DIETARY PATTERNS AND SUPPLEMENT INTAKE OF OLDER ADULTS IN NORTHEAST GEORGIA

by

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(Under the Direction of Joan G. Fischer, Ph.D.)

ABSTRACT

The purpose of this study was to identify the patterns of dairy product, meat, fruit, vegetable, whole grain, and dietary supplement intake among older adults in northeast Georgia senior centers (N = 173; mean age: 77 years; 75% female; 39% African American). A survey questionnaire collected self-reported information on food and supplement consumption patterns, socioeconomic factors, nutrition knowledge, and illnesses. Daily servings of dairy products, fruits and vegetables, and whole grains were approximately 1, 3, and 1, respectively. Only 3.4% of participants consumed 3 or more servings of dairy products per day, and only 31% of participants in the lowest category of dairy product intake (0-6 servings per week) took calcium supplements. Only 16% of participants consumed 5 or more servings of fruit and green, orange or yellow vegetables (intakes of potatoes and legumes not examined) per day, and only 7% of participants consumed 3 or more servings of whole grains per day. Forty percent of participants took multivitamin/mineral supplements, while 32% took calcium supplements. Older adults do not meet the 2005 Dietary Guideline recommendations, and interventions should be implemented to increase consumption of these foods.

INDEX WORDS: Older Americans Act Nutrition Program, Senior center, Dairy products, Fruits and vegetables, Whole grains, Supplement use, Nutrition knowledge

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CHAPTER 1

INTRODUCTION

Gradual growth of the population of adults aged sixty-five or older has occurred since the 1950s (U.S. Census Bureau, 2001a). In 2000, 35 million adults aged 65 and older, 20.6 million of whom were women and 14.4 million of whom were men, were living in the United States. The older population comprised 12.4 percent of the total population (U.S. Census Bureau, 2001a).

Optimal nutritional status decreases risk of chronic illness, increases longevity, optimizes outcomes of hospital visits, and improves quality of life (Chapman et al., 1996; Kagansky et al., 2005; Lesourd, 1999). Studies on the dietary patterns of older Americans provide overwhelming evidence that intakes of dairy products, fruits, vegetables, and whole grains are below dietary recommendations to maintain health and prevent disease (Wold et al., 2005; Foote et al., 2000). However, additional studies on food patterns and predictors of intake among older adults are needed.

This study examined the patterns of dairy product, meat, fruit, vegetable, whole grain, and dietary supplement intake among 173 older adults in northeast Georgia senior centers. More specifically, this project sought to determine whether intakes of dairy products, fruits, vegetables, and whole grains met the 2005 Dietary Guidelines for Americans and whether age, gender, race, general nutrition knowledge, and food security impact food intake and dietary supplement use.

The average age (± SD) of participants was 77 ± 7 years, 75 percent were female, and 39 percent were African American. Participants aged 75 years and older comprised 65 percent of the sample. Common illnesses reported by participants included hypertension, constipation, diabetes,

heart disease, osteoporosis, congestive heart failure, and stroke. About 27 percent of participants reported an inability to purchase multivitamins and calcium supplements due to inadequate financial resources. Only 30 percent of participants correctly answered that three servings of whole grains, and only 29 percent of participants knew that five or more servings of fruits and vegetables per day are recommended. Additionally, only 34 percent of participants knew that three or more servings of calcium-rich foods per day are recommended.

Only 3.4 percent consumed the recommended three servings of dairy products per day. Twenty-nine percent of participants consumed dairy products less than seven times per week, and 28 percent consumed 14 or more servings per week. Positive predictors of dairy product intake were Caucasian ethnicity and food insecurity, and a negative predictor was milk intolerance. Meat, fish, and poultry were consumed by 25 percent of participants less than seven times per week, and participants aged 58 to 74 tended to consume meat, fish, or poultry more frequently than participants 75 years old or older. Positive predictors of meat, fish, or poultry intake were greater education and absence of osteoporosis. All fruits and vegetables were consumed less than seven times per week by a high percentage of the participants, including calcium-fortified juice, orange or yellow vegetables, other non-citrus fruit or citrus juice, citrus fruit or citrus juice, and green vegetables. Only 16 percent consumed five or more servings per day of green, orange or yellow vegetables and fruit. Intake of white vegetables, such as potatoes, was not assessed, but these data suggest that most participant intakes of all fruits and vegetables would be below seven to ten servings/day, which is recommended for those consuming 1,600 to 2,400 kcal. It is possible that some participants consumed more potatoes and rice and therefore did not consume as many other vegetables. Negative predictors of total fruit and orange, yellow, and green vegetable intake were heart disease and osteoporosis. While 72 percent and 74 percent of participants reported

consuming whole grain cereals and breads, respectively, only seven percent consumed the currently recommended three servings per day. Positive predictors of whole grain intake were self-reported diabetes and whole grain knowledge.

Use of multivitamin-mineral supplements was reported by 40 percent of participants, and calcium supplement use was reported by 32 percent of participants. Positive predictors of multivitamin-mineral use were Caucasian race, food insecurity, dairy product knowledge, and fruit and vegetable intake. Only 31 percent of participants in the lowest category of dairy product intake (0-6 servings per week) took calcium supplements, and only 24 percent consumed calcium-fortified fruit or juice. Twenty-four percent of calcium supplement users did not know whether vitamin D was included in the supplement. Positive predictors of calcium supplement use were osteoporosis and female gender.

The results of this study suggest that a small percentage of older adults in the Georgia OAANP meet the 2005 Dietary Guideline recommendations. Data from this study provide a better understanding of dietary patterns and supplement use in older adults, and the results will be used to plan future interventions to improve nutrition and overall health of older adults.

CHAPTER 2

LITERATURE REVIEW

Demographics of Older Adults

Advances in education, economics, medicine, and technology over the past century have resulted in an unprecedented life expectancy in developed nations (FIFARS, 2004). This increased longevity and a recent decline in childbirths have resulted in a disproportionate rise in the percentage of older people relative to the rest of the population (FIFARS, 2004). The United States has one of the fastest growing and largest older populations in the world (United Nations, 2006). Individuals aged 65 and older fall into the older population category, while individuals eighty-five and older fall into the oldest old population category. The oldest old population is the fastest growing segment of older adults (United Nations, 2006). By 2030, it is projected that 17 percent of the U.S. population will be aged 65 to 84 and that three percent will be aged 85 and over (U.S. Census Bureau (USCB), 2004).

The older population is culturally diverse, and ten percent of older adults living in the United States were born in a foreign country (USCB, 2004; USDC, 2004). Fifty-six percent of the older population are married, 32 percent are widowed, seven percent are divorced, and four percent have never married (USCB, 2001). Twenty-eight percent of older individuals live alone, and six percent live in group settings. Currently, eighty-five percent of older Americans are white; 7.7 percent are black; 4.3 percent are Hispanic; 1.7 percent are Asian or Pacific Islander; and 0.4 percent are American Indian, Aleut, and Eskimo (USCB, 2001). Median earnings, home ownership, education level attainment, and labor force participation decrease with age within the

older population, while poverty increases (USDC, 2004).

The older population also has a larger female component than male component (USCB, 2004). Table 2.1 shows that age is associated with declines in the percent of males within the population (USCB, 2001).

TABLE 2.1 Composition of Older U.S. Population in Terms of Age and Gender

	Number of Older Adults (in millions)		
Age (in years)	**Females**	**Males**	**Ratio of Women to Men**
65-74	7.5	4.8	1.6
75-84	3.0	1.2	2.5
Total	10.1	8.4	1.2

Key Factors of Well-Being

Several key factors have led to increased longevity of the elderly, including improved education, increased income, improved health care and overall health, and the development and industrialization of nations (FIFARS, 2004; USDHHS & USDC, 2001; USDA, 2005).
Drastic improvements in education have occurred in the United States over the last century. In 1950, only 17 percent of the older population were high school graduates, and three percent were college graduates (FIFARS, 2004). By 2003, 72 percent of the older population were high school graduates, and 17 percent were college graduates. Higher levels of education directly correlate with increased knowledge of nutrition and higher income, which are associated with better nutrition status (FIFARS, 2004).

Another key factor related to well-being of the older population is household income (FIFARS, 2004). The median household income for people aged sixty-five and older was $23,152 in 2002, with 10 percent of older Americans living below the poverty level. The improved financial position of the elderly largely results from the increase of older women who participated in the work force during their lifetime. A trend towards later retirement among both men and

women has also promoted the median income increase among older individuals (FIFARS, 2004).

Improved health care and overall health have improved well-being among older adults (FIFARS, 2004). The older population is experiencing a decline in smoking and chronic disability rates. Increased availability of prescriptions has also improved the health of older individuals.

Implications of a Growing Older Population

The growth of the older American population has many implications for the future (Centers for Disease Control (CDC), 2005). Possible problems that may arise include inadequate social security funds and increased health care costs. The epidemic of obesity and diabetes in the United States, coupled with a greater incidence of heart disease, will place strains on the health care system as the population grows older (CDC, 2006; USCB, 2001a). Older individuals require more health care and assistance with daily activities than other groups in the population, and the growth of the older population may pressure communities to improve and build more senior centers and nursing homes to care for the nation's aging populations (Warshaw & Bragg, 2003). However, maintaining the health of older adults should allow them to live independently in the community, ultimately reducing societal costs associated with nursing home care (CDC, 2006).

Older Americans Act Nutrition Program Participants

Title III of the Older Americans Act established the Older Americans Act Nutrition Program (OAANP) throughout the United States (Administration on Aging (AoA), 2005). The nutrition programs provide either home-delivered or congregate meals, each of which meets one-third of recommended dietary allowances, to 3.1 million older adults. Participants of the OAANP must be at least 60 years old, and the program specifically targets individuals who have financial difficulties, limited social interactions, live in rural communities, run a high risk of losing independence, and are minorities (AoA, 2005).

Physiological and Socioeconomic Changes Affecting Nutrient Intake

Changes in body composition, reduction in physical activity, and physiological factors alter the dietary requirements of older adults (Bozzetti, 2003). As people age, body fat increases and lean body mass decreases, which reduces protein reserves in the body. The predisposition of older individuals to chronic pain or illness also may limit physical activity. Reduced physical activity and decreases in lean body mass lower energy needs, so most older adults consume fewer calories than younger adults. To obtain adequate protein and micronutrients with reduced energy needs, older adults must consume nutrient dense diets.

Many factors may affect the diet of an older adult (Bozzetti, 2003). Older adults, especially those in low-income groups, are at a high risk for nutritional deficiencies due to poor diet quality and low nutrient intake (Cole & Fox, 2004). Most older individuals no longer work and are financially dependent upon retirement savings, pensions, and/or social security. These funds are often limited, and the elderly cannot afford to purchase healthy foods, which are often more costly than unhealthy options. Consequently, many older people are forced to purchase cheaper foods which often are higher in fat, cholesterol, and sugar (Drewnowski et al., 2004). Physical disabilities and reduced mobility may also make it difficult for the elderly to purchase healthy foods and cook nutritionally balanced meals. Additionally, a lack of nutrition education may lead elderly individuals to purchase foods that do not constitute a healthy diet (Chapman et al., 1996). McKay et al. (2006) found that individuals with lower levels of education rely most-heavily upon television, doctors, and neighbors for nutrition information. Participants with higher levels of education tended to consume healthier diets than those with lower levels of education. Additional factors related to nutritional risk include decreased appetite, polypharmacy, depression, mouth problems which affect chewing ability, social encounters, smoking status, and

physical activity levels (American Academy of Family Physicians (AAFP), 2005; Walker & Beauchene, 1991; Posner et al., 1993; Chapman et al., 1996; Sahyoun & Zhang, 2005; Cleveland et al., 2000).

Benefits of High Dairy Product, Fruit and Vegetable, and Whole Grain Intake

Diets high in fruits, vegetables and whole grains, and with adequate amounts of dairy and lean meats, significantly reduce risk for disease development and promote a healthy body weight (Kris-Etherton et al., 2004; Schulze & Hu, 2004; USDA & USDHHS, 2005). Several epidemiologic studies have indicated a strong association among high whole grain, low-fat dairy, and fruit and vegetable consumption with reduced risk of cardiovascular disease and/or breast and colon cancer (Williams & Hord, 2005; Joshipura et al., 2001; Hung et al., 2004; Appel et al., 1997; Jacobs & Gallaher, 2004).

Dairy Products

Healthcare providers have long made great efforts to ensure that children and adolescents consume enough dairy products (USDA & USDHHS, 2005). However, adequate dairy consumption is very important for older adults as well. The 2005 Dietary Guidelines recommend that adults consume three, eight-ounce servings of dairy products daily. Dairy choices should be either low-fat or fat-free and preferably should have no sugar added.

As a rich source of calcium and vitamin D, adequate consumption of dairy products throughout the lifecycle helps to prevent loss of bone mass later in life (Gennari, 2001; Miller et al., 2000). The presence of vitamin D in dairy products is especially important for older adults who tend to spend less time outdoors than younger people and also have less skin synthesis of vitamin D from the sun (Weaver & Fleet, 2004). Insufficient vitamin D intake may lead to osteoporosis, osteoarthritis, or osteomalacia (O'Connell & Stamm, 2004). Therefore, older

individuals require greater vitamin D consumption, and low-fat dairy products and vitamin D supplements are primary sources of vitamin D (O'Connell & Stamm, 2004; Johnson & Kimlin, 2006).

Additionally, numerous epidemiological studies have suggested that high consumption of low-fat dairy products correlates with reduced blood pressure levels, and thus reduced incidence of hypertension (Vollmer et al., 2001; Miller et al., 2000; Briefel, 2004). Studies of the DASH diet, which includes low-fat dairy products, show reductions in blood pressure among participants (Appel et al., 1997; Vollmer et al., 2001). Because blood pressure increases with age, consumption of low-fat dairy products can be especially beneficial among older populations. Additionally, calcium and insulin resistance appear to be negatively correlated (Schulze & Hu, 2004).

Dairy products provide high quality protein, which is important for the maintenance of lean body mass and in recovery from illness (USDA & USDHHS, 2005). An additional benefit of dairy products is the presence of conjugated linoleic acid (CLA), a fatty acid present in milk and milk products. There is interest in a possible role for CLA as a chemopreventive, anti-inflammatory, or anti-atherosclerotic agent (Salas-Salvado et al., 2006).

Fruits and Vegetables

Fruits and vegetables are also considered functional foods (Kaur & Kapoor, 2001). High consumption of fruits and vegetables is essential for optimal health and disease reduction (Van Duyn & Pivonka, 2000; Heber, 2004; Weisburger, 2000; USDA & USDHHS, 2005). Epidemiological studies provide strong evidence that fruits and vegetables help to prevent some cancers, coronary heart disease, stroke, chronic obstructive pulmonary disease, hypertension, diverticulosis, and cataract formation (Van Duyn & Pivonka, 2000; Weisburger, 2000; Kaur &

Kapoor, 2001; USDA & USDHHS, 2005). Studies indicate that high consumption of fruits and vegetables is associated with a 20 to 40 percent reduction in coronary heart disease and stroke (Hung et al., 2004; Van Duyn & Pivonka, 2000). Diets including 8.5 to 10 fruits and vegetables per day have been reported to reduce blood pressure (Appel et al., 1997).

The protective mechanisms associated with high levels of fruit and vegetable intake may be associated with the components of these foods (Van Duyn & Pivonka, 2000). Fruits and vegetables are rich sources of vitamin A, vitamin C, folate, and potassium (USDA & USDHHS, 2005). The high fiber content of fruits and vegetables may be related to reduced risk of cancer and cardiovascular disease (Krauss et al., 2000; American Cancer Society (ACS), 2006). Soluble fiber lowers serum cholesterol concentration levels (Van Duyn & Pivonka, 2000). In addition to both soluble and insoluble fiber, antioxidants present in fruits and vegetables may play a role in disease prevention by decreasing free radical damage and oxidant stress (Traber, 2006). For example, antioxidants may reduce oxidation of LDL cholesterol (Kris-Etherton & West, 2005). Folate intake is negatively associated with serum homocysteine levels, which is linked to reduced risk for cardiovascular disease (Handy & Loscalzo, 2003). Brightly-colored fruits and vegetables have the highest levels of phytochemicals, which include lutein, lycopene, dithiolthiones, isothiocyanates, allium, indoles, flavonoids, and isoflavones (Van Duyn & Pivonka, 2000). Carotenoids, which are abundant in yellow and orange vegetables, may be related to reduced risk for macular degeneration and cataract formation (Moeller et al., 2006). The presence of vitamin C and flavonoids in fruits and vegetables may decrease the risk of COPD due to their antioxidant activity (Romieu & Trenga, 2001).

The promotion of fruits and vegetables is not new in the field of health, but recent studies indicate that people should eat more fruits and vegetables than previously thought. The 2005

Dietary Guidelines recommend that people should consume 5 to 13 servings of fruits and vegetables per day, depending on calorie level (USDA & USDHHS, 2005). For a typical older adult consuming 1600 to 2400 calories per day, this would mean consuming 7 to 10 servings per day. A wide variety of fruits and vegetables should be selected. Over the course of a week, 3 cups of dark green vegetables, 2 cups of orange vegetables, 3 cups of legumes, 3 cups of starchy vegetables, and 6½ cups of additional vegetables should be consumed by a person who needs 1800 calories. The American Institute for Cancer Research has recommended that 5 to10 servings (400g) of fruits and vegetables be consumed daily (Van Duyn & Pivonka, 2000). This is the amount associated with a twenty percent reduction of cancer incidence (Van Duyn & Pivonka, 2000).

Whole Grains

Unlike processed grains, whole grains still contain the bran and germ of the kernel, which is where the majority of the vitamins, minerals, antioxidants, fiber, lignans, and phenolic compounds are located (USDA & USDHHS, 2005). Whole grains are rich in pantothenic acid, riboflavin, thiamin, niacin, iron, calcium, sodium, potassium, magnesium, and phosphorus (Slavin, 2004). Older adults consuming a 1,800 calorie-a-day diet should consume six ounces of grains per day, of which at least three ounces are whole grains and three ounces are enriched grains (USDA & USDHHS, 2005). A review of 17 studies found that compared to non-whole grain consumers, those who consume whole grain foods on a consistent basis had a 20 to 40 percent reduced risk for non-insulin dependent diabetes and atherosclerotic cardiovascular disease (Jacobs & Gallaher, 2004). Other studies have shown that a higher intake of whole grains correlates with a reduced incidence of obesity and all-cause mortality (Guo & Kindstedt, 1998). The components of whole grains not only reduce the incidence of chronic disease, but also help people to reach and

maintain a healthy weight. Whole grains also have important health benefits due to their rich content of lignans, phytoestrogens, antioxidants, and fiber (USDA & USDHHS, 2005; Kris-Etherton et al., 2002). Lignans and phytoestrogens may decrease risk for breast cancer and prostate cancer development (Kris-Etherton et al., 2002).

Whole grains are high in fiber, unlike processed grains, which is beneficial for numerous reasons (Briefel, 2004). The high fiber content of whole grains may decrease risk for both cancer and coronary heart disease development (Jacobs & Gallaher, 2004). The presence of soluble fiber lowers cholesterol and improves blood-lipid concentrations, thereby reducing the risk of coronary heart disease (USDA & USDHHS, 2005; Guo & Kindstedt, 1998). Soluble fiber also retards the digestion and absorption rates of carbohydrates from foods, so blood glucose levels are maintained at a relatively low level (Guo & Kindstedt, 1998). High fiber foods with low glycemic indexes are beneficial for people with non-insulin dependent diabetes because smaller amounts of insulin release are necessary after meals (Schulze & Hu, 2004). Whole grains also contain oligosaccharides, short chain carbohydrates, which act similarly to soluble fiber (Guo & Kindstedt, 1998).

Micronutrients in whole grains also have beneficial effects. Folate, as mentioned previously, lowers levels of homocysteine in the blood, which, in turn, reduces risk of atherosclerosis, stroke, and heart disease (Briefel, 2004). Potassium maintains electrolyte balance, proper nerve functioning, fluid balance and muscle contraction. The presence of magnesium in whole grains helps to prevent a condition of hypomagnesemia, which results in reduced insulin receptor activity and perhaps even insulin resistance and non-insulin dependent diabetes (Schulze & Hu, 2004).

Whole grains provide antioxidants in the form of phenolic compounds and trace minerals

(Guo & Kindstedt, 1998). Phytic acid, vitamin E, and selenium are the primary antioxidants present in whole grains. Phytic acid binds to metals that act as catalysts in redox reactions, and the inhibition of these metal catalysts prevents oxidative damage. Whole grains also contain phytoestrogens, including lignans and plant stanols and sterols, which raise serum enterolactone and help to reduce cholesterol, respectively (Guo & Kindstedt, 1998). Vitamin E prevents oxidative damage of polyunsaturated fatty acids. Selenium is a component of glutathione peroxidase, a critical antioxidant enzyme (Guo & Kindstedt, 1998).

Importance of Adequate Nutrition

Older individuals who are undernourished suffer from more diseases and infections, and have longer and more frequent hospital visits, than those who receive proper nourishment (AAFP, 2005). Adequate nutrition status strongly correlates with decreased risk of chronic illnesses and other life-threatening complications, and thus increases independence and longevity (Chapman et al., 1996). For example, Kagansky et al. (2005) conducted a prospective cohort study of 414 patients who were at least 75 years old to examine factors that cause malnutrition in the hospital. A "Mini Nutritional Assessment" score was calculated for each patient in order to evaluate dietary habits. Researchers found that only 17.6 percent of patients were considered to be well-nourished, and it was noted that those who were well-nourished had a much greater survival rate than those who were malnourished. Patients with dementia, malignancy, ulcers, and infections had much lower scores on the Mini Nutritional Assessment than patients who had no health complications. It was concluded that the outcomes of hospital visits for the elderly can largely be predicted by their dietary behaviors or nutritional status (Kagansky et al., 2005).

Dietary Intake and Dietary Variety Among Older Adults

Dietary Intake of Foods

The 2005 Dietary Guidelines include recommendations for a daily intake of three servings of low-fat dairy products; seven to ten servings of fruits and vegetables; and six grain servings, three of which are whole grain for individuals consuming approximately 2,000 kcal per day (USDA & USDHHS, 2005). Several food groups are under-consumed by older adults, particularly dairy products, fruits, vegetables, and whole grains (Chapman et al., 1996; Ellis et al., 2005; Foote et al., 2000).

As the size of the older population grows, studies regarding the food patterns of older people have become more important (Chapman et al., 1996). Many studies have been done in recent years to assess dietary patterns and nutrient density of the diets of older Americans, and these studies provide overwhelming evidence that the older adults did not meet earlier dietary recommendations (Foote et al., 2000). A study of the dietary patterns of 474 non-institutionalized older Americans found that 20 percent of participants did not regularly consume lunch, which significantly reduced nutrient intake among these individuals (Ryan et al., 1992). Foote et al. (2000) assessed the dietary patterns of 1,740 Arizona men and women who were between 51 and 85 years of age. The cross-sectional study utilized verbal food frequency questionnaires. Foods consumed by the participants were categorized into the basic food groups and subsequently summed within each food group to determine the number of ½ cup servings consumed in each food group. The dietary patterns of these seniors were compared to the recommendations of the 2000 Food Guide Pyramid and to dietary reference intakes. Less than ten percent of participants met the 2000 Dietary Guideline recommendations of six or more grain servings per day, and less than five percent met recommendations of three dairy product servings per day. Only about 50

percent of the participants met the 2000 Dietary Guideline recommendations of five fruit and vegetable servings per day. Chapman et al. (1996) assessed the dietary patterns of 472 Illinois seniors aged sixty-four and older. The Behavioral Risk Factor Surveillance Survey (BRFSS), a fifty-five-question survey conducted by telephone, was used to collect data regarding the dietary patterns of the participants. These dietary patterns were assessed for how well they followed the 1995 Dietary Guidelines for Americans. Ten additional questions were included in the survey regarding fruit, vegetable, and dairy product intake. Only five percent of participants met the 1995 Dietary Guideline recommendations for fruits, vegetables, and dairy products. Of the participants who met fruit and vegetable recommendations, eight percent did not meet dairy product recommendations. Nineteen percent of participants consumed adequate amounts of dairy products but did not meet fruit and vegetable recommendations. Only 26 percent of participants had a diet that was considered moderately adequate. Researchers concluded that low income, social isolation, and poor education increased one's risk for inadequate nutrition (Chapman et al, 1996).

Failure of the elderly to meet dietary recommendations was also found in a study which evaluated whole grain consumption among U.S. adults aged twenty and older (Cleveland et al., 2000). Researchers identified whole grain foods and compared food and nutrient consumption for people who eat whole-grains and those who do not. Methods used in the study included a 24-hour recall in two, non-consecutive, face-to-face interviews. Results of the study indicated that although U.S. adults, including the elderly, consume about 6.7 grain servings per day, they consume only one whole-grain on average per day. Eight percent ate three or more whole-grain servings per day. Fifty-six percent ate only one whole-grain per day, and 36 percent had a daily consumption of less than one whole-grain serving per day. The top sources of whole grains consumed by participants included yeast breads and cereals. The primary sources of non-whole

grains consumed included pasta, cookies, pies, quick breads, and cakes. Results indicated that the top whole-grain consumers were older, had higher incomes, did not smoke, and exercised regularly (Cleveland et al., 2000). Larrieu et al. (2004) assessed the impact of gender, education attainment, age, and lifestyle on the dietary behaviors of older people. 9,250 participants aged 65 and older participated in an interview using food frequency questionnaires. The results of this study showed a strong, negative correlation between age and consumption of cereals, vegetables, fish, and meats. Older women consumed more fruits and vegetables, but less alcohol, than men. Higher levels of education among the participants correlated with greater consumption of fish, fruits, vegetables, and alcohol. Participants who lived alone had a more limited diet than those who lived in a community or with family. Additionally, it was found that older people who live alone and who are poorly educated are a highest risk for nutritional deficiencies (Larrieu et al., 2004). Higher income and greater education have also been associated with greater chicken consumption, while lower income and lower education were associated with higher beef and pork consumption (Guenther et al., 2005). Finally, Elbon et al. (1998) reported that only 16 percent of older adults consumed milk two or more times per day. Positive predictors of milk consumption were adolescent milk consumption, greater nutrition knowledge, and diabetic diet, while intolerance to milk was associated with lower milk consumption (Elbon et al., 1998).

Previous studies on older adults in North Georgia Senior Centers have found that weekly fruit and vegetable consumption was nine servings and 23 servings per week, respectively; and weekly whole grain consumption was 10.5 servings (Wade et al., 2003; Ellis et al., 2005). Aspinwall (2001) and McCamey (2003) found that only 25 to 34 percent of older adults in the Georgia Elderly Nutrition Program consumed five or more fruits and vegetables per day. Results from the 2005 Behavioral Risk Factor Surveillance System (BRFSS) Report indicated that only 32

percent of older adults consumed five or more fruits and vegetables per day. Greater education, knowledge of fruit and vegetable recommendations, and greater income positively predicted fruit and vegetable intake, while poor taste and difficulty in fruit and vegetable preparation negatively predicted intake (BRFSS, 2005; Wade, 2001). Ellis et al. (2005) found that appreciation of whole grain taste, diabetes, and knowledge of whole grain benefits, labeling, and recommendations positively predicted whole grain intake, while negative predictors of intake were smoking and cancer. Little association was found between whole grain consumption and gender, cognition, body mass index (BMI), age, and ethnic background. An explanation for low whole grain consumption among older adults may be lack of an ability to distinguish whole grain from non-whole grain foods. Physical ailments, lack of transportation, and low (if any) income create difficulties with the purchase and preparation of whole grain foods (Ellis et al., 2005).

Dietary Variety

Variety in the diet ensures that a wide range of vitamins and minerals are consumed, and a limited diet may prevent adequate consumption of nutrients and lead to deficiencies. Therefore, older people can benefit from dietary supplements and should attempt to eat a variety of foods from all of the food groups (Marshall et al., 2001). A lack of dietary variety is especially problematic among many older populations who may be unable to purchase or prepare foods. A study of 3,194 adults aged 65 and older examined correlations between Healthy Eating Index (HEI) scores and social contact, demographic, and lifestyle factors (Sahyoun & Zhang, 2005). Researchers compared HEI scores with the frequency of encounters with other people via personal contact or telephone, as well as with participation in club meetings and religious gatherings. For both men and women, increases in social encounters increased HEI scores. It was found that a significant difference in HEI scores existed between older adults with four social contacts and

older adults with three or fewer social contacts. The fewer social encounters a participant had, the lower the consumption of fruits and vegetables, calories, and a varied diet.

The Dietary Variety Score (DVS), a measurement for the total number of different foods in a diet, was created to assess dietary variety (Drewnowski et al., 1997). A study of 48 healthy individuals, half of whom were aged 20 to 30 and the other half of whom were aged 60 to 75, assessed dietary quality with the DVS. Researchers found that the diets of older adults had greater variety than the diets of the young adults. It was also found that those with higher DVS scores (typically elderly individuals) had greater vitamin C consumption but lower saturated fat, salt, and sugar intakes than those with lower DVS scores (typically younger individuals). In contrast, Marshall et al. (2001) reported that older people have a smaller variety of foods in their diets than younger generations because physical pain, illness, or degeneration makes it more difficult to cook, shop for groceries, and to taste different foods. The researchers encouraged greater consumption of fruits, vegetables, whole grains, dairy products, and low-fat protein sources.

Nutrient Intake

Numerous studies indicate that inadequate nutrient consumption among older adults is still a large problem (Lesourd, 1999). In one study, more than ninety percent of participants had inadequate consumption of vitamin A, vitamin D, vitamin K, and vitamin B12 (Foote et al., 2000). More than 73 percent of participants did not consume enough vitamin E, and more than fifty percent of the older adults did not meet recommended levels of folate. Over 80 percent of these participants did not have adequate calcium intakes, and more than 55 percent of male participants did not meet magnesium requirements. Researchers concluded that special attention should be placed on the promotion of folate, calcium, vitamin D, and vitamin E consumption, for which the elderly are at highest risk for deficiencies (Foote et al., 2000).

The nutritional status and nutritional risk of 420 Iowans who lived in rural communities and were seventy-nine years old or older was also assessed (Marshall et al., 2001). Participants completed three-day dietary records, and data regarding dietary patterns, cognitive abilities, and demographics was collected. Intakes of folate, vitamin A and calcium were inadequate for 25, 17, and 37 percent of participants, respectively. Only 20 percent of participants had consumed adequate amounts of at least four nutrients. A positive correlation was found between fiber, nutrient, and energy intake and dietary variety. Based on this information, the researchers concluded that dietary variety and numerous nutrients are lacking in the diets of older Iowans who live in rural communities and that use of supplements and increased variety in foods should be encouraged among this population (Marshall et al., 2001).

Dror et al. (2002) assessed the nutrient intake of 50 institutionalized older people with an average age of 84.6. The study utilized food frequency questionnaires, which were created based upon recipes, menus, and serving sizes used by the institutions. The results of the study indicated that the average energy intake of the participants was 1,910 kilocalories. Energy from protein and fat was at or above recommended levels. However, intakes of fiber, calcium, magnesium, copper, zinc, vitamin B6, vitamin B1, vitamin C, vitamin D, vitamin E, and folic acid were low. Iron consumption among these participants was either adequate or high. Researchers concluded that although iron and vitamin A supplements were unnecessary, older people may derive benefit from supplementation of other micronutrients (Dror et al., 2002).

Strategies for Improving Dietary Intakes among Older Adults

Nutritional guidance can help older individuals to maintain a diet that provides an adequate nutrient supply. Encouraging older individuals to follow the 2005 Dietary Guidelines for Americans and Food Guide Pyramid are basic strategies for improving dietary intakes among

older adults. Greater adherence to the Dietary Guidelines will tend to improve nutrient intake (Bozzetti, 2003; Seiler, 2001). The Dietary Guidelines for Americans 2005 provide key recommendations for different subgroups of the population, including the elderly (USDA/DHHS, 2005). These recommendations are backed up by many studies, which indicate that fruits and vegetables, whole grains, dairy products, and meats/beans provide numerous health benefits to consumers. Although older people tend to consume more whole grains and are more aware of nutrition-based disease prevention than younger people, they still do not meet the recommendations of the Dietary Guidelines (Cleveland et al., 2000).

It is clear that the elderly are in need of nutritional guidance, and nutrition programs for this high risk group may be very beneficial. Nutrition education can significantly improve the dietary habits of older adults, who often consume low nutrient-dense diets, and improvements in nutrition education programs are in progress (Drewnowski, 2005). Nutrition education is especially important for elderly individuals who do not have much money, are widowed or live alone, and/or who have low levels of education (Chapman et al., 1996). Health programs should focus more on older people who are at highest risk for low consumption (Johnson, 1998). Greater emphasis should be placed on promotion of the Food Guide Pyramid among older people as a reference for food choices (Foote et al., 2000). Programs that help the elderly to obtain and cook nutritious meals, and that promote dairy product, fruit, and vegetable consumption, are needed in order to minimize risk for nutritional deficiencies in older people (Chapman et al., 1996). Additionally, the consumption of balanced meals should be encouraged among older adults at highest risk for poor nutrition (Larrieu et al., 2004).

One new approach to nutrition intake assessment and education of the consumer utilizes a nutrient density score (Drewnowski, 2005). Former measurements of nutrient density have based

the nutritional value of food on the relationship of a minimally-present nutrient to calories or to other nutrients in the food. However, the nutrient density score bases the nutritional value of food on the relationship of a beneficial nutrient, rather than a nutrient present only in minimal amounts, to calories or to other nutrients in the food. Because a large percentage of Americans believe that foods low in sugar, fat, and sodium are automatically "healthy", and because the typical American diet is less nutrient dense and more energy dense than in previous decades, it is important that an accurate definition of nutritional foods is conveyed to the public. The creation of a nutrient density score will help nutrition educators to teach at-risk groups for nutrient deficiencies, such as the elderly, what defines a nutritious food (Drewnowski, 2005).

Dietary Supplements

Dietary supplement sales have undergone a dramatic increase over the last ten years (Briefel, 2004). In fact, supplement sales doubled between 1994 and 1999 alone, from $8.8 billion in sales to $14.7 billion in sales, respectively (Wold et al., 2005). Older adults today are more educated and health conscious than in previous decades and therefore are aware that dietary supplements may improve their nutrition (Wold et al., 2005). Additionally, age-related conditions such as arthritis, constipation, and inability to sleep prompt many older people turn to dietary supplements for relief.

Adults aged sixty and older have greater supplement consumption than any other adult age group (Radimer et al., 2004). Approximately 46 percent of supplements taken in the United States from 1988 to 1994 were vitamin/mineral supplements, and use of supplements increased with age (Ervin et al., 1999). Recent studies confirm that dietary supplement use is increasing, especially among older adults (Radimer et al., 2004; Rock et al., 2004). NHANES data collected between 1971 and 2000 showed trends in dietary supplement use among different age groups in the U.S.

population (Briefel, 2004). The trend towards increased dietary supplement use began in the 1970s. During the early 1970s, children had higher supplement use than any other age segment of the population. By 2000, however, older adults were the most frequent consumers of supplements. Currently, elderly women have the highest dietary supplement consumption in the United States. Older adults may benefit from dietary supplements because they have reduced immunity to illness, absorb nutrients less efficiently than younger people, and eat fewer and smaller meals due to decreased appetite or inability to prepare meals (Lesourd, 1999). Table 2.2 displays the NHANES data, which indicates that a change in dietary supplement consumers from children to older adults took place between 1971 and 2000 (Briefel, 2004).

TABLE 2.2 Prevalence of Dietary Supplement Use among Older Adults

Age/Gender	NHANES I, 1971-1974	NHANES II, 1976-1980	NHANES III, 1988-1994	NHANES, 1999-2000
60-74 (males)	31.6	36.9	39.5	60.6
60-74 (females)	40.2	45.3	52.6	66.4

Benefits of Supplements

Dietary supplements are often a vital source of nutrients for the elderly who may not have an adequate nutrient intake from their diet alone (Briefel, 2004). Older adults consume far fewer nutrient-dense foods than are needed to obtain necessary nutrients (Ledikwe et al., 2004). They absorb some nutrients less efficiently than younger people, and eat fewer and smaller meals due to decreased appetite or inability to prepare meals (Lesourd, 1999). Supplements may benefit older adults by strengthening the immune system, reducing incidence of chronic disease, and improving overall nutrition (Lesourd, 1999). Therefore, behavior interventions that promote nutrient-dense diets and use of supplements may greatly improve the nutrition status of older adults (Ledikwe et al., 2004).

Older individuals are at high risk for deficiencies of several nutrients, primarily B_{12}, calcium, and vitamin D, due to poor nutrition habits, reduced energy requirements, and reduced appetite (Marshall et al., 2001; Taylor, 2006). Vitamin B12 status directly correlates with intake (Tucker et al., 2005). Therefore, supplementation is effective in raising plasma B12 concentrations, which lowers methylmalonic acid levels (Johnson et al., 2003; Tucker et al., 2005; Fletcher & Fairfield, 2002). Folic acid, vitamin B6, and vitamin B12 lower the level of serum homocysteine in older adults, which may reduce the risk of cardiovascular disease (Lesourd, 1999). Vitamin D deficiencies are often seen in older adults due to a lack adequate sunlight exposure, reduced cutaneous synthesis due to aging, and lack of vitamin D-rich food consumption (Holick, 2006; O' Connell & Stamm, 2004). Vitamin D supplements reduce risk of deficiency (Holick, 2006; Johnson & Kimlin, 2006). Vitamin D supplements also lower serum PTH levels, which optimizes calcium absorption (Fletcher & Fairfield, 2002; Lesourd, 1999; Weaver & Fleet, 2005). Adequate vitamin D intake and calcium availability help to reduce bone loss and bone fractures in the elderly by reducing resorption of bone (Fletcher & Fairfield, 2002; Heaney & Weaver, 2003; Lesourd, 1999; Weaver & Fleet, 2005). Thus, use of calcium and vitamin D supplements, when appropriate, is important because fractures associated with bone loss are painful, expensive, and decrease quality of life (Miller, 2000). Further, a randomized controlled trial of 246 older women and 199 older men found that daily supplements containing 500 mg calcium citrate malate and 700 IU cholecalciferol reduced the risk of falling by 20 percent when taken for three years (Bischoff-Ferrari, 2006b). Longer use of vitamin D and calcium supplements is associated with greater reductions in falls, and thus fractures (Bischoff-Ferrari et al., 2006b). Currently, Caucasian women have a higher use of calcium supplements than African American women (Mojtahedi et al., 2006). The 2005 Dietary Guidelines for Americans suggest that older

individuals consume extra vitamin D by either taking vitamin D supplements or consuming foods fortified with vitamin D (USDA, 2005).

Additionally, older adults who take dietary supplements have higher micronutrient intake and better general health outcomes than those who do not (Radimer et al., 2004; Dangour et al., 2004; Rock et al., 2004). Several studies have linked micronutrient supplement use to general improvements in nutritional status, which may help to preserve and enhance immunity during aging (Lesourd, 1999). A strong immune response reduces the severity of infectious diseases, a common cause of hospitalizations in older individuals (Lesourd, 1999). Jatoi et al. (2005) found that elderly, non-small cell, lung cancer patients who used vitamin/mineral supplements had a better quality of life and better survival rates than patients who took no vitamin/mineral supplements. Langkamp-Henken et al. (2004) found that older patients with an upper respiratory tract infection recovered more quickly and had enhanced immune function after consuming eight ounces per day of a vitamin/mineral nutrition formula for 183 days.

Some studies fail to show benefits of vitamin/mineral supplement use, and excessive intakes of iron or vitamin A above 100 percent of the RDA can be hazardous to health (NIH, 2006; Committee on Dietary Reference Intakes, 2000). Some randomized trials here failed to show disease prevention benefits of vitamin/mineral supplements for many diseases (National Institutes of Health (NIH), 2006). Thus, controversy surrounds the issue of dietary supplement use. Some feel that dietary supplements are over-consumed and that a large percentage of the people who use supplements do not need them. Studies have shown that people who have unhealthy diets and are overweight are less likely to take supplements than healthier individuals (Radimer et al., 2004; Foote et al., 2003). It is important to educate older adults about supplements that are beneficial and to avoid unnecessary supplementation.

Studies of Supplement Use in Older Adults

According to numerous studies and to the 1999-2000 NHANES data, dietary supplement use is much greater among highly educated, higher income, older, Caucasian, physically active, non-obese, and former-smoking but currently non-smoking individuals (Radimer et al., 2004; Foote et al., 2003; Archer et al., 2005; McKay et al., 2006).

A retrospective review conducted by the University of New Mexico's Aging and Genetics Epidemiology Program took place between 1994 and 1999 and found that both nonvitamin and nonmineral dietary supplement use increased in their population of older adults (Wold et al., 2005). 359 participants between 60 and 99 years of age participated in the study, which was conducted over a period of six years. Eighty-nine percent of participants aged 60 and older took dietary supplements, and an increase in age corresponded with an increase in dietary supplement use.

The National Health and Nutrition Examination Survey of 1999-2000, a cross-sectional survey, collected data representative of the entire U.S. population (Radimer et al., 2004). 1,825 participants aged 60 and older were included in the study. Results of the survey showed that 63.3 percent of participants took dietary supplements, 39.8 percent took multivitamins or multiminerals, 25.3 percent took vitamin E, 17.3 percent took vitamin C, 18.4 percent took calcium (not including antacids), 33.5 percent took calcium (including antacids), 7.2 percent took B-complex vitamins, 0.8 percent took chromium, 1.9 percent took iron, 2.1 percent took folic acid, 1.8 percent took vitamin A, 2.9 percent took vitamin B12, 1.6 percent took selenium, and 1.9 percent took zinc. Consumption of dietary supplements was found to be slightly higher among women than men.

Similarly, the Slone Survey found that of its total participants aged sixty-five and older,

one out of seven women consumed dietary supplements, while only one out of nine men consumed dietary supplements (Wold et al., 2005). Less than half of the total adult participants took any supplements daily, but an average of two supplements were taken daily by the participants who were sixty years old and older.

Dietary Supplement-Drug Interactions

Herbal dietary supplement-drug interactions have become more common in the United States as the use of dietary supplements has increased (Ly et al., 2002; Wold et al., 2005). Interactions between dietary supplements and medications have recently become a serious problem (Wold et al., 2005). These interactions are especially prevalent among the elderly because they take more dietary supplements than other segments of the population but do not always inform their physicians of their dietary supplement use (Wold et al., 2005; Ly et al., 2002). As a result, physicians do not warn their patients of possible interactions that might occur with their medications, and serious consequences may result. Common interactions may increase risk for seizures, alter bleeding time, inhibit reuptake of serotonin, and alter serum glucose (Wold et al., 2005).

Older adults who have recently undergone surgery are at highest risk for dietary supplement-drug interactions (Wold et al., 2005). Among the most dangerous interactions for such people are those that inhibit the formation of platelets, which may result in excess bleeding among surgery patients.

Ly et al. (2002) studied supplement use among twenty-eight older adults (average age of seventy-eight years). Half of the participants used dietary supplements, but 36 of the participants admitted that they did not tell their physicians or pharmacists of their dietary supplement use. Fifty-four percent took a dietary supplement that posed a risk for interactions with their

medications. Forty-five dietary supplement-drug interactions actually occurred among the patients during the study, and each participant experienced between one and two interactions on average. The most common interactions occurred between ginkgo and aspirin, and garlic and warfarin, which inhibit the aggregation of platelets.

Wold et al. (2005) also studied supplement-drug interactions. Twenty-two dietary supplements were observed for possible interactions with the prescription and nonprescription medications taken by older adult participants. Ten dietary supplements interacted with medications. Between 1994 and 1999, a total of 142 supplement-drug interactions took place among participants. Researchers found that flax oils, evening primrose, and borage interacted with medications a total of nine times, which included twice with anticonvulsants and seven times with estrogen or progesterone; chondroitin interacted with an anticoagulant once; chromium iodinate interacted with antidiabetic agents twice; dehydroepiandrosterone interacted with estrogen or progesterone drugs six times, garlic interacted with medicines 62 times, of which 59 times were with estrogen or progesterone and three times were with anticoagulants; ginkgo biloba interacted with medicines 57 times, of which once was with an anticonvulsant, three times were with anticoagulants, 36 times were with aspirin or cyclates, and 17 times were with drugs that reduce inflammation; glucosamine interacted twice with antidiabetic agents; St. John's wart interacted once with a beta-blocker; and wild yam interacted once with estrogen or progesterone drugs. Therefore, the researchers concluded that the identification of these interaction risks by dietitians, physicians, and pharmacists is essential to the well-being of older adults who take prescription/nonprescription medications and dietary supplements (Wold et al., 2005).

Rationale for Current Study

Older adults, especially those in low-income groups, are at a high risk for nutritional deficiencies due to poor diet quality and low nutrient intake (Cole & Fox, 2004; Marshall et al., 2001). Optimal nutritional status decreases the risk of chronic illness and total mortality, increases longevity, and improves quality of life in the elderly (Tucker et al., 2005; Chapman et al., 1996). Further study is needed on food patterns and predictors of intake among older adults.

CHAPTER 3

DIETARY PATTERNS AND SUPPLEMENT INTAKE OF OLDER ADULTS IN NORTHEAST GEORGIA[1]

[1]Kolmers AM, Fischer JG, Johnson MA, Andress EL. To be submitted to the *Journal of Nutrition for the Elderly.*

ABSTRACT

The purpose of this study was to identify the patterns of dairy product, meat, fruit, vegetable, whole grain, and dietary supplement intake among older adults in northeast Georgia senior centers (N = 173; mean age: 77 years; 75 percent female; 39 percent African American). A survey questionnaire collected self-reported information on food and dietary supplement consumption patterns and predictors of intake. Average daily intakes of dairy products, fruits and vegetables, and whole grains were 1.2, 3, and 1.3 servings, respectively. Only 3.4 percent of participants consumed three or more servings of dairy products per day. Only 16 percent of participants consumed five or more servings of fruit and green, orange or yellow vegetables per day, and only seven percent of participants consumed three or more servings of whole grains per day. Forty percent of participants took multivitamin/mineral supplements, while 32 percent took calcium supplements. Significant predictors of intake were nutrition knowledge, education, illness, and ethnicity. Despite low dairy product intake, many did not take calcium supplements. Only 31 percent of participants in the lowest category of dairy product intake (0-6 servings per week) took calcium supplements. Older adults do not meet the 2005 Dietary Guideline recommendations, and interventions should be implemented to increase consumption of these foods.

INTRODUCTION

In 2000, 35 million adults aged sixty-five and older, 20.6 million of whom were women and 14.4 million of whom were men, were living in the United States. The older population comprised 12.4 percent of the total population (USCB, 2001b).

Optimizing the nutritional status of older adults decreases risk of chronic illness, increases longevity, optimizes outcomes of hospital visits, and improves quality of life (Chapman et al., 1996; Kagansky et al., 2005; Lesourd, 1999). However, studies on the dietary patterns of older Americans provide overwhelming evidence that many have poor dietary patterns and that intakes of dairy products, fruits, vegetables, and whole grains are low (Wold et al., 2005; Foote et al., 2000).

Diets high in fruits, vegetables and whole grains, and with adequate amounts of dairy and lean meats, significantly reduce risk for disease development and promote a healthy body weight (Kris-Etherton et al., 2004; Schulze & Hu, 2004; USDA & USDHHS, 2005). Dairy products are a rich source of calcium and vitamin D, and adequate consumption throughout life may help to prevent osteoporosis, osteoarthritis, osteomalacia, hypertension, and insulin resistance later in life (Gennari, 2001; Miller et al., 2000; O'Connell & Stamm, 2004; Vollmer et al., 2001; Briefel, 2004; Appel et al., 1997; Schulze & Hu, 2004). Typical intake is low, with only 16 percent of older adults consuming two or more servings of dairy products per day (Elbon et al., 1998). A positive predictor of dairy product intake has been greater nutrition knowledge, while intolerance to milk has been associated with lower milk consumption (Elbon et al., 1998).

Epidemiological studies provide strong evidence that fruits and vegetables help to prevent some cancers, coronary heart disease, stroke, chronic obstructive pulmonary disease, hypertension, diverticulosis, and cataract formation (Van Duyn & Pivonka, 2000; Weisburger,

2000; Kaur & Kapoor, 2001; USDA & USDHHS, 2005). Previous studies have found that only 25 to 34 percent of older adults consumed five or more fruits and vegetables per day (Aspinwall, 2001; McCamey, 2002; BRFFS, 2000). Greater education, knowledge of fruit and vegetable recommendations, and greater income have been found to positively predict fruit and vegetable intake, while poor taste and difficulty in fruit and vegetable preparation are barriers to consumption (BRFSS, 2000; Wade, 2001).

Unlike processed grains, whole grains contain the bran and germ of the kernel, where the majority of the vitamins, minerals, antioxidants, fiber, lignans, and phenolic compounds are located (USDA & USDHHS, 2005). Whole grains are rich in pantothenic acid, riboflavin, thiamin, niacin, iron, calcium, sodium, potassium, magnesium, and phosphorus (Slavin, 2004). The lignans and phytoestrogens in whole grains may decrease risk for breast cancer and prostate cancer development (Kris-Etherton et al., 2002), and the high fiber content may decrease risk for both cancer and coronary heart disease development (Jacobs & Gallaher, 2004). Previous studies have found that average whole grain consumption among older adults is only 10.5 servings per week (Ellis et al., 2005). Whole grain taste, diabetes, and knowledge of whole grain benefits, labeling, and recommendations have been positively associated with whole grain intake, while smoking and self-reported cancer were negatively associated with intake (Ellis et al., 2005).

Dietary supplements are often a vital source of nutrients for the elderly, who may not have an adequate nutrient intake from their diet alone (Briefel, 2004). Supplements may benefit older adults in several ways by strengthening the immune system, reducing risk of chronic disease, and improving overall nutrition (Lesourd, 1999). Previous studies have found that dietary supplement use is present in 63 to 89 percent of the older population (Wold et al., 2005; Radimer et al., 2004). According to numerous studies and to the 1999-2000 NHANES data, dietary supplement use is

greatest among highly-educated, higher income, older, Caucasian, physically active, non-obese, and former-smoking but currently non-smoking individuals (Radimer et al., 2004; Foote et al., 2003; Archer et al., 2005; McKay et al., 2006).

For the current study, it was hypothesized that intakes of dairy products, fruits, vegetables, and whole grains by older adult participants would not meet the recommendations of the 2005 Dietary Guidelines for Americans, and that dietary and supplement intakes would be positively associated with nutrition knowledge and negatively associated with food insecurity (U.S. Department of Agriculture, U.S. Department of Health and Human Services, 2005).

The specific aims of this study were to examine 2004 and 2005 data collected from older adults in northeast Georgia to: 1) Determine whether intakes of dairy, fruits, vegetables, and whole grains meet recommendations of the 2005 Dietary Guidelines for Americans, 2) Determine the intakes of multivitamin/mineral, calcium, and calcium plus vitamin D supplements, and 3) Examine the impact of age, gender, ethnicity, self-reported disease, knowledge of dietary recommendations, and food insecurity on intake of dairy, fruits, vegetables, whole grains, and dietary supplements.

Methods

This study identified the patterns of dairy product, meat, fish and poultry, fruit, vegetable, whole grain and dietary supplement intake among 173 older adults in northeast Georgia Senior Centers. The methods have been previously described by Sellers et al. (2006). A random sample of older adults aged 58 and older was recruited from 12 of the 13 senior centers in northeast Georgia (Barrow, Clarke, Elbert, Greene, Jackson, Jasper, Loganville, Morgan, Newton, Oconee, Oglethorpe, and Walton). One senior center declined to participate. These counties typically served between 20 and 70 congregate meals daily and there was a mix of rural and urban counties.

Participants, who received congregate meals at the senior centers, were enrolled with the assistance of the directors of the senior centers. The only exclusion criteria, which was determined by interviewer assessment, was the inability to answer the questions and participate in the education activities. Written informed consent was obtained from all participants and all procedures in this study were approved by the Institutional Review Boards of the Georgia Department of Human Resources and The University of Georgia.

Assessments have been conducted annually since 2004. In 2004, 137 participants were completely assessed. In 2005, 36 new participants were assessed for a total of 173 participants.

Survey Questionnaire

Nutrition experts (three faculty members and one registered dietitian in The University of Georgia's Foods and Nutrition department) reviewed and edited the survey questionnaires to ensure content validity and cultural appropriateness based on collective experience working with the target population since 1997. The questionnaire is found in Appendix C. Trained interviewers from the Department of Foods and Nutrition read the questions to the participants and recorded their responses. The questionnaires collected self-reported information on food consumption patterns, knowledge about dietary recommendations, and other nutrition and health variables. Other questions were selected based on past nutrition questionnaires that were developed for this population of OAANP participants (Burnett, 2003; Ellis et al., 2005; Johnson et al., 2003; McCamey, 2003; Redmond, 2004; Wade, 2003). Participants were asked how frequently they consumed dairy products, fruits, vegetables, and whole grains. For selected food groups, frequency categories were times/week (<1, 1, 2, 3, 4, 5, 6) or times/day (1 or 2 or more). Frequency of intake was considered to be more important than the serving sizes to gauge exposure of this population to the target foods (Subar et al., 2001). Therefore, serving sizes were not

estimated. Participants were weighed on a digital scale fully clothes and without shoes, with the exception of participants at one senior center. BMI (body mass index) measures were assessed using weight and self-reported height. Participants were asked if they consumed multivitamin/mineral, calcium, and/or calcium plus vitamin D supplements.

A list of self-reported illnesses or conditions in the past year (yes, no) was obtained for anemia, Alzheimer's disease and other dementias, cancer, circulatory problems, congestive heart failure, constipation, diabetes, diarrhea, glaucoma, hearing problems, heart disease, hypertension, legal blindness, liver disease, mental illness, osteoporosis, hip fracture, pace maker, Parkinson's disease, renal disease, respiratory disease, seizures, skin rashes, stroke, thyroid problems, visual disturbances, cataracts, smoking, stomach surgery, emergency room visits, arthritis, pneumonia, dizziness, and gout.

Nutrition knowledge questions were used to identify participants at nutritional risk. This assessment tool consisted of three questions concerning whole grains, fruits and vegetables, and calcium rich foods. Questions included: 'How many whole grain servings should people eat each day?', 'How many servings of fruits and vegetables should people eat each day?', and 'How many servings of calcium rich foods should people eat each day?'. Responses determined whether participants knew about dietary recommendations that were current in 2004.

Food security in this study was assessed using a four-item questionnaire and was used to identify participants at risk for malnutriton due to food inavailability. Questions used in the model included: 'In the past month, did you ever have no food in the house and no money or food stamps to buy food?', 'In the past month, did you have to choose between buying food and buying medications?', 'In the past month, did you have to choose between buying food and paying rent or utility bills?', and 'In the past month, did you skip one or more meals?'. For each question

answered with a 'yes', one point was awarded, while 'no' answers were awarded zero points. A total score of zero indicated no food insecurity, while a score of four indicated serious food insecurity. Some questions were adapted from the National Evaluation of the Elderly Nutrition Program (1993-1995).

Statistical Analysis

The data was analyzed using the Statistical Analysis System (SAS, Versions 8 and 9.1, SAS Institute, Cary, NC). Descriptive statistics, including frequencies, means and standard deviations were calculated. Effects were significant at a p value of $p < 0.05$. Chi square analyses were used to determine effects of age and gender on food intake and supplement use. Factors tested included age, gender, ethnicity, education, nutrition knowledge, food insecurity, ability to purchase supplements, illnesses, and BMI. Correlation analyses were used to identify factors associated with the consumption of foods of interest. Factors that were associated with food or supplement intake at a $p < 0.05$ were entered into regression models. Stepwise regression models examined the effect of participant characteristics on intake of dairy products, fruits and vegetables, and whole grains. Logistic regression models examined the effect of participant characteristics on dietary supplement use.

Results

The average age of participants was 77 ± 7 years, 75 percent were female, and 39 percent were African American (Table 3.1, N = 173). Participants 75 years of age and older comprised 65 percent of the sample. Fifty-nine percent completed nine or more years of education. Common illnesses reported by participants included hypertension (64 percent), constipation (34 percent), diabetes (31 percent), heart disease (24 percent), osteoporosis (14 percent), congestive heart failure (9 percent), and stroke (6 percent). Approximately 10 percent of participants smoked or

used tobacco. Table 3.2 includes data on financial ability to purchase food and supplements, nutrition knowledge, and perceived lactose intolerance. About 25 percent of participants said they do not always have enough money to buy food, and 27 percent reported an inability to purchase multivitamins and calcium supplements due to inadequate financial resources. Intolerance to milk was reported by 19 percent of participants. Only 30 percent of participants correctly answered that three servings of whole grains per day and only 29 percent of participants knew that five or more servings of fruits and vegetables per day are recommended. Additionally, only 34 percent of participants knew that three or more servings of calcium rich foods per day are recommended.

Table 3.3 displays frequencies and mean intakes of dairy products, selected fruits and vegetables, meat, fish, and poultry, and whole grains. Twenty-nine percent of participants consumed dairy products less than seven times per week, and only 28 percent consumed 14 or more servings per week (two or more servings per day) of dairy products. Calcium-fortified orange juice is a good source of calcium for those who do not consume dairy products, but only 29 percent of participants consumed calcium-fortified juice. Age did not impact dairy product intake, but female participants tended to consume dairy products more frequently than male participants ($p = 0.09$).

Meat, fish, and poultry were consumed by 25 percent of participants less than seven times per week. Participants aged 58 to 74 tended to consume meat, fish, or poultry more frequently than participants 75 years old or older ($p = 0.10$), but mean intakes did not differ.

All categories of fruits and vegetables were consumed by a high percentage of participants less than seven times per week: calcium-fortified juice (83 percent), orange or yellow vegetables (71 percent), other non-citrus fruit or juice (61 percent), citrus fruit or juice (59 percent), and green vegetables (31 percent). Participants aged 58 to 74 tended to have higher mean intakes of orange

and yellow vegetables ($p = 0.06$) but tended to consume less citrus fruit or citrus juice ($p = 0.12$) than participants aged 75 and older. Female participants tended to have higher mean intakes of orange or yellow vegetables ($p = 0.05$) and tended to consume non-citrus fruit or juice ($p = 0.09$), calcium-fortified juice ($p = 0.09$), and citrus fruit or citrus juice ($p = 0.15$) more frequently than male participants.

While 72 percent and 74 percent of participants reported consuming whole grain cereals and breads, respectively, only 28 percent consumed seven or more servings of whole grain cereals and only 18 percent consumed 14 or more servings of whole grain breads per week. Participants aged 58 - 74 tended to have higher mean intakes of whole wheat or whole grain bread ($p = 0.08$) and tended to be more likely to consume whole wheat or whole grain bread ($p = 0.19$) than participants aged 75 and older. In contrast, participants aged 75 and older tended to be more likely to consume whole grain cereals ($p = 0.06$). Male participants were less likely than females to consume whole grain cereals ($p = 0.06$).

Table 3.4 shows totaled intake levels for vegetables, fruits, fruits and vegetables, and whole grains. Twenty percent of participants consumed green, orange, or yellow vegetables less than seven times per week, and 37 percent of participants consumed fruit less than seven times per week. Only 16 percent of participants consumed 35 or more servings per week (five or more servings per day) of fruits and green, orange, and yellow vegetables. Participants aged 58 to 74 consumed totaled fruits and vegetables ($p = 0.04$) more frequently than participants aged 75 or older. Female participants tended to have higher mean intakes of fruit ($p = 0.10$) and total green, orange, and yellow vegetables and fruit ($p = 0.08$) than males. Thirty-nine percent of participants consumed whole grain breads and cereals less than seven times per week (once per day), and only seven percent consumed 21 or more servings per week (three or more servings per day). Average

total whole grain bread and whole grain cereal intake was 8.9 ± 6.5 servings per week (one serving per day).

Use of multivitamin-mineral supplements was reported by 40 percent of participants (Table 3.5). These supplements were taken by five percent of users three days per week, two percent of users five days per week, and 94 percent of users seven days per week. Calcium supplement use was reported by 32 percent of participants. Only 31 percent of participants in the lowest category of dairy product intake (0-6 servings per week) took calcium supplements, and only 24 percent consumed calcium-fortified fruit or juice. There were no significant differences in calcium supplement usage or calcium-fortified fruit or juice consumption among different categories of dairy product intake. In addition, while 59 percent of participants who took calcium supplements said that their calcium supplements also contained vitamin D, 24 percent did not know whether vitamin D was included in the supplement.

Spearman correlations were used to determine potential predictors of food and supplement intake. Correlations among food groups of interest and age, gender, ethnicity, education, food insecurity, general nutrition knowledge, and common illnesses are shown in Appendix A. Age and food insecurity (determined by FS Total scores) were not significantly correlated with intake of any of the food groups. Dairy product intake was positively correlated with dairy product knowledge, and Caucasian race, but negatively correlated with milk intolerance. Intake of meat, fish, or poultry was positively correlated with education. Total fruit and vegetable intake was correlated with intake of dairy product ($r = 0.3165$; $p < 0.0001$) and whole grain ($r = 0.1876$; $p = 0.0135$) intake. Green vegetable intake was positively correlated with education and negatively correlated with having had a stroke. Food security and knowledge of fruit and vegetable and dairy product recommendations were positively correlated with orange and yellow vegetable intake.

Citrus and non-citrus fruit or juice consumption was positively correlated with knowledge of dairy product recommendations. A positive correlation was found between total vegetable intake and education and dairy product knowledge. Total fruit and total fruit and vegetable intake was positively correlated with dairy product knowledge. A positive correlation was found between total fruit and vegetable intake and female gender, education, fruit and vegetable knowledge, and dairy product knowledge. Heart disease and stroke were negatively associated with total fruit and vegetable intake. Total whole grain intake was positively correlated with knowledge of whole grain recommendations and presence of diabetes.

Regression analyses conducted to examine predictors of food intake are shown in Table 3.6. Caucasian ethnicity was positively associated with dairy product intake, food insecurity and knowledge of dairy product recommendations tended to be positively associated with intake. Milk intolerance was negatively associated with dairy product consumption. Greater education and absence of osteoporosis tended to be positively associated with intake of meat, fish, or poultry. Green vegetable intake was negatively associated with stroke, and greater education tended to positively predict intake. Greater education, food insecurity, and self-reported diabetes were positively associated with orange or yellow vegetable consumption. Citrus fruit or citrus juice intake was positively associated with self-reported osteoporosis but negatively associated with self-reported heart disease. Greater education and diabetes tended to be positively associated, while heart disease tended to be negatively associated with total vegetable consumption. Self-reported stroke was positively associated with total vegetable consumption. Total fruit consumption was negatively associated with heart disease. Education tended to be positively associated with fruit and vegetable intake, while self-reported heart disease and stroke were negatively associated with total fruit and vegetable intake. Total whole grain intake was positively

associated with diabetes, and whole grain knowledge tended to predict consumption..

Appendix B displays Spearman correlations between supplement use and potential predictors of intake, such as age, gender, race education, food security, ability to purchase supplements, knowledge of dietary recommendations, and common illnesses. Multivitamin-mineral use was positively correlated with Caucasian race, education, ability to purchase supplements, fruit and vegetable consumption, dairy product recommendation knowledge, and presence of heart disease. Calcium supplement use was positively correlated with female gender, ability to purchase supplements, and presence of osteoporosis.

To further examine predictors of multivitamin-mineral and calcium supplement use, logistic regression analyses were performed (Table 3.7). Standard predictors in all models included age, gender, race, education, food insecurity, and ability to purchase supplements. The first multivitamin-mineral model considered illnesses as potential predictors, and only Caucasian race and food insecurity were positively associated with multivitamin-mineral use. Fruit and vegetable knowledge and dairy product knowledge were considered in the second multivitamin-mineral model, and Caucasian race and dairy product knowledge were positively associated with multivitamin-mineral use. The third multivitamin-mineral model considered actual fruit and vegetable intake, and positive predictors of multivitamin-mineral use were Caucasian race, food insecurity, and actual fruit and vegetable intake.

The final calcium-supplement model evaluated osteoporosis, ability to purchase supplements, milk intolerance and knowledge of dairy product recommendations as potential predictors, and ability to purchase supplements and osteoporosis were found to positively predict calcium supplement use.

Discussion

This study examined data from 2004 and 2005 to determine the patterns and predictors of dairy product, fruit, vegetable, whole grain, and dietary supplement intake among the Older Americans Act Nutrition Program (OAANP) participants. Major outcomes of this study were that: 1) mean intakes of dairy products, fruits and green, orange, and yellow vegetables, and whole grains were approximately one, three, and one servings per day, respectively, 2) a low percentage of program participants consumed recommended amounts of dairy products, fruits and vegetables, and whole grain foods, and 3) use of calcium supplements and calcium-fortified orange juice was not related to intake of dairy products.

New 2005 Dietary Guidelines include recommendations for 3 servings of dairy products per day. Predictors of dairy product consumption included Caucasian ethnicity ($p = 0.02$), female gender ($p = 0.09$) and food insecurity ($p = 0.08$), while milk intolerance ($p = 0.03$) was negatively associated with dairy product intake. Similarly, Elbon et al. (1998) found that milk intolerance negatively predicted milk intake. In contrast, Elbon et al. (1998) also found that greater nutrition knowledge and diabetic diet were associated with greater milk consumption, while ethnicity did not predict intake. Only 28 percent of participants consumed 14 or more servings of dairy products per week (2 or more servings per day), six percent of participants consumed no dairy products at all, and only 3.4 percent of participants consumed three servings of dairy products per day. This is similar to the results of Foote et al. (2000), who found that less than five percent of older adults met recommendations for three dairy product servings per day. Low dairy product consumption was also noted by Lancaster (2004), who found that only 65 percent of older adults consumed dairy products daily, and Elbon et al. (1998), who found that only 16 percent of older adults consumed dairy products two or more times per day. Some of the recommendations for

those who do not consume an adequate number of dairy products is to take calcium and vitamin D supplements and consume calcium-fortified juice. Only 32 percent of this sample took a calcium supplement. A similar percentage (33.5 percent of those at least 60 years old) was found in the National Health and Nutrition Examination Survey (1999-2000) (Radimer et al., 2004). Those with lower dairy product intakes were not more likely to take calcium supplements in the current study. Furthermore, 24 percent of calcium supplement users did not know whether their supplement contained vitamin D. Predictors of calcium supplement use were female gender ($p < 0.01$) and osteoporosis ($p = 0.03$). Radimer et al. (2004) found that non-Hispanic blacks were less likely to consume a calcium supplement. There was a weak trend toward less frequent calcium supplement use by African Americans in the current study.

There is much evidence of the health benefits of vitamin D (Boonen et al., 2006a). For example, vitamin D reduces incidence of fractures, increases bone mineral density, promotes normal calcium homeostasis, and helps to maintain muscle strength. However, it has now been shown that supplementation of vitamin D also reduces ambulatory falls in women (Bischoff-Ferrari et al., 2006b). Thus, interventions targeting increased dairy product and calcium and vitamin D supplement use are clearly needed in this population.

Fruit and vegetable intake was also low among participants. The mean weekly intake of fruits and green, yellow and orange vegetables in this study was 21 servings (three servings per day), and only 16 percent of participants consumed five or more servings per day of these foods. This result is similar to that reported by Wade (2003), who found that mean intake of fruits and vegetables was only 22.8 servings per week in another study of northeast Georgia older adults. Data from the Behavioral Risk Factor Surveillance System (BRFSS, 2005) indicated that in 2003, 22.5 percent of those 65 and over in Georgia consumed five or more servings per day of fruits and

vegetables. The discrepancy in percentage of those consuming five or more serving per day between the BRFSS data and the current study may be explained by the collection of data only for green, orange and yellow vegetables, which would not include potatoes, legumes, or many other vegetables. The 2005 Dietary Guidelines and Food Pyramid suggest that a person consuming 1,600 to 2,400 calories per day should eat three and half to five servings of dark green, orange, starchy and other vegetables (USDA, 2005). Allowing for consumption of potatoes, which were not assessed in this study, one would expect participants to consume approximately three to four servings of green, orange and yellow vegetables per day to meet current recommendations. In fact, six to ten servings per week of dark green and orange vegetables are specifically recommended in the My Pyramid Food Intake Patterns. Thus, only 17 percent of the participants in this current study would meet this requirement. The current recommendations for fruit intake for a person consuming 1600 to 2400 calories per day is three to four servings per day (USDA, 2005). Only eight percent of participants consumed three or more servings of fruit per day.

Regression models suggested that the only factors positively associated with total fruit and vegetable consumption were education ($p = 0.12$), self-reported heart disease ($p < 0.05$) and stroke ($p = 0.09$). Foote et al. (2000) and Lancaster et al. (2004) have also reported that females consumed more fruits and vegetables than males and that level of education is positively associated with higher fruit and vegetable intake. In contrast to this study, Lancaster et al. (2004) found that adults aged 75 and older were more likely to consume fruits and vegetables daily than those younger than 75 years old. While Wade (2003) found that income, food insecurity and lack of nutrition knowledge of fruit and vegetable recommendations were barriers to fruit and vegetable consumption, these factors were not associated with intake in this study.

The mean weekly intake of whole grain breads and cereals was 8.9 servings. Similarly,

Ellis et al. (2005) found that mean whole grain intake among older adults was 10.5 servings per week, and Cleveland et al. (2000) and Sahyoun et al. (2006) found that males and females consume approximately one whole grain serving daily. According to Kuhn (2002), the typical American consumes between zero and one serving of whole grains per day. Whole grains were not consumed at all by nine percent of the participants. Lack of whole grain consumption was more prevalent in a study by Cleveland (2000), who found that whole grains were not consumed at all by 26 percent of males and 23 percent of females. Only seven percent of participants in this study consumed three or more whole grains daily, which was similar to reports by Sahyoun et al. (2006) and Cleveland et al. (2000). Because whole grain intake is low among older adults, interventions that teach preparation methods, health benefits, and identification of whole grain foods may be beneficial.

Predictors of whole grain intake included knowledge of whole grain recommendations ($p = 0.07$) and self-reported diabetes ($p = 0.03$). These predictors were similar to those of Ellis et al. (2005), who found that smoking and cancer negatively predicted intake, while knowledge of whole grain benefits, labeling, and recommendations positively predicted intake. Ellis et al. (2005) also found that age did not predict whole grain intake. Possible barriers to low whole grain consumption include an inability to correctly identify whole grain foods, unfamiliarity with whole grain health benefits, high cost of some whole grain foods as compared to non-whole grain foods, belief that whole grains are less palatable and do not taste as good as non-whole grain foods, and unfamiliarity with whole grain preparation methods (Kantor et al., 2001).

Use of multivitamin-mineral supplements was reported by 40 percent of participants, and 94 percent of these individuals took supplements once per day. This is virtually identical to data from the National Health and Nutrition Examination Survey (1999-2000), which showed that 39.8

percent of those aged 60 and over took multivitamins or multiminerals. In contrast to our participants' reports of regular consumption of supplements, Mitchell et al. (2006) reported that older adults in congregate programs in North Carolina only sometimes took daily multivitamins. This may have been due to a different survey question format. However, supplement use is promoted in northeast Georgia senior centers.

Recent studies suggest that education, physical activity, abstinence from smoking, and fruit and/or vegetable consumption are positively associated with supplement use. In addition, women are more likely to take supplements than men, and non-Hispanic whites are more likely to take supplements than non-Hispanic blacks (Patterson et al., 1998; Radimer et al., 2004; Foote et al., 2003; Rock et al., 2004; Archer et al., 2005; McKay et al., 2006). Currently, older women have the highest dietary supplement use in the United States (Briefel, 2004). Use of multivitamin-mineral supplements has often been associated with other healthy eating behaviors. For example, Reedy et al. (2005) reported that individuals who took a multivitamin-mineral supplement and a non-vitamin-mineral supplement had a higher vegetable consumption, as well as selected fruits and vegetables that were higher in nutrients.

The present study confirmed some of these findings. Caucasian participants were more likely to consume multivitamin-mineral supplements, and Caucasian ethnicity was the most powerful predictor of supplement use in logistic regression models. Similar to the findings of others (Patterson et al., 1998; Foote et al., 2003), fruit and vegetable intake was positively associated with supplement use. While several questions about knowledge of current dietary recommendations (in 2004-2005) were asked, only accurate knowledge of the recommendations for dairy product consumption was related to supplement use. In contrast with results of other studies, there was only a weak trend for women to be more likely to consume

multivitamin-mineral supplements than men in regression models. Education and smoking status were not associated with supplement use in logistic regression models. Self-reported diseases were also not associated with MVM supplement use in the current study. One unusual finding was that food insecurity was positively associated with use of multivitamin-mineral supplements in regression models. It is possible that a higher score on the food insecurity scale indicates attention to the inability to purchase adequate food, and thus these individuals take supplements because they feel that they are not meeting nutrient needs through food alone.

Finally, only 65 percent of participants in the current study knew the brand name of the multivitamin-mineral supplement. Based on this information and the knowledge that there was no relationship between dairy product consumption and use of calcium and/or vitamin D supplements and also that 15 percent of participants did not know whether their calcium supplements contained vitamin D, older adults should benefit from educational interventions dealing with supplement use and identification. An intervention program on supplement use in congregate feeding sites has been described (Mitchell et al., 2006; Cheong, 2002).

Meat, fish, and poultry consumption was predicted by higher education ($p = 0.09$) and absence of osteoporosis ($p = 0.06$). Participants under 75 years of age had higher levels of intake, and 25 percent of participants consumed meat, fish, or poultry less than seven times per week (once per day). Food insecurity did not affect consumption levels. In contrast, Guenther et al. (2005) found that higher income and greater education were associated with greater chicken consumption, while lower income and education were associated with higher beef and pork consumption.

This study indicates that older adults in northeast Georgia had poor nutrition knowledge and did not meet the 2005 Dietary Guideline recommendations for dairy products, fruits and

vegetables, and whole grains. Nutrition interventions targeting dairy product, fruit and vegetable, and whole grain consumption among older adults are needed, and older adults should be encouraged to meet the 2005 Dietary Guidelines for Americans. No relationship was found between dairy product intake and use of calcium supplements or calcium-fortified juice, and knowledge of multivitamin/mineral and calcium supplement brand names was low among supplement users. Older adults in northeast Georgia would benefit from calcium and multivitamin/mineral education interventions.

TABLE 3.1 Participant Characteristics (N = 173)

	N	% of Total
Age (years)		
58-74	61	35
75 or older	111	65
Mean age ± SD	77 ± 7	
Gender (%)		
Male	44	25
Female	129	75
Ethnicity (%)		
Caucasian	106	61
African American	67	39
Education (years)		
≤ 8	64	41
9-12	78	40
13 or more	14	19
Ill1-Ill36. Have you had any of the following illnesses or conditions within the past year? (% yes)		
Congestive Heart Failure	16	9
Constipation	59	34
Diabetes	54	31
Heart Disease	42	24
Hypertension	111	64
Osteoporosis	24	14
Stroke	10	6
Smoking/Chewing Tobacco	17	10

TABLE 3.2 Participant Food Security and Nutrition Knowledge

Variable	Name and Description	N	% Yes of Total
SuppAf	Do you feel you have enough money to buy multivitamins and calcium supplements?		
	Multivitamins	168	73
	Calcium supplements	168	73
FS10	In the past month, did you ever have no food in the house and no money or food stamps to buy food?	172	3
FS11	In the past month, did you have to choose between buying food and buying medications?	172	6
FS12	In the past month, did you have to choose between buying food and paying rent or utility bills?	172	5
FS13	In the past month, did you skip one or more meals?	171	18
	Food insecurity (range 0-4)*		
	0	130	75
	≥ 1	43	25
MilkInt	Do you get a stomachache, gas, or diarrhea after drinking milk?	170	19
NK1	How many whole grain servings should people eat each day?		
	% that answered 3 or more servings per day	172	30
NK2	How many servings of fruits and vegetables should people eat each day?		
	% that answered 5 or more servings per day	173	29
NK3	How many servings of calcium rich foods should people eat each day?		
	% that answered 3 or more servings per day	173	34

* The sum of the food insecurity questions

TABLE 3.3 Frequency of Food Intake by Age and Gender

Variable Name and Description		Total (%)	N = 172 Age Group (%)			N = 173 Gender (%)		
			< 75	≥ 75	P value	Male	Female	P value
mna12a	Milk, yogurt, cheese							
	0 - 1 serving per week	9	8	10		9	9	
	2 - 3 servings per week	8	7	9		14	6	
	4 - 6 servings per week	12	16	10		20	9	
	7 - 13 servings per week	42	39	43		30	47	
	14 or more servings per week	28	30	28	0.7454	27	29	0.0966**
	Mean ± SD (servings)	8.1 ± 4.7	8.5 ± 5.0	7.9 ± 4.6	0.4352	7.5 ± 4.8	8.3 ± 4.7	0.3585
	n	173	61	111		44	129	
mna12c	Meat, fish, poultry							
	0 - 3 servings per week	9	10	8		9	9	
	4 - 6 servings per week	16	7	21		14	17	
	7 - 13 servings per week	48	51	46		45	48	
	14 or more servings per week	28	33	25	0.1037***	32	26	0.8852
	Mean ± SD (servings)	8.7 ± 4.2	9.2 ± 4.2	8.4 ± 4.2	0.2800	9.2 ± 4.3	8.5 ± 4.1	0.3287
	n	173	61	111		44	129	
nq4	Green vegetables							
	0 - 3 servings per week	18	20	17	0.5944	18	18	0.7161
	4 - 6 servings per week	13	15	12		18	12	
	7 - 13 servings per week	43	36	47		41	43	
	14 or more servings per week	26	30	24		23	27	
	Mean ± SD (servings)	7.9 ± 4.4	8.0 ± 4.4	7.9 ± 4.4	0.8811	7.6 ± 4.6	8.1 ± 4.3	0.5856
	n	173	61	111		44	129	

Variable	Name and Description	Total (%)	N = 172 Age Group (%) < 75	≥ 75	P value	N = 173 Gender (%) Male	Female	P value
nq5	Orange or yellow vegetables							
	0 - 1 serving per week	18	18	18		18	18	
	2 - 3 servings per week	19	15	22		25	17	
	4 - 6 servings per week	34	28	37		36	33	
	7 or more servings per week	29	39	23	0.1472***	20	32	0.4517
	Mean ± SD (servings)	4.1 ± 3.1	4.8 ± 3.7	3.7 ± 2.7	0.0576**	3.5 ± 2.3	4.3 ± 3.3	0.0544**
	n	173	61	111		44	129	
nq6	Citrus fruit or citrus juice							
	0 - 1 serving per week	29	38	24		34	27	
	2 - 3 servings per week	20	21	19		20	19	
	4 - 6 servings per week	10	5	13		14	9	
	7 or more servings per week	41	36	44	0.1375***	32	44	0.4966
	Mean ± SD (servings)	4.4 ± 4.0	3.8 ± 3.8	4.8 ± 4.0	0.1155***	3.7 ± 3.5	4.7 ± 4.1	0.1542***
	n	173	61	111		44	129	
nq7	Other non-citrus fruit or juice							
	0 - 1 servings per week	34	36	32		36	33	
	2 - 3 servings per week	17	16	18		16	18	
	4 - 6 servings per week	10	5	14		20	7	
	7 - 13 servings per week	29	30	29		20	32	
	14 or more servings per week	10	13	8	0.3943	7	11	0.0938**
	Mean ± SD (servings)	4.5 ± 4.5	4.7 ± 4.6	4.5 ± 4.4	0.8054	3.8 ± 4.0	4.8 ± 4.6	0.2372
	n	173	61	111		44	129	

Variable	Name and Description	Total (%)	N = 172 Age Group (%) < 75	≥ 75	P value	N = 173 Gender (%) Male	Female	P value
OJCa	Calcium-fortified juice							
	0 servings per week	71	74	70		84	67	
	1 -6 servings per week	12	7	15		5	14	
	7 or more servings per week	17	20	16	0.2640	12	19	0.0986**
	Mean ± SD (servings)	2.6 ± 9.7	1.7 ± 3.2	3.2 ± 11.9	0.2408	3.1 ± 13.4	2.5 ± 8.2	0.7880
	n	173	61	109		44	129	
nq9	Whole wheat or whole grain bread							
	0 - 3 servings per week	46	39	49		55	43	
	4 - 6 servings per week	9	8	9		7	9	
	7 - 13 servings per week	27	30	26		20	20	
	14 or more servings per week	18	23	16	0.5901	18	19	0.5252
	Mean ± SD (servings)	5.5 ± 5.3	6.4 ± 5.6	5.0 ± 5.1	0.0821**	5.0 ± 5.5	5.6 ± 5.2	0.4968
	n	173	61	111		44	129	
nq10	Whole grain cereals							
	0 - 3 servings per week	54	57	52		57	53	
	4 - 6 servings per week	17	15	19		14	19	
	7 or more servings per week	28	28	29	0.7425	30	28	0.7539
	Mean ± SD (servings)	3.4 ± 2.9	3.1 ± 2.9	3.6 ± 2.9	0.2435	3.3 ± 3.4	3.4 ± 2.7	0.7768
	n	173	61	111		44	129	
nq9	Whole wheat or whole grain bread							
	0 servings per week	26	20	29		30	25	
	1 or more servings per week	74	80	71	0.1879***	70	75	0.5361
	Mean ± SD (servings)	5.5 ± 5.3	6.4 ± 5.6	5.0 ± 5.1	0.0821**	5.0 ± 5.5	5.6 ± 5.2	0.4968
	n	173	61	111		44	129	

Variable Name and Description		Total (%)	N = 172 Age Group (%) < 75	≥ 75	P value	N = 173 Gender (%) Male	Female	P value
nq10	Whole grain cereals							
	0 servings per week	28	36	23		39	24	
	1 or more servings per week	72	64	77	0.0565**	61	76	0.0617**
	Mean ± SD (servings)	3.4 ± 2.9	3.1 ± 2.9	3.6 ± 2.9	0.2425	3.3 ± 3.4	3.4 ± 2.7	0.7768
	n	173	61	111		44	129	

* P values < 0.05 were considered statistically significant
** P values of 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

TABLE 3.4 Frequency of Food Intake by Age and Gender

Variable Name and Description		Total (%)	N = 172 Age Group (%) <75	≥75	P value	N = 173 Gender (%) Male	Female	P value
Totvegrc	All green, yellow, and orange vegetables							
	0 - 6 servings per week	20	21	20		23	19	
	7 - 13 servings per week	39	28	45		41	39	
	14 - 20 servings per week	23	30	20		25	22	
	21 or more servings per week	17	21	15	0.1432***	11	19	0.6763
	Mean ± SD (servings)	12.1 ± 6.2	12.8 ± 6.6	11.7 ± 5.9	0.2487	11.1 ± 5.9	12.4 ± 6.2	0.2283
	n	173	61	111		44	129	
Totfruitrc	All fruit							
	0 - 6 servings per week	37	43	33		48	33	
	7 - 13 servings per week	34	28	37		32	34	
	14 - 20 servings per week	21	18	23		16	23	
	21 or more servings per week	8	11	6	0.2943	5	9	0.3038
	Mean ± SD (servings)	8.9 ± 6.7	8.4 ± 6.8	9.3 ± 6.7	0.4475	7.5 ± 6.2	9.4 ± 6.8	0.1037**
	n	173	61	111		44	129	

Variable Name and Description		Total (%)	N = 172 Age Group (%) <75	≥75	P value	N = 173 Gender (%) Male	Female	P value
Totvegfruitrc	All green, yellow, and orange vegetables and all fruit							
	0 - 13 servings per week	30	36	26		32	29	
	14 - 20 servings per week	22	10	29		25	22	
	21 - 27 servings per week	21	20	23		25	20	
	28 - 34 servings per week	11	15	9		14	10	
	35 or more servings per week	16	20	14	0.0402*	5	20	0.2284
	Mean ± SD (servings)	21.0 ± 10.5	21.2 ± 11.5	20.9 ± 10.1	0.8507	18.6 ± 8.8	21.8 ± 11.0	0.0810**
	n	173	61	111		44	129	
Allwhgrainrc	All whole grain bread and whole grain cereal							
	0 servings per week	9	7	10		16	6	
	1 - 6 servings per week	30	31	30		25	32	
	7 - 13 servings per week	30	26	32		32	29	
	14 - 20 servings per week	24	26	23		20	26	
	21 or more servings per week	7	10	5	0.7261	7	7	0.3443
	Mean ± SD (servings)	8.9 ± 6.5	9.5 ± 6.7	8.6 ± 6.4	0.3737	8.3 ± 7.5	9.1 ± 6.2	0.4885
	n	173	61	111		44	129	

* P values < 0.05 were considered statistically significant
** P values of 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

TABLE 3.5. Use of Multivitamin/mineral and Calcium Supplements or Calcium-Fortified Juice

Variable	Name and Description	Total (% yes)	Gender: Male (%)	Gender: Female (%)	P value	Ethnicity: Caucasian (%)	Ethnicity: African American (%)	P value
MVMa	Do you take a multivitamin-mineral supplement?	40	32	42	0.0257*	47	28	0.0138*
CaSup	Do you take a calcium supplement?	32	19	36	0.0344*	35	26	0.1942

Variable	Name and Description	Total (%)	Do you take a calcium supplement? (% yes)	P value	Do you consume calcium-fortified fruit or juice? (% yes)	P value
mna12a	How many servings of milk, yogurt, or cheese do you consume?					
	0-6 servings per week	29	31		24	
	7-13 servings per week	42	26		32	
	14 or more servings per week	28	40	0.3132	30	0.6141
	n	173	54		49	

* P values < 0.05 were considered statistically significant
** P values of 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

TABLE 3.6. Stepwise Regression Analyses of Participant Characteristics and Frequency of Food Consumption (P value ≤ 0.20)[a]

	How many servings of milk, yogurt, or cheese do you consume? Parameter Estimate ± SEM	P value
N	141	
Intercept	3.89 ± 2.34	0.0983**
Age (years)	--[b]	--
Gender (male = 0, female = 1)	--	--
Ethnicity (Caucasian = 0, African American = 1)	-2.04 ± 0.84	0.016*
Education (years)	--	--
Milk Intolerance (no = 0, yes = 1)	-2.15 ± 1.00	0.0324*
# of calcium-rich food servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 3 = 2)	1.16 ± 0.80	0.1475***
Food Insecurity (0 - 4; 4 is greatest food insecurity)	1.19 ± 0.68	0.0828**
Cancer (no = 0, yes = 1)	--	--
Diabetes (no = 0, yes = 1)	--	--
Heart Disease (no = 0, yes = 1)	--	--
Hypertension (no = 0, yes = 1)	--	--
Osteoporosis (no = 0, yes = 1)	--	--
BMI (wt kg/ ht m^2)	0.12 ± 0.07	0.0916**

	How many servings of meat, fish, or poultry do you consume? Parameter Estimate ± SEM	P value
N	146	
Intercept	7.62 ± 0.94	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	0.16 ± 0.09	0.0924**
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Diabetes (no = 0, yes = 1)	--	--
Osteoporosis (no = 0, yes = 1)	-1.77 ± 0.94	0.0611**
BMI (wt kg/ ht m^2)	--	--

	How many servings of green vegetables do you consume? Parameter Estimate ± SEM	P value
N	151	
Intercept	6.40 ± 0.97	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	0.18 ± 0.10	0.0651**
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Heart Disease (no = 0, yes = 1)	--	--
Stroke (no = 0, yes = 1)	-3.05 ± 1.45	0.0368*

	How many servings of orange or yellow vegetables do you consume? Parameter Estimate ± SEM	P value
N	148	
Intercept	1.59 ± 0.85	0.0643**
Age (years)	--	--
Gender (male = 0, female = 1)	0.88 ± 0.57	0.1223***
Education (years)	0.13 ± 0.07	0.0486*
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	0.91 ± 0.42	0.0322*
Diabetes (no = 0, yes = 1)	1.11 ± 0.52	0.0353*
Stroke (no = 0, yes = 1)	--	--
BMI (wt kg/ ht m^2)	--	--

	All green, yellow, and orange vegetables Parameter Estimate ± SEM	P value
N	145	
Intercept	9.82 ± 1.39	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	0.27 ± 0.13	0.0503**
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Cancer (no = 0, yes = 1)	--	--
Diabetes (no = 0, yes = 1)	1.87 ± 1.10	0.0913**
Heart Disease (no = 0, yes = 1)	-1.90 ± 1.12	0.0916**
Hypertension (no = 0, yes = 1)	--	--
Stroke (no = 0, yes = 1)	4.81 ± 2.15	0.0272*
BMI (wt kg/ ht m^2)	--	--

	How many servings of citrus fruit or citrus juice do you consume? Parameter Estimate ± SEM	P value
N	149	
Intercept	4.86 ± 0.40	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	--	--
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Cancer (no = 0, yes = 1)	-2.31 ± 1.21	0.058**
Heart Disease (no = 0, yes = 1)	-1.69 ± 0.75	0.0268*
Hypertension (no = 0, yes = 1)	--	--
Osteoporosis (no = 0, yes = 1)	1.89 ± 0.93	0.0429*

	All fruit Parameter Estimate ± SEM	P value
N	145	
Intercept	9.73 ± 0.70	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	--	--
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Cancer (no = 0, yes = 1)	-3.53 ± 2.07	0.0899**
Heart Disease (no = 0, yes = 1)	-2.84 ± 1.29	0.0295*
Osteoporosis (no = 0, yes = 1)	2.80 ± 1.61	0.0856**
BMI (wt kg/ ht m^2)	--	--

	All green, yellow, and orange vegetables and all fruit Parameter Estimate ± SEM	P value
N	145	
Intercept	19.06 ± 2.44	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	0.37 ± 0.24	0.1236***
# of fruit and vegetable servings that should be consumed per day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Cancer (no = 0, yes = 1)	--	--
Diabetes (no = 0, yes = 1)	--	--
Heart Disease (no = 0, yes = 1)	-3.90 ± 1.96	0.0482*
Osteoporosis (no = 0, yes = 1)	--	--
Stroke (no = 0, yes = 1)	-6.19 ± 3.63	0.09**
BMI (wt kg/ ht m^2)	--	--

	All whole grain bread and whole grain cereal Parameter Estimate ± SEM	P value
N	146	
Intercept	5.77 ± 1.61	0.0005*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Education (years)	--	--
# of whole grain servings that should be consumed (don't know or incorrect = 1, correct ≥ 3 = 2)	2.09 ± 1.14	0.0696**
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Cancer (no = 0, yes = 1)	--	--
Diabetes (no = 0, yes = 1)	2.51 ± 1.17	0.0345*
Osteoporosis (no = 0, yes = 1)	--	--
BMI (wt kg/ ht m^2)	--	--

[a] P values < 0.05 considered statistically significant
[b] Indicates not associated because variable was not retained in forward stepwise regression model (P > 0.20)
* P values < 0.05 were considered statistically significant
** P values 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

TABLE 3.7. Logistic Regression Models of Participant Characteristics and Use of Multivitamins and/or Calcium Supplements (P value ≤ 0.20)[a]

	Do you take a multivitamin-mineral supplement? (0 = no, 1 = yes) Parameter Estimate ± SEM	P value
N	145	
Intercept	-0.0883 ± 0.2167	0.6837
Age (years)	--[b]	--
Gender (male = 0, female = 1)	--	--
Ethnicity (Caucasian = 0, African American = 1)	-1.2866 ± 0.4108	0.0017*
Education (years)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	0.6858 ± 0.3132	0.0285*
Ability to purchase supplements (no = 0, yes = 1)	--	--
Cancer (no = 0, yes = 1)	--	--
Diabetes (no = 0, yes = 1)	--	--
Heart Disease (no = 0, yes = 1)	--	--
Hypertension (no = 0, yes = 1)	--	--
Osteoporosis (no = 0, yes = 1)	--	--
Stroke (no = 0, yes = 1)	--	--
Smoking (no = 0, yes = 1)	--	--

	Do you take a multivitamin-mineral supplement? (0 = no, 1 = yes) Parameter Estimate ± SEM	**P value**
N	149	
Intercept	-1.3189 ± 0.5587	0.0182*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Ethnicity (Caucasian = 0, African American = 1)	-0.8835 ± 0.3761	0.0188*
Education (years)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Ability to purchase supplements (no = 0, yes = 1)	--	--
# of fruit and vegetable servings people should eat each day (don't know or incorrect = 1, correct ≥ 5 = 2)	--	--
# of calcium-rich food servings that should be consumed per day (dk or incorrect = 1, correct ≥ 3 = 2)	0.9280 ± 0.3645	0.0109*

	Do you take a multivitamin-mineral supplement? (0 = no, 1 = yes)	
	Parameter Estimate ± SEM	**P value**
N	149	
Intercept	-0.8813 ± 0.4205	0.0361*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Ethnicity (Caucasian = 0, African American = 1)	-1.3997 ± 0.4154	0.0008*
Education (years)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	0.7234 ± 0.3176	0.0228*
Ability to purchase supplements (no = 0, yes = 1)	--	--
# of fruit and vegetable servings consumed per day	0.0369 ± 0.0173	0.0331*

	Do you take a calcium supplement? 0 = no, 1 = yes Parameter Estimate ± SEM	P value
N	168	
Intercept	-1.6811 ± 0.4185	0.0001*
Age (years)	--	--
Gender (male = 0, female = 1)	--	--
Ethnicity (Caucasian = 0, African American = 1)	--	--
Education (years)	--	--
Food Insecurity (0 - 4; 4 is greatest food insecurity)	--	--
Ability to purchase supplements (no = 0, yes = 1)	0.9905 ± 0.4621	0.0321*
Osteoporosis (no = 0, yes = 1)	1.1108 ± 0.4630	0.0164*
MilkInt (no = 0, yes = 1)	--	--
# of dairy products that are consumed per day	--	--
Knowledge of the # of calcium-rich foods that should be consumed per day	--	--

[a] P values < 0.05 were considered statistically significant
[b] Indicates not associated because variable was not retained in model (P > 0.20)
* P values < 0.05 were considered significant
** P values 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

CHAPTER 4

CONCLUSIONS

The objectives of this study were to examine 2004 and 2005 data collected from older adults in northeast Georgia to: 1) Determine whether intakes of dairy products, fruits, vegetables, and whole grains meet recommendations of the 2005 Dietary Guidelines for Americans, 2) Determine intakes of multivitamin/mineral, calcium, and calcium plus vitamin D supplements, and 3) Examine the impact of age, gender, race, general nutrition knowledge, and food insecurity on intake of dairy products, fruits and vegetables, whole grains, and dietary supplements.

Major Findings

Data collected from 173 participants of senior center programs in Northeast Georgia indicates hypertension, diabetes and heart disease are quite prevalent among this older population. Optimal nutritional status, which is achieved by a good diet, reduces the risk of the chronic illnesses and maximizes hospital outcomes and quality of life among older individuals (Chapman et al., 1996; Kagansky et al., 2005; Lesourd, 1999). Therefore, it is important that the diets of older adults meet the 2005 Dietary Guideline recommendations. However, this study found that few participants met these recommendations.

Intake of dairy products, fruits and vegetables, and whole grains was low. The first major outcome is that mean intake was 8.1 ± 0.4 servings per week for dairy products, 21.0 ± 0.8 servings per week for fruits and vegetables, and 8.9 ± 0.5 servings per week for whole grains. The 2005 Dietary Guidelines recommend the following: Intake of dairy products should be 21 servings per week (3 servings per day), intake of fruits and vegetables should be 49 to 70 servings per week

(7-10 servings per day), and intake of whole grains should be 21 servings per week (3 servings per day). These findings support the first hypothesis, which states that intakes of dairy products, fruits and vegetables, and whole grains do not currently meet the recommendations of the 2005 Dietary Guidelines for Americans.

Use of multivitamin/mineral, calcium, and calcium plus vitamin D supplements was similar to that found in national surveys, and calcium supplement use was higher than reported by others. The second major outcome is that 40 percent of participants took a multivitamin-mineral supplement, 32 percent of participants took a calcium supplement, and 59 percent of those who took calcium supplements took a calcium plus vitamin D supplement. Twenty-seven percent of participants felt that they did not have enough money to buy multivitamins or calcium supplements ($p < 0.01$). Of those with low intakes of dairy products (0-6 servings/week), only 31 percent took calcium supplements, and 24 percent consumed calcium-fortified fruit or juice. Nearly one-fourth of calcium users did not know if their supplement contained vitamin D. These findings confirmed the second hypothesis that 40 percent of older adults take a multivitamin-mineral supplement. These findings also exceeded the expectations stated in the second hypothesis that 20 percent of older adults take a calcium or calcium plus vitamin D supplement.

Consumption of the food groups of interest was predicted by several factors. The third major outcome is that gender, ethnicity, education, milk intolerance, heart disease, diabetes, osteoporosis, cancer, BMI, nutrition knowledge, and food insecurity influenced food patterns among participants. Intake of dairy products was negatively associated with milk intolerance ($p = 0.03$) and food insecurity ($p = 0.08$) but positively associated with Caucasian race ($p = 0.02$) and dairy product knowledge ($p = 0.15$). Intake of fruits and vegetables was negatively associated with heart disease ($p < 0.05$) and stroke ($p = 0.03$) but positively associated with greater education ($p =$

0.12). Intake of whole grains was positively associated with diabetes ($p = 0.03$) and whole grain knowledge ($p = 0.07$). Nutrition knowledge and food insecurity were only predictive of dairy product intake, which contradicts the third hypothesis, which states that intake of dairy products, fruits and vegetables, and whole grains will be positively associated with nutrition knowledge and negatively associated with food insecurity.

Implications

The results of this study show that older adults in the Georgia OAANP do not meet the 2005 Dietary Guideline recommendations for dairy products, fruits and vegetables, and whole grains. Older adults, especially those in low-income groups, are at high risk for nutritional deficiencies due to poor diet quality and insufficient nutrient intake (Cole & Fox, 2004).

Knowledge of Dietary Guideline recommendations has been shown to improve intakes of dairy products, fruits and vegetables, and whole grains in several studies. Our study found that knowledge about dietary recommendations was associated with higher intakes of dairy products and whole grains. Elbon et al. (1998) found that greater nutrition knowledge was associated with greater milk consumption. Nutrition education intervention trials by Wade (2003) and McCamey (2002) targeted fruit and vegetable consumption and were successfully increased consumption among participants. Data from the 2000 Behavioral Risk Factor Surveillance System (BRFSS) Survey also indicated that nutrition education (in years) predicts fruit and vegetable intake. Ellis (2005) implemented a nutrition education intervention and found that knowledge of whole grain benefits, ability to identify whole grain foods, and intake of whole grains increased after the intervention.

Only 28 percent of participants consumed dairy products two or more times per day, and only 31 percent of participants of this study with low calcium-rich food intakes took calcium

supplements. Because fractures associated with bone loss are painful, expensive, and reduce quality of life, interventions targeting calcium supplement use would benefit this population (Miller, 2000). Additionally, only six percent of participants with low calcium-rich food intakes took calcium plus vitamin D supplements, and 41 percent of calcium supplement-users did not know whether their supplements contained vitamin D. Therefore, interventions targeting calcium supplement use should encourage older adults to take calcium plus vitamin D supplements.

The Food Intake section of the questionnaire should include an option for calcium-fortified soy products in the question "How many servings of milk, yogurt, or cheese do you consume?". The question "How many servings of orange or yellow vegetables do you consume?" and "How many servings of green vegetables do you consume?" should be accompanied by the question "How many servings of other vegetables do you consume?" to get a more accurate picture of total vegetable consumption. Additionally, the question "How many servings of fruits and vegetables should people eat each day?" should include an option for 7-10, which became the correct answer with the 2005 Dietary Guideline recommendations.

In conclusion, the diets of older adults in the Georgia OAANP do not meet the 2005 Dietary Guideline recommendations, and interventions that aim to increase consumption of the food groups of interest should be implemented. Such interventions should target those at highest risk for nutritional deficiencies and should provide nutrition and supplement education. Factors including gender, ethnicity, education, milk intolerance, nutrition knowledge, food insecurity, and some illness are predictive of intake and should be considered in choosing participants in future interventions. By improving dietary quality and using supplements as necessary, the nutritional status and quality of life of older adults can be optimized.

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APPENDIX A. Spearman Correlations of Participant Characteristics and Food Intake

	Dairy	Meat	Green Vegs[a]	Orange or Yellow Vegs	Citrus Fruit/Juice	Non-citrus Fruit/Juice	Green, Orange, Yellow Vegs	All Fruit	All Green, Orange, Yellow Vegs and All Fruit	Whole Wheat Breads/ Cereals
Age (years)	0.0060[b] (0.9368)[c]	0.0541 (0.4806)	0.0754 (0.3255)	-0.0840 (0.2736)	0.0437 (0.5693)	-0.0785 (0.3059)	0.0114 (0.8823)	-0.02645 (0.7302)	-0.0103 (0.8937)	-0.0176 (0.8185)
Gender (male = 0, female = 1)	0.0702 (0.3585)	-0.0747 (0.3287)	0.0417 (0.5856)	0.1241 (0.1035***)	0.1099 (0.1542***)	0.0903 (0.2372)	0.0921 (0.2283)	0.1241 (0.1037***)	0.1331 (0.081**)	0.0530 (0.4885)
Ethnicity (Caucasian = 0, African American = 1)	-0.1821 (0.0165*)	-0.0055 (0.9431)	0.0530 (0.4883)	-0.0052 (0.9455)	0.0726 (0.3425)	-0.0149 (0.8451)	0.0351 (0.6469)	0.0327 (0.6692)	0.0414 (0.5889)	0.0573 (0.4542)
Education (years)	0.1370 (0.0881**)	0.1630 (0.0421*)	0.1733 (0.0305*)	0.1357 (0.0912**)	0.0332 (0.6812)	0.0715 (0.3748)	0.1895 (0.0178*)	0.0669 (0.4064)	0.1532 (0.0562**)	0.0597 (0.4593)
Food Insecurity (0-4; 4 is greatest food insecurity)	0.0240 (0.7549)	-0.1125 (0.1429***)	0.0719 (0.3499)	0.1851 (0.0154*)	-0.0818 (0.2876)	-0.0112 (0.8847)	0.1449 (0.0586**)	-0.0556 (0.4700)	0.0479 (0.5336)	-0.1113 (0.1472***)

	Dairy	Meat	Green Vegs	Orange or Yellow Vegs	Citrus Fruit/Juice	Non-citrus Fruit/Juice	Green, Orange, or Yellow Vegs	All Fruit	All Green, Orange, Yellow Vegs and All Fruit	Whole Wheat Breads/ Cereals
Knowledge of recommen-dations										
Whole Grains (don't know or incorrect = 1, correct ≥ 3 = 2)	0.1487 (0.0515**)	-0.0263 (0.7318)	-0.0514 (0.5032)	0.1167 (0.1274***)	0.0308 (0.6887)	0.1098 (0.1515***)	0.0223 (0.7716)	0.0913 (0.2337)	0.0715 (0.3512)	0.1972 (0.0095*)
Fruits and Vegs (don't know or incorrect = 1, correct ≥ 5 = 2)	0.0976 (0.2012)	-0.1433 (0.06**)	0.0804 (0.2930)	0.1621 (0.0331*)	0.0089 (0.9072)	0.0649 (0.3960)	0.1386 (0.0690*)	0.0485 (0.5263)	0.1119 (0.1426***)	0.0351 (0.6471)
Calcium-rich Foods (don't know or incorrect = 1, correct ≥ 3 = 2)	0.2043 (0.0070*)	0.0149 (0.8449)	0.0759 (0.3211)	0.2051 (0.0068*)	0.2015 (0.0079*)	0.2362 (0.0018*)	0.1570 (0.0391*)	0.2757 (0.0002*)	0.2678 (0.0004*)	0.0907 (0.2351)
Milk Intolerance (no = 0, yes = 1)	-0.2328 (0.0023*)	0.0420 (0.5862)	0.0767 (0.3202)	-0.0660 (0.3926)	-0.1173 (0.1278***)	-0.0181 (0.8143)	0.0213 (0.7826)	-0.0809 (0.2939)	-0.0395 (0.6095)	0.0845 (0.2733)

	Dairy	Meat	Green Vegs	Orange or Yellow Vegs	Citrus Fruit/Juice	Non-citrus Fruit/Juice	Green, Orange, or Yellow Vegs	All Fruit	All Green, Orange, Yellow Vegs and All Fruit	Whole Wheat Breads/ Cereals
Illnesses[d]										
Cancer (no = 0, yes = 1)	0.0653 (0.3934)	0.0015 (0.9845)	-0.0067 (0.9307)	-0.0315 (0.6807)	-0.1358 (0.0749**)	0.0732 (0.3384)	-0.0206 (0.7883)	-0.1286 (0.0918**)	-0.0941 (0.2180)	0.0737 (0.3350)
Diabetes (no = 0, yes = 1)	0.0299 (0.6953)	0.1035 (0.1754***)	0.0424 (0.5793)	0.1228 (0.1075***)	0.0125 (0.8699)	0.0416 (0.5869)	0.0919 (0.2293)	0.0351 (0.6469)	0.0761 (0.3199)	0.1767 (0.0201*)
Heart Disease (no = 0, yes = 1)	0.0527 (0.4935)	0.0294 (0.7026)	-0.0877 (0.2539)	-0.0303 (0.6941)	-0.1379 (0.072**)	-0.0538 (0.4845)	-0.0776 (0.3133)	-0.1170 (0.1274***)	-0.1200 (0.1179***)	0.0091 (0.9062)
Hypertension (no = 0, yes = 1)	-0.0964 (0.2084)	0.0034 (0.9647)	0.0419 (0.5855)	-0.0121 (0.8752)	0.0584 (0.4464)	-0.0013 (0.9866)	0.0238 (0.7572)	0.0335 (0.6630)	0.0353 (0.6460)	-0.0176 (0.8184)
Osteoporosis (no = 0, yes = 1)	0.0614 (0.4250)	-0.1390 (0.0698**)	-0.0233 (0.7622)	-0.0045 (0.9534)	0.1309 (0.0880**)	0.0373 (0.6283)	-0.0188 (0.8067)	0.1018 (0.185***)	0.0542 (0.4810)	0.0620 (0.4203)
Stroke (no = 0, yes = 1)	-0.0288 (0.7064)	-0.0078 (0.9188)	-0.1599 (0.0356*)	-0.0708 (0.3547)	-0.0275 (0.7194)	-0.0204 (0.7897)	-0.1492 (0.05**)	-0.0298 (0.6974)	-0.1062 (0.1644***)	0.0129 (0.8664)

	Dairy	Meat	Green Vegs	Orange or Yellow Vegs	Citrus Fruit/Juice	Non-citrus Fruit/Juice	Green, Orange, or Yellow Vegs	All Fruit	All Green, Orange, Yellow Vegs and All Fruit	Whole Wheat Breads/ Cereals
BMI (wt kg/ ht m^2)	0.0843 (0.2802)	0.0793 (0.3097)	-0.0688 (0.3788)	0.1318 (0.0905**)	-0.0005 (0.9952)	0.0671 (0.3901)	0.0174 (0.8241)	0.0442 (0.5721)	0.0385 (0.6229)	0.0165 (0.8331)

[a] Abbreviation for vegetables
[b] Spearman Correlation Coefficient
[c] P value in parentheses
[d] Illness or conditions within the past year only
* P values < 0.05 were considered statistically significant
** P values 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

APPENDIX B. Spearman Correlations of Participant Characteristics and Multivitamin-Mineral and Calcium Supplement Use

	Use of Multivitamin-Mineral Supplements (Yes/No)	**Use of Calcium Supplements (Yes/No)**
Age (years)	-0.0843[a] (0.2716)[b]	-0.0664 (0.3899)
Gender (male = 0, female = 1)	0.0962 (0.2080)	0.1618 (0.0345*)
Ethnicity (Caucasian = 0, African American = 1)	-0.1871 (0.0137*)	-0.0993 (0.1963***)
Education (years)	0.1621 (0.0432*)	-0.0406 (0.6175)
Food Insecurity (0 - 4; 4 is greatest food insecurity)		
I do not always have enough money to buy the food I need	0.0772 (0.3158)	0.0007 (0.9929)
Ability to purchase supplements (no = 0, yes = 1)	0.2181 (0.0045*)	0.2131 (0.0058*)
Total Fruit and Vegetable Consumption	0.1516 (0.0464*)	-0.0038 (0.9604)
Knowledge of recommendations		
Fruits and Vegetables (don't know or incorrect = 1, correct ≥ 5 = 2)	0.0947 (0.2151)	0.1441 (0.0600**)
Calcium-rich Foods (don't know or incorrect = 1, correct ≥ 3 = 2)	0.2717 (0.0003*)	0.1245 (0.1048***)
Milk Intolerance		
Do you get a stomachache, gas, or diarrhea after drinking milk? (no = 0, yes = 1)	--[c]	0.0447 (0.5652)

Illnesses or risk factors[d]		
Cancer (no = 0, yes = 1)	-0.0978 (0.2003)	-0.0525 (0.4955)
Diabetes (no = 0, yes = 1)	0.0221 (0.7733)	--
Heart Disease (no = 0, yes = 1)	0.1803 (0.0183*)	--
Hypertension (no = 0, yes = 1)	0.0709 (0.3550)	--
Osteoporosis (no = 0, yes = 1)	0.1138 (0.1384***)	0.2365 (0.0020*)
Stroke (no = 0, yes = 1)	-0.0187 (0.8067)	--
Smoking (no = 0, yes = 1)	-0.0706 (0.3560)	-0.0575 (0.4548)
BMI (wt kg/ ht m^2)	0.0790 (0.3114)	0.0607 (0.4404)

[a] Spearman Correlation Coefficient
[b] P value in parentheses
[c] Indicates not associated because variable was not retained in model
[d] Illness or conditions within the past year only
* P values < 0.05 were considered statistically significant
** P values 0.05 - 0.09 were considered trends
*** P values 0.10 - 0.20 were considered trends

APPENDIX C

NUTRITION AND HEALTH OF OLDER ADULTS CONSENT FORM

I, _____, agree to participate in the study titled "NUTRITION AND HEALTH OF OLDER ADULTS" conducted by Dr. Mary Ann Johnson in the Department of Foods and Nutrition at the University of Georgia. I understand that I do not have to take part if I do not want to. I can stop taking part without giving any reason and without penalty. I can ask to have all information concerning me removed from the research records, returned to me, or destroyed. My decision to participate will not affect the services that I receive at the senior center.

The benefits of this study are to help me improve my nutrition, health, and physical activity habits. This study will also help the investigators learn more about good ways to help older adults improve their nutrition, health, and physical activity habits. This study will be conducted at my local senior center.

To make this study a valid one, my name was randomly selected from all of the congregate meal participants at my senior center. If I agree to take part in this study, I will be asked to do the following things:

1. Answer questions about my nutrition, food intake, health, and physical activity each year. Each year, this will take about 60 minutes in one or two sessions at the senior center and another 10 minutes answering questions over the telephone about my daily food intake.

2. Participate in a monthly nutrition, health, and physical activity program to improve my eating habits, health, strength and balance. Each program will last about 30 to 60 minutes.

3. Someone from the study may contact me to clarify my information.

The instructor will provide food to taste. Mild to no risk is expected by tasting food. However, I will not taste foods that I should not eat because of swallowing difficulties, allergic reactions, dietary restrictions, or other food-related problems.

No risk is expected, but I may experience some discomfort or stress when the researchers ask me questions about my nutrition, health, and physical activity habits. The leaders will advise me to stop exercising if I experience any discomfort or chest pains. No information concerning myself or provided by myself during this study will be shared with others without my written permission, unless law requires it. I may choose not to answer any question or questions that may make me uncomfortable. I will be assigned an identifying number and this number will be

used on all of the questionnaires I fill out. Data will be stored in locked file cabinets under the supervision of Dr. Mary Ann Johnson at the University of Georgia; only the staff involved in the study will have access to these data and only for the purpose of data analyses and interpretation of results. The data will be destroyed by January 1, 2012.

The privacy law, Health Insurance Portability and Accountability Act (HIPAA), protects my individually identifiable health information (protected health information). For my potential benefit, the researchers would like to know if I would like to give my permission for the researchers to send the following health information to my healthcare provider. I may change my mind and revoke the authorization by contacting the project coordinator, Ms. Tiffany Sellers (706-542-4838). This authorization does not have an expiration date.

If I am found to be at risk for depression, then I give my permission for you to release this information to my health care provider. I can still be in this study even if I do not give permission for you to release this information to my health care providers.

Circle one: YES / NO. Initial _____.

If I have any further questions about the study, now or during the course of the study I can call Ms. Tiffany Sellers (706-542-4838) or Dr. Mary Ann Johnson (706-542-2292).

I will sign two copies of this form. I understand that I am agreeing by my signature on this form to take part in this study. I will receive a signed copy of this consent form for my records.

_____	_____	_____
Signature of Participant	Participant's Printed Name	Date

_____

Participant Address and Phone

_____	Mary Ann Johnson	_____
Signature of Investigator	Printed Name of Investigator	Date

Email: mjohnson@fcs.uga.edu

_____	_____	_____
Signature of Staff who Reads Consent Form to Participant	Printed Name of Staff	Date

For questions or problems about your rights please call or write: The Chairperson, Institutional Review Board, University of Georgia, 612 Boyd Graduate Studies Research Center, Athens, Georgia 30602-7411; Telephone (706) 542-3199;
E-Mail Address IRB@uga.edu.

UGA project number: H2004-10793-0 DHR project number: 040501 Date: April 7, 2005 maj

ID of Participant: _____

PHYSICIAN CONTACT INFORMATION (RECORD HERE ONLY IF PERMISSION GRANTED)

Name: _____

Mailing address: _____

Phone: _____

FAX: _____

Record of Healthcare Provider Contacts and Disclosed Information

ID: _____

Staff Initials	Confirmed Participant Consent	Date of Disclosure	Name and Address of Entity Receiving Information	Description of Information Sent	Mode of Delivery

	GENERAL INFORMATION – 1st Visit Only, Update Contact Info as Needed	Line 01
ID	**Participant ID :**	(1-3)
Service	**Do you have lunch at the senior center?** *If yes, circle "congregate meal"* 1- Congregate Meal 0 - No	(10)
GN1	**Today's date: ___ / ____ / ____** *Month/Day/Year*	(11-16)
GN2	**This information was obtained from:** 0 Client (Note: This study is client only) 1 Senior center staff person 2 Family member of client 3 Caregiver for client 4 Other: _____	(17)
~~Phone~~	~~**What are some good times that we can contact you by telephone to ask you questions about your daily diet ? Think of any TV shows, church activities, doctor appointments or other engagements you might have.**~~	

	~~**Participant**~~				
	~~Mondays~~				
	~~Tuesdays~~				
	~~Wednesdays~~				
	~~Thursdays~~				
	~~Fridays~~				
	~~Saturdays~~				
	~~Sundays~~				

		Line 2
GN4	**Date of birth**: ___ / ____ / ____ *Month/Day/Year (missing 999999)*	(13-18)
GN5	**Current age: ___ ___ ___** *Example: age 75 is 075 (missing 999)*	(19-21)
GN6	**Gender:** 0 Male 1 Female *missing 9*	(22)
GN7	**Ethnicity:** 0=Caucasian, 1=Black, 2=Hispanic, 3=Asian, 4=Other *missing 9*	(23)
GN8	**Years completed in school? ____ years** *Example: 8 yrs is 08 missing 99*	(24-25)
County	**County of residence** 00=Madison, 01=Morgan, 02=Walton, 03=Jackson, 04=Newton, 05=Barrow, 06=Greene, 07=Clarke, 08=Ogelthorpe, 09=Elbert, 10=Oconee, 11=Jasper, 12=Franklin, 13=Cherokee, 14=Gilmer	(26-27)
xxx	**Deleted question.** **Code 9**	(28)
	ALL TIME POINTS:	
SuppAf	**Do you feel that you have enough money to buy multivitamins and calcium supplements? The cost is about $7-$8 each month.** 0 = No 1 = Yes 9 = missing	(29)
MilkInt	**Do you get a stomachache, gas, or diarrhea after drinking milk?** 0 = No 1 = Yes 9 = missing	(30)

Nutrition Screening, Weight, Height, BMI (05/16/05) – Line 3

Name (ID): 1-4	**2. County:** 5-7	**3. Date (M/D/Y):** 8-13	
4. Age: 14-16	**5. Male(0) Female(1)** 17	**6. White(1) Black(2) Hispanic(3) Other(4)** 18	

NUTRITIONAL HEALTH

	Circle one *Missing = 9*	
NH1. Do you have an illness or condition that made you change the kind and/or amount of food you eat.*	No (0) Yes (2)	19
NH2. Do you eat fewer than two meals per day.	No (0) Yes (3)	20
NH3. Do you eat few (circle all that apply): fruits or vegetables, or milk products.	No (0) Yes (2)	21
NH4. Do you have 3 or more drinks of beer, liquor or wine almost every day.	No (0) Yes (2)	22
NH5. Do you have tooth or mouth problems that make it hard for you to eat.*	No (0) Yes (2)	23
NH6. Do you always have enough money to buy the food you need.	No (4) Yes (0)	24
NH7. Do you eat alone most of the time.	No (0) Yes (1)	25
NH8. Do you take 3 or more different prescribed or over-the-counter drugs a day.	No (0) Yes (1)	26
NH9. Without wanting to, have you lost or gained 10 or more pounds in the last 6 months. Circle one: Lost weight OR Gained weight.	No (0) Yes (2)	27
NH10. Are you not always physically able to (circle all that apply): Shop, cook, and/or feed yourself.*	No (0) Yes (2)	28
TOTAL SCORE:		29-30
If your score is:		

0-2: **Good.** Recheck your nutritional score in 6 months.

3-5: **You are at moderate nutritional risk.** See your dietitian or health care provider to help you improve your eating habits and lifestyle. Recheck your nutritional score in 3 months.

6 or more: **You are at high nutritional risk.** See your dietitian or health care provider to help you improve your eating habits and lifestyle. Recheck your nutritional score in 3 months.

BODY WEIGHT AND BMI
Use a Scale to Measure Body Weight
Ask participant their height

Weight in pounds (use scale)	*999 missing*		pounds	31-33
Height in feet and inches (ask)	*999 missing*	feet	inches	34-36
BMI	*99 missing*		kg/m^2	37-38

If your BMI is:	
18 or less: **You are at risk of being underweight.** See your health care provider to help you find out why you are losing weight and to help you gain weight.	
19 to 24.9: **This is the normal healthy range.**	
25 or higher: **You are overweight.** See your health care provider to help you find out why you are gaining weight and to help you lose or stop gaining weight.	

* Question reworded in May 2005

Participant ID: _____ Line 4, column 10

What was your overall level of satisfaction with the nutrition education and physical activity education programs at your senior center in the past year?

Circle One: **1- Poor** **2-Fair** **3-Good** **4-Very Good** **5-Excellent**

8 = not applicable

9 = missing

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

	FOOD INTAKE: Now I'm going to ask you about your usual intake common foods.	**Line 5**
	CODE AS SERVINGS PER WEEK (Note 07 per week is 1 time per day) **Per WEEK:** 00 01 02 03 04 05 06 07 08 09 10 11 12 13 **14 or more** 21 or more	
MNA12A.	**How many servings of <u>milk, yogurt, or cheese</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(10-11)
MNA12C	**How many servings of <u>meat, fish, or poultry</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(12-13)
NQ4	**How many servings of <u>green vegetables</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(14-15)
NQ5	**How many servings of <u>orange or yellow vegetables</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(16-17)
NQ6	**How many servings of <u>citrus fruit or citrus juice</u> do you consume (e.g., orange, grapefruit)? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(18-19)
NQ7	**How many servings of <u>other non-citrus fruit or juice</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(20-21)
OJCa	**How many servings of <u>CALCIUM-FORTIFIED juice</u> do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(22-23)
NQ8	**How many servings of liver (eg., beef, chicken,pork) do you consume? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(24-25)
NQ9	**How many servings of <u>whole wheat or whole grain bread</u> do you consume (such as 100% whole wheat bread)? Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(26-27)
NQ10	**How many servings of <u>whole grain cereals</u> do you consume? (Such as oatmeal or bran cereal?) Circle one**: 0/wk 1/wk 2/wk 3/wk 4/wk 5/wk 6/wk 8/wk 9/wk 10/wk 11/wk 12/wk 1/d 2/d 3/d (or more)	(28-29)

		Line 5, cont.
MVM	**Do you take a multivitamin-mineral supplement?** 0=No 1=Yes	30
	If yes, what is the brand name? _____	x
	If yes, how many days/week do you take it? _____	31
	(*Code . if no or missing)*	
CaSup	**Do you take a calcium supplement?** 0=No 1=Yes 8=Don't Know 9=Missing	32
	If yes, what is the brand name? _____	x
	If yes, how many days/week do you take it? (*Code . if no or missing)*	33
CaDSup	**Does the calcium supplement you take also have vitamin D?**	34
	0=No 1=Yes 8=Don't Know 9=Missing	
NK1	**How many whole grain servings should people eat each day?**	35
	Circle one: 1 2 3 or more 8=Don't Know 9=Missing	
NK2r	**How many servings of fruits and vegetables should people eat each day?****	36-37**
	Circle one: 01 02 03 04 "05 or more" "7 to 10"	
	(Code 1=01, 2=02, 3=03, 4=04, 5or more 05,	
	"7 to 10" = 71, 88=Don't Know 99=Missing)	
NK3	**How many servings of calcium rich foods should people eat each day?**	38**
	Circle one: 1 2 3 or more 8=Don't Know 9=Missing	

***** Note to Coders: Spacing for coding this question was changed in 2005.***

The recommended servings of fruits and vegetables changed in January 2005 in the middle of our education year, but we may not have yet communicated this by May or June 2005.

For older people the recommended number of servings of fruits and vegetables is 7 to 10 based on energy needs.

FOOD STAMPS AND FOOD SECURITY

INTERVIEWER: Read this form to the participant and record their answers.

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

ID: 1-4	**2. County:** 5-7	**3. Date (M/D/Y):** 8-13	**Line 6**
~~**4. Age:** 14-16~~	~~**5. Male(0) Female(1)** 17~~	~~**6. White(1) Black(2) Hispanic(3) Other(4)** 18~~	
		Circle One	
CMeals. Do you have meals at a Senior Center? If yes, how many meals do you receive each week?		No or less than 1 time per week (0) Meals each week: 1 2 3 4 5 6 7 or more	19
HDMeals. Do you receive home-delivered meals? If yes, how many meals do you receive each week?		No or less than 1 time per week (0) Meals each week: 1 2 3 4 5 6 7 or more	20
FS1. Do you currently receive food stamps? .		No (0) Yes (1)	21
			~~22~~
			~~23~~
			~~24~~
			~~25~~
			~~26~~
			~~27~~
			~~28~~
			~~29~~
FSC. Next I'm going to ask some questions about your ability to obtain enough food during the past month. These questions are being asked to see if there are some ways that we can help you make sure you have enough food. ***(Interviewer should follow up to provide assistance and/or referral to food bank or food stamp office).***			
FS9. In the past month, have you received food from a food pantry or food bank?		No (0) Yes (1)	30
FS10. In the past month, did you ever have no food in the house and no money or food stamps to buy food?		No (0) Yes (1)	31
FS11. In the past month, did you have to choose between buying food and buying medications?		No (0) Yes (1)	32
FS12. In the past month, did you have to choose between buying food and paying rent or utility bills?		No (0) Yes (1)	33
FS13. In the past month, did you skip one or more meals? **If yes, was it because: (Check all that apply)**		No (0) Yes (1)	34

FS14. You had no food in the house.	No (0)	Yes (1)	Not applicable (8)	35
FS15. You had no money or food stamps to buy food.	No (0)	Yes (1)	Not applicable (8)	36
FS16. You had no way to get to the store to buy food.	No (0)	Yes (1)	Not applicable (8)	37
FS17. You were not hungry or had a poor appetite.	No (0)	Yes (1)	Not applicable (8)	38
FSSum. FS10+FS11+FS12+(1 if FS13 AND FS14 AND FS15 all are YES). Maximum score is 4.				39

Questions FS10-12 (and 13 with adaptation) from the National Evaluation of the ENP, 1993-95

ww.aoa.dhhs.gov/aoa/nutreval/fulltext/v1ch2a1.html.

HOME FOOD SAFETY PRACTICES

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

Name (ID):	County:	Date (M/D/Y):	**LINE 7**
~~Age:~~	~~Gender: Male Female~~	~~Race: White Black Hispanic Other~~	

	Circle one 0 1	
Think back over the past month . . .		
1. In the past month, did you **always** wash your hands with warm water and soap for 20 seconds before **eating** food?	No Yes*	10
2. In the past month, did you **always** rinse fresh fruits and vegetables with cold running water before **eating** them?	**No Yes***	11
3. In the past month, did you **ever** eat cookie dough or cake batter that was made with raw eggs?	**No* Yes**	12
4. In the past month, have you checked the temperature of your refrigerator?	**No Yes***	13
5. Do you cook, reheat or prepare meals in your home? IF NO, THEN STOP HERE; CODE REMAINING QUESTIONS AS "8")	No Yes	14
6. In the past month, did you **always** clean the countertops before preparing food?	**No Yes***	15
7. In the past month, did you **always** rinse fresh fruits and vegetables with cold running water before **preparing** them?	**No Yes***	16
8. In the past month, did you **always** wash your hands with warm water and soap for 20 seconds before **preparing** food?	**No Yes***	17
9. In the past month, did you **always** wash, rinse, and sanitize the cutting boards used after preparing raw meat, fish and poultry?	**No Yes***	18
10. In the past month, did you **always** keep raw meat, fish and poultry wrapped properly in the refrigerator so juices do not drip on other foods?	**No Yes***	19
11. In the past month, did you **always** put cooked meat, fish or poultry on a different platter than the one with the raw juices?	**No Yes***	20
12. In the past month, did you **always** rotate food in the microwave to avoid "cold	**No Yes***	21

spots"? (Enter "yes" if participant has a rotating tray in their microwave; enter "8" if don't have microwave)			
13. In the past month, did you **always** bring sauces, soups and gravy to a boil when reheating?	**No**	**Yes***	22
14. In the past month, did you **always** make sure eggs were cooked properly?	**No**	**Yes***	23
15. In the past month, did you **always** refrigerate leftovers right away?	**No**	**Yes***	24
16. In the past month, did you **always** defrost foods in the refrigerator OR in cold water OR in the microwave?	**No**	**Yes***	25
17. In the past month, did you **always** use a food thermometer to decide if meat, poultry, or fish are done before serving?	**No**	**Yes***	26
Sum of the * responses (maximum = 16):			27-28
18. Do you have a food thermometer?	**No**	**Yes***	29

Coding: 0 = No, 1 = Yes, 8 = Not applicable, 9 = missing/don't know
(Variable names are H1, H2, etc)

Adapted by Mary Ann Johnson, Ph.D. and Elizabeth L. Andress, Ph.D. from the Fight Bac Program, **April 27, 2004;** Original questionnaire available at http://www.fightbac.org/pdf/Survey.pdf

Medication Management-Short Form (4/28/04)

Administer this questionnaire before doing "brown bag" reviews or medication management education activities

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

Name (ID):	County:	Date (M/D/Y):	Line 8
~~Age:~~	~~Gender: Male Female~~	~~Race: White Black Hispanic Other~~	

	Circle one	
		0 1
MM5. Do you go to one pharmacy for **all** of your medications?	No Yes	10
MM6. Do you have a written list of **all** of your prescription medications, non-prescription medications, and dietary supplements?	No Yes	11
MM7. Do you carry this written list with you in your purse or wallet?	No Yes	12
MM8. Have you had a physician, pharmacist, or other health professional look at all of your medications in the past 6 months?	No Yes	13
MM9. Do you **always** throw out your medications when they are expired (past their "use by" date)?	No Yes	14
MM10. Do you **use** a pillbox or other system to help you take your medications?	No Yes	15
MM11. Do you know the name of **each** of your medications?	No Yes	16
MM12. Do you know what **each** of your medications is for?	No Yes	17
MM15. Do you know the possible side effects of **each** of your medications?	No Yes	18
MMTot. Total "no" answers:		19-20

If you answered "no" to any of the above questions, then talk with your pharmacist, physician or other health professional to learn more about your medications.

Prepared by the College of Pharmacy and Department of Foods and Nutrition,
University of Georgia, Athens, GA 30602 (706-542-4838; noahnet@uga.edu)

Code 0 = No, 1 = Yes, 8 = Person Takes No Medications, 9 = Don't Know or Missing

Geriatric Depression Scale (GDS) Short form

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

Choose the best answer for how you felt over the past week. Please answer the following questions "YES" or "NO there are no right or wrong answers, only what best applies to you.

		* = 1 point	Line 9
1)	Are you basically satisfied with your life?	Yes *NO	
2)	Have you dropped many of your activities and interests?	*YES No	
3)	Do you feel that your life is empty?	*YES No	
4)	Do you often get bored?	*YES No	
5)	Are you in good spirits most of the time?	Yes *NO	
6)	Are you afraid that something bad is going to happen to you?	*YES No	
7)	Do you feel happy most of the time?	Yes *NO	
8)	Do you often feel helpless?	*YES No	
9)	Do you prefer to stay at home, rather than going out and doing new things?	*YES No	
10)	Do you feel you have more problems with memory tha----------n most people?	*YES No	
11)	Do you think it is wonderful to be alive now?	Yes *NO	
12)	Do you feel pretty worthless the way you are now?	*YES No	
13)	Do you feel full of energy?	Yes *NO	
14)	Do you feel that your situation is hopeless?	*YES No	
15)	Do you think that most people are better off than you are?	*YES No	
GDStot	*** = 1 point.**	**TOTAL * SCORE = _____**	**(10-11)**

If * score is 10 or greater, or if Nos. 1, 5, 7, 11, and 13 were answered with * , then the participant may be depressed. Proceed with referral plan. (Consult with Tiffany Sellers, tsellers@uga.edu, before coding, or Dr. Steve Miller, lsmiller@egon.psy.uga.edu)

ILLNESSES, CONDITIONS - IN THE PAST YEAR

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

Obtain information from reliable source. ***This information was provided by****: client, caregiver, other____?*

Line 10

Next, I'm going to ask you about your <u>current</u> medications and the illness you have had IN THE PAST YEAR.	NO (0)	YES (1)	Don't Know (9 or 99)	Space
Total number of PRESCRIPTION medications				10-11
Total number of NON -PRESCRIPTION medications, not counting vitamins and minerals				12-13
Multiple vitamin mineral supplement? 0 = no, 1 = yes				14
Number of other nutritional supplements?				15
Total number of illnesses - fill in when finished below. DID YOU HAVE:				16-17
1) Anemia				18
2) Alzheimer's				19
3) Other dementias				20
4) Cancer				21
5) Circulatory problems				22
6) Congestive heart failure				23
7) Constipation				24
8) Diabetes: Kind_____; Dx date _____				25
9) Diarrhea				26
10) Glaucoma				27
11) Hearing problems				28
12) Heart disease				29
13) Hypertension or high blood pressure				30
14) Legally blind				31
15) Liver disease				32
16) Mental illness:				33
17) Osteoporosis				34
18) Hip fracture				35
19) Pace maker				36
20) Parkinson's disease: Dx date_____				37
21) Kidney or renal disease				38
22) Respiratory disease				39
23) Seizures: 1st date_____; last date_____				40
24) Skin rashes, bed sores				41
25) Stroke: Number_____; Dates_____				42
26) Thyroid problems: Kind_____; Dx date_____				43
27) Visual disturbances				44
28) Cataracts				45
29) Smoking: cigarettes, pipes, cigars, OR chewing tobacco				46
30) Stomach Surgery				47
31) Emergency room visit in the past year?				48
32) Other illness? If yes, then list here:				49
33) Arthritis				50
34) Pneumonia				51

35) Dizziness				52
36) Gout				53
37)				54
38)				55

ACTIVITIES OF DAILY LIVING	No (0)	Yes (1)	. = NA 9 = Miss
ADL1. EATING: Are you able to feed yourself?			10
ADL2. BATHING: Are you able to bathe or shower or take sponge baths for maintaining adequate hygiene?			11
ADL3. GROOMING: Are you able to take care of your personal appearance?			12
ADL 4. DRESSING: Are you able to dress and undress as necessary to carry out your daily activities?			13
ADL 5. TRANSFER: Are you able to get into and out of bed or other usual sleeping place?			14
ADL 6. CONTINENCE: Are you able to take care of bladder/bowel functions without difficulty?			15
ADL6a. If you receive help with eating, bathing, grooming, dressing, getting out of bed, OR getting to the bathroom, who usually helps you?	*No one (0)* *Family (1)* *Friend (2)* *Agency (3)* *Other (4)*		16
ADL6b. If you receive help with eating, bathing, grooming, dressing, getting out of bed, OR getting to the bathroom, about how many hours each day does someone help you?	< 0.5 hr (0) 0.5 to < 1.5 hr (1) 1.5 to < 2.5 hr (2) 2.5 to < 3.5 hr (3) 3.5 or more hr (4)		17
PADL. TOTAL NUMBER OF ADLS (RESPONSE IN THE "NO" COLUMN:			18
INSTRUMENTAL ACTIVITIES OF DAILY LIVING	No (0)	Yes (1)	
ADL7. MANAGING MONEY: Are you able to handle money and pay bills?			19
ADL8. TELEPHONING: Are you able to use the telephone to communicate your essential needs?			20
ADL9. PREPRAING MEALS: Are you able to prepare hot and/or cold meals that are nutritionally balanced or therapeutic, as necessary, which you can eat?			21
ADL10. LAUNDRY: Are you able to do your laundry?			22
ADL11. HOUSEWORK: Are you able to do routine housework?			23
ADL12. OUTSIDE HOME: Are you able to get out of your home and to essential places outside the home?			24
ADL13. ROUTINE HEALTH CARE: Are you able to follow the directions of physicians, nurses or therapists as needed for routine health care?			25
ADL14. SPECIAL HEALTH CARE: Are you able to follow directions of physicians, nurses or therapists as needed for specialized health care?			26
ADL15. BEING ALONE: Are you able to be left alone?			27
IADL: TOTAL NUMBER OF IADLS (RESPONSES IN THE "NO" COLUMN):			28
Additional Questions:			
ADL16. MEDICATIONS: Are you able to take medications without assistance?			29
ADL16a. If you receive help with medications, who usually helps you?	*No one (0)* *Family (1)* *Friend (2)* *Agency (3)* *Other (4)*		30
ADL17. PHYSICAL THERAPY: Are you receiving physical therapy or other professional rehabilitative services? If yes, describe:	No (0)	Yes (1)	31
ADL17a. If you receive physical therapy or other professional rehabilitative services, for about how many hours <u>each week</u>? *Revised May 16, 2005 maj*	< 0.5 hr (0) 0.5 to < 1.5 hr (1) 1.5 to < 2.5 hr (2) 2.5 to < 3.5 hr (3) 3.5 or more hr (4)		32

ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____

PHYSICAL PERFORMANCE

	EPESE SHORT BATTERY **Physical Performance Test-Task Descriptions** **Equipment: Stopwatch, 8-Ft Tape Measure, Folding Chair**	**RECORD TIME IN SECONDS**	**Use open coding LINE 12**
ASB	**STANDING BALANCE:** **Time each item until >10.0 sec. OR until participant moves feet or reaches for support.** **1a) SEMI-TANDEM** (heel of one foot placed at mid-position of the other) *If can hold for 10 seconds, move to **1b)** *If can NOT hold for 10 seconds, move to **1c)** **1b) TANDEM** (heel to toe, one foot directly in front of the other) **1c) SIDE-BY-SIDE** (toes lined up evenly)	Time to the nearest 10th second: **a)** ___ ___ . ___ > 10.0 sec. go to **b)** < 10.0 sec. go to **c)** **b)** ___ ___ . ___ **c)** ___ ___ . ___	~~**(1)**~~ ~~**(2)**~~
ASB D	**DOMAIN SCORE:** If A= <10 & C= 0-9, score= 0 A= <10 & C= 10, score= 1 A= ≥10 & B= 0-2, score= 2 A= ≥10 & B= 3-9, score= 3 A= ≥10 & B= ≥10, score= 4	**SCORE:** _____	~~**(3)**~~
AFW	**8 FOOT WALK:** **Participant begins at standing position and will walk a straight distance of 8-feet, measured with tape on the floor.** **Instruct the participant to walk at normal gait using any assistive devices. If possible, have them begin walking a few feet before starting mark, and continue walking a few feet past the 8-foot mark. Tester will start and stop watch at the distance marks.** **Complete the walk twice.**	Time to the nearest 10th second: **1)** ___ ___ . ___ **2)** ___ ___ . ___ Use best (lowest) time **Assistive device used?** (0) NO (1) YES Describe _____	~~**(4)**~~ ~~**(5)**~~
AFW D	**DOMAIN SCORE:** 1= ≥5.7 2= 4.1-5.6 3= 3.2-4.0 4= ≤3.1	**SCORE:** _____	~~**(6)**~~
ACS	**CHAIR STANDS:** **Participant is asked to stand one time from a seated position in an armless, straight-backed chair with their arms folded across their chest.** **If able, participant is asked to stand-up and sit-down 5 times as quickly as possible while being timed.** **If not able to perform, then the test is complete.**	Time to the nearest 10th second: **1)** ___ ___ . ___	~~**(7)**~~
ACS D	**DOMAIN SCORE:** 1= ≥16.7 2= 13.7-16.6 3= 11.2-13.6 4= ≤11.1	**SCORE:** _____	~~**(8)**~~
TDS	**TOTAL SCORE: Add all 3 domain scores. (1-12)**	**TOTAL SCORE:**__ __	~~**(9)**~~

~~**Coding,** 88.8 = physically unable, 99.9 = refused~~ **Revised coding:** 8 = physically unable, 9=refused, 7=not applicable. Enter data starting at column 10; example of coding is 44412 where scores are 4, 4, 4, total =12. Another examples is 12306, where scores are 1, 2, 3 and total is 6; 99999 if all are missing. **Good function (score of 10 to 12); moderate function (score of 6 to 9); poor function (score of 0 to 5)**	

Georgia Baseline Walking Survey

ID: _____ Date: (M/D/Year): _____

(Line 13)

Next, I'm going to ask you about your physical activity and walking habits.

W1. On average, how many days a week do you do exercise?

(10)

1. ___ One day a week
2. ___ Two days a week
3. ___ Three days a week
4. ____ Four days a week
5. ___ Five days a week
6. ___ Six days a week
7. ___ I don't exercise

W2. On average, about how many minutes do you spend engaging in physical activity on one of these days?

(11)

1. ___ Less than 10 minutes
2. ___ 11-20 minutes
3. ___ 21-30 minutes
4. ___ 31-45 minutes
5. ___ 46-60 minutes
6. ___ More than 60 minutes

W3. How physically active are you? *Would you say that you are*

(12)

1. ___ I don't currently engage in regular physical activity
2. ___ I'm not physically active, but plan to start in the next 6 months
3. ___ I'm not physically active, but plan to start in the next month
4. ___ I have been physically active on a regular basis for less than 6 months
5. ___ I have been physically active on a regular basis for more than 6 months but < 1 year
6. ___ I have been physically active on a regular basis for a year or longer

W4. How often do you think a person <u>your age</u> needs to exercise to be healthy?

(13)

1. ___ Not at all
2. ___ Once or twice a month
3. ___ Once or twice a week
4. ___ Three of four times a week
5. ___ Five or more times a week

W5. Which one of the following statements best describes how you currently exercise?

(14)

1. ___ I usually exercise by myself
2. ___ I usually exercise with a friend, spouse, or family member
3. ___ I usually exercise with a group or class
4. ___ I usually exercise with a personal trainer
5. ___ I exercise by myself as much as I exercise with other people
6. ___ I don't exercise

W6. How would you describe the level of exercise you <u>typically</u> engage in?

(15)

1. ___ VIGOROUS – exercise that brings about large increase in heart rate and breathing such as running or aerobics

2. ___ MODERATE – exercise that brings about slight increases in heart rate and breathing such as brisk walking or light yard work.
3. ___ LIGHT – exercise that brings about little or no increase in heart rate or breathing such as yoga, Tai Chi
4. ___ MIX – I exercise at different levels on different days of the week or month
5. ___ I don't exercise

W7. Where do you exercise? (Check all that apply)

(16-21)

1. ___ Health club
2. ___ Community center
3. ___ At home
4. ___ At work
5. ___ Somewhere else: _____
6. ___ Senior Center

W8. What physical conditions interfere with your ability to exercise? (Check all that apply)

(22-29)

1. ___ Arthritis
2. ___ An injury (knee, foot, shoulder, etc…)
3. ___ Heart problems
4. ___ Asthma
5. ___ Physical disability
6. ___ Chronic pain
7. ___ Other: _____
8. None

W9. In a typical week, do you ever walk for <u>10 minutes</u> at a time for any reason (e.g., at work, for recreation, for exercise, to run errands)?

(30-31)

1. ___ Yes How many days? _____
2. ___ No

W10. In a typical week, do you ever walk for <u>30 minutes</u> at a time for any reason (e.g. work, for recreation, for exercise, to run errands)?

(32-33)

1. ___ Yes How many days? _____
2. ___ No

W11. In a typical week, do you do any things to increase muscle strength or tone (e.g., lifting weights, doing pull-ups, push-ups, or sit-ups)?

(34-35)

1. ___ Yes How many days? _____
2. ___ No

~~W12. Did you get (or will you get) a pedometer as part of your involvement in the walking campaign?~~

~~(36)~~

~~1. ___ Yes~~
~~2. ___ No~~

(Code Line 13, start at space 10)

NUTRITION AND DEPRESSION REPORT
From Department of Foods and Nutrition, University of Georgia

NAME: _____ COUNTY: _____ DATE (M/D/Year): _____

Recently, we interviewed you about your nutrition and health. A summary is provided below. For a nutrition consult, please contact the Department of Foods and Nutrition at the University of Georgia (706-542-4838) or an agency in your community (see attached list).

1. Nutritional risk (10 item questionnaire).
____ 0-2, low risk for nutrition problems
____ 3-5, moderate risk for nutrition problems (recommend nutrition consult)
____ 6 or more, high risk for nutrition problems (recommend nutrition consult)

2. Food assistance: some people may need food assistance because of low income and/or high costs of medications, rent, or utility bills, or problems with transportation.
____ no problems noted
____ recommend continuing food stamps
____ recommend seeking assistance from a local food bank and/or applying for food stamps (contact your senior center for assistance)

3. Body mass index is a measure of weight and height (kg/m^2). Underweight, overweight or obesity indicates the need for a nutrition consult to help manage weight related health problems.
____ greater than 30, obese (recommend nutrition consult)
____ 25 to 30, overweight (recommend nutrition consult)
____ 18.5 to 24.9, normal range
____ less than 18.5, underweight (recommend nutrition consult)

4. Losing weight without meaning to may indicate low food intake or illness. However, some people need to lose weight if they are overweight or obese.
____ no weight loss noted
____ weight loss of 10 or more pounds in the past 6 months (recommend nutrition consult)

5. Physical function was assessed by balance, an 8 foot walk, and chair stands. No matter what your physical function, try to maintain or increase your physical activity to help improve function, maintain independence, mobility, and the ability to live in the community for as long as possible. Contact your senior center and/or your physician about physical activity programs in your community.
____ good function (10-12)
____ moderate function (6-9)
____ poor function (0-5)

6. Geriatric depression scale (15 item questionnaire) is a measure of risk for depression.
____ not assessed at this visit
____ depression unlikely
____ possible depression (recommend that you contact your physician)

The University of Georgia
Department of Foods and Nutrition
Athens, GA 30602-3622

Date

Physician Address

Dear Dr. [],

Your patient, [], is a participant in the research study titled "Nutrition and Health in Older Adults" conducted in the local senior center by the Department of Foods and Nutrition at the University of Georgia.

During this study, we found that your patient may be at risk for depression and these results are attached.

Your patient gave us permission to send you these results.

Please let us know if we can provide any additional information.

Sincerely,

Mary Ann Johnson, Ph.D.
Professor

Phone: 706-542-2292
FAX: 706-542-5059
Email: mjohnson@fcs.uga.edu

Attachment