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Title: Nutrient Intake of Rural Oregon Participants in the Elderly Nutrition Program.

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The nutrient intake of forty-five participants in the Title IIIc Elderly Nutrition Program in rural Oregon was assessed through 7-day dietary records. The 1980 Recommended Dietary Allowances (RDA) were used to assess adequacy of intake. There were no statistically significant differences between the 7-day nutrient intakes of those who received home-delivered meals and those who ate at meal-sites one to four times a week. Age and sex of the subjects did not influence their nutrient intakes. The participants' overall seven-day dietary intakes of energy, calcium and vitamin B-6 were significantly (each $p<0.05$) below the RDA. Thiamin intake by the females was also significantly ($p<0.05$) below the RDA. Fat, as a percentage of energy intake, was significantly ($p<0.05$)

greater than 30%. For some participants the Program Meals contributed over 50% of the total carbohydrate, calcium, vitamin A and vitamin C intake for the seven-day period. It can be concluded that the provision of more Program Meals would increase the nutrient intake of the elderly who participate in the program.

Nutrient Intake of Rural Oregon Participants in the Elderly Nutrition Program

by

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NUTRIENT INTAKE OF RURAL OREGON PARTICIPANTS IN THE ELDERLY NUTRITION PROGRAM

INTRODUCTION

The elderly population in the United States has increased greatly in recent years and is expected to continue to increase for many more years. In 1980, there were 31.4 million Americans age 62 and older. By 1990, the Census Bureau expects this group to have increased to more than 38.2 million people (1). The elderly, as a group, have been thought to be in danger of having nutritionally inadequate diets (2). In an attempt to rectify this potential problem, the Federal Government sponsors nutrition programs through Title IIIc, which are administered by local divisions of Area Agencies on Aging.

Several studies have investigated the nutrient intakes of participants in the Elderly Nutrition Programs (ENP) who eat at congregate meal-sites (3-8). However, these studies have been conducted in urban areas and have not investigated the nutrient intakes of elderly individuals who receive home-delivered meals.

When the ENP began in 1972 it was intended to provide one hot meal per day, five days each week, to

individuals over age 62 in a congregate setting (9). This was soon extended to include the elderly who were incapable of providing meals for themselves and were physically unable to attend congregate meal sites.

The elderly people who live in Lincoln County, Oregon, do not ordinarily have an opportunity to receive more than two or three meals per week through the Title IIIc Elderly Nutrition Program depending on their location in the county. The people receiving home-delivered meals are expected to be less able to provide nutritious meals for themselves than those who are more ambulatory and eat at the meal-sites. Consequently, it was believed that the participants in the Lincoln County Elderly Nutrition Program may be at nutritional risk. In light of this, it was hypothesized that:

1) When averaged over three meals per day, seven days per week, the energy intake of ENP participants is less than the recommended range for persons over age 60.

2) The ENP participants who receive home-delivered meals have a lower nutrient intake than do the ENP participants who eat at the meal sites.

3) The Program Meals contribute a greater percentage of nutrients to the overall diets of those who receive home-delivered meals than to the diets of those who eat at the meal-sites.

4) Female ENP participants are significantly deficient in calcium intake as based on the RDA of 800 mg. per day.

5) The older (75 years and older) ENP participants have a lower nutrient intake than do the younger (under 75 years of age) ENP participants.

6) The fat content of the ENP participants' diets significantly exceeds the recommended thirty percent of daily energy intake.

The study reported in this thesis was undertaken to test the above hypotheses in anticipation of improved diets for the ENP participants in Lincoln County, Oregon.

REVIEW OF LITERATURE

Part I: Recommended Nutrient Intakes

The Recommended Dietary Allowances (RDA) have been the standard used by some nutritionists to measure dietary adequacy since 1943, even though the original intent of the Food and Nutrition Board of the National Academy of Sciences was to have the RDA be the nutritional goals. A margin of safety was built into the RDA in an attempt to insure the maintenance of good nutrition for "practically all healthy people in the United States" (10). Because there is this margin of safety (for all nutrients but not for energy), researchers commonly use sixty-seven percent or more of the RDA as signifying nutritional adequacy for practically all healthy people. However, problems may arise by accepting this standard for the elderly. Young (11) asserts that because the RDA focus on health maintenance, nutritional deficits may occur when additional nutrient requirements arise due to acute and chronic diseases and infections, physical trauma, or other stressful events common to the elderly. In view of these conditions, plus the numerous drugs taken by elderly people which may also increase nutrient needs, Butler and McGuire (12) concluded that using the RDA

for evaluating nutritional status of elderly people may be inappropriate.

The RDA for nutrients for individuals over 51 years of age are given in Appendix A. It must be recognized that there can be as many or more differences between an individual age 51 and another individual age 91 as there are in the forty-year period prior to age 51. Rivlin (13) believes that the data base used to determine nutritional requirements for the elderly needs to be expanded. Grouping all people over age 51 into one physiological entity is neither adequate nor appropriate. However, until more research on the nutritional needs of older people has been accomplished, we must rely on the current (1980) RDA as our standard.

It has been recognized that the energy needs of individuals decline as they age due to decreased resting metabolic rate and less physical activity(14,15). The Food and Nutrition Board (10) acknowledges this fact. Harper (16) cited the recommendations of a World Health Organization committee when he said that moderately active people age 60 to 69 need ten percent fewer calories than do people age 51. After age 70, the calorie allowance should be reduced by an additional ten percent. No further reductions for very elderly persons have been

given. With no documented research to base her comments on, Boykin (17) disagrees with the rationale apparent in these recommendations. She states,

> The older person typically has been advised to 'eat less' because his physical activity and metabolic demands have decreased. Yet, it must be recognized that as age increases more energy is needed for the same task performed in earlier years with less energy demand. The older person may require as much as twenty percent more energy to perform heavy activities than his younger counter-part.

Clearly, more studies must be undertaken in order to determine the energy requirements of the elderly.

Even though the actual energy requirements for the elderly are unknown, nutrient requirements have been assumed to be at least as high as those of people much younger (16-19). Consequently, in order to achieve adequate nutrient intake without consuming an excessive amount of energy, the nutrient density of the diets of the elderly must be greater.

An additional factor that should be considered is that the RDA values are established for a population and not for specific individuals (20). Variations in requirements among individuals are unknown. Howell and Loeb (21) assert that use of the RDA to establish inadequate nutritional intake (i.e., malnutrition) in an individual, when compared with his 24-hour recall of foods consumed, is not considered acceptable by the

National Research Council (10). The recommended allowances are intended as guides for interpretation of food consumption by groups of people. In evaluation of individual dietary adequacies, these allowances can serve as a reference. Current and past nutrient intake, presence of disease states, evaluation of clinical signs and symptoms, and biochemical data on tissue, blood, and excretory levels of nutrients are all necessary to determine the nutritional status of individuals.

Caliendo (3) sums this up when she says that it is difficult to state the nutritional needs of the elderly. It is most unfortunate that, in considering this question, those persons who are over the age of sixty years are frequently lumped together in the classification of "the elderly." The needs of all individuals are clearly individual. The RDA should not be totally rejected in terms of the elderly, but rather their limitations should be recognized and the older person should be treated as an individual with respect to nutritional needs.

Part II: Nutrient Intake of the Elderly

Recently, Freedman and Ahronheim (22), two medical doctors, made some recommendations for nutrient intake

by the elderly. Citing no references, they stated that they believe that 50 to 70 grams of protein per day, in a diet of 1800 to 2400 kilocalories, is adequate. In the absence of disorders of calcium metabolism all elderly persons should ingest at least 800 mg per day of calcium. All elderly persons should receive at least 400 IU's per day of vitamin D - perhaps even 800 IU's per day in order to prevent age-related osteomalacia and calcium malabsorption leading to osteoporosis. The RDA of 5,000 IU's vitamin A per day should not be exceeded in American elderly persons except in the extremely rare case of proven vitamin A deficiency. Their recommendations for other nutrients are consistent with the RDA.

Probably the most widely publicized studies of nutrient intakes in the United States were the Ten-State Nutrition Survey (23) and the Health and Nutrition Examination Survey I (HANES I) (24). These studies looked at the intakes of a cross-section of Americans, ages 1 to 74. Schwerin et al. (25) reexamined the data from these surveys and found that out of the 1828 individuals age 65 to 74 in the HANES I study, 88.8 percent exhibited clinical symptoms of nutritional deficiency. Specific nutrient deficiencies were not given. However, the symptoms listed consisted of forty different visible clinical manifestations

including problems with eyes, mouth and teeth, hair, skin, tongue, etc., many of which are manifestations of chronic medical problems which are common in elderly people. Among those older individuals who consumed diets high in meat, vegetables, fruits and juices 87.2 percent exhibited clinical symptoms of deficiency and those older individuals who ate diets high in poultry and shellfish and lower in red meats, vegetables and fruits showed a 90.8 percent rate of clinical symptoms. According to the HANES I, these older individuals are more apt to exhibit clinical symptoms of nutritional deficiency than any other groups of people in the United States. (People in the 24 to 34 years age group showed 69.8 percent with clinical symptoms of nutritional deficiency.) Biochemical measurements did not reveal the same differences between age groups. In fact, only thirty-five percent of the individuals age 65 to 74 exhibited biochemical deficiencies. The Ten-State data were not broken down and examined in the same way. However, Betts and Vivian (26) state that both the Ten-State and the HANES I presented the conclusion that the elderly as a group have been thought to be at risk nutritionally. Betts and Vivan went on to say that the diets of elderly are commonly inadequate in calcium, vitamin A, iron and vitamin C.

Consuming a nutritious diet can be a very real

problem for many elderly people. Dietary restrictions may be imposed due to physical conditions (27). Older people frequently must cope with social, economic, and psychological changes in their lives. Many of these changes drastically reduce a person's food intake (28). Pelcovits (29) said that lonely people may not prepare meals just for themselves, thereby acquiring poor eating habits. Albanese and Wein (30) point out that the negative physical, psychological and social factors can eventually lead to loss of appetite and associated clinical problems. They go on to say that faulty nutrition manifests itself in a progressive order in the following conditions: tissue depletion, biochemical changes, functional changes, and anatomical changes. Brin et al. (31) suggest that vitamin deficiencies transverse five stages: preliminary , biochemical, physiological, clinical, and anatomical.

Busse (32) states that changes in hearing, vision, taste and smell play an important part in the eating and drinking patterns of the elderly. Many elderly people feel socially isolated, have problems in maintaining their self-esteem and have such a change of life-style after they retire and/or lose spouses that their eating habits are severely affected. Several researchers (2,18,33-38) suggest that low incomes of a large segment of the elderly population have a great

impact on the poor diets they have. This refutes the findings of Jordan et al. (38) in Westchester County, New York. They concluded that there were no gross differences in the eating habits of the persons studied, regardless of economic status. Grotkowski and Sims (39) reported that the possession of attributes such as those named above may lead the elderly into undesirable dietary habits such as under-eating, over-eating, and eating monotonous meals.

LeClerc and Thornbury (4) studied a group of elderly people in Maine, half of whom were recipients of meals at a congregate meal site. They found no significant differences, based on 3-day dietary records, between the nutrient intakes of those who ate congregate meals and those who did not. More than 75 percent of the subjects had diets which contained more than 66 percent of the 1980 RDA for all but two of the nutrients measured (thiamin and female intake of calcium).

Yearick, Wang, and Pisias (41) evaluated the nutrient intakes of 100 elderly men and women, twenty of whom lived in a retirement community which provided one meal per day for the residents. The other eighty subjects were living independently. They found that the people who had one meal prepared for them daily actually ate less food than those who provided for

themselves. These twenty retirement community residents consumed significantly less protein, iron, thiamin, and ascorbic acid, but had higher mean intakes of calcium, vitamin A and riboflavin than those who lived in private homes.

In a study of fifty elderly Canadians, all living in private homes, Reid and Miles (2) found that only ten percent of the subjects had diets meeting the Canadian Dietary Standard (CDS) (Appendix C) for energy and eight nutrients. Most of their subjects ate three meals per day which they provided for themselves. Receiving less than two-thirds the CDS for energy were twenty percent of the subjects; for vitamin A, twenty-four percent of the subjects; for ascorbic acid, riboflavin, and thiamin, respectively, fourteen, eight, and six percent of the subjects; two percent of the subjects exhibited intakes that were less than two-thirds the CDS for protein, calcium, and iron.

Grotkowski and Sims (39) examined nutritional knowledge, attitudes and dietary practices of forty independently-living senior citizens. They found that socioeconomic status and nutritional knowledge were important influences on positive dietary intakes. The mean intakes of energy for both men and women were seventy-five percent of the RDA for 1974 (Appendix B). The women's mean intake of calcium was two-thirds of

the RDA (800 mg) and thiamin intake was between two-thirds and 100 percent of the RDA. All other nutrients met or exceeded the recommended amounts.

To investigate the relationship between nutritional status and immune function, Garry et al. (42) did a five-year longitudinal study of 270 independently-living, healthy elderly people. Approximately three-quarters of the study population had energy intakes less than 100 percent the 1980 RDA (Appendix A). These investigators were concerned that one-fourth of their study population failed to receive at least 75 percent of the RDA for vitamin B-6 and calcium.

Dietary intakes and supplement usage were determined by Gray, Paganini-Hill, and Ross (43) who mailed questionnaires to elderly individuals living in a retirement community. For the fifty-one people who completed the questionnaires, the nutrients which most often fell below 100 percent of the RDA were calcium for both men and women; energy for men; and iron, thiamin, riboflavin, and niacin for women.

One hundred independently-living elderly people participated in a study using 24-hour dietary recalls which was conducted by Betts and Vivian (26). When compared to the RDA, total food energy, calcium, and vitamin B-6 were below recommended amounts for one-half of the women. The mean energy intake of all subjects

fell below the recommended range.

In England, Exton-Smith, Stanton, and Windsor (44) and Stanton and Exton-Smith (45) conducted studies with independently-living elderly people. Exton-Smith et al. (44) looked at the nutrient intakes of 54 elderly individuals through the use of 7-day dietary records. The mean intakes of energy, iron, and protein for both sexes were less than the recommended amounts and the calcium intake by women was less than recommended. Stanton and Exton-Smith (45) assessed nutrient intake by weighing the food eaten by nineteen elderly women for seven days. Of the five nutrients examined, only calcium intake was less than the recommended amount. Six years later, the nutrient intakes of thirteen of the original nineteen women were again investigated. At this time, calcium intake exceeded the recommended amounts and the intakes of the other four nutrients examined (energy, protein, iron and vitamin C) were found to be adequate.

Caliendo (3) investigated the dietary intakes of 53 elderly participants in the Title IIIc Nutrition Program for the Elderly. All participants ate at congregate meal-sites. She found that over 25 percent of the participants had energy intakes of less than two-thirds the 1974 RDA. Twenty percent had calcium intakes below two-thirds the RDA. For many of the

subjects, she observed that on the day the Program Meal was eaten the Title IIIc meals provided at least fifty percent of their daily nutrient intake.

Kohrs et al. (5) also examined the nutrient intakes of 250 elderly individuals who ate at congregate meal-sites of the Title IIIc Nutrition Program. Even though the Program Meals provided at least 50 percent of all nutrients on the days Program Meals were available, many people did not eat all of the food they were served. Consequently, twenty-five percent of those surveyed received less than two-thirds the RDA for energy, twenty percent had intakes below two-thirds the RDA for both calcium and thiamin, eighteen percent fell below this standard for iron and fifteen percent were below for niacin.

In an attempt to identify nutritional deficiencies in a rural elderly population, Rawson et al. (46) investigated the nutrient intakes of 28 elderly individuals through the use of 24-hour dietary recall. The subjects in their study exhibited more nutritional deficiencies than the subjects in the other studies cited here. At least eighteen percent of the subjects had nutrient intakes less than two-thirds of the RDA for all of the nutrients they examined. More than fifty percent of the subjects reported intakes of calcium that were below two-thirds of the RDA. Fifty

percent or more of the men in the study had intakes of energy, riboflavin and vitamin A that were below this standard. The women appeared to have slightly better diets than the men.

Bowman and Rosenburg (47) surveyed the nutritional intakes of 100 elderly individuals. Thirty-three percent of the women in their study reported intakes of calcium that were less than two-thirds the RDA. Thirty percent of the subjects had a vitamin C intake that was below two-thirds the RDA and between ten and fifteen percent had energy intakes less than two-thirds the RDA. Twenty-four percent of the women received less than two-thirds the RDA for vitamin A.

Pao and Mickle (48,49) examined the data from the Ten-State and HANES I surveys to arrive at their conclusions about problem nutrients. They found that out of 2730 elderly women and 1654 elderly men, fifty-four percent of the women and thirty-eight percent of the men had calcium intakes below two-thirds the RDA. The other problem nutrients for the elderly that they identified were iron, vitamin A and vitamin C.

Summaries of the nutrient intake data from all of the above cited studies are found in Table 1 and 2. Studies on the nutrient intakes of the elderly which had been reported before 1978 were reviewed by O'Hanlon and Kohrs (40).

TABLE 1

A summary of significant findings from dietary studies of elderly persons conducted since 1978#.

Authors	-- SUBJECTS -- No.	Sex	Avg. Age	Nutri-ents*	Records	Findings
LeClerc & Thornbury (4)	27 26	M/F	72	abcdef ghijk	3-day dietary records	Thiamin<RDA; VitC>RDA
Yearick et al. (41)	75 25	F M	76 81	abcdef ghijk	3-day dietary records	Calcium(M)>RDA; Thiamin>RDA
Reid and Miles (2)	50	M/F	75	abefg hijk	24-hr.recall for 4 days	Kcals,Thi,Ca(F)<RDA; Fe<RDA;VitC>RDA
Grotkowski & Sims (39)	40	M/F	72	abcdef ghijk	3-day dietary records	Kcals,Ca&Thi(F)<RDA; Thi(M),VitC>RDA
Garry et al. (42)	125 145	F M	70 70	abcd	3-day dietary records	Kcals<RDA; VitC>RDA
Gray et al. (43)	32 19	F M	75 77	abcdef ghijk	Questionnaire-Diet Practices	Kcals<RDA; Thi,VitC,Ca(M)>RDA
Betts & Vivian (26)	75 25	F M	65+ 65+	abefg hijkl	24-hour recall	Kcals,Ca(F)<RDA; Thi,VitC>RDA
Exton-Smith et al. (44)	44 10	F M	82 87	abefgk	7-day dietary records	Kcals,Fe,Pro&Ca(F) <recommended
Stanton & Exton-Smith(45)	19 13	F F	84 85	abefk	7-day weighed food records	Ca<RDA; Ca>RDA (6 yrs. later)

Footnotes:

*a=kcals; b=protein; c=fat; d=carbohydrate; e=calcium; f=iron; g=vitA h=thiamin; i=riboflavin; j=niacin; k=vitC; l=vitB-6

#O'Hanlon and Kohrs (40) reviewed elderly intake studies that were conducted prior to 1978.

TABLE 2

A summary of studies of independently-living elderly persons with percent of nutrient intakes less than 67% RDA.

Authors	Sex	No.	Kcal	Pro	Ca	Fe	Thi	Rib	Nia	VitA	VitC
Caliendo (3)	M/F	53	26	17	20	18	15	3	3	7	4
Kohrs et al.(5)	M/F	250	25	5	20	18	20	8	15	3	2
Rawson et al. (46)	M	11	73	18	64	18	45	55	45	73	18
	F	17	35	18	53	29	35	35	29	35	24
Bowman & Rosenburg (47)	M	25	12	4	16	0	12	4	12	16	30
	F	75	15	0	33	4	17	1	4	24	30
Pao & Mickle (48,49)	M	1654	*	*	38	5	*	*	*	16	27
	F	2730	*	*	54	14	*	*	*	19	24

Footnotes:

*Pao and Mickle did not include these data when they reported their findings.

Part III: Title IIIc Nutrition Program

In response to the discovery of hunger among our nation's elderly, the Federal Government developed policies to rectify the problem. Some funds were allocated in 1967 to study hunger among the elderly. Other monies have since been given for programs to aid in feeding these older people. Jean Mayer, one of the driving forces behind the 1969 White House Conference on Food, Nutrition and Health noted, "The aim of the 1969 White House Conference was to evaluate the state of nutrition of the American people and formulate the basis for a national nutrition policy" (50).

A report published by the National Council on Aging (51) in 1970, points out that after housing costs were paid, eleven percent of the 24,000 American elderly from across the nation who were surveyed said that there was not enough money left over for food. Seventeen percent reported difficulty in getting meals or securing food, and thirty percent said they could not prepare their meals by themselves. On the basis of reported incomes and known food costs, even moderately nutritious meals appeared impossible for many.

Polcovits (29) reported, in 1970, on a research and demonstration program initiated in 1968 by the

Administration on Aging. This program was the first involvement of the Federal Government in providing meals for the elderly in congregate settings and through home-delivery to shut-ins. Federal policy directs nutrition centers to serve meals (congregate and home-delivered meals) providing one-third of the RDA of major nutrients (52).

During the White House Conference on Aging in 1971, further recommendations were made in regard to nutrition policies for the elderly (53). In the introductory statement to the recommendations, it was pointed out that we take for granted that all older Americans should be provided with the means to insure that they can enjoy life, liberty, and the pursuit of happiness. Adequate nutrition is obviously basic to the enjoyment of these rights. Food is more than a source of essential nutrients. It can be an enjoyable interlude in an otherwise drab existence. Recommendations were then made for the Federal Government to allocate the major portion of funds for action programs to rehabilitate the malnourished aged and to prevent malnutrition among those nearing old age.

In March 1972, the projects begun through Title IV of the Older Americans Act to improve nutrition services to the elderly, resulted in the enactment of

the Title VII Nutrition Program for the Elderly. (This is now Title IIIc.) With the aid of Title VII funds, nutrition projects provide at least one hot meal a day for elderly persons plus supportive services in a congregate setting in community locations (9).

The Administration on Aging, Department of Health, Education and Welfare, now the Department of Health and Human Services (DHHS), administers the National Nutrition Program for the Elderly. Even though it provides one hot meal per day for elderly individuals, it does not reach many people due to inadequate funding (54).

Kohrs, O'Hanlon, and Eklund (6) conducted a survey in Missouri in an attempt to determine the contribution the congregate meals made to the participants' diets. Through 24-hour food records kept by 466 individuals, they found that those eating at the meal site on the day of the food record received more energy, protein, and calcium than non-participants. Between forty and fifty percent of the total daily nutrient intake was obtained at the meal center. As a result of this study, Kohrs concluded that programs should serve meals five times a week (9). She affirms that if the program meals were to provide 50 percent of the RDA for all nutrients, one-third of the weekly allowances could be provided for an individual who received the meals five

days per week. When individuals only receive meals three days per week, providing 80 percent of the RDA for all nutrients would be necessary in order to insure the same amount of nutrition provided by meals served five days per week.[1]

In 1978 the Comprehensive Older Americans Act Amendments consolidated social services, nutrition services, and multipurpose senior centers under a revised Title III, and increased funds for congregate meals from $250 million in 1978 to $400 million in 1981 (7). However, under the Reagan administration there were some cut-backs and in fiscal 1984 the program for congregate meals only received federal funding of $382 million. At the present time, the meal programs are working to increase voluntary contributions from participants and to diversify their funding (1).

A study called "Evaluation of the Nutrition Services for the Elderly" (8) revealed that the voluntary contributions of the participants were rather insignificant when compared to the costs of providing the meals. In 1982, congregate contributions averaged $0.57 and home-delivery contributions averaged $0.62.

[1]The following formulas were used to support her arguments:

$$\frac{50\% \text{ of the RDA/day} \times 5 \text{ days/week}}{7 \text{ days} \times 100\% \text{ of the RDA/day}} = \frac{250\% \text{ consumed/week}}{700\% \text{ suggested/week}}$$

$$\frac{80\% \text{ of the RDA/day} \times 3 \text{ days/week}}{7 \text{ days} \times 100\% \text{ of the RDA/day}} = \frac{240\% \text{ consumed/week}}{700\% \text{ suggested/week}}$$

The costs were approximately $4.09 to provide a congregate meal and $4.70 to provide a home-delivered meal. The contributions of the congregate participants in Lincoln County, Oregon, in September 1985, averaged $0.80 per meal. The home-delivery recipients contributed $0.74 per meal during the same period. The costs of providing the meals in Lincoln County were approximately $4.00 at the congregate site and $4.28 for home-delivery (56).

Based on the premise that "half of our older population do not have adequate diets, and a good income does not mean that the older person eats well," the American Dietetic Association (ADA) took a pro-active stance and testified before legislative groups prior to the reauthorization in 1984 of the Older Americans Act (57). The ADA recommended that Congress reinstate the requirement that project sites serve meals providing one-third of the Recommended Dietary Allowances at least five days per week. One site in each area should provide for home-delivered meals seven days per week. Additional funds should be allocated for weekend meals for people who cannot prepare their own and would, therefore, go hungry. In order to adequately provide for optimum nutrition of the elderly, most of the researchers appear to be in agreement with the ADA's position.

METHODS

Survey Design

The cooperation of the meal site managers in Lincoln County was obtained through the Elderly Nutrition Program Director, Barbara Barnes. The managers briefly explained the study to the elderly individuals who ate at the meal sites. They also contacted the recipients of home-delivered meals and asked if they would be willing to be part of a nutritional study. The names of the individuals who responded favorably were placed on a list for further contact by the investigator.

The investigator spoke to the people eating at the meal sites in three different locations of the county, Lincoln City, Siletz and Waldport, to explain the purpose of the study and what would be expected from those who volunteered. The volunteers were then given further instructions on how the data would be collected.

The recipients of home-delivered meals were contacted by telephone to arrange a convenient time for the investigator to visit and explain the study. At the end of this visit, the investigator explained how the records were to be kept or, in cases where the

people could not write, the investigator arranged a time to collect the data daily.

Sample

Out of the three congregate meal-sites visited, twenty-two volunteers kept daily food records: four men and four women from Lincoln City[2], one man and three women from Siletz, and two men and eight women from Waldport completed the food records. This group included one married couple. The mean age for those who ate at the meal-sites was 74.5 ± 8.8 years, with a range of 63 to 91 years.

The recipients of home-delivered meals who participated in our study were chosen from Newport, Siletz and Waldport. Thirty-four recipients were contacted. Twenty-eight people agreed to an initial interview and twenty-three of them completed the seven-day dietary study. There were three men and eleven women who lived in Newport, two men and two women in Siletz, and one man and four women in Waldport. This group included four married couples. The mean age for the recipients of home-delivered meals included in the

[2] Although one man at the Lincoln City meal-site chose not to eat any of the Program Meals during the study week, his data were included in this investigation as he is a regular participant in the meal-site program.

study, was 81 ± 8.8 years, with a range of 62 to 96 years.

The two groups had nearly equal distributions by sex. There were seven men and fifteen women in the meal-site group and six men and seventeen women in the group receiving home-delivered meals. All of subjects but two were ambulatory even though some had limited mobility.

Forms

The forms which were used for the data collection are given in Appendix D. Instructions for filling them out were given verbally as well as in written form.

The subjects were also given questionnaires which they filled out at the end of the week of data collection. The questionnaires were designed by using information found in Oppenheim's Questionnaire Design and Attitude Measurement(58). (See Appendix E.) Some of the information gathered through the questionnaires will be used in a later paper.

Collection Procedures

Seven-day dietary records were used to calculate nutrient intake for days when Program Meals were eaten

as well as the weekdays and weekend days when the individuals had to prepare meals for themselves. Campbell and Dodds (59) found that dietary intake varied a great deal from weekdays to weekend days. Consequently, they recommended a three-day dietary record to include one weekend day. We believed that seven days would give a better overall average for the subjects in this study. However, the data were not analyzed to determine whether or not seven-day dietary records were significantly different from three-day dietary records which included one weekend day.

All participants in the study were shown plastic food models as an indication of portion size. They were each given a clear plastic measuring cup which had been marked for fractional cup amounts. They were encouraged to weigh their food if a food scale was available. Since the Program Meals are served by prescribed portions, the participants were informed to record "all," "one-half," etc., of the portions consumed when they ate a program meal. In addition to the verbal instructions, the participants were given a sheet containing the same instructions as a reminder. Each participant was given seven sheets of blank diet records, a questionnaire and an information/instruction sheet. They were asked to use a different sheet for each day and to mark the day of the record on the

sheet. They were instructed to include all food and beverages consumed each day.

Recipients of home-delivered meals who were unable to write, were visited each day by the investigator. Eleven people required daily visits. The investigator went through the questionnaires with all of the recipients of the home-delivered meals at the end of the study week. Answers to food and beverage questions on the questionnaires (Appendix E) were used as checks against the diet records. For example, an individual who reported daily alcohol cosumption on the questionnaire and not on the daily diet sheets was asked to add the correct amounts to the diet records.

After one week of record keeping, the meal-site participants returned the completed record sheets and questionnaires to the meal-site. As they were received by the interviewer, the records and questionnaires were checked over for completeness and agreement between the dietary records and food and beverage questions on the questionnaires. The people were all thanked for their cooperation in the study.

Evaluation of Data

The food items from each subject's seven-day dietary record were compiled into a total composite for

each one's weekly dietary intake. Food items and amounts were then coded for use with the Ohio State Nutrient Database (60). Following computerized analysis of the diets, each nutrient to be examined was carefully checked against Revised Handbook 8 (61). The nutrients were then averaged to show the average daily intake of each subject.

Married Couples

Married couples were not treated any differently than single subjects in this study. The fact that two people lived in the same household appeared to have little influence on how much the individuals ate or even what they ate. The married couples had diets as varied as the other participants.

Statistical Analysis

With the assistance of graduate students[3] from the Statistics Department at Oregon State University, the methods for statistical analysis were chosen. The SIPS (62) program was used for regression analysis, analysis of variance, and t-tests. The test statistic used to

[3]Pachitjanut "Oui" Siripanich
Bārbara Peniston

eliminate non-significant data was $p>.05$. Data are expressed as means + standard deviation.

Regression analysis was used first to determine any significant relationships between the recipients of home-delivered meals and the individuals who ate at the meal-sites. This method was also used to test relationships between nutrient intakes and the sex and age of the subjects.

T-tests were used to test the significance of differences between mean nutrient intakes of the subjects and the RDA for each nutrient. They were also used to test the significance between the mean calcium intake of women who received home-delivered meals and the women who ate at the meal-sites.

Analysis of variance was used to measure the relationships between number of Program Meals eaten and the percentage of the amounts of nutrients consumed. Whether the meals were home-delivered or eaten at a meal site was also a variable considered in the analysis of variance.

All data were analyzed with and without the outliers (individuals with nutrient intake values much higher or lower than the rest). As there were no significant differences, except as discussed in the Results section, all data were used in the final analysis.

RESULTS AND DISCUSSION

There were forty-five elderly persons who participated in this study: thirteen males and thirty-two females. Table 3 shows the number of Program Meals eaten by the people who received home-delivered meals and the people who ate at the meal-sites. The mean number of meals eaten by those who received home-delivered meals was 2.5 ±.6 meals. The individuals who ate at the meal sites ate a mean number of 2.4 ±1.0 meals. The mean number of meals consumed by the combined groups was 2.4 ±.8 meals.

7-Day Nutrient Intake Including Program Meals by Sex and Age

The sex of the subjects made no statistically significant difference on nutrient intakes (data not given) except for niacin and alcohol, which is not ordinarily classified as a nutrient, both with regression coefficients of 0.37 (significant at $p<.01$). Male subjects had a significantly higher intake of alcohol, and female subjects had a significantly higher niacin intake. These differences will be discussed later. Although there was a wide range in the participants' ages, the age of the subjects did not

TABLE 3

Number of Program Meals eaten during study week.

Number of Meals	Number of Persons Eating	
	Home-Delivered Mean=2.5 meals	Meal-Site Mean=2.4 meals
0	0	1
1	1	3
2	9	6
3	13	11
4	0	1

make a statistically significant difference on their nutrient intake. The ages of the two groups were similar: 81.8 ± 8.8 (range 62 - 96) years for the recipients of the home-delivered meals and 74.5 ± 8.8 (range 63 - 91) years for those who ate at the meal sites.

Since there were no statistically significant differences, sex and age were disregarded when nutrient intake of the recipients of home-delivered vs. meal-site meals were compared.

Daily Nutrient Intake, Based on 7-Day Dietary Records, of Subjects Receiving Meal-Site or Home-Delivered Meals

Based on t-tests, there were no statistically significant differences in the mean energy or nutrient intake between the participants who ate at the meal sites and the recipients of home-delivered meals (Table 4). All subjects ate zero[4] to four Program Meals (Table 3) which are included in this 7-day mean. Busse (32), in 1979, and Schafer and Keith (33), in 1982, suggested that decreased nutrient intake could be expected through decreased socialization of the

[4]One man who was a volunteer driver and normally ate at the meal-sites chose not to eat any of the Program Meals during the study week. His data were included because of our interest in the effect of social characteristics on nutrient intake.

TABLE 4

Mean daily nutrient intake based on 7-day dietary records of elderly persons receiving home-delivered or meal-site meals*(1).

Nutrient	Home-Delivered N=23 $\bar{X}$	s.d.	Range	Meal-Site N=22 $\bar{X}$	s.d.	Range	t-values*(2)
Energy, kcals*(3)	1260	335	516-1925	1445	517	833-3439	1.39
Protein, g.	45	14	23-75	53	19	32-118	1.49
Fat, %kcals*(3)	39	7	22-52	38	6	24-46	0.48
CHO, %kcals*(3)	47	9	33-71	48	10	37-60	0.38
Calcium, mg.	571	277	84-1015	587	278	213-1605	0.19
Iron, mg.	10	6	5-33	11	5	6-24	0.76
Vit A, IU	3998	1778	783-16,479	5097	2327	1076-10270	1.73
Thiamin, mg.	.1	.0	.3-1.6	1.0	.5	.4-2.7	1.08
Riboflavin,mg.	1.4	1.1	.3-6.1	1.4	.6	.6-3.9	0.18
Niacin, mg.	12.1	4.7	4.8-25.2	14.2	6.00	7.3-35.4	1.28
Vit C, mg.	65	45	13-201	71	31	14-140	0.48
Vit B-6, mg.	1.1	.5	.5-2.0	1.2	.4	.7-2.1	0.62

Footnotes:
*(1) Mean number of Nutrition Program Meals = 2.4.
*(2) None of the values were statistically significant.
*(3) Alcohol was not included in figuring the percentage of energy from fat and carbohydrate.

elderly. The results of the current study appear to refute this. However, not all subjects in either group in this study lived alone. Of the people who received home-delivered meals, nine (39%) lived in a home with one other person and two (9%) lived with more than one other person. Six (27%) elderly people who ate at the meal-sites lived with one other person. Only twelve (52%) recipients of home-delivered meals and sixteen (73%) people who ate at the meal-sites lived alone. The meal-site participants included one married couple and the home-delivered meal recipients, four.

There is a paucity of published literature comparing the nutrient intake of the recipients of home-delivered meals with their counterparts who eat at meal sites. However, McLaren and Posner (63), in an abstract, reported a study of 79 home-bound elderly in whom extreme protein calorie malnutrition, selected nutrient deficiencies and massive obesity were diagnosed (63). These people were not receiving any outside help such as nutrition program meals. There were only two (4%) individuals in the current study who could actually be classified as "home-bound" elderly, as the rest were able to shop for their own food. (Some needed transportation for this, however). More research should be done on the needs of home-bound elderly persons and those elderly who feel they cannot

leave home for the purpose of eating a meal in a congregate setting.

Contribution of Program Meals to Total Nutrient Intake

Several investigators (3-5) have examined the nutritional intake of people who ate at meal-sites. They found that the people who ate in the congregate settings received at least 50 percent of the RDA for nutrients on the day Program Meals were eaten. In the current study, we did not examine the contribution from Program Meals on a daily basis. The investigators cited used control groups who received no Program Meals which the current study did not. Table 5 shows the contribution of Program Meals in Lincoln County, Oregon, to the total nutrient intake of those who received them during the study week. These percentages were calculated by comparing the subjects' nutrient intake from the foods supplied by the Program Meals with their overall food intake for the week. In general, the mean intake of most nutrients indicate that one-fifth to one-fourth of the subjects' total intake was supplied by the one to four program meals eaten during the week. (Table 3 shows the number of Program Meals eaten by the two groups of subjects.) Table 6 gives the percentage of nutrients supplied by

TABLE 5

Contribution of Program Meals as a percentage of total nutrient intake for one week. (1 - 4 Program Meals eaten)

	Combined Groups N=45			Home-Delivered N=23			Meal-Site N=22			
Nutrient	$\bar{X}$	s.d.	Range	$\bar{X}$	s.d.	Range	$\bar{X}$	s.d.	Range	t-value*
Energy(kcals)	18	10	5-40	19	9	5-40	14	9	5-40	1.73
Protein	21	10	2-45	25	10	6-45	18	9	2-34	2.49
Fat	16	10	3-43	19	10	5-43	13	8	3-34	2.02
CHO	18	14	2-54	18	15	2-54	19	13	3-48	0.23
Calcium	20	15	2-53	21	16	2-53	18	14	2-47	0.71
Iron	18	9	2-41	20	9	2-41	17	8	4-34	1.03
Vitamin A	22	16	2-70	24	19	2-70	19	14	2-43	0.87
Thiamin	17	9	3-40	17	9	3-40	16	9	3-26	0.53
Riboflavin	18	11	3-42	18	11	4-37	17	10	3-42	0.30
Niacin	18	8	4-32	20	8	4-32	16	7	6-30	1.83
Vitamin C	24	16	0-56	25	17	0-56	22	14	4-49	1.93
Vitamin B-6	17	8	4-38	16	9	4-38	18	7	6-28	0.57

Footnotes:
*None of the values were statistically significant between home-delivered and meal-site meals.

The mean number of meals was 2.5 and 2.4, respectively.

TABLE 6

Contribution of Program Meals as a percentage of total nutrient intake based on number of Program Meals eaten (home-delivered and meal-site meals combined).

Nutrient	1 Meal N=4 $\bar{X}$	s.d.	Range	2 Meals N=15 $\bar{X}$	s.d.	Range	3 Meals N=24 $\bar{X}$	s.d.	Range	4 Meals N=1 $\bar{X}$	s.d.	Range
Energy(kcals)	6	2	4-10	12	5	5-21	22	9	11-40	25	0	25
Protein	7	2	6-10	20	9	2-37	26	9	12-45	26	0	26
Fat	8	5	3-12	12	7	5-26	21	10	7-43	17	0	17
CHO	6	3	4-10	10	6	2-20	25	15	6-54	29	0	29
Calcium	6	3	3-9	13	12	2-42	26	15	10-61	26	0	26
Iron	5	3	2-9	12	7	4-22	20	10	9-41	15	0	15
Vitamin A	5	3	2-9	11	11	2-43	27	16	9-70	16	0	16
Thiamin	6	3	3-9	13	6	3-27	17	11	7-42	18	0	18
Riboflavin	5	2	5-7	9	5	4-29	18	14	9-46	20	0	20
Niacin	6	2	4-9	12	7	5-29	21	8	8-36	19	0	19
Vitamin C	8	4	4-13	16	16	0-49	22	18	6-56	36	0	36
Vitamin B-6	7	1	6-8	11	8	4-28	17	10	10-38	19	0	19

the one, two, three or four Program Meals eaten per week. As would be expected, analysis of variance and regression analysis indicated a straight-line relationship between the number of Program Meals eaten per week and the percent of the total nutrients and energy from those meals. An example of this relationship is shown in Figure 1. In light of the relationship between numbers of meals eaten and nutrients consumed from those meals, the formulas given by Kohrs et al. (6), in which they recommended providing 80 percent of the RDA in the Program Meals for people who only eat Program Meals three days per week, would seem feasible in theory if not in practicality.

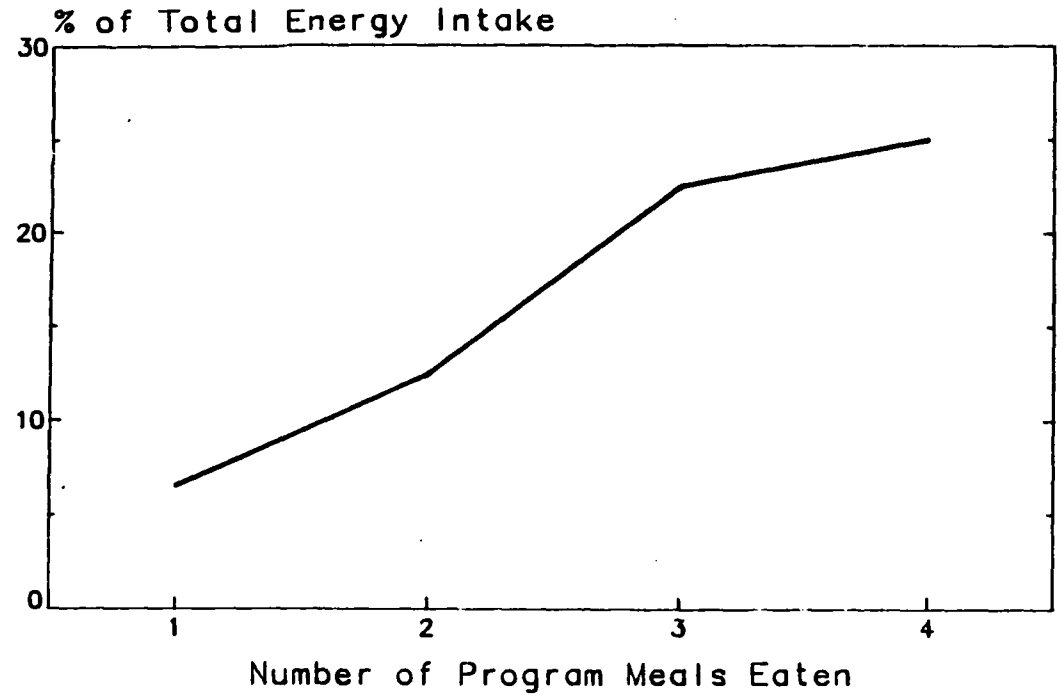
Table 5 shows that some of the subjects received more than 50 percent of the RDA from the Program Meals for their total energy, calcium, and vitamins A and C needs for the week. Therefore, the Program Meals are a very important contribution to the total nutrient intake of these individuals.

Correlation Between Nutrient and Energy Intake

Generally, the total amount of nutrients consumed by the subjects was directly proportional to energy intake. This is shown in the signficant regression

Energy Intake vs. Number of Program Meals Eaten
(Percentage of Total Energy Intake)

FIGURE 1



analysis coefficients (except for vitamin C) listed in Table 7. In this study, vitamin C did not exhibit a positive correlation with kilocalories. This was expected because the energy content of vitamin C-rich foods is usually low. Therefore, even though the vitamin C content of the subjects' diets was high, the energy content of those foods was low.

Daily Nutrient Intake of the Two Groups Combined Based on 7-Day Dietary Records

Since there were no statistically significant differences between the nutrient intakes of those who received home-delivered meals and those who ate Program Meals at congregate meal-sites (Table 4), all of the nutrient data from those two groups were combined. However, there were wide variations in the amounts of nutrients consumed. These differences will be discussed in the following subsections on energy (Table 8), calcium (Table 9), and the other nutrients examined (Table 10). The data in these tables have been compared to the RDA (10). The numbers of individuals receiving less than two-thirds the RDA for each nutrient are given in Table 11.

TABLE 7

Correlation between energy intake and other nutrient intakes of elderly persons.

Nutrient	r value*
Protein	0.85
Fat	0.87
CHO	0.89
Iron	0.67
Vitamin A	0.58
Thiamin	0.79
Riboflavin	0.76
Niacin	0.62
Vitamin B-6	0.65
Vitamin C	0.33

TABLE 8

Daily average energy intake of independently-living elderly persons who are participants in the Elderly Nutrition Program as compared to the RDA. (Based on 7-day dietary records from home-delivered and meal-site participants.)

Kcal RDA	Subjects			$\bar{X}$	s.d.	Range	Median	p	
	No.	Age (yrs.)	Sex	<------Kcals per day------>					
1,600	18	76+	F	1303	304	619-1925	1245	.01	<RDA
1,800	14	62-75	F	1214	350	516-1913	1270	.01	<RDA
2,050	10	76+	M	1396	247	943-1690	1463	.01	<RDA
2,400	3	62-75	M	2118	1154	1303-3439	1613	NS	

TABLE 9

Daily calcium intake of elderly nutrition program participants comparing home-delivered meal recipients with those eating at meal-sites based on 7-day dietary intake.

Location	No.	Age yrs.	Sex	$\bar{X}$	s.d.	Range	Median	p	
				<-------mg per day------>					
Home	17	62-96	F	553	284	84-1015	523	.005	<RDA of 800mg/d
Meal-Site	15	63-91	F	521	150	213-803	482	.0005	<RDA of 800mg/d
Home	6	77-89	M	623	273	229-910	712	.01	<RDA of 800mg/d
Meal-Site	7	68-91	M	728	429	398-1605	600	NS	

TABLE 10

Daily average nutrient intake of Nutrition Program participants receiving home-delivered or meal-site meals based on 7-day dietary intake as compared to the 1980 RDA and U.S. Dietary Guidelines.

Nutrient	Sex	$\bar{X}$	s.d.	Range	Median	p	
Protein, g.	F	47	12	23-75	50	NS	
	M	56	23	29-118	59	NS	
Fat, %kcals	F/M	39	7	22-52	39	.01	>30% kcal intake
CHO, %kcals	F	47	9	33-71	46	.025	<50% kcal intake
	M	49	7	35-60	48	NS	
Iron, mg.	F/M	11	6	5-33	9	NS	
Vitamin A, IU	F	4458	2713	783-16479	5217	NS	
	M	5840	2651	1217-10270	5265	NS	
Thiamin, mg.	F	.9	.3	.3-1.8	.7	.05	<RDA of 1.0
	M	1.1	.5	.5-2.7	.9	NS	
Preformed Niacin, mg.	F	12	3	6-20	12	NS	
	M	15	8	5-35	13	NS	
Ribo-flavin, mg.	F	1.3	.9	.3-6.1	1.2	NS	
	M	1.6	.8	.6-3.9	1.5	NS	
Vitamin C, mg.	F	71	43	13-201	61	NS	
	M	62	26	21-112	59	NS	
Vitamin B-6, mg.	F	1.1	.4	.5-1.8	.9	.0005	<RDA of 2.0mg/d
	M	1.5	.5	.6-2.1	1.2	.0005	<RDA of 2.2mg/d

Footnotes:
1) The subjects were 32 females, age 62 to 96, and 13 males, age 68 to 91.
2) The data for fat and for iron were consolidated as the RDA for both females and males is the same.

TABLE 11

Number of Nutrition Program participants who received home-delivered meals or ate at congregate meal-sites with nutrient intakes less than 2/3 RDA based on 7-day dietary intake.

Nutrient	Females N=32	Males N=13
	No. %	No. %
Calcium	19(59%)	6(46%)
Protein	2(6%)	3(23%)
Thiamin	9(28%)	3(23%)
Riboflavin	6(19%)	1(8%)
Niacin	5(16%)	5(38%)
Vitamin B-6	25(78%)	9(69%)
Vitamin A	8(25%)	2(25%)
Vitamin C	11(34%)	1(8%)*
Iron	11(34%)	2(15%)

Footnotes:
* Five males reported a vitamin C intake between 40 and 50 mg.

Energy Intake

Because of the wide ranges of recommended energy intakes based on age and sex (Appendix A), the breakdown for total caloric intake is separated from the rest of the nutrient data. This is found in Table 8. The three men in the 75 and under age group had a mean energy intake that was within the recommended range. All of the other groups of subjects, as based on sex and age, received significantly less energy than the 1980 RDA. Other investigators (2,39,42,43) have reported similar findings. None of the subjects in the current study reported a weight change during the preceding year, even though some subjects reported energy intakes that were well below the recommended range for their age and sex, and others reported a much higher energy intake. Since other investigators have reported a low energy intake without concurrent weight loss in the elderly (2,3,5,26,39,42-44,46, 47), perhaps the energy standards in the RDA are higher than necessary.

Calcium

The calcium intake of the 32 women in the study was significantly lower than the RDA of 800 mg per day

(Table 9). With the exception of one man whose mean daily calcium intake exceeded 1600 mg, the men also had a mean intake which was significantly lower than the RDA. There were wide variations in the subjects' intake of calcium. The low for females was 84 mg. per day and the low for males was 213 mg. The high for each sex was 1015 and 1605, respectively. The women who ate at the meal-sites had a lower mean calcium intake than the women who received home-delivered meals. Milk was provided for all, with both types of Program Meals, but the women who ate in the congregate settings were more apt to drink coffee or tea with their meal and leave the milk. Men, on the other hand, who ate at the meal sites appeared to drink both coffee and milk with their meals. The women, as well as the men, who consumed higher amounts of calcium also ate a proportionately larger amount of breakfast cereal than the individuals with low calcium intakes. Most of the ones who ate breakfast cereal consumed it with milk. Fifty-nine percent of the women and forty-six percent of the men reported intakes of calcium lower than two-thirds of the RDA (Table 11).

Protein

Mean protein intake was not significantly different

from the 1980 RDA of 44 grams for women and 56 grams for men. Freedman and Ahronheim (22) recommended that 12 to 15 percent of the total caloric intake should be protein. The mean percentage protein intake of the subjects in this study was 15 ± 3 percent. All participants consumed meat, poultry or fish at least once each day. Table 10 also shows the wide range of protein intake for the subjects in the study. Of the females, six percent did not receive at least two-thirds the RDA for protein; of the males, twenty-three percent fell below this level (Table 11).

Fat

As was expected, fat consumption was greater than 30 percent of the kcal intake. The largest amount of fats came from butter and/or margarine. Meat, peanut butter and half-and-half, which several subjects used on breakfast cereal or fruit, also contributed to the large proportion of fat in the subjects' diets. The mean intake of fat, at 39 percent of total kcals is less than the 40 percent commonly attributed to the American diet (64,65). Even though the amount is not significantly less, it is a healthful indicator as based on the reportings of Swenerton and Dunkley (64) and Olson (65).

Carbohydrate

It has been recommended that carbohydrates should constitute at least 50 percent of daily caloric intake (63,64). The elderly women in this study reported an intake significantly less than this at $p<.025$. There were no significant differences from the 50 percent figure for men. The subjects did not report a high intake of "sweets" on their questionnaires. In fact, the carbohydrates appear to have been from cereal and bread products, mostly whole-grain, and fruits and vegetables.

Other Nutrients

B-Complex Vitamins

The intake of thiamin by the female subjects was significantly less than the RDA at $p<.05$. There was no significant difference in the intake of thiamin by the male subjects. There were no statistically significant differences from the RDA seen in the intakes of niacin or riboflavin for either sex. However, both sexes reported an intake of vitamin B-6 that was inadequate as based on the 1980 RDA. This was significant at $p<.05$. The overall low caloric intake and choice of

foods could be responsible for this. The variability of subjects' intakes for all the B vitamins is given in Table 10. Twenty-eight percent of all female and twenty-three percent of all male subjects had thiamin intakes below two-thirds of the RDA. Nineteen percent of the women and eight percent of the men had intakes below two-thirds of the RDA for riboflavin. Sixteen percent of the female and thirty-eight percent of the male subjects had preformed niacin intakes of less than two-thirds of the RDA. The intakes for vitamin B-6 were below two-thirds the RDA for seventy-eight percent of the women and sixty-nine percent of the men. (Table 11).

Vitamins A and C

Neither sex received a vitamin A or a vitamin C intake that was significantly higher or lower than the RDA (Table 10). The sources of both of these vitamins were, in large part, the fresh fruits and vegetables that were available at the time of the year this study was conducted (fall). There was a wide variability in the intake of these nutrients, which may have been the result of individual likes and dislikes or physical conditions which precluded the intake of fruits and vegetable. Two individuals who reported that they were

on low residue diets were among those whose intake of vitamins A and C were less than two-thirds the 1980 RDA (Table 11).

Iron

The iron intake did not differ significantly from the RDA of 10 mg for either sex (Table 10) even though the intake was also wide for this nutrient. Eleven (34%) of the women and two (15%) of the men received diets containing less than two-thirds the RDA for iron (Table 11).

Alcohol

Alcohol intake provided a complexity when total percentages of carbohydrate, fat and protein were calculated. (The intake of alcohol was disregarded in Tables 4 and 10.) Three men and one woman (17%), of the twenty-three elderly individuals who received home-delivered meals, consumed some form of alcoholic beverage during the study week. Of the twenty-two meal-site participants, three men and three women (27%) consumed alcoholic beverages. For those ten individuals the percentages of energy from protein, fat and carbohydrate were difficult to calculate. For a

breakdown of the total protein, fat and CHO percentages as compared with total kilocalorie intake, both with and without the consideration of alcohol consumption for these ten people, see Table 12. Regression analysis failed to show any correlation between alcohol consumption and nutrient intake of these people.

Use of Nutrient Supplements

Other investigators have looked at the contributions of vitamin and/or mineral supplements to the diets of elderly people (26,41-43,47,65,66). The current study did not attempt to analyze the contribution to total nutrient intake made by the supplements taken by the subjects. However, the subjects were asked on the questionnaire to list the supplements regularly taken. Nine (39%) of the 23 elderly who received home-delivered meals and 13 (59%) of the 22 elderly who ate at the meal-sites took some form of nutrient supplement.

The nine recipients of home-delivered meals who took vitamin/mineral supplements were not all nutrient deficient when their dietary intakes were compared to the RDA. Six of the elderly women receiving home-delivered meals who took some form of supplementation did not appear to be nutrient deficient, based on their

TABLE 12

Mean daily intakes of energy and the daily percentages of energy from protein, fat and carbohydrates for 10 alcohol-consuming subjects.

Nutrient	With Alcohol $\bar{X}$	s.d.	Range	Without Alcohol $\bar{X}$	s.d.	Range	Significance
Kcals	1582	687	943-3439	1457	725	775-3367	None
Protein	14%	2%	11%-17%	15%	1%	12%-18%	None
Fat	38%	5%	30%-46%	42%	5%	32%-48%	None
CHO	43%	7%	35%-59%	47%	7%	37%-62%	None

reported nutrient intake, with the exception of energy for four of them. Two of the women and the one man in this group reported a deficient intake for nearly every nutrient examined. The man had sufficient intake of vitamins A and C, and one of the deficient women had a vitamin C intake nearly double the RDA.

The thirteen people who ate at the meal-sites and took vitamins and/or mineral supplements consisted of five men and eight women. Two of the women and one of the men were taking supplements that were unnecessary according to a comparison of their reported nutrient intake with the RDA. One of the men was taking only supplemental calcium and could probably have benefited from a multiple vitamin supplement as well. One man and two women reported intakes that were only deficient in calcium, but were taking multiple vitamins. One woman was only taking vitamin E capsules, but had a reported intake that was deficient in all of the nutrients. The man who was only taking vitamin C reported an intake that was deficient in all nutrients as did the two women and the one man who were taking a variety of supplements. The woman who was taking only calcium reported a deficiency only in calcium intake.

Effect of Time of the Year

The nutrient content of the subjects' diets may have been altered had the study been done at a time of the year other than fall. Comparing differences in nutrient intake between fall and spring, Dibble et al. found that higher ascorbic acid levels were found in the diets of the elderly in spring (67). Carotene levels were higher in the fall. The current study did not find a significant difference from the RDA for these nutrients, but further investigation of the diets of the elderly in the winter and spring should be undertaken. Many of the elderly subjects of this study had access to free fresh tomatoes and cantaloupe. Fresh produce was also available in the local supermarkets at prices within most of their budgets. Fresh fish and other seafood appeared on the dietary records of some of the subjects. Three of them said that the fish was a gift from a friend. Others may have also obtained the fish as a gift or caught it themselves. This is another source of nutrients that would not be available to many during the entire year.

Consistency With Other Studies

The nutrient content of the diets of the elderly

in this study was not consistent with prior studies. Grandjean et al. found that the participants in a congregate meals program had satisfactory nutritional status (68). They compared their nutrient intake data to 66 percent of the RDA, however, and the current study compared intake data with 100 percent as well as two-thirds of the RDA. Brown et al. (69), reported adequate nutritional intakes for all subjects as based on 66 percent of the RDA. All of the nutrients reported in the Brown study were above 90 percent of the RDA except calcium. The fourteen non-institutionalized women in that study had a mean calcium intake of 570 mg ± 248 mg which is 71 percent ± 31 percent of the RDA. The mean calcium intake for women in the present study was 515 mg ± 212 mg.

SUMMARY AND CONCLUSIONS

Forty-five elderly residents of Lincoln County, Oregon, participating in the Title IIIc Elderly Nutrition Program, kept 7-day dietary records of all foods and beverages they consumed. The food records were analyzed for total nutrient and energy intake through the use of the Ohio State Nutrient Data Base. The average daily nutrient intake for each subject was then derived from the totals.

Twenty-two subjects ate at congregate meal-sites (MS) and twenty-three received home-delivered (HD) meals. Thirty-two of the subjects were female; thirteen of the subjects were male. Only two of the subjects were not fully ambulatory.

No statistically significant differences were found for sex or age of the subjects, or whether they received home-delivered meals or ate at congregate meal-sites. As a result of these findings, all of the data except energy and calcium were combined.

Eleven nutrients, plus energy, were examined and compared to the 1980 RDA (Appendix A). The mean energy intake for all subjects in this study was significantly less ($p<.05$) than the amounts recommended (RDA) for the age and sex groups, with the exception of the three men under age 75 who ate at congregate meal-sites. The

median energy intake for all subjects was below the recommended range.

Calcium intake was examined separately for males and females for the purpose of this study. The calcium intake of meal-site (MS) participants was also separated from that of those who received home-delivered (HD) meals. Mean daily calcium intake for all subjects was below the RDA: HD females' mean intake was 553 ± 284 mg.; HD males' mean intake was 623 ± 273 mg.; MS females' mean daily intake was 521 ± 150 mg.; and the mean daily calcium intake of MS males was 728 ± 429 mg. Fifty-nine percent of all female subjects and forty-six percent of all male subjects had a calcium intake that was below two-thirds the RDA.

Other nutrients with a large percentage (more than 25 percent) of subjects reporting intakes below two-thirds the RDA were iron (34 percent of all female subjects), vitamin C (34 percent of all female subjects), thiamin (28 percent of all female subjects), preformed niacin (38 percent of all male subjects), and vitamin B-6 (78 percent of all female subjects and 69 percent of all male subjects).

The nutrient intakes of the subjects were also examined to determine the total contribution of Program Meals to the average daily nutrient intake. The subjects ate 0 to 4 Program Meals during the week they

kept the daily dietary records. The mean number of meals for all subjects was 2.5. The data from the subject eating 0 meals were excluded from the analysis discussed in the following section. The Program Meals contributed from 0 to 70 percent of the nutrients consumed by the subjects. Only one subject reported no contribution of the meals to his vitamin C intake. All others reported some contribution to all nutrient intakes. As was expected, the subjects who consumed more Program Meals derived a greater percentage of their nutrient intake from the meals.

The original hypotheses that stated differences between individuals who eat at meal-sites and those receiving home-delivered meals were proven to be false. Also, no differeces were found between the ages of the subjects and their nutrient intakes. However, the other three hypotheses were proven to be true: the energy intake of the Elderly Nutrition Program participants is less than the recommended range for persons over age 51; female Elderly Nutrition Program participants are significantly deficient in calcium intake as based on the RDA of 800 mg. per day; and the fat content of the Elderly Nutrition Program participants' diets significantly exceeds the maximum recommended thirty percent of daily energy intake.

Because there appears to be a great deal of

variation in the nutrient intakes of elderly individuals and a disparity between recommended amounts and intake amounts, further investigation is needed to determine if the intakes are adversely affecting the nutritional status - clinically and biochemically - of elderly people. For example, the elderly subjects of this study reported low energy intakes, but they did not also report a coinciding weight loss.

Program Meals contributed a large percentage of the subjects' nutrient intake when the meals were eaten. More studies of longer duration should be done to determine the need for more Program Meals to be provided for those elderly individuals who are unable or unwilling to provide adequate nutrition for themselves.

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APPENDICES

APPENDIX A

1980 Recommended Dietary Allowances

Food and Nutrition Board, National Academy of Sciences – National Research Council Recommended Daily Dietary Allowances,* Revised 1980

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Protein (g)	Fat-Soluble Vitamins: Vitamin A (μg RE)†	Fat-Soluble Vitamins: Vitamin D (μg)‡	Fat-Soluble Vitamins: Vitamin E (mg α-TE)§	Water-Soluble Vitamins: Vitamin C (mg)	Water-Soluble Vitamins: Thiamin (mg)	Water-Soluble Vitamins: Riboflavin (mg)	Water-Soluble Vitamins: Niacin (mg NE)‖	Water-Soluble Vitamins: Vitamin B-6 (mg)	Water-Soluble Vitamins: Folacin¶ (μg)	Water-Soluble Vitamins: Vitamin B-12 (μg)	Minerals: Calcium (mg)	Minerals: Phosphorus (mg)	Minerals: Magnesium (mg)	Minerals: Iron (mg)	Minerals: Zinc (mg)	Minerals: Iodine (μg)
Males	11-14	45	99	157	62	45	1000	10	8	50	1.4	1.6	18	1.8	400	3.0	1200	1200	350	18	15	150
	15-18	66	145	176	69	56	1000	10	10	60	1.4	1.7	18	2.0	400	3.0	1200	1200	400	18	15	150
	19-22	70	154	177	70	56	1000	7.5	10	60	1.5	1.7	19	2.2	400	3.0	800	800	350	10	15	150
	23-50	70	154	178	70	56	1000	5	10	60	1.4	1.6	18	2.2	400	3.0	800	800	350	10	15	150
	51+	70	154	178	70	56	1000	5	10	60	1.2	1.4	16	2.2	400	3.0	800	800	350	10	15	150
Females	11-14	46	101	157	62	46	800	10	8	50	1.1	1.3	15	1.8	400	3.0	1200	1200	300	18	15	150
	15-18	55	120	163	64	46	800	10	8	60	1.1	1.3	14	2.0	400	3.0	1200	1200	300	18	15	150
	19-22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14	2.0	400	3.0	800	800	300	18	15	150
	23-50	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	18	15	150
	51+	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	10	15	150

(Recommended Dietary Allowances. Washington, DC, National Academy of Sciences, 1980)

* The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined.

† Retinol equivalents. 1 retinol equivalent = 1 μg retinol or 6 μg β carotene. See text for calculation of vitamin A activity of diets as retinol equivalents.

‡ As cholecalciferol. 10 μg cholecalciferol = 400 IU of vitamin D.

§ α-tocopherol equivalents. 1 mg d-α tocopherol = 1 α-TE. See text for variation in allowances and calculation of vitamin E activity of the diet as α-tocopherol equivalents.

‖ 1 mg niacin equivalent is equal to 1 mg of niacin or 60 mg of dietary tryptophan.

¶ The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay after treatment with enzymes (conjugases) to make polyglutamyl forms of the vitamin available to the test organism.

** The recommended dietary allowance for vitamin B_{12} in infants is based on average concentration of the vitamin in human milk. The allowances after weaning are based on energy intake (as recommended by the American Academy of Pediatrics) and consideration of other factors, such as intestinal absorption.

Mean Heights and Weights and Recommended Energy Intake* Recommended Dietary Allowances, Revised 1980

Category	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Energy Needs (with range) (kcal)	Energy Needs (with range) (MJ)
Males	11-14	45	99	157	62	2700 (2000-3700)	11.3
	15-18	66	145	178	69	2800 (2100-3900)	11.8
	19-22	70	154	177	70	2900 (2500-3300)	12.2
	23-50	70	154	178	70	2700 (2300-3100)	11.3
	51-75	70	154	178	70	2400 (2000-2800)	10.1
	78+	70	154	178	70	2050 (1650-2450)	8.8
Females	11-14	48	101	157	62	2200 (1500-3000)	9.2
	15-18	55	120	163	64	2100 (1200-3000)	8.8
	19-22	55	120	163	64	2100 (1700-2500)	8.8
	23-50	55	120	163	64	2000 (1600-2400)	8.4
	51-75	55	120	163	64	1800 (1400-2200)	7.6
	78+	55	120	163	64	1600 (1200-2000)	6.7

APPENDIX B

1974 Recommended Dietary Allowances

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1974

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age	Weight		Height		Energy	Protein	Fat-Soluble Vitamins				Water-Soluble Vitamins							Minerals					
								Vitamin A Activity		Vitamin D	Vitamin E Activity[e]	Ascorbic Acid	Folacin[f]	Niacin[g]	Riboflavin	Thiamin	Vitamin B_6	Vitamin B_{12}	Calcium	Phosphorus	Iodine	Iron	Magnesium	Zinc
	(years)	(kg)	(lbs)	(cm)	(in)	(kcal)[b]	(g)	(RE)[c]	(IU)	(IU)	(IU)	(mg)	(μg)	(mg)	(mg)	(mg)	(mg)	(μg)	(mg)	(mg)	(μg)	(mg)	(mg)	(mg)
Infants	0.0–0.5	6	14	60	24	kg × 117	kg × 2.2	420[d]	1,400	400	4	35	50	5	0.4	0.3	0.3	0.3	360	240	35	10	60	3
	0.5–1.0	9	20	71	28	kg × 108	kg × 2.0	400	2,000	400	5	35	50	8	0.6	0.5	0.4	0.3	540	400	45	15	70	5
Children	1–3	13	28	86	34	1,300	23	400	2,000	400	7	40	100	9	0.8	0.7	0.6	1.0	800	800	60	15	150	10
	4–6	20	44	110	44	1,800	30	500	2,500	400	9	40	200	12	1.1	0.9	0.9	1.5	800	800	80	10	200	10
	7–10	30	66	135	54	2,400	36	700	3,300	400	10	40	300	16	1.2	1.2	1.2	2.0	800	800	110	10	250	10
Males	11–14	44	97	158	63	2,800	44	1,000	5,000	400	12	45	400	18	1.5	1.4	1.6	3.0	1,200	1,200	130	18	350	15
	15–18	61	134	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	1,200	1,200	150	18	400	15
	19–22	67	147	172	69	3,000	54	1,000	5,000	400	15	45	400	20	1.8	1.5	2.0	3.0	800	800	140	10	350	15
	23–50	70	154	172	69	2,700	56	1,000	5,000		15	45	400	18	1.6	1.4	2.0	3.0	800	800	130	10	350	15
	51+	70	154	172	69	2,400	56	1,000	5,000		15	45	400	16	1.5	1.2	2.0	3.0	800	800	110	10	350	15
Females	11–14	44	97	155	62	2,400	44	800	4,000	400	12	45	400	16	1.3	1.2	1.6	3.0	1,200	1,200	115	18	300	15
	15–18	54	119	162	65	2,100	48	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	1,200	1,200	115	18	300	15
	19–22	58	128	162	65	2,100	46	800	4,000	400	12	45	400	14	1.4	1.1	2.0	3.0	800	800	100	18	300	15
	23–50	58	128	162	65	2,000	46	800	4,000		12	45	400	13	1.2	1.0	2.0	3.0	800	800	100	18	300	15
	51+	58	128	162	65	1,800	46	800	4,000		12	45	400	12	1.1	1.0	2.0	3.0	800	800	80	10	300	15
Pregnant						+300	+30	1,000	5,000	400	15	60	800	+2	+0.3	+0.3	2.5	4.0	1,200	1,200	125	18+[h]	450	20
Lactating						+500	+20	1,200	6,000	400	15	80	600	+4	+0.5	+0.3	2.5	4.0	1,200	1,200	150	18	450	25

[a] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for more detailed discussion of allowances and of nutrients not tabulated. See Table 1 (p. 6) for weights and heights by individual year of age.

[b] Kilojoules (kJ) = 4.2 × kcal.

[c] Retinol equivalents.

[d] Assumed to be all as retinol in milk during the first six months of life. All subsequent intakes are assumed to be half as retinol and half as β-carotene when calculated from international units. As retinol equivalents, three fourths are as retinol and one fourth as β-carotene.

[e] Total vitamin E activity, estimated to be 80 percent as α-tocopherol and 20 percent other tocopherols. See text for variation in allowances.

[f] The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay. Pure forms of folacin may be effective in doses less than one fourth of the recommended dietary allowance.

[g] Although allowances are expressed as niacin, it is recognized that on the average 1 mg of niacin is derived from each 60 mg of dietary tryptophan.

[h] This increased requirement cannot be met by ordinary diets; therefore, the use of supplemental iron is recommended.

APPENDIX C

Recommended Nutrient Intakes for Canadians

Dietary Standards for Canada

Age (years)	Sex	Weight (kg)	Height (cm)	Energy[a] (kcal)	Protein (g)	Fat-soluble vitamins: Vit. A (µg RE)[b]	Vit. D (µg cholecalciferol)[c]	Vit. E (mg α-tocopherol)	Thiamin (mg)	Water-soluble vitamins: Niacin[d] (mg)	Riboflavin (mg)	Vit. B_6[e] (mg)	Folate[f] (µg)	Vit. B_{12} (µg)	Ascorbic acid (mg)	Minerals: Ca (mg)	P (mg)	Mg (mg)	I (µg)	Fe (mg)	Zn (mg)
0.0–0.5	Both	6	—	kg × 117	kg × 2.2 (2.0)[g]	400	10	3	0.3	5	0.4	0.3	40	0.3	20[h]	500[i]	250[i]	60[i]	35[i]	7[i]	4[i]
0.5–1	Both	8	—	kg × 108	kg × 1.4	400	10	3	0.5	8	0.6	0.4	60	0.3	20	500	400	50	50	7	5
1-3	Both	13	90	1400	22	400	10	4	0.7	9	0.8	0.8	100	0.9	20	500	500	75	70	9	5
4-6	Both	19	110	1800	27	500	5	5	0.9	12	1.1	1.3	100	1.5	20	500	500	100	90	9	6
7-9	M	27	129	2200	33	700	2.5	8	1.1	14	1.3	1.8	100	1.5	30	700	700	150	110	10	7
	F	27	128	2000	33	700	2.5	8	1.0	13	1.2	1.4	100	1.5	30	700	700	150	100	10	7
10-12	M	38	144	2500	41	800	2.5	7	1.2	17	1.5	1.8	100	3.0	30	900	900	175	130	11	9
	F	38	145	2300	40	800	2.5	7	1.1	15	1.4	1.5	100	3.0	30	1000	1000	200	120	11	9
13-15	M	51	162	2800	52	1000	2.5	9	1.4	19	1.7	2.0	200	3.0	30	1200	1200	250	140	13	10
	F	49	159	2200	43	800	2.5	7	1.1	15	1.4	1.5	200	3.0	30	800	800	250	110	14	10
16-18	M	64	172	3200	54	1000	2.5	10	1.6	21	2.0	2.0	200	3.0	30	1000	1000	300	150	14	12
	F	54	161	2100	43	800	2.5	6	1.1	14	1.3	1.5	200	3.0	30	700	700	250	110	14	11
19-35	M	70	178	3000	56	1000	2.5	8	1.5	20	1.8	2.0	200	3.0	30	800	800	300	150	10	10
	F	56	161	2100	41	800	2.5	8	1.1	14	1.3	1.5	200	3.0	30	700	700	250	110	14	8
36-50	M	70	176	2700	56	1000	2.5	8	1.4	18	1.7	2.0	200	3.0	30	800	800	300	140	10	10
	F	56	161	1800	41	800	2.5	6	1.0	13	1.2	1.5	200	3.0	30	700	700	250	100	14	9
51+	M	70	176	2300[k]	56	1000	2.5	8	1.4	18	1.7	2.0	200	3.0	30	800	800	300	140	10	10
	F	56	161	1800[k]	41	800	2.5	6	1.0	13	1.2	1.5	200	3.0	30	700	700	250	100	9	9
Pregnant				+300[l]	+20	+100	+2.5	+1	+0.2	+2	+0.3	+0.5	+50	+1.0	+20	+500	+500	+25	+15	+1[m]	+3
Lactating				+500	+24	+400	+2.5	+2	+0.4	+7	+0.6	+0.8	+50	+0.5	+30	+500	+500	+75	+25	+1[m]	+7

Source: Canadian Council on Nutrition: *Dietary standards for Canada*, Can. Bull. Nutr. 6-1, 1984 (suppl. 1974).

[a] Recommendations assume characteristic activity pattern for each age group.

[b] One µg retinol equivalent (1 µg RE) corresponds to a biological activity in humans equal to 1 µg of retinol (3.33 IUI and 6 µg of β-carotene (10 IU).

[c] One µg cholecalciferol is equivalent to 40 IU vitamin D activity.

[d] Approximately 1 mg of niacin is derived from each 60 mg of dietary tryptophan.

[e] Recommendations are based on the estimated average daily protein intake of Canadians.

[f] Recommendation given in terms of free folate.

[g] Recommended protein allowance at 2.2 g/kg of body weight for infants age 0 to 2 mo and 2.0 g/kg of body weight for those age 3 to 5 mo. Protein recommendation for infants, 0 to 11 mo, assumes consumption of breastmilk or protein of equivalent quality.

[h] Considerably higher levels may be prudent for infants during the first week of life to guard against neonatal tyrosinemia.

[i] The intake of breast-fed infants may be less than the recommendation but is considered to be adequate.

[j] Most older children and adults receive enough vitamin D from irradiation but 2.5 µg daily is recommended. This recommended allowance increases to 5.0 µg daily for pregnant and lactating women and for those who are confined indoors or otherwise deprived of sunlight for extended periods.

[k] Recommended energy allowance for age 66+ years reduced to 2000 for men and 1500 for women.

[l] Increased energy allowance recommended during second and third trimesters. An increase of 100 kcal per day is recommended during first trimester.

[m] A recommended total intake of 15 mg daily during pregnancy and lactation assumes the presence of adequate stores of iron. If stores are suspected of being inadequate, additional iron as a supplement is recommended.

APPENDIX D

Data Collection Form

FOOD AND BEVERAGE INTAKE SHEET

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

Age: 60 - 64
65 - 69
70 - 74
75 - 79
80 - 84
85 - 89
90 +

Time of Day	Where Eaten	Food or Beverage Name	Description Brand, Type, Preparation, Recipe	Amount	Please Do Not Write In This Space

APPENDIX E

Questionnaire

Nutrient Intake
of Lincoln County, Oregon
Elderly Nutrition Program Participants Project

Department of Foods and Nutrition
Oregon State University

The purpose in keeping a record of the food you eat and the beverages you drink is that it provides information about the types of nutrients in your diet. We will be using a computer program to analyze your diet and determine the amounts of these nutrients that you have in your diet. You will be provided with a copy of the analysis. Please be very accurate when you write down foods and beverages. The more accurate you are, the more accurate our analysis of your diet will be.

Procedure:

1. Please use a separate Food and Beverage Intake Sheet for each day of the week. Circle the day of the week on the top of the sheet.

2. Write down everything you eat and drink.

3. Please eat normally during the week you are keeping the records for us. We are interested in your normal diet.

4. Write down the time of day - morning, noon, afternoon, early evening, evening, night - you eat or drink each item.

5. Please record where you eat or drink the food or beverage - home, restaurant, someone else's home, meal site.

6. The name of the food or beverage item is to be written in the next space.

7. Please describe the food or beverage item. For example: beef stew could be described as homemade with beef, carrots, potatoes, onions and gravy, or it could be Dinty Moore or something else; an egg should be described by how it was prepared; coffee is regular of decaffeinated. Of course, water is water and needs no description. If you fry foods, please state the type of fat used and the amount. Also, please write down whether the milk you use is whole milk, 2%, or skim milk.

8. Please write down how much you eat or drink of each item. If you know the weight of the item - for example, a 6 oz. raw steak - or can use a kitchen scale to measure the items, please write down the number of ounces. If it is convenient for you to measure the food in cups, tablespoons, teaspoons, etc., please do that. If neither of the above are possible, please estimate, as closely as possible, how many cups, ounces, etc., that you eat or drink.

9. Remember to include the butter or margarine on bread, sugar and cream in coffee, syrup on pancakes, etc., that you eat/use.

10. Recording your foods and beverages as soon as you consume them improves accuracy. Please record them when you eat or drink the item(s) or as soon afterwards as possible.

Please remember to put your name on each of your food item sheets so we can mail or bring the nutrient analysis of your diet to you. If you do not want to receive a copy of the analysis, you do not need to put your name on the sheets. However, in order to completely analyze the nutrients we do need to know your age range. Therefore, please circle your age range on the top of each Food Intake Sheet.

At the end of the week, please answer the following questions by circling the correct response:

1. Were you ill during the week you kept this record?

   Yes No

2. The amount of food you ate during the week was

   a) more than usual

   b) less than usual

   c) ate different foods than usual

   d) about the same as usual

3. The amount of beverages you drank during the week was

   a) more than usual

   b) less than usual

   c) drank different beverages than usual

   d) about the same as usual

Thank you for your cooperation. If you have any questions please call me, collect, at 929-2809. If I am not there, I will return your call as soon as I am able. (Just ask for Lillian.)

QUESTIONNAIRE

You do not need to give us your name, but we would like to have some information about you. This will help us to coordinate the rest of the information you give us about the food you eat, with your health, personal habits, etc. By doing this, we will have a better idea of how well the nutrition program is providing for your nutritional needs. Please circle your answers and write in pen the answers that require more than a circle.

1. Which group does your age fall in?
   60 - 65 66 - 70 71 - 75 76 - 80 81 - 85 86 - 90 90+

2a. Do you regularly take vitamin and/or mineral supplements?
   Yes No

2b. If you answered "Yes" to question 2a, what do you take?
   Multiple Vitamin Vitamin(s) A 8 C 0 E Calcium Other_____
   8rand Name(s)_____

3a. Do you use tobacco?
   Yes No

3b. If you answered "Yes" to question 3a, please answer the following:
   Smoke cigarettes (number of cigarettes per day_____)
   Smoke a Pipe Chew Tobacco Use Snuff

4a. Do you drink alcoholic beverages?
   Yes No

4b. If you answered "Yes" to question 4a, please answer the following:
   Drink 8eer (Number of bottles per week_____)
   Drink Wine (Approximate amount per week_____)
   Drink Liquor (Kind and approximate number of jiggers per week_____)

5. How long has it been since you saw a doctor?
   Within the past week Within the past month
   More than 1 month, but less than 1 year More than 1 year, but less than 2
   More than 2 years Never

6a. Are you taking prescription drugs for a condition now?
   Yes No

6b. If you answered "Yes" to question 6a, please complete the following:
   Name of drug_____Number of times per day you take it_____
   Name of drug_____Number of times per day you take it_____
   Name of drug_____Number of times per day you take it_____
   If you need more space to list your drugs, please use the back of this page.

7a. Do you take drugs/medicines other than those prescribed by a doctor?
Yes No

7b. If you answered "Yes" to 7a, what do you take and how much?
Aspirin Number per week_____
Antacids Kind (Tums, Maalox, etc.) and Number per week_____
Other (Name)_____

8a. Do you wear dentures?
Yes No

8b. If you answered "Yes" to 8a, do you wear them when you eat?
Yes No Usually Usually Not

9. If you regularly have problems with any of the following, please circle which one(s).
Fainting Loss of Memory Headaches Constipation Weight Loss
Frequent Urination Sight Problems Trouble in Hearing Teeth/Gum Disorders

10. How many people normally live in your home?
Live Alone Live with Spouse Live with Companion Other_____
(Total Number_____) Ages of all people other than yourself_____

11. Who normally purchases the food you eat?
Self Spouse Relative Neighbor Other (Who?)_____

12. Who normally prepares the food you eat?
Self Spouse Relative Neighbor Other (Who?)_____

13. What source(s) of income do you have? (Please circle all that apply)
Social Security Part-time Job Full-time Job
Income from bank/savings and loans Income from sale of property
Other_____

14. Please circle the correct response to where you are living:
Own the home I live in Pay rent where I am living now
Live with a relative other than a spouse Other(state what)_____

15. Do you normally watch television when you eat

Breakfast	Yes	No
Lunch	Yes	No
Dinner	Yes	No
Snacks	Yes	No

16a. Do you eat candy and/or other sweets?
Yes No

16b. If you answered "Yes" to 16a, please complete the following:

Type of sweets (Candy, Caramel Corn, Doughnuts, etc.)_____

Approximate amount per week_____

17. How much coffee, tea and/or water do you normally drink each day?

Coffee:	0 - 1	2 - 5	6 - 10	More than 10	cups per day.
Tea:	0 - 1	2 - 5	6 - 10	More than 10	cups per day.
Water:	0 - 1	2 - 5	6 - 10	More than 10	glasses per day.

18. Has your weight increased/decreased (Please circle which) more than 5 pounds in the past year?

Yes No Don't know

19. Have your eating habits changed in the past year?

No

I eat better than I used to.

I don't think that I eat as well as I used to.

20a. Do you have a microwave oven?

Yes No

20b. If you answered "Yes" to 20a, do you use it?

Yes No

21. Do your normal activities include any of the following? (Please circle all that apply.)

Going on walks	Gardening	Sewing
Going out to eat	Traveling	Building things

22a. Do you usually drive yourself to places you want to go?

Yes No

22b. If you answered "No" to 22a, how do you get to places you want to go?

_____

23. Are you a male or a female?_____

24. In your own words, please describe your health.

MEAL QUESTIONNAIRE

1. Has anyone ever asked you, before now, what you like or do not like about the program meals?

   Yes No

   If yes, Who?_____

2. Is your hot food hot and your cold food cold when you receive it?

   Yes No

3. On a scale of 1 to 10, with 10 being the best, how does the food usually look?

   1 2 3 4 5 6 7 8 9 10

4. On a scale of 1 to 10, with 10 being the best, does most of the food taste good?

   1 2 3 4 5 6 7 8 9 10

5. Do you like the food they bring you/serve you?

   Yes No Usually Sometimes

6. If you could change anything about the meals that are served to you, what would it be?

7. Is there anything else you would like us to know about the program meals and/or the food you eat?