

A B S T R A C T

THE NUTRITIVE VALUE AND COST
OF FOODS CONSUMED BY SELECTED
INDIVIDUALS OVER 70 YEARS OF AGE

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Submitted by

May E. Combs

In partial fulfillment of the requirements
for the Degree of Master of Science
Colorado

Agricultural and Mechanical College

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Unprecedented changes have taken place in the age distribution of the population of the United States since the beginning of the present century. The proportion of the population of this country over 65 years of age increased from 4.1 per cent in 1900 to 6.9 per cent in 1940. If the 1900 to 1940 longevity trends prevail, it is possible that 11.0 per cent of the population of the United States may be over 65 years of age by 1975.

This shift in the weight of the population to the upper age brackets has accented many existing problems including those concerning the health of older people. Old age is characterized by a high mortality rate and a high rate of disabling sickness. It is generally agreed that adequate nutrition can be an important factor in maintaining the health and vitality of senescent individuals. Some information concerning the specific dietary adjustments and nutritional requirements of aged groups has been secured from experimental studies involving animals and a limited number of studies of human beings. However more research involving human beings is indicated.

It was pointed out that dependence on processed food, fixed food habits, and reduced incomes increased the danger of nutritional inadequacy in older people.

It was suggested that "the mode of life" seems to be the most important factor in the development and possibly the basic instigation of degenerative diseases. It was also indicated that diet is "certainly a major element in"the mode of life". Careful analysis of records of food consumption was recommended as one of the best methods of determining nutritional needs of various groups of individuals.

The problem

What are the nutritive value and costs of foods consumed by a group of selected individuals over 70 years of age and what is the significance of this information?

Problem analysis.--1. What foods and how much of each food do elderly people eat for breakfast, dinner, supper and between meals?

2. What is the nutritive value of this food?

3. In what nutrients are the diets deficient when compared with the National Research Council's allowances for average sedentary adults, and why?

4. If an adequate diet is not already supplied, what adjustments could be made to improve the quality of the diet without materially increasing the cost?

5. What are the meal patterns of elderly people and how do they compare with a standard meal pattern?

6. Does this study indicate any well defined dietary habits that are characteristic of this group of

aged persons?

7. Do the diets of those housed in a boarding home differ from those living in private homes? If so, what are these differences and what are the possible reasons for them?

8. Are the diets consumed now the same or different from those eaten when the participants were younger? Why and in what way do they differ?

9. Are there any obvious differences in health or activity that can be correlated with either past or present dietary habits?

10. What is the cost of the present diets?

11. Is it possible to plan adequate diets for these people (that take into consideration the so-called "typical food preferences of elderly people") at a reasonable cost?

12. What are the seasonal differences in the dietary patterns of the two groups of participants?

13. Does availability of foods at different seasons have a significant effect on the nutritive value of the diets or are any possible effects nullified by fixed food habits?

Delimitation.--This study was limited to two groups of aged people living in Fort Collins, Colorado. Group I consisted of nine people over seventy years of age who lived in a boarding home. Group II included five

couples, both members of which were over seventy years of age who lived in their own homes.

Definition of terms.--The term "recommended allowance" refers to the quantity of the various nutrients agreed upon by the majority of the members of the Food and Nutrition Board of the National Research Council as guides for planning adequate diets for every normal person. The allowances used in the present study are those recommended for sedentary men and women.

Adequate diet, as used in this study, means a diet in which the nutrient content equals or exceeds the National Research Council's recommended allowances for the various nutrients.

Nutrient is used in this study to include calories as well as the food constituents, such as protein, fat, et cetera.

Background.--Fort Collins, Colorado, is located in the north central part of the state. The altitude is about 5000 feet. The population is between 15,000 and 18,000. The percentage of persons over 60 years of age in this county in 1940 was somewhat higher than the national or state averages. Statistics compiled from the United States Census Reports illustrate this point, (Table 1.)

Table 1.--NUMBER AND PER CENT OF PEOPLE OVER 60 YEARS
OF AGE IN THE UNITED STATES, 1940.

	<u>1940 Population over 60 years old</u>	
	Number of individuals	Per cent of total population
United States	13,747,654	10.4
Colorado	130,018	11.7
Larimer County	4,730	13.3

In order to determine the nutritive value and cost of food consumed by a selected group of aged individuals, the following methods and materials were employed.

Two groups of people 70 to 90 years of age participated in the study. Their cooperation was secured through personal visits to their respective homes.

Group I consisted of nine people, three men and six women, who resided in a boarding home maintained for old people. This home did not accept residents who required nursing care. Although most of them exhibited physical and/or mental infirmities that are associated with senility, they were ambulatory.

Group II included five couples (husbands and wives) living in private homes. The individuals in this group indicated that they were afflicted with various

infirmities. However, they led "normal" lives, and they appeared to be in better condition than the members of Group I.

The kinds and amounts of food eaten by each participant were determined for one week in the fall (October 1947) and another week in the winter (January 1948). The grams of each of the various foods consumed were determined by weighing the individual portions of food as they were served. Each kind of food left on the plates at the end of the meal was weighed and the amount subtracted from the original weight. The difference then represented the weight of the food that was actually eaten. Dietary balances were used for all weighing. The menus for each meal with a description of the foods served and the method of preparation were entered on a columnar pad. The data on the weights of each food eaten by each participant were recorded on the same blank.

Meals were served to the boarding house residents in their private rooms. The writer weighed and recorded all information on the food intake of the participants living in the boarding home.

In Group II, residents in private homes, either the man or his wife assumed the responsibility of weighing the foods eaten by each of them, and recorded the necessary data. The writer instructed this participant in the correct use of the dietary balance and the method of recording the

description and weight of the foods eaten. Daily visits were made to each home during each weighing period in order to check the recorded data and to assist the recorder when necessary.

The weights in grams of the individual foods eaten by each participant were totaled for the weighing period in October 1947 and for the period in January 1948. The foods were grouped according to a standard classification and the nutritive value of each food was calculated according to standard food tables. In a few cases it was necessary to secure recipes from the families or the manager of the boarding home and calculate the nutritive value of the various amounts of the particular items that were consumed by each participant. The writer made allowances in these calculations for the loss of ascorbic acid during cooking but did not make any other adjustments for loss of nutritive value.

When the calculation of the nutritive value of each food was completed, the amounts of the various nutrients were totaled for each weighing period. Each participant's average daily intake of each nutrient was then determined and compared with the National Research Council's recommended allowances for sedentary adults. The number of grams and the per cent of the average daily intake of each nutrient derived from each food group were also calculated.

The average weight of each group of food consumed per day by each participant was calculated from the data on kind and amount of food eaten, and these weights compared with a standard meal pattern. Comparisons were also made by groups of participants and by seasons.

Data were secured on past and present dietary patterns by means of a personal interview. Each person was asked what foods he ate in the past and at present, and how frequently they were eaten. A check list of foods was used for recording this information. The members of Group I could not follow the writer in the questioning, and frequently had to ask questions that indicated that they did not understand or follow the line of questioning. Therefore the data secured from this group were of very doubtful value. The data secured from the participants living in their own homes were more satisfactory.

Information pertaining to the physical status of the participants was obtained from the participants themselves and/or other persons who had access to information concerning their physical condition. A check sheet adapted from several nutritional status blanks, and lists of criteria was used to record these data.

The cost of the food consumed by each group of participants was determined from data supplied by the participating couples and the manager of the boarding house. These data were in the form of grocery bills and

the homemaker's estimates of quantities of home produced and stored foods used during the week. The total cost of various kinds of food used during the week was determined from this information. In addition, the writer computed the cost of the food actually served.

The mean intakes of all specific nutrients except iron were less than the National Research Council's recommended allowances for sedentary adults. The average intakes of the men ranged from 66 (ascorbic acid) to 120 (iron) per cent of the quantities recommended by the National Research Council, and the intakes of the women ranged from 60 (ascorbic acid) to 94 (iron) per cent of the allowance suggested for sedentary women.

The intakes of nutrients of the residents of boarding home were more nearly adequate than the intakes of the residents of private homes. The above difference in nutritive values of the diets of the two groups of participants was greater in the case of the female participants than in the case of the male participants. The ranges in intakes for the residents of private homes were slightly higher than the range in intake of the residents of the boarding home.

The only variation in nutrient intakes that seemed to be attributable to seasonal availability of foods was the difference between the October and

January ascorbic acid values for the men in Group II.

The weights of the participants' daily intakes of most of the food groups were less than the amounts calculated for a daily food pattern suggested by the National Research Council.

The male residents of the boarding home ate adequate amounts of milk, meat, other vegetables, other fruits, and fats, and the male residents of private homes ate adequate quantities of other fruits and fats. The female residents of the boarding home ate adequate amounts of other vegetables, other fruits and fats, and the female residents of private homes ate adequate amounts of fats only.

The expenditures for food averaged approximately \$4.00 per person per week for both groups of participants in the present study. The average cost of food per person was slightly higher for the residents of the boarding home (Group I) than for those living in private homes (Group II).

The food expenditures for Group I were divided approximately into fifths as is recommended in a commonly used plan. The food expenditures for Group II were similar to the results of food expenditure studies of average American dietaries.

The relationship of the expenditure for a food group to its contribution to the nutritive content of the

diets of the participants is best illustrated by the following examples. Milk and milk products and cereal and bread furnished a much larger share of most of the 9 nutrients than would correspond with their cost. In contrast sweets furnished its proportionate share of only one nutrient, namely calories.

It was suggested that the participants use some of the less expensive forms of milk such as dried, skimmed, and canned milk to replace part of and/or to supplement the milk now included in the diets. These forms of milk could be used in various dishes commonly eaten by the participants. Their use in various types of drinks to be taken between meals is also suggested as a means of improving the nutritive quality of the diets.

It was suggested that Group II (residents of private homes) could improve the nutritive content of their diets by reducing the proportion of the food money spent for meat and using this increment to purchase milk and milk products. The use of liver or some other glandular meat each week was also proposed as a means of improving the vitamin content of the diets of both groups of participants. The total weight of vegetables in the diets of both groups of participants should be increased. It was noted however that this would require an increase in total expenditure for food unless they could be produced at home. The total

food intake of the participants would have to be increased in order to meet the caloric intake recommended for average sedentary adults.

The following suggestions were made for further study:

1. Studies of the food intake of large numbers of elderly people in conjunction with medical histories and examinations to determine standards for dietary allowances for elderly people.
2. Caloric balance studies with elderly people.
3. Further studies of the protein intake of senescent individuals to determine optimum intake.

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Agricultural and Mechanical College
Fort Collins, Colorado

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WE HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER OUR
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NATIONAL BANK

Chapter I

INTRODUCTION

Unprecedented changes have taken place in the age distribution of the population of the United States and certain other countries of the world since the beginning of the present century. According to the United States Census Reports for 1940 (54), 4.1 per cent of the population of the United States was over 65 years of age in 1900. By 1940 this proportion had increased to 6.9 per cent. It was noted in Special Census Studies (52 and 53) that nearly 11 per cent of the population of this country would be over 65 years old by 1975 if 1900 to 1940 longevity trends prevail. In addition, Metropolitan Life Insurance Company data (23) showed that the expectation of life at birth had increased from about 47 years in 1900 to slightly more than 65 years in 1945, a rise of nearly 33 per cent.

The changes indicated above have accented many existing problems including those concerning the health of older people. Old age is characterized by a high mortality rate and a high rate of disabling sickness. That adequate nutrition can be an important factor in maintaining the health and vitality of older people is a

widely accepted fact. Nevertheless, there is little information available concerning the characteristic dietary patterns or specific nutritional needs of aging and aged groups. There have been experimental studies using laboratory animals to determine the nutritional requirements during senescence. However, more research is needed.

McCay (19), in a discussion of the diets of aged people, pointed out the increased danger of malnutrition during senescence. He stated that older women are more likely to depend on processed foods rather than on foods which require home preparation. Fixed food habits and the belief that certain foods "aren't good for him" reduce the variety of foods consumed by elderly people. In addition, reduced incomes frequently cause the aged to buy a smaller quantity and a more limited variety of foods. Frequently, the expenditure for other items in the budget cannot be reduced, therefore, the amount available to spend for food is not adequate. Restriction of the amount as well as the variety of foods consumed suggests the possibility of nutritional inadequacy in older people.

Keys (13) in a discussion of the relation of nutrition to the etiology and cause of degenerative disease, stated that the "mode of life" seems to be the most important factor in the development and possibly

the basic instigation of these degenerative diseases. He also pointed out that diet is "certainly a major element in the mode of life".

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Chapter II

REVIEW OF LITERATURE

At present, the dietary allowances that are recommended for the average sedentary adult have been applied to older people. It has been noted by numerous writers that senescent people would benefit by the development and application of knowledge concerning their specific needs just as children in the last two decades have benefitted.

Since changes associated with aging would be expected to modify dietary recommendations, pertinent information concerning the physiology of aging as it is related to nutritional requirements is cited. Research studies that have been conducted to determine the specific nutritional requirements of the aging and aged individual, and dietary studies involving aged people are reviewed. Typical food budgets that are recommended for elderly people are also cited.

The effect of senescence on digestion,
absorption and metabolism

Anatomical changes during senescence.--Anatomical changes that should be considered in assessing dietary requirements of senescent individuals occur in the

mouth and gastrointestinal tract. Tuohy (50) indicated that half of the people in our population over 50 years of age have artificial dentures and suggested the importance of comfortable and serviceable dentures to insure adequate nutrition. He also pointed out that in many cases people cannot be fitted with dentures because of sore gums, lips, tongue or mouth as well as certain other disorders.

The changes in the gastrointestinal tract include a reduction in the number of secretory units and a loss of muscular tone (Freeman 8). Felsen (7) and Freeman (8) mentioned that the small intestines and colon are subject to muscular atrophy, muscular thinning and loss of muscle tone which are associated with intestinal vascular sclerosis. Freeman (8) pointed out, however, that in most aged persons these changes are not sufficient to cause any appreciable loss of ability to function properly. He indicated that the efficiency of the intestinal tract of aged people is more likely to be impaired by a relaxed abdominal wall or by an interruption in the duodenal lumen by the weight of the mesentery crossing its horizontal position. In addition, deposits of fat in the subserous membrane and a stretching of the omentum may interfere with the functioning of the gastrointestinal tract.

Physiological changes during senescence.---Among the physiological changes that occur during the aging process are those in the volume and concentration of the digestive enzymes. Meyer and co-workers (26) found that the ptyalin content of the saliva of a group of young people (average age 25 years) was 2.4 to 22.2 units with an average of 10.15 units, while in a group of aged persons (average age 81 years) the range in ptyalin content was 0.19 to 0.48 units with an average of 0.303 units. This reduction in the amount and concentration of the salivary amylase places the burden of starch digestion in the aged upon the pancreatic amylase. These same authors reported slightly subnormal values for pancreatic amylase.

Other digestive enzymes which were found to be diminished in aged persons were the proteolytic enzymes, pepsin and trypsin, and the lipolytic enzyme, lipase (24 and 25). The author suggested that while the secretion of pepsin and trypsin was diminished in the aged, there is probably a sufficient amount of these enzymes to digest enough protein to supply the needs of the body. In the case of lipase the concentration was relatively unchanged, but the amount secreted was diminished. The reduction in the amount of lipase was considered the result of a loss of ability of the secretory units to function.

Meyer (24) and Freeman (8) indicated that while there is a reduction in the amount of certain enzymes, the aged are still able to digest an adequate diet though it may take a longer time.

Van Liere and co-workers (58) studied the gastric emptying time of elderly people to determine whether it was delayed sufficiently to make it necessary to alter the dietary plans for aging and aged persons. The authors concluded that the gastric emptying time was not affected by senescence since the rate at which the stomach of aged people empties compares favorably with that found for younger adults.

The high incidence of achlorhydria among aged people has been mentioned frequently. The lack of hydrochloric acid favors the growth of some microorganisms and unless care is taken to control the introduction of these organisms or to avoid foods that will favor their development, putrefactive and fermentative bacteria are likely to cause trouble in the digestive tract.

The available literature indicates that the alimentary tract of aged people is capable of digesting an adequate diet in spite of both anatomical and physiological changes that occur during senescence. The difference between the aged person and a youth is therefore the difference between "maximum and minimum

efficiency" (Freeman 8).

Nutritional requirements during senescence

Studies involving laboratory animals.--Sherman et al (43 and 44) found that quantitative improvements in the vitamin, protein and mineral content of an already adequate diet expedited the growth and development of the animals, extended the average length of adult life, and resulted in a higher level of adult vitality. Studies of the relation of vitamin A to nutritional well-being during aging were also carried out by Sherman and co-workers (45). The results indicated that the level of vitamin A in the diet can be increased to twice the amount that is considered adequate with beneficial results.

McCay et al (20 and 21) found in a series of experiments on rats that restriction of the caloric intake of an otherwise optimum diet increased the average life span. They also noted that protein from liver seemed to result in greater length of life than when casein was used as the source of this nutrient. However, while restriction of the caloric intake introduced in middle age can influence the life span significantly, it is not as effective as when underfeeding is introduced at the time of weaning. Radiographs were made of various organs at post mortem and it was found that the kidneys, aortas, heart, and eyes were frequently the sites of

deposits of calcium in advanced age. These deposits of calcium were more common in the retarded animals than in those allowed to grow "normally". It was also noted that restricting the caloric content of the diet lowered the incidence of diseases commonly found in old rats. They suggested that this reduction in the incidence of diseases may account for the influence of reduced caloric intake on the life span of their rats.

Paul and Paul (32) reported on a study of vitamin A intake and its relation to length of life, growth, tooth structure, and eye conditions of experimental animals. Their results showed that as intakes of vitamin A were increased, the average age at death was advanced, progressively better growth was made during early life, and abnormalities of the eyes decreased in their experimental animals. Tooth mottling and discoloration were noted in the lower levels of vitamin A.

Mill and co-workers (27 and 28) in a report of a study of the effect of advancing age on the dietary thiamine requirement of rats, concluded that the requirement for this vitamin increased with advancing age and increased body size even though food consumption showed little change. They suggested the possibility that the thiamine requirement is related to the mass of metabolizing tissue and is more or less independent of the caloric intake. They also suggested that perhaps the

diets of aged or ill persons whose food intake is reduced should be supplemented with thiamine to compensate for the lack which would result from inadequate dietary intake.

Carlson and Hoelzel (5) studied the effect of intermittent fasting on the life span of rats. The results showed that the life span was increased. The optimum amount of fasting was found to be one day in three, since it resulted in the greatest increase in the life span in their experiment, viz., 20 per cent in litter mate males and 15 per cent in litter mate females. They also noted that mammary tumors were reduced in proportion to the amount of fasting.

An experimental study by Van Duyne and co-workers (57) showed that when the diet was adequate in all nutrients except riboflavin and vitamin A, a calcium intake of three or four times the amount required for minimal adequacy gave the best results in improved nutritional well-being. It was not concluded whether more calcium would further improve the nutritional status of their experimental animals.

In contrast, Shields and Mitchell (46) reported the findings of a study of the effect of excess dietary calcium on longevity and tissue calcium of the albino rat. They found that there was no significant effect on the rate of growth of either the male or female rats. A

slight tendency toward greater calcification of the soft tissues was noted on the highest calcium regime.

Henry and Kon (9) reported a study of the effect of advancing age on the assimilation of calcium by the albino rat. They found that the calcium retention usually decreased with advancing age regardless of the amount contained in the diet. At two years of age the rats were losing body calcium in the feces and urine, when they were consuming a diet from which they retained 96 per cent of the calcium when they were young. Their study suggested the need for a higher concentration of calcium in the diet during senescence if the body stores of calcium are to be maintained.

Studies involving human subjects.--An observation by Kay (12) of 700 elderly patients at the United Home for Aged Hebrews in Rochelle, New York, disclosed that vitamin deficiencies are probably more frequent in aged persons than in any other age group. He suggested that these deficiencies might be the result of habits, such as preferences for sweets and starches and rejection of highly nutritious foods like meat, fruit and vegetables, and preference for a soft diet. Prolonged cooking of meats and vegetables may be necessary to produce soft diets preferred by elderly people. This treatment would cause the loss of some vitamins, especially if the cooking water is discarded. The author

made a study of the effect of preventive treatment with a multi-vitamin preparation on respiratory diseases in aged people. Seventy-five aged people were selected for this study, of whom 25 suffered from chronic respiratory infections and in addition had evidences of certain degenerative disease conditions. The control group was made up of other residents in the home. The results of this study showed that none of the vitamin treated patients had any acute respiratory disease for a period of six months although there were epidemics of these diseases in the institution. This was noted as especially significant, since the 25 vitamin treated patients were probably the weakest residents in the home.

Rafsky and Newman (39) studied ascorbic acid retention and excretion in a group of 25 so-called "normal" aged men and women. These individuals were given comparatively large doses of ascorbic acid. Of this group, two showed rather a constant saturation point irrespective of the amount of ascorbic acid given. In another group of seven, the amount of ascorbic acid retained continued to increase in spite of the fact that constantly larger amounts of ascorbic acid were required before the level of retention showed a drop.

Rafsky and Newman (37 and 38) reported the results of their investigations of porphyrinuria in aged people and the relation to niacin in the diet. They

found porphyrins present in the urine of 43 per cent of the patients studied. They believed that this condition resulted from a niacin deficiency, since other conditions were not found that might cause these substances to be present. When the patients were given niacin, the porphyrinuria disappeared and did not return for several days after the niacin treatment was discontinued. A control series of patients who did not receive the niacin did not show a corresponding decrease or absence of porphyrinuria. The authors suggested that niacin probably corrected the liver functioning of these people, and thereby exerted a beneficial effect on the condition. These same authors (35) found that 86 per cent of the aged people examined showed evidence of liver disfunction.

Rafsky and Newman (36) discussed vitamin utilization in the aged, and pointed out that "vitamin requirements of normal elderly people cannot be measured in terms applicable to young adults and children". They claimed that the vitamin requirements of elderly people are increased. They also suggested that further investigations are needed to explain the reasons for the increased requirements.

Swanson and Eppright (47) reported a study of ascorbic acid, phosphorous and nitrogen metabolism of women in their fifth and sixth decades to determine the correlations between dietary, urinary and plasma ascorbic

acid.

Kountz and co-workers (15) conducted nitrogen balance studies with a group of 27 elderly patients at the St. Louis Infirmary. The diet offered these patients contained about 2,000 calories. These calories were distributed as follows: 17-18 per cent from protein, 34-36 per cent from fat and 47-48 per cent from carbohydrates. On this diet 11 of the patients were in negative nitrogen balance, 8 were in nitrogen equilibrium, and the remaining 6 were in positive nitrogen balance. Further studies on this same group of patients indicated that one gram of protein per kilogram of body weight was insufficient to maintain the average aged person in nitrogen balance. When the diets provided as high as 1.8 to 2.0 grams of protein per kilogram of body weight, it was still insufficient for some of the patients. These figures were taken to indicate the need for paying particular attention to the protein content of the diets of aged persons. The authors pointed out that the cause of the failure to maintain nitrogen balance might be inadequate intake, incomplete absorption, or metabolic changes in the aged person.

Rafsky and Newman (34) conducted cholesterol studies in a group of so-called "normal" persons over 60 years old. Determinations were made of the total and esterified cholesterol in both serum and whole blood.

These determinations were made after a period of fasting in order to avoid the possibility of temporary lipemia affecting the results. The normal limit of total cholesterol was regarded as 200 milligrams per 100 milliliters with a maximum of 30 to 40 per cent existing as free sterols. In this study they found the total cholesterol and free sterols more than these established normal limits. The authors did not conclude whether high total cholesterol and free sterols in aged persons had any significance.

Lanham (16) found that there was some correlation between the past diets of aged people and their physical condition, and less correlation between their present diets and their physical condition. The data for this study were collected by interviews and questionnaires.

A lowered basal metabolic rate has been reported for old people by McKay and Patton (22), Lewis (18), and Kise and Ochi (14). These authors pointed out that this would indicate that the total calories in the diet of elderly people should be reduced.

Food consumption studies

Leeper (17) studied the foods consumed by two groups of elderly people ranging in age from 58 to 98 years. One group resided in an institution and the other lived in their own homes. In the institution the foods

eaten by these people were weighed for one week; the people in private homes recorded the amount and kind of foods eaten for the week on forms provided for that purpose. The results showed that the diets of those living in the institution were low in calories, but otherwise the diets compared favorably with National Research Council recommended allowances for all nutrients except ascorbic acid. The diets for the participants residing in private homes were also low in calories. The ascorbic acid values were higher than in the institution, but they did not meet the National Research Council recommended allowances.

Ohlson and co-workers (31) studied the food intake of 100 women ranging in age from 40 to 78 years. They found that the most significant difference between the food consumed by this group and the average consumption of adults was one of calories. All of the groups studied averaged from 300 to 500 calories less than the amount consumed by a representative sample of young adults. The women who were in poor health ate less total food than the other aged people included in this study. While the lower caloric intake was expected in view of previous food studies with aged people, the authors pointed out that there was a lowered intake of specific nutrients when the calories were reduced. The authors suggested that these women were reducing the total calories by eating less of all foods rather than by

selecting foods that lowered the fat and carbohydrate content of the diet and eliminating them from their diets. Pike and co-workers (33) studied the food intake of four different groups of old people living in London, England. The authors stated that this study was done in the hope that they could learn something of the dietary requirements of aged people. In two of the groups, the old people kept a diary of every item of food and drink consumed during one week in February 1947. The weight of the food was determined by a dietitian who obtained and weighed duplications of the various foods eaten. In the other two groups, the foods served to the subjects were weighed. Any food left on the plate was also weighed and this amount deducted from the original weight. The difference then represented the amount eaten. The tables of food composition of the Ministry of Food were used to calculate the nutritive value of these diets. Allowance was made for the loss of ascorbic acid in cooking. The results of this research study showed that the diets of the aged people were low in caloric content, and also low in ascorbic acid, riboflavin, niacin and thiamine.

Cost of food

In 1948 the Social Security Administration, with the assistance of the United States Department of Agriculture, Bureau of Human Nutrition and Home

Two food budgets for old people are described since food expenditure studies for aged couples or

individuals are not available. The findings of two food expenditure studies of populations of unspecified age are presented.

Budgets.--In 1938, Armstrong (1) constructed a yearly food budget for aged persons for the Federal Security Administration. The cost was indicated per unit of food as well as the total cost of food per year. The total food budget estimated for an aged couple was \$282.37 per year or about \$5.40 per week. The proportions allowed for the various food groups, as determined from calculation of their data, were as follows: about 20 per cent for milk; 25 per cent for meat and eggs; 25 per cent for vegetables and fruits; approximately 9 per cent for cereals and bread; and about 23 per cent for fats, sweets, vitamin concentrates and miscellaneous foods. The following weekly allowances per person of the various food groups were also calculated from data in this budget: a little less than two pounds of bread and cereals, four quarts of milk, about nine pounds of vegetables and fruits, approximately two and one-half pounds of meat and eggs, one pound of fats, a little less than one pound of sweets, plus miscellaneous foods such as coffee, tea, vitamin concentrates, et cetera.

In 1948 the Social Security Administration, with the assistance of the United States Department of Agriculture, Bureau of Human Nutrition and Home

Economics (56), prepared a food budget for an elderly couple. This budget gave quantities of food per week and per month but did not indicate the cost of individual foods or the total cost. The following amounts of food were indicated for the two elderly people for one week: about 12 quarts of milk, a little more than five pounds of meat and eggs, about 20 pounds of vegetables and fruits, approximately eight pounds of cereals and bread, and about four and one-half pounds of sweets, fats and miscellaneous foods. The husband was assumed to be 65 years old or older and his wife only a few years, if any, younger. Both husband and wife were assumed to be ambulatory and able to care for themselves.

Food expenditures

The United States Department of Agriculture made a study of American family diets in 1942 (51), and determined the relative cost and contributions to nutritive value of certain food groups. Data taken from the report of this study are given, Table 2.

Table 2.--RELATIVE COST AND CONTRIBUTION TO NUTRITIVE VALUE OF EACH FOOD GROUP. (51)

Food group	Per cent of total food cost	Percentage of total nutrients contributed by each food group							
		Ca- lories	Pro- tein	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Vita- min C
Milk, cheese, ice cream	17	14	23	65	7	15	8	43	6
Meat, fish, poultry, eggs	30	13	33	5	31	16	37	28	1
Vegetables and fruit	23	15	13	16	36	58*	29	19	92
Grain products	11	30	28	12	21	*	22	9	0
Sweets, fats, and other	15	28	3*	2*	5*	11*	4*	1*	1*

*If food yielded less than 0.5 per cent the amount was not shown.

Sherman (41) reported a study of the average percentage distribution of cost and nutrients in "224 freely chosen American dietaries", Table 3.

Table 3.--AVERAGE PERCENTAGE DISTRIBUTION OF COST AND NUTRIENTS IN FREELY CHOSEN AMERICAN DIETARIES.

Type of food	Percentages					
	Relative cost	Ca- lories	Pro- tein	Phos- phorous	Cal- cium	Iron
Milk and cheese	10.59	8.08	11.56	20.61	55.76	5.11
Meat, fish and eggs	37.66	20.76	39.98	30.38	7.50	36.62
Vegetables and fruit	15.86	12.04	10.33	17.40	18.02	29.71
Grain products	18.29	38.20	37.25	30.27	15.67	25.87
Sweets, fats, other	17.60	20.92	0.88	1.34	3.05	2.69
Per day per man	100	3256	106 grams	1.63 grams	0.74 grams	0.0179 grams

Rollins (40) gave an account of a study of the relationship of the price of food to its nutritive content. She concluded that the necessity for including sufficient calories in the diet will in large part determine the cost of the diet. She also suggested that anyone interested in keeping food costs low should choose

those foods that are low cost in calories and that also provide other nutrients, and should consider the amount of calories provided by foods chosen for other nutrients. She pointed out, however, that cheap sources of vitamin A and ascorbic acid are not likely to be cheap sources of other nutrients.

Summary

From these studies it appears that the efficiency of digestion of older people is impaired, more liberal intakes of protein, minerals and vitamins are indicated for elderly people, and that dietary intakes of senescent individuals are low in these food elements perhaps because of lowered caloric intakes. The information provided by available food consumption studies of aged individuals should be supplemented by data from analysis of weighed food intakes of elderly people in various regions where different food habits prevail. A more complete picture of dietary intakes and food habits of typical senescent individuals would be obtained in this way.

Elvehjem (6) suggested that careful analysis of records of food consumption may be one of the best methods of determining nutritional needs of various groups of individuals.

Chapter III
METHODS AND MATERIALS

In order to determine the nutritive value and cost of food consumed by a selected group of aged individuals, the following methods and materials were employed.

Subjects

Two groups of people 70 to 90 years of age participated in the study, (Table 4). Their cooperation was secured through personal visits to their respective homes.

Group I consisted of nine people, three men and six women, who resided in a boarding home maintained for old people. This home did not accept residents who required nursing care. Although most of them exhibited physical and/or mental infirmities that are associated with senility, they were ambulatory.

Group II included five couples (husbands and wives) living in private homes. The individuals in this group indicated that they were afflicted with various infirmities. However, they led "normal" lives, and they appeared to be in better condition than the members of Group I.

Table 4.--PARTICIPANTS IN THE STUDY OF NUTRITIVE VALUE AND COST OF FOOD USED BY SELECTED INDIVIDUALS OVER 70 YEARS OF AGE

Subject number	Sex male female	Age years	Height feet inches	Weight pounds	Marital status
Group I--(Residents of boarding home)					
1	x	79	6 0	158	widower
2		x 80	5 3	92	widow
3		x 90	5 0	131	widow
4		x 76	5 4	128	widow
5		x 78	5 3	115	widow
6	x	81	5 7	172	widower
7		x 80	5 5	104	widow
8		x 80	5 7	139	widow
9	x	76	5 5	128	single
Group II--(Residents of private homes)					
10		x 70	5 8	157	married
11	x	72	5 9	197	married
12		x 76	5 0	169	married
13	x	82	5 8	151	married
14		x 73	5 2	160	married
15	x	82	5 6	135	married
16		x 79	5 2	122	married
17	x	81	6 0	162	married
18		x 77	5 5	120	married
19	x	80	5 5	165	married

Methods of determining kinds and amounts of food consumed

The kinds and amounts of food eaten by each participant were determined for one week in the fall (October 1947) and another week in the winter (January 1948). The weight of each of the various foods consumed was determined by weighing the individual portions of food as they were served. Each kind of food left on the plates at the end of the meal was weighed and the amount subtracted from the original weight. The difference then represented the weight of the food that was actually eaten. Dietary balances were used for all weighing. The menus for each meal with a description of the foods served and the method of preparation, were entered on a columnar pad. The data on the weights of each food eaten by each participant were recorded on the same blank, (see Appendix A).

Meals were served to the boarding house residents in their private rooms. The writer weighed and recorded all information on the food intake of the participants living in the boarding home. As the dishes of food were placed on individual trays, the writer weighed the dish plus the food and recorded the combined weight as well as the weight of the dish. If more than one food was served on a dish such as a dinner plate, the weights were recorded as described above, except that the weight of the dish plus any food previously placed on the plate

was substituted for the weight of the dish.

In Group II, residents in private homes, either the man or his wife assumed the responsibility of weighing the foods eaten by each of them, and recorded the necessary data. The writer instructed this participant in the correct use of the dietary balance and the method of recording the description and weight of the foods eaten. Daily visits were made to each home during each weighing period in order to check the recorded data and to assist the recorder when necessary.

Summarizing records

The weights in grams of the individual foods eaten by each participant were totaled for the weighing period in October 1947 and for the period in January 1948. The foods were grouped according to the classification given by Turner (49) and the nutritive value of each food was calculated according to standard food tables (3, 4, and 48). In a few cases it was necessary to secure recipes from the families or the manager of the boarding home and calculate the nutritive value of the various amounts of the particular items that were consumed by each participant. The writer made allowances in these calculations for the loss of ascorbic acid during cooking but did not make any other adjustments for loss of nutritive value.

When the calculation of the nutritive value of

each food was completed, the amounts of the various nutrients were totaled for each weighing period. Each participant's average daily intake of each nutrient was then determined and compared with the National Research Council's recommended allowances for sedentary adults. The number of grams and the per cent of the average daily intake of each nutrient derived from each food group were also calculated.

The average daily values for the participants in each group were assembled for each weighing period and the arithmetic mean, range, standard deviation, and standard deviation of the mean were calculated.

The average weight of each group of food consumed per day by each participant was calculated from the data on kind and amount of food eaten, and these weights compared with a standard meal pattern. Comparisons were also made by groups of participants and by seasons.

Dietary patterns - past and present

Data were secured on past and present dietary patterns by means of a personal interview. Each person was asked what foods he ate in the past and at present, and how frequently they were eaten. A check list of foods was used for recording this information and may be seen in Appendix B. The members of Group I could not

follow the writer in the questioning, and frequently had to ask questions that indicated that they did not understand or follow the line of questioning. Therefore the data secured from this group were of very doubtful value. The data secured from the participants living in their own homes were more satisfactory.

Health histories

Information pertaining to the physical status of the participants was obtained by using a check sheet (Appendix C) adapted from several nutritional status blanks, and lists of criteria suggested by Jolliffe et al (10) and the National Research Council (29). These data were secured from the participants themselves and/or other persons who had access to information concerning the physical condition of these people.

Method of calculating cost

The cost of the food used by each group of participants during each weighing period was determined from data supplied by the couples and the manager of the boarding home. These data were in the form of grocery bills and the homemaker's estimates of quantities of home produced and stored foods used during each week. In addition, the writer computed the cost of the food actually served. In order to do this, the weight of fresh food required to furnish the number of grams served

was calculated. Adjustments were made in the quantity of food served to compensate for average losses of weight in preparation as well as shrinkage in cooking. The data needed to make these adjustments were taken from West and Wood (59). Bureau of Labor Statistics prices of important foods for the respective weeks were used to calculate the cost of the food, (Appendix D). The per cent of the total expenditure for food allotted to each food group was then determined.

Chapter IV

RESULTS

The results of the analysis of the records of weighed amounts of food consumed by two groups of aged people are presented below. The distribution of the expenditures for food and comments regarding past and present food habits and present physical condition are given.

Food patterns and amounts of foods eaten

The weight in grams of various types of foods consumed by each group of participants in each weighing period are discussed below and may be seen in tables 5, 6, 7, 8, and 9 and are illustrated in Figure 1. Typical arrangement of foods by meals may be seen in Appendix E. Individual intakes of the various food groups are tabulated in Appendices F, G, H, and I. The food classification suggested by Turner (49) has been followed in all the food groupings indicated in this study of the nutritive value and cost of food.

Milk and milk products.--The foods included in this group were milk, cream and cottage cheese, ice cream, and such dishes as cream soups, milk puddings, and cream

Table 5.--WEIGHT IN GRAMS OF PREPARED* FOOD CONSUMED PER DAY BY ELDERLY PEOPLE

Type of food	Men			Women		
	Group I (boarding home)	Group II (private homes)	Both groups	Group I (boarding home)	Group II (private homes)	Both groups
Milk	516	224	358	378	113	258
Eggs	20	39	32	17	18	17
Meat	96	61	74	73	65	69
Green and yellow vegetables	19	31	26	12	30	20
Other vegetables	156	89	114	110	68	91
White potatoes	62	58	62	46	48	47
Citrus fruit and tomatoes	70	84	79	70	70	70
Other fruit	112	116	114	100	70	86
Cereal, bread and macaroni	352	315	327	304	186	250
Sweets	106	118	114	81	92	86
Fats	34	30	32	27	26	26
*Ready for consumption						

Table 6.--WEIGHT AND RANGE IN GRAMS OF PREPARED* FOOD
CONSUMED PER DAY BY ELDERLY MEN, BY SEASON

OCTOBER 1947

Food group	Group I (boarding home)		Group II (private homes)		Both groups
	Average intake	Range	Average intake	Range	Average intake
	grams	grams	grams	grams	grams
Milk and milk products	482	327 to 729	228	120 to 402	324
Eggs	22	17 to 26	32	0 to 62	28
Meat, fish, and poultry	103	73 to 141	66	7 to 115	80
Green and yellow vegetables	27	17 to 33	29	13 to 91	31
Other vegetables	77	60 to 93	109	5 to 25	94
White potatoes	65	45 to 86	56	24 to 83	59
Citrus fruit and tomatoes	53	47 to 57	66	0 to 158	61
Other fruit	134	105 to 144	142	84 to 303	136
Cereal and bread	377	351 to 402	334	209 to 445	350
Sweets	91	55 to 113	120	55 to 178	109
Fats	30	13 to 43	38	25 to 57	36

*Ready for consumption

Table 7.--WEIGHT AND RANGE IN GRAMS OF PREPARED* FOOD
CONSUMED PER DAY BY ELDERLY MEN, BY SEASON

JANUARY 1948

Food group	Group I (boarding home)		Group II (private homes)		Both groups
	Average intake	Range	Average intake	Range	Average intake
	grams	grams	grams	grams	grams
Milk and milk products	550	377 to 802	219	118 to 317	343
Eggs	19	18 to 19	46	0 to 72	36
Meat, fish, and poultry	90	79 to 108	56	11 to 104	69
Green and yellow vegetables	20	18 to 22	28	0 to 62	25
Other vegetables	235	200 to 282	69	20 to 140	129
White potatoes	60	51 to 67	60	20 to 101	60
Citrus fruit and tomatoes	87	78 to 94	102	35 to 139	97
Other fruit	89	88 to 92	89	11 to 159	89
Cereal and bread	326	242 to 387	297	199 to 428	308
Sweets	121	78 to 158	116	41 to 174	118
Fats	38	35 to 40	23	17 to 34	29

*Ready for consumption

Table 8.--WEIGHT AND RANGE IN GRAMS OF PREPARED* FOOD
CONSUMED PER DAY BY ELDERLY WOMEN, BY SEASON

OCTOBER 1947

Food group	Group I (boarding home)		Group II (private homes)		Both groups
	Average intake	Range	Average intake	Range	Average intake
	grams	grams	grams	grams	grams
Milk and milk products	404	254 to 496	92	2 to 148	265
Eggs	19	11 to 30	10	0 to 36	15
Meat, fish, and poultry	76	66 to 107	71	56 to 109	74
Green and yel- low vegetables	12	8 to 16	39	4 to 82	25
Other vege- tables	65	47 to 89	86	34 to 115	66
White potatoes	54	40 to 82	44	22 to 78	50
Citrus fruit and tomatoes	57	46 to 63	60	0 to 105	57
Other fruit	118	110 to 137	84	6 to 173	105
Cereal and bread	313	269 to 405	183	138 to 231	254
Sweets	62	49 to 80	97	45 to 138	78
Fats	28	21 to 32	30	8 to 53	29

*Ready for consumption

Table 9.--WEIGHT AND RANGE IN GRAMS OF PREPARED* FOOD
CONSUMED PER DAY BY ELDERLY WOMEN, BY SEASON

JANUARY 1948

Food group	Group I (boarding home)		Group II (private homes)		Both groups
	Average intake	Range	Average intake	Range	Average intake
	grams	grams	grams	grams	grams
Milk and milk products	352	305 to 421	134	61 to 216	253
Eggs	15	11 to 17	26	0 to 44	20
Meat, fish, and poultry	69	59 to 84	59	30 to 71	64
Green and yellow vegetables	13	11 to 16	22	0 to 41	17
Other vegetables	155	128 to 196	50	31 to 78	107
White potatoes	38	31 to 49	53	22 to 84	45
Citrus fruit and tomatoes	82	76 to 91	80	45 to 124	81
Other fruit	81	77 to 84	57	33 to 92	70
Cereal and bread	295	254 to 351	198	137 to 294	251
Sweets	100	88 to 116	88	44 to 119	95
Fats	26	20 to 30	22	7 to 49	22

*Ready for consumption

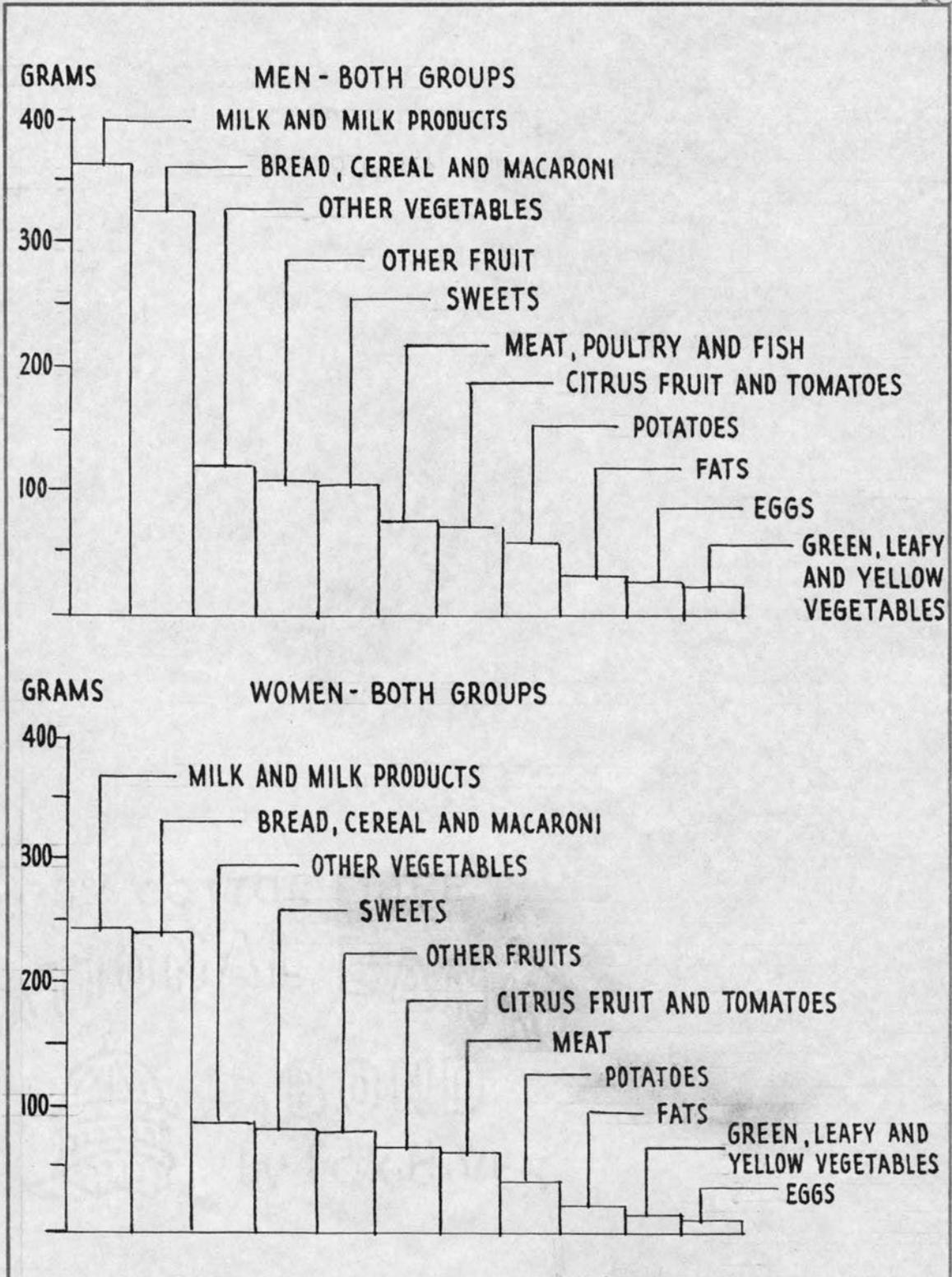


Fig. 1.--Average weight of each food group consumed per day, two seasons.

pies. Since the nutritive value of these foods is dependent to a large extent on the amount of milk in them, the weight of these foods is included with milk in the quantities given in the following statements.

The men consumed about 370 grams of milk and milk products daily and the women consumed an average of 245 grams of these foods per day. The male residents in the boarding home ingested about two and one-fourth times as many grams of milk and milk products as those who resided in their own homes. Likewise the female residents in the boarding home ingested about three times as many grams of these foods as did the women residing in their own homes.

Approximately two-thirds of the milk consumed by both groups of participants was used as a beverage or as fluid milk on cereal, and the remainder was included in the various other milk products.

Eggs.--The eggs eaten by the participants in each group were served fried, poached, boiled, and scrambled. Although a few eggs were used in baked goods, they are not included in the average intake figures given below.

The men in the present study ate an average of 30 grams or a little more than one-half egg per day, or the equivalent of three to four eggs per week. The women who cooperated in the present study ate an average of

about 18 grams, or a little less than one-half egg per day. This is equivalent to about two eggs per week. The female residents in their own homes ate slightly more eggs than those living in the boarding home.

Meat, fish, and poultry.--The quantity of meat consumed daily averaged about 80 grams for the men and 70 grams for the women. The residents in the boarding home, especially the men, ate slightly more meat than the residents in private homes.

The kinds of meat used by the two groups of participants included beef, pork, venison, veal and some glandular meat as well as chicken, duck, turkey, and fish. The methods of preparation included roasting, stewing and frying.

Green and yellow vegetables.--The average daily consumption of green and yellow vegetables was a little more than 20 grams per person. The participants who resided in their own homes ate more of this type of vegetables than the boarding house residents. However, some of the members of Group II did not eat any green or yellow vegetables. Yellow vegetables such as carrots, winter squash and sweet potatoes were used more frequently than the green kinds, although green beans, asparagus, lettuce and spinach were eaten by some of the participants. The method of preparation was usually boiling or baking.

White potatoes.--The average daily consumption of white potatoes for each group of participants was about 60 grams per person in each of the weighing periods. The women averaged a little less than this amount.

The potatoes were served boiled, mashed, fried and baked.

Other vegetables.--The men ate an average of 120 grams of other vegetables per day and the women ate about three-fourths of that amount. The participants in Group I consumed about one and two-thirds times as much of this type of food as the members of Group II. The quantity of other vegetables consumed by the participants in Group I in January was almost twice as much as in October, while the members of Group II ate more of these food items in October than in January.

The vegetables included from this group (Turner's classification) were corn, peas, dry beans, beets, rutabagas, turnips, cabbage, and such vegetable mixtures as vegetable soup, mixed vegetable salads, and canned mixed vegetables.

Citrus fruit and tomatoes.--Both the men and the women ate approximately 70 grams of citrus fruit and tomatoes per day. The men in Group II consumed a little more of this type of food than those in Group I, but the amounts consumed by the two groups of women were almost identical. The male participants living in private

homes ate more citrus fruit and tomatoes in January than they did in October.

Fresh and canned citrus fruit and fruit juice, and canned tomatoes and tomato juice were used by both groups of participants. The canned products were used more frequently than the fresh ones. However the residents in their own homes used more fresh citrus fruit than the boarding house residents.

Other fruit.--The male participants in each group ate about 115 grams of other fruit daily. The female participants ate about 85 grams of other fruit per day. However the average daily consumption of the women residing in the boarding house was about a third more than for those living in their own homes. Both male and female participants ate about 45 per cent more fruit in October than they did in January.

Dried and canned fruits accounted for the largest portion of this type of food, but some fresh apples and bananas were also used.

Cereal, bread and macaroni.--The quantity of cereal and cereal products eaten by the participants in the present study ranked next to milk in the average number of grams consumed per day. The men averaged about 330 grams and the women 250 grams of cereal and cereal products daily. The average values for both groups of men differed very little from the intake quoted above.

However, there was considerable difference between the average quantities of cereal and cereal products consumed by the two groups of women. Those living in the boarding house ate about 25 per cent more of this type of food than the women living in their own homes.

The larger proportion of this class of food was made up of enriched white bread, cooked cereals and enriched and whole grain breakfast cereals. Some hot breads, prepared cereals and dishes made with macaroni were also used.

Sweets.--Pastries, syrups, jams, preserves, sweet rolls and desserts are included in this group along with candy and sugar.

The male participants in the present study consumed an average of about 110 grams or one-fourth pound of sweets per day and the women ate about one-third less sweets than the men. There was very little difference between the quantity of sweets consumed by the two groups of participants.

Summary

The male and female participants in Group I (boarding home residents) ate more liberal amounts of milk, meat, and other vegetables than the members of Group II (residents in private homes). The participants in Group II ate slightly larger amounts of eggs, green and yellow vegetables and citrus fruits and tomatoes than

the members of Group I. Both groups of participants ate very small amounts of green and yellow vegetables and white potatoes. The only variation in food intake that seems to be attributable to seasonal availability of food is the difference in the amount of citrus fruit and tomatoes consumed by the male members of Group II.

Specific nutrients in foods eaten

The mean intakes of specific nutrients and the range and standard deviation of the mean for the men and for the women of each group for one week in the fall (October 19 to 25, 1947) are presented in Tables 10 and 11. The same information for one week in the winter (January 24 to 30, 1948) is given in Tables 12 and 13. The distribution of the individual intakes of the various nutrients may be seen in Appendix J. Individual intakes of specific nutrients are tabulated in Appendices K, L, M, and N.

Protein.--The mean daily protein intakes were approximately 56 grams for the men and 42 grams for the women in both groups. The mean protein intake for the residents in the boarding home averaged about 10 grams more than the mean for the residents in their own homes. The range of protein values of the male participants averaged 18 grams for the residents in the boarding home and 30 grams for the residents in their own homes. The range in protein values of the female participants averaged

Table 10.--MEAN INTAKE OF NUTRIENTS AND RANGE AND STANDARD ERROR OF MEAN MALE PARTICIPANTS, OCTOBER 1947

Nutrients	Group I (boarding home) 3 subjects			Group II (private homes) 5 subjects		
	Mean daily intake	Standard error	Range	Mean daily intake	Standard error	Range
Protein (grams)	55	6.0	47-64	57	7.3	47-82
Fat (grams)	64	11.4	49-78	68	8.7	50-95
Carbohydrate (grams)	271	16.2	255-297	266	25.4	212-323
Calories	1880	146.3	1717-2113	1912	199.4	1487-2474
Calcium (grams)	0.863	0.142	0.712-1.118	0.581	0.019	0.523-0.630
Phosphorous (grams)	1.145	0.176	0.950-1.425	1.190	0.143	0.904-1.583
Iron (milligrams)	17.4	1.4	14.6-19.6	14.2	1.4	12.4-17.0
Vitamin A (International Units)	5111	839	4201-6451	4747	716	2465-6361
Thiamine (milligrams)	1.053	0.209	0.904-1.274	1.197	0.051	1.032-1.297
Riboflavin (milligrams)	1.404	0.240	1.161-1.797	1.111	0.071	0.982-1.286
Niacin (milligrams)	8.0	0.6	7.2-9.0	13.0	1.4	8.7-16.5
Ascorbic acid (milligrams)	41	3.5	36-45	45	13.2	9-68

Table 11.--MEAN INTAKE OF NUTRIENTS AND RANGE AND STANDARD ERROR OF MEAN
MALE PARTICIPANTS, JANUARY 1948

Nutrients	Group I (boarding home) 3 subjects			Group II (private homes) 5 subjects		
	Mean daily intake	Standard error	Range	Mean daily intake	Standard error	Range
Protein (grams)	67	6.5	57-75	47	5.1	33-59
Fat (grams)	89	14.1	67-106	63	7.8	44-85
Carbohydrate (grams)	292	27.8	266-337	234	36.6	137-337
Calories	2244	213.5	1976-2571	1696	213.8	1076-2132
Calcium (grams)	0.923	0.195	0.723-1.232	0.509	0.067	0.381-0.667
Phosphorous (grams)	1.289	0.174	1.077-1.559	0.880	0.100	0.673-1.117
Iron (milligrams)	14.5	0.7	13.5-15.3	11.2	1.5	6.7-15.0
Vitamin A (International Units)	4749	780.9	4301-6007	4477	598.7	3067-6356
Thiamine (milligrams)	1.145	0.095	1.003-1.270	1.068	0.143	0.677-1.328
Riboflavin (milligrams)	1.772	0.331	1.308-2.243	1.239	0.275	0.872-2.158
Niacin (milligrams)	9.4	1.1	7.8-11.0	9.0	1.5	4.6-12.6
Ascorbic acid (milligrams)	55	5.1	33-61	62	7.4	41-78

Table 12.--MEAN INTAKE OF NUTRIENTS AND RANGE AND STANDARD ERROR OF MEAN
FEMALE PARTICIPANTS, OCTOBER 1947

Nutrients	Group I (boarding home) 6 subjects			Group II (private homes) 5 subjects		
	Mean daily intake	Standard error	Range	Mean daily intake	Standard error	Range
Protein (grams)	44	1.8	39-49	37	2.1	30-41
Fat (grams)	58	0.5	46-78	50	6.1	41-71
Carbohydrate (grams)	216	11.5	185-264	167	18.2	131-218
Calories	1573	91.9	1383-1946	1266	120.7	1086-1566
Calcium (grams)	0.681	0.042	0.546-0.795	0.316	0.041	0.214-0.433
Phosphorous (grams)	0.924	0.041	0.830-1.063	0.607	0.046	0.506-0.754
Iron (milligrams)	15.1	0.7	14.7-17.8	9.0	1.2	6.0-12.6
Vitamin A (International Units)	4501	321.8	3916-5855	3294	244.0	2905-4096
Thiamine (milligrams)	0.812	0.033	0.717-0.904	0.760	0.061	0.573-0.861
Riboflavin (milligrams)	1.096	0.055	0.921-1.254	0.646	0.046	0.533-0.765
Niacin (milligrams)	6.5	1.9	5.4-7.8	8.1	1.0	5.3-9.9
Ascorbic acid (milligrams)	39	1.7	33-44	46	7.5	19-69

Table 13.--MEAN INTAKE OF NUTRIENTS AND RANGE AND STANDARD ERROR OF MEAN
FEMALE PARTICIPANTS, JANUARY 1948

Nutrients	Group I (boarding home) 6 subjects			Group II (private homes) 5 subjects		
	Mean daily intake	Standard error	Range	Mean daily intake	Standard error	Range
Protein (grams)	47	2.9	39-57	36	2.4	30-42
Fat (grams)	67	4.0	55-77	46	4.9	35-62
Carbohydrate (grams)	207	13.1	174-257	169	22.8	125-244
Calories	1623	98.4	1347-1954	1229	117.0	930-1556
Calcium (grams)	0.632	0.035	0.561-0.774	0.351	0.046	0.293-0.499
Phosphorous (grams)	0.935	0.051	0.810-1.121	0.637	0.064	0.509-0.810
Iron (milligrams)	11.9	0.9	10.0-14.4	8.9	0.9	6.2-11.1
Vitamin A (International Units)	3992	216.9	3451-4654	3519	669.8	2243-5681
Thiamine (milligrams)	0.870	0.052	0.726-1.061	0.797	0.065	0.584-0.934
Riboflavin (milligrams)	1.284	0.047	1.117-1.494	0.830	0.150	0.540-1.191
Niacin (milligrams)	7.1	0.5	5.6-9.0	7.4	0.9	6.0-10.5
Ascorbic acid (milligrams)	46	1.7	40-50	48	4.2	36-58

14 grams for the residents in the boarding home and 12 grams for the residents in their own homes.

Calories.--The men ingested about 1900 calories per day while the women ingested approximately 1400 calories. The differences between the mean caloric intakes for the participants in Groups I and II averaged about 400 calories. The range in the caloric content of the diets was about twice as great for the male participants residing in their own homes as for those living in the boarding home. The range in caloric intakes for the two groups of female participants was very similar in both weighing periods.

The per cent of the average caloric intakes of the participants that was supplied by carbohydrate, fat, and protein is illustrated in Figures 2, 3, 4, and 5.

Calcium.--The average daily intake of calcium was about 0.700 grams for the men and 0.500 grams for women. The average calcium intakes of the two groups of participants differed by a larger amount than the intakes of any other nutrient included in the analyses. The differences between the average calcium intakes of the two groups of participants were: men about 0.350 grams and women 0.320 grams. In both instances, the average calcium values were higher for the boarding home residents than for the residents in their own homes.

Iron.--The men ingested an average of about

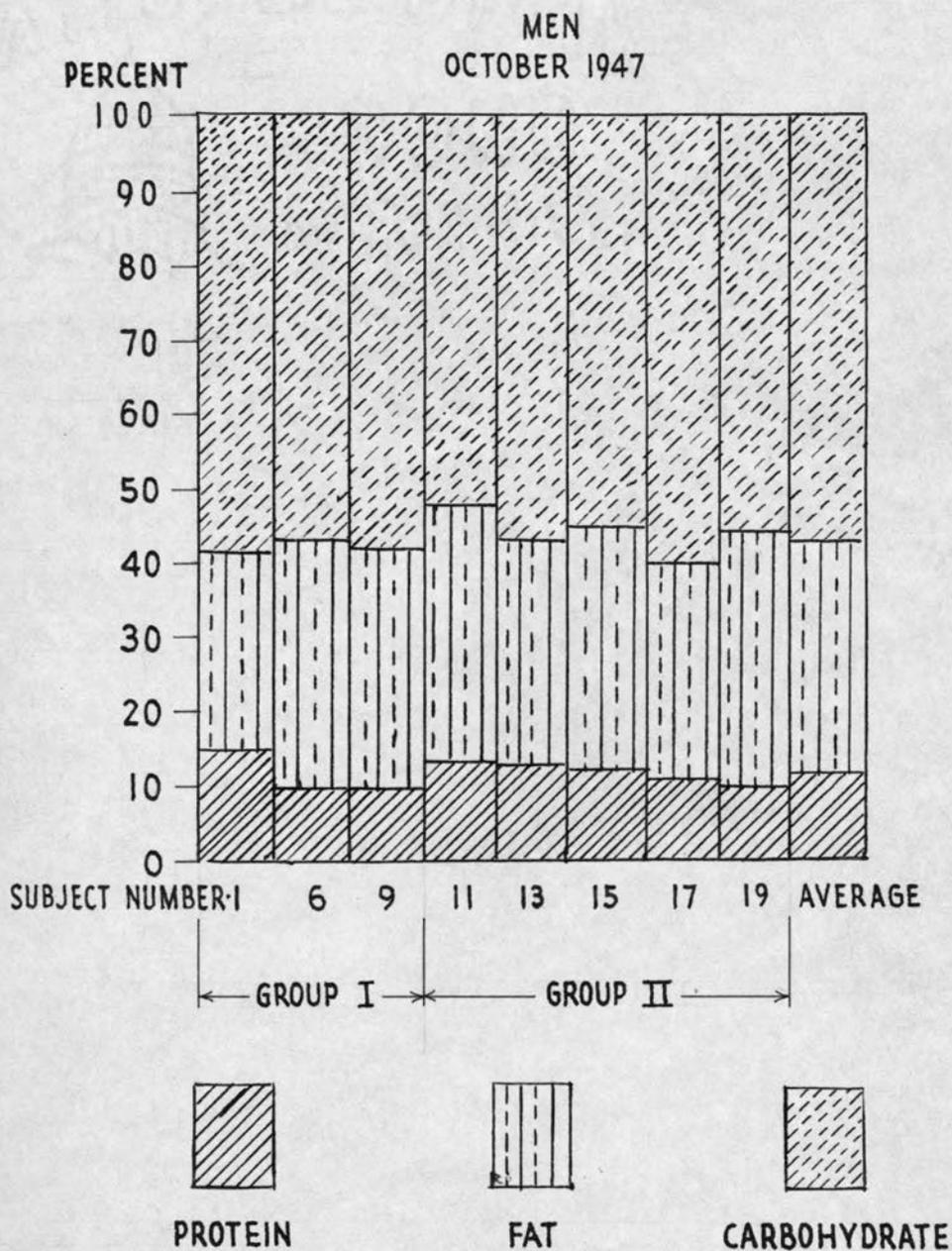


Fig. 2.--Per cent of total calories supplied by protein, fat, and carbohydrate.

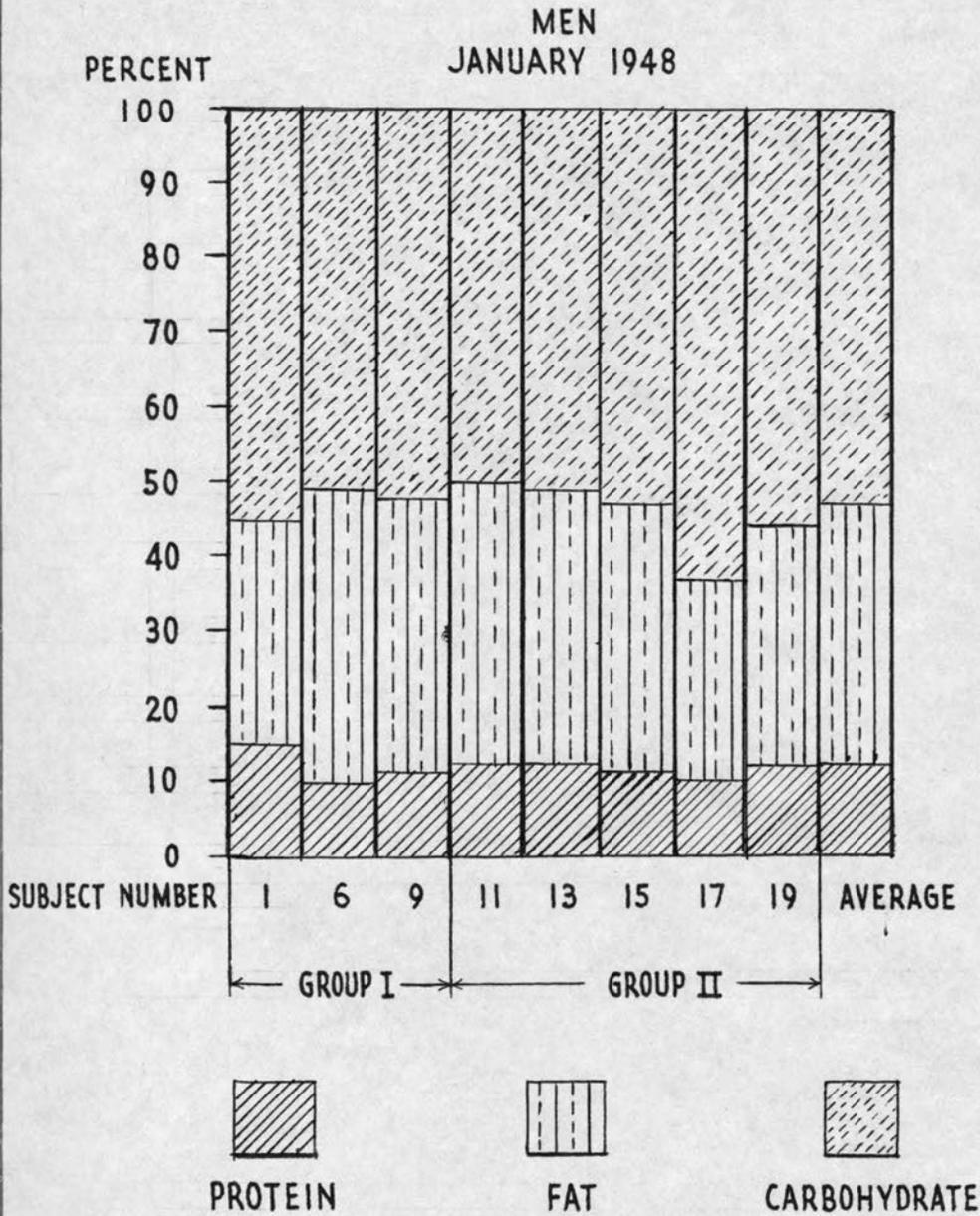


Fig. 3.--Per cent of total calories supplied by protein, fat, and carbohydrate.

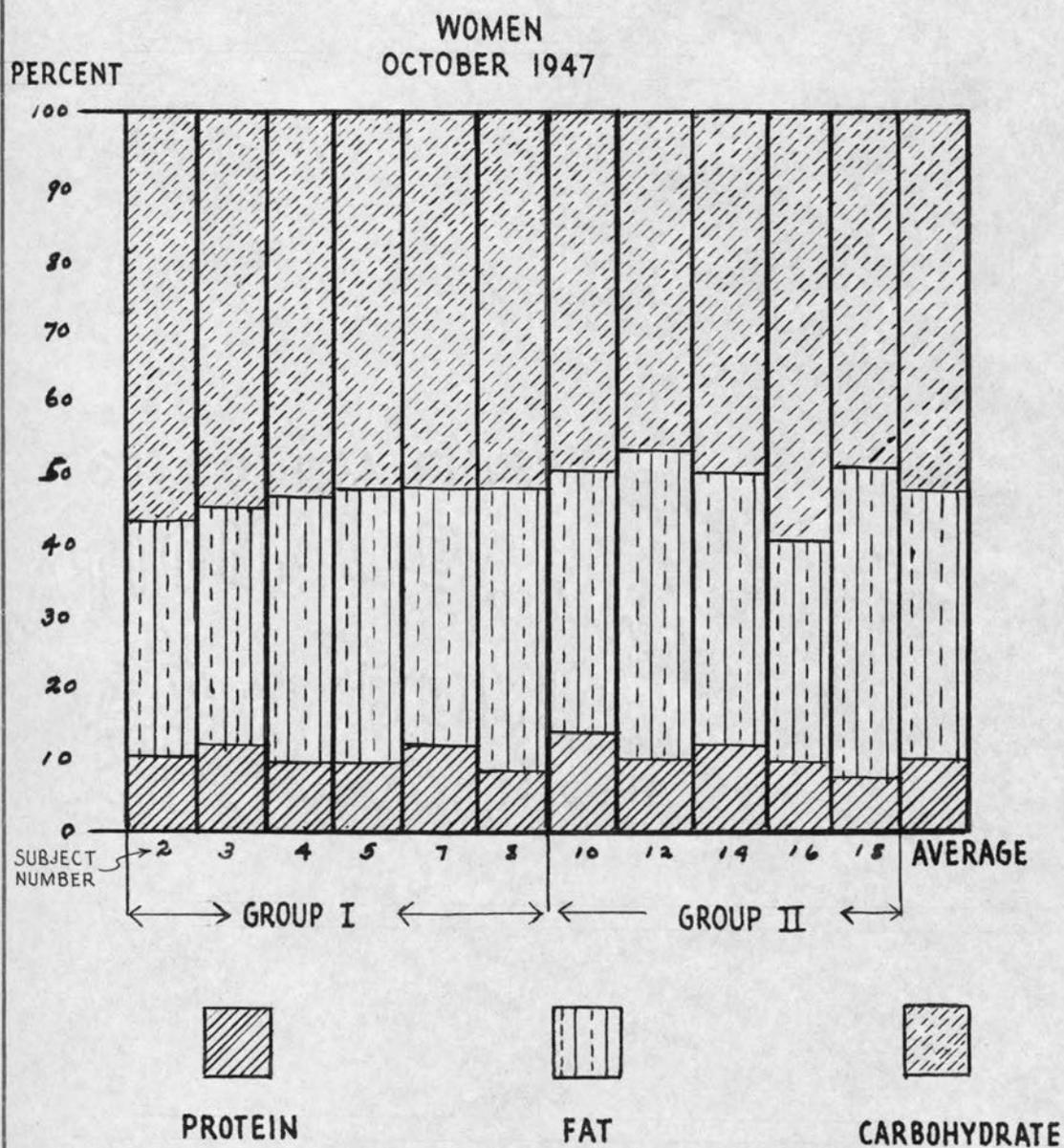


Fig. 4.--Per cent of total calories supplied by protein, fat, and carbohydrate.

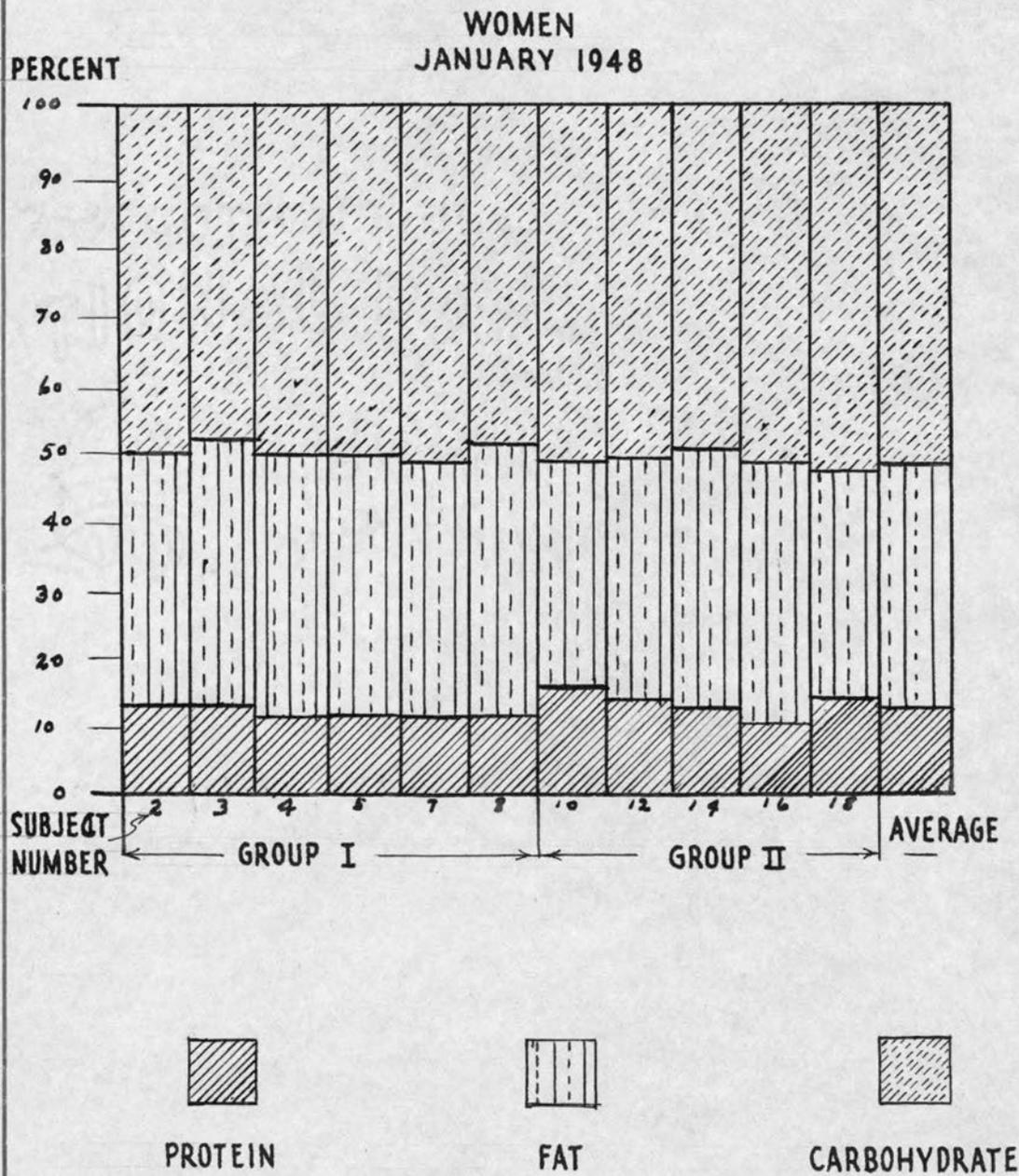


Fig. 5.--Per cent of total calories supplied by protein, fat, and carbohydrate.

14.0 milligrams of iron per day while the women ingested about 11.0 milligrams of iron daily. The participants in Group I averaged from 2.0 to 3.0 grams more iron per day than did the participants in Group II. The range in the iron intakes was greater for the female than for the male participants in this study of nutritive value and cost of foods.

Vitamin A.--Vitamin A values for the men averaged 4734 International Units. The mean intakes for Group II were slightly less in both periods than were those for Group I. The average amount ingested in October was about 300 International Units more than in January.

The average intake of vitamin A for the women was 3866 International Units. In October the female residents in the boarding home averaged about 1200 International Units more vitamin A than those residing in their own homes. In January the difference between the average vitamin A values for the two groups of women was slightly under 500 International Units, with Group I having the higher average intake. The range in vitamin A intakes averaged about 2800 grams for the men and 2000 grams for the women with the data for Group II showing greater variability.

Thiamine.--The mean thiamine intake for the men was 1.120 milligrams. Each group of men averaged slightly over one milligram of thiamine in both periods.

However, there was considerable variation in the individual values of the participants in Group I in October as well as among those of Group II in January.

Thiamine values for the women averaged approximately 0.800 milligrams in both periods. Although the average for Group II was lower than that for Group I, the difference was relatively small. The range in thiamine intakes of the female participants averaged about 0.260 grams.

Riboflavin.--The daily intake of riboflavin averaged 1.330 milligrams for the men and 0.986 milligrams for the women. The men and women residing in the boarding house ingested about one-third more riboflavin than corresponding sex groups living in their own homes. Both groups of men and women consumed more riboflavin in January than in October, with Group I showing the largest increase in intake. The variation in mean riboflavin values of the male participants was rather large except the October values of those residing in their own homes. The values for the female participants showed less variation.

Niacin.--The average niacin intake was 10.2 milligrams for the men and 7.3 milligrams for the women. In October the mean niacin intake for the residents in their own homes was much higher than for those living in the boarding house, but in January the difference between the mean values for the two groups was negligible. The average daily amount of niacin consumed by both men and

women in Group I increased in January while the amount for Group II was decreased. There was slightly more variation in the individual niacin values of the male participants than in those of the female participants, and the values for Group II showed greater variability than those for Group I. The range in niacin intakes averaged about 4.0 grams for the male participants and 5.0 grams for the female participants.

Ascorbic acid.--Ascorbic acid intakes averaged 52 milligrams for the men and 44 milligrams for the women. The average values were slightly higher in January than in October, and the increase for the men was greater than that for the women. The individual ascorbic acid values of both men and women participants in Group II showed more variation than those for the members of Group I. The greatest variation was evident in the values for the men in Group II.

Past and present diets and present physical status

Tabulation of the data regarding past and present diets and their present physical condition was inconclusive. These data were so variable that an adequate summary could not be made of them.

Summary

The participants in Group I (boarding home residents) consumed considerably more protein, calories,

calcium, and riboflavin and slightly more iron and vitamin A than the participants in Group II (residents in private homes). The members of Group II ingested slightly more niacin and ascorbic acid than the members of Group I. The data on intakes of nutrients for the boarding home residents exhibited less variation than the data for the residents in their own homes.

The data on intakes of specific nutrients show very small seasonal differences except in the case of ascorbic acid intakes of the men living in private homes. The seasonal variation in intakes of the male participants was generally a little larger than those of the female participants.

Cost of foods used

The average cost of food used in each group was about \$4.00 per person per week. The average expenditure per person in Group I was slightly higher than in Group II.

The food expenditures for the participants in the present study were divided as follows: Group I (residents in boarding home) - 18 per cent for milk and milk products; 23 per cent for meat and eggs; 22 per cent for vegetables and fruits; 15 per cent for bread and cereals; and 21 per cent for sweets, fats and other foods; and Group II (residents in their own homes) - 10 per cent for milk and milk products; 37 per cent for meat and eggs; 22 per cent for vegetables and fruits; 15 per cent

for bread and cereals; and 16 per cent for sweets, fats, and other foods. (See tables 14 and 15.)

Table 14.--PERCENTAGE DISTRIBUTION OF COST AND NUTRIENTS IN DIETARIES OF AGED PEOPLE
GROUP I, BOARDING HOME RESIDENTS, TWO SEASONS

Food group	Relative cost	Proportion contributed by								
		Cal- ories	Pro- tein	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascorbic acid
Milk and milk products	18	19	30	62	3	17	17	54	6	10
Eggs	4	2	4	2	3	5	2	4	*	0
Meat, fish, and poultry	18	7	19	2	13	17	10	10	29	4
Vegetables	9	6	8	4	12	28	8	4	7	11
White potatoes	2	4	3	1	2	1	6	2	9	16
Fruit	12	8	2	3	6	14	8	2	6	56
Cereal, bread and macaroni	15	29	29	20	52	5	45	17	40	1
Sweets	10	16	4	4	5	2	3	4	3	1
Fats	4	7	1	2	1	11	1	2	*	0
Other	7	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
*Not shown if less than 0.5 per cent.					(1) Not calculated					

Table 15.--PERCENTAGE DISTRIBUTION OF COST AND NUTRIENTS IN DIETARIES OF AGED PEOPLE GROUP II, PRIVATE HOME RESIDENTS, TWO SEASONS

Food group	Relative cost	Proportion contributed by								
		Cal- ories	Pro- tein	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascorbic acid
					Percentages					
Milk and milk products	10	10	13	44	2	9	6	27	2	3
Eggs	8	3	8	3	7	8	3	9	*	0
Meat, fish, and poultry	29	10	25	5	16	12	16	17	23	1
Vegetables	8	3	6	7	9	35	5	7	5	16
White potatoes	2	5	3	2	4	1	7	3	8	16
Fruit	12	8	2	6	8	15	7	5	6	62
Cereal, bread and macaroni	15	30	32	23	39	2	45	24	43	0
Sweets	9	19	6	8	13	6	6	7	5	2
Fats	6	10	3	1	2	12	4	2	3	0
Other	*	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
*Not shown if less than 0.5 per cent				(1) Not calculated						

Chapter V
DISCUSSION

The average intakes of specific nutrients for the participants in the present study were compared with the National Research Council's recommended allowances for sedentary adults, (Tables 16, 17, and 18, and Figures 6, 7, 8, and 9). Comparisons of individual intakes with the recommended allowances are given in Appendices O, P, Q, and R. Tables 19 and 20 present the comparison of the average intakes of specific nutrients in the present study with those calculated from data reported in one other dietary study of aged people (Pike et al, 33). The daily food pattern was compared with a plan suggested by the National Research Council, (Tables 21, 22, and 23). The distribution of expenditures for the various groups of foods and the relative contribution of each food group to the nutritive value of the average dietary intake are tabulated in Tables 14 and 15 and illustrated in Figures 10, 11, 12, and 13. Suggestions are made for a few simple nutritional adjustments in the food patterns of the participants and for further research.

Intakes of specific nutrients

Protein.--The men's daily intake of protein in

Table 16.--MEAN INTAKE OF NUTRIENTS BY AGED MEN AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCES FOR SEDENTARY MEN.

Nutrients	Group I ¹		Group II ²		Groups I and II		Recommended daily Allowance
	Mean daily intake October	January	Mean daily intake October	January	Mean daily intake October	January	
Protein (grams)	55	67	57	47	56	55	70
Fat (grams)	64	89	68	63	66	73	--
Carbohydrate (grams)	271	292	266	234	268	256	--
Calories	1880	2244	1912	1699	1895	1904	2500
Calcium (grams)	0.863	0.923	0.581	0.509	0.687	0.665	0.800
Phosphorous (grams)	1.145	1.289	1.190	0.880	1.173	1.031	--
Iron (milligrams)	17.0	14.5	14.2	11.2	15.4	12.4	12.0
Vitamin A (International Units)	5111	4749	4747	4477	4884	4584	5000
Thiamine (milligrams)	1.053	1.145	1.197	1.068	1.142	1.099	1.200
Riboflavin (milligrams)	1.404	1.772	1.111	1.239	1.221	1.440	1.600
Niacin (milligrams)	8.0	9.4	13.0	9.0	11.1	9.2	12.0
Ascorbic Acid (milligrams)	41	55	45	62	44	59	75

(1) Residents of boarding home. (2) Residents of private homes.

Table 17.--MEAN INTAKE OF NUTRIENTS BY AGED WOMEN AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCES FOR SEDENTARY WOMEN.

Nutrients	Group I ¹		Group II ²		Groups I and II		Recommended daily Allowance
	Mean daily intake October	Mean daily intake January	Mean daily intake October	Mean daily intake January	Mean daily intake October	Mean daily intake January	
Protein (grams)	44	47	37	36	41	42	60
Fat (grams)	58	67	50	46	54	58	--
Carbohydrate (grams)	216	207	167	169	194	190	--
Calories	1573	1623	1266	1229	1433	1453	2100
Calcium (grams)	0.688	0.632	0.316	0.351	0.515	0.505	0.800
Phosphorous (grams)	0.940	0.935	0.607	0.637	0.789	0.803	--
Iron (milligrams)	15.1	11.9	9.0	8.9	12.3	10.5	12.0
Vitamin A (International Units)	4501	3992	3294	3519	3952	3779	5000
Thiamine (milligrams)	0.812	0.870	0.760	0.797	0.788	0.846	1.100
Riboflavin (milligrams)	1.096	1.284	0.634	0.830	0.891	1.081	1.500
Niacin (milligrams)	6.5	7.1	5.6	7.4	7.1	7.5	11.0
Ascorbic Acid (milligrams)	39	46	45	48	42	47	60

(1) Residents of boarding home. (2) Residents of private homes.

Table 18.--PERCENTAGE OF NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCES FURNISHED BY FOODS CONSUMED BY ELDERLY PEOPLE DURING TWO SEASONS

Participants	Nutrients								
	Cal- ories	Pro- tein	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascorbic acid
Women	Percentages								
Group I	76	76	82	113	86	82	79	62	60
Group II	60	60	42	74	68	72	49	72	66
Both groups	68	68	62	94	77	77	64	67	63
Men									
Group I	82	87	112	134	102	92	100	72	65
Group II	72	74	68	106	92	94	74	90	68
Both groups	77	80	90	120	97	93	87	81	66

Table 19.--AVERAGE DAILY INTAKE OF SPECIFIC NUTRIENTS BY ELDERLY MEN PARTICIPANTS
 COMPARED WITH RESULTS OF OTHER DIETARY STUDIES OF AGED MEN AND NATIONAL RESEARCH
 COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY MEN

Author and date	Number of sub- jects	Method of study	Cal- ories	Pro- tein grams	Cal- cium grams	Iron milli- grams	Vitamin A Inter- national Units	Thia- mine milli- grams	Ribo- flavin milli- grams	Niacin milli- grams	Ascorbic acid milli- grams
Pike et al, 1947	12	diary, calculated	2160	74.1	0.800	15.2	3609	1.400	1.3	16.0	33.0
Pike et al, 1947	12	weighed, calculated	2050	74.2	1.100	13.3	3025	1.200	1.600	12.0	40.3
Present study October, 1947	8	weighed, calculated	1895	56	0.687	15.40	4884	1.142	1.221	11.1	44
January, 1948	8	weighed, calculated	1904	53	0.665	12.45	4584	1.099	1.440	9.2	59
Recommended allowance		----	2500	70	0.800	12.00	5000	1.200	1.600	12.0	75

Table 20.--AVERAGE DAILY INTAKE OF SPECIFIC NUTRIENTS BY ELDERLY WOMEN PARTICIPANTS COMPARED WITH RESULTS OF OTHER DIETARY STUDIES OF AGED WOMEN AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY WOMEN

Author and date	Number of subjects	Method of study	Calories	Protein grams	Calcium grams	Iron milligrams	Vitamin A International Units	Thiamine milligrams	Riboflavin milligrams	Niacin milligrams	Ascorbic acid milligrams
Pike et al, 1947	10	diary, calculated	1409	48.6	0.600	7.50	1,450	0.800	0.900	7.0	16
Pike et al, 1947	12	weighed, calculated	1579	60.4	0.700	10.00	2,000	1.000	1.100	10.0	15
Pike et al, 1947	10	weighed, calculated	1434	45.4	0.600	8.40	2,500	1.100	0.800	7.0	13
Ohlson et al, 1948	100	weighed, calculated	1824	61.0	0.900	**	**	**	**	**	**
Present study October, 1947	11	weighed, calculated	1433	41.0	0.515	12.30	3,952	0.788	0.891	7.1	42
Present study January, 1948	11	weighed, calculated	1453	42.0	0.505	10.50	3,779	0.846	1.081	7.5	47
Recommended allowance		----	2100	60	0.800	12.00	5,000	1.100	1.500	11.0	70
**Not reported											

Table 21.--WEIGHT OF PREPARED FOOD CONSUMED DAILY BY ELDERLY PEOPLE AND PER CENT OF DAILY FOOD PATTERN RECOMMENDED BY THE NATIONAL RESEARCH COUNCIL

Food	Men				Women			
	Group I		Group II		Group I		Group II	
	Grams	Per cent*	Grams	Per cent*	Grams	Per cent*	Grams	Per cent*
Milk	516	108	224	47	378	80	113	24
Eggs	20	42	39	81	17	35	18	40
Meat	96	96	61	61	77	77	65	65
Green, yellow vegetables	19	19	31	31	12	12	30	30
Other vegetables	156	156	89	89	110	110	68	68
White potatoes	62	41	58	39	46	30	48	32
Citrus fruit and tomatoes	70	70	84	84	70	70	70	70
Other fruit	112	112	116	116	100	100	70	70
Enriched cer- eal and bread	352	114	315	105	304	101	190	63
Butter or enriched oleomargarine	34	226	30	200	27	180	26	173

*Per cent of daily consumption recommended by National Research Council

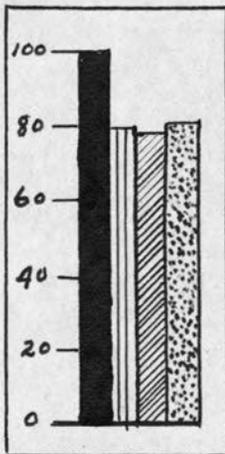
Table 22.--WEIGHT IN GRAMS OF PREPARED FOOD CONSUMED DAILY BY ELDERLY MEN AND DAILY FOOD PATTERN SUGGESTED BY NATIONAL RESEARCH COUNCIL

Food groups	Minimum daily intake	Grams per day	Intake-group I				Intake-group II			
			October		January		October		January	
			Mean	Range	Mean	Range	Mean	Range	Mean	Range
Milk	1 pint	480	482*	327*-729	550*	377*-802	228*	120*-402	219*	118*-317
Eggs	1 egg (3-4 per week)	48	22	17-36	19	18-19	32	0-62	46	0-72
Meat, fish, and fowl	1 serving	100	103	73-141	89	79-108	66	7-104	56	11-104
Vegetables green, yellow	1 serving	100	18	9-22	20	18-22	34	16-91	28	0-62
other	1 serving	100	17	66-94	235	200-282	109	5-251	69	20-140
White potato	1 serving	150	65	45-86	60	51-67	56	24-83	60	30-101
Fruits citrus, tomato	1 serving	100	53	47-57	87	78-94	142	0-158	89	35-139
other	1 serving	100	134	105-144	89	88-92	66	0-303	102	11-159
Cereals and bread	1 serving	150	166	152-176	161	242-387	133	209-445	140	199-428
Butter or enriched oleomargarine	1 serving	13	30	13-43	38	35-40	38	25-57	23	17-34
Other food as needed to complete the meals. *For method of calculation see page										

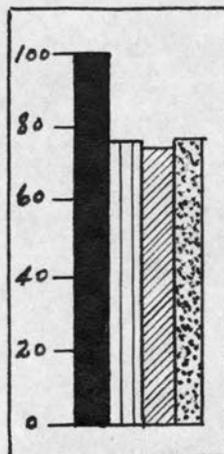
Table 23.--WEIGHT IN GRAMS OF PREPARED FOOD CONSUMED DAILY BY ELDERLY WOMEN AND DAILY FOOD PATTERN SUGGESTED BY NATIONAL RESEARCH COUNCIL

Food groups	Minimum daily intake	Grams per day	Intake-group I				Intake-group II			
			October		January		October		January	
			Mean	Range	Mean	Range	Mean	Range	Mean	Range
Milk	1 pint	480	404*	254* ⁴⁹⁶	352*	305* ⁴²¹	92*	2* ¹⁴⁸	134*	61* ²¹⁶
Eggs	1 egg (3-4 per week)	48	19	11-30	15	11-17	10	0-36	26	0-44
Meat, fish, and fowl	1 serving	100	76	66-107	69	59-84	71	56-109	59	30-71
Vegetables green, yellow	1 serving	100	12	8-16	13	11-16	39	4-82	22	0-41
other	1 serving	100	65	47-89	155	128-196	86	34-115	50	31-78
White potato	1 serving	150	54	39-82	38	31-49	44	22-78	53	22-84
Fruits citrus, tomato	1 serving	100	57	46-63	82	76-91	60	0-105	80	45-124
other	1 serving	100	118	110-137	81	77-84	84	6-173	57	33-92
Cereals and bread	1 serving	150	313	269-404	295	254-351	183	138-231	198	136-294
Butter or enriched oleomargarine	1 serving	13	28	21-30	26	20-30	30	8-53	22	7-49
Other food as needed to complete the meals. *For method of calculation see page										

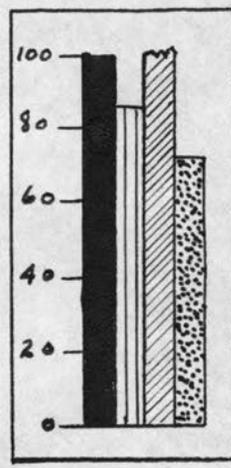
PROTEIN



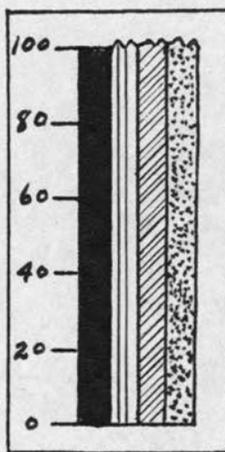
CALORIES



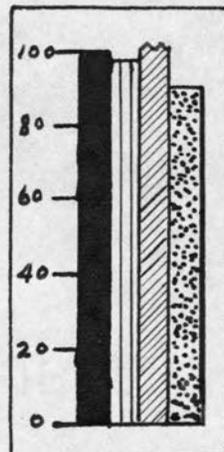
CALCIUM



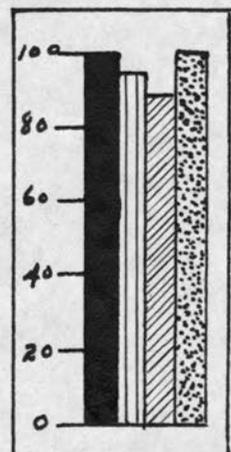
IRON



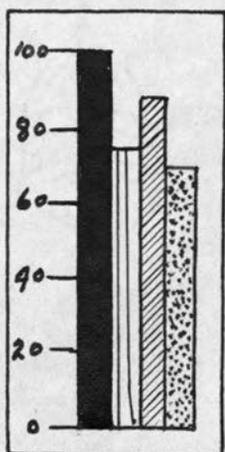
VITAMIN · A



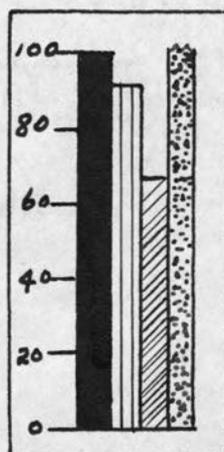
THIAMINE



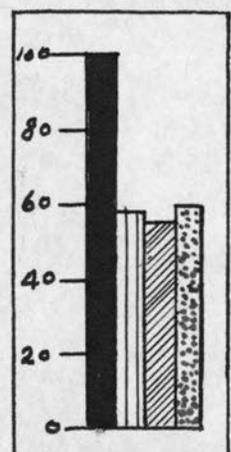
RIBOFLAVIN



NIACIN

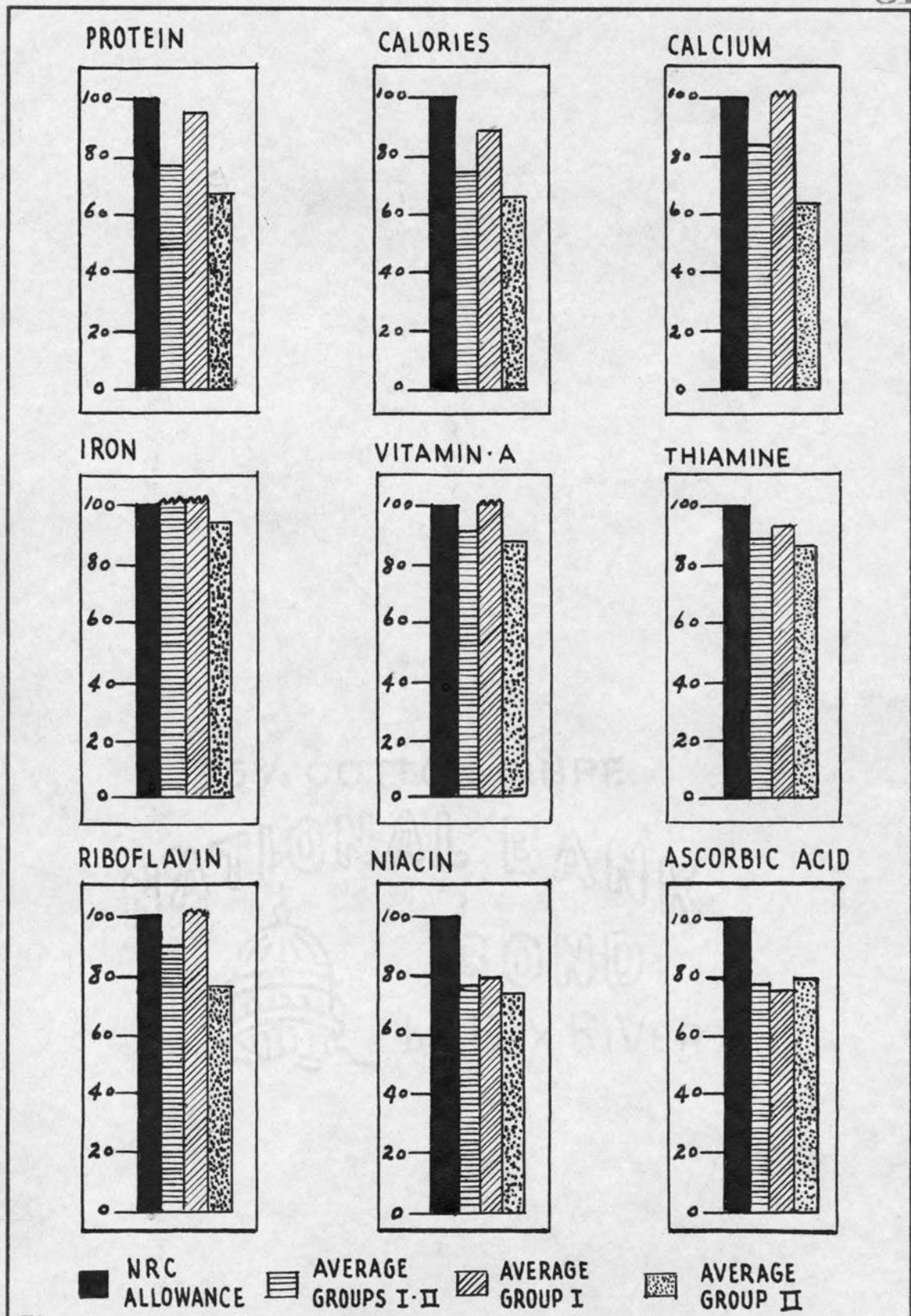


ASCORBIC ACID



NRC ALLOWANCE
 AVERAGE GROUPS I · II
 AVERAGE GROUP I
 AVERAGE GROUP II

Fig. 6.--Percentage intakes of specific nutrients compared with the National Research Council's recommended allowances.



NRC ALLOWANCE
 AVERAGE GROUPS I-II
 AVERAGE GROUP I
 AVERAGE GROUP II

Fig. 7.--Percentage intakes of specific nutrients compared with the National Research Council's recommended allowances.

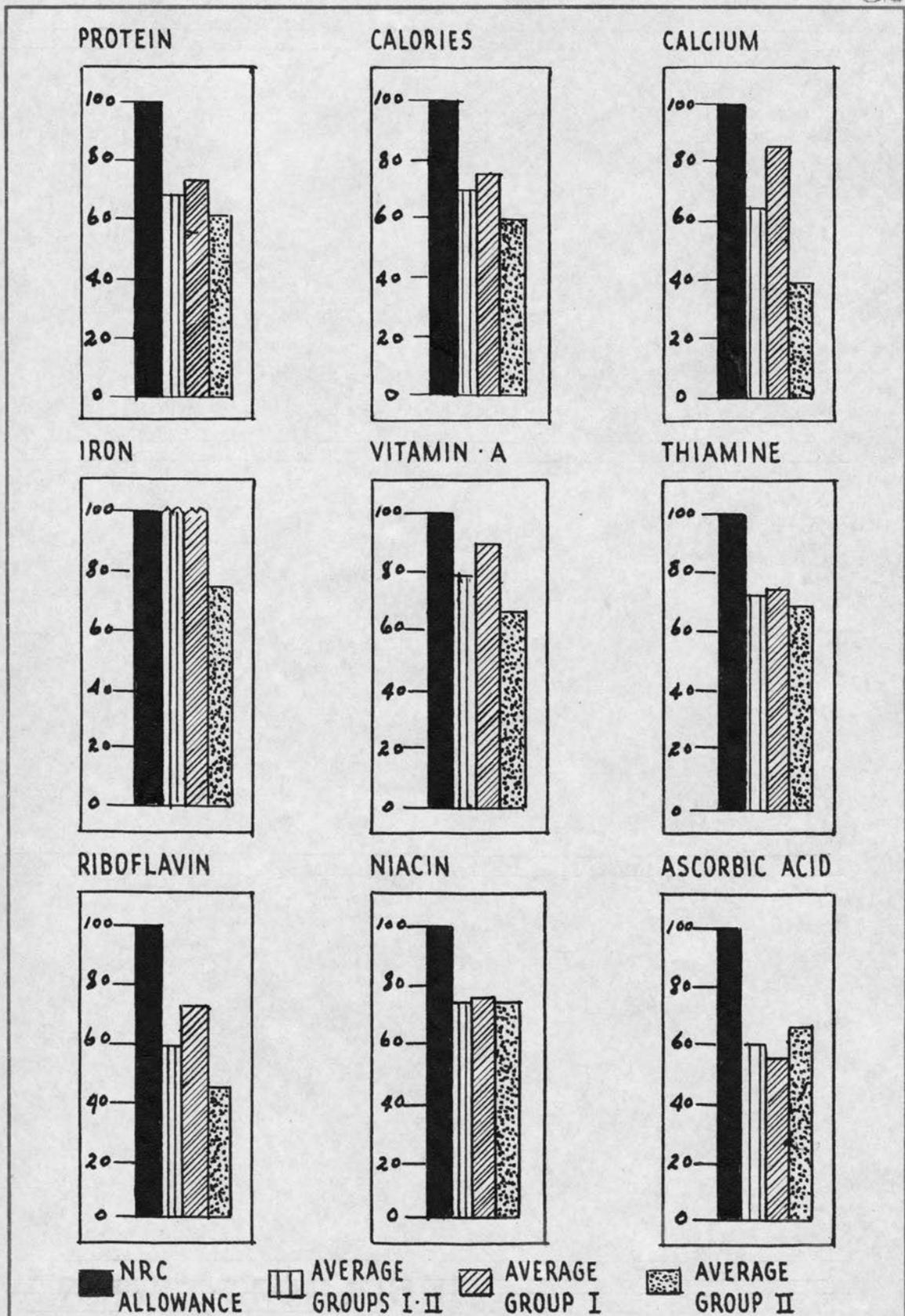


Fig. 8.--Percentage intakes of specific nutrients compared with the National Research Council's recommended allowances.

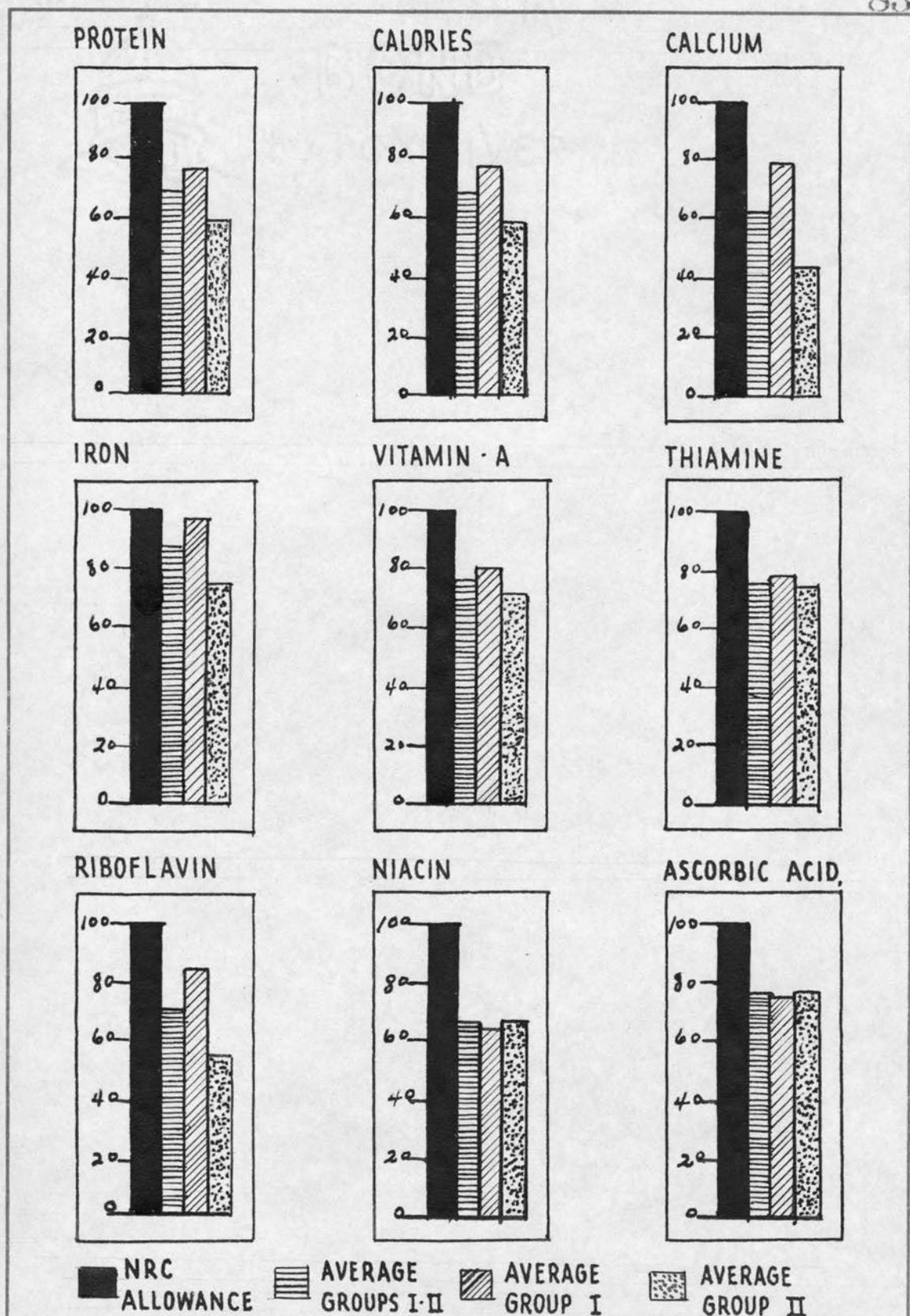


Fig. 9.--Percentage intakes of specific nutrients compared with the National Research Council's recommended allowances.

the present study averaged 80 per cent of the amount recommended by the National Research Council. The women's daily protein intake averaged approximately 70 per cent of the allowance recommended by the National Research Council for sedentary women. The protein intakes of the men and women in the present study were about 25 per cent lower than the values that the writer calculated from data reported in the study by Pike and co-workers (33).

Kountz et al (12) found that some of the aged participants in their study were in negative nitrogen balance when their diets furnished as much as 1.8 or 2.0 grams of protein per kilogram of body weight and protein furnished 17 to 18 per cent of their total daily caloric intake. One gram of protein per kilogram of body weight is a generally accepted standard for planning average diets. It is also customary in dietetic practice to allow from 10 to 15 per cent of the total food calories from protein. In the present study about 10 to 12 per cent of the total food calories was supplied by protein, (see Figures 2, 3, 4, and 5).

Calories.--Using the National Research Council's recommendation of 2500 calories per day for sedentary men and 2100 calories per day for sedentary women as standards, nearly all of the individual daily caloric intakes in the present study were unusually low. The male residents in the boarding home averaged about 80 per cent

and the female residents averaged approximately 75 per cent of the allowances quoted above. The caloric intakes of the participants who resided in their own homes averaged approximately 72 per cent of the recommended allowance for the men and 60 per cent of the recommended allowance for the women. The mean caloric intakes of all the men in the present study was lower than that calculated for the male participants in the study reported by Pike et al (33). The women participants in the present study consumed approximately the same number of calories per day as the women in the dietary study reported by Pike et al (33).

The total caloric intake should be commensurate with basal requirements plus additional energy requirements. The basal metabolic rate in healthy adults depends on functional requirements of the various body organs and processes and the size, shape, and composition of the body. Boothby and Sandiford's modification of the DuBois standards (2) indicated that the basal metabolic requirement of elderly people is somewhat lower than for average adults. As a rule the basal metabolic requirement increases with increased size, but differences in weight did not explain the variations in caloric intakes in the present study.

Muscular activity is the most important factor which raises the food requirements of adults above basal

needs. It is noteworthy that inclement weather forced most of the participants in both groups to stay indoors during part of the first and nearly all of the second weighing periods, thus reducing the amount of physical activity.

In addition some of the participants who resided in their own homes did not eat three meals per day during these periods. Because of the bad weather they did not arise until about 10 in the morning, ate a late breakfast and then did not eat dinner until mid afternoon. Under these circumstances they were not sufficiently hungry to eat an evening meal, but had only a snack before retiring. The total food intake of Group II was thereby reduced somewhat. The residents in the boarding house, however, ate three meals daily and otherwise maintained a regular schedule during both weighing periods. The manager of this residence maintained a regular schedule regardless of weather conditions. This may account in part for the higher intake of nutrients found for this group of participants.

Calcium.--The men and women in the present study averaged 83 and 64 per cent respectively of the National Research Council's recommended daily calcium allowance. The average calcium intakes of the boarding house residents were higher than those of the residents in their own homes. Pike and co-workers (33) reported calcium intakes

higher than those of the men in the present study but the values for the women in the two studies were quite similar (Table 17). Ohlson et al (31) reported higher intakes of calcium for the women participants in their study.

Research studies involving animals (7) indicated that calcium retention was decreased with advanced age, and that increased intake of calcium improved the nutritional well being of the animals. No research studies were found that indicated the effect of increased calcium intake on nutritional status of aged or aging human beings.

Iron.--The mean intake of iron for the participants in the present study exceeded the National Research Council's recommended allowance in all but one instance, namely the women in January 1948. The average iron intakes of both groups of men compare favorably with the iron intake reported by Pike and co-workers (33) for their male participants. However, the women in the present study ingested considerably more iron than the amount reported by the above research workers.

Vitamin A.--The average vitamin A values in the present study ranged from 2757 International Units, or about 55 per cent less, to 1451 International Units more, or approximately 30 per cent, than the National Research Council's recommended allowance. The average vitamin A intake for the men was 95 per cent and that of the women about 75 per cent of the suggested allowance. The men

and the women in this present study averaged about 50 per cent more vitamin A than the participants in the study reported by Pike and co-workers (33).

Thiamine.--The National Research Council recommends a daily thiamine allowance of 1.2 milligrams for sedentary men and 1.1 milligrams for sedentary women. Thiamine values for the men in the present study averaged about 90 per cent and for the women about 75 per cent of the recommended allowances indicated above. The average thiamine values calculated from data reported by Pike and co-workers (33) met the National Research Council's recommended allowance for sedentary men but were only slightly more than 75 per cent of the amount suggested for women.

Riboflavin.--A daily riboflavin allowance of 1.6 milligrams for men and 1.5 milligrams for women is recommended by the National Research Council. The male participants in the present study ingested about 85 per cent of these respective allowances. The residents in the boarding house averaged about 30 per cent more riboflavin than those living in their own homes. The data reported by Pike and co-workers (33) gave the men riboflavin values that were slightly higher than the recommended allowance, but the values for the women were about 65 per cent of the suggested allowance or about the same as those in the present study.

Niacin.--The men's average daily niacin intake

in the present study was approximately 84 per cent and that of the women was about 70 per cent of the respective amounts recommended by the National Research Council.

The men's niacin intake indicated above is approximately 30 per cent less than the average computed from data reported by Pike et al (33), but the values for the women in the two studies were very similar.

Ascorbic acid.--The daily ascorbic acid intake of the male participants in each group in the present study was about 68 per cent, and of the women in each group, approximately 64 per cent of the National Research Council's recommended intake. The average ascorbic acid values in the present study were much higher than those computed from data reported by Pike and co-workers (33).

Summary

The intakes of specific nutrients of the male participants were about 80 per cent of the National Research Council's recommended allowances except for iron and ascorbic acid. The iron intakes of the men averaged 120 per cent of the recommended allowance and the ascorbic acid values averaged about 65 per cent of the allowance suggested for this nutrient. The intakes of specific nutrients of the female participants were approximately 65 to 75 per cent of the National Research Council's recommended allowance for

sedentary women except in the case of iron, which was 94 per cent of the allowance suggested for this nutrient.

The men's intakes of all specific nutrients in the present study were lower than the values computed from the data reported by Pike et al (33) except for iron, vitamin A, and ascorbic acid. The iron intakes were approximately the same, while the intakes of vitamin A and ascorbic acid were higher in the present study than in the study by Pike and co-workers (33).

The women's intakes of protein, calcium, thiamine, and niacin were less, of calories and riboflavin approximately the same, and of iron, vitamin A, and ascorbic acid, higher than those computed from individual values reported by Pike et al (33). The intakes of protein, calories, and calcium for the female participants were also somewhat lower than the average values reported by Ohlson et al (31).

In general, the intakes of the participants residing in private homes were lower than the intakes of the participants living in the boarding home.

Comparison of food patterns

There are many food groupings that may be used as a guide to an adequate diet. However, the following commonly used pattern suggested by the National Research

Council (30) has been arbitrarily chosen as a basis for comparison: Milk, one pint daily; eggs, at least three to four per week and preferably one per day; meat, fish and poultry, at least one serving daily; vegetables, two servings daily, one of which should be green or yellow; fruits, two servings daily, one of which should be citrus fruit or tomato or other good source of ascorbic acid; whole grain cereal, two or more servings daily; and butter or fortified margarine, at least one tablespoon daily. These servings have been translated in grams for ease in comparing the food pattern with the daily intake of the participants in the present study. The weight per serving was that given by Turner (49).

Examination of Tables 19, 20 and 21 shows that both groups of participants consumed unusually small quantities of eggs, green and yellow vegetables, and white potatoes and less than the recommended amounts of meat and citrus fruit and tomatoes. The participants residing in private homes also consumed extremely small amounts of milk and milk products and less than the suggested amounts of other vegetables and grain products.

The results presented above suggest some of the reasons for the low intake of many nutrients in the present study. Low consumption of milk leads one to suspect low calcium and riboflavin intakes. Low consumption of eggs and meat suggests the reasons for

inadequate intakes of niacin, thiamine, riboflavin and protein, especially for Group II, when considered in conjunction with the deficiency in milk consumption. Likewise the extremely low quantity of green and yellow vegetables consumed by the participants suggests that the diets will be low in the vitamin A content. Inadequate consumption of citrus fruit as well as the unusually small quantity of white potatoes eaten points to low ascorbic acid values.

Inclement weather caused the participants to stay indoors during a large part of both weighing periods, and the residents in their own homes did not eat their meals regularly during this time. The combination of the factors just indicated brought about a reduction in the total amount of food consumed.

The data on intake of specific nutrients, Tables 10 and 11, as well as that on dietary patterns, Tables 6 to 9 inclusive, show very little variation between the two seasons studied. Apparently food habits offset any possible effect of availability of foods at the two seasons of the year included in the present study.

Summary

There are obvious differences between the diets and intakes of nutrients of the two groups of participants. The probable reasons for these variations are the differences in the types and amounts of foods included

in the meals of the two groups as well as the differences previously noted in the regularity of meals. The participants in Group I (boarding home residents) consumed more milk and milk products, more of other vegetables, and slightly more bread and cereal than those in Group II (residents in private homes). Group II consumed more eggs, green and yellow vegetables, and in October more sweets. The sweets used by the members of Group II included more sorghum, karo syrup, and sweet rolls than that consumed by Group I.

Distribution of food expenditures

Various divisions of the family food budget have been recommended to ensure adequate diets at different income levels. However, a simple food budget that is quite generally used has been selected for comparison. This budget recommends one-fifth or more for milk and cheese; one-fifth or less for meat, fish and eggs; one-fifth, more or less, for vegetables and fruits; one-fifth, more or less, for bread and cereals; and one-fifth or less for fats, sugar and other foods and food adjuncts. In addition, comparisons are also made with the food expenditure studies by the United States Department of Agriculture (51) and Sherman (41).

The relative cost and contribution to nutritive value of the various food groups may be best understood by examining Tables 14 and 15 and Figures 10, 11,

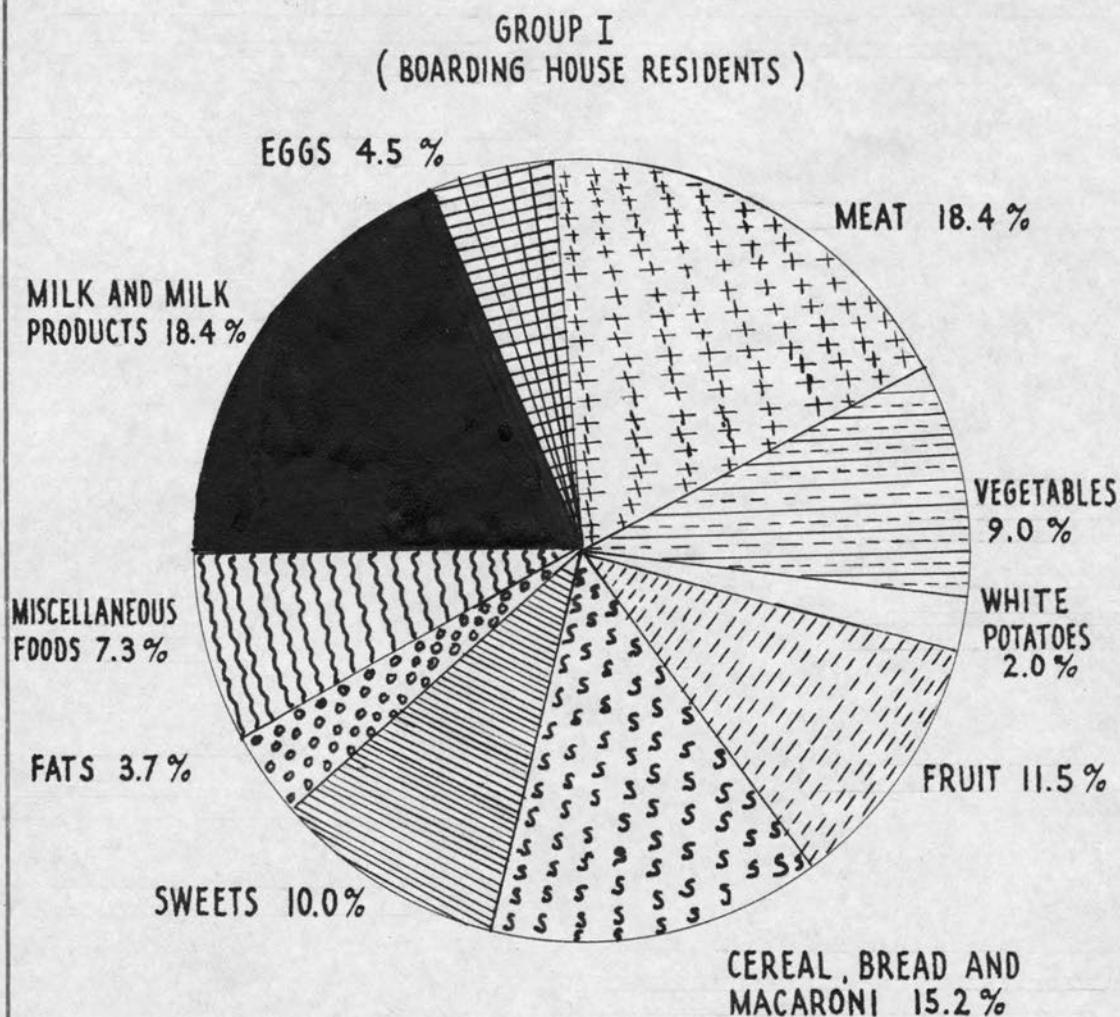


Fig. 10.--Per cent of food dollar spent for various food groups, two seasons.

GROUP II
(RESIDENTS, PRIVATE HOMES)

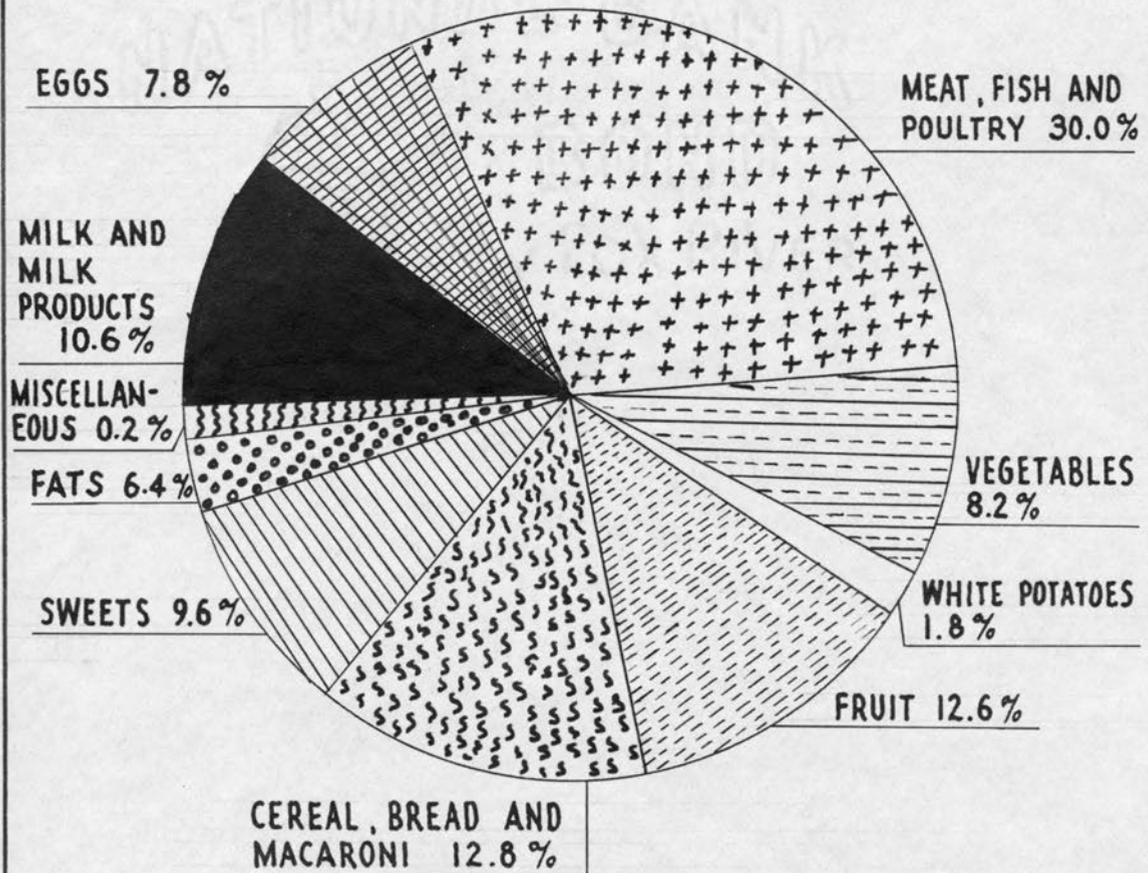
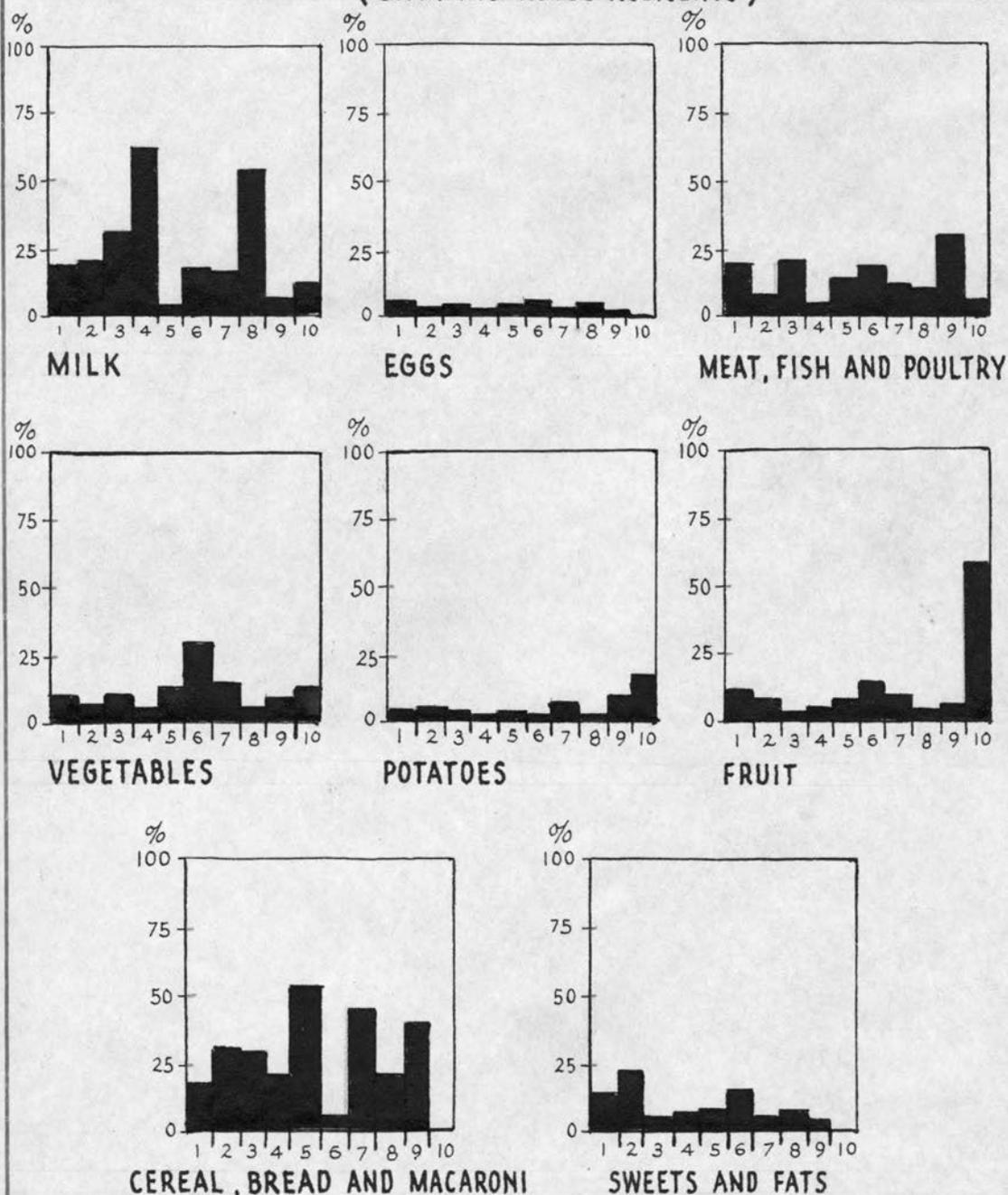


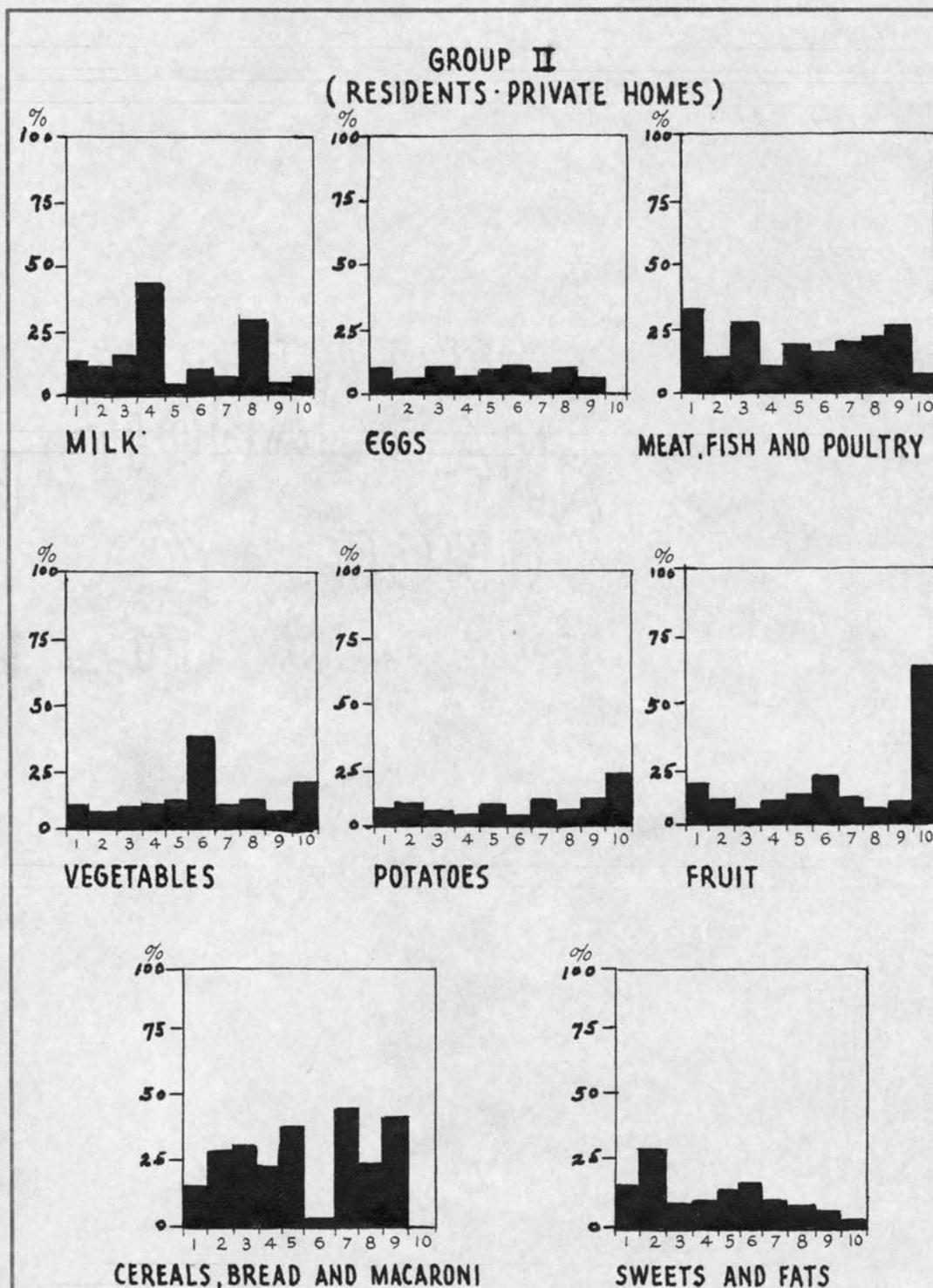
Fig. 11.--Per cent of food dollar spent for various food groups, two seasons.

**GROUP I
(BOARDING HOUSE RESIDENTS)**



1. COST 2. CALORIES 3. PROTEIN 4. CALCIUM 5. IRON 6. VITAMIN-A
7. THIAMINE 8. RIBOFLAVIN 9. NIACIN 10. ASCORBIC ACID

Fig. 12.--Proportion of nutrients supplied by various food groups, two seasons.



1. COST 2. CALORIES 3. PROTEIN 4. CALCIUM 5. IRON 6. VITAMIN-A 7. THIAMINE
8. RIBOFLAVIN 9. NIACIN 10. ASCORBIC ACID

Fig. 13.--Proportion of nutrients supplied by various food groups, two seasons.

12, and 13. By glancing across the page in Tables 14 and 15 it will be seen that in some instances the percentage contribution of several nutrients equals or exceeds the relative expenditure for the particular food group, while in other instances, this is not the case. For example, milk contributed more than its proportionate share of calories, protein, calcium, and riboflavin and cereals and bread contributed more than its share of calories, protein, calcium, iron, thiamine, riboflavin, and niacin. Therefore milk and cereals can be considered as economical foods, while sweets which provided its share of only one nutrient, may not be.

The percentage distribution of cost and nutrients for the boarding home residents is quite similar to that reported by the United States Bureau of Labor Statistics in a study of spending and saving in wartime (51). The data for the residents in private homes on cost and contribution to nutritive value differ in many respects from the study mentioned above, but resemble the data reported by Sherman (41) for typical American families.

Suggestions for improving the diets of participants

The adequacy of the diets of the participants in the present study could have been improved in several ways without materially increasing the cost.

Skimmed, canned, and dried milk are less

expensive than fresh whole milk and can be used in place of part of the whole milk in low-cost budgets. These less expensive forms of milk could have been used in soups, puddings, and cream dishes eaten by the participants. The boarding home could have substituted these forms of milk for part of the fresh whole milk included in the diets, but the participants living in their own homes would need to add these to the milk and milk products they are now using.

The expenditures for meat at the boarding home compared favorably with the suggested budgets and with the proportion spent for this food item in the food expenditure studies. The participants living in their own homes, however, spent an unusually large portion of their food budget for meat. Meat cannot be used liberally in economical diets because it is usually the most expensive food item. Meat is appetizing and it may be prepared in such a way that its flavor is extended over other foods such as cereals, bread, and certain vegetables. The dietary intakes of vitamin A, thiamine, riboflavin, and niacin of both groups of participants could have been improved by using liver or other glandular meat at least once a week.

The quantity of vegetables and fruits eaten by the participants was extremely low and any increase in the consumption of these foods would no doubt entail an

increase in total expenditures unless they could be produced at home. In order to obtain the maximum benefit from the fruits and vegetables in low-cost diets, particular attention must be given to their selection and preparation in order to conserve the mineral and vitamin content of these foods. They should be used at the height of their season, selected with special regard for their nutritive value rather than size and color, and when fresh vegetables are purchased only those that have been kept fresh should be selected.

Most of the cereal and cereal products used by the participants in the present study were enriched. Whole grain cereal and cereal products would have improved the diets nutritionally, but because they are coarser products they might prove irritating to the digestive tracts of elderly people. Both groups of participants could have spent a larger per cent of the total food expenditure for enriched and whole grain products and thereby improved the adequacy of their dietary intakes.

The participants' diets did not meet the National Research Council's recommended allowances for many of the nutrients. These deficiencies could be corrected by increasing the total food intake. Foods such as milk drinks and fruit and fruit juice could be taken between meals in addition to increasing the size

of servings at meal time.

Suggestions for further research

This study of food consumption suggests the need for additional dietary studies with elderly individuals supplemented by physical examinations for people in the upper age brackets. Other research studies designed to indicate optimum intakes of protein, calories, and calcium seem to be indicated by this study.

Chapter VI

SUMMARY

The increased proportion of people in this country over 65 years of age has amplified many existing problems, including those relating to health. It is generally agreed that adequate nutrition can be an important factor in maintaining the health and vitality of senescent individuals. Since there is little information available concerning the specific nutritional requirements of aging and aged people, and it has been suggested that studies of food consumption may be one of the best methods of determining nutritional needs, this study was planned.

The purpose of this experiment was to determine the significance of information on the nutritive value and cost of foods consumed by a selected group of individuals over 70 years of age. Information on nutritional status and past and present dietary patterns of the participants was to be secured to help in the interpretation of the data.

Records of the weight and cost of food consumed by each of two groups of men and women over 70 years of age were obtained for each of two seasons and the mean intakes of specific nutrients, range, and standard

deviation of the mean were calculated. The weight of each group of participants' average daily intakes of the various food groups was determined.

In general the intakes of specific nutrients did not meet the National Research Council's recommended allowances. The average intakes of the male participants were more adequate than those of the female participants except the ascorbic acid intakes which were practically the same for both sexes. The iron intakes of both the male and female participants exceeded the National Research Council's recommended allowance for this nutrient. The participants in Group I (boarding home residents) consumed more adequate amounts of most nutrients than did the participants in Group II (residents in private homes).

The participants in Group I ate especially small amounts of eggs, green and yellow vegetables, and white potatoes and more than adequate amounts of other vegetables and fats. The members of Group II ate very inadequate amounts of milk, meat, green and yellow vegetables, and white potatoes, and more than adequate amounts of fats.

The distribution of food expenditures for the members of Group I compares favorably with a commonly used food budget, but the participants in Group II spent less than the suggested proportions for milk and cereal

and about 50 per cent more for meat than is generally recommended. The food expenditures for Group II resemble data given in a study of food cost (41).

Seasonal differences in dietary intakes were notable only in the case of ascorbic acid values of the male participants. The other differences in the intakes during the two seasons apparently are not attributable to seasonal differences in availability of foods.

Increased total food intakes are suggested to improve the nutritional quality of the diets. At least part of this increased intake could be accomplished by taking some food such as milk or fruit juice between meals.

This experiment suggests the need for further dietary studies supplemented by physical examinations to establish allowances of specific nutrients for senescent groups of individuals.

A P P E N D I X

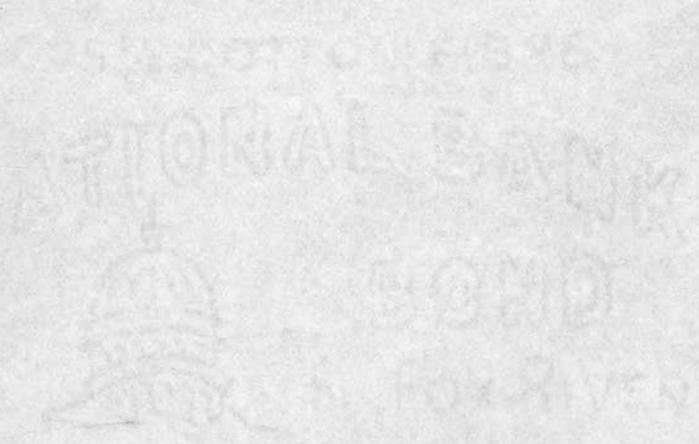


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Appendix A.--FORM USED FOR RECORDING WEIGHT OF FOOD EATEN.

Menu and de- scription of food served	Participants							
	1				2			
	Weight of dish plus food (grams)	Weight of dish (grams)	Weight of food served (grams)	Weight of food not eaten (grams)	Weight of food eaten (grams)	Weight of dish plus food (grams)	Weight of dish (grams)	Weight of food served (grams)

Appendix B.--DIETARY PATTERN - PAST AND PRESENT

Name or Number _____

Directions:

Please check the following chart as to foods eaten frequently, occasionally, and never. The first three columns are for the foods that you ate in the past, that is, during childhood, youth, and middle age. The next three columns are to be used in checking foods which you eat at present.

If you wish to make any comments, use the column headed "explanation." For example:

1. Never tasted this food; or
2. Cannot eat apples, because --

In case there are foods which you have used in abundance either in the past or at the present time, and you do not find them on the chart, they may be written in at the end of the food group they resemble most.

Food	Past			Present			Explanation
	Frequently	Occasionally	Never	Frequently	Occasionally	Never	
<u>I. Milk and Milk Products</u>							
whole sweet milk							
skimmed milk							
buttermilk							
cheese							
cottage cheese							
cream							
ice cream							
evaporated or canned milk							
dried milk							
<u>II. Meat and Meat Substitutes</u>							
beef							
pork or ham							
lamb							
veal							
variety meats							
brains							
liver							
heart							
kidney							
sweet breads							
tongue							
tripe							
canned meats							

Appendix B.--Continued Food	Past			Present			Explaination
	Frequently	Occasion- ally	Never	Frequently	Occasion- ally	Never	
II. Meat and Meat Substitutes							
(continued)							
rabbit							
game meat							
large game							
birds							
poultry							
fish							
canned							
fresh water							
salt water							
other seafood							
eggs							
dried peas							
dried beans							
pinto							
navy							
Mexican							
other							
nuts							
peanuts							
other nuts							
peanut butter							
III. <u>Bread, Cereals and Flour</u>							
<u>Products</u>							
white bread							
whole wheat bread							
rye bread							
hot breads							
biscuit							
pancakes							
others							
crackers							
cereals							
oatmeal							
wheat cereal (WW)							
cream of wheat							
farina							
grits							
rice							
prepared cereals							
other							
macaroni, spaghetti, vermicelli or other							

Appendix B.--Continued Food	Past			Present			Expla- nation
	Frequently	Occasion- ally	Never	Frequently	Occasion- ally	Never	
V. Fruits (continued)							
Citrus and tomato (continued)							
grapefruit							
fresh							
canned							
juice							
tomatoes							
fresh							
canned							
juice							
other citrus							
Other fruit (fresh, dried, or canned)							
apples							
bananas							
berries							
cherries							
figs (fresh)							
cantaloupe							
other melons							
peaches							
pears							
persimmons							
plums							
other							
Dried fruit							
prunes							
raisins							
figs							
dates							
other							
VI. <u>Sweets</u>							
cake							
cookies							
candy							
honey							
jams, jellies, and preserves							
sugar							
syrup							
molasses							
pastries							
other desserts							

Appendix B.--Continued Food	Past			Present			Expla- nation
	Frequently	Occasion- ally	Never	Frequently	Occasion- ally	Never	
VII. <u>Fats</u> butter oleomargarine bacon mayonnaise							
VIII. <u>Miscellaneous</u> Tea coffee carbonated drinks cocoa and chocolate beer wine other alcoholic beverage							
IX. <u>Dietary Supplements</u> Vitamin preparations Iron compounds Liver preparations Calcium and phosphorous compounds Mineral oil Agar agar							
X. <u>Related Information</u> How long has present diet been used? Any previous special diets? Kind? How long? Regularity of meals Past Present Appetite Where is most of food eaten? (Home or other) Where was most of food eaten past?							

Appendix C.--NUTRITIONAL STATUS CHART

Date _____

Name or Number _____ Age _____ Sex _____

Height _____ Weight _____

Condition of

eyes

abnormal discharge of tears
 night blindness
 abnormal intolerance of light
 burning or itching of eyes
 spots in eyes or other

teeth

sore bleeding gums
 cavities
 dentures

skin

dry and wrinkled
 color
 burning or prickling of skin

hair

degree of greyness
 amount
 dryness or oiliness

Other symptoms of malnutrition

Lack of appetite
 Lassitude or chronic fatigue
 Loss of weight
 Lack of mental application
 Loss of strength
 History of sore mouth or tongue
 Chronic diarrhea
 Nervousness and irritability
 Muscle and joint pains, muscle cramps
 Sores at the corners of the mouth (cheilosis)

Degree of activity

Mental alertness

Previous illness

Acute infections

Chronic conditions

Surgery

Appendix D.

U. S. Department of Labor
Bureau of Labor Statistics
Pacific-Rocky Mountain Region
550 Federal Office Building
San Francisco 2, California

RETAIL FOOD PRICE INDEX ^{1/}

Pricing Period October 15, 1947 City Denver

Commodity Group	Index 1935-39 = 100	Percent Change to					from
		Sept. 15 1947	Oct. 15 1947	June 15 1946	Aug. 15 1939	7-15-47 Previous Quarter	
All Foods	197.2	- 0.9	15.1	35.7	112.7	2.9	
Cereals and Bakery Products	160.5	1.8	15.6	35.9	77.2	3.1	
Meats, Poultry and Fish	239.5	- 1.8	38.9	80.2	144.6	4.0	
Meats							
Beef and Veal		- 3.2	51.5			0.5	
Pork		0.1	39.3			12.9	
Lamb		- 2.5	37.2			3.5	
Chickens		3.1	- 8.6			2.4	
Fish, Fresh and Canned		0.3	21.8			5.6	
Dairy Products	189.0	- 4.7	- 6.4	24.3	97.3	3.2	
Eggs	221.0	1.7	9.6	53.5	191.2	16.4	
Fruits and Vegetables	179.0	- 1.5	5.5	1.0	102.0	- 2.0	
Fresh	179.5	- 1.8	3.9	- 5.2	105.4	- 1.7	

^{1/} Based on average prices of 50 foods.

Appendix D.--Continued

Commodity Group	Index 1935-39 = 100	Percent Change to				from
		Sept. 15 1947 Last Month	Oct. 15 1947 Year Ago	June 15 1946	Aug. 15 1939	7-15-47 Previous Quarter
Fruits and Vegetables.--Continued.						
Canned	140.7	0.3	8.6	15.6	52.8	- 2.9
Dried	260.9	- 2.7	13.6	43.2	182.7	- 3.3
Beverages	174.5	7.5	26.4	46.9	81.4	7.3
Fats and Oils	189.1	7.2	27.1	43.1	115.6	3.3
Sugar and Sweets	181.7	0	10.3	28.0	84.5	0

Appendix D.--Continued

Pricing Period October 15, 1947City Denver

AVERAGE PRICES OF IMPORTANT FOODS

Article	Average Price	Range of Prices	Percent Change		
			From Previous Month	From Previous Quarter	
Flour	5 lb.	46.1	42 - 58	3.4	2.9
Round Steak	lb.	75.2	60 - 90	- 4.7	- 0.1
Pork Chops	lb.	81.0	68 - 89	- 1.7	11.6
Bacon	lb.	92.1	82 -100	2.0	17.6
Butter	lb.	78.7	69 - 84	-14.2	4.2
Eggs	doz.	77.8	67 - 89		
Oranges	doz.	52.5	36 - 69	- 1.5	18.5
Carrots	bu.	8.2	6 - 11	30.2	13.9
Lettuce	head	11.3	8 - 15	- 7.4	50.7
Potatoes	15 lb.	64.7	52 - 75	11.6	-27.5
Peaches No.2 $\frac{1}{2}$	can	30.9	28 - 36	- 0.6	- 3.7
Tomatoes No.2	can	17.9	15 - 22	- 2.2	- 5.3
Coffee	lb.	50.2	48 - 53	7.5	7.3
Lard	lb.	32.2	25 - 39	23.4	32.5
Sugar	lb.	10.1	10 - 11	0	0
Apples	lb.	10.5	8 - 15	-21.6	-12.5
Corn	No. 2 can	17.3	13 - 20	2.4	3.0
Peas	No. 2 can	15.2	12 - 19	2.7	- 1.9
Prunes	lb.	24.9	18 - 30	- 3.1	- 3.1
Cheese	lb.	59.5	54 - 69	9.0	16.9

Appendix D.--Continued.

U.S. Department of Labor
Bureau of Labor Statistics
Pacific-Rocky Mountain Region
550 Federal Office Building
San Francisco 2, California

RETAIL FOOD PRICE INDEX 1/

Pricing period January 15, 1948 City Denver

Commodity Group	Index 1935-39 - 100	Percent Change to January 15, 1948				from	
		Dec. 15 1947 Last Month	Jan. 15 1947 Year Ago	June 15 1946	Aug. 15 1947	Oct. 15 1947 Previous Quarter	
All Foods	208.6	1.5	12.8	43.6	125.0	5.8	
Cereals and Bak- ery Products	172.5	1.2	19.1	46.1	90.4	7.5	
Meats, Poultry and Fish	239.6	4.0	15.6	80.3	144.7	0	
Meats							
Beef and Veal		4.7	21.8			3.9	
Pork		2.7	12.9			- 7.3	
Lamb		3.1	10.3			- 3.4	
Chickens		5.4	2.1			0.4	
Fish, Fresh and Canned		3.6	5.5			1.9	
Dairy Products	207.8	- 1.6	8.6	36.6	116.9	9.9	
Eggs	208.6	-11.1	21.1	44.9	174.8	- 5.6	

1/ Based on average prices of 50 foods.

Appendix D.--Continued.

Commodity Group	Index 1935-39 = 100	Percent Change to				from
		January 15, 1948		June 15	Aug. 15	Oct. 15
		Dec. 15 1947 Last Month	Jan. 15 1947 Year Ago	15 1946	15 1939	1947 Previous Quarter
Fruits and Vegetables	201.1	3.6	9.3	13.4	127.0	12.3
Fresh	209.4	4.8	13.9	10.6	139.6	16.7
Canned	145.0	0.3	1.1	19.1	57.4	3.1
Dried	248.5	- 1.1	-11.0	36.4	169.2	- 4.8
Beverages	190.6	2.9	15.1	60.4	98.1	9.2
Fats and Oils	208.4	0.2	4.8	57.8	137.6	10.2
Sugar and Sweets	188.9	1.0	4.5	33.0	91.8	4.0

Appendix D.--Continued.

Pricing Period January 15, 1948City Denver

AVERAGE PRICES OF IMPORTANT FOODS

Article		Average Price	Range of Prices	Percent Change	
				From Previous Month	From Previous Quarter
Flour	5 lb.	47.6	42 - 60	- 4.2	3.3
Round Steak	lb.	77.7	63 - 89	5.1	3.3
Pork Chops	lb.	70.0	63 - 79	5.7	- 13.6
Bacon	lb.	87.0	69 - 100	- 2.8	- 5.5
Butter	lb.	90.8	83 - 99	- 6.9	15.4
Eggs	doz.	72.7	63 - 84		
Oranges	doz.	44.7	23 - 69	3.5	- 14.9
Carrots	bu.	12.4	8 - 17	2.5	51.2
Lettuce	head	16.1	9 - 25	10.3	42.5
Potatoes	15 lb.	79.0	71 - 99	1.2	22.1
Peaches No.2 $\frac{1}{2}$ can		30.2	26 - 36	- 2.3	- 2.3
Tomatoes No.2 can		18.0	16 - 22	- 3.2	0.6
Coffee	lb.	54.3	48 - 57	1.9	8.2
Lard	lb.	35.6	33 - 40	- 3.3	10.6
Sugar	lb.	10.4	10 - 12	0	3.0
Rice	lb.	22.6	16 - 26	8.7	17.7
Cheese	lb.	62.2	57 - 69	1.5	4.5
Prunes	lb.	22.5	18 - 28	- 3.0	- 9.6
Shortening, hydrogenated	lb.	44.2	40 - 53	2.6	19.8
Cabbage	lb.	8.1	5 - 15	12.9	76.1
Pineapple No.2 $\frac{1}{2}$ can		35.1	32 - 42	4.8	<u>1/</u>

1/ Inadequate.

Appendix E.--MENUS FOR ONE WEEK GROUP I JANUARY 1948

Breakfast	Dinner	Supper
Orange and grape- fruit juice (canned) Oatmeal, top milk and sugar Milk, tea, or coffee with cream and sugar	Beef hash Scalloped tomatoes Stewed rutabagas (with butter) Canned peaches White bread and butter	Vegetable soup (canned) Crackers Sandwich-roll and mayonnaise spread Plain cake and frosting Beverage
Grapefruit juice (canned) Oatmeal, top milk and sugar or corn flakes Toast, white with butter Beverage	Macaroni and meat balls with toma- to sauce Buttered peas White enriched bread and butter Canned cherries Chocolate cake and icing Beverage	Homemade vegetable soup Crackers Canned pears Spice cake and icing Milk or tea
Grapefruit and orange juice Cream of wheat with top milk and sugar or corn flakes White enriched toast and butter Milk, tea, or coffee with cream and sugar	Meat loaf Boiled white potatoes Cream gravy Mixed vegetables (canned) White enriched bread and butter Red cherries (canned) Graham crackers	Cream of tomato soup Crackers Bread and butter Graham crackers with icing Milk, tea, or cof- fee with cream and sugar
Prune juice Oatmeal or corn flakes with top milk and sugar White enriched toast and butter Milk or coffee with cream and sugar	Meat loaf Baked hubbard squash Creamed onions Harvard beets White enriched bread and butter Cherries Milk or tea with cream and sugar	Scrambled eggs Cottage cheese with chopped onion Bread and butter Applebutter Chocolate cake with chocolate icing Tea with cream or sugar Milk

MENUS FOR ONE WEEK GROUP I JANUARY 1948.--Continued

Breakfast	Dinner	Supper
Orange and grape- fruit juice (canned) Whole wheat cereal or cornflakes with top milk and sugar White enriched toast and butter Coffee with cream and sugar	Baked beans with bacon Mashed potato Corn bread with butter and jelly Dill pickle Baked custard Milk	Pancakes with butter and syrup Canned pears (water packed) Milk or tea
Orange and grape- fruit juice (canned) Oatmeal with top milk and sugar Enriched white toast and butter Coffee with sugar and cream	Fried pork liver Fried white pota- toes Baked hubbard squash Raisin bran muf- fins with butter Sauerkraut or green beans Jello whip Milk	Split pea soup Crackers Canned pears (Water packed) Applesauce cake Milk
Pancakes with butter and syrup Fried eggs Milk or coffee with sugar and cream	Chicken pie with biscuit crust Mashed potatoes Grapefruit and avocado salad on lettuce, with mayonnaise Tomato juice Enriched white bread and butter Chocolate pie Milk	

Appendix F.--GRAMS OF PREPARED* FOOD CONSUMED PER DAY BY ELDERLY MEN, OCTOBER 1947.

Sub- ject num- ber	Food Groups										
	Milk and milk products	Eggs	Meat fish fowl	Green and leafy veg- etables	Other vege- tables	Pota- toes	Citrus fruit and tomatoes	Other fruit	Cereal bread maca- roni	Sweets	Fats
Group I. (Residents of boarding house)											
1	729	17	73	30	93	64	47	105	402	55	13
6	327	26	96	33	77	86	57	144	381	113	43
9	393	22	141	17	60	45	54	126	351	107	33
Average	482	22	103	27	77	65	53	134	377	91	30
Group II. (Residents of private homes)											
11	120	54	115	13	251	43	158	226	445	178	27
13	402	62	7	16	5	24	--	--	316	55	25
15	224	45	47	31	73	51	97	84	316	73	37
17	204	--	59	91	124	77	--	99	383	140	57
19	191	--	104	20	69	83	74	303	209	154	43
Average	228	32	66	29	109	56	66	142	334	120	38
Average both groups	324	28	80	31	94	59	61	136	350	109	36

* Ready for consumption.

Appendix G.--GRAMS OF PREPARED* FOOD CONSUMED PER DAY BY ELDERLY MEN, JANUARY 1948.

Sub- ject num- ber	Food Groups										
	Milk and milk products	Eggs	Meat fish fowl	Green and leafy veg- etables	Other vege- tables	Pota- toes	Citrus fruit and tomatoes	Other fruit	Cereal bread maca- roni	Sweets	Fats
Group I. (Residents of boarding house)											
1	802	19	82	19	223	62	90	88	397	78	35
6	377	18	79	18	200	51	78	88	348	126	38
9	471	19	108	22	282	67	94	92	242	158	40
Average	550	19	90	20	235	60	87	89	326	121	38
Group II. (Residents of private homes)											
11	248	72	76	62	90	30	115	71	302	174	17
13	243	69	11	8	20	53	133	11	199	41	23
15	118	49	63	--	140	40	35	66	243	169	23
17	317	43	27	41	33	101	89	136	428	124	34
19	171	--	104	27	46	79	139	159	314	72	20
Average	219	46	56	28	69	60	102	89	297	116	23
Average both groups	343	36	69	25	129	60	97	89	308	118	29

* Ready for consumption.

Appendix H.--GRAMS OF PREPARED* FOOD CONSUMED PER DAY BY ELDERLY WOMEN, OCTOBER 1947

Sub- ject num- ber	Food Groups										
	Milk and milk products	Eggs	Meat fish fowl	Green and leafy veg- etables	Other vege- tables	Pota- toes	Citrus fruit and tomatoes	Other fruit	Cereal bread maca- roni	Sweets	Fats
Group I. (Residents of boarding house)											
2	395	19	66	13	47	61	60	112	276	56	21
3	434	19	79	16	71	82	60	125	322	59	29
4	451	20	71	14	63	39	61	110	325	75	30
5	407	11	65	8	54	43	46	137	269	49	27
7	496	17	70	10	56	49	63	118	284	53	32
8	254	30	107	11	89	55	53	133	404	80	32
Average	404	19	76	12	6	54	57	118	313	62	28
Group II. (Residents of private homes)											
10	2	13	68	15	104	22	96	108	172	130	8
12	192	--	56	82	34	33	20	6	180	56	29
14	70	36	65	23	40	38	105	67	195	45	26
16	51	--	56	74	115	47	--	68	231	138	53
18	148	--	109	4	54	78	65	173	138	119	33
Average	92	10	71	39		44	60	84	183	97	30
Average both groups	265	15	74	25	66	50	57	105	254	78	29

* Ready for consumption.

Appendix I.--GRAMS OF PREPARED* FOOD CONSUMED PER DAY BY ELDERLY WOMEN, JANUARY 1948.

Sub- ject num- ber	Food Groups										
	Milk and milk products	Eggs	Meat fish fowl	Green and leafy veg- etables	Other vege- tables	Pota- toes	Citrus fruit and tomatoes	Other fruit	Cereal bread maca- roni	Sweets	Fats
Group I. (Residents of boarding house)											
2	326	11	64	13	132	33	81	77	254	88	20
3	359	17	84	16	179	31	91	82	308	108	23
4	359	16	69	15	168	49	79	80	301	110	30
5	343	16	61	11	128	31	76	80	268	90	27
7	305	13	59	12	128	43	81	82	290	90	25
8	421	16	78	11	196	41	80	84	351	116	28
Average	352	15	69	13	155	38	82	81	295	100	26
Group II. (Residents of private homes)											
10	61	43	70	40	78	22	66	92	137	119	7
12	186	8	57	19	37	84	124	37	214	76	49
14	101	44	71	--	54	31	45	36	185	108	16
16	216	34	30	37	31	79	78	87	294	94	28
18	104	--	64	14	50	51	87	33	160	44	8
Average	134	26	59	22	50	53	80	57	198	88	22
Average both groups	253	20	64	17	107	45	81	70	251	95	22

* Ready for consumption.

Appendix J.--DISTRIBUTION OF INDIVIDUAL INTAKES OF
SPECIFIC NUTRIENTS

Nutrient	MEN				WOMEN			
	Group I		Group II		Group I		Group II	
	Octo- ber (Boarding house)	Jan- uary	Octo- ber (Private homes)	Jan- uary	Octo- ber (Boarding house)	Jan- uary	Octo- ber (Private homes)	Jan- uary
Protein (grams)								
Under 40	0	0	0	1	2	1	3	3
41 - 50	1	0	2	2	4	3	2	2
51 - 60	1	1	2	2	0	2	0	0
61 - 70	1	1	0	0	0	0	0	0
71 - 80	0	1	0	0	0	0	0	0
Over 81	0	0	1	0	0	0	0	0
Calories								
Under 1200	0	0	0	1	0	0	3	3
1201-1400	0	0	0	0	2	1	0	0
1401-1600	0	0	2	0	3	2	2	2
1601-1800	1	0	0	2	0	2	0	0
1801-2000	1	1	1	1	1	1	0	0
2001-2200	1	1	1	1	0	0	0	0
Over 2201	0	1	1	0	0	0	0	0
Calcium (grams)								
Under 0.400	0	0	0	1	0	0	4	4
0.401-0.500	0	0	0	2	0	0	1	1
0.501-0.600	0	0	4	0	1	2	0	0
0.601-0.700	0	0	1	2	2	3	0	0
0.701-0.800	2	1	0	0	3	1	0	0
Over 0.801	1	2	0	0	0	0	0	0
Iron (milligrams)								
Under 6.0	0	0	0	0	0	0	1	0
6.1 - 8.0	0	0	0	1	0	0	1	1
8.1 - 10.0	0	0	0	0	0	0	2	3
10.1 - 12.0	0	0	0	2	0	4	0	1
12.1 - 14.0	0	1	3	1	2	1	1	0
14.1 - 16.0	1	2	0	1	3	1	0	0
16.1 - 18.0	1	0	2	0	1	0	0	0
Over 18.1	1	0	0	0	0	0	0	0
Vitamin A (International Units)								
Under 3000	0	1	0	0	0	0	2	3
3001-4000	0	0	1	1	2	3	2	0
4001-5000	2	2	1	3	3	3	1	1
5001-6000	0	1	1	0	1	0	0	1
Over 6001	1	1	0	1	0	0	0	0

DISTRIBUTION OF INDIVIDUAL INTAKES OF SPECIFIC NUTRIENTS.--
 Continued.

Nutrient	Men				Women			
	Group I		Group II		Group I		Group II	
	Octo- ber (Boarding house)	Jan- uary	Octo- ber (Private homes)	Jan- uary	Octo- ber (Boarding house)	Jan- uary	Octo- ber (Private homes)	Jan- uary
Thiamine (milligrams)								
Under 0.700	0	0	0	0	0	0	1	1
0.701-0.800	0	0	0	0	2	2	1	1
0.801-0.900	0	0	0	0	3	2	3	2
0.901-1.000	2	0	0	2	1	1	0	1
1.001-1.100	0	1	1	1	0	1	0	0
1.101-1.200	0	1	1	0	1	0	0	0
1.201-1.300	1	1	3	0	0	1	0	1
Over 1.301	0	0	0	2	1	2	0	1
Riboflavin (milligrams)								
Under 0.600	0	0	0	0	0	0	1	1
0.601-0.700	0	0	0	0	0	0	3	1
0.701-0.800	0	0	0	0	0	0	1	1
0.801-0.900	0	0	0	1	0	0	0	0
0.901-1.000	0	0	1	2	1	0	0	0
1.001-1.100	0	0	2	0	2	0	0	0
1.101-1.200	1	0	0	0	2	2	0	1
1.201-1.300	1	0	2	0	1	1	0	0
1.301-1.400	0	1	0	1	0	3	0	0
Over 1.401	1	2	0	1	0	1	0	1
Niacin (milligrams)								
4.1 - 6.0	0	0	0	1	3	2	1	1
6.1 - 8.0	2	1	0	1	3	3	2	3
8.1 - 10.0	1	1	1	1	0	1	2	0
Over 10.1	0	1	4	2	0	0	0	1
Ascorbic acid (milligrams)								
0 - 20	0	0	1	0	0	0	1	0
21 - 40	1	0	1	0	4	1	1	1
41 - 60	2	2	1	2	2	5	1	4
61 - 80	0	1	2	3	0	0	2	0

Appendix K.--INDIVIDUAL INTAKES OF SPECIFIC NUTRIENTS AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY ADULTS. MALE PARTICIPANTS, OCTOBER 1947.

Subject	Calo- ries	Pro- tein (grams)	Cal- cium (grams)	Iron (milli- grams)	Vitamin A (Inter- national Units)	Thiamine (milli- grams)	Ribo- flavin (milli- grams)	Niacin (milli- grams)	Ascorbic acid (milli- grams)
Group I. (Residents of boarding house)									
1	1717	64	1.118	19.6	4201	1.274	1.797	9.0	44
6	2113	54	0.760	18.0	6451	0.981	1.254	7.7	45
9	1811	47	0.712	14.6	4682	0.904	1.161	7.2	36
Mean value	1880	55	0.863	17.4	5111	1.053	1.404	8.0	41
Standard deviation	207	8	0.200	2.5	1185	0.295	0.340	0.1	5
Recommended allowance	2500	70	0.800	12.0	5000	1.200	1.600	12.0	75

Group II. (Residents of private homes)									
11	2474	82	0.596	17.0	6361	1.297	1.286	13.9	65
13	1487	47	0.630	12.4	2465	1.185	1.247	13.2	9
15	1570	47	0.523	12.8	4705	1.032	1.022	8.7	57
17	2048	57	0.580	16.6	4834	1.266	1.022	12.7	25
19	1979	51	0.578	12.5	5371	1.207	0.982	16.5	68
Mean value	1912	57	0.581	14.2	4747	1.197	1.112	12.9	45
Standard deviation	386	14	0.038	2.9	1433	0.103	0.143	2.8	26
Recommended allowance	2500	70	0.800	12.0	5000	1.200	1.600	12.0	75

Appendix L.--INDIVIDUAL INTAKES OF SPECIFIC NUTRIENTS AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY ADULTS. MALE PARTICIPANTS, JANUARY 1948.

Subject	Calo- ries	Pro- tein (grams)	Cal- cium (grams)	Iron (milli- grams)	Vitamin A (Inter- national Units)	Thiamine (milli- grams)	Ribo- flavin (milli- grams)	Niacin (milli- grams)	Ascorbic acid (milli- grams)
Group I. (Residents of boarding house)									
1	1976	75	1.235	15.3	39390	1.270	2.243	9.5	57
6	2185	57	0.712	13.5	4301	1.003	1.308	7.8	47
9	2571	69	0.823	14.8	6007	1.161	1.764	11.0	61
Mean value	2244	67	0.923	14.5	4749	1.145	1.772	9.4	55
Standard deviation	302	9	0.276	0.3	1104	0.134	.468	1.6	7
Recommended allowance	2500	70	0.800	12.0	5000	1.200	1.600	12.0	75
Group II. (Residents of private homes)									
11	1989	59	0.643	15.0	6356	1.328	2.158	10.7	78
13	1076	33	0.450	6.7	3067	0.677	0.914	4.6	57
15	1617	43	0.381	10.9	4514	1.097	0.923	7.7	41
17	2132	54	0.667	12.6	4281	1.314	1.338	9.6	61
19	1683	48	0.410	10.8	4209	0.939	0.872	12.6	74
Mean value	1696	47	0.509	11.2	4477	1.068	1.239	9.0	62
Standard deviation	428	10	0.135	3.0	1197	0.285	0.548	3.0	15
Recommended allowance	2500	70	0.800	12.0	5000	1.200	1.600	12.0	75

Appendix M.--INDIVIDUAL INTAKES OF SPECIFIC NUTRIENTS AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY ADULTS. FEMALE PARTICIPANTS, OCTOBER 1947.

Subject	Calo- ries	Pro- tein (grams)	Cal- cium (grams)	Iron (milli- grams)	Vitamin A (Inter- national Units)	Thiamine (milli- grams)	Ribo- flavin (milli- grams)	Niacin (milli- grams)	Ascorbic acid (milli- grams)
Group I. (Residents of boarding house)									
2	1383	39	0.660	14.7	3916	0.738	1.027	6.9	39
3	1595	47	0.726	16.0	4645	0.881	1.168	7.8	44
4	1593	44	0.751	15.5	4457	0.812	1.172	5.7	39
5	1390	39	0.657	13.3	3987	0.717	1.034	5.4	33
7	1533	45	0.793	13.4	4145	0.819	1.254	5.6	41
8	1946	49	0.546	17.8	5855	0.904	0.921	7.5	36
Mean value	1573	44	0.689	15.1	4501	0.812	1.096	6.5	39
Standard deviation	91.2	1.8	0.0419	0.6	321.8	.0333	.0548	1.9	1.7
Recommended allowance	2100	60	0.800	12.0	5000	1.100	1.500	11.0	70
Group II. (Residents of private homes)									
10	1127	36	0.214	7.9	3244	0.573	0.533	7.0	46
12	1086	30	0.313	6.0	3263	0.861	0.620	5.3	30
14	1104	37	0.276	8.7	2964	0.706	0.650	7.3	62
16	1445	40	0.342	12.6	4096	0.855	0.600	8.8	19
18	1566	41	0.433	8.8	2905	0.805	0.765	9.9	69
Mean value	1266	37	0.316	9.0	3294	0.760	0.634	7.6	46
Standard deviation	120.7	2.1	0.0406	1.2	244.0	0.0608	0.0461	1.0	7.5
Recommended allowance	2100	60	0.800	12.0	5000	1.100	1.500	11.0	70

Appendix N.--INDIVIDUAL INTAKES OF SPECIFIC NUTRIENTS AND NATIONAL RESEARCH COUNCIL'S RECOMMENDED ALLOWANCE FOR SEDENTARY ADULTS. FEMALE PARTICIPANTS, JANUARY 1948.

Subject	Calo- ries	Pro- tein	Cal- cium	Iron (milli- grams)	Vitamin A (Inter- national Units)	Thiamine (milli- grams)	Ribo- flavin (milli- grams)	Niacin (milli- grams)	Ascorbic acid (milli- grams)
Group I. (Residents of boarding house)									
2	1347	39	0.569	10.1	3472	0.726	1.117	5.6	45
3	1744	51	0.636	13.0	4654	0.897	1.355	7.6	50
4	1712	49	0.649	11.9	4407	0.911	1.364	7.3	46
5	1482	43	0.604	10.7	3451	0.794	1.154	6.0	40
7	1503	43	0.561	11.0	3954	0.834	1.220	6.9	44
8	1954	57	0.774	14.4	4019	1.061	1.494	9.0	50
Mean value	1623	47	0.632	11.9	3992	0.870	1.284	7.1	46
Standard deviation	220	6.6	0.078	1.8	485	0.115	0.104	1.1	4
Recommended allowance	2100	60	0.800	12.0	5000	1.100	1.500	11.0	70
Group II. (Residents of private homes)									
10	1137	36	0.301	9.7	4022	0.821	1.911	6.9	51
12	1433	42	0.382	8.9	5681	0.781	1.124	10.5	58
14	1187	33	0.293	9.0	2820	0.864	0.714	6.0	36
16	1556	40	0.499	11.1	2846	0.934	0.622	7.2	52
18	930	30	0.284	6.2	2243	0.584	0.540	6.5	45
Mean value	1229	36	0.351	8.9	3519	0.797	0.830	7.4	48
Standard deviation	238	4	0.091	1.8	1340	0.131	0.299	1.7	8
Recommended allowance	2100	60	0.800	12.0	5000	1.100	1.500	11.0	70

Appendix Q.--PERCENTAGE OF NATIONAL RESEARCH COUNCIL'S
RECOMMENDED ALLOWANCES FURNISHED BY FOODS CONSUMED
BY ELDERLY MEN, OCTOBER 1947

Sub- ject	Nutrients								
	Pro- tein	Calo- ries	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascor- bic acid
Group I (Residents of boarding house)									
1	69	91	140	163	84	106	112	75	59
6	85	77	95	150	129	82	78	64	60
9	72	67	89	122	94	75	73	60	48
Average	75	78	108	145	102	88	88	66	56
Group II (Residents of private homes)									
11	97	116	74	141	127	108	80	116	87
13	59	67	77	103	49	99	78	110	13
15	63	67	65	107	94	86	64	72	77
17	82	81	72	138	97	106	64	106	33
19	79	73	72	104	107	101	61	138	91
Average	76	81	72	119	95	100	70	108	60
Average both groups	76	80	90	132	99	94	79	87	58

Appendix P.--PERCENTAGE OF NATIONAL RESEARCH COUNCIL'S
RECOMMENDED ALLOWANCES FURNISHED BY FOODS CONSUMED
BY ELDERLY MEN, JANUARY 1948.

Sub- ject	Nutrients								
	Pro- tein	Calo- ries	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascor- bic acid
Group I (Residents of boarding house)									
1	79	107	154	128	96	106	140	78	79
6	87	81	89	114	86	84	82	65	63
9	103	99	104	123	120	97	111	92	81
Average	90	96	116	122	101	96	111	78	74
Group II (Residents of private homes)									
11	80	84	80	125	127	111	135	89	104
13	43	47	56	56	61	56	57	38	76
15	65	61	48	91	90	91	58	64	34
17	85	77	83	105	86	110	84	80	81
19	67	69	51	89	84	77	54	105	87
Average	68	68	64	93	90	89	78	73	76
Average both groups	79	82	90	108	96	92	94	76	75

Appendix Q.--PERCENTAGE OF NATIONAL RESEARCH COUNCIL'S
RECOMMENDED ALLOWANCES FURNISHED BY FOODS CONSUMED
BY ELDERLY WOMEN, OCTOBER 1947.

Sub- ject	Nutrients								
	Pro- tein	Calo- ries	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascor- bic acid
Group I (Residents of boarding home)									
2	65	66	76	122	78	67	68	63	56
3	78	76	91	133	93	78	78	72	63
4	73	76	94	129	89	78	78	52	56
5	65	66	82	110	80	69	69	49	47
7	75	73	99	112	83	74	85	51	59
8	82	93	66	148	117	82	61	68	51
Average	73	75	85	126	90	75	73	59	55
Group II (Residents of private homes)									
10	60	54	27	66	65	52	36	64	66
12	50	51	39	50	65	78	41	48	43
14	62	53	34	81	59	64	47	85	89
16	67	69	43	105	81	78	40	80	27
18	68	75	54	73	58	73	51	90	103
Average	61	60	39	75	66	69	42	73	66
Average both groups	68	68	62	100	78	72	58	66	60

Appendix R.--PERCENTAGE OF NATIONAL RESEARCH COUNCIL'S
RECOMMENDED ALLOWANCES FURNISHED BY THE FOODS CONSUMED
BY ELDERLY WOMEN, JANUARY 1948.

Sub- ject	Nutrients								
	Pro- tein	Calo- ries	Cal- cium	Iron	Vita- min A	Thia- mine	Ribo- flavin	Nia- cin	Ascor- bic acid
Group I (Residents of boarding house)									
2	65	64	71	84	69	66	74	51	64
3	85	83	78	108	93	81	90	68	67
4	80	81	80	108	88	82	90	66	71
5	72	70	76	89	71	72	77	55	59
7	72	72	68	86	83	75	80	63	63
8	95	98	97	120	90	95	98	88	71
Average	78	78	78	99	82	78	85	65	66
Group II (Residents of private homes)									
10	60	54	38	81	80	75	79	63	73
12	65	64	48	71	114	71	72	91	83
14	55	57	37	75	56	79	51	55	51
16	67	74	62	92	57	85	41	65	74
18	50	44	35	52	44	53	36	85	56
Average	59	59	44	74	70	73	56	72	67
Average both groups	69	69	61	86	76	76	70	68	66

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