HOME FOOD SAFETY INTERVENTION FOR THE GEORGIA OLDER AMERICANS ACT NUTRITION PROGRAM

by

Tiffany Carol Sellers

(Under the Direction of Mary Ann Johnson)

ABSTRACT

The purpose of this study was to examine the effects of an educational intervention on improving home food safety practices in congregate meal recipients in senior centers in northeast Georgia. A random sample of participants was selected from north Georgia senior centers (N = 136; mean age: 79 years; 74% female; 61% Caucasian; 39% African American). The study design was a pre-test, intervention, and post-test design. At the pre-test, variability in adherence to 16 home food safety practices was large and ranged from ≤ 17% for checking temperatures of the refrigerator and cooked meats to ≥ 76% for other behaviors. Following the intervention, participants were more likely to wash their hands with warm water and soap for 20 seconds before eating (76% vs. 90%, $P \leq 0.01$) and before preparing food (76% vs. 92%, $P \leq 0.01$). In a series of regression analyses, younger age was the most consistent predictor of adherence to home food safety practices at the pre-test, and older age was the most consistent predictor of improvements in adherence after the intervention. As a first step, this intervention improved several aspects of home food safety practices; however, additional interventions that target the individual are needed to increase home food safety practices in older adults.

INDEX WORDS: Older Americans Act Nutrition Program, Congregate Meal Program, Senior Center, Home Food Safety Practices, Nutrition Education, Nutrition Intervention.

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by

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DEDICATION

This project is dedicated to my wonderful and gracious family for their perpetual gifts of uncompromising love and indescribable support.

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CHAPTER 1

INTRODUCTION

The face of America's aging population is continuing to change. From 1950 to 2004, the aging population (65 years and older) increased from 12 million to 36 million. Projections indicate that in the coming years this population will grow more than twice as rapidly as the total population due to the aging baby boomers (Americans born between the late 1940s and the early 1960s) (Merck, 2004). About 12.3% of the U.S. population is made up of older Americans (Administration on Aging, 2003). In addition to the growing population, life expectancy has increased from 51 to 80 years for women and from 48 to 75 years for men since the turn of the 20th century (Merck, 2004). Those persons reaching age 65 have an additional average life span of 18 years (Administration on Aging, 2003).

As the U.S. changes demographically, the aging population will also become more ethnically and racially diverse (Administration on Aging, 2004). In addition, the rising numbers of older adults will increase the demands on health care and social services (Administration on Aging, 2004).

Previously conducted research by the University of Georgia's Department of Foods and Nutrition has shown that Older Americans Act Nutrition Program (OAANP) participants from northeast Georgia senior center congregate meal programs are considered to be at an increased nutritional risk. Data from these studies are consistent with other research reports that OAANP participants have high rates of chronic diseases and physical disabilities, indicating that they are an at-risk population (Millen et al., 2002). OAANP participants are older and more likely to be

have low socioeconomic status, to live alone, and to be members of minority groups when compared to the overall older adult population. Additional research indicates that 22% of congregate meal participants and 48% of home delivered meal clients are at an increased risk for nutritional problems (Ponza et al., 1996). Older adults represent the largest at-risk population for foodborne illnesses (Fey-Yensan et al., 2001). However, many behavioral patterns that lead to foodborne illnesses in older adults can be prevented (Buzby, 2002). An intervention was developed to increase home food safety practices in this population of older adults. The featured home food safety practices were selected based on the four key principles of the FightBAC!® food safety campaign: clean, separate, cook, and chill. Given the OAANP participants' other nutrition- and food-related concerns, it seems likely that food safety practices may also be a concern.

The purpose of this study was to develop, implement, and evaluate a home food safety education intervention to increase home food safety practices. Three home food safety educational lessons were developed for this intervention and were delivered over a six-month period in the 12 participating counties.

Chapter 2 in this thesis is a review of literature relative to home food safety practices and older adults. The literature review also identifies other research on home food safety practices, describes other nutrition education interventions conducted in senior centers in northeast Georgia, and describes their ability to produce changes in behavior.

Chapter 3 is a manuscript that will be submitted to the Journal of Nutrition for the Elderly. The manuscript includes the methods, results, and a discussion of the results from the home food safety practice intervention. All data tables are included in Chapter 3.

Chapter 4 summarizes the major findings of the home food safety practice educational intervention and states the general conclusion.

CHAPTER 2

LITERATURE REVIEW

The Older Adult Population

The face of American's aging population is continuing to change. From 1950 to 2004, the aging population (65 years and older) increased from 12 million to 36 million. Projections indicate that in the coming years this population will grow more than twice as rapidly as the total population due to the aging baby boomers (Americans born between the late 1940s and the early 1960s) (Merck, 2004). About 12.3% of the U.S. population is made up of older Americans (Administration on Aging, 2003). In addition to the growing population, life expectancy has increased from 51 to 80 years for women and from 48 to 75 years for men since the turn of the 20th century (Merck, 2004). Those persons reaching age 65 have an additional average life span of 18 years (Administration on Aging, 2003).

The fastest growing segment of this population are those 85 years and older (Merck, 2004). The U.S. Census Bureau reported 4.2 million citizens age 85 and older in 2000 (U.S. Census Bureau, 2000). This number is predicted to increase to 21 million by 2050 (Administration on Aging, 2004) and has the potential to have the greatest impact on America's health care system because of this population's overall poor health and a need for more services. Analysis of state populations of adults age 60 and older shows Georgia has the tenth fastest growing population (Georgia Department of Human Resources, 2004). During the 20th century, the number of Georgians age 60 and older increased ten-fold compared to a four-fold growth in the overall population (Georgia Department of Human Resources, 2004). As the U.S. changes

demographically, the aging population will also become more ethnically and racially diverse (Administration on Aging, 2004). The rising numbers of older adults will increase the demands on health care and social services (Administration on Aging, 2004).

Food Safety and Older Adults

Foodborne illnesses will become more of a problem in years to come due to several underlying forces (Office of Disease Prevention and Health Promotion and U.S. Department of Health and Human Services, 2000). The presence of an aging population will likely contribute to an increase in the rates of foodborne illnesses. Healthy People 2010 predicts that the increased number of people at risk of a compromised capacity to fight foodborne illnesses due to aging will cause an increase in foodborne illnesses (ODPHP and USDHHS, 2000). This will burden older adults with undesirable sickness, will burden the public health system, and contribute greatly to health care costs. After examining reported and unreported cases of foodborne diseases in the United States, the Centers for Disease Control estimate 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths occur each year due to microorganisms in food. Unknown pathogens account for 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths (Mead et al., 2005). Foodborne illnesses cost up to $4 billion per year in medical costs (Partnership for Food Safety Education, 2006) and between $20 and $40 billion in lost productivity (ODPHP and USDHHS, 2000). It is estimated that in two to three percent of foodborne illness cases, a secondary or long-term illness will develop (Partnership for Food Safety Education, 2006). Most foodborne illnesses are clinically characterized by gastrointestinal distress (vomiting, diarrhea, and abdominal cramps) (American Dietetic Association, 2003).

Older adults represent the largest at-risk population for foodborne illnesses (Fey-Yensan et al., 2001). They are more likely to experience severe complications from foodborne illnesses, such as illness and death from gastroenteritis. This is due in part to the fact that some older people have poor nutrition habits and decreased food consumption patterns. These habits and patterns are attributed to a variety of complications such as digestive disorders (malabsorption, dental problems, and greater difficulty swallowing); multiple medication use (resulting in nausea, loss of appetite, and malabsorption); early satiety; living alone/social isolation; altered senses of smell and taste (decreased eating enjoyment); and physical disabilities (resulting in difficulties with shopping, cooking, and eating) (Buzby, 2002). Dehydration is another factor that increases the chances of contracting an illness. Thirst typically declines with age, resulting in decreased fluid consumption which causes decreased immune function and decreased resistance to pathogens (Buzby, 2002). Other factors that can contribute to increased susceptibility are decreased intestinal contractions (allowing more time for toxins to form and cause damage in the gastrointestinal tract); a decline in stomach acid production (allowing ingested pathogens into the intestinal tract); and the use of anti-diarrhea medications (decreases stomach acid) (Buzby, 2002). Racial and ethnical differences also exist for foodborne illnesses. Hispanics, African Americans, and Asians have certain cultural food preferences that increase the chances of certain types of infections when compared with whites (ADA, 2003).

Even though current knowledge of consumer food-handling and preparation behavior is limited in the United States (Anderson et al., 2004), many behavioral patterns that lead to foodborne illnesses in older adults can be prevented (Buzby, 2002). Several research studies have found that more than 70% of the older adults prepare food in the home daily (Hanson and Benedict, 2002; Weinrich et al., 2003). A study conducted in 2001 found that many older adults

do not use appropriate food safety practices when preparing meals at home (Gettings and Kiernan, 2001). The Behavioral Risk Factor Surveillance System study found that of participants age 60 and older, 13% did not wash their hands, 13% did not wash cutting surfaces with soap or bleach after use, and 49% ate undercooked eggs (Buzby, 2002). Most studies examined adults, but most do not address older adults as a subpopulation (Gettings and Kiernan, 2001). However, studies examining adult populations indicate similar low use of recommended home food safety practices. One study conducted with low-income adults found that 77% prepared meals in their home all or nearly all of the time. Of those, 65% of respondents incorrectly thought that food should be cooled before placing it in the refrigerator, 42% thought that illness-causing foods could be identified by sight or smell and 65% did not know the temperature of their refrigerator (Wenrich et al., 2003). In a study conducted to compare food handling practices of adult men and women with FightBAC® recommendations, researchers found that only one-third of hand washing attempts were made with soap, only one-third of surfaces were thoroughly cleaned, nearly all participants cross-contaminated raw foods (meat, poultry, eggs, seafood, and unwashed vegetables) with ready-to-eat foods, and very few participants used a food thermometer (Anderson et al., 2004).

Food safety is an important health issue. The Partnership for Food Safety Education's FightBAC!® campaign was created and endorsed by the U.S. Departments of Agriculture, Education, and Health and Human Services, and ten food industry organizations in 1997. It was developed to reduce the incidence of foodborne illness in the home by educating Americans about safe food-handling practices. FightBAC!® identifies and recommends four steps to keep consumers and their food safe from harmful bacteria: clean, separate, cook, and chill (Partnership for Food Safety Education, 2006). In addition, Healthy People 2010 and the 2005 Dietary

Guidelines for Americans have identified food safety as a key concern. Healthy People 2010 established two overarching goals: to increase quality and years of healthy life and to eliminate health disparities. Chapter ten of Healthy People 2010 concerns food safety, and the primary goal expressed in this chapter is to reduce foodborne illnesses (ODPHP and USDHHS, 2000). The 2005 Dietary Guidelines for Americans provides science-based advice to promote health and to reduce the risk of chronic diseases. Food safety is one of the key chapters of this publication (USDHHS and USDA, 2005). Healthy People 2010 and 2005 Dietary Guidelines for Americans use the key FightBAC!® principles to help consumers with food safety and reduce the incidence of foodborne illnesses (ODPHP and USDHHS, 2000; USDHHS and USDA, 2005). Although it is widely acknowledged that older adults are at risk for foodborne illness and have suboptimal food safety practices (Buzby, 2002), there is not a lot of research reported on food safety education interventions specifically targeting older adults in senior centers. Most senior centers are required to provide nutrition and health education programs on a regular basis, so this might be a good audience to target. As discussed in the next sections, older adults receiving nutrition services at senior centers through OAANP have many risk factors for foodborne illnesses such as chronic health problems, low incomes, and food insecurity (Food Security Institute, 2003).

Chronic Conditions

Although people are living longer, this doesn't mean that they are living healthier. Many people are living longer with life-threatening diseases. Many are also living long enough to develop other chronic conditions, such as diabetes and arthritis. Most older adults have at least one chronic condition and many have several.

Five of the six leading causes of death among older Americans are chronic diseases (Administration on Aging, 2004). The prevalence of diabetes, hypertension, heart disease, and

other chronic diseases increase with age (Merck, 2004). Heart disease, cancer, and diabetes are the most common and costly health conditions and are three of the leading six causes of death for those age 65 and older (Administration on Aging, 2004). Heart disease, stroke, and cancer accounted for 60% of all deaths among people age 65 and older in 2000, and the death rates for cancer and diabetes have increased (National Academy on an Aging Society, 2003). In 2003, diabetes was the sixth leading cause of death in Georgia and more than 15% of adults in Georgia age 60 and older have diabetes (Jack et al., 2003).

Disability is a condition that many older adults face. Chronic conditions cause almost half of all disabilities among the older population (National Academy on an Aging Society, 2003) and negatively affect the quality of life, by accelerating functional decline and the inability to remain the community (Administration on Aging, 2004). These conditions can limit the ability of older adults to perform basic daily functions. Arthritis is the nation's leading cause of disability. In many cases, arthritis deprives individuals of their independence and creates enormous costs for individuals, their families, and the U.S. In 2002, over 15 million older adults had physician-diagnosed arthritis. This number is expected to increase to 33.3 million by 2030 (CDC, 2006). Over 25% of Georgia's adult population has self-reported and physician-diagnosed arthritis (CDC, 2006). Limitations on physical mobility, such as those caused by arthritis, interfere with the ability of older adults to shop, cook, and prepare food (Food Security Institute, 2003).

Problems Linked to Low Income

To complicate problems for older adults, many live on a fixed or limited income. With an increase in multiple chronic health conditions and the high medical costs for medical care and prescription medications, many older adults have problems affording their daily needs based on

the income that they receive. In 2002, 3.6 million older adults lived below the poverty line, and another 2.2 million were classified as "near-poor" (Administration on Aging, 2003). Those 85 and older (14.7%) are most likely to live below the poverty line (U.S. Census Bureau, 2000). Data from the National Health and Nutrition Examination Study III (NHANES III) indicates that older adults are more likely to have fair or poor health than those in other income groups. They are also less likely to have very good or excellent health (Cole and Fox, 2004). Low income older adults are more likely to have diabetes and emphysema or congestive heart failure, have had a heart attack or stroke, and have poorer dental health than their non-poor counterparts (Cole and Fox, 2004).

Poverty also contributes to hunger and food insecurity in older adult populations. Older adults in the lowest income group are less likely to consume three meals per day, significantly less likely to be physically active, less likely to have social interaction, and more likely to have less stable housing than older adults classified in higher income groups (Cole and Fox, 2004).

Older people who live alone are more likely to live in poverty than their peers who live with spouses. Poverty rates increase for older women who live alone, especially those who are black or Hispanic (Administration on Aging, 2004). Approximately 7.5 million older women and 2.4 million older men live alone (U.S. Census Bureau, 2000). Older women are more likely than men to live alone because they are more likely to be widows, least likely to remarry, and have a longer life expectancy (Administration on Aging, 2004). Health status is linked to living arrangements (Administration on Aging, 2004). The 2000 Census reports that 28% of those age 65 and older live alone. This is especially high for those who are 85 and older, with 39% living alone (U.S. Census Bureau, 2000).

Older Americans Act Nutrition Program

The Older Americans Act Nutrition Program (OAANP), formerly known as the Elderly Nutrition Program, was established in 1972 by the Administration on Aging (AoA) to improve the dietary intakes of adults age 60 and older and their spouses by funding nutrition and social service programs. OAANP serves three million people annually and provides participants with 30% to 50% of their daily nutrient needs. This program offers services based on low-income, physical disability, and social isolation. In addition to services that promote health and wellness, transportation, and meal and nutrition programs, this program also provides services that emphasize preventative intervention programs through the use of nutrition screening and education, as well as other health and social support services (Millen et al., 2002; Ponza et al., 1996).

OAANP participants have high rates of chronic disease and physical disabilities, indicating that they are an at-risk population (Millen et al., 2002). Compared to the overall older adult population, OAANP participants are older and more likely to have low socioeconomic status, to live alone, and to be members of minority groups. Twenty-two percent of congregate meal participants and 48% of home delivered meal clients are at an increased risk for nutritional problems (Ponza et al., 1996). Participants in the OAANP in northeast and northwest Georgia senior centers are a population at risk of developing heart disease, type 2 diabetes, and certain cancers, and nutritional deficiencies (Brackett, 1999; Burnett, 2003; Johnson et al., 2003; Redmond, 2004).

The Older Americans Act has provided funding to over 6,000 senior centers in the U.S. through service contracts for program activities since 1965 (National Council on Aging, 2006). An estimated 7% of the older adult population and 20% of low-income older adults receive

congregate or home-delivered meals and other nutrition- and health-related services form the OAANP (Ponza, 2003). In 2004, the Georgia Department of Human Resources-Division of Aging Services served 1,391,381 meals to 13,511 Georgians (Georgia Department of Human Resources-Division of Aging Services, 2004). A total of 16,787 older Georgians participated in wellness programs. These programs provided nutrition screening, education, and counseling; physical activity and exercise; medications management; fall prevention; foot and ear care; physical therapy; occupational therapy; massage; yoga; pilates; stress reduction; home safety inspections; weight control; and management of chronic diseases (Georgia Department of Human Resources-Division of Aging Services, 2004).

Research suggests that nutrition programs have a beneficial impact on food-insecure older adults (Food Security Institute, 2003). OAANP participants are better nourished (4% to 31% higher mean daily nutrient intake) and achieve higher levels of socialization (17% higher average monthly contacts) than non-participants (Millen et al., 2002). The National Council on Aging reports that older adult nutrition programs prevent or delay unnecessary placement of older adults in nursing homes and help people manage chronic conditions (2006). Overall, for every $1 spent on nutrition programs, $3.25 was saved in hospital costs (NCOA, 2006).

As previously mentioned, no studies were found that examined many food safety practices of participants in OAANP. Given their other nutrition- and food-related concerns, it seems likely that food safety practices may also be a concern. Thus, the OAANP provides an excellent opportunity and a desirable audience to implement a food safety education program to lower the risk and incidence of foodborne illnesses in these vulnerable older adults.

Health Belief Model

Many behavioral theories have been used in nutrition education interventions with older adults (Sayhoun et al., 2004), although not all such interventions are theory-based (Higgins and Barkley, 2004; Sayhoun et al., 2004). To help explain why and how people are able to make health behavior changes, the proposed study design will include the Health Belief Model (HBM) that was originally developed in the 1950's. This model is based on the idea that people are willing to make nutrition-related behavior changes when they believe that their diet is placing them at increased risk for chronic illness. The theory addresses changes in health behavior based on (1) perceived susceptibility - one's opinion of the likelihood of getting the condition, (2) perceived severity - one's opinion of how serious a condition and the consequences are, (3) perceived benefits - one's opinion of the efficacy of the advised action to reduce risk or seriousness, (4) perceived barriers - one's opinion of the tangible and psychological costs of action, (5) cues to action - strategies to activate readiness, and (6) self-efficacy - confidence in one's ability to take action (Strecher and Rosenstock, 1997). The HBM states that individuals will engage in healthful behaviors when they see themselves as susceptible to the illness and perceive the illness as serious (ie., perceived threat), believe that the healthful behaviors are beneficial (ie., perceived benefit) and believe that the benefits of the healthful behaviors are greater than the costs (ie., perceived barriers) (Hanson and Benedict, 2002). Cues to action (e.g., education, public health interventions) influence perceived threat, thus influencing behavior (Hanson and Benedict, 2002; Strecher and Rosenstock, 1997). Some barriers to food safety for older adults may include resistance to change, (ie., justify years of unsafe behaviors, don't like the change after trying it, the change is inconvenient), lack of resources to make the changes (Gettings and Keirnean, 2001), and a lack of knowledge about the importance of safe behaviors.

The recommended changes need to be easy to implement and should result in a detectable risk reduction for a behavior change to be successful (Coulston et al., 2001). Food safety educators have found that addressing the basic food safety messages is the best way to insure that participants retain the information (Anderson et al., 2004; Peregrin, 2001). To be effective, consumer education programs about foodborne illness should address consumer food handling and preparation practices (ADA, 2004). Education can raise awareness by addressing how foodborne illness is caused, the seriousness of it, and how to prevent and control it (Anderson et al., 2004).

Previous Successful Interventions in Older Georgians

Several community-based educational interventions have been successful in the northeast Georgia and Georgia OAANP with funding from the northeast Georgia Area Agency on Aging, the UGA Gerontology Center, the UGA Department of Foods and Nutrition, and the USDA Food Stamp Nutrition Education Program.

Nutrition for Older Adults' Health (NOAHnet) is a series of nutrition and health education materials that are available throughout Georgia and online. These materials have been developed and evaluated by UGA experts in gerontology, nutrition, health, physical activity, and pharmacy. Wellness Coordinators and other health educators access these materials from the website, which has more than 15,000 visits annually (www.arches.uga.edu/~noahnet). These materials promote nutrition, physical activity, medication management, and wellness to the most vulnerable older adults, including the three million Americans who receive Meals on Wheels and Congregate Meals. These lessons were designed to help these vulnerable older adults remain at home, live independently in the community, and avoid nursing home placement.

In the "Take Charge of Your Health" intervention, older adults (N = 501; mean age: 76 years) completed a pre-test, a series of nutrition education and physical activity sessions, and a post-test. This study helped sedentary older Georgians at senior centers improve their knowledge and intakes of vegetables, increase their walking speed, and lower their barriers to exercise (McCamey et al., 2003).

A "Fruit and Vegetable Nutrition Education" program increased the intake of vegetables as a snack and total intake of fruits and vegetables in older Georgians (N = 54; mean age: 77 years) at senior centers, which can help lower the risk of cancer and heart disease and lower health care costs (Wade, 2003).

An "Eat Well, Live Well with Diabetes" program helped older Georgians (N = 105; mean age: 73 years) with diabetes at senior centers improve their dietary and physical activity habits, test their blood sugar more often, and improve their blood sugar control, which will decrease the risk of diabetes-related complications and save health care costs (Burnett, 2004; Redmond, 2004).

A "Nutrition and Bone Health Education" program increased the intakes of calcium-rich foods and supplements in older Georgians (N = 103; mean age: 76 years) at senior centers, which can help save lives, improve independence, and lower health care costs by decreasing bone fractures (Cheong et al., 2003).

A "Whole Grains Education" program increased the recognition and intakes of whole grain foods in older Georgians (N = 84; mean age: 77 years) at senior centers, which can help decrease the risk and improve the management of diabetes and other age-related disorders (Ellis et al., 2005).

In summary, this successful record of developing, implementing, and evaluating wellness programs for older adults in Georgia provides a good environment to implement a food safety education intervention.

Rationale, Specific Aims, and Hypotheses

It is likely that this food safety education intervention will improve food safety practices of older adults based on previous studies in which education programs were successful (Burnett, 2003; Redmond, 2004), decreased modifiable factors (Cheong et al., 2003), and improved nutrition knowledge and decreased barriers (McCamey et al., 2003). The present study was conducted in northeast Georgia with OAANP congregate meal participants. This population is at risk for nutrition-related diseases. The overall goal of this study was to develop, implement, and evaluate a home food safety education program. The following hypotheses were tested in older adults in senior centers in northeast Georgia:

1) Older adults will have low adherence to recommended home food safety practices.

2) The primary barriers to following recommended dietary practices will be poor physical function, as well as advanced age, diabetes, and food insecurity.

3) Nutrition education programs designed specifically for the target audience and that address barriers to food safety will be associated with improvements in practices related to food safety.

The specific aims of this study were to:

1) Conduct a pre-test to determine compliance with home food safety practices.

2) Examine the associations of home food safety practices with other factors such as age, gender, race/ethnicity, education, food insecurity, physical performance, and chronic conditions such as diabetes, arthritis, heart disease, and cancer.

3) Determine the effects of a nutrition and health education program on changes in adherence to recommended home food safety practices.

CHAPTER 3

HOME FOOD SAFETY PROGRAM FOR THE GEORGIA OLDER AMERICANS ACT NUTRITION PROGRAM[1]

[1]Sellers, T., E. Andress, J.G. Fischer, and M.A. Johnson. Submitted to Journal of Nutrition for the Elderly.

ABSTRACT

This study examined the effects of an educational intervention on improving home food safety practices in congregate meal recipients. Participants were a random sample selected from northeast Georgia senior centers (N = 136; mean age: 79 years; 74% female; 61% Caucasian; 39% African American). The study design was a pre-test, intervention, and post-test design. At the pre-test, adherence to 16 home food safety practices was variable and ranged from ≤ 17% for checking temperatures of the refrigerator and cooked meats to ≥ 76% for other practices. Following the intervention, participants were more likely to wash their hands with warm water and soap for 20 seconds before eating (76% vs. 90%, $P \leq 0.01$) and before preparing food (76% vs. 92%, $P \leq 0.01$). In a series of regression analyses, younger age was the most consistent predictor of adherence to home food safety practices at the pre-test, and older age was the most consistent predictor of improvements in adherence after the intervention. As a first step, this intervention improved several aspects of home food safety practices; however, additional interventions that target the individual are needed to increase home food safety practices in older adults.

INTRODUCTION

Food safety is an important health issue, with the likelihood of foodborne illnesses becoming more of a problem in the future due to several underlying forces (Office of Disease Prevention and Health Promotion and U.S. Department of Health and Human Services, 2000). Healthy People 2010 predicts that the increased number of people at risk due to aging and a compromised capacity to fight foodborne illnesses will increase foodborne illnesses in the future (ODPHP and USDHHS, 2000). FightBAC!® identifies and recommends four steps to keep consumers and their food safe from harmful bacteria: clean, separate, cook, and chill (Partnership for Food Safety Education, 2006). In addition, the 2005 Dietary Guidelines for Americans has identified food safety as a key concern (USDHHS and USDA, 2005). The Centers for Disease Control and Prevention estimate 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths occur each year due to microorganisms in food (Mead et al., 2005). These estimates include unknown pathogens that account for 62 million illnesses, 265,000 hospitalizations, and 3,200 deaths.

Older adults represent the largest at-risk population for foodborne illnesses (Fey-Yensan et al., 2001) and many behavioral patterns that lead to foodborne illnesses in older adults can be prevented (Buzby, 2002). One subgroup of older adults who might benefit from increasing their home food safety practices is participants receiving congregate meals through the Older Americans Act Nutrition Program (OAANP). OAANP participants have high rates of chronic disease and physical disabilities, indicating that they are an at-risk population (Millen et al., 2002). No studies were found that examined several recommended home food safety practices of participants in OAANP. Given their other nutrition- and food-related concerns, it seems likely that food safety practices also may be a concern. In our ongoing programs with congregate meal

recipients in northeast Georgia, the Georgia Division of Aging Services recommended that food safety education be included in nutrition programs offered by OAANP. Before beginning an education intervention, we decided to first examine home food safety practices in this population. Thus, the first goal of this education intervention and evaluation was to explore home food safety practices. The second goal was to determine the effects of a nutrition education intervention on home food safety practices. The important contribution of this study is that it will be a first step in describing the home food safety practices of recipients of congregate meals.

METHODS

This study is part of a large study that is ongoing in northeast Georgia senior centers. The complete methodology of the entire study can be found in the appendix B. The overall design of this study was sample recruitment and pre-test (June through August, 2004); intervention (3 lessons at senior centers, one time per month: November, 2004; February, 2005; and April, 2005) and post-test (May and June, 2005).

Sample

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.

In 2004, 254 participants were randomly selected, 97 were unavailable (e.g., at the time of the assessment, they were sick, in a nursing home, on vacation, not at senior center despite repeated visits, receiving home delivered meals, were staff at the senior center and couldn't leave their job, or had died), 13 refused, 7 were ineligible, 1 refused to complete the assessment, and 136 participants were completely assessed.

Pre-test

Nutrition experts (three faculty members and one registered dietitian in the Department of Foods and Nutrition, The University of Georgia) reviewed and edited the pre-and post-test questionnaires to ensure content validity and cultural appropriateness based on our collective experience working with the target OAANP population since 1997 (complete questionnaire is available for download at http://www.arches.uga.edu/~noahnet/administrative.html). 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 home food safety practices, education, and other nutrition and health variables. 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 et al., 2003; Redmond, 2004; Wade, 2003). Food insecurity was assessed using a questionnaire adapted from the National Evaluation of the Elderly Nutrition Program (1993-1995).

Self-reported home food safety practices were assessed using a 16-item original questionnaire developed by two faculty from the Department of Foods and Nutrition. The questions were based on the four key food safety principles of FightBAC!®, with response categories of "yes"

(= 1) or "no" (= 0). Four questions assessed home food safety practices that everyone can do. Twelve questions assessed home food safety practices that generally only food preparers can do. From the 16 individual home food safety practices three summary scores were created: practices that everyone can do was the sum of four variables (range of 0 to 4), practices that food preparers can do was the sum of 12 variables (range 0 to 12), and the total home food safety practice score was the sum of 16 all items (range of 0 to 16). If an individual item was missing, then the summary score(s) was/were computed as missing. An additional question was added to the post-test concerning owning a food thermometer.

The Short Physical Performance Battery test (Guralnik et al., 1994) was used to assess older adults' mobility by measuring three categories - balance, strength, and gait speed - as they performed the following tasks: standing balance, chair stands, and an 8-foot walk, respectively. The summary score is the sum of three category scores (range from 0 to 12), where higher scores indicate higher performance (Guralnik et al., 1994). Poor performance (0 to 5) on this test predicted future nursing home placement, disability, and death (Guralnik et al., 1994). Self-reported illnesses or conditions in the past year (yes or no) were obtained for cancer, diabetes, heart disease, hypertension, and arthritis.

Intervention

Faculty (three) and staff (two) from the Department of Foods and Nutrition developed, reviewed, and revised the curriculum specifically for congregate meal participants. They also ensured that the curriculum was culturally appropriate based on their experience with the target population.

The conceptual framework for the education interventions was based on the Health Belief Model (Strecher and Rosenstock, 1997). The key concepts of this framework that were

incorporated were perceived susceptibility and severity (e.g., emphasizing the health conditions that occur frequently in older people that are associated with inappropriate food safety practices), perceived benefits (e.g., defining how to take action by increasing the food safety behavior and the potential positive benefits for decreasing the risk of health conditions), perceived barriers (e.g., providing information and correcting misinformation about food safety or certain foods), cues to action (e.g., providing "how-to" information on practicing the food safety behavior), and self-efficacy (e.g., by demonstrating and reinforcing during the lessons the various ways to practice food safety).

Post-test

The questionnaires in 2004 and 2005 were nearly identical, except for minor changes in wording and clarification of some questions and the addition of one question on owning a food thermometer. Questions were read to participants and their answers recorded by trained interviewers.

Statistical Analysis

The data were analyzed using the Statistical Analysis System (SAS, Versions 8, SAS Institute, Cary, NC). A P-value of ≤ 0.05 was considered statistically significant. Descriptive statistics, including frequencies, means, and standard deviations were calculated. Chi-square analyses and paired t-tests were used to assess changes in home food safety practices following the intervention. Forward stepwise regression analyses were used to identify barriers to and/or predictors of practicing the targeted behaviors at the pre-test and to identify factors associated with making changes in the targeted behaviors after the intervention.

RESULTS

One-hundred thirty-six people completed the pre-test and 92 of these individuals completed the post-test. Characteristics of the participants are shown in Table 3.1. At the pre-test, the 44 individuals who did not (non-completers) and the 92 who did (completers) complete the intervention did not differ in any of the variables reported in this paper except that those who completed the intervention had a higher mean age (79 vs. 76 years, $P \leq 0.03$). At the pre-test, completers and non-completers did not differ in gender, ethnicity, education, physical function, food insecurity, self-reported cancer, high blood pressure, diabetes, heart disease, and arthritis, and home food safety practices (individual items or practices summary scores). Home food safety practices of the participants at the pre-test and post-test are shown in Table 3.2. Of the 16 practices assessed in the whole sample (N = 136), seven were practiced by 90% to 97%, four were practiced by 80% to 87%, three were practiced by 76% to 79%, and two were practiced by ≤ 17%. After the intervention there was an increase in the number of participants that reported washing their hands with warm water and soap for 20 seconds before eating food and an increase in the number of those reporting washing their hands with warm water and soap for 20 seconds before preparing food ($P \leq 0.01$), a non-significant increase in the percentage of participants checking the temperature of the their refrigerators (14% vs. 24%, $P = 0.09$), and no significant changes in the other 13 home food safety practices.

Means of the home food safety practice summary scores are shown in Table 3.3 and Figure 3.1. There was a significant change in the mean summary score of the summary of all home food safety practices from pre-test to post-test, but there were no statistically significant changes in the other two mean summary scores (Table 3.3). Figure 3.1 shows that after the intervention, there were significant increases in the percentage of participants who answered

"yes" to three or four of the total four food safety practices that everyone can do (66% vs. 80%, $P \leq 0.05$) "yes" to ten to 12 of the 12 home food safety practices that food preparers can do (60% vs. 77%, $P \leq 0.05$) "yes" to 12 to 16 of all home food safety practices (70% vs. 88%, $P \leq 0.01$).

A series of forward stepwise regression models were used to explore the relationship of the three home food safety practice summary scores with characteristics of the participants; criteria for entry and retention in the model was $P \leq 0.05$ (Tables 3.4 and 3.5). Statistically significant relationships and several trends ($P > 0.05$ to $P \leq 0.20$) were observed among the summary practice scores and several characteristics of the participants (Table 3.4). At the pre-test, the main significant finding was that higher age was consistently and significantly associated with lower home food safety practice summary scores (all three measures). Also, higher scores for home food safety practices that everyone can do were significantly associated with lower physical function and having cancer; higher scores for home food safety practices that food preparers can do was significantly associated with being food insecure and having arthritis; and higher summary scores for all practices was non-significantly associated with lower physical function, having arthritis and having cancer ($P = 0.09$-0.19).

Table 3.5 summarizes the regression models describing the relationships among participant characteristics and changes in summary scores between the pre-test and the post-test. Higher age was consistently associated with greater changes in all three home food safety practice summary scores from pre-test to post-test. Also, higher changes in food safety practices that everyone can do was significantly associated with being black (rather than white), higher education, and not having heart disease; greater changes in all food safety practices was significantly associated with not having arthritis.

DISCUSSION

Only a few studies have examined food safety practices of older adults who prepare meals at home. For example, Gettings and Kiernan (2001) conducted focus groups (N = 74; median age: 73 years) and found that many older adults do not use appropriate food safety practices when preparing meals at home.

To our knowledge, this is the first reported study of an intervention designed to increase several home food safety practices in older people attending a congregate meal program. The study design included the Health Belief Model, a theory model that is based on the idea that people are willing to make health-related behavior changes when they believe that their behaviors are placing them at increased risk for chronic illness (Strecher and Rosenstock, 1997). Hanson and Benedict (2002) suggested that this may be a useful framework for examining food-handling practices among older adults. The major findings were that there was 1) a large variability in adherence to home food safety practices; 2) checking the temperature of the refrigerator and cooked foods were practiced much less frequently than the other practices; 3) several significant improvements in individual practices and summary scores were found after the intervention; 4) younger age was the most consistent predictor of adherence to home food safety practices at the pre-test; and 5) older age was the most common predictor of improvements after the intervention.

According to the 2005 Dietary Guidelines for Americans, one of the major recommendations used to avoid microbial foodborne illness is to cook foods to a safe temperature to kill microorganisms (USDHHS and USDA, 2005). In the present study, one of the major areas of concern was lack of temperature checking. At the pre-test (N = 136) only 13% reported using a food thermometer to decide if meat, poultry, or fish were done before

serving and only 17% reported checking the temperature of their refrigerator in the past month. Low rates of temperature checking have been found in other studies of adults and older adults. In one study conducted to assess food safety knowledge of adults (N = 139), 65% did not acknowledge that keeping the refrigerator above 40°F will increase chances of food poisoning (Wenrich et al., 2003). In a study conducted with 809 adults aged 65 and older living in the United Kingdom, 70% had refrigerators too warm for safe storage (Johnson et al., 1998). Clearly, results from our study and others suggest that a greater emphasis on using thermometers to measure the temperature of cooked foods and of refrigerators is needed in future interventions.

Cleaning hands, food contact surfaces, and fruits and vegetables is another important food safety recommendation (USDHHS and USDA, 2005). In the present study, 70% reported washing their hands with warm water and soap for 20 seconds before eating, 80% reported washing their hands before preparing food, 90% reported rinsing fresh fruits and vegetables with cold running water before eating them, and 95% reported rinsing fresh fruits and vegetables with cold running water before preparing them. Thus, there is room for improvement in some of these practices, especially hand washing.

A cross-sectional analysis of the Behavioral Risk Surveillance System study found that 13% of respondents age 60 and older did not wash their hands with soap after handling raw meat (Buzby, 2002). When examining food safety practices in adults age 18 years and older, one-third of the study population (N = 1,620) reported unsafe hygiene practices such as not washing hands (Altekruse, 1996). In another study that documented food safety practices using videotaping and surveys to compare food-handling practices of adult men and women (N = 99; unreported age) in comparison with FightBAC!® recommendations, only one-third of hand-washing attempts were made with soap and the average hand wash time was significantly less than 20 seconds

(Anderson et al., 2004). The Behavioral Risk Surveillance System study also found that 13% of respondents did not wash cutting surfaces with soap or bleach after using them (Buzby, 2002). Anderson et al. (2004) found that one-third of participants did not attempt to clean surfaces during food preparation. In the present study, 92% of the 136 participants reported washing, rinsing, and sanitizing the cutting boards after preparing raw meat, fish, and poultry. Compared to Anderson et al. (2004), the higher rates in the present study could be attributed to use of self-reported data.

Another key recommendation is to chill (refrigerate) perishable food promptly and defrost foods properly (USDHHS and USDA, 2005). We found 94% reported refrigerating leftovers immediately after cooking and 76% reported defrosting foods in the refrigerator or in cold water or in the microwave.

Although the effects of educational interventions on food safety practices have been studied in adults (Redmond and Griffith, 2003), information for older adults is very limited (Gettings and Kiernan, 2001). For example, only one study was found that examined the effectiveness of an education intervention to improve home food safety practices in congregate meal program participants (Dutram et al., 2002). They found that 62% of the participants improved in at least one of the two home food safety practices they addressed (thawing, storing foods properly).

In the present study, the main changes following the intervention were seen in two individual items (washing hands reported by everyone and washing hands reported by food preparers) and in several summary scores. This study demonstrates that progress was made, but there is room for additional improvement.

Associations of several potential predictors of and barriers to home food safety practices were explored including demographic characteristics (age, gender, race, and education), food insecurity, physical function, and five diseases (diabetes, arthritis, heart disease, cancer, and hypertension). To our knowledge, this is the first study to explore the relationships of these potential barriers with home food safety practices of older adults. The diseases examined in this analyses are five of the most common and costly health conditions and are three (diabetes, hypertension, heart disease) of the leading six causes of death for those age 65 and older (Administration on Aging, 2004). In addition, the prevalence of these chronic diseases increases with age (Merck, 2004). Age was negatively associated with all three mean summary scores at pre-test. Perhaps the oldest participants were unaware of the importance or unable to perform some of the home food safety practices, such as those perceived to require extra effort. For example, during discussions with the participants, several noted that they do not prepare foods properly because it is too exhausting to remain standing. Others noted that their past food safety practices seemed safe and saw little point in changing their food safety practices. Even though the older participants had lower summary scores, the regression models showed that they made the biggest changes. Thus, advanced age was not a barrier to behavioral changes for older participants. No other factor consistently emerged as a barrier to or predictor of all three summary scores at the pre-test (Table 3.4) or in the change analyses (Table 3.5). Perhaps a larger sample is needed to identify barriers and predictors.

Based on our experiences, we recommend several changes in future interventions. Additional information on the importance of checking temperatures and the use of thermometers is needed in the curriculum. A special focus on hand washing is recommended because it applies to everyone. In addition, the questionnaire that addresses home food safety practices could be

written in a more specific manner, such as asking participants if they are using a bleach solution when cleaning and sanitizing; documenting that the temperature of the refrigerator is 40°F or below; and that cooking eggs properly means until yolks and whites are firm.

There are several limitations to this study: our study sample was small; outcome data were self-reported; attendance at the sessions was voluntary; and the sample was primarily women. The relatively small sample size may have limited our ability to detect small changes in some of the practices (e.g., the trend for an increase in the practice of checking the temperature of the refrigerator). To help compensate for voluntary attendance, handouts were available to those who did not attend the lessons, and all key messages were repeated in all three home food safety sessions. This study also has several strengths. Trained educators delivered all of the lessons and key messages were repeated throughout each of the three sessions. Each handout had easy-to-read messages that included home food safety guidelines and temperature charts. All lessons were informal, the participants had the opportunity to ask questions and make comments. Each participant was also given a food thermometer at the end of the intervention.

Our findings of modest increases in home food safety practices suggest that changes in home food safety practices are possible, even among a low-income and low literacy older adult population. Future studies should include a larger sample size, additional emphasis on thermometers, and improved specificities of some of the assessment questions. The positive outcomes of this study provide evidence that congregate meal program participants can benefit from food, nutrition and wellness education programs that address health promotion and disease prevention (Cheong et al., 2003; Ellis et al., 2005; McCamey et al., 2003).

Acknowledgements

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TABLE 3.1. Characteristics of Participants

Variable	N	Pre-test (All participants)	N	Pre-test (Completers)[a]
Age, years, mean ± SD	135	78 ± 7	91	79 ± 7
Women, %	136	74	92	75
Caucasian, %	136	61	92	61
Education, years, mean ± SD	122	9 ± 4	86	9 ± 4
Food insecurity (range 0-4), mean ± SD	136	0.19 ± 0.60	88	0.18 ± 0.50
0, %		89		86
≥ 1, %		11		14
Self-reported diseases, in the past year, % yes				
Cancer	136	9	92	10
High blood pressure	136	59	92	59
Diabetes	136	28	92	26
Heart disease	135	24	91	23
Arthritis	136	69	92	70
Short Physical Performance Battery, mean ± SD	128	7 ± 3	88	7 ± 3

[a]Participants who completed both the pre-test and post-test.

TABLE 3.2.Home Food Safety Practices Reported by Adults in Older Americans Act Nutrition Program

In the past month…did you always…	Pre-test % Yes (N=136)	Pre-test, % Yes (N=92)	Post-test, % Yes (N=92)	Change, Percentage Points	P-values ≤[a]
Home food safety practices everyone can do:					
Wash your hands with warm water and soap for 20 seconds before eating food?	79	76	90	14	0.01*
Rinse fresh fruits and vegetables with cold running water before eating them?	90	90	95	5	0.27
Did you avoid eating cookie dough or cake batter that was made with raw eggs?	93	93	89	-4	0.30
Have you checked the temperature of your refrigerator?	17	14	24	10	0.09
Home food safety practices that the food preparer can do:					
Clean the countertops before preparing food?	87	90	93	3	0.55
Rinse fresh fruits and vegetables in cold running water before preparing them?	95	95	96	1	0.70
Wash your hands with warm water and soap for 20 seconds before preparing food?	80	76	92	16	0.01*
Wash, rinse, and sanitize the cutting boards after preparing raw meat, fish and poultry?	92	91	96	5	0.30
Keep raw meat, fish and poultry wrapped properly in the refrigerator so juices do not drip on other foods?	97	97	99	2	0.56
Put cooked meat, fish or poultry on a different platter than the one with raw juices?	83	82	90	8	0.15
Rotate food in the microwave to avoid "cold spots"?	81	83	86	3	0.64
Bring sauces, soups and gravy to a boil when reheating?	78	80	83	3	0.66
Make sure eggs were cooked properly?	95	94	94	0	1.00
Refrigerate leftovers right away?	94	95	96	1	0.70
Defrost foods in the refrigerator OR in cold water OR in the microwave?	76	77	84	7	0.28
Use a food thermometer to decide if meat, poultry, or fish are done before serving?	13	18	25	7	0.31
Do you have a food thermometer?	na[b]	na	65	na	na

[a]P-values are from chi-square analyses.
[b] na indicated not asked.
* P-value ≤ 0.01.

TABLE 3.3. Changes in Home Food Safety Practice Summary Scores from Pre-test to Post-test by Adults in Older Americans Act Nutrition Program

Summary of home food safety practices	N	Pre-test Mean ± SD	Post-test Mean ± SD	P-value ≤
Home food safety practices that everyone can do (four practices, range = 0 to 4)	92	2.7 ± 0.77	3.0 ± 0.65	0.20
Home food safety practices that food preparers can do (12 practices, range = 0 to 12)	60	9.9 ± 1.42	10.3 ± 1.69	0.09
Home food safety practices summary of all practices (16 practices, range = 0 to 16)	60	12.7 ± 2.00	13.3 ± 2.03	0.05*

* P-value ≤ 0.05.

TABLE 3.4. Forward Stepwise Regression Models for Exploring Relationships of Participant Characteristics with Three Home Food Safety Practice Summary Scores by Adults in Older Americans Act Nutrition Program at pre-test (P-values ≤ 0.20)[a]

	Home food safety practices that everyone can do		Home food safety practices that food preparers can do		Home food safety practices summary of all practices	
	Parameter Estimate (± SEM)	P-values ≤	Parameter Estimate (± SEM)	P-values ≤	Parameter Estimate (± SEM)	P-values ≤
N	81		43		38	
Intercept	5.38 ± 0.90	< 0.0001	15.04 ± 2.44	< 0.0001	22.41 ± 3.88	< 0.0001
Age (years)	-0.03 ± 0.01	0.01	-0.08 ± 0.03	0.02	-0.12 ± 0.05	0.02
Sex (male = 0, female = 1)	na[b]		na		na	
Race (white = 0, black = 1)	na		na		na	
Education (years)	na		na		na	
Food Insecurity (0 to 4)	na		0.77 ± 0.35	0.05	na	
Physical Function (0 to 12)[c]	-0.06 ± 0.03	0.05	na		-0.20 ± 0.15	0.18
Diabetes (no = 0, yes = 1)[c]	na		na		na	
Arthritis (no = 0, yes = 1)	na		1.12 ± 0.51	0.05	0.97 ± 0.73	0.19
Heart Disease (no = 0, yes = 1)	na		na		na	
Cancer (no = 0, yes = 1)	0.65 ± 0.27	0.02	na		1.96 ± 1.13	0.09
Hypertension (no = 0, yes = 1)	na		na		na	

[a] P-values ≤ 0.05 considered statistically significant.
[b] na indicates not associated because variable was not retained in forward stepwise regression model (P > 0.20).
[c]Food Insecurity higher scores = more food insecure; Physical function higher scores = higher performance.

TABLE 3.5. Forward Stepwise Regression Models for Exploring Relationships of Participant Characteristics with Changes in Three Food Safety Practice Summary Scores from Pre-test to Post-test by Adults in Older Americans Act Nutrition Program (P-values ≤ 0.20)[a]

	Changes in home food safety practices that everyone can do		Changes in home food safety practices that food preparers can do		Changes in Home food safety practices summary of all practices	
	Parameter Estimate (± SEM)	P-values ≤	Parameter Estimate (± SEM)	P-values ≤	Parameter Estimate (± SEM)	P-values ≤
N	77		48		48	
Intercept	-0.48 ± 1.0	0.6305	1.36 ± 3.58	0.71	1.17 ± 4.27	0.78
Pre-test	-0.98 ± 0.10	0.0001	-0.90 ± 0.15	0.0001	-0.86 ± 0.13	0.0001
Age (years)	0.04 ± 0.01	0.001	0.11 ± 0.04	0.01	0.14 ± 0.04	0.01
Sex (male = 0, female = 1)	na[b]		na		na	
Race (white = 0, black = 1)	0.31 ± 0.15	0.05	na		0.74 ± 0.57	0.20
Education (years)	0.05 ± 0.02	0.05	na		na	
Food Insecurity (0 to 4)[c]	0.25 ± 0.13	0.07	na		na	
Physical Function (0 to 12)[c]	na		na		na	
Diabetes (no = 0, yes = 1)	na		na		na	
Arthritis (no = 0, yes = 1)	na		-0.99 ± .53	0.07	-1.34 ± 0.62	0.05
Heart Disease (no = 0, yes = 1)	-0.36 ± 0.15	0.02	na		na	
Cancer (no = 0, yes = 1)	na		na		na	
Hypertension (no = 0, yes = 1)	na		na		na	

[a] P-values ≤ 0.05 considered statistically significant.
[b] na indicates not associated because variable was not retained in forward stepwise regression model (P > 0.20).
[c]Food Insecurity higher scores = more food insecure; Physical function higher scores = higher performance.

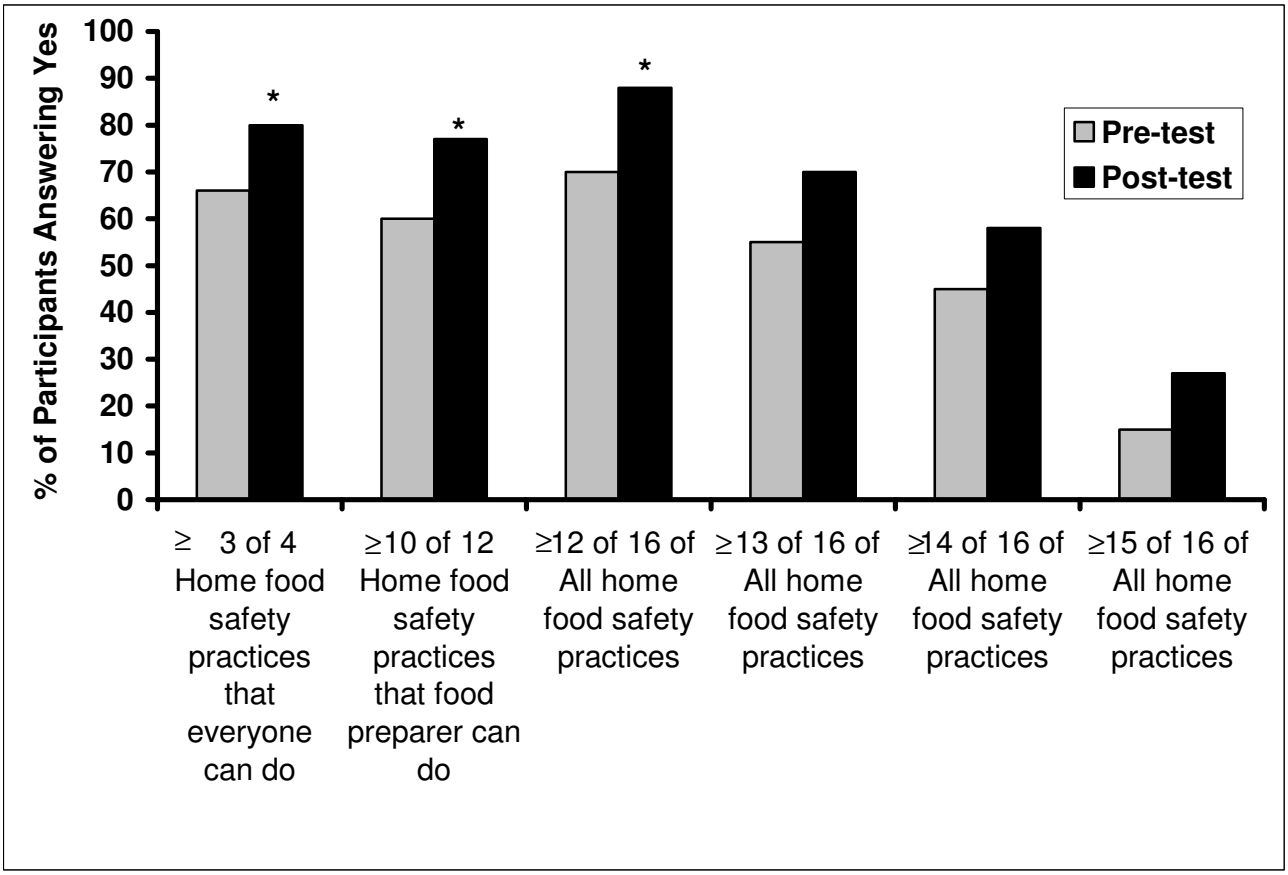

FIGURE 3.1. Percentages of participants answering "yes" to home food safety practice questions at the pre-test and post-test. Home food safety practices that everyone can do included four practices (range = 0 to 4); home food safety practices that food preparers can do includes 12 practices (range = 0 to 12); and all home food safety questions includes 16 practices (range = 0 to 16). * indicates P-value ≤ 0.05.

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CHAPTER 4

CONCLUSIONS

The goals of this thesis were to (1) determine compliance with practices related to food safety, (2) examine the associations of home food safety practices with other factors such as age, gender, race/ethnicity, education, food insecurity, physical performance, and chronic conditions such as diabetes, arthritis, heat disease, and cancer, and (3) determine the effects of an education program on changes in adherence to recommended home food safety practices. It was hypothesized that (1) older adults will have low practices related to home food safety; (2) primary barriers to following recommended dietary practices will be poor physical function, as well as advanced age, diabetes, and food insecurity; and (3) nutrition education programs designed specifically for the target audience, that address barriers to food safety, will be associated with improvements in practices related to food safety. At pre-test, adherence to 16 home food safety practices was variable and ranged from ≤ 17% for checking temperatures of the refrigerator and cooked meats to ≥ 76% for other practices. After the intervention, participants were more likely to wash their hands with warm water and soap for 20 seconds before eating (76% vs. 90%, $P \leq 0.01$) and before preparing food (76% vs. 92%, $P \leq 0.01$). Younger age was the most consistent predictor of adherence to home food safety practices at the pre-test and older age was the most common predictor of improvements after the intervention. Therefore, these findings support the hypotheses in a sense: prior to the home food safety education intervention, even though there was a large variability in adherence, some of the home food safety practices were low. After the educational intervention, some of the reported home food safety practices showed a modest improvement.

The results of this home food safety education intervention suggests that changes in home food safety practices are possible, even among low-income and low literacy older adults. More effort should be made to increase food safety practices among the older adults considering that this intervention only showed modest improvements. For this study, the nutrition educators used easy-to-read handouts that identified and targeted the four key FightBAC!® messages: clean, separate, cook, and chill. These handouts also included temperature charts for cooking and chilling. In addition, each participant was given a food thermometer with an additional meat cooking temperature reference on the thermometer sleeve. The key messages were repeated in each lesson. This led to significant changes in the number of participants reporting washing their hands with warm water and soap for 20 seconds before eating food (76% vs. 90%, $P \leq 0.01$) and an increase in the number of those reporting washing their hands with warm water and soap for 20 seconds before preparing food (76% vs. 92%, $P \leq 0.01$). In regards to barriers, when predictors and barriers were explored, this study found that younger age was the most consistent predictor of adherence to home food safety practices at the pre-test and older age was the most common predictor of improvements after the intervention. Thus, advanced age was not a barrier to behavioral changes for older participants.

The results indicate that there is still more room for improvement in home food safety practices among older adults. Therefore, future interventions should continue to strongly encourage participants to use proper home food safety practices. Future studies should include a larger sample size, a more diverse population, additional emphasis on thermometers, and improved specificities of some of the assessment questions. For example, additional information on the importance of checking temperatures and the use of thermometers is needed.

In conclusion, the positive outcomes of this study provide evidence that congregate meal program participants can benefit from food, nutrition and wellness education programs that address health promotion and disease prevention (Cheong et al., 2003; Ellis et al., 2005; McCamey et al., 2003).

APPENDICES

APPENDIX A

PRE-TEST/POST-TEST (2006 Version)

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

May 2006

Dear _____,

You have been chosen to participate in a research study called "Nutrition and Health of Older Adults." To make this study a valid one, your name was randomly selected from all of the participants at your senior center. If you agree to take part in this study, you will be asked to do the following things:

1. Answer questions about your 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 at your senior center to improve your eating habits, health, strength and balance. Each program will last about 30 to 60 minutes.

We hope you will be interested in participating and would be happy to discuss this study with you further.

Sincerely,

Heather Stephens
Nutrition Assistant

Mary Ann Johnson, Ph.D.
Professor

Phone: 706-542-4838
FAX: 706-542-5059

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: _____

New First Time Participants

Explain study by reading the consent form to the participant (change the "I" to "you" and the "my" to "yours."

The participant and the interviewer must sign two copies of the consent form:

1. The loose form which the participant keeps.
   The one in the questionnaire packet, which we keep at UGA for our records.

April, 2006

New First Time Participants

AND

Previous Participants

Should be asked the questions on the following pages

Staff must initial and date each box as indicted

Participant ID	**Time 1**	**Time 2**	**Time 3**	**Time 4**	**Time 5**
Date informed consent done					
Date questionnaires completed					
~~Date 3-day dietary records completed; if not, why not?~~					
Date Nutritional Status Report sent to participant					
Date, Depression letter sent to physician, if needed					
Nutrition education programs provided at center each year (indicate number of sessions)					
General nutrition					
Health screenings					
Fruits and vegetables					
Nutrition and bone health					
Whole grains					
Food safety					
Food stamps and security					
Physical activity					
Medication management					
Reason(s) dropped out: 0=Died (file adverse event report) 1=Refused, too ill 2=Refused, not interested 3=Moved to other city 4=Moved to NH, Ass. Liv. 5=Unable to locate 6=Other Explain further:					

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 spots"? (Enter "yes" if participant has a rotating tray in their microwave; enter "8" if don't have microwave)	**No** **Yes***	21
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

DIVISION OF AGING SERVICES CHECKLIST
ACTIVITIES OF DAILY LIVING
***This information was provided by**: client, caregiver, other _____?*
ID: _____ DATE (M/D/Year): _____ STAFF INITIALS: _____ Line 11

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):_____STAFFINITIALS:_____**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)

BRFSS Questions Annual Evaluation (Added March 15, 2006)
http://www.cdc.gov/brfss/questionnaires/pdf-ques/2005brfss.pdf

Question	Write or Circle Answer	Code
		Line 13
1. Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health NOT good?	__ __ Number days	88 None 77 Don't know/not sure 99 Refused 10-11
2. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health NOT good?	__ __ Number days	88 None 77 Don't know/not sure 99 Refused 12-13
3. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?	__ __ Number days	88 None 77 Don't know/not sure 99 Refused 14-15
4. About how long has it been since you last had your blood cholesterol checked?	1) Within the past year 2) Within the past 2 yr 3) Within the past 5 yr 4) 5 or more yrs ago	7 Don't know/not sure 9 Refused 16
5. About how long has it been since you last had your blood pressure checked?	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 17
6. Have you ever been told by a doctor, nurse, or other health professional that your blood cholesterol is high?	1) Yes 2) No	7 Don't know/not sure 9 Refused 18
7. A flu shot is an influenza vaccine injected into your arm. During the past 12 months, have you had a flu shot?	1) Yes 2) No	7 Don't know/not sure 9 Refused 19
8. During the past 12 months, have you had a flu vaccine that was sprayed in your nose? The flu vaccine sprayed in the nose is also called FluMist™.	1) Yes 2) No	7 Don't know/not sure 9 Refused 20
9. A pneumonia shot or pneumococcal vaccine is usually given only once or twice in a person's lifetime and is different from the flu shot. Have you ever had a pneumonia shot?	1) Yes 2) No	7 Don't know/not sure 9 Refused 21
10. When was the last time you visited ANY eye care professional? (To have your eyes and vision checked?)	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 22
11. When was the last time you visited ANY ear care professional? (To have your hearing or hearing aids checked?)	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 23
12. When was the last time you visited ANY foot care professional? (To have your feet checked?)	1) Within past month 2) Within past year 3) Within past 2 yrs 4) 2 or more years ago 5) Never	7 Don't know/not sure 9 Refused 24

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)

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

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

APPENDIX B

COMPLETE METHODOLOGY

Sample

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 are conducted annually beginning in 2004. In 2004, 254 participants were randomly selected, 97 were unavailable (e.g., at the time of the assessment, they were sick, in a nursing home, on vacation, not at senior center despite repeated visits, receiving home delivered meals, were staff at the senior center and couldn't leave their job, or had died), 13 refused, 7 were ineligible, 1 refused to complete the assessment and 136 participants were completely assessed. In 2005, 92 of the 136 participants from 2004 were reassessed (43 unavailable, 1 refused); thus, 92 participants were available to assess changes in their knowledge and behavior between 2004 and 2005. In 2005, 66 new participants were randomly selected, 19 were

unavailable, 5 refused, 3 were ineligible, and 39 were assessed. For cross-sectional analysis of the first assessments there are total of 136 from 2004 and 39 from 2005 for a total of 175 participants. Each subsequent year, we will re-test at least 70% of the older adults from the previous year, randomly select about 60 new participants and assess about 40 participants, so that annual assessment can be compared for at least 95 participants (preferably 100 participants for better power).

Pre-test

Nutrition experts (three faculty members and one registered dietitian from the Department of Foods and Nutrition, The University of Georgia) reviewed and edited the pre-and post-test questionnaires to ensure content validity and cultural appropriateness based on our collective experience working with the target population since 1997. Questionnaires are available at our website http://www.arches.uga.edu/~noahnet. 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, height, 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 et al., 2003; Redmond, 2004; Wade, 2003) and issues related to food safety in the home. For selected food groups, frequency categories were times/week (<1, 1, 2, 3, 4, 5, 6) or times/day (1 or 2 or more). We determined that the frequency of intake was more important than the serving sizes to gauge exposure of this population to the target foods (Thompson and Subar, 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.

Self-reported illnesses or conditions in the past year (yes, no) was obtained for anemia, Alzheimer's, 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.

The Nutrition Screening Initiative (NSI) Level I Screen was used to identify participants at nutritional risk. This assessment tool consists of 10 questions concerning nutritional habits, weight changes, socioeconomic changes, and functional status (Martini, 1996). For each question answered "yes," there are weighted points assigned. A client having a high score is identified at risk for malnutrition (score 0 to 2: good; 3 to 5: moderate nutritional risk; 6 or more: high nutritional risk). The need for nutrition education, counseling, social services, or other health services can be identified using this instrument (Lee and Nieman, 1993).

Functional health, or level of physical function, was assessed by an Activities of Daily Living (ADL) inventory provided by the Northeast Georgia Area Agency on Aging. The participants' ADL classification is based on six items of ADL performance: transfer, grooming, dressing, eating, bathing, and bladder continence system. Instrumental Activities of Daily Living (IADL) were also assessed. The IADL classification is based on nine items of instrumental performance: managing money, telephoning, preparing meals, laundry, housework, transfer outside the home, following directions of routine and specialized heath care, and function when

left alone. The participants indicated in a yes/no format their ability to function independently in these tasks. The individual items were summed to create an ADL and IADL summary score.

The Geriatric Depression Scale (GDS) Short form assessed affective dysfunction in terms of depression (Sheik & Yesavage, 1986) based on a 15-item questionnaire (yes/no format). A score of 0 to 5 indicates that depression is unlikely. A score of 6 to 9 indicates possible depression and a score of 10 or greater indicates probable depression.

The Short Physical Performance Battery test (SPPB) (Guralnik, et al., 1994) was used to assess participants' performance level. This test assessed older adults' mobility by measuring three categories - balance, strength, and gait speed - as they performed the following tasks: standing balance, chair stands, and an 8-foot walk, respectively. Performance on each of the three categories is scored on a scale of 0 to 4. A summary performance score was calculated by summing each of the three category scores (range from 0 to 12), where higher scores indicate higher performance: poor function (0 to 5), moderate function (6 to 9), and good function (10 to 12). We designated categories based on the literature (Guralnik et al., 1994), which reported a strong association with measures of self-reported disability. Poor performance on this test predicted future nursing home placement, disability, and death (Guralnik et al, 1994).

Participants were assessed using a Medication Management Short Form questionnaire. This 9-item questionnaire asked the participants questions about the use of one pharmacy for all medications, having a written list of all medications (prescriptions, non-prescriptions, and dietary supplements), having the written list in one's purse or wallet, having a consultation about medications with a physician, pharmacist, or other health professional in the last 6 months, disposing of expired medications, the use of a pillbox or other organization system, and knowledge about the name, purpose, and side effects of each medication. These questions were

in yes/no format. If participants answered no to any of the questions, it was recommended that they speak with a pharmacist, physician, or other health professional to learn more about their medications. This original questionnaire was prepared by the College of Pharmacy and Department of Foods and Nutrition at The University of Georgia.

Food insecurity was assessed using a 12-item questionnaire. This questionnaire asked participants if they eat meals at the senior center, receive home-delivered meals, receive food stamps, receive food from a food bank or food panty, had to choose between buying food or medications, had to choose between buying food or paying rent/utility bills, skip meals, had no food in the house, had no money or foods stamps to buy food, had no way to get to the store to buy food, or had a poor appetite. Some questions were adapted from the National Evaluation of the Elderly Nutrition Program (1993-1995).

Intervention

The intervention is a health, nutrition, and physical activity education program that is delivered about once per month at each senior center. Nutrition experts from the Department of Foods and Nutrition developed, reviewed, and revised the curriculum specifically for congregate meal participants. They also ensured that the curriculum was culturally appropriate based on their experience with the target population.

The conceptual framework for the education interventions was based on the Health Belief Model (Strecher and Rosenstock, 1997). The key concepts of this framework that were incorporated were perceived susceptibility and severity (e.g., emphasizing the health conditions that occur frequently in older people that are associated with low intake of certain foods or inappropriate food safety practices), perceived benefits (e.g., defining how to take action by increasing the food safety behavior and/or the intake of the target foods and the potential positive

benefits for decreasing the risk of health conditions), perceived barriers (e.g., providing information and correcting misinformation about food safety or certain foods), cues to action (e.g., provided "how-to" information on practicing the food safety behavior, reading food labels, choosing foods economically, and including the target foods at various meals), and self-efficacy (e.g., by demonstrating and reinforcing during the lessons the various ways to practice healthy behaviors and consume the target foods).

Between July 2004 and June 2005, the monthly nutrition and health education programs consisted of three lessons on food safety, three lessons on fruits and vegetables (peaches, tomatoes, and squash and pumpkins), one lesson on eggs and cholesterol, one lesson on holiday eating, one lesson on supplements, one lesson on medication management, one lesson on water and hydration, and one lesson on blood pressure. Medication management and physical activity were integrated into each lesson.

Between July 2005 and June 2006, the monthly programs consisted of one lesson on healthy snacks, five lessons on bone health, four lessons on fruits and vegetables (snacks; canned, fresh or frozen; breakfast; lunch), one lesson on protein, and one lesson on oral health. Medication management and physical activity were incorporated into each lesson. In addition, four centers (Jackson, Loganville, Morgan, and Newton) had a weekly intervention in January 2006 to April 2006 focusing increasing fruit and vegetable consumption, physical activity, and self-management of diabetes (16 lessons) as part of Live Healthy Georgia-Seniors Taking Charge Community Intervention Study. The curriculum is available for download at http://www.livewellagewell.info.

Post-test

Post-tests were administered in June, July, and August in 2004 and in May and June in 2005. The instruments in 2004 and 2005 were nearly identical, except for minor changes in wording and clarification of some questions.

Statistical Analysis

The data were analyzed using the Statistical Analysis System (SAS, Versions 8 and 9.1, SAS Institute, Cary, NC). Descriptive statistics, including frequencies, means, standard deviations, and Spearman correlation coefficients were calculated. Data from the pre-test and post-test were compared using the Signed Rank Test, paired T-tests, and Chi-square analyses to identify changes that were statistically significant ($P \leq 0.05$). All comparisons of mean changes from the pre-test and the post-test were evaluated with the Signed Rank Test for non-normally distributed data, unless otherwise indicated (Paired T-test for normally distributed data). Regression analyses were used to identify barriers to practicing the targeted behaviors at the pre-test and to identify factors associated with making changes in the targeted behaviors and/or increasing knowledge after the intervention.