied. Meals provided for fewer than four days a week made no significant nutritional difference to the total dietary of the elderly.

The ways in which the elderly people managed at weekends and on days when meals were not provided were investigated. The majority managed well and only 40 per cent of those questioned would have liked meals more often. It must be remembered, however, that all but three subjects received meals for at least five days a week.

At weekends meals were prepared by neighbours, relatives or the elderly people themselves. Some did less well nutritionally at weekends and 13 of them had markedly reduced intakes on days when mobile meals were not available. The well-being of these people might suffer as the result of a five rather than seven day service.

Recommendations

1 Closer contact between the elderly and handicapped people receiving meals and those supplying meals is essential if the food is to be enjoyed and waste avoided. Those who could help with communications are the workers who deliver meals, geriatric and health visitors and medical social workers in public health departments. It might be possible to bring the cooks and the elderly people together for discussions, perhaps once a year.

2 A meals service should be confined primarily to those who cannot cater for themselves, or be catered for by luncheon clubs, good neighbour schemes or by relatives.

3 Meals should be planned with their nutritive value in mind, as well as their attractiveness to eye and palate. The aim should be to provide about half the daily needs for protein, together with approximately a third of the day's recommended intake of calcium, iron and vitamin C.

4 Welfare services should review their cases periodically to ensure that only those who require meals are getting them. Such redeployment could result in those who really need meals getting them more often.

5 The possibility of evening meal deliveries might be explored, especially in large towns where elderly and handicapped people may have been used to cooked meals in the evening when they were commuters, or in areas where it is customary to have the main meal in the evening.

6 Some of those who cater for themselves on days when mobile meals are not provided, would benefit from advice on how to prepare simple yet nutritious meals.

Table 1 Degree of isolation

	living alone	living with relatives/ friends	married, living with spouse (men and women)
married couples			5*
women (single)	17	6	
men (single)	1	0	
widows	44	5	
widowers	7	4	
total number interviewed	**69**	**15**	**7***
total per cent	**76**	**16**	**8**

* Two married couples, both husband and wife interviewed (four people); three married couples, husband or wife interviewed (three people).

Table 2 Children visiting parent living alone

	visited	not visited	no information	total
widows	17	24	3	44
widowers	4	1	2	7
totals	21	25	5	51

Main Report of Findings

1 PREAMBLE

A meals on wheels service was started before the Second World War by the Invalid Kitchens of London and during the war gained impetus throughout the country by the work of the Women's Voluntary Service (now the Women's Royal Voluntary Service). From these small beginnings a vast network has been built up which in 1969 provided some 13 000 000 meals to over 100 000 people in their own homes[5] and there is evidence to suggest a still unsatisfied demand.

There is a striking difference in rates of provision between local authority areas; the average figure is 56·5 per thousand elderly population. The rate in London at the time of this study was from 27·9 to 231·6. London was not peculiar in this respect.[7] Criteria of need are difficult to define, but generally meals are required by those who can obtain a hot, nutritious meal only in this way.

The function of a meals on wheels service is to provide meals sufficiently often and of such nutritive value as to make a significant contribution to total food intake. In the present investigation the meals supplied by six meals on wheels kitchens and two luncheon clubs in two North London boroughs were studied over a period of one year. The findings may be typical for many large towns; they may or may not be so for rural areas. The investigation, which formed part of a larger study of the nutrition and health of old people, was undertaken with three aspects in mind:

a opinions of those who received meals
b nutritive value of meals supplied
c contribution made by these meals towards an individual's nutritive requirements.

Table 3 Degree of mobility (ability to shop)

a Who does the shopping?

	women	men	total	per cent
home help	28	5	33	36
neighbour/friend	22	4	26	28
relative	13	5	18	21
self	11	3	14	15
totals	**74**	**17**	**91**	**100**

b How long to the shops?

	men and women	per cent
2 minutes or less	30	33
up to 5 minutes	45	49
10 minutes	6	7
no information	8	9
total	**89***	**100**

c Stairs

	men and women	per cent
ground floor	30	33
1 flight	28	31
2 flights	11	12
3 flights or more	22†	24
total	**91**	**100**

* In addition two telephoned orders for food.
† Lifts in four cases.

Table 4 Cooking facilities

where done		**type of cooker**	
separate kitchen	62	electric boiling ring	2
bed-sitting or sitting room	22	gas ring	5
no information	7	electric cooker	10
		gas cooker	67
		no information	7
total	**91**	**total**	**91**

Opinions, and information on what happened to the meals once they were delivered, were collected by means of questionnaire and interviews during a period covering all the seasons of the year. Nutritive values of the meals were obtained by weighing average portions and analysing these with the help of food tables. Some fruits and vegetables were chemically analysed for vitamin C. (See Appendix A for details of methods used.)

There has been one previous report, *Meals on Wheels for Old People*, published in 1961.[8] This enquiry looked at the scope of the service, why and to whom meals were provided, sources from which meals were obtained and the types of containers and vehicles used. The nutritive value of meals, however, was not considered and has not been adequately studied by other workers in this field.

2 DEGREE OF ISOLATION AND MOBILITY

Three-quarters of the sample lived alone and of those who were widowed, less than half were visited by their children (Tables 1 and 2). (Visiting of less than once in six months was discounted.)

Eighty per cent were five minutes or less from the shops but only 15 per cent did their own shopping (Table 3). This points to a general feebleness of those concerned which is further indicated by the fact that, for 35 per cent, home helps were provided who did the shopping as part of their duties. Stairs were also a factor in determining ability to go out. A third lived on the ground floor but a further third had more than two flights to climb. Six individuals mentioned specifically that steepness of stairs kept them indoors and although four lived in blocks of flats with automatic lifts, none used the lifts regularly. One woman, who lived alone 18 floors above ground level, never went out by herself because she was afraid to use the lifts. Another stopped using a luncheon club because each time she went out there were six flights of steep stairs to climb.

3 COOKING AND STORAGE FACILITIES AT HOME

The majority had adequate cooking facilities: 68 per cent possessed a separate kitchen; 84 per cent had a gas or electric cooker in working order (Table 4).

Food storage must be considered in relation to frequency of shopping;

Table 5 Food storage facilities

refrigerator	4
separate food store or larder	5
cupboards	70
food stored in oven/on table/floor	5
no information	7
total	**91**

Table 6 Reasons given for not wanting meals more often

	men	women	all
prefer own cooking as a change	3	14	17
prefer weekend meals which are prepared by relatives, neighbour or others	5	11	16
content to go without	–	3	3
meals not sufficiently appetising prefer to be undisturbed at weekend would be too much trouble for the 'meals on wheels ladies'	–	3	3
no reason given	1	4	5
totals	**9**	**35**	**44**

for 15 per cent shopping was done once a week yet only one of these had a refrigerator. In general, food storage for perishables was unsatisfactory, especially in summer as so few had refrigerators or ventilated space used for food alone. As Table 5 indicates, more than 90 per cent kept perishables and other foods in closed cupboards, in ovens, on tables or on the floor.

Food Costs

It was difficult to obtain any information about the cost of food. Few people separated money spent on food from that spent on cleaning materials, periodicals and numerous other commodities which they bought regularly. Other people were reluctant to discuss their finances. Almost all made such comments as, 'My money all goes', or, 'I can just manage but have little to spare'.

4 OPINIONS ON MEALS PROVIDED

Delivery

Of the 91 subjects interviewed, four had meals on seven days, 84 had meals on five days and the other three on four, three and two days respectively, per week.

When asked if they would like meals more often, in most instances over the weekend, more people answered No than Yes. The replies were:

	men	women	all	per cent
don't know	1	5	6	7
yes	7	30	37*	42
no	9	35	44	51
totals	17	70†	87†	100

When asked why meals were not wanted more often, a number of reasons were given (Table 6).

No one mentioned that it would cost too much to have meals more frequently.

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*Three would have liked meals six days a week and thirty-four on seven days.

†Four women receiving meals on seven days were excluded.

Table 7 Times of delivery of meals, and times preferred

number of replies	food delivered	time preferred	number of those wishing to change
15	11–11 30 am	noon–1 pm	5 (10 content)
21	11 30–noon	12 30–1 pm	5 (16 content)
21	noon–12 30 pm	11 30–noon	1 (20 content)
14	12 30–1 pm		2 (12 content)
7	1–1 30 pm	12 30–1 pm	3 (4 content)
7	after 1 30 pm	12 30–1 pm	5 (2 content)
6	time varied	12 30–1 pm	2 (4 content)
91	**total**		

Table 8 Time between delivery and eating, and place where the meal was kept

time		place	
number replying	time before food was eaten	number replying	where kept
12	½ hour	16	on a table (covered)
15	½–1 hour	1	on a table (uncovered)
17*	over 1 hour	6	in the oven (cold)
3†	overnight	24	no information
47	**totals**	**47**	

* Seven ate the complete meal and two ate the sweet (total, nine) in the afternoon or evening.

† At the weekend food was kept regularly from Friday until Saturday.

Length of Time Meals Had Been Received

More than half the elderly people had had meals for over a year and more than a quarter for over two years. In detail, 24 had received meals for less than six months, 12 for six months to a year, 21 for one to two years and 25 (28 per cent) for more than two years. Nine people could not remember how long it was and none had entertained the idea that their needs could be reviewed should their conditions alter. In their opinion, once on the 'meals list' they stayed there until they themselves asked to be removed.

In the two boroughs, meals were delivered within a spread of two to two-and-a-half hours around midday. The earliest meals arrived at about eleven o'clock and the latest at half-past one. There were no evening deliveries although it was found that ten per cent of the sample ate the meal in the late afternoon or early evening. It may well be that evening deliveries would be both difficult and expensive to arrange, although two deliveries daily would double the numbers fed, using the same equipment.

Replies to the question whether the present time of delivery was satisfactory and if not, what time would be preferred, are presented in Table 7.

Sixty-eight were satisfied with time of arrival but this did not mean that meals were eaten soon after they were delivered. Some of those whose food arrived after one o'clock would have liked to change, but more than half of these were content. With only one exception, all those wanting to change would have preferred meals between noon and one o'clock.

Keeping Food Before Eating

Half the recipients ate their food soon after it was delivered, although seven of them rewarmed the meal in different ways for up to a quarter of an hour; the other half kept it for varying periods (Table 8).

Of the 47 who kept food, 20 did so for more than an hour, and three kept it overnight. None stored food in a refrigerator although most kept the meal covered. All of them ran some risk of food poisoning by keeping food under far from ideal conditions. Also, ways of keeping and reheating the food caused further destruction of heat labile vitamins (especially C).

Table 9 Preferences for meat and fish and methods of cooking

a Meat

liked	times mentioned	disliked	times mentioned
roast—any kind	64	liver	36
stews	33	pork	3
liver	33	'soggy pies' and	
all meat	18	dumplings	2
chicken	10	chicken	1
pies and puddings	6		
mince	6		

b Fish

kind liked		cooking liked	
any kind	21	fried	56
cod	15	steamed	43
haddock	8	baked	23
skate	7		
herring	3		

Less than a quarter would accept cheese dishes, even occasionally, in place of meat; 82 per cent liked potatoes, 97 per cent a second vegetable (yet waste was considerable) and 93 per cent liked puddings. Four of the women would not eat pudding; three because they wished to avoid putting on weight and one because she preferred puddings made for her by a friend.

When asked whether they were satisfied with existing portions or would like larger, the answers were:

	would like more			
	men	women	all	per cent
meat	8	13	21	23
fish	6	14	20	22
potatoes	4	7	11	12
second vegetable	7	14	21	23
pudding	6	12	18	20

For the majority, the meal was large enough but nearly a quarter said that they could eat more of four out of five items. On the other hand, some wasted one or more items. In the kitchens visited, portions were standardised and did not take account of varying appetites, though one kitchen varied the amount of potato served, from one to two scoops. The effect of the amount of wasted food is discussed later.

Table 9 shows which were the favourite kinds of meat and fish: roast meat and fried fish were much more popular than other kinds. Earlier studies report similar findings.[4, 2]

Less than a quarter (23 per cent) said they would like cheese, even occasionally, in place of meat. Others said, 'It is no substitute for meat', 'It causes constipation', 'It is indigestible'.

Cheese dishes mentioned as liked included macaroni cheese (12), cheese flan, welsh rarebit, cauliflower cheese and raw cheese.

Of vegetables liked, though mashed potato heads the list (Table 10), a number of people said that they liked potatoes to be varied and that mashed potato was served too often. Because of staff shortages, potato powder was used frequently. Continual use of this product may decrease the vitamin C content of meals as the analysis described later will show.

Table 10 Preferences for vegetables

a Potatoes

kind	times mentioned as liked
mashed	56
boiled	50
chips	35
baked/roast	21
jacket	1

b Second vegetable

kind	times mentioned as disliked
greens	2
salad	36
carrots	2
'roots'	1
pulse (canned)	23
pulse (dried)	26
baked beans	3

In asking the elderly people their opinions it was made clear, early in the interview, that the questioner was not connected with the meals service and that answers would be regarded as confidential. Some were diffident and did not wish to grumble because the 'meals ladies' were so kind, whereas others welcomed the opportunity to give their opinions, sometimes in unflattering terms. This part of the survey was concerned with subjective judgments and was, therefore, liable to bias.

Answers to the question, 'Are the meals what you like ?', are summarised:

	men	women	all	per cent
Yes	11	35	46	50
qualified Yes	4	13	17	19
No	2	26	28	31
totals	17	74	91	100

Fifty per cent were satisfied and, if 'qualified Yes' answers are included, 69 per cent could be regarded as reasonably content. However, it is disturbing to find that almost one-third did not like the meals. The reasons are discussed later.

Food Preferences

There appeared to be little opportunity for recipients to make known their likes and dislikes to those supplying meals. Obviously, in so large and scattered an organisation, individual attention is difficult; nevertheless, there should be some means of finding out whether meals are eaten and which items are regularly wasted.

The next series of questions dealt with preferences for the different items of meals and whether portions were large enough or too large.

Foods disliked were:

	disliked by			
	men	women	all	per cent
fish	4	14	18	20
cheese (as main dish)	10	60	70	77
potatoes	4	12	16	18
second vegetable	1	2	3	3
puddings	2	4	6	7

Meat was liked by everyone; 20 per cent disliked fish but only two refused to eat it and both because they were afraid of choking on the bones.

Table 11 Preferences for puddings

kind	times mentioned as liked
pies/tarts	68
milk puddings	67
fruit and custard	65
steamed	47
other	43
cheese and biscuits	8

Table 12 Reasons for not using luncheon clubs

physical		psychological	
difficulty in walking	38	dislike going out	7
housebound	20	prefer to eat at home	2
nervous to go out because of falls	3	tried and disliked	2
		confused	1
blind	7		
deaf	1	don't like eating with old people	1*
total	**69†**	**total**	**13†**
	(76 per cent)		**(14 per cent)**

* This man was aged 70.

† No reason given by nine subjects (10 per cent).

From Table 10 a number of interesting points arise:

Green vegetables were popular, but salads, although mentioned favourably by 26 people, were disliked by 36, nearly all of whom said that they had difficulty in chewing raw vegetables.

Root vegetables were mentioned far less frequently than green.

Canned and dried pulse vegetables were disliked by 49 people, yet they continue to be served. Not only are they unpopular but, in contrast to green vegetables, they contribute little or no vitamin C.*

Subjects were asked which puddings were liked (Table 11). Many showed enthusiasm for the first time when talking about puddings. Sixty-one refused cheese and biscuits in place of a pudding (even occasionally). The usual comment was, 'I can get that myself'. Tapioca pudding was the only one disliked by a significant number.

The idea of selecting meals from a menu a day or two beforehand appealed to very few. Some expressed a doubt that they would get what they chose anyway. Others had a more contented attitude and were happy to be surprised by what was provided.

5 LUNCHEON CLUBS

For those who can use them, luncheon clubs have many advantages over meals on wheels. There is direct contact between supplier and consumer so that, within limits, the amount and type of food can be varied to suit the customer. There is, or should be, less delay between cooking, serving and eating with consequent greater palatability and retention of heat labile vitamins. Finally, there are social benefits derived from meeting other people.

The reasons why people did not use luncheon clubs are shown in Table 12.

Three-quarters of the total number of old people studied were judged to be incapable of getting to luncheon clubs unaided. Some of the remainder could have been encouraged, but only if a club was nearby.

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*See also section on nutritive values.

Table 13 Average nutritive value of meals

kitchens (code)	Cals	P g	Cals (per cent)	Ca mg	Fe mg	vit C mg
1	*765**	*38·6*	20	*372*	5·0	11·9
2	660	27·0	16	200	5·2	*17·07*
3	546	29·0	21	*311*	5·3	22·5†
4	*836*	*33·6*	16	*308*	*7·8*	11·0†
5	700	18·5	10	197	3·8	*17·4*†
6	687	24·7	14	183	4·5	10·7†
clubs						
7	524	19·0	14	173	3·6	*21·3*†
8	457	19·3	17	138	4·5	15·0†

* Figures in italics are highest values.
† Figures from Vitamin C analysis.

Figure (below flap) Comparisons of highest and lowest average nutritive values (calculated from food tables) with recommended intakes (represented as 100 per cent).

6 NUTRITIVE VALUE OF MEALS

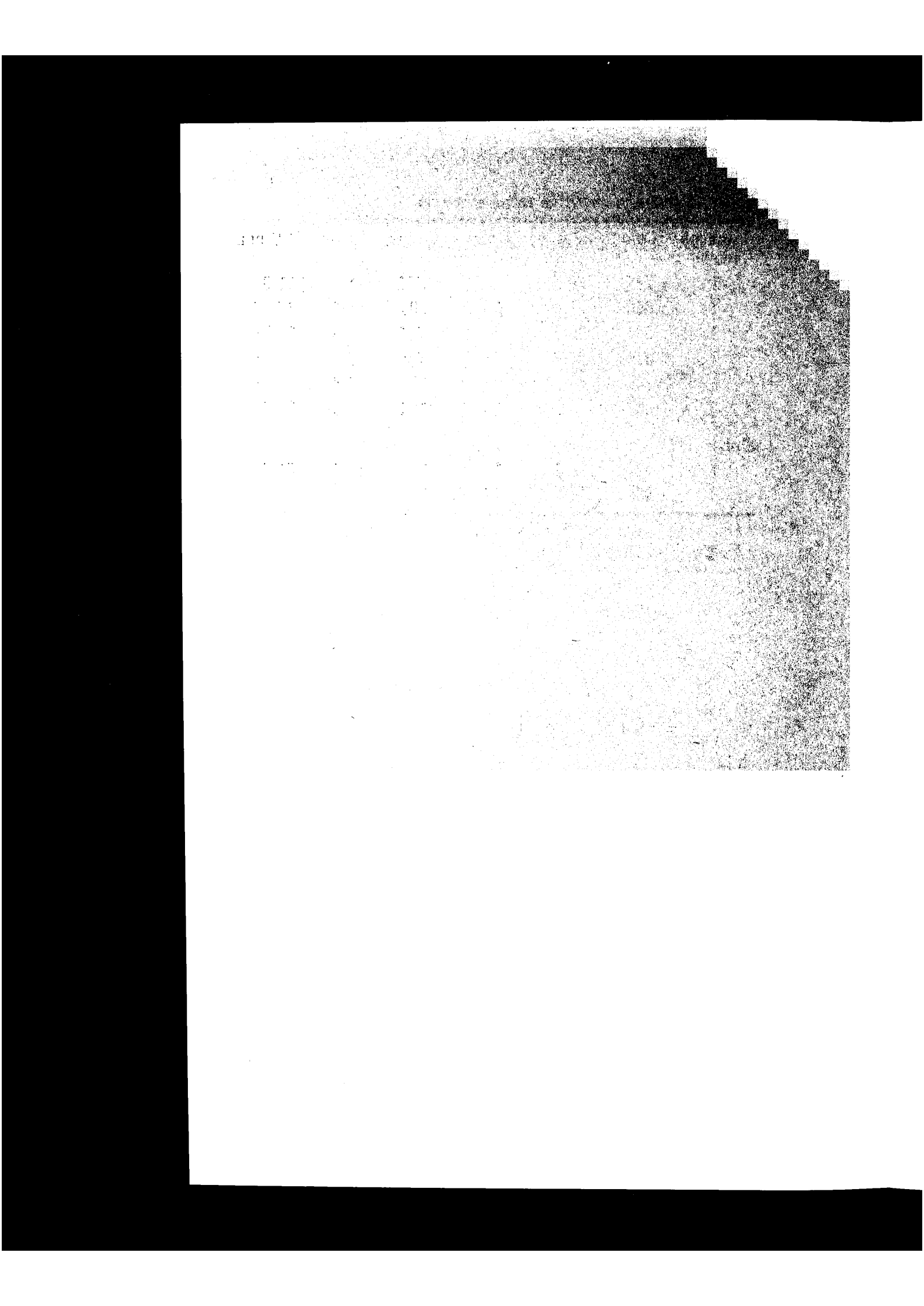
Two aspects of the nutritive value of the meals were studied: firstly, calculations were made, using food tables, to determine the average protein, calorie, calcium, iron and vitamin C values of meals supplied by the kitchens and clubs; and, secondly, 107 individuals were surveyed, to discover what proportion of their total dietary intake was contributed by their meals.

General

All meals were of the conventional kind, with meat or fish served with potatoes and usually at least one other vegetable, followed by a pudding. Differences in size of portions and, as a consequence, in nutritive value of the meals, were quite considerable. For example, servings of roast meat varied from 3oz to as low as 0·7oz, and minced meat from 1·6oz to 5·2oz. There were similar variations in servings of other foods; kitchens which gave small helpings of one food tended to give small ones of all, and vice versa.

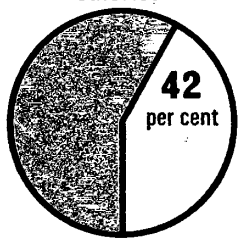
The average nutritive value of the meals, calculated from food tables, is shown in Table 13. Differences in the nutritive values of the meals were also considerable, as the Figure with Table 13 indicates. It will be seen that the best meals (nutritionally) provided three-quarters of the recommended intakes of some nutrients, and the lowest, one-third or less. The highest protein, iron and vitamin C contents were double those of the lowest. The reason for these quite large differences is to be found partly in portion size, partly in how often certain foods were served and partly in selection of food: for example, Kitchens 1 and 4 provided meals with the highest protein content and Kitchen 5 with the lowest. The first two consistently gave larger portions of meat than Kitchen 5 and served milk as pudding or custard more often and in larger amounts.

A fine balance must be kept between a portion which is large enough to give a highly nutritious meal yet not so large as to cause waste. But 'too much meat' was not given as a cause of waste (see page 45). On the contrary, a fifth of the elderly people studied said that they could eat more meat and fish. Also, comparatively few wasted milk pudding or custard. From this limited survey, it appears that portions of food recommended (Appendix B) are large enough to contribute significantly to the total dietary intake yet not so large as to cause waste.



Highest

Calories



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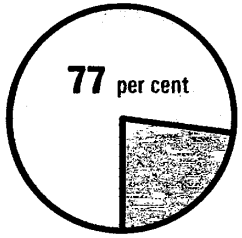
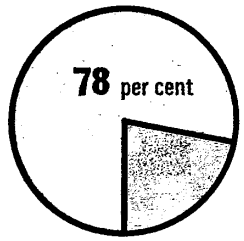
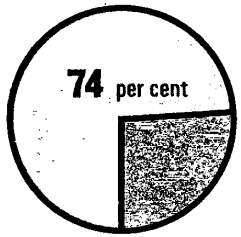


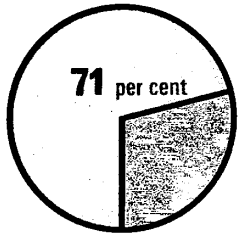
Iron



Calcium



Vitamin C

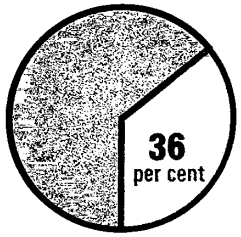


Lowest

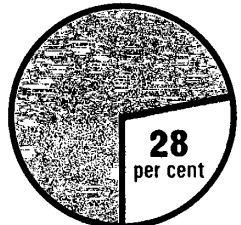
Calories

Protein

Iron



Calcium



Vitamin C

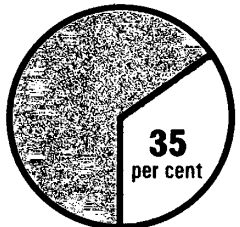


Table 14 Vitamin C content of vegetables, sampled at the end of a delivery round, some three hours after serving

kitchen code	food	vitamin C (mg/100g)	average
6	whole boiled potatoes	3·8 8·8 12·2	8·2
3	mashed potatoes (fresh)	4·9	
	whole boiled potatoes	15·9 14·3 15·9 8·5	13·8
5	whole boiled potatoes	14·4 13·8 7·4 21·3	14·2
6	cabbage	3·1 4·4	3·7
3	cabbage	13·8 1·2 2·7 6·4	6·0
5	cabbage	12·7 13·4	13·0
6	tomatoes	10·9	
3	carrots	0·9 0·9	0·9
5	carrots and peas	0·3	

The iron content of meals was mainly influenced by the amount of meat; hence, Kitchens 1 and 4 were again at the top of the list and Kitchen 5 was among the lowest. Kitchen 4 is interesting, the average figure of 7·8mg of iron was achieved because liver was included in the menu. Many kitchens did not serve liver because of its unpopularity, which seems a pity when at least a third of those questioned said that they liked it and another third would eat it occasionally. Perhaps an alternative dish could be provided for those known to dislike liver when this valuable food appears on the menu.

Vitamin C value depended partly on the retention of the vitamin during cooking and subsequent service, partly on the quantity served and partly on the kind of vegetable or fruit. Kitchen 3 and Club 7 served meals with the highest content and Kitchen 6 with the lowest. The first two served larger portions of green vegetables and/or citrus fruits more frequently than other kitchens, whereas Kitchen 6 served dried pulses for half the meals and prunes were the only fruit provided.

Vitamin C

The amount of vitamin remaining in vegetables after cooking is particularly important because the meals provided may be the chief source of vitamin C in the total diet. Also, it has been shown that losses in vitamin C are paralleled by loss of palatability.[9]

The interval between dishing up and delivering meals may be as long as three or more hours. To find the effect of such delay on vitamin C content, vegetables were sampled at the end of a delivery round during two weeks in July and August. At this time of year, most if not all the potatoes used were new, which accounts for their high vitamin C values. In winter and early spring, vitamin C content of potatoes would be only one-fifth or even less of the amount shown in Table 14. Critics of meals on wheels have suggested that they contain no vitamin C, but the present investigation does not bear out this criticism. In fact, during the summer months these meals could provide one-third to one-half of the day's recommended intake of 30mg.[6] Even in winter when old potatoes would be used, meals could provide a third or more of this amount, *but only if vegetables were well chosen and cooked with care.* Green vegetables, tomatoes and, to a lesser extent, swedes are the only rich sources of this vitamin; other vegetables, especially carrots and pulses, are poor sources (see Tables 14 and 15). Dried pulses and processed peas contain none and should never be served as the only second vegetable. They are

Table 15 Vitamin C losses during cooking and delivery of meals
(samples taken June and July)

		sample taken at	vitamin C mg/100g
potato powder		10 00 am	0·5
reconstituted		1 35 pm	0·3
potatoes		9 15 am	13·0
mashed—fresh		2 00 pm	2·0
potatoes		9 00 am	0·5
whole—boiled*		2 00 pm	1·2
potatoes		8 50 am	4·0
chipped		2 00 pm	7·7
cabbage	raw		45·6
(sample 1)	freshly cooked		34·0
cabbage	raw		67·5
(sample 2)	freshly cooked	9 00 am	12·2
		2 00 pm	1·6
peas		9 00 am	9·6
frozen		2 00 pm	1·4
carrots		10 00 am	1·1
canned		1 35 pm	0·7

* These were probably old potatoes, in contrast to new ones shown in Table 14.

Table 16 Vitamin C values of vegetables served at two luncheon clubs
(samples taken February and March)

	club 7 vitamin C mg/100g	club 8 vitamin C mg/100g
potato powder, mashed (average three samples)	1·3	0·8
spinach	10·1	9·8
brussels sprouts	45·5	29·4
cauliflower	22·2	10·3
cabbage	4·3	6·8
runner beans	1·2	1·0

also unpopular with old people and, as reported earlier, are often wasted.

Well cooked vegetables are those cooked in a minimum amount of water and as near dispatch time as possible. The greatest losses in cooking green leafy vegetables, like cabbage, occur during boiling. Vitamin C dissolves quickly from the large surface of the leaf and considerable losses result: for example, a drop from 67·5mg in raw cabbage to 12·2mg in freshly cooked cabbage (a loss of 67 per cent). Vegetables should not be kept hot for long in the kitchen before being loaded into the van and dispatched, or further loss occurs. To effect speedy dispatch, cooking must be well organised. In some of the best run kitchens visited, vegetables were cooked in batches and the time between dishing up and sending out was kept to a minimum. In others, there was a half to one hour lapse between the end of cooking and dispatch which, added to delivery time, could mean a gap of up to four hours before the meal was eaten.

Table 15 also shows differences in vitamin C content between boiled and mashed potatoes (noted by other workers including Platt et al[9]). Mashed potato reconstituted from potato powder was very low, a finding confirmed by analyses made at two luncheon clubs.

Meals at Luncheon Clubs

Cooked vegetables from two luncheon clubs were analysed (Table 16). At both clubs, considerable use was made of frozen vegetables. Analyses were made during February and March when many of the vegetables served would have been unobtainable or far too expensive in the fresh form. It is interesting to note the high values for most of the green vegetables at Club 7 where the kitchen adjoined the dining-room and cooking was done just before the meals were served. At Club 8 cooked food was carried from the kitchen and kept hot for up to one hour over fierce heat before serving. Losses in vitamin C in sprouts and cauliflower were quite considerable.

7 CONTRIBUTION MADE BY MEALS ON WHEELS AND LUNCHEON CLUBS TO THE TOTAL DIET

The dietary of 43 elderly people was measured for one week (diet measured group) and that of 64 others was assessed from a diet history (diet assessed group).

The part played by meals on wheels or club meals in the total dietary was found to vary and was due mainly to one or more of four factors:

number of meals supplied to individuals in a week
nutritive value of the meal provided
nutritive value of the remainder of the person's diet
amount of the meal eaten

Numbers of Meals Supplied

Only four people had fewer than five meals in seven days, too small a sample from which to draw firm conclusions. However, it is obvious that, all other things being equal, the greater the number of meals eaten, the greater will be the proportion of nutrients they contribute to the total diet. The present investigation supports the view expressed in *Report of an Investigation into the Dietary of Elderly Women Living Alone*[4], that, 'There is no significant contribution to the nutritive value of the dietary when less than four meals a week are provided'.

Nutritive Value

The mean value of the meals received by the 43 people whose intakes were measured was:

	Cals	P g	Ca mg	Fe mg	Vit C mg
	590	24	218	4	14
range:	200—	11—	45—	2—	6—
	890	31·6	370	7	27

The range was wide, but when meals for individual subjects were considered, the range was even wider:

	Cals	P g	Ca mg	Fe mg	Vit C mg
range:	40—	2—	0—	0·24—	0—
	1170	45	361	25	37

The chief cause of these differences was the amount of food wasted. As an example, the woman whose meal yielded only 40 calories, wasted an entire meal except for a small portion of meat. The man who derived no calcium and the woman who derived no vitamin C from their meals ate none of the foods containing these nutrients. Another factor which influenced individual meals was the presence of foods especially rich in a particular nutrient. Meals yielding 25mg iron contained liver; those producing 37mg vitamin C contained citrus or summer berry fruits, in addition to green vegetables.

Conversely, those low in vitamin C usually contained carrots or dried pulses as a second vegetable. High calorie meals invariably contained fried fish, chips and a steamed pudding or pastry. A long standing myth beloved by some caterers, is that to balance a meal a light first course of fish must be followed by a heavy steamed pudding or pastry dish. Conversely, low calorie meals contained meat, boiled potatoes, greens or salad and a second course of fruit with custard.

Nutritive Value of the Remainder of the Diet

The poorer the remainder of the diet the greater was the importance of club or meals on wheels and the larger their contribution to the total diet. To arrive at some basis for comparison the 107 subjects were divided into categories according to:

a total number of protein meals eaten weekly (a protein meal is defined as one containing not less than 1oz of meat, 2oz of fish, 1oz of cheese or 1 egg)

b the amount of citrus fruit, tomatoes or green vegetables eaten

One quarter of the sample fell into the poorest category of those eating eight or less protein meals weekly, of which between five and seven were club meals or meals on wheels.*

One half of the sample fell into the next category of nine to 13 meals weekly; that is, two meals a day for half or more of the week.

One quarter came into the top group eating 14 or more protein meals a week; that is, two or more daily. Most of those in the top group were also drinking seven or more pints of milk a week.

Those in the bottom grade relied to a great extent on supplementary meals, not merely for animal protein but also for associated nutrients: iron, calcium and B complex vitamins. Some subjects could be assessed as getting 40 per cent of their total protein and nearly half their iron intake from these meals: whereas, those in the top category

*See also Table 20 in Appendix A.

relied to a far lesser degree, deriving about a quarter of their protein and a third of their iron.

Twenty-five people ate little fruit or vegetables other than those in supplementary meals. The average vitamin C intake for this group was assessed as 12mg, 59 per cent of which came from club or meals on wheels. At the other extreme, 34 people ate a diet with a mean daily value of 48mg vitamin C, of which only 23 per cent came from supplementary meals.

From Five Case Studies

Five of those whose intake was assessed low in vitamin C also had fewer than eight protein meals a week, and it can be inferred that they ate a generally poor diet. These five were further investigated in an attempt to find out why their diets were so poor.

Mrs A lived with her husband in a comfortable council flat with adequate cooking and food storage facilities. A home help gave assistance twice a week with shopping and cleaning and Mr A also did quite a lot of the shopping. Mrs A was depressed, listless and had no appetite. The depression, which may have caused lack of appetite, appeared to be the main reason for her poor diet.

Mr B was a widower who lived alone in squalor above a disused shop. Cooking and storage arrangements were poor. He had no contact with his children due to a family quarrel. He was disinclined to exert himself, particularly with the preparation and cooking of food.

Miss C was 84 years old and lived alone in a fourth floor council flat. A home help shopped twice a week. Miss C was reputedly 'mean with her money and reluctant to spend it on food'.

Mrs D was a 76 year old and lived alone in rooms on the fourth floor. She had only a single gas ring for cooking.

Mrs E was 90 years old, a childless widow. She lived alone and had adequate cooking and storage facilities. She had a private income allowing her sufficient money to buy food.

There were no immediately obvious physical or environmental reasons for a poor diet in any of these five people, except, possibly, Mr B and Mrs D who had inadequate cooking facilities.

From this small sample of 107 people, it may be deduced that the quality of the rest of the diet was such as to make mobile or club meals of considerable nutritive importance for a quarter of the total and of some significance for three-quarters.

Amount of Meals Eaten

Of those whose diet was measured (diet measured group) 63 per cent wasted some food, the waste varying from a small part of the meal to all of it. Table 21 in Appendix A gives details of waste for 22 people receiving meals on wheels. Almost a quarter wasted food every day and almost a half on every day but one. Second vegetables were most often wasted; 18 subjects (82 per cent) wasted them at least once and many did not eat them at all. Dried pulse vegetables were particularly unpopular. Meat was wasted by 64 per cent, potatoes by 68 per cent and pudding by 60 per cent.

The 64 people whose diet was assessed (diet assessed group) were asked whether they ate all the meal and if not what foods were left, how often and why. The emotive word 'waste' was not used, to avoid any suggestion of criticism on the part of the questioner. Twenty-seven people (42 per cent) stated that at least one item of the meal was regularly 'left' – a lower percentage than that found for people whose intake was measured. Differences may be due to individual differences but more likely to differences in survey techniques.

The types of food regularly left by these 27 people were:

meat (liver mentioned twice)	13
second vegetables (salad and hard vegetables mentioned twice)	11
potatoes	10
puddings (pastry, 'heavy' puddings mentioned twice)	5

Some wasted more than one item.

Reasons given for leaving food are of interest:

too large a portion (potatoes mentioned most often)	16
too hard to chew (meat and salads mentioned)	13
unpalatable (too sloppy, too dry, heavy, 'doughy')	11
poor cooking	10
cold	3
indigestible	3

Other reasons included dislike of particular foods: for example, liver, meat, green vegetables, dried pulses and heavy puddings. Temperature of food was mentioned by only three people, probably because meals could be reheated easily. The majority reheated their meals anyway.

The story of two elderly sisters living together underlines the seriousness of food waste. These two ladies each had meals on wheels five days a week. During the week of the survey, Maisie N wasted half her entire meal every day and on one day all the vegetables. Her sister Violet wasted the entire meal on one day and all but a little meat on the remaining days. The amount of waste was said to be usual. The average nutritive value of the meals they actually ate over five days is contrasted with that of meals eaten by the whole group.

	Cals	P g	Ca mg	Fe mg	Vit C mg
Maisie N	178	9	64	1·4	6
Violet N	69	5	18	0·7	0
Averages for the group	590	24	218	4·0	14

These two cases were extreme, but clearly, the reasons for regularly and frequently wasting food need to be investigated. If the old or handicapped person does not eat the meal, the purpose of the long, complicated and expensive process, involving food, time, transport and personnel, is lost and the individual can remain poorly nourished.

What Happened on Days Without Supplied Meals

For most people in the survey, Saturday and Sunday were the only days when meals were not provided. How did they fare on these days? Table 17 compares the average nutrient intakes for the diet measured group on days when meals were available with days when they were not (that is, at the weekend). The four people supplied with meals on seven days a week are not included in this table. On the whole, people did a little less well at the weekend than during the week but for eight there was a considerable drop in the nutritive standard of the diet at that time. For example, the fall in all nutrients was considerable for two people (Code numbers 7013 and 7032). Conversely, six improved their vitamin C intakes at the weekend and one (Code number 7011) showed a general improvement when meals on wheels were not available. There was no obvious difference at the weekends whether

meals were prepared by neighbours, relatives or by the elderly people themselves.

The 64 people who had their diet assessed were asked what they ate for main meals when no mobile or club meals were available. In listing their replies, cooked meals were defined as hot meals containing meat, potatoes and other vegetables; main meals were bread and butter with egg, cheese, meat or fish; snacks, as soup or bread and butter or cake, biscuits and beverages.

Their replies were summarised:

	number	per cent
cooked meals on both Saturday and Sunday	40	62
snack on one day and cooked meal on the other	9	14
snacks on both days	10	16
snack or cooked meal on one day only	5	8
total	64	100

Thus, nearly two-thirds (62 per cent) ate cooked meals on both Saturday and Sunday and an additional 14 per cent ate a cooked meal on one day. Sixteen per cent ate only snacks at the weekend and consequently might be expected to eat less well. Five people (8 per cent) ate little; three kept part of Friday's mobile meal for Saturday and had a snack on Sunday, while two ate a snack on Saturday and had nothing apart from bread and butter or biscuits on Sunday.

On this limited evidence, eight people in the measured intake group and five in the assessed intake group had markedly reduced diets on days when no mobile or club meals were available. Most (82 per cent) managed reasonably well and the total diet was unlikely to suffer as a result of a five rather than a seven day service.

Who Prepared Meals at the Weekend?

Meals were prepared by neighbours for 19 of the whole group, by relatives for 16, and 54 (seven men and 47 women) prepared their own. Of these 54, some were capable of preparing a cooked meal using conventional raw foods but for many there was an almost total dependence on 'convenience' foods: ie, canned or sliced cooked meats, meat pies, canned fish or frozen fish fingers, canned soups, milk puddings and fruit. Fruit was mostly of the low vitamin C

variety, pears and peaches. Only one woman bought canned mandarin oranges.

Meals on wheels are undoubtedly an important part of domiciliary services but, to quote from the Department of Health circular 5/70, 'meals on wheels are inevitably a second best service since they involve an interval between cooking and service which would ordinarily be unacceptable'.[5] It remains to be seen whether future developments in food technology can reduce this interval.

Table 18 Facilities in kitchens and clubs with dates of survey

dates of survey	code	kitchens	days surveyed
Aug/Sept 1967	3	canteen also supplying meals for office workers	4
Aug/Sept 1967	5	factory canteen	4
Aug/Sept 1967	6	commercial catering establishment	4
June/Sept 1968	4	Town Hall canteen also supplying midday meals for office workers	6
April 1969	2	kitchen catering for mobile meals **only**	5
June 1969	1	kitchen catering for mobile meals only. Some special diets provided*	5
		clubs	
Feb/March 1968	7	club with dining-room and kitchen adjoining	7
November 1968	8	supplied with meals from Club 7, 10–15 minutes' journey away by van	5

* Some of these were therapeutic diets (diabetic or low salt) and others were soft diets for which the food was minced.

Appendix A

SAMPLE, SURVEY METHOD AND TABULATED RESULTS NOT INCLUDED IN MAIN REPORT

Sample

Total number: 107 21 men, 86 women
Forty-three of these (seven men, 36 women) took part in one of three measured diet surveys:

a investigation into the dietary of housebound people in Camden*
b follow-up study of elderly women living alone[10]
c randomly selected patients over the age of retirement†, attending a group practice in Camden.

An additional 64 people (14 men, 50 women) 'diet assessed' group, were selected by geriatric or health visitors of the two London boroughs concerned, on the basis that they were over retirement age and had received meals on wheels for a few weeks. It was also necessary to select people who could take part without difficulty; the very deaf and confused were omitted. The refusal rate was remarkably low; only three did not cooperate.

Survey and Methods

Four kitchens supplying meals on wheels and two luncheon clubs in one London borough, and two kitchens supplying meals on wheels in another were investigated. Table 18 gives details of facilities and dates of the survey. The method adopted was the same for both, except that in three of the kitchens only two meals from each could be weighed

*To be published.
† Retirement age was taken as 60 for women and 65 for men.

on four consecutive days. In all others, at least ten per cent of the total number of meals was weighed, each item being weighed separately and weights averaged (Table 19). The nutritive value of these average portions was calculated, using food tables. Past menus were checked to ensure that the meals investigated were typical.

Samples of some fruit and vegetables were taken for vitamin C analysis during preparation, cooking, service and at the end of a delivery round. Samples were placed in weighed bottles containing metaphosphoric acid and were delivered to the Government Laboratories within two hours of sampling. They were kept in dry ice and analysed for both total and reduced vitamin C within 36 hours. Analyses were carried out by the Government Chemist using the Titrimetric Method for Ascorbic Acid.[1]

Four dietitians took part in the field studies.

Diet Measured Group (43 people)

Each elderly person was visited a few days before the start of the survey and the method to be followed was explained. A detailed diet history and a list of usual weekly food purchases were taken. On the day the survey began, the dietitian called at a previously arranged time, when she explained how the simple food record form was to be completed and demonstrated how to use the scales (these were left at the home). All food such as butter, bread, sugar, jam, in current use was weighed by the dietitian and any unbroken packets in reserve were noted. The home was visited each day for seven consecutive days and visits were timed to coincide either with the arrival of the meals on wheels delivery service when portion weights could be assessed, or at the end of the meal when waste could be weighed. As a check on portion weights, average portions supplied by the kitchens were obtained. The dietitian, during these daily visits, also discussed the food record sheet, weighed new purchases and reweighed food in current use, noting the amount used since her previous visit.

Food eaten away from home, including that at luncheon clubs, was assessed by description of type and amount, expressed as slices or spoonfuls. Average weights of food served at the two clubs involved were also obtained.

Diet Assessed Group (64 people)

A modified Bertha S Burke method was used to assess nutrient

Table 19 Average weights (ounces) of foods served in meals on wheels kitchens and clubs

	meals on wheels kitchens						clubs	
	1	2	3	4	5	6	7	8
Meat, fish and cheese								
roast meat	2·2 (2)	2·1	3·1	2·3	0·7	3·0	–	2·8
boiled meat	–	2·0	–	2·4	–	–	–	–
stewed beef with some gravy	8·7 (2)	–	3·9	–	1·1	2·7 (2)	–	2·8
steak pie or pudding	–	3·7	–	4·3	–	–	3·4	4·0
mince with some gravy	–	5·2	2·7	–	1·7	–	1·6 (2)	2·2
chop with bone	–	–	3·7	–	–	3·0	2·5	–
chicken	2·3	–	2·0	–	–	–	–	–
sausage/rissole	–	–	–	–	–	3·4	2·3 (2)	2·0
liver with some gravy	–	–	–	4·9	–	–	–	–
fish—baked	5·7 (2)	2·9	–	3·5	–	–	4·0	–
fish—fried in batter	7·2	–	–	6·2	–	–	–	–
cheese	2·4	–	–	–	–	–	–	–

Fruit and vegetables								
potatoes	5·5 (5)	4·2 (5)	4·0 (4)	4·0 (6)	3·4 (4)	3·5 (4)	4·3 (7)	4·2 (5)
greens	2·4 (2)	2·7	3·3 (5)	1·6 (2)	1·8 (2)	2·1 (2)	2·3 (5)	2·8 (2)
pulses	2·6 (3)	2·1 (4)	2·2	2·0 (2)	1·2 (2)	1·8 (2)	1·4	2·2 (2)
root	2·4 (2)	–	2·7 (4)	2·5 (3)	0·6	–	1·8 (2)	2·2 (2)
tomatoes	–	1·8	–	–	–	1·0	–	–
stone fruit (canned)	3·7 (2)	3·7	3·0 (3)	2·0	–	–	2·3	2·5
prunes	–	–	–	–	–	1·2	–	–
pineapple	–	–	–	–	–	–	–	2·3
citrus	–	–	–	–	–	–	2·0	–
Milk dishes								
custard	5·7 (5)	3·3 (3)	5·0 (3)	5·2 (4)	2·6 (4)	2·0	2·8 (4)	1·5 (4)
milk pudding	7·4	–	7·5 (2)	5·1	–	5·4	4·7	–

Note: figures in brackets indicate number of times, if more than once, the item was served during the survey period.

Table 20 Number of protein meals per week compared with the percentage contribution made to nutrient intakes by mobile and club meals

a Diet measured group (37 people*)

number of people in each category	per cent	number of protein meals/week	percentage contribution to total diet 37 people		
			P	Ca	Fe
10	27	8 or less	40	23	49
15	41	9–13	36	21	42
12	32	14 and over	27	17	31
total 37	**100**				

b Diet assessed group (64 people)

number of people in each category	per cent	number of protein meals/week
17	26	8 or less (6 people drank less than $3\frac{1}{2}$ pints of milk weekly)
31	49	9–13 (the majority drank more than $3\frac{1}{2}$ pints of milk weekly)
16	25	14 and over (all but one drank a minimum of 7 pints of milk weekly)
total 64	**100**	

*of the original 43, for whom a meal pattern was available.

intakes of this group.[3] Questions were asked on the usual meal pattern and amounts of food eaten were assessed through description of spoonfuls or slices. This information was cross-checked by details of weekly food purchases. The contribution made by mobile meals to the dietary of both the measured and assessed groups was calculated.

Questionnaire

Ninety-one of the 107 who took part in the investigation were interviewed and orally answered questionnaires which were designed to elicit information as to their views on meals on wheels. Each person was interviewed for a total of two to three hours and usually two separate interviews were necessary. Old people tire easily and may answer at random in order to end the session as soon as possible.

Table 20 shows that the better the diet, in terms of the number of protein meals, the less the contribution made by mobile and club meals.

The percentage in each category is similar in both the measured and assessed diet groups.

Twenty-seven (10 in the measured group and 17 in the assessed group) came within the poorest diet category whilst 28 came within the best. For those in the poorest category, supplementary meals were considerably more important than for those able to provide themselves with 14 or more protein meals and seven or more pints of milk a week.

Table 21 Food wasted by 22 people (of 35 in the diet measured group) taking meals on wheels

code	number of days		food wasted			
	food wasted	meals provided	meat	second vegetable	potato	pudding
7007	4	5	some (1)	all (3)		half (1)
7010	1	5		total meal on one day		
7011	5	5	all (1)			all (5)
7019	7	7		some (2)	half (7)	
7025	3	5	some (1)	all (1)	all (1) some (1)	
7030	3	5	all (3)	all (3)	all (2)	all (1)
7031	5	5	all (1)	some (3)	some (1)	
7032	4	5	total meal on one day		some (1)	all (2)
7033	2	5	some (1)	all (1)	all (2)	
7036	3	5	all (1) some (1)	all (2)	some (3)	some (1)
7041	5	5	all (1) some (3)	all (5)	all (5)	all (5)
7047	4	5		all (2)	all (5)	
7051	3	5	some (1)	all (3)	some (2)	
7053	5	5	some (4)	all (4)	all (2) some (3)	
7054	4	5	half (1)	all (2) some (1)	some (1)	
6023	1	5				all (1)
6155	1	5		all (1)	all (1)	all (1)
6174	1	5				some (1)
6142	1	5				all (1)
L 38	6	7	all (1) some (3)	all (4) some (2)	all (2) some (3)	all (1)
L 41	2	7		all (1)		some (1)
L 53	4	7		all (4)		

Note: figures in brackets indicate the number of times in a week the food was wasted.

Appendix B

RECOMMENDED INTAKES OF NUTRIENTS FOR THE UNITED KINGDOM*

75 years and over (assuming a sedentary life)

	calories	protein	calcium	iron	vit C
		g	mg	mg	mg
men	2100	53	500	30	10
women	1900	48	500	30	10

Recommended portion weights (cooked food in ounces)

food	small	normal
	oz	oz
meat (not including gravy)	$1\frac{1}{2}$	2
fish (steamed/boiled)	3	4
fried in batter	4	5
cheese – raw	1	$1\frac{1}{2}$
milk pudding	5	7
steamed or baked pudding	2	3
custard	3	4
custard – with fruit	4	5
potato	2	4
second vegetable	$1\frac{1}{2}$	2

*From Report of the Panel on Recommended Allowances of Nutrients.[6]

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