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Nutritional Risk Assessment in the Older Adult

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Abstract

With advancing age, the risk of developing nutritional deficiencies increases. Both obesity and malnutrition can lead to functional dependency, increased morbidity, mortality, and greater use of health care resources. While there is extensive empirical information available regarding the nutritional status of the elderly few sources have documented the specific dietary intake of elderly individuals or have defined the relationship between actual intake and identified levels of nutritional risk. The goal of this study was to assess the nutritional status of elderly, rural community-dwelling individuals by comparing their specific nutrient intake to the risk assessment on the DETERMINE screening tool.

Thirty-two individuals who consumed meals at a congregate meal center participated in this exploratory study. Using computer software, Body Mass Index (BMI) was calculated and the nutrient intakes of individual subjects quantified. Mean percentages of intakes for the identified nutrients were calculated and the number of subjects meeting the requirements of the Food Guide Pyramid was identified. The results demonstrated that while screening instruments frequently used to assess nutritional risk of the older person may provide comprehensive assessment

of eating ability, such as access to food and preparation abilities, they fall short in assessing the nutritional value of actual food intake.

Keywords: Aged, Nutrition, Risk Factors, Obesity, Vitamins, Health Screening, Nutritional Assessment, Eating

More than 40% of older Americans have been identified as "at nutritional risk," and between 10 and 51% are malnourished or have an inadequate nutritional intake[1]. In older people, the risk of developing nutritional deficiencies increases due to age-related reductions in total food intake combined with the presence of debilitating disease. The presence of malnutrition increases functional dependency, morbidity, mortality, and the use of health care resources. Similarly, nutritional intake greater than body requirements has made obesity among the elderly a primary public health problem in the United States.

Despite the availability of congregate and home delivered meals, millions of older Americans are not eating well, some are hungry or worried about finding their next meal and some may not be eating at all[2]. Assessment techniques of nutritional risk and risk status of older Americans have been well documented[3,4]. Most studies have been directed toward describing the nutritional status of elderly individuals with generalized references to a decreased intake of selected nutrients or food groups and abnormalities in laboratory values that assess nutritional status, such as albumin levels or reduced iron stores or calcium deficiency[5-7]. Other investigations describe contributing physical risks, such as poor dentition, decreased senses of taste and smell, or psychosocial risks such as lack of resources or loneliness associated with the death of a spouse[8]. Those sources that document specific nutrient intake fail to identify the relationship between specific dietary intake and identified levels of nutritional risk. Moreover, older Americans who have been not been found at risk by screening instruments may be consuming inadequate

[1] Abbasi, A. A. & Rudman, D. (1994). Undernutrition in the nursing home: Prevalence, consequences, causes and prevention. *Nutrition Reviews, 52*(4), 113-121.

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[2] Torres-Gil, F. M. (1996). Malnutrition and hunger in the elderly. *Nutrition Reviews, 54*, (1), S7-S9

[3] Coulston, A. M., Craig, L., & Voss, A. C. (1996). Meals-on-wheels applicants are a population at risk for poor nutritional status. *Journal of the American Dietetic Association, 96*(6), 570-573.

[4] Ryan, A. S., Craig, L. D., & Finn, S. C. (1992). Nutrient intakes and dietary patterns of older Americans. *Journal of Gerontology, 47*, M145-M150.

[5] Buchowski, M.S., & Sun, M. (1996). Nutrition in minority elders: Current problems and future directions. *Journal of Health Care for the Poor and Underserved, 7*(3), 184-194.

[6] Coulston, 1996

[7] Ryan, 1992

[8] Torres-Gil, 1996

macro- and micro-nutrients. The goal of this study was to assess the nutritional status of the older, rural community-dwelling individuals by comparing their specific nutrient intake to the nutrition risk profile on the DETERMINE screening tool.

The specific aims were to:

1. Describe the macro- and micro-nutrient content of foods consumed by elderly, community-dwelling residents.
2. Compare the nutrient intake assessed by the Food Guide Pyramid[9] and recommended dietary allowance (RDA) to the level of identified nutritional risk.
3. Compare nutritional intake between age groups (old and oldest old) and sexes.

[9] The Food Guide Pyramid is a simple visual guide to assist individuals in meeting recommended dietary allowances (RDA). The pyramid separates the requirements into five food groups: bread and cereal, vegetables, fruits, meat and milk and suggests the number of servings from each group which should be consumed on a daily basis to meet the RDA. Source: United States Department of Agriculture. *The Food Guide Pyramid. Home and Garden Bulletin no. 252.* Washington D C : U. S. Government Printing Office, 1992.

Relevant Literature

Nutritional Status of the Older Adult

Older adults have different dietary needs than younger adults and are affected in different ways by slight alterations in nutritional status[10]. The relationship of nutritional status to clinical outcomes is seen in a variety of disorders, such as heart disease, stroke, hypertension, diabetes and cirrhosis, while excess and insufficient energy intake contribute to malnutrition, overweight, and obesity[11]. Obesity is a major health problem in the United

[10] Fisher, C. A., Crockett, S. G., Heller, K. E., & Skauge, L. H. (1991). Nutrition knowledge, attitudes, and practices of older and younger elderly in rural areas. *Journal of the American Dietetic Association, 91* (11), 1389-1401.

[11] Buchowski, 1996

States, particularly among older adults, and represents an important risk factor for chronic health conditions. Body fat distribution, overweight and obesity are independent predictors of cardiovascular disease[12]. As individuals age, the amount of lean body mass decreases, subcutaneous fat increases and is redistributed. There is fat loss from the face and extremities, and fat gain in abdomen and hips.

[12] McGinnis, J.M., & Ballard-Bush, R.M. (1991). Obesity in minority populations: Policy implications of research. *American Journal of Clinical Nutrition, 53,* 1512S-1514S.

Energy requirements have been noted to decrease with age, primarily due to a decrease in resting energy expenditure. This is thought to accompany declines in muscle mass and level of physical activity[13]. Nutritional recommendations include a decrease in average energy intake of 600 kcal/day for men and 300 for women resulting in a Recommended Dietary Allowance (RDA) for calories of 2300 and 1900 kcal per day, respectively[14]. However, the current RDAs do not address the needs of persons over age 51 and do not acknowledge that older adults have unique nutritional needs[15]. Diets that contain less than 1800 kcal/day may provide inadequate amounts of essential nutrients including calcium, iron and vitamins needed for good health. While aging does not alter requirements for essential lipids, the Committee on Diet and Health of the Food and Nutrition Board, as well as the American Heart Association, recommends that fat calories represent no more than 30% of total daily calories, with less than 10% supplied by saturated fat[16].

[13] Lipschitz, D.A. (1995). Approaches to the nutritional support of older patients. *Clinics in Geriatric Medicine, 11,* 715-724.

[14] Committee on Diet and Health, Food and Nutrition Board (1989). National Research Council: Diet and Health. *Implications for Reducing Chronic Disease Risk.* Washington, DC: National Academy Press.

[15] Committee, 1989

[16] US Department of Health and Human Services (1988). *Surgeon General's Report on Nutrition and Health*. Washington, DC: Government Printing Office.

Many older people are at at risk for deficient intakes of some essential nutrients. These include calories, calcium, vitamin B-6, magnesium and zinc[17]. Deficiencies of vitamins and trace elements are observed in almost one-third of all older

[17] Weimer, J. P. (1997). Many elderly at nutritional risk. *Food Reviews, 20* (1), 42-48

18 Chandra, R.K. (1997).

individuals[18]. For some nutrients, higher RDAs may need to be developed for the oldest of the old in this country[19]. Surveys indicate that a large percentage of older people consume less than two-thirds of the RDA of vitamins. Vitamins A and D, as well as several B vitamins, are frequently deficient in the diets of older adults. Vitamin E supplements provide independent protective effects for all-cause mortality and for coronary heart disease mortality, lowering total mortality rates by 27%, reducing the risk of heart disease mortality by 41%, and decreasing cancer mortality by 22%[20]. Data substantiate that those individuals having higher blood levels and dietary intakes of vitamin E have significantly lower CHD rates and decreased risk of heart attack in both men and women[21,22]. Low plasma zinc concentrations have been found in 2 to 27% of the older population[23]. In older subjects with chronic debilitating diseases, modest zinc deficiency may contribute to anorexia. Zinc supplementation has been shown to improve immune function and impede the rate of development of macular degeneration in the older individual. Intakes of zinc in the older adult decline in relation to the decrease in energy intake and were much lower in this sample than the recommended level of 15 mg/day for men and 12 mg/day for women[24].

Population studies suggest a relationship between a high dietary fiber intake and protection against cardiovascular disease, diabetes, and obesity. Clinical intervention trials that have examined the effect of oat bran intake on cholesterol levels have reported a decrease in total serum cholesterol of approximately 10% in subjects with elevated cholesterol levels[25].

Graying of the immune system. Can nutrient supplements improve immunity in the elderly? *Journal of American Medical Association, 277*, 1398-1399.

[19]McCormack, P. (1997). Undernutrition in the elderly population living at home in the community: A review of the literature. *Journal of Advanced Nursing, 26*, 856-863.

[20]Jha, P., Flather, M., Lonn, E., Farkouh, M., & Yusuf, S. (1995). The antioxidant vitamins and cardiovascular disease: A critical review of epidemiologic and clinical trial data. *Annuals of Internal Medicine, 123*(11), 860-872.

[21]Jha, 1995

[22]Stampfer, M.J., & Rinun, E. B. (1995). Epidemiologic evidence for vitamin E in prevention of cardiovascular disease. *American Journal of Clinical Nutrition, 62*(Suppl. 6), 1365-1369.

[23]Bogden, J.D., Oleske, J.M., Munves, E. M., Lavenhar, M.A., Bruening, K.S., Kemp, F. W., Holding, K. J., Denny, T. N., & Louria, D.B. (1987). Zinc and immunocompetence in the elderly: Baseline data on zinc nutriture and immunity in unsupplemented subjects. *American Journal of Clinical Nutrition, 46*, 101.

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[25] Kipsin, C.M., Keenan, J.M., Jacobs, D. R. Elmer, P.J., Welch, R. R, Van Horn, L., Liu, K., Turnbull, W.H., Thye, F. W., & Kestin, M. (1992). Oat products and lipid lowering: A meta-analysis. *Journal of the American Medical Association, 267*, 3317-3325.

Assessment of Nutritional Risk

Several instruments have been developed and tested to characterize the nutritional status of older Americans. Three of these instruments were the product of the National Nutritional Screening Initiative of the early 1990s, a combined effort of the American Dietetic Association, the American Academy of Family Physicians, and the National Council of the Aging, Inc.[26,27]. The instruments included DETERMINE, a simple checklist designed as a self-evaluation instrument to more detailed, Level I and II instruments which included more advanced assessment techniques such as anthropometric, biochemical, and clinical measures[28-30]. These instruments were designed to identify which elders were at risk and, once identified as at risk, to further delineate the depth and possible causes of the risk.

The most frequently used screening instruments ask questions such as numbers of vegetables or fruits consumed per day or closed-ended questions such as “did the subject consume three or more from each group?” A more precise method of assessing nutriture of the older adult is recording and analyzing actual food intake

Data from the *Elderly Nutrition Program of the Older Americans Act* shows that 67% to 88% of subjects are at nutritional risk[31], while 8% to 16% of older adults do not have regular access to a nutritionally adequate, culturally compatible diet[32]. Some data indicate that 41.5% of older Americans sampled are overweight with mean dietary lipid intakes above normal, and 16% are underweight, with low dietary calcium levels. About 28% fail to consume adequate levels of three or more key nutrients: protein,

[26] Quinn, C. (1997). The nutritional screening initiative: Meeting the nutritional needs of elders. *Orthopaedic Nursing, 16*, (6), 13-23.

[27] Dwyer, J. (1993). A vital sign: Progress and prospects in nutrition screening of older Americans. *Aging, 5*(Suppl. 1), 13-21.

[28] Barrocas, A., White, J. V., Gomez, C., & Smithwick, L. (1996). Assessing health status in the elderly: The nutrition screening initiative. *Journal of Health Care for the Poor and Underserved, 7*(3), 210-213.

[29] Posner, B. M., Jette, A., Smith, K. W., & Miller, D. (1993). Nutrition and health risks in the elderly: The nutrition screening initiative. *American Journal of Public Health, 83* (7), 972-978.

[30] Quinn, 1997

[31] Kennedy, E.T., Ohls, J., Carlson, S., & Fleming, K. (1995). The Healthy Eating Index: Design and applications. *Journal of the American Dietetic Association, 95*(10), 1103-1108.

[32] Kennedy, 1995

[33] Posner, B. M., Jette, A.,

consume adequate levels of three or more key nutrients: protein, calcium, and Vitamins A, C, and B1[33].

This study was guided by the theoretical rationale that dietary behavior and food consumption choices are central to health promotion[34]. Nutritional status surveys of older individuals have demonstrated a low prevalence of frank nutrient deficiencies, but a marked increase in risk of malnutrition and evidence of subclinical deficiencies[35]. Moreover, dietary behavior, including food choices and consumption, provides a more complete and accurate assessment of risk than traditional assessment measures[36,37]. Arnott[38] theorized that individuals consume foods in a cyclic fashion or in cores. The inner core includes those foods with a high frequency of consumption, with the secondary core including those foods with intermediate consumption. The peripheral core includes those foods consumed with low frequency. Older individuals frequently consume foods on a routine basis that are easy to prepare and easy to eat[39]. If the inner and secondary core intake is nutritionally poor, risk increases.

Methods

Research Design

A descriptive correlational design was used in this exploratory study to determine the relationships between the nutrients consumed by older community-dwelling individuals and at risk scores on the DETERMINE scale.

Smigelski, C., Miller, D., & Mitchell, P. (1994). Nutritional risk in New England elders. *Journal of Gerontology, 49* (3), M123.

[34] Devine, C. M., Connors, M., Bisogni, C. A., & Sobal J. (1998). Life-course influences on fruit and vegetable trajectories: Qualitative analysis of food choices. *Journal of Nutrition Education, 30*(6), 361-370.

[35] Rosenberg, I. H. (1994). Keys to a longer, healthier, more vital life. *Nutrition Reviews, 52*(8), S50 - S51.

[36] Devine, 1998

[37] Kristal, A. R., Shattuck, A. L., & Henry, H. J. (1990). Patterns of dietary behavior associated with selecting diets low in fat: Reliability and validity of a behavioral approach to dietary assessment. *Journal of the American Dietetic Association, 90*(2), 214-220.

[38] Arnott, M. (Ed.). (1975). *The anthropology of food habits* (pp. 91-111). Paris: Mouton Publishers.

[39] Medaugh-Abernethy, M., & Fanelli Kuczmarski, M. T. (1994). Food intake and food-related attitudes of older women: implications for nutrition education. *Journal of Nutrition Education, 26*, 3-9.

Sample

A convenience sample of volunteers residing in a small southwestern rural area and who consume meals at one of the two southwest senior citizens centers where federally mandated congregate meals were served participated in the study. All subjects were living independently and able to feed themselves. They, or someone residing in the same residence, were also responsible for the preparation of at least two meals per day. The subjects were alert and oriented to person, place and time, as determined by the ability to state their name, identify their present location, and the time of day correctly. In addition, the subjects were able to read at a fourth grade level or higher as demonstrated by their ability to read aloud to the investigator the introductory comments on the tool.

Instruments

[40] *Diet Analysis Plus.* (1998). ESHA Research and West Publishing Company.

The *Diet Analysis Plus 3.0*[40] software program analyzes macro- and micro-nutrient intake from dietary recall and volume; it also provides a comparison of the recorded intakes and the RDA of nutrients. Analysis options included: 1) recommended daily nutrients for the subject, based upon age, gender, height, weight, and activity; 2) amount of each nutrient eaten as compared to the recommended amount of intake for each nutrient, recorded in percentages of the recommended amount; 3) sources of calories recorded in percentages of protein, carbohydrates, and fat (for fat, the program analyzes the data in terms of total fat, saturated fat, mono-unsaturated fat, and poly-unsaturated fat); 4) the Pyramid report, comparing the individuals daily intake according to the

recommended Pyramid servings; and 5) the analysis for any single nutrient, the intake of total fat, saturated fat, mono unsaturated fat, saturated fat, cholesterol. Vitamins A, B1, B2, B3, B6, B12, C, D, and E and calcium, iron, magnesium, phosphorous, potassium, sodium, and zinc were also included.

The DETERMINE scale measures nutritional risk. This scale permits self-evaluative scoring, with a score of 0-2 points representing low nutritional risk, 3-5 moderate risk, and 6+ indicating at risk. The scale has been used in a variety of settings and was retrospectively and prospectively validated with groups of older individuals living in the community[41]. Sayoun & colleagues[42] found that several of the questions (#10, related to difficulty with shopping and cooking and #7, eating alone), demonstrated a strong association with mortality. Relative risk was reported as 1.10 (.95 CI: 1.00, 1.14) with a 10% increase in mortality risk for each point increase in score.

The Body Mass Index (BMI) is an expression of relative weight, in this case, body weight relative to height. BMI is calculated as weight (in Kg) divided by the square of height (m^2). The BMI reflects relative weight of both lean tissue and fat tissue[43]. It is generally recommended that persons over the age of 65 have a BMI between 24 and 29. Using this measure, obesity has been defined as a BMI > 27.3 kg/m^2 in women and 27.8 kg/m^2 in men[44], which corresponds to approximately 20% above the ideal body weight according to Metropolitan Life Insurance Company tables[45].

[41] Barrocas, 1996

[42] Sayoun, N. R., Jacques, P. F., Dallal, G. E., & Russell, R. M. (1997). Nutrition Screening Initiative checklist may be a better awareness/educational tool than a screening one. *Journal of the American Dietetic Association, 97* (7), 760-765.

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[44] Keller, C. S., & Thomas, K. T. (1995). Measurement of body fat and fat distribution. *Journal of Nursing Measurement, 3*(2), 159-174.

[45] Metropolitan Life Insurance Co., www.metlife.com/ Lifeadvice/Tools/ Heightnweight/Docs/index.html 1999.

Procedure

Subjects were asked to complete the DETERMINE scale. The screening tools were administered during times of regular attendance by the subjects (between 11:00 am and 1:30 pm). The subjects read a series of ten statements which comprise the assessment portion of the DETERMINE scale. Each statement was scored between 1 and 4. For each statement answered yes, the score was recorded. At the completion of each ten items, the scores were totaled. Each subject was then administered a 24 hour dietary recall, including food quantities consumed the previous day. The subjects needed to recall only gross measurement amounts in traditional household quantities, e.g. tablespoons, cups, ounces. The investigator then recorded the types of food and amounts consumed. At the completion of the individual's recall, the list was read to the subjects to validate their verbal report. Following reporting food intakes, the subjects were evaluated for weight and height using a standardized, balance-beam weight and height scale. Each subject was asked to describe his or her level of activity, as classified by the Diet Analysis Plus software. Levels were sedentary (minimal activity), lightly active (of 16 waking hours, 3 are spent in activities such as walking, golf), moderately active (such as light industry, farm workers, active students), very active (full time athletes, mine and steel workers), and extremely active (lumberjacks, construction workers).

Following collection of the diet recalls, the recorded foods and amounts, height, weight, and activity level were entered into the computerized database for assessment of macro- and micro-nutrient intake. Procedures for the protection of human subjects

were followed: the data collection instruments were coded by subject number and the subjects provided informed consent and were told that they were free to withdraw from the study at any time.

Data Analysis

Body Mass Index (BMI) was identified through use of *Diet Analysis Plus 3.0*,[46] and the nutrient intakes of individual subjects were quantified. From this information, mean percentages of intakes for the identified nutrients were calculated. The subjects meeting the requirements of the Food Guide Pyramid were identified and each of these was then classified into groups by age. Percentages were computed to identify the number of subjects who met the requirements of the Food Food Guide Pyramid . For nutritive evaluation, the means of the following nutrients were tabulated: total calories, protein, fiber, total fat, niacin, zinc, iron, and vitamins A, B1, C, D, and E (see Table 1).

[46] *Diet*, 1998

Table 1. Nutrient Intakes of Based on Twenty-Four Hour Recall

Nutrient and Suggested Requirements by Gender				
Nutrient	**Males**	**Females**	**Mean Intakes**	**Stand. Dev.**
Calories	2300	1900	1699.59	934.23
Iron	10 mg	10 mg	16.12	9.81
Niacin	15 mg	13 mg	20.55	115.99
Protein	63 g	50 g	83.38	36.36
Total Fat	65 g	65 g	55.99	24.61
Vitamin A	1000 *u*g	800 *u*g	892.76	684.81
Vitamin B1	1.2 mg	1.0 mg	1.84	1.37
Vitamin C	60 mg	60 mg	107.66	95.14
Vitamin D	10 mg	10 mg	3.55	2.99
Vitamin E	10 mg	8 mg	6.07	3.54
Calcium	1200 mg	1200 mg	714.80	489.83
Fiber	25 g	25 g	20.56	17.28
Zinc	15 mg	11 mg	10.41	5.4

Scores for each DETERMINE tool were compiled through summation of yes scores; with a yes answer to each question; the total score possible is 21. To describe differences between age groupings on macro- and micro-nutrient intake, Chi Square analyses were computed; ANOVA was used to compare nutrient intakes between the sexes, as well as between the risk scores on the DETERMINE scale.

Findings

Sample Characteristics

Thirty-two individuals participated in this study, ranging in age from 65-92, (*M*= 75.4). Eleven of the subjects were aged 80 or above. Eleven of the subjects were men; twenty-two of the subjects were Anglo and ten were Mexican American. The subjects' BMIs ranged from 18.16 to 45.47 (*M*= 26.599, SD= 5.768). Those individuals aged 80 and older had a mean BMI of 26.93 and those 79 and younger a mean of 26.42. The mean for BMI for those identified as at risk by the DETERMINE was 27.61 with a range of 18.16 to 45.47. The mean BMI for those identified as no risk was 25.82 with a range of 18.65 to 32.22.

Nutrition Risk

The energy intake of the food recall included that consumed at the congregate meal site, with recall of the prior day's evening meal, and the morning breakfast (see Table 2). The similarity in fruit and vegetable consumption was due to the menu served at the senior center during the dietary recall (see Table 3). The only complete meal consumed by the subjects was that served at the meal site; other intake included predominately fast foods (pizza, McDonalds salads, breakfast) and sandwich and soup meals. The variety if fruit and vegetable intake was limited.

Table 2. Summary of Food Intake for 24 Hours

Fats and Oils	Fruits	Vegetables	Grains/Pasta	Milk/Dairy	Meats
Margarine	Banana	Green Beans	Waffles	Eggs	Bacon
Cakes-Choc, Yellow	Cantaloupe	Green Chiles	Cracked Wheat Toast	Milk	Sausage
Oatmeal Cookies	Apple	Iceberg Lettuce	Dinner Roll	Ice Cream	Chicken
Jell-o Pudding	Orange/Apple Juice	Cole Slaw	Saltine Crackers		Olive Loaf/ Pickle-Pimento Loaf
Peanut Butter		Tossed Green Salad	Macaroni & Cheese		
Cherry Pie Filling			Spaghetti		
			Cereal		
			Pancakes		
			Pizza		

Table 3. Sex differences in Nutrient Intake

Nutrient	F	P value
Calories	11.38	.002
Protein	9.19	.005
Fiber	7.11	.012
Total Fat	3.98	.055
Vitamin B1	9.52	.004
Niacin	9.37	.005

The mean score for the DETERMINE was 3.43, SD = 3.843, with a range of 0 – 14. Eighteen subjects were score as no risk on the DETERMINE scale; however only 50% of them met the

requirements on the Food Guide Pyramid in the meat group, only a third met the requirements for the fruit and vegetable group, and less than 6% met the requirement for the milk group. For the 14 individuals identified as at risk, 100% met the RDA for the fat and oils group, compared with only 50% of the no risk group.

The vegetable, fruit, and meat groups were met by 20-35% of the at risk individuals. Less than 15% met the milk group requirement. With the exception of the meat group, those identified as at risk met the requirements of the Food Pyramid by a greater percentage than those identified as no risk (see Table 4).

Table 4. Percent of Total Sample Meeting Requirements of the Food Pyramid by Nutritional Risk Scores

Food Group	Scores of 0–2 No Risk	Scores of 3+ Moderate to High Risk
Bread	33.3	35.7
Fat/Oil	100.0	100.0
Meat Group	50.0	21.4
Fruit	27.8	35.7
Vegetable	33.3	35.7
Milk Group	5.6	14.3

There was little difference in meeting the requirements for the Food Pyramid. Those aged 80-92 failed to meet the meat and fruit group more often than those aged 65-79 (see Table 5). In the measurement of actual nutrient intake, no subject met the RDA for all of the nutrients. Iron, niacin, protein, and vitamins C and B1 were each met by over 50% of all groups (see Table 6).

Table 5. Percent of Total Sample Meeting Requirements of the Food Pyramid by Age

Food Group	Ages 65–79	Ages 80–92
Bread	33.3	36.4
Fat/Oil	100.0	100.0
Meat Group	42.9	27.3
Fruit	33.3	27.3
Vegetable	33.3	36.4
Milk Group	9.5	9.1

Table 6. Percentages Of Total Sample, By Age, Meeting Requirements of Specific Nutrients

Nutrient	Men Ages 65–79 N=7	Women Ages 65–79 N=14	Men Ages 80–92 N=4	Women Ages 80–92 N=7
Calories	29%	0%	75%	0%
Iron	57%	72%	100%	71%
Niacin	71%	79%	100%	71%
Protein	86%	79%	75%	86%
Total Fat	57%	21%	75%	0%
Vitamin A	14%	57%	25%	43%
Vitamin C	71%	79%	50%	57%
Vitamin D	0%	7%	0%	0%
Vitamin B1	57%	79%	75%	57%
Vitamin E	29%	29%	0%	14%
Calcium	29%	7%	75%	0%
Fiber	29%	7%	75%	29%
Zinc	57%	29%	50%	9%

There were no significant differences between the age groups and either macro- or micro-nutrient intakes. Among the sexes,

ANOVAs demonstrated significant differences in dietary intakes of calories, proteins, fiber, total fat, vitamin B1 and niacin. Among the macro- and micro-nutrients, there were significant differences among the no risk and high-risk groups only in vitamin C, and Vitamin D.

Discussion

The mean BMI for the subjects in this study fell within the recommended range for older persons, however, the ranges for both the at risk and no risk groups, as well as among the age categories had rather large upper limits. This may be attributable to the fact that each of the individuals met or exceeded the requirements for fat, oils and sweets. The requirement for this top level of the Pyramid is very small and meeting this amount is not difficult with even a limited intake. The intake of fast foods, eggs, and prepared meats by the subjects contributed to the more than adequate intake of fats and oils.

In this study, the subjects fell far short of adequate fiber intake, including total consumption of fruits and vegetables. There were also deficiencies in a number of micro-nutrients. All subjects fell below the RDA for vitamin E, as well as for zinc. In this sample, the only group who met the RDA for calcium were men aged 80 and over; this was a very small number (n=4). Less than 2% of the individuals in the study met the RDA for vitamin D. These results are consistent with that found by other investigators who reported calcium intakes of individuals aged 60-94 to be 62-72% below the RDA[47-49]. Thus, while half of the subjects were assessed as no risk, their food intake was limited in variety, and

[47] Elbon, S. M., Johnson, M. A., & Fischer, J. G. (1998). Milk consumption in older Americans. *American*

computed as falling short of recommended macro- and micro-nutrient intake.

The lack of variety and reliance on fast foods, sandwiches, and familiar, easily prepared foods in this sample of older individuals points to the theoretical approach of the use of “core” foods for this group. Core foods are consumed with frequency, while “peripheral” foods, those consumed less frequently included the variety of foods found in more balanced diets such as that offered at the meal site. As individuals age, the ability and interest in exploring a variety of foods diminishes, as well as the interest and ability to prepare a variety of foods, contributing to nutritional deficits[50-52]. Additionally, the subjects resided in a rural community; there is some evidence that dietary intake patterns are more dependent upon local customs and family mores than ethnic differences, contributing to varying food intake patterns in this sample[53].

The use of 24-hour recall as a method of diet analysis has been used successfully to evaluate dietary intake[54,55], and may be more useful in assessing nutritional risk that other screening tools, such as the DETERMINE scale. The results of this study indicate that the DETERMINE screening tool provided selective information regarding nutritional well-being or risk. The statements were ambiguous, making it difficult to pinpoint any one particular facet of risk. For example, the statement “I eat few fruits or vegetables, or milk products” forces the respondent to answer yes to all categories, even if they consume sufficient amounts of one of the three food groups. Respondents reported difficulties discriminating between the concepts included in the various questions. For example, one statement read, "I am not

Journal of Public Health, 88 (8), 1221-1225.

[48] McCormack, 1997

[49] Pareo-Tubbeh, S. L., Romero, L. J., Baumgartner, R. N., & Garry, P. J. (1999). Comparison of energy and nutrient sources of elderly Hispanics and non-Hispanic White in New Mexico. *Journal of the American Dietetic Association, 99*(5), 572-582.

[50] Buchowski, 1996

[51] Coulson, 1996

[52] Ryan, 1992

[53] Arnott, 1975

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always physically able to shop, cook and/or feed myself." Multiple concepts (shopping, cooking, feeding) were assessed within one question, necessitating an answer that might address one or two of the behaviors.

This study has several important limitations. First, the dietary intakes were self-reported; validation of nutrient intake was not possible. Additionally, one 24-hour report of food intake might not have thoroughly described the pattern of “core” foods consumed by this group of older people. A modest portion of the sample was Mexican American, and ethno-cultural differences in food choices and preparation were not explored. An examination of the ethno-cultural influences on food choice and preparation might indicate the nature of the core foods found in rural older people.

The findings from this study indicate the limited variation of dietary intake among the older people who participated, with sandwiches and fast food completing the dietary intake outside the congregate meal center. The assessment of the shopping and dining out choices of independent older individuals seems important. Guidance about shopping for fresh produce, rather that processed, and selecting lean cuts of meats, rather than processed meats, would assist in the reduction of fat intakes in older people, as well as increase the intake of dietary fiber. For the older individual, as muscle mass (lean tissue) decreases and fat tissue is redistributed in unfavorable patterns, it becomes of greater importance to monitor total caloric intake and the amount of fat calories.

Adequate intakes of essential nutrients appear to ameliorate a variety of chronic conditions, such as CHD and osteoporosis. Supplemental therapy might be an approach to controlling for nutrient deficits in older individuals, such as those in this sample. Osteoporosis appears to be delayed with calcium supplementation; women subjects in this study reported low or no calcium supplementation[56]. Thus supplementation might benefit certain older persons, but dosage levels must remain within the recommended intake levels[57].

[56] NIH Consensus Statement. (1994). *Optimal Calcium Intake12*,(4), 1-31.
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The results of this exploratory study indicate that, while screening instruments frequently used to assess nutritional risk of the older person may provide comprehensive assessment of eating ability, such as access to food and preparation abilities, they fall short in assessing the nutriture of actual food intake. Further exploration of nutriture in older persons based on food choices and eating patterns is warranted.

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