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DIETARY PRACTICES OF 50 NEGRO
WOMEN 31 TO 79 YEARS IN
LANSING, MICHIGAN. WITH THE
DAILY PROTEIN INTAKE OF
15 WOMEN DETERMINED BY
ANALYSIS

Thesis for the Degree of M. S.
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This is to certify that the

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DIETARY PRACTICES OF 50 NEGRO WOMEN
31 TO 79 YEARS IN LANSING, MICHIGAN,
WITH THE DAILY PROTEIN INTAKE OF 15 WOMEN
DETERMINED BY ANALYSIS

by

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INTRODUCTION

Food practices of groups of people in early years were influenced principally by customs, traditions, sectional institutions, and availability of food supplies. Possibly the driving force in man, as in animals, in the selection of food was that inward urge of the body for the satisfaction of a full stomach. As civilization developed, dietary practices were further modified by education and economic conditions. More recently there has developed an interest in the role of food in promoting better health. Since World War I, the food consciousness of the nation has become evident in rapidly increasing tempo. The attitude has been promoted by popular education and by current methods of advertisement. Here we have economic conditions **vying** with preferences and prejudices in food tastes (Mendel '35). The Negro, like other racial groups, has been affected by all these influences to a greater or lesser degree.

As other customs and practices in the American way of living have changed, so have food habits and practices. However, the greatest influences of food habits in recent years have been education and economic conditions (Nutrition, Geneva, '37). During the war years, rationing and shortages in civilian supplies have done much toward influencing eat-

ing habits, at least temporarily. There has been keen interest in knowing to what extent nutritional requirements have been met by civilians in their adaptation to a limitation in food supplies other than that imposed by a lack of money.

It has often been assumed that the diets of American Negroes show marked divergence from the diets of the American Whites. Joffe and Walker ('44) reported that there were no purely Negro food habits, and that the most important factors operative in setting up patterns are those of cultural heritage and income levels. Steibling ('41) and Moser ('35) reported that the diets of the American Negro and the American White showed no significant differences when the economic levels and education were the same.

Dietary practices of the older group are of special interest because of the increasing numbers of older people in the total population each year. Accompanying the change in population structure, is the disturbance of sex ratio. A large part of the older population will be women, since female mortality in adult life, and especially at the older ages, is considerably lower than that among men (Cowdry '39).

It should be of interest to mankind not only to have a long life span, but to enjoy the pleasures and happiness of a long life with good health. Recent investigations reveal that a reasonably high percentage of older people have

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shown various chronic diseases which tend to interfere with their capacity for useful activity (Dowmes '41). Chronic diseases, though in some cases associated with senescence, may be of nutritional interest, since investigations of food deficiencies among the older group have been given little attention until recent years.

In the present investigation it has been possible to study the food practices of 50 Negro homemakers between the ages of 31 and 79, living in Lansing, Michigan. It was possible to have 15 women of this group keep individual weighed food intake records over a period of seven consecutive days and to collect a laboratory sample of food as ingested. The purposes of the investigation were: first, to study the dietary practices of Negro women in the older age brackets; second, to determine the conditions which have been contributing factors toward development of these practices; third, to obtain a nutritional history of the span of adult life of these women; fourth, to make weighed records of food intake on part of the group as a check on the validity of the data obtained by interview; and fifth, to determine by analysis the total protein in a week's dietary sample.

EXPERIMENTAL PROCEDURE

Subjects

Most of the subjects were selected from a list of names of women which was secured from a local school. The women were judged to have had some interest in a nutrition program since they had attended meetings during the war emergency years at which nutrition problems had been discussed.¹ All women assumed or known to have been less than 40 years of age were eliminated from the list.² The experimental group was then selected from representative sections of the city so as to make the group heterogeneous in character. Although no specific checks on economic status were made, all the subjects chosen were known to have had sufficient income to be able to provide adequate food supplies. The sample represented an industrial population during the peak of wartime employment.

Information was gathered from two major sources: first, two questionnaires dealing with habits of food intake

¹These meetings were conducted by Mrs. Jane S. Williams, nutrition consultant, from War Food Administration, Washington, D. C.

²For this assistance the writer appreciates the service of Miss Nell M. Bloodgood, principal of the local school, and Mrs. Rose Brunsen, president of Lansing Women's Clubs.

and a health history, and second, weighed food intake records, including laboratory food samples.

Questionnaires

Procedure:

The subjects were interviewed individually by the investigator. All data on food habits, practices and general health conditions past and present were obtained from a questionnaire which had been used in making a similar study on a group of rural white women in Iowa, 1942.³ The form was revised to make it appropriate for use with an urban group. A record of all food eaten during the 24 hours before the visit was obtained. A second questionnaire was designed to investigate the presence or absence of a series of symptoms associated with specific food deficiencies. This form was adapted from the discussion of Kruse on the evaluation of nutritional status ('43). A copy of each questionnaire may be found in the Appendix. A total of 50 women were interviewed and complete records obtained.

The survey was done at intervals extending over a period of five months, beginning March 25, and ending August 25, 1945. In most instances the woman was contacted by telephone and the appointment made for a personal interview. When called upon, the nature and purpose of the interview was clearly explained, as well as the importance of the in-

³Unpublished data, courtesy of Dr. Margaret A. Ohlson, Michigan State College.

formation desired. She was assured that all information was strictly confidential and would be used in a ~~non~~-personal manner only to contribute to the investigation. When it was certain that the good will of the woman had been obtained, the questionnaire was begun. During the questioning period the interviewer aimed to make the woman feel at ease and allowed ample opportunity for her to talk freely if she desired. Each interview required ~~one~~ to one and a half hours, during which time there were frequent discussions on food and health problems, at the end of which there were usually expressions of appreciation by the woman for having been interviewed.

Analysis:

The 24-hour records of food intake on the group of 50 women were analyzed as to the food selection and the number of servings of certain food portions per day. Information concerning food habits, practices, and nutritional history was studied, tabulated and evaluated. The findings from the second questionnaire dealing with symptoms as related to food deficiencies were evaluated in relation to the food habits of the subjects.

Weighed Food Intake Studies

Experimental Plan:

Fifteen women were selected from the 50 interviewed, to make weighed records of their food intake. Women whose

duties took them out during the day and necessitated their eating away from home were not asked to participate because of the inconvenience of keeping accurate records and samples of all food eaten. The plan usually was discussed at the first interview and the woman asked if she would like to participate. In most cases, if she was interested, she volunteered before the question was asked.

Since only two women could be studied at any one time, definite dates were arranged for each subject to suit her convenience. During the week of food collection, the woman was asked not to eat **away** from home, or do anything that would interfere with the accuracy of the records. No plans or suggestions were made for the time and method of eating. All meals were self-selected and each subject was **urged** to eat as she had been accustomed. The only requirement was that she weigh all food eaten, keep an accurate record, and collect food samples for the laboratory.

Procedure:

A kit containing supplies needed by each woman in making the food collections was prepared. A list of items included may be found in the appendix. Each kit contained beakers for food collections, cellophane covers and rubber bands to fit the beakers for protection of food samples from foreign matter. A dietetic scale graduated in grams was used for the weighing. A glass which had been calibrated to one-ounce divisions by use of tiny strips of adhesive tape

applied to the outside, was used in measuring the water intake without use of the scale.

Twenty per cent HCL was used in preservation of the solids and concentrated HCL was used in preservation of the liquids. A small beaker without preservative was provided for fats. The supplies were packed into a small fruit basket which completed the kit. Each woman also was supplied with a duplicating record book and pencil.

Most of the subjects chose Sunday as the first day of the experiment which then ended after the last meal on Saturday. **The women were** reimbursed for the food samples as a means of encouraging cooperation.

The weighed records of food intake were made over a period of eight weeks, beginning June 24, and ending August 25, 1945. On the day before the collections were begun, the supervisor arranged to call on the subject and deliver the kit. At this time the woman was introduced to the use of the scale and instructed in keeping records. This was followed by a demonstration of weighing various food combinations, as coffee with cream and sugar, bread with butter, potatoes or rice with gravy, and so on. Two weights were taken: (1) the food plus the dish, (2) the dish with any uneaten portions of food. The difference between these two weights was the weight of the food ingested. A copy of the record form may be found in the Appendix.

Each afternoon, after the last meal was served, the

investigator called on the subject. The records were checked for possible errors. Problems and misunderstandings were cleared up and the laboratory samples weighed and placed in the respective beakers in the presence of the subject, who was allowed to assist. One seventh of the full day's intake of each food, including water and other liquids, was collected as the laboratory sample. At the end of the seven days the beakers contained the equivalent of one full day's intake of all the solids, liquids, and fats ingested by the subject.

Analysis:

The collections were then brought into the laboratory where they were made into a "brown digest" by the method of Stearns ('29). The product was analyzed for total nitrogen by the Macro-Kjeldhal Method (Hawk and Berguin, '44). A list of materials and supplies used may be found in the Appendix.

The weighed records of this group were then analyzed for other food nutrients by the revised Food Composition Table for Short Method of Dietary Analysis, prepared by Donelson and Leichsenring ('44).

LITERATURE

Dietary Studies

The first attempts in this country to evaluate American dietaries were made by Atwater in 1886. In 1898, through the Federal Office of Experiment Stations, headed by Atwater, studies of food intake were made on as many as 200 families. Sherman and Gillet, in 1914 to 1915, made a study of the diets of low income families, most of whom lived in New York City. Many dietary studies have been made since this time, the most extensive of which are reported by Steibling and Phipard ('39), including 4000 records from eight major sections of the United States. Most of these families were white; however, a few Negro families from the South and Southeast were included.

In these investigations the food consumption during the week was determined by taking inventory by weights of food on hand at the beginning of the period, food brought in from all sources during the week, and food on hand at the end of the period. The families were all employed wage earners and clerical workers in cities. It was reported that the protein intake was adequate, averaging at least one gram per unit body weight per day. Diets of the Negro families were adequate in protein, iron, and vitamin A, but low

in calcium and vitamin B. Niacin appeared deficient in 60 per cent of the Negro family dietaries, and 70 per cent of the white families lacked full protection. The diets of both groups showed approximately 50 per cent deficiency in riboflavin. Vitamin C probably was low. The Negro families ate 41 pounds of tomatoes per year, while the white families on the same economic level ate 28 to 41 pounds. The Negro families ate 21 pounds of green leafy vegetables to 11 pounds by the whites, 91 pounds of green and yellow vegetables against 60 to 122 pounds by the whites, and 91 pounds of potatoes (more sweet potatoes) to 100 pounds by the whites. Diets of all families on low incomes were low in calcium and vitamin B₁. Higher intakes of these items were characteristic of families of higher economic status.

Steibling, in a second study ('41), found only one-fourth of the diets of the families studied to be good. More than one-third were fair and more than one-third were poor. When Negro and white families lived on the same economic level, their diets rated good, fair, and poor in the same proportion.

A nutritional survey made in a small community of North Carolina in a cotton mill section resulted in similar findings. Seven-day records of the diets of both Negro and white families were kept and analyzed by the use of tables to show the daily intake of carbohydrates, protein, fat, calories, iron, calcium, vitamins A, B, C, and riboflavin.

Laboratory examinations were made on the blood for vitamins A and C, carotene, total protein, calcium, phosphorus, phosphatase, hemoglobin, red count, and red cell volume. The results showed low plasma vitamin C, especially in the spring, but there was little scurvy and practically no other obvious cases of deficiency disease. Vitamin A was slightly below normal in the blood. Thiamin, riboflavin, iron, and calories were below normal. Medical examination was of little help in determining dietary deficiency. More information was obtained from health histories and food habits (Milan '42)

Winters ('32) studied the diets of Mexicans in Texas. Food records were kept for one week on 65 families. The diets of 54 of these families were inadequate in calories, 29 per cent were inadequate in protein, 94 per cent in calcium, 54 per cent in phosphorus, and 51 per cent in iron. All diets were low in Vitamin A. It was thought that if the Mexicans bought enough food to meet the caloric requirement, but did not change their food selection, all deficiencies probably would disappear, except those of calcium and vitamin A.

Moser ('35) studied a group of both white and Negro farm families in South Carolina. Findings seem to agree with those of the previous investigators. The protein of the diets varied with the energy and money values. Higher money expenditures showed a higher percentage of animal protein and higher intakes of calcium. There also were season-

al high and low intakes of vitamin A and iron. Diets which showed 10 to 14 per cent of the calories to come from protein were representative of 11.9 per cent of the white families and 11.5 per cent of the Negro families. Diets below standards in protein were shown by 10 per cent of the white families and 21 per cent of the Negroes. Diets with at least one-half of the protein supplied from animal origin were representative of 59 per cent of the white and only 27.9 per cent of the Negro families. These diets also were low in phosphorus.

Lockhart et al. ('44) have reported a study of the nutritional quality of dietaries determined by chemical analysis of a group of 71 families in Boston and New York. The average intake of these families was adequate in ascorbic acid, calcium and iron, but inadequate in thiamin, riboflavin and niacin. Only 7 per cent of these families received adequate intakes of all the nutrients required. The average intakes for adult women from the two sections were: thiamin, 1.21 mg.; riboflavin, 1.83 mg.; niacin, 12.0 mg.; ascorbic acid, 80.4 mg.; calcium, .90 gms.; and iron, 14.0 gms.

In another study that has been reported by Barsook ('42), on a group where the economic factor was unimportant in determining the quality and quantity of food, only 25 per cent of these families had good diets, 65 per cent were classed as fair, and 5 per cent were classed as poor. In a

group where the income was \$5,000 or more, 65 per cent of the families had good diets, 30 per cent of the diets were classed as fair, and again 5 per cent were poor. It was concluded that without the necessary technical knowledge, even the well-to-do will not always choose a diet that will afford optimum health. The chief difference was the lack of the B complex vitamins. In the low income groups, the situation was worse.

Downes and Baranovsky ('44) studied the diets of a population in Baltimore, before and after the beginning of rationing of processed foods, meats, and fats. The food habits were studied in relation to the age of the housewife. The frequency of the seven basic foods in the daily dietaries was reported by the group. Marked deficiencies in the quality of the diet were noted in both periods, to be most frequently in the use of citrus fruits and tomatoes, green, leafy and yellow vegetables, and milk. These deficiencies were greatest in the old-age group.

Tuohy ('40) studied the relation of an adequate energy-producing and protective diet to the health of the aged and found that some undernourishment among old people was due to limited food intakes because of faulty advice or inherent fear. With the senescent group, thiamin, the B complex and vitamin C play important roles. Tuohy recommended less fear of foods for older people, including the necessary protective elements, especially ample supply of thiamin for

carbohydrate metabolism.

Tuohy ('43) has further outlined the dietary treatment for the aged by pointing out the importance of protein. Protein safeguards the health of the liver. He recommends at least one gram per kilogram body weight per day, less fat, eggs and bulky foods, more cheese and vegetables, coffee and tea for body fluids, and fruit juices for vitamins.

From the foregoing investigations, certain dietary deficiencies seem to be found in all groups irrespective of the economic status, although they are more prevalent at the lower than higher incomes. Calcium, thiamin, riboflavin and niacin appear to be deficient more frequently than other food nutrients. In normal times and in average income groups, protein has been eaten in adequate amounts. From these studies, there appears to be a need for mass education on the foods necessary for an adequate diet, and to provide sufficient means with which to supply these foods.

The Process of Ageing

Investigators have revealed a number of physiological as well as pathological changes associated with old age (Cowdry '39). Just where to distinguish between pathological and physiological changes is quite uncertain. However, it is believed that many of the changes due to ageing may be accelerated or slowed by dietary practices.

Benedict ('28) performed a study on one older man and

three older women who were presumably in good health. He observed a gradual decrease in physical powers accompanied by a lowered basal metabolism. Basal metabolism in old men of 77 to 83 years was studied earlier by Aub and Du Bois ('17), who have reported similar results. They found the average basal heat production decreased 12 per cent below that for men 20 to 50 years old.

Later, Benedict and Sherman ('37) were able to confirm these reports with a study on rats, where the entire life span could be observed. They found a decline in body temperature and a decrease in body weight in aged rats. A greater decrease in body weight than in body temperature indicated a loss of fat and water with lesser drafts on the protein. Lowered basal metabolism in old age suggests the need for lowered intakes of calories.

Cowdry ('40) has reported a decrease in water content with ageing, in which he observed shrinkage of older people in both weight and height. He also has reported a decrease in the rate of tissue replacement.

Gastrointestinal disturbances are common among older people, but whether or not this accompanies the ageing process is not certain. A number of investigations have shown a decline in the gastric acidity with age and a decrease in the volume of digestive secretions. The investigations by Vanzant et al. ('32-'33) who studied over 3,000 cases at the Mayo Clinic, are probably the most extensive. Results of

these studies showed that there was a high incidence of achlorhydria with increase in age, particularly after the age of 65. Women showed lower gastric acidities and higher percentage of cases of achlorhydria than men.

Meyers et al. ('37) studied the secretion of saliva of a group of patients in a home for the aged. Subjects were 66 to 81 years of age. It was found that the concentration of ptyalin and the volume output of saliva was much decreased as compared to that of young people, resulting in a deficiency in starch digestion in the mouth and stomach. Thus, the entire weight of carbohydrate digestion was thrown on the pancreas. Yavorsky, Almaden and King ('34) have reported a decrease in vitamin C in the pancreas and also in the liver, but the effect of this on digestion and metabolism is not certain, nor is there a certain relation to the dietary intake.

Ivy ('39) has speculated that the decrease in hunger motility of the stomach of the aged may be due to two factors: (1) the change in the musculature controlling the motor mechanism of the stomach, and (2) the decline in metabolism, which may reduce the quantity of the blood-borne chemical stimuli of the hunger mechanism. In the aged, it is common to observe changes in the tonus of the musculature of the mouth, and appetite may be absent. Nausea may or may not be a complaint (Meyers '40). Thiamin stimulates the appetite by shortening the emptying time of the stomach (Ivy

'39).

The effect of ageing on glycogen concentration of the liver has been studied on rats by Deuel et al. ('37). The content of liver glycogen increases from birth up to 40 days of age, when it exceeds 8 per cent. It then decreases slowly to 4 per cent at about 75 days of age. In old age the glycogen content was much decreased, but there was no difference in content in the sexes. Differences did occur during adult life when the glycogen content of the female was less than that of the male. This decreased glycogen concentration in the liver indicates lowered energy reserves in older age, resulting in more rapid body exhaustion. This suggests the need for frequent supplies of energy-producing foods.

No serious studies have been made on the volume output of bile and its composition in the liver in old age. However, Boyden and Grantham ('36) studied the evacuation of the gall bladder after feeding of a test meal in 24 men and women between the ages of 60 and 78 years. It was concluded that if the biliary tract escapes pathological alterations, its motility does not become impaired with age. The relation of gall bladder pathology to age is pointed out by Crump ('31), who found 78 per cent of 325 cases with gall stones to be over 40 years of age. The incidence was higher in females than in males.

Albright et al. ('41) found that bones, like many

other tissues, atrophy in old age in both sexes. Adult bone is subject to two continuous processes, formation and resorption. The mass of the bone may be deficient either because resorption is too great, or because formation is too slow. Furthermore, formation may be inadequate, either because the osteoblasts do not lay down sufficient osseous matrix, or because the matrix once laid down is not calcified. Albright believes that increased availability of phosphorus and calcium as a result of a diet rich in these substances is a stimulus to osteoblastic activity. It also was found that osteoporosis occurs after the menopause, affecting particularly the short bones of the spine and pelvis. However, an investigation of the diets of those subjects studied showed inadequate intakes of calcium by most of them. The diets of many of the subjects contained very low daily intakes of milk.

Certain changes, such as lowered basal metabolism, gastrointestinal disturbances, decreased secretion of digestive juices, decreased appetite, decreased glycogen storage in the liver and the pancreas, and the high incidence of gall stones and osteoporosis in old age, as studied by these investigators, should be of interest to the nutritionist.

Protein and Other Food Requirements of Older Women

Protein Requirement

There seem to be two schools of thought on the daily protein requirement, the "minimum" and the "optimum". Investigators in the period following the first World War emphasized the minimum or low protein ration, while recent workers recommend more liberal intakes.

The low protein era was introduced by Chittenden ('05), who showed that young men could maintain vigor, and freedom from physical ailments, on 40 to 50 grams of protein per day. Dr. Chittenden ('07) carried out a personal experiment on low protein intake. At the time, he weighed 65 kilograms and was nearly 47 years of age. Total nitrogen excreted was measured each day to check protein metabolism. He was able to keep his body in good health on 36.6 grams of protein per day and 1,549 calories. However, he was not very active at the time.

Chittenden worked further with a group of United States soldiers in training, who were sustained on less than 50 grams of protein per day with an intake of 2,500 to 2,600 calories. These soldiers were in good health throughout the experiment of five months. Experiments were carried out with other groups of individuals and with dogs, in which similar results were obtained (Chittenden '07).

Numerous and carefully conducted experiments have shown the possibility of healthy adults with nitrogen equi-

librium upon dietaries which furnished not over 0.5 grams of protein per kilogram body-weight per day, even when the protein food was not of the highest nutritive value (Sherman '37). It was shown by Rose and Cooper ('17) that nitrogen balance was maintained when nitrogen was supplied by potatoes, in an amount ranging from .04 to .08 grams per day. Rose and McLeod ('25) further demonstrated that adult women sustained nitrogen equilibrium on 0.5 grams of protein per kilogram body-weight when the source of nitrogen was milk, meat, bread and milk, or soybean curd.

Sherman ('41) reviewed the literature and found records of 109 experiments on healthy individuals in which the nitrogen balance showed sufficient approach to equilibrium to make it appear that the output of nitrogen might be taken as an indication of the protein requirement. The apparent protein requirement, as indicated by the data of these individual experiments, ranged between the extremes of 21 and 65 grams, averaging 44.6 grams of protein per 70 kilograms body-weight per day.

None of the above experiments were conducted over any considerable portion of the life cycle of the adult. Nitrogen equilibrium may be maintained on a low protein intake over a short period of time, but the effects over the entire life span of the individual are to be considered. Most of these experiments on very low protein intakes were conducted under laboratory conditions. Mere maintenance of nitrogen

balance may not allow a safe margin for the individual who must be prepared to meet emergencies. For the adult woman of 56 kilograms body-weight, the National Research Council recommends 60 grams of protein per day, which is at least 1 gram per kilogram body-weight.

Sloanker and Card ('35) found that pubescence, fertility, and the menopause in mice were unfavorably influenced by a restricted diet and that the addition of animal protein to the ration lengthened the period of reproductivity, but that high protein intake resulted in higher mortality and a shorter life span. McKay et al. ('41) agreed with the former investigators that a high protein ration was accompanied by high mortality, but that female rats lived longer than males. In these experiments high protein referred to a protein concentration greater than 14 per cent of the caloric intake.

Cannon ('44) stated that from clinical, chemical and experimental facts the acquisition of a high level of immunity is dependent upon an adequate food intake, particularly of proteins, since an adequate supply of proteins of good biological value is essential for globulin synthesis. Anderson ('45) further brings out the dependence of the body upon a continuous supply of proteins for the development of hormones, enzymes, plasma albumin, globulin, and hemoglobin, in addition to the over-all needs for growth and repair of tissues, suggesting that protein should be ingested liberal-

ly. According to Sherman the daily protein intake should be at least 10 per cent or more of the caloric intake. Little is known about the needs for advancing age. However, proteins ingested in excessive amounts result in increased specific dynamic action, which is a waste of energy. Furthermore, a high protein diet is expensive.

Albright et al. ('41), in a study on osteoporosis which is associated with senescence, indicated that a diet inadequate in protein might lead to a negative balance, and this in turn might make it impossible for osteoblasts to lay down the necessary organic matrix which is the first step in bone formation, and that some osteopathies which have been attributed to lack of phosphorus and calcium, may have been due to lack of protein. It has also been shown that the body tends to adjust its protein metabolism to its protein supply. When the adult body has been accustomed to a certain rate of protein metabolism, it requires a period of time to adjust itself to a materially higher or lower rate (Sherman '41).

Cannon ('44) again has reported that patients with low preoperative concentrations of serum protein were more susceptible to infection than patients with adequate protein reserves. Jones and Eaton ('33) have reported that in 34 patients, 26 showed postoperative nutritional edema and that others showed potential edema. All cases had a previous history of limitation of food and/or loss by vomiting, diar-

rhea, or exudates previous to the operation. Eighteen of the 26 cases were between the ages of 45 and 65 years. Postoperative records in all these cases showed serum protein and serum albumin far below normal values.

Johnson ('44) has suggested that a high protein diet must be high caloric with the greater supply of energy from carbohydrates. Nutritional edema or war edema has been shown to be due to insufficient intake of dietary protein or to interference with the assimilation of protein due to gastrointestinal disorders.

From the investigations reported, both the absolute intake of protein and the per cent of protein calories would seem to be important.

Other Food Requirements

Earlier standards for the optimum intake of the various food nutrients by individuals were published by Sherman ('57), through the analysis of the results of a number of experiments conducted by other investigators. These standards recently have been superseded by the recommendations of the National Research Council ('45). The daily allowances for the adult woman of 56 kilograms body-weight are as follows: calories, 2,100; protein, 60 gms.; calcium, 0.8 gms; iron, 12 mgs.; vitamin A, 5,000 I.U.; thiamin, 1.1 mgs.; riboflavin, 1.5 mgs.; niacin, 11 mgs.; ascorbic acid, 70 mgs.

However, no specific allowances have been determined for the aged. Are the requirements for the adult man or

woman adequate or inadequate for the ageing group? It has been observed that old age is accompanied by slowing up of physical activities and lowered basal metabolism. Most people in the older group live moderately inactive lives. This should suggest a lesser need for energy, resulting in a lowered caloric requirement.

A decrease in calories may not indicate a need for a decrease in specific food nutrients. Decreased digestive secretions in the digestive tract of the aged, as has been mentioned, may result in more food nutrients being lost in the stool, which might suggest a need for an increased intake, so as to assure the body of adequate supplies.

The lack of appetite in old age often leads to the intake of more palatable food in the form of carbohydrates that usually are low in thiamin concentration. The lack of teeth or poorly fitted dentures also contribute to the intake of soft, easily masticated foods usually low in nutritional values. Lack of appetite and gastrointestinal disturbances in old age suggest the need of a diet that is attractive, appetizing, easily digested, and high in thiamin concentration (Tuohy '43).

The process of ageing has been shown to be accompanied by a decrease in the storage of certain food nutrients and an increased demand for others. A decrease in the storage of vitamin C in the liver and pancreas has been reported by Yavorsky, Almanden, and King ('34). King and Menton

('35) have reported that liberal intakes of vitamin C will protect against capillary fragility which is a part of the ageing process in some people, and will combat toxins. They also have indicated that the body may or may not develop arterio-sclerosis, according to the liberality with which this vitamin is supplied.

A decrease in the storage of liver glycogen in the aged (Deuel et al. '37) suggests more frequent feedings in relatively smaller amounts for needed energy. This group also has shown an increased need for calcium in the body (Albright '41). A diet high in calcium must also be high in protein (Sherman '41).

Sherman and Campbell ('36) found that senility is deferred in adult rats whose calcium intake is greater than the requirement for maintenance. The utilization of calcium by normal women was studied by Ryder ('38), who showed that the calcium requirement for maintenance of equilibrium by a human adult is dependent not only upon the amount of mineral needed for maintenance of vital metabolic processes, but also upon the body stores, and that the higher the previous intake, the higher will be the demand for maintenance.

Tuohy ('43) has suggested that excess fats in the diet may be dangerous for the aged, but leaving out what is needed may be fatal. Fats spare the protein and thiamin, and produce energy, but if not well utilized may damage the liver. Drummond ('34) has reported that stores of vitamin A

in the human liver gradually become exhausted if the diet is deficient, and that a prolonged deficiency undermines the organs of resistance to infection.

From previous observations, it seems that some progress has been made in determining what foods the aged should eat. The recommendation, as summarized by Huohy ('45), are: low calories, but high intake of the specific food nutrients; less bulky foods, fats and eggs, but more liver, cheese, and vegetables. Tea and coffee when not too strong may help furnish body fluids. Liberal use of fruit juices should supply added vitamins. Condiments may be tolerated to help the appetite. However, there still is much uncertainty about requirements of specific nutrients for the aged.

Nutritional Status

Methods which have been used in nutritional status studies are: (1) clinical examinations, (2) demonstration of biochemical and physiological lesions, and (3) estimation of dietary intakes (Dann and Darby '45). To this group may be added a fourth method, a detailed history of the food and health habits of the individual.

Previous investigators have found sufficient weaknesses in each of the first three methods of determining nutritional deficiencies. As Dann and Darby ('45) have pointed out, clinical examinations detect only well defined deficiency diseases and must therefore be supplemented by other

evidence. Results of most of the biochemical tests are uncertain, because the tests have not been correlated with the production and cure of the clinical signs in human subjects, and dietary standards which have been widely employed in estimating dietary adequacy, were developed on a limited amount of evidence on human subjects. Since data have been limited, there has been a tendency to set standards high. It is therefore possible in some cases that redommendations have been excessively high. A detailed history may give a certain amount of information concerning the extent and progress of the development of undernutrition symptoms.

In this study no clinical or biochemical tests were conducted. The nutritional status of the group was determined in the following ways: (1) a history of the food and health habits of the members of the group was taken; (2) a single day's food intake was obtained from memory from each of the fifty subjects questioned; (3) fifteen women were selected from the larger group for whom food was weighed for seven consecutive days and a laboratory sample obtained of all the food eaten; and (4) total nitrogen was determined on the samples.

PRESENTATION OF DATA AND DISCUSSION

In the analysis of the data collected in this investigation, a study has been made of the character of the population sampled, their food habits, health histories and food intakes. The results obtained are presented in a series of tables and graphs.

Character of the Group

The age distribution of the group is shown in Table I. Seventy per cent of the women were between the ages of 40 and 60 years. Two women were less than 40, and 13 were over 60. The youngest woman was 31 years and the oldest 79.

TABLE I
DISTRIBUTION OF WOMEN BY AGE

Age range	Women in group	
	Number	Per cent
31 - 39	2	4
40 - 49	20	40
50 - 59	15	30
60 - 69	7	14
70 - 79	6	12

Many of these women had migrated to Lansing from various sections of the United States, Canada, and the West Indies. However, 50 per cent of the group were from the

southern states, and 32 per cent were from Michigan and Ohio. Only a small percentage were from other sections. A distribution of the group according to the place of birth is shown in Table II.

TABLE II
DISTRIBUTION OF WOMEN BY PLACE OF BIRTH

Sections of United States	Per cent	Other regions	Per cent
Southern States	50	Canada	6
Northern States	32	West Indies	2
Western States	8		
Eastern States	2		

Although most of the individuals were not natives of Michigan, 72 per cent of them had lived in the area 20 or more years. Table III shows a distribution of the group according to years of residence in Michigan.

TABLE III
DISTRIBUTION OF WOMEN
ACCORDING TO YEARS RESIDENCE IN MICHIGAN

Number of years	Number of women
0 - 4	5
5 - 9	5
10 - 19	4
20 - 29	21
30 - 39	1
40 - 49	6
50 and over	8

A majority of the migrants had come from the South where food habits might have differed, but the fact that all but 14 had lived in Lansing most of their adult lives would

suggest that local food habits and food supplies might be expected to influence the selection of a diet.

Since education may influence familiarity with food and cooking practices, the educational achievements of the group were studied. The results are shown in Table IV.

TABLE IV
EDUCATIONAL ACHIEVEMENTS

Elementary grades	Some high school	Completed high school	Some college
Per cent of women			
34	42	12	12

Sixty per cent of the group had received an education above that of the elementary grades and none had completed less than five of these grades. In addition, most of the women had received some nutrition education through emergency nutrition meetings during the war years. Dovee and Downes ('41) found in a group of families in New York that food and health habits were improved through intensive nutrition education.

Some of the women worked for a wage either outside of or within the home, in addition to performing usual household tasks. Employment, particularly outside of the home, may influence the character and regularity of meals. The distribution of the group in terms of gainful employment is given in Table V.

TABLE V
RECORD OF EMPLOYMENT

<u>Per cent of women employed</u>		<u>Per cent of women</u>
<u>At home</u>	<u>Away from home</u>	<u>not employed</u>
6	34	60

Forty per cent of the women were employed at or away from home. About half of the employed group were over 50 years of age.

The diets of the employed and the unemployed women were studied as to the daily intake of basic foods. In the working group 57 per cent of the women had milk, 87 per cent had some kind of fruit, 67 per cent had two or more vegetable, and all had breads, and meat or meat substitutes. In the non-working group, 49 per cent had milk, 83 per cent had some kind of fruit, 72 per cent had two or more vegetables, all had breads, and all but one had meat, or meat substitutes. In terms of the conditions under which this survey was conducted, these probably are not important differences. There was no difference in the type of meals served by the working and non-working group. Moser ('39) has reported that increasing variety of foods, especially fruits and vegetables, appeared in the dietaries when more time was spent in household food production.

Another factor sometimes determining food intake is whether meals are eaten alone or in a family group. Fifty-two per cent of these women ate at least one meal alone, as

shown in Table VI.

TABLE VI
PER CENT OF WOMEN EATING MEALS ALONE

All meals	Some meals	No meals
12	40	48

Most of the women lived in families where there were not more than two persons. Two-thirds of these were over 50 years and about one-fourth of them were over 60. There were only seven women who lived in families where there were from five to seven persons, and 16 women were responsible for children under 20 years of age. Four women lived in homes with non-relatives, but prepared and ate their meals alone. The size and character of the family group with whom the woman ate her meals is further described in Table VII.

TABLE VII
DISTRIBUTION OF WOMEN
IN RELATION TO FAMILY SIZE AND CHARACTER

Number of adults and children in families			Per cent of women
Adults	Children 6-20 years	Children under 6 years	
1	0	0	8
2	0	0	46
3	0	0	14
2	0	1	8
2 - 3	1 - 2	0	10
2 - 3	3 - 4	0	14

The type of meals eaten by women who ate some or all of their meals alone, and those who ate all of their meals

in a family group was studied. In the group eating some of their meals alone, an average of nine different foods were eaten during the day, and 64 per cent of the group ate three meals. In the group eating all of their meals in a family group, there also were an average of nine different foods served, and 54 per cent of this group ate three meals. In the group eating all meals alone, an average of seven different foods were served, and none in this group ate more than two meals per day. In the group where some of the meals were eaten alone, some of the women were employed and probably required more food; however, more desirable habits of food intake were found in the groups eating some or all of their meals in a family atmosphere, confirming the clinical observation of Tuohy ('40).

Food Habits

The availability of food, the food tastes, and cooking practices, all may influence the quality of the diet; therefore, the food habits were studied. Thirty-two women had vegetable gardens, each producing from six to 13 different vegetables. Twenty-seven families had fruit trees, and most of the women canned food for home use. The amount of food preservation done in the home is shown in Table VIII.

TABLE VIII
HOME FOOD PRESERVATION

Per cent of group	Quarts of food canned	Average number		
		Quarts per family	Persons per family	Quarts per person
55	100-400	204	3	68
45	12- 80	45	2	23

Although two-thirds of the women had vegetable gardens, some of the gardens were inadequate to supply vegetables for home canning; so much of the fruit and vegetables for this purpose were purchased. Fifty-five per cent of the women canned about one-half the fruits and vegetables needed by their families. The War Food Administration reported in 1944 that two-thirds of the canned fruits and one-half of the vegetables used by civilians in that year were supplied by home canning.

Since methods of cookery may affect the nutritive value of the diets, some of the practices in vegetable cookery were studied. The results as obtained by questioning are shown in Table IX.

TABLE IX
METHODS USED IN VEGETABLE COOKERY

Cookery methods	Number women using methods
Cook vegetables:	
In small amounts of water	41
Until just tender	28
Use vegetable stock	39
Use soda in certain vegetables	24
Cook certain vegetables in jackets	28

The interpretation of "amounts of water" used in vegetable cookery, and the "length of time" in cooking, are too indefinite to draw any conclusions; however, it was shown that at least half of the group were aware of the advantages of small amounts of water and short cooking times. The use of soda in certain foods was reported by 48 per cent of the group. Certain vegetables cooked in the jacket were reported by 48 per cent of the group. Certain vegetables cooked in the jacket were reported by a larger group of women who did not work away from home and who probably spent more time in food preparation. Mason ('39) suggests quick boiling, small amounts of water, and certain vegetables cooked in the jacket for best retention of food nutrients. Alkali, although useful in retention of certain pigments, may be destructive to specific food nutrients.

Similarly, Table X shows methods most used in meat cookery.

TABLE X
METHODS USED IN MEAT COOKERY

Methods most used	Number of women using methods
Roasting	43
Stewing	30
Deep fat frying	11
Broiling, or pan broiling	23
Wash meats before cooking	37

More roasting and stewing than broiling and frying were reported in meat cookery. Since this study was made

during the rationing of meats and fats, this result might be expected, and might not be characteristic of another period. Three-fourths of the group washed meats before cooking, which seems to be a general practice among American housewives. Mason ('39) again suggests stewing for retention of nutritive qualities and that washing meats before cooking increases food losses.

Variety cuts are known to contain high nutritive values. The use of these foods in the dietaries of this group as reported is shown in Table XI.

TABLE XI
USE OF VARIETY CUTS IN THE DIETARIES

Organs	Number women using variety cuts		
	Once per week	Once per month	Seldom, or not at all
Liver	22	22	6
Kidneys	3	1	46
Brains	3	0	47
Sweetbreads	0	0	50

Liver was reported used more often than any of the other organs, probably because of its availability in the markets. Liver is an excellent source of iron and vitamins A, niacin and riboflavin, as well as protein. All of the organs are good sources of iron (Sherman '37). McKay et al. ('41) found a longer life span in rats when animal protein was furnished largely from liver.

The frequency with which the women thought they used certain food groups is shown in Table XII. Ninety per cent

of the group thought they had fruits once or twice per day, and 98 per cent said they had vegetables. One woman ate practically no vegetables, but reported a high intake of fruits and a large daily intake of milk. Milk was reported to have been used in some form, at least once per day, by 70 per cent of the women, and an equal number said they ate some raw vegetables.

TABLE XII

THE INTAKE OF CERTAIN FOODS IN THE DIETARIES
AS ESTIMATED BY THE WOMEN

Foods	Per cent of women using foods		
	Once per day	Twice per day	Seldom, or not at all
Fruits, fresh or cooked	92	30	8
Vegetables, cooked	98	30	2
Vegetables, raw	70	0	30
Milk, or milk substitutes	70	2	30
Meat, or meat substitutes	98	48	2

The food habits of the group were studied further, from a record of the food intake of the 24-hour period previous to the interview (Table XIII). On the day recorded, 96 per cent of the group had meat, or meat substitutes at least once, 60 per cent had milk or milk products, 72 per cent had vegetables of some kind, and 74 per cent had fruits raw or cooked.

TABLE XIII

FOOD EATEN IN THE 24-HOUR PERIOD PREVIOUS TO THE INTERVIEW

Foods	Per cent of women eating foods		
	One serving	Serving in food group	Two or more servings
Whole grain, or enriched cereals	100		98
Dairy products: Milk	64	64	23
Cheese	10		0
Fruits: Citrus, or tomatoes	60	90	27
Other, raw, cooked or dried	74		16
Meat, poultry, fish, or other substitutes	96		44
Vegetables: Green, leafy, or yellow	72	86	10
Other vegetables, cooked	54		0
Vegetables, raw	44		7
Coffee, tea, or soft drinks	80		42

Vitamin medication with or without the advice of a physician is commonly practiced by the lay public. Thirty-four per cent of the group had taken vitamin concentrates, and 28 per cent had taken cod liver oil; however, only 28 per cent of the medication was prescribed by a physician. No evidence of the composition of the vitamin products was obtained.

The actual food selection of the group of women on one day, as reported by memory, showed some variation from their estimation of what they thought they usually ate, as shown in Table XIV.

TABLE XIV
A COMPARISON OF ESTIMATED AND ACTUAL FOOD HABITS

Foods	Per cent	
	Estimated food selection	Actual food selection
Fruits, fresh or cooked	92	90
Vegetables, cooked	98	86
Vegetables, raw	70	46
Milk, or milk products	70	64
Meat, or meat substitutes	98	96

The greatest variation was found in the use of raw and cooked vegetables and in milk. Since the survey was made during the spring and summer months, there is no explanation for the low intake of vegetables. However, the season of the year may account for the low intake of **citrus** fruits and tomatoes. There is no explanation for low intakes of milk, except that their actual food habits were not quite so good as they had estimated. Fifty-two per cent of the group actually drank milk, while another 12 per cent made use of ice cream and cheese in their diets.

Some other studies have been made, where similar results were found. Milan ('42) found diets low in vitamin C, especially in the spring, and intakes of vitamin A that were slightly below normal, but adequate intakes of calcium. Steibling and Phipard ('39) found low intakes of vitamin C and milk, but somewhat higher intakes of vitamin A. Downes and Baranovsky ('44) found deficiencies in citrus fruits and tomatoes, green, leafy and yellow vegetables, and milk, in

the diets studied by them, and especially was this true in the older age group. The diets reported in this paper were rated by the scoring card suggested by Chaney and Ahlborn ('44). Twenty-six per cent were rated good, 30 per cent fair, and 44 per cent poor. A copy of the scoring sheet may be found in the Appendix.

Health Histories

The health of the individual may have an influence on food consumption. The data shown in the following tables were obtained from responses to certain questions concerning health which were asked during the interview. Table XV shows the number of women who had borne children, the number of stillbirths, miscarriages, and complications during pregnancy. Fifty-two per cent of the women had borne children, and 38 per cent had had one to four accidents of pregnancy resulting in the loss of a child. Eighteen per cent of the women reported having pregnancy complications, and there were reported two Cesarean births.

TABLE XV
MATERNAL HISTORIES

Pregnancies and complications	Per cent of women
Women:	
Bearing children	52
Having stillbirths	4
Having miscarriages	34
Having Cesarean births	4
Having other complications during pregnancy	
(a) Feet swelling	12
(b) Fever after birth	6

All of the women were or had been married. There were reported 86 children born to this group (not including losses through accidents of pregnancies), an average of 1.72 children per woman. The number of accidents of pregnancy resulting in the loss of a child were 30, an average of 0.6 child per woman, and the number of stillbirths were 2.3 per 100 livebirths.

Thompson ('31) has reported the ratio of children to women in the United States in 1920 to be 3.3. The ratio of children born to colored women was 3.6. In the state of Michigan the average number of children born to all women was 3.2 and to colored women 2.9. Hall ('35) has reported in the 1931 census a total of 17,884 stillbirths or 7.6 per 100 livebirths in the Negro population of the United States. In the state of Michigan the total number of stillbirths was 3.7 per 100 livebirths, and in the Negro population the percentage was 5.8. The 50 women studied in this report had an

average of 1.72 children, as compared to the 2.9 reported for colored women in Michigan in the records of 1920. On the other hand, fewer children were stillborn (2.3 as against 5.8 per cent).

Census figures do not give records on miscarriages. However, Ebb et al. ('41) have reported that the incidence of miscarriages, stillbirths, premature births, and pregnancy complications have been found in increased numbers among women whose diets were poor before or during pregnancy. They recorded 38.1 per cent of 120 multiparous patients as having had miscarriages, where the diets had been poor. In this group of 50 women there were recorded 34 per cent as having had miscarriages. Forty-four per cent of the diets of this group studied scored "poor".

Kiser ('41) has reported the birth rate in relation to occupational status, educational attainment, and family income for a group of families in New York. In practically all groups, more women who had borne children were found in the moderate or low income status groups and in families with lower educational attainment. A sharp lowering of birth rate was found with improved economic status. The reproductive pattern observed in this study may be an expression of the fact that the group chosen was economically sufficient.

Since habits of eating may be influenced by adequacy of the teeth, the number of women with complete and partial

dentures was studied. Twenty-one women had complete, while 15 women had partial dentures. No specific data have been found on the loss of teeth as related to old age; however, it is observed that most older people have or need artificial teeth, which may be the result of poor nutrition in childhood or adult life. The lack of teeth may result in improper selection of food by the older individual because of difficulty in chewing.

One school of thought associates the onset of senility in women with the completion of the menopause (Albright '40); for that reason the physiological age of the group with respect to this function was explored. Twenty-eight women had completed the menopause,--22 normally, and six as a result of operation. In 12 women ranging in age from 45 to 58 years, the menopause was still in progress. The mean age at which this physiological change was completed spontaneously was 47 years, with an age range of 35 to 58 years. Menopause as a result of operation occurred at from 25 to 40 years, with a mean age of 35 years. There was no difference in the age range at which the period was entered by the women who had borne children and by those who had not. Sloanker and Card ('23) found that the menopause in rats was hastened on a restricted diet, and later ('38) they found that the menopause was delayed by adequate intakes of protein.

No medical examinations were made; however, certain chronic complaints were reported by these women, even though

none were actively ill. Chronic nephritis, diabetes, neuritis, and gastrointestinal disorders, were each reported by one woman. Hypertension, arthritis and anemia each were reported by two women, and gallstone was reported by four women. Cowdry ('39) has reported the diseases listed as being associated with old age. However, investigations by Doyden and Grantham ('33), Vanzant et al. ('32), Yavorsky et al. ('34), and by Ivy ('39) have seemed to relate them to the eating habits of the individual.

Some symptoms which, if persistent, may indicate lack of specific foods in the diets were studied. The results are shown in Table XVI. The high incidence of complaints reported by this group may indicate that there were food deficiencies present. However, in the list of symptoms, certain ones are subjective and may easily be influenced by conditions other than nutrition. Such symptoms as fatigue, inability to concentrate, nervousness and irritability, may be in this class. These symptoms were reported by a high percentage of women.

From the group reporting loss of weight, 10 women had loss because of dieting, and two because of previous illness. Loss of strength may have been associated with loss of weight. Sore mouth and chronic diarrhea were reported by a small percentage of the group. Constipation was more prevalent and has been reported by Cowdry ('39) as a common complaint of the ageing. Inadequate total intake of food

may result in constipation. Eighteen per cent of the women reported burning or itching skin, and approximately 42 per cent had some eye symptoms, while 46 per cent complained of muscle cramps, joint pains, and ease of bleeding and bruising. Although these symptoms suggest poor food habits, there may be other influencing factors.

TABLE XVI
NUMBER OF WOMEN REPORTING SYMPTOMS
WHICH MAY INDICATE FOOD DEFICIENCIES

Symptoms	Number of women reporting symptoms
Lack of appetite	5
Fatigue, lassitude, lack of interest in surroundings	23
Loss of weight	15
Inability to concentrate	31
Loss of strength	19
Sore mouth and tongue	7
Chronic diarrhea	7
Nervousness or irritability	29
Burning or prickling of the skin	18
Poor adjustment of sight from light to darkness	21
Eyes affected by sunlight, snow, rain	24
Eyes itch or burn	16
Eyes water easily	25
Muscle cramps	26
Pain in joints	25
Sore gums	12
Bleed easily	28
Spot or bruise easily from slight bumps	28

Weighed Food Intake Records

The objective of this portion of the investigation was to study more precisely the habits of food intake of a selected number of women of the original group, with special emphasis on the amount of protein supplied by the daily diets.

The age of the women selected for this portion of the study ranged from 43 to 78 years, with the exception of one subject who was 31 years; the mean age was 54 years. Sixty per cent of the group were 50 years or over. The women ranged in height from four feet 11 inches to five feet six inches. Their weights ranged from 122 to 224 pounds, the mean weight being 167 pounds. Seventy-three per cent of the group weighed 160 pounds or over, and two women weighed over 200 pounds. According to Davenport's weight-height-age table for women ('23), two-thirds of these women were overweight. The families of which these women were a part were small, the average size per family being 2.3 persons. One woman had a family of six persons and two women lived alone. The individual data by age, weight, height, and the size of families are shown in Table XVII.

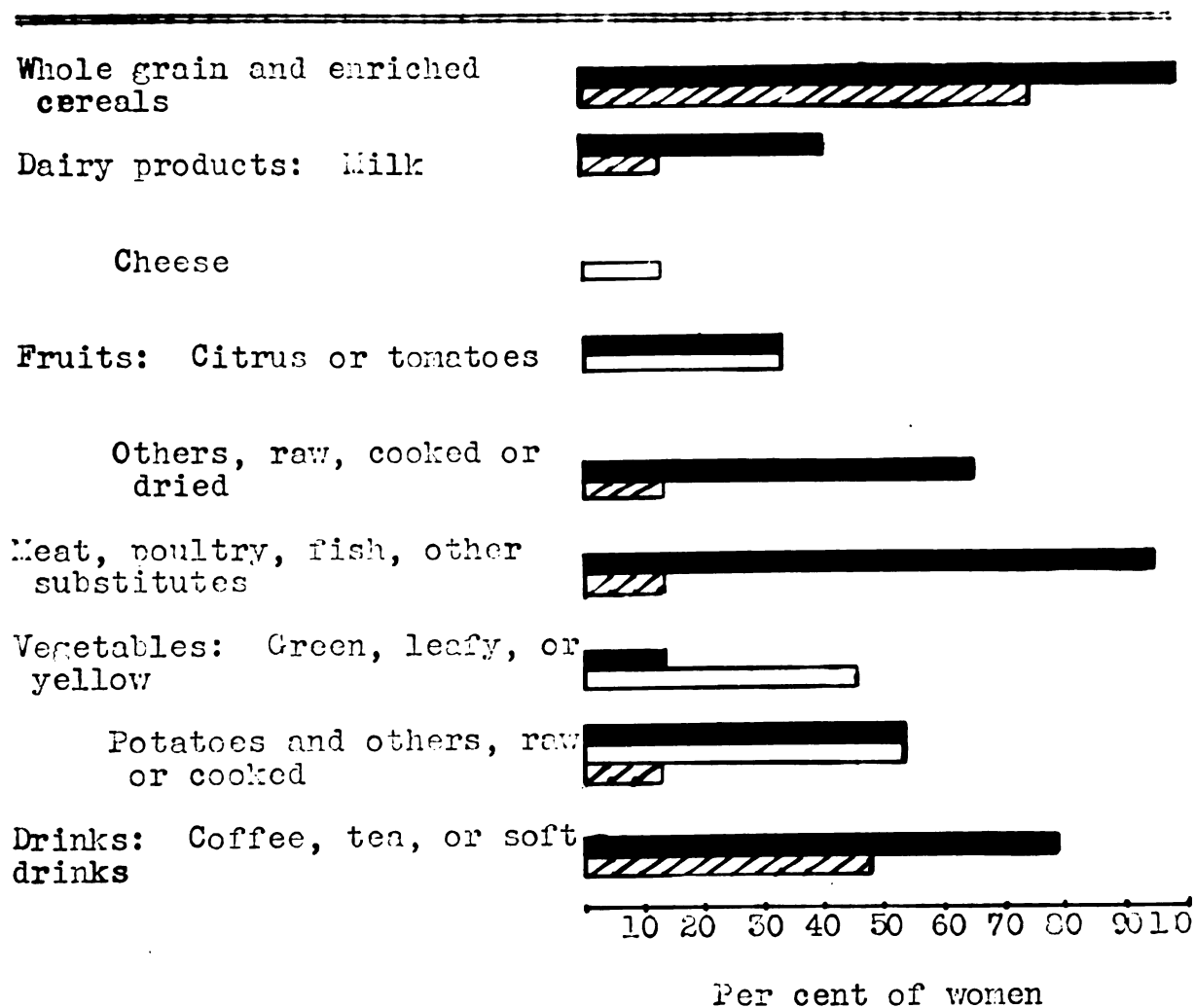
Because of the necessity of collecting food samples, women were chosen who did not work away from home; however, RR and VH were gainfully employed within the home. All but two of the women lived within a family circle. These two women lived in homes with other families but prepared and

TABLE XVII
AGE, WEIGHT, HEIGHT,
AND SIZE OF FAMILY OF EACH SUBJECT

Subjects	Age	Height		Weight	Number of persons in each family
	yrs.	ft.	ins.	lbs.	
MS	48	5	1	165	2
RM	60	5	3	149	2
RR	43	5	4	174	3
LB	45	5	5	180	6
BB	63	5	5	165	2
MT	56	5	4	205	3
MB	58	5	2	122	2
RS	78	5	3	170	Lived alone
MDG	58	4	11	160	2
CW	43	5	6	178	2
PL	60	5	6	160	2
MG	47	5	2	224	3
NW	59	5	6	180	Lived alone
VH	59	4	11	142	2
EC	31	5	4	123	2
Mean	54	5	3	167	

ate their meals alone. The food habits of the group can be expressed through the record of food selected over the seven-day period in relation to the seven basic food groups.

All of the women used whole grain cereals or enriched breads at least once per day, and 75 per cent of the group made use of these foods twice per day. The next most frequently selected foods were meats or meat substitutes. These included fish, poultry, eggs, sausage and luncheon meats. All but one of the group selected from these foods at least once per day, and 15 per cent made use of them twice per day. Milk and milk products were used by only 40 per cent of the group daily, and 13 per cent had these products twice daily. Citrus fruits and tomatoes were less frequently used, as only a third of the women selected foods from this group each day; however, an additional one-third ate citrus fruits and tomatoes three to six times during the week. The least used foods were green, leafy and yellow vegetables. Thirteen per cent of the subjects used these foods each day, and 45 per cent of them selected green, leafy and yellow vegetables three to six times during the week. Other fruits and vegetables were selected by 53 to 65 per cent of the group each day, and almost an equal number used these foods three to six times per week. Coffee, tea, and soft drinks were used by 78 per cent of the subjects daily. The food selection of these women over the seven-day period is shown in Figure 1.



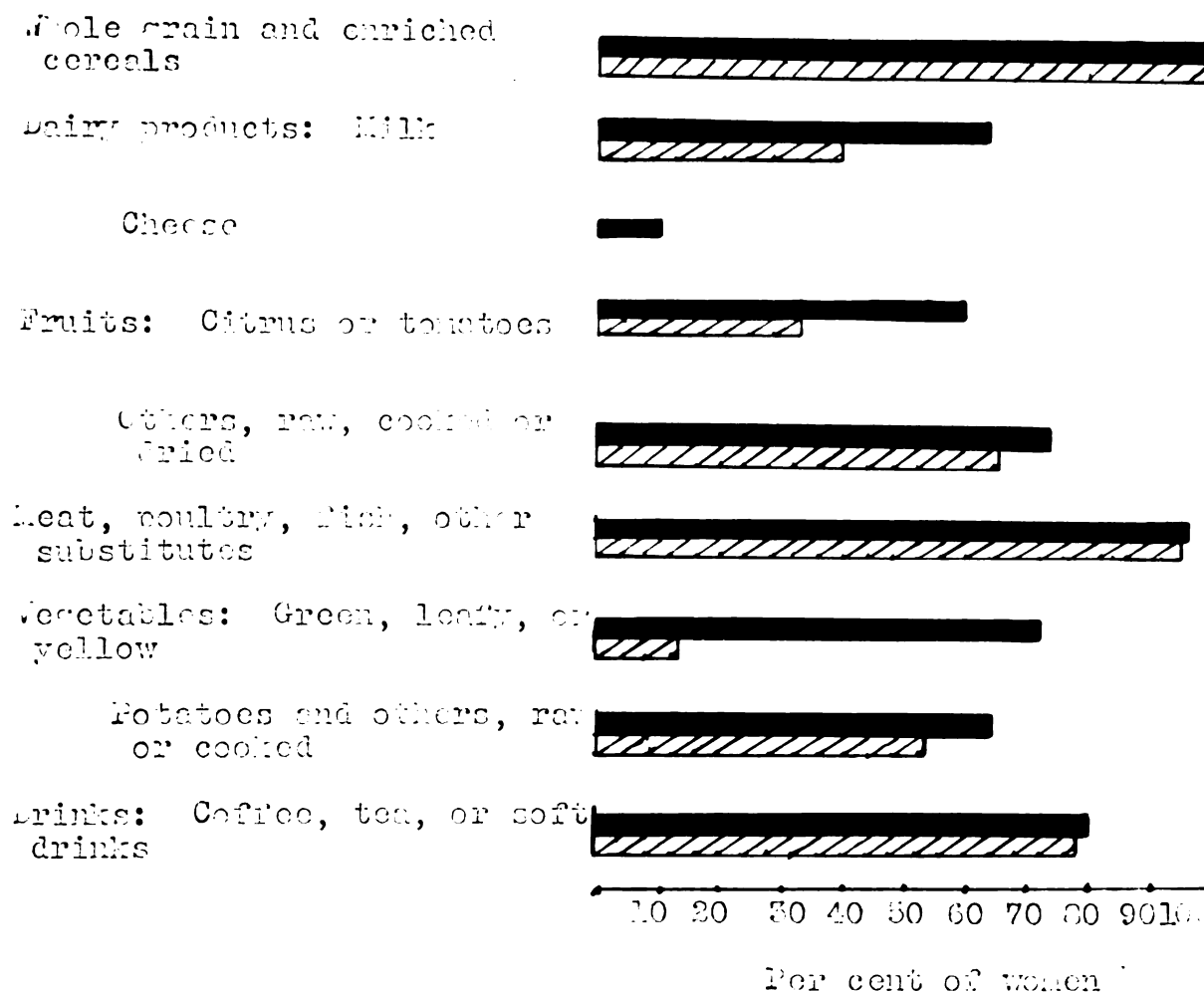
 One serving each day
 Two or more servings each day
 3-6 servings per week

FIGURE 1
FOOD SELECTION OVER 7-DAY PERIOD
BY GROUP OF 15 WOMEN

The per day pattern of food selected in the seven-day period by the 15 women was quite similar to that eaten by the 50 women in a 24-hour period. Slightly lower intakes of citrus fruits and tomatoes, green, leafy and yellow vegetables, and milk were observed in the seven-day records (Figure 2). Both methods of study showed high intakes of cereal foods and meat or meat substitutes, with fair intakes of other fruits and vegetables, and low intakes of citrus fruits and tomatoes, green, leafy and yellow vegetables, and milk.

All food ingested by these subjects during the experimental period was weighed before eaten. The total food ingested in terms of recommended nutrients was calculated by the revised Food Composition Table for Short Method of Food Analysis by Donelson and Leichsenring ('44), as shown in Table XVIII. The individual data have been presented in the order of ascending protein intake. The lowest amount of protein ingested per day was 27.5 grams by MS and the highest was 65.7 grams by VH, except EC who was pregnant and whose intake was 81.6 grams per day. The calories ingested ranged from 882 by MS to 2,277 by VH, except for EC whose intake was 2,371 calories. The intake of other nutrients were in proportion to calories and protein.

An inspection of the data suggested that the women might be conveniently divided into two groups, one receiving less than the minimum of 45 grams of protein per day as rec-



 One serving during 24-hour period by 50 women
 One serving each day during 7-day period by 15 women

PLATE 3

COMPARISON OF FOOD SELECTION OF 50 WOMEN OVER 24-HOUR PERIOD
WITH THAT OF 15 WOMEN OVER 7-DAY PERIOD

TABLE XVIII

CALCULATED DAILY INTAKE OF FOOD NUTRIENTS OF FIFTEEN WOMEN

Group	Sub- jects	Calories	Protein		Carbo- hydrate	Fat	Cal- cium	Phos- phorus	Iron	Vitamin A	Ascorbic acid	Thia- min	Ribo- flavin	Niacin
			Det.	Cal.										
			gms.	gms.	gms.	gms.	gms.	gms.	mgs.	I.U.	mgs.	mgs.	mgs.	mgs.
I	MS	882	27.5	30.6	127.1	26.3	.25	.74	7.2	7,443	58	.64	.67	5.73
	RM	1,205	31.7	33.2	166.4	46.9	.36	.64	6.3	2,658	36	.78	.77	5.86
	RR	1,155	38.7	52.8	145.8	38.1	.47	.89	9.8	1,197	37	.68	1.10	6.93
	LB	1,065	35.5	49.5	135.8	33.5	.43	.88	10.1	4,791	41	.83	1.22	8.77
	BB	1,022	39.1	48.8	125.4	37.3	.37	.76	22.6	2,300	41	.74	.97	9.25
	MT	1,021	39.2	39.1	114.5	42.3	.33	.56	9.0	3,457	42	.64	.61	7.19
	MB	1,484	39.5	49.8	209.0	47.2	.32	.71	11.3	4,358	56	1.42	.92	9.91
	RS	1,120	39.6	45.8	145.9	59.6	.37	.72	8.1	4,250	44	.71	.91	8.37
II	MDG	1,803	48.8	55.7	233.7	43.7	.52	.78	9.3	4,059	47	.93	1.11	9.10
	CW	1,539	51.6	71.0	207.4	41.8	.64	.98	13.8	5,341	94	1.15	1.04	13.18
	FL	1,390	52.5	65.4	193.0	39.7	.55	1.04	7.1	5,609	68	1.16	1.41	10.51
	MG	1,812	54.8	61.4	181.9	68.0	.53	.89	13.8	9,770	76	1.36	2.09	11.07
	HW	1,912	65.0	63.1	167.0	55.8	.43	.92	12.9	4,108	51	.88	1.19	13.16
	VH	2,277	65.7	90.5	306.0	72.9	.86	1.51	18.3	9,742	79	1.49	1.76	13.45
	EC	2,371	81.6	86.5	297.9	104.6	1.01	1.57	12.9	11,868	88	1.00	2.21	13.72
Mean		1,454	47.4	56.2			.50	.91	11.5	5,397	57	.88	1.22	9.79

TABLE XIX

AVERAGES OF FOOD NUTRIENTS SUPPLIED IN LOW AND HIGH PROTEIN LEVELS

Group	Calories	Protein		Carbo- hydrate	Fat	Cal- cium	Phos- phorus	Iron	Vitamin A	Ascorbic acid	Thia- min	Ribo- flavin	Niacin
		Det.	Cal.										
		gms.	gms.	gms.	gms.	gms.	gms.	mgs.	I.U.	mgs.	mgs.	mgs.	mgs.
I	1,122	41.3	49.9	167.1	47.5	.41	.84	12.1	4,122	49	.9	1.0	10
II	1,789	56.4	67.8	241.5	53.7	.59	1.19	13.4	6,438	69	1.2	1.5	12

ommended by Sherman (Group I), and one receiving more than this amount (Group II). The data for EC are not considered in the averages for Group II. The average intake of all of the specific nutrients in these two groups are shown in Table XIX. The average intake for each nutrient is higher in the diets containing more protein and calories. In other words, as the food intake was reduced, all nutrients tended to be proportionately reduced, while all of the available information on the requirement of specific nutrients for older people would suggest that certain of the nutrients, such as calcium, ascorbic acid, and thiamin, may be needed in higher rather than lower concentrations.

It was found that in Group I all food nutrients consumed, including protein and calories, were much lower than recommended for the adult woman by the National Research Council ('45), with the exception of iron. However, the iron intake in all but one diet was low, but the extremely high intake of subject DB raised the average for the group.

In Group II the average protein intake does not reach the standards of the National Research Council for adult women, but it more than satisfies Sherman's minimum requirement. The calories in this group may be adequate for ageing individuals if all other requirements are met, since a decrease in caloric intake has been recommended for the ageing by Tuohy ('43). In Group II all other nutrients were consumed in adequate amounts except calcium and perhaps phos-

phorus.

The diets in Group II may be compared to the diets in a recent study by Milan ('42), who found a mean intake of 46 grams of protein in a group of Negro housewives in North Carolina and 51 grams in a white group. The caloric intakes were 1,443 calories in the Negro group and 1,577 in the white. The mean caloric intake found in Group II of this study was 1,789 and the mean protein intake 56.4 grams per day. The diets studied by Milan also were reported below standards in vitamin A, thiamin, riboflavin, niacin, calcium, and iron. However, the National Research Council standard for thiamin, riboflavin, and niacin were lowered in the 1945 report of that group, and a re-evaluation of Milan's data probably would demonstrate adequate average intakes of these factors. In Group II of this paper, the diets seemed adequate in all food nutrients except calcium and phosphorus. In these observations there seems to be a definite relation between the total food consumed and the adequacy of specific nutrients, with the exception of calcium. In other words, increased protein and calories resulted in adequate supplies of all other nutrients except calcium and perhaps phosphorus.

Because of low caloric intake resulting in low intake of other food nutrients in Group I, as compared to results obtained in Group II, the source of calories supplied was studied. The approximate number of calories supplied by vitamin-free fats and refined carbohydrates, such as cookies,

cakes, and the like, are shown in Table XX. The subject receiving the lowest number of calories (29) from fats and refined carbohydrates was LB. The highest intake from these sources was 619 calories, consumed by HW. The average number of calories derived daily from refined foods in Groups I and II were 195 and 383, respectively. This observation seems to show that in all but two subjects, the food pattern in Groups I and II were the same. The caloric intake in Group I resulted from a decrease in the amount of total food eaten, without careful selection, which resulted in low intake of all specific nutrients. The subjects in Group II received more adequate diets, not by careful food selection, but by a higher intake of all foods.

If diets are to be reduced to a minimum caloric intake in old age, the diets must be carefully selected, omitting unnecessary calories from fats and refined carbohydrates.

Food Analysis

The food habits were studied further, through a laboratory analysis of the nitrogen content of the diets of the 15 women. Protein was calculated as total nitrogen times the factor 6.25 (Hawk and Bergeim '44).

The total protein obtained by calculations from food tables and by analysis showed a variation of from 13 to 30 per cent in 60 per cent of the diets, the calculated value for protein being greater in each case than the protein

TABLE XX
 AVERAGE DAILY CALORIES
 SUPPLIED IN THE DIETARIES OF 15 WOMEN
 FROM FATS AND REFINED CARBOHYDRATES

Group	Subjects	Total Calories	Calories derived from fats and refined carbohydrates
I	MS	882	201
	RM	1,205	311
	RR	1,155	189
	LB	1,065	29
	BB	1,022	154
	MT	1,021	282
	MB	1,484	231
	RS	1,120	160
II	MDG	1,803	391
	CW	1,539	273
	FL	1,390	35
	MG	1,812	309
	HW	1,912	691
	VII	2,277	572
	EC	2,371	410
Average for Group I			195
Average for Group II			383

found by analysis. The protein intake as calculated and as determined, the weight of subjects by kilograms, and the protein intake per kilogram bodyweight, are shown in Table XXI. The smallest subject, who weighed 55 kilograms, had a protein intake of 0.71 grams per kilogram bodyweight and the largest subject, who weighed 102 kilograms, consumed 0.51 grams of protein per kilogram bodyweight daily. The mean protein intake was 0.64 grams per kilogram bodyweight.

There are two possible explanations for the differences in the results obtained in the estimation of protein. The experiment was conducted during the time when rationing of meats and other protein foods was at its peak. During this strict rationing period much of the meat eaten was in the form of luncheon meats, which at this time may have contained more cereals and less meat than in normal times. Likewise, many of the diets in which the determined protein was found to be low, also contained combination dishes as meat extenders, which can be responsible for error in calculation. Both these circumstances could, and probably did, result in an overestimation of protein.

Cannon ('44) has shown that protein supplied in the diet at a minimum concentration probably does not allow a safe margin for emergencies. Tuohy ('40) has suggested at least one gram of protein per kilogram bodyweight for the ageing group. In this study, only 13 per cent of the subjects received this amount of protein in the daily intake. Forty

TABLE XXI
DAILY PROTEIN INTAKE OF SUBJECTS
AS CALCULATED AND AS DETERMINED

Group	Sub- jects	Weight in kilograms	Daily protein intake		Protein per kilogram body-weight as determined
			As cal- culated	As deter- mined	
			gms.	gms.	gms.
I	MS	75	30.6	27.5	0.37
	RM	68	33.2	31.7	0.47
	RR	81	52.8	38.7	0.49
	LB	82	49.5	35.5	0.43
	BB	75	48.8	39.1	0.51
	MT	93	39.1	39.2	0.41
	MB	55	49.8	39.5	0.71
	RS	77	45.8	39.6	0.51
II	MDC	73	55.7	48.8	0.66
	CW	81	71.0	51.6	0.64
	FL	73	61.4	52.5	0.72
	MG	102	65.4	54.8	0.53
	HW	82	63.1	65.0	0.79
	VH	65	90.5	65.7	1.01
	EC	56	86.5	81.6	1.46
Mean		75	56.2	47.4	0.64

per cent received over 60 grams as recommended by the National Research Council for adult women. However, two-thirds of these women weighed more than 56 kilograms.

The percentage of calories in the daily intake as supplied by protein is shown in Table XXII. The relation of protein to calories was adequate. Sherman ('41) has recommended that the protein be supplied in the diets at 10 per cent or more of the total caloric intake. No diet in this study contained less than 10.5 per cent of total calories supplied from protein foods. There have been some indications in studies by Sloanker and Card ('38) and by McKay et al. ('41) that protein intake greater than 14 per cent in diets of old rats tended to shorten the life span.

The percentage of animal protein present in the total protein intake is shown in Table XXIII. The percentage protein derived from animal origin also appeared adequate. McCollum ('40) has suggested that the total protein should be made up of from 25 to 30 per cent animal protein. No diet in this group contained less than 30 per cent protein derived from animal source.

Since the absolute protein intakes were low in at least half of the women studied, the diets from Groups I and II representing high and low intakes of protein and calories were studied in relation to the list of symptoms that were recorded during the interview. It is possible that these symptoms may be a measure of food deficiencies (Youman '44).

TABLE XXII
PERCENTAGE CALORIC INTAKE DERIVED FROM PROTEIN,
AS DETERMINED

Subjects	Caloric intake	Protein intake as determined	Per cent protein calories
LS	832	27.5	12.5
RM	1,205	31.7	10.5
RR	1,155	38.7	13.5
LB	1,065	35.5	13.3
BB	1,022	29.1	15.3
MT	1,021	39.2	15.3
MB	1,484	39.5	10.6
RS	1,120	39.6	14.1
MDG	1,803	48.8	10.8
CW	1,539	51.6	13.4
FL	1,390	52.8	15.1
MG	1,812	54.8	12.1
HW	1,912	65.0	13.6
VH	2,277	65.7	11.1
EC	2,371	81.6	14.6
Mean	1,454		13.4

TABLE XXIII
PERCENTAGE PROTEIN
DERIVED FROM PLANT AND ANIMAL ORIGIN

Subjects	Per cent of total protein as calculated	
	Plant origin	Animal origin
MS	70.0	30.0
RM	55.0	45.0
RR	52.0	48.0
LB	47.0	53.0
DB	56.0	64.0
MT	57.0	43.0
MB	70.0	30.0
RS	44.0	56.0
MDG	60.0	40.0
CW	46.0	54.0
MG	53.0	47.0
HW	31.0	69.0
EC	44.0	56.0
Mean	44.0	55.0

The results are shown in Table XXIV.

The women comprising Group I complained 42 times, or an average of 6 times per woman, of non-specific symptoms, frequently associated with chronic undernutrition. In Group II 23 complaints were registered, or an average of 3.3 per woman. The symptoms as listed in Table XXIV may not always be specific for lack of any one food nutrient, but may be related to one or more deficiencies (Youman '44). Yavorsky et al. ('34) have suggested the need for higher intakes of vitamin C in older people, Tuohy ('40) has suggested the need for increased thiamin, and Albright ('41) for calcium. The high incidence of symptoms in Group I, where the intakes of all nutrients were low, would support these suggestions.

TABLE XX IV

HISTORY OF SYMPTOMS SOMETIMES ASSOCIATED WITH SPECIFIC FOOD DEFICIENCIES IN RELATION TO CALORIC AND PROTEIN INTAKE

Group	Sub- jects	Age in years	Caloric intake	Protein as determined	Presence of symptoms that					may be associated with specific food deficiencies									
					Muscle: cramps:	Joint: pains:	Loss of: weight:	Fatigue:	Nervous- ness	Eye waters:	Eye itch:	Sun blinds:	Sore mouth: or tongue	Poor memory:	Skin: itch:	Loss of strength:	Bleed easily:	Bruise easily:	
				gms.															
I	MS	48	882	27.5	X						X						X		
	RM	60	1,205	31.7								X		X			X	X	
	RR	43	1,155	38.7										X			X	X	
	LB	45	1,065	35.5	X	X											X	X	
	BB	63	1,022	39.1	X	X	X	X	X	X					X	X		X	
	MT	56	1,021	39.2		X	X			X								X	
	MB	58	1,484	39.5	X	X			X	X				X	X		X		
	RS	78	1,120	39.6				X	X	X		X				X		X	
II	MDG	58	1,803	48.8		X				X								X	
	CW	43	1,539	51.6				X											
	FL	60	1,390	52.5			X	X	X									X	
	MG	47	1,812	54.8	X						X						X		
	HW	59	1,912	65.0							X						X		
	VH	59	2,277	65.7	X	X	X			X		X		X		X			
	EC	31	2,371	81.6							X	X			X			X	

SUMMARY

The food habits of a group of 50 Negro women between the ages of 31 and 79 years were studied, with special emphasis on the protein intake which, for 15 women, was determined by analysis.

The group of 50 women were interviewed, at which time a record was made of the food eaten in a 24-hour period. Records also were made of certain practices in the management of food and health histories were taken. From this number an experimental group of 15 women were chosen, who kept weighed food intake records for a period of seven days. All food eaten by these women ~~was~~ weighed, and aliquots of one-seventh of all food ingested were collected throughout the period for laboratory analysis. The samples were analyzed for nitrogen by the macro Kjeldhal method (Hawk and Bergeim '44).

The group studied represented a cross section of an American population with average intelligence. All were economically independent. Forty per cent of the women were employed away from home. The families within which the women lived were small, most of them consisting of two persons.

The food habits of the group were studied in terms of food production and preservation in the home, vegetable and

meat cookery and food selection. It was found that 50 per cent of the women canned about one-half of the fruits and vegetables used by their families. More than half of the women were using cooking methods designed for retention of food values. Food habits obtained through the record of food eaten in the 24-hour period showed high intakes of cereals and breads and meat or meat substitutes, low intakes of citrus fruits and tomatoes, green, leafy and yellow vegetables, fair intakes of other fruits and vegetables, and low intakes of milk. There was no difference in the type of diets served in the homes by the working or non-working women; however, more desirable habits of food intake were found in women who ate all or some of their meals in a family group. Forty-four per cent of these diets were rated as poor.

All of the women had been married. There was reported an average of 1.72 children per woman, 2.3 stillbirths per 100 livebirths, and 34 per cent of the group reported miscarriages. The average age at which the women experienced a spontaneous menopause was 47 years. Twenty-four per cent of the group complained of chronic diseases, and there was a high incidence of non-specific symptoms of ill health.

The food habits of the 15 women studied for a seven-day period were quite similar to those of the 50 women. Fifty-three per cent of the weighed food intake records showed protein intakes below the minimum requirement of 45

grams per day. Calories were low and all other food nutrients correspondingly low, and probably inadequate. The other 47 per cent of the group had protein intakes above 45 grams with higher intakes of calories. In these diets, all food nutrients were adequate, except calcium and possibly phosphorus. A definite relation was found between caloric and protein intakes, and other food nutrients were correspondingly high or low in proportion to the presence of these two factors in the diets.

The average protein and calories supplied in the generally low diets were 41.3 grams protein and 1,122 calories per day. The average supplied in the better diets were 56.4 grams protein and 1,739 calories per day. There were no differences in the kinds of foods chosen in Groups I and II. The basic difference was in quantity. No diet contained less than 10.5 per cent protein. Likewise, no diet contained less than 30 per cent protein from animal sources. There was found a definite increase in certain non-specific symptoms among subjects with inadequate diets as compared to those on higher food intakes.

In conclusion, this study has shown a tendency in older people to eat less food, but in most cases without careful selection, resulting in diets tending to be inadequate in many respects. When the average protein intake was 56.4 grams per day, all nutrients **except** calcium and perhaps phosphorus were present in at least minimum adequate amounts.

If calories are to be reduced in old age, the diets must be carefully selected so as to be adequate in necessary food requirements.

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APPENDIX

NUTRITION STUDY OF WOMEN OVER 40 - LANSING, SPRING, 1945

NAME _____ ADDRESS _____ PHONE _____

DATE _____

1. Do you usually have a vegetable garden? Yes _____ No _____
2. What vegetables do you usually raise? _____

3. How many different kinds of vegetables do you usually raise? _____
4. What fruits do you usually raise? _____
5. Have you usually had these fresh vegetables and fruits available in summer months? Yes _____ No _____
6. Do you usually can food from your garden? Yes _____ No _____
7. About how many quarts per year? _____ quarts.
8. Did you can more or less last year than the year before?
 (a) More _____ (b) Less _____ (c) Same _____ (d) Why _____
9. Do you eat vegetables? _____ Fresh? _____ Canned? _____
10. Do you usually plan vegetables in your diet? Yes _____ No _____
 (a) Once per day? _____ Twice per day? _____ More? _____
11. Do you eat fruits? Yes _____ No _____. Fresh _____ Canned _____
 Dried _____
12. Do you usually plan some fruits in your diet? Yes _____ No _____
 (a) Once per day? _____ Twice per day? _____ More? _____
13. Do you eat meat? Yes _____ No _____
14. How often do you plan meat in your diet? Once per day? _____
 Twice per day? _____ Several times per week? _____

NUTRITION STUDY OF WOMEN OVER 40 - LANSING, SPRING, 1945
(cont.)

15. Do you buy (a) Liver? Yes_____ No_____
- (b) Kidney? _____
- (c) Brains? _____
- (d) Sweetbreads? _____
16. How often do you eat:
- (a) Liver? Once per week?_____ Twice per month_____ Less_____
- (b) Brains? " " " _____ " " " _____ " _____
- (c) Kidney? " " " _____ " " " _____ " _____
- (d) Sweetbreads? " " " _____ " " " _____ " _____
17. What method is used most in preparing meats? Deep Frying _____
- Roasting_____ Stewing_____ Broiling or Panbroiling_____
18. Do you wash your meats before cooking? Yes_____ No_____
19. Do you cook vegetables (a) in large amounts of water? Some_____ All_____
- (b) " small " " " Some_____ All_____
20. How long do you usually cook vegetables? Until tender?_____
- Until well done?_____
21. Do you use the stock from canned or home cooked vegetables?_____
- Yes_____ No_____ How used (a) with vegetables? Yes_____ No_____
- (b) in soups or gravies? Yes_____ No_____
22. Do you use soda in vegetables? Yes_____ No_____
23. Do you boil such vegetables as potatoes in the skin?_____
- Peeled?_____
24. Do you eat any vegetables raw? Yes_____ No_____
25. How often? Once or twice per day?_____ Several times per week?_____

NUTRITION STUDY OF WOMEN OVER 40 - LANING, SPRING, 1945
(cont.)

26. Record below, to the best of the woman's memory, everything she ate and drank yesterday or during the last 24 hours.

BREAKFAST

LUNCH

DINNER

27. Between meals and at bedtime _____

28. Was this a "usual day" with respect to your meals (food intake)? Yes _____ No _____

29. If it was not usual, why was it unusual? _____

30. Have you taken any vitamin tablets or cod liver oil in the last ten years? Yes _____ No _____

31. If so, which ones and how long ago? _____

32. On whose advice? _____

33. Age (as of last birthday) _____ years.

34. Have you always lived here? Yes _____ No _____. If not, from what state or country? _____ Your parents? _____
(from where?)

35. Grade completed in school. Less than 8th grade _____
Completed 8th grade _____ High School _____ Completed H.S. _____
Some college _____ Graduate study _____

NUTRITION STUDY OF WOMEN OVER 40 - LANSING, SPRING, 1945
(cont.)

36. Do you work away from home? Yes_____ No_____ If not, why?_____
- (a) Type of work_____
37. Do you participate in any outside activities? Yes_____ No_____
38. What are some of the activities you do take part in?_____
- _____
39. Do you usually work or play out of doors in the summer?
- Yes_____ No_____
40. Have you completed the menopause? Yes_____ No_____ In progress_____
41. How long did it last? _____ years.
42. How long ago was the menopause completed? _____ years.
43. Did you have:
- (a) Hot flashes? Yes_____ No_____ How long?_____ years.
- (b) Nervousness? Yes_____ No_____ How long?_____ years.
- (c) Other ills?_____
- _____
44. Were any of these symptoms serious enough to consult a doctor?
- Yes_____ No_____
45. List the ones that were severe enough to call a doctor_____
- _____
46. How many people do you cook for? (a) Adults, 21 years and over_____
- (b) Children, 6-20 years_____ Children, under 6 years_____
47. If you don't do the cooking, how many people do you eat with?
- (a) Adults_____ Children_____ Children_____
- (21+ years) (6-20 years) (under 6 years)
48. If all of the meals are not eaten with the family, give the meals which are eaten alone or any other usual irregularity._____
- _____

49. Children born:

Order of birth:	Age of children:	Sex:	Number months each was breast fed:	For those children: not breast fed give reasons:	Cause of death:
living:	dead:	M F			
1st:	:	:	:	:	:
2nd:	:	:	:	:	:
3rd:	:	:	:	:	:
4th:	:	:	:	:	:
5th:	:	:	:	:	:
6th:	:	:	:	:	:
7th:	:	:	:	:	:
8th:	:	:	:	:	:
9th:	:	:	:	:	:
10th:	:	:	:	:	:
11th:	:	:	:	:	:
12th:	:	:	:	:	:
13th:	:	:	:	:	:
14th:	:	:	:	:	:

50. Did you have any miscarriages or stillborns? How many? _____

51. Did you have any complications of pregnancy such as swelling of any part of the body, convulsions, fever following birth, Cesarean birth, or other? List these complications with respect to each birth. _____

52. Did you consult a dentist during or following any pregnancy?

Yes... No

53. If not, should you have? Yes No Don't know

54. If so, did you have any teeth filled or pulled, or any gum inflammations? Yes No

55. Do you have false teeth? Upper complete Upper partial

Lower complete Lower partial

56. What serious illnesses or operations have you had?

SYMPTOMS WHICH, IF PERSISTENT, MAY INDICATE LACK OF ADEQUATE
VARIETY OR AMOUNT OF FOOD*

Check those symptoms which have been severe or annoying
during the past 6 months.

1. _____ Lack of appetite.
2. _____ Fatigue, lassitude, lack of interest in your surroundings.
3. _____ Loss of weight. Explain _____
4. _____ Inability to concentrate.
5. _____ Loss of strength.
6. _____ Sore mouth and tongue.
7. _____ Chronic diarrhea.
8. _____ Nervousness or irritability.
9. _____ Burning or prickling of the skin.
10. _____ Can you see to follow the usher down the aisle of a dark theater?
11. _____ Does bright sunlight (sunlight, fresh snow, or water) hurt your eyes?
12. _____ Do your eyes itch or burn?
13. _____ Do your eyes water easily?
14. _____ Do you have muscle cramps?
15. _____ Do you have joint pains?
16. _____ Are your gums sore?
17. _____ Do you bleed easily?
18. _____ Do slight bumps tend to cause black and blue spots?

*From report of Council on Foods and Nutrition, American Medical Association, Adapted, Symposium by H. D. Kruse, 1943.

FOOD INTAKE RECORD SHEET

Date: _____ Day: _____

Name: _____

[illegible]

EQUIPMENT FOR LABORATORY ANALYSIS

The Kit

- 2 3-liter Beakers, labeled "Solids" and "Liquids"
- 1 250-ml. Beaker, labeled "Fats"
- 1 Dietetic scale
- 1 Drinking glass, calibrated to 1 oz.
- 1 200-ml. Flask of Concentrated HCL, for "Liquids"
- 1 400-ml. Flask of 20% HCL for "Solids"
- Cellophane covers to fit beakers.
- Rubber bands for covers
- Record book and pencil

Note: HCL used in preservation of samples during the collection period.

Chemical Supplies

Concentrated Sulphuric Acid	Mossy Zinc
Concentrated Hydrochloric Acid	Methylene Blue
Potassium Acid Phthalate	Methyl Red
Sodium Hydroxide Pellets	Phenalthalein
Sodium Hydroxide Flakes	Alcohol
Sodium Sulphate	Lubriscal
Copper Sulphate	

Equipment

500-ml. Kjeldhal Flasks	50-ml. Burettes
300-ml. Erlenmeyer Flasks	50-ml. Volumetric Pipettes
250-ml. Volumetric Flasks	20-ml. Volumetric Pipettes
2-liter Volumetric Flasks	5-ml. Volumetric Pipette
1-liter Volumetric Flask	10-ml. Graduated Blood
20-liter Flasks	Pipette
2-liter Flasks	500-ml. Sample Bottles
2-liter Mixing Flask or Bottle	10-in. Watch Glasses
1-liter Wash Bottle	4-in. Watch Glasses
3-liter Beakers	10-in. Funnel
250-ml. Beakers	4-in. Funnel

EQUIPMENT FOR LABORATORY ANALYSIS (cont.)

Dietetic Scales	Gram Scale
Wire Baskets	Balance
Dessicator	Weighing Bottle
Wire Sieve	Electric Hot Plates
Spatula	Digestion and Distillation Racks
Cellophane Paper	Asbestos Glove
Rubber Bands	

Solutions

10/N Hydrochloric Acid
 10/N Sodium Hydroxide
 10/N Potassium Acid Phthalate
 20% Hydrochloric Acid
 Concentrated Sodium Hydroxide (Saturated)
 Copper Sulphate (5 cc. contained 1 gm. salt)
 Mixed Indicator

Materials Used in Each Determination

10 mls. Food Digest (Solid)
 or 50 mls. Food Digest (Liquid)
 5 mls. Copper Sulphate
 10 gms. Sodium Sulphate
 25 mls. Concentrated Sulphuric Acid
 50 mls. 10/N Hydrochloric Acid
 50 mls. 10/N Sodium Hydroxide (or less)
 60 mls. Concentrated Sodium Hydroxide
 A few pieces of mossy zinc
 10 drops Mixed Indicator
 (or less)

FOOD SELECTION SCORE CARD

Courtesy of U. S. Dept. of Agri. Cooperative Extension Service,
 Adapted. Presented in Nutrition
 by
 M. S. Chaney and M. Ahlborn

Points	Food	No. of servings						
		1	2	3	4	5	6	7
	MILK							
20	{ Adults: 1/2 pt., 10; 3/4 pt., 15; 1 pt., 20 { Children: 3/4 pt., 10; 1 pt., 15 3/4 qt., 20							
	VEGETABLES							
40	{ 1 serving, 5; 2 servings, 10; 3 servings, 15 { Potatoes and leafy vegetables, 5 extra pts.							
	FRUITS							
	{ 1 serving, 10; 2 servings, 15 { If raw fruit or vegetable, 5 extra pts.							
	WHOLE GRAIN PRODUCTS							
15	{ 1 serving, 10; 2 servings, 15							
	CHEESE, EGGS, MEAT, DRIED PEAS AND BEANS							
15	{ 1 serving, 10 { 1 serving of any two, 15							
	WATER							
10	{ 1 1/2 qts., 5; 2 qts., 10							

100 Points possible
 85-100 points _____ Good
 75- 85 points _____ Fair
 Below 75 points _____ Poor

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