

INTROSPECTION INTO THE NUTRITIONAL HEALTH STATUS AND ACTIVITY OF
DAILY LIVING (ADL) INDICATORS FOR OLDER SOUTH CAROLINA RESIDENTS:
PROGRAM EVALUATIONS OF STATE-BASED OLDER ADULT PROGRAMS

by

CHRISTINE BARR HALTIWANGER

(Under the Direction of SU-I Hou, DrPH)

ABSTRACT

The National Institute on Aging (NIA) Director announced in 2012, that approximately 39 million Americans are aged 65 and older (Hodes, 2013). The predicted number of older adults, 65 and older, in the United States in the next twenty years is staggering at over 72 million or nearly 20% of the entire population (CDC, 2013). The NIA attributes this exceptional population growth to the growing number of aging “baby boomers” as well as an increased life span due to medical advancements. Chronic diseases such as heart disease, diabetes, and degenerative illnesses older adults are faced with greater physical and financial burdens than in previous decades (CDC, 2013). These burdens impact not only the individual, but also the health care system at large. Older adults predominately utilize Medicare to cover healthcare costs, but this resource is limited and finite (Bryant et al., 2006).

As the older adult population grows so do the demands for services such as healthcare, transportation, food, shelter, and social support. In anticipation of these demands, public health professionals are connecting older adults with community programs which promote healthy aging through provision of personal, societal, cultural, economic, and environmental services (Wilcox et al., 2000). In accordance with the Older American's Act of 1965 (OAA), the South Carolina Lieutenant Governor's Office on Aging (LGOA) serves as the designated State Unit on Aging (SUA) for South Carolina. As such, they are charged with administering and delivering the coordination of services as well as acquiring data to allow greater anticipation and development of future older adults programs and services.

This study was designed to answer the question, "what is the relationship between receipt of SUA services such as home-delivered meals, group meals, home care visits, transportation, and health promotion activity services with clients' self-reported activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status scores?" A longitudinal study design was used to guide ANOVA and regression analysis of data collected from clients by LGOA staff. Findings can inform future program evaluation efforts as well as future program development.

INDEX WORDS: Activities of daily living, ADLs, instrumental activities of daily living, IADLs, nutritional status, home-delivered meals, group meals, older adults, congregate meals, transportation, health promotion, home care of older population, food insecurity, and food insufficiency

INTROSPECTION INTO THE NUTRITIONAL HEALTH STATUS AND ACTIVITY OF
DAILY LIVING (ADL) INDICATORS FOR OLDER SOUTH CAROLINA RESIDENTS:
PROGRAM EVALUATIONS OF STATE-BASED OLDER ADULT PROGRAMS

by

CHRISTINE BARR HALTIWANGER

B.A. Clemson University, 2004

MPH University of South Carolina, 2007

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial
Fulfillment of the Requirements for the Degree

DOCTOR OF PUBLIC HEALTH

ATHENS, GEORGIA

2015

© 2015

Christine Barr Haltiwanger

All Rights Reserved

INTROSPECTION INTO THE NUTRITIONAL HEALTH STATUS AND ACTIVITY OF
DAILY LIVING (ADL) INDICATORS FOR OLDER SOUTH CAROLINA RESIDENTS:
PROGRAM EVALUATIONS OF STATE-BASED OLDER ADULT PROGRAMS

by

CHRISTINE BARR HALTIWANGER

Major Professor: SU-I Hou

Committee: Kerstin Emerson

Marsha Davis

Cheryl Dye

Electronic Version

Suzanne Barbour

Dean of the Graduate School

The University of Georgia

August 2015

DEDICATION

I dedicate this dissertation and the hard work within to my family and friends. To James, I will never forget the nights that you spent working from the front seat of our car while I sat in class so that I would not have to drive alone at night. Your love and pride for me are so incredibly appreciated. To my beautiful children Laura and Davis, my sister Carrie Mott, my brother Jason Barr, and my father Peter Barr who have all encouraged and motivated me unselfishly, I will be forever grateful. A special thank you to Dr. Hou, Dr. Emerson, Dr. Davis and Dr. Dye who have worked with me tirelessly, I am indebted to you and thankful for your guidance and support. Thank you also to the wonderful faculty at The University of Georgia who challenged me to do more, think bigger, and let everything I do benefit those around me. Thank you to Dr. Sharon Thompson for helping me to find my passion for Public Health.

TABLE OF CONTENTS

INTRODUCTION	1
1.0 Overview	1
1.1 Purpose of Research.....	1
1.2 Specific Research Aims	3
1.3 Research Questions	4
1.4 Research Design and Methodology	5
1.5 The South Carolina Lieutenant Governor’s Office on Aging.....	8
1.6 Evidenced-Based Research	11
1.7 Summary	12
1.8 Conclusion	13
CHAPTER 2	15
LITERATURE REVIEW	15
2.0 Overview	15
2.1 General Literature Review Section	15
2.2 Literature Review Part One	17

2.3 Literature Review Part Two.....	22
2.4 Conclusion	26
CHAPTER 3	28
EVALUATION OF SOUTH CAROLINA OLDER ADULT STATE-BASED SERVICES.....	28
3.0 Abstract	28
3.1 Introduction.....	29
3.2 Background.....	29
3.3 Purpose of Research.....	32
3.4 Research Questions	33
3.5 Literature Review.....	34
3.6 Methodology	43
3.7 Results.....	50
3.8 Summary	55
3.9 Conclusion	56
3.10 References	59
CHAPTER 4	68
EVAUATION OF SOUTH CAROLINA OLDER ADULT STATE-BASED HOME- DELIVERED MEAL PROGRAM.....	68

4.0 Abstract	68
4.1 Introduction	69
4.2 Background	69
4.3 Purpose.....	70
4.4 Research Question	71
4.5 Literature Review.....	72
4.6 Methodology	75
4.7 Results.....	78
4.8 Summary	82
4.9 Conclusion	84
4.10 References.....	86
CHAPTER 5	91
CONCLUSION.....	91
5.0 Overview	91
5.1 Research Questions and Research Findings	92
5.2 South Carolina Lieutenant Governor’s Office on Aging: Suggestions Moving Forward ..	94
5.3 Research Limitations	96

5.4 Discussion	97
5.5 References	101
5.6 Appendix	103
Appendix A	104
Table 5.6-1: Recoding Key for South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment Data	104
Appendix B	108
Table 5.6-2: Katz Index of Independence of ADL	108
Appendix C	109
Table 5.6-3 Nutritional Scoring	109
Appendix D	110
Table 5.6-4: Definitions of Terms	110
Appendix E	111
Supporting Document 5.6-1: South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment	111
Appendix F	113
Supporting Documentation 5.6-2: Instrumental Activities of Daily Living (IADL) Scale	113

CHAPTER 1

INTRODUCTION

1.0 Overview

The purpose of this chapter will be to provide a framework for the following dissertation and the research, analysis, and findings stated within. This document will begin with a brief background and history concerning the South Carolina Lieutenant Governor's Office on Aging, and their goal of providing aging services that are designed to enhance the lives of older adults. The intentions and implications of the Older Americans Act (OAA) will be reviewed and discussed to provide additional rationale as to the goals and mission of the South Carolina Lieutenant Governor's Office on Aging. Relevant statistics and data will be provided where appropriate to provide justification, and illustrate the need for state-based older adult programs to maintain or improve the health of South Carolina residents. The author will state the purpose of this research, specific research aims and questions therein, research design and methodology, and conclude with a summary of the dissertation components.

1.1 Purpose of Research

The National Institute on Aging (NIA) Director announced in 2012, that nearly 39 million Americans are aged 65 and older (Hodes, 2013). The NIA attributes this extraordinary population growth to the growing number of aging "baby boomers" as well as an increased life expectancy due to medical advancements. The predicted number of older adults, 65 and older, in

the United States in the next twenty years is staggering at over 72 million or nearly 20% of the entire population (CDC, 2013). Chronic diseases such as heart disease, diabetes, and degenerative illnesses older adults are faced with greater physical and financial burdens than in previous decades (CDC, 2013). These burdens affect not only the individual, but also the health care system at large. Older adults predominately utilize Medicare to cover healthcare costs, but this resource is limited and finite (Bryant et al., 2006).

An increase in the older adult population brings greater demands for services such as healthcare, transportation, food, shelter, and social support. To meet these increased demands, public health professionals are connecting older adults with community programs which promote healthy aging through provision of personal, societal, cultural, economic, and environmental services (Wilcox et al., 2000).

The state of South Carolina is experiencing similar growth in the number of older adults as the overall US population. South Carolina reports that 12.1% of their population is 65 years of age and older while national rates for this group are similar at 12.4% (Werner, 2011). In South Carolina the 85 to 94 age group is experiencing the largest growth of nearly 30%, while the 95+ age group has increased 26% (LGOA, 2012). The 2010 Census indicated that South Carolina ranks 17th in the nation for the highest percentage of age 60+ residents (Census, 2011). By 2030, the percentage of older adults in South Carolina is projected to increase to 1,450,487 (22%) from 917,000 in 2010 which is a 50% increase in just twenty years (Census, 2011).

Within the last decade there has been a considerable shift from older adults living in private or publicly funded assisted living centers to older adults remaining in their homes with the assistance of community-based long-term care services which beneficiaries with a disability tend to favor (CMS, 2006). This shift could be due in part to the increase in chronic

degenerative diseases resulting in disabilities debilitating enough to require home-based assistance but not severe enough to necessitate in-patient care. The Centers for Medicare and Medicaid (CMS) predicts dramatic increases in spending for home-based services of \$82.9 billion by 2015, and nursing home costs of \$172.2 billion by 2015 (2006). South Carolina's nursing home facilities are operating at nearly full capacity (LGOA, 2013), and unless an older adult is Medicaid eligible or has funds to pay privately, alternative options such as home and community-based services are extremely limited (CDC, 2013).

South Carolina must plan to meet their aging population's health needs with proper resources to support a sustainable quality of life. Disabilities or poor health should not be considered an inevitable consequence of aging. If South Carolina continues to promote positive health behaviors, and provide services to manage chronic health conditions, the aging population can experience reduced disability and avoid or delay institutionalization.

1.2 Specific Research Aims

Bryant and Whitelaw (2006) assert that it is the goal and mission of public health programs to intervene effectively wherever risks may be modified or prevented to improve outcomes. Because resources to support these programs are often limited, especially Medicare and state-based services, they must be based upon best practices that have been tested through rigorous evaluation research (Bryant et al 2006).

To predict or estimate the health status of older adults, measurements of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) are often used as proxies. When older adults indicate an inability to perform daily activities this may signify a restriction on their engagement in life and thus enjoyment of family and friends. Factors such as

lack of mobility, transferring, or ability to cook or clean for oneself narrows an older person's participation in events or activities that bring enjoyment and meaning to life. This loss of ability to care for oneself safely and appropriately means further loss of independence, and can often lead to dependence on family members, friends, or institutional settings (CDC, 2013).

1.3 Research Questions

The South Carolina Lieutenant Governor's Office has been creating and assessing programs for older adults in South Carolina to promote the healthy aging of their residents. With approximately 89% or \$30,220,404 of their budget being allocated toward services which are designed to improve the quality and length of life for South Carolina's seniors, it becomes imperative to objectively evaluate the success of such programs (LGOA, 2012). It is the purpose of this researcher to conduct the following research:

Manuscript 1: How predictive are the state's home-delivered meals, group meals, home care visits, transportation, and health promotion activity services at improving the participants' activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status scores?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of nutritional status, ADL, and IADL values, and A2 are those values after program services have been rendered and subsequent assessments obtained. The researcher hypothesizes that nutritional status, ADL and IADL values are predicted to improve, or decrease, with each additional unit of older adult services of home-delivered meals, group meals, home care visits, transportation, and health promotion activity services received.

Manuscript 2: How does the state's home-delivered meal program impact participants' sense of food insecurity and/or food insufficiency?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of food insecurity and food insufficiency values, and A2 are those values after program services have been rendered and subsequent assessments obtained.

The researcher hypothesizes that as home-delivered program resources are used, predicted nutritional values will be reduced illustrating improvement and predicted perceptions of food insufficiency and food insecurity values will decrease which will again reflect improvement.

1.4 Research Design and Methodology

Longitudinal analysis was conducted utilizing data from the South Carolina Lieutenant Governor's Office on Aging Assessment. The Lieutenant Governor's Office on Aging Assessment was administered as clients requested state-based aging services. Baseline data were collected beginning in 1988/1999 and on average, clients were reassessed annually. Assessments were completed by the South Carolina residents requesting or receiving the state-based aging services or by their caregivers. The most recent wave of data collection were conducted in 2013. To address the increase of potential physical disabilities, cognitive impairments, chronic diseases manifestations, and other general declines in health as one ages (CDC, 2013), the researcher restricted data assessment/reassessment findings to only two years of consecutive data per client.

ANOVA and regression analyses were performed, and all analyses were conducted utilizing SPSS software (version 22).

Inclusion Criteria

Only data for participants enrolled in one or more of the following program(s): group/congregate meals, home-delivered meals, home care visits, transportation, or health promotional services, such as management of chronic disease, were included and only data for those who completed subsequent assessments were included in the study.

Exclusion criteria

Data from program participants under the age of 60, and from those who did not complete a reassessment were not considered for this research. Sixty years of age was chosen as the minimum age for analysis as this is the minimum age in which older adults in South Carolina may participate in the state-based programs mentioned within this study (LGOA, 2012).

Manuscript 1: Evaluation of South Carolina Older Adult State-based Services

For the purpose of this research, the dependent variables ADLs, IADLs, and nutritional status were quantitative with the greater scores (values) indicating poorer outcomes. The independent variables were the following state-based services: congregate meals, home-delivered meals, home care visits, transportation, and health promotion services (See Appendix A Table 5.6-1: Recoding Key). Additional independent demographic variables such as age, marital status, rural status, monthly income, race, educational attainment, and gender were investigated as to their relationship with state-based services and participant outcomes.

For this study, a more in-depth analysis utilizing ANOVA and regression were conducted to determine the relationship between demographic and state-based services serving as the independent variables on the following dependent variables of ADLs, IADLs, and nutritional status. This research allowed for the investigation of current South Carolina older adult state-based services mentioned above. The data were obtained by the South Carolina Lieutenant Governor's Office on Aging between the years of 1999-2013. This secondary data analyses consists of quantitative data with a robust sample of approximately 33,173 observations.

ANOVA is deemed appropriate as it allows repeated investigation of change over time, from one assessment to the next, the data set were not exclusive of one another, and included both quantitative and qualitative values (Issel, 2009).

Regression analyses was used to examine the influence of various independent variables such as age, race, educational attainment, monthly income, gender, marital status, rural residency, on the predictive values of ADL, IADL, and nutritional status of program participants. To address the increase of potential physical disabilities, cognitive impairments, chronic diseases manifestations, and other general declines in health as one ages (CDC, 2013),

Manuscript 2: Evaluation of South Carolina Older Adult State-based Home-delivered Meal Program

For the purpose of this research, the dependent variables are nutritional status and perceptions of food insecurity and food insufficiency. Nutritional status was quantitative with the greater scores (values) indicating worse outcomes, and self-perceptions of food insecurity and food insufficiency were dichotomous (yes/no answers). The independent variables were home-delivered meals and demographic variables such as age, marital status, rural status,

monthly income, race, educational attainment, and gender were also investigated as to their relationship with participant outcomes.

ANOVA and regression analyses were conducted to determine the relationship between the aforementioned dependent variables, and the independent demographic variables and home-delivered meal services. The data were obtained by the South Carolina Lieutenant Governor's Office on Aging between the years of 1999-2013. This secondary data analysis consists of quantitative data with a robust sample of approximately 28, 551 observations.

ANOVA analyses were deemed appropriate as it allowed for repeated investigation of change over time, from one assessment to the next, the data set were not exclusive of one another, and included both quantitative and qualitative values representing perceptions of food insecurity and food insufficiency (Issel, 2009).

Regression analyses was used to examine the influence of various independent variables such as age, race, educational attainment, monthly income, gender, marital status, and rural residency, on predicted nutritional status, and feelings of food insecurity and food insufficiency values of program participants. To address the increase of potential physical disabilities, cognitive impairments, chronic diseases manifestations, and other general declines in health as one ages (CDC, 2013), the researcher restricted data assessment/reassessment findings to only two years of consecutive data per client.

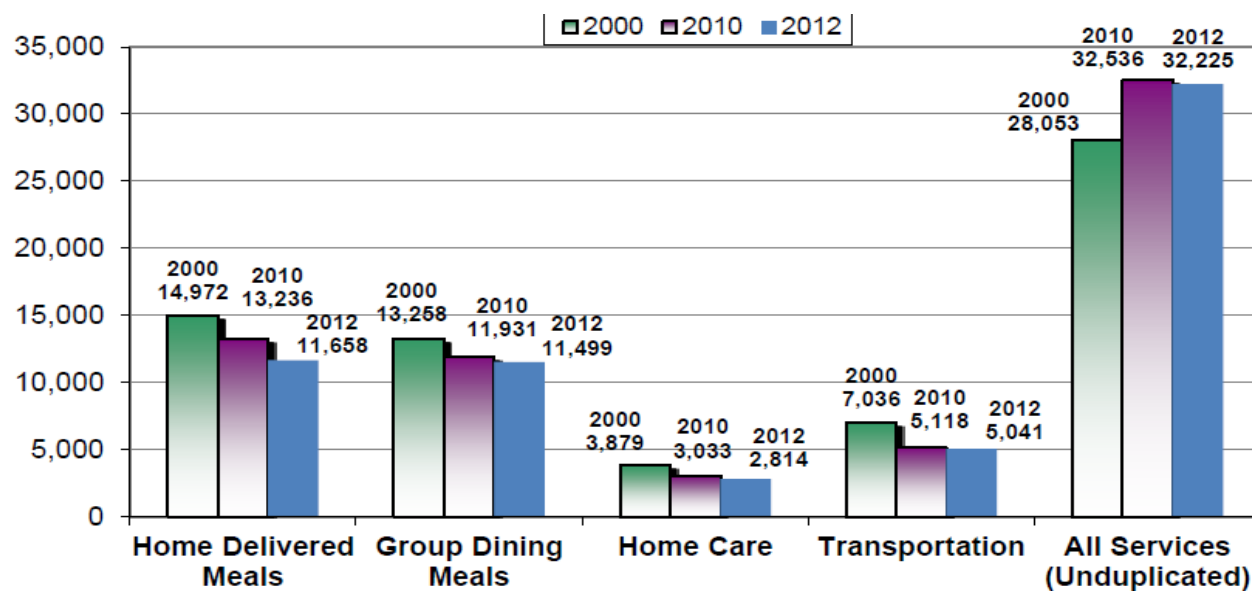
1.5 The South Carolina Lieutenant Governor's Office on Aging

Since 1965, as indicated by the Older Americans Act (OAA), each state must submit a State Plan on Aging in order to fulfill their requirements to become eligible for federal funding under the OAA. The South Carolina Lieutenant Governor's Office on Aging (LGOA) is the

designated State Unit on Aging (SUA) for South Carolina, and in serving as such is responsible for administering and carrying out requirements of the OAA. Their State Plan on Aging outlines the state's aims as they pertain to the coordination of services for older adults as well as acquiring data from various needs assessments carried out throughout the state by the LGOA as well as aging network partners. In 2005, LGOA reported their mission was to "enhance quality of life for seniors through advocating and developing resources in partnership with state and local governments, non-profits, and the private sector, individuals, and advocates to meet the present and future needs of seniors" (LGOA, 2005 p. 3).

The LGOA provides aging services that are designed to enhance the lives of older adults, aged 60 and older, and give them the resources necessary to remain in their homes safely and independently. Some of the many services offered by the LGOA include the following: group dining sites, home-delivered meals, transportation, home care, employment services and legal services. The agency also provides insurance counseling, education, training, family caregiver support, and they also serve as the Alzheimer's Resource Coordination Center (ARCC) (See Graph 1.5-1: South Carolina Older Adult Clients Served Using Aging Funds in Fiscal Year 2011-2012) (LGOA, 2013).

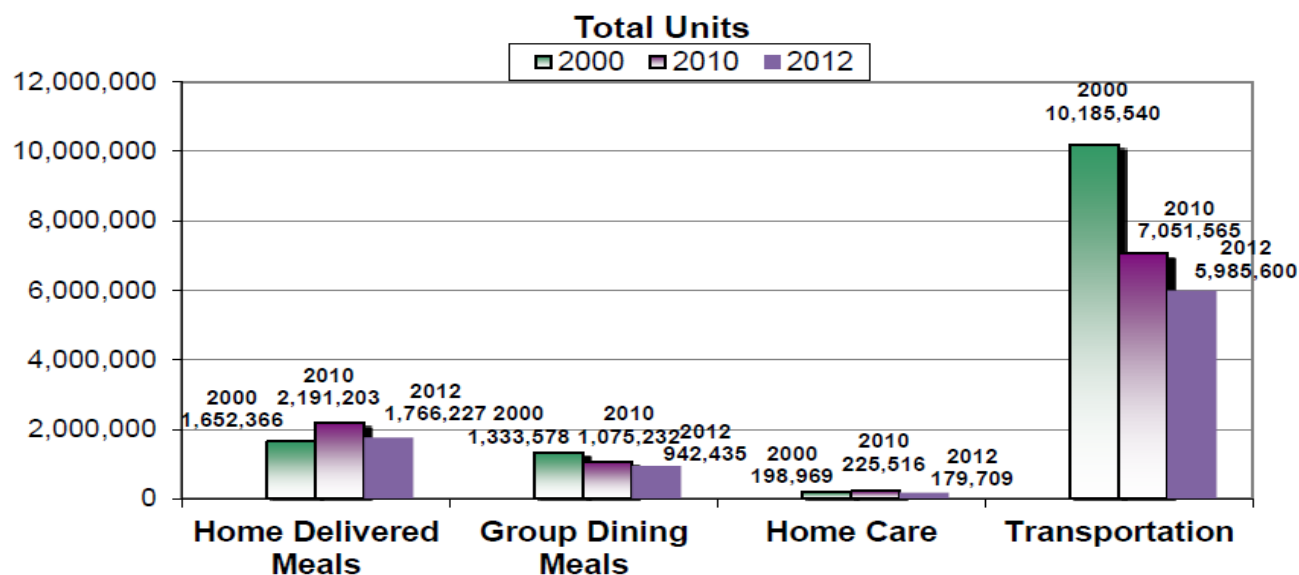
Graph 1.5-1: South Carolina Older Adult Clients Served Using Aging Funds in Fiscal Year 2011-2012



Source: (LGOA Advanced Information Manager (AIM) FY 11-12 and Lieutenant Governor's Office Annual Accountability Report, 2012)

The LGOA had approximately 27,880 clients in Fiscal Year 2010-12 and a wait-list of thousands of seniors needing services (LGOA, 2013). The number of clients represents only about 3% of the state's eligible population (See Figure 1.5-2: Total Units Served Through SC LGOA Funds in Fiscal Year 2011-12) (LGOA, 2013).

Figure 1.5-2: Total Units Served Through SC LGOA Funds in Fiscal Year 2011-12



Source: (LGOA Advanced Information Manager (AIM) FY 11-12; Lieutenant Governor's Office Annual Accountability Report, 2012)

1.6 Evidenced-Based Research

Evidence-based research is a driving force behind efforts to validate and support public health programs. As such, the Agency on Aging in an attempt to improve implementation of disease prevention and health promotion (DPHP) programs, asserts that as of October 2016 these programs must be evidenced-based to receive Title IID funds (AoA, 2014). In accordance with the new guidelines, the United States Department of Health and Human Services' Administration for Community Living has issued new criteria to replace the current protocol under which Title IID funds are allocated for disease prevention and health promotion services (AoA, 2014). Previous criteria were divided into three levels ranging from the minimal level to highest level. Minimal level included tasks such as basic program evaluation and translation of use of the findings. The highest level, which falls within the new 2016 criteria, includes proven effectiveness of programs while utilizing experimental or quasi-experimental study designs, full

translation of findings within the community, dissemination of products to the public, and publishable findings among a few other criteria (AoA, 2014). These new criterion, which includes the current highest-level criteria, would provide evidence of effectiveness for improving the health and well-being, reducing disease, injury and/or disability among older adults, proven effective use of experimental or quasi-experimental study designs, publishable results; and full translation and public dissemination of relevant findings (DHHS, 2014).

1.7 Summary

It is imperative that each state's Department on Aging provides valuable, supportive services to their rapidly growing Medicare-eligible population which is residing in communities while experiencing mobility and nutritional challenges that are amenable to effective management and prevention strategies. Continuous evaluation of aging programs must guide states so that they may expand successful services, and improve or remove programs that have not met their intended goals or served their audiences successfully. When considering the success of state-based older adult programs, program planners should also consider the new evidence-based criteria within Title IIID of the United States Department of Health and Human Services' Administration for Community Living when designing or implementing new health promotion or disease prevention programs. States are continually dealing with restricted budgets and the need for continued federal subsidizes or grants are ever increasing. Current data indicate that South Carolina receives approximately \$13 million dollars in Title III funding (LGOA, 2012).

1.8 Conclusion

The predicted number of older adults, particularly those aged 60 and older, in the United States in the next twenty years is overwhelming at over 72 million or nearly 20% of the entire population (CDC, 2013) with the projected percentage of those over age 65 in South Carolina to be even greater at 22%. The 85 to 94 age group is experiencing the largest rate of growth of nearly 30%, while the 95+ age group has increased 26% (Werner, 2011).

As discussed within this chapter, due to the shift from infectious diseases to chronic diseases and degenerative illnesses, older adults are faced with greater physical and financial burdens than in previous decades (CDC, 2013). These burdens affect not only the individual, but also the public health and healthcare systems at large which do not receive enough Medicare funding to meet the rapidly increasing burden (Bryant et al., 2006).

Accommodations and services for older adult populations such as maintaining and providing access to healthcare, transportation, food, shelter, and social support services must be anticipated and made available by states as indicated by the OAA (AoA, 2006). Disabilities or poor health should not be considered an inevitable consequence of aging and through participation in effective health promotion programs; South Carolina elderly can postpone or avoid disability and institutionalization.

Accommodations and services for older adult populations such as maintaining and providing access to healthcare, transportation, food, shelter, and social support services must be anticipated and made available by states as indicated by the OAA (AoA, 2006). South Carolina in particular must plan to meet their aging population's health needs with resources to support a sustainable quality of life. Disabilities or poor health should not be considered an inevitable

consequence of aging. If South Carolina continues to promote positive health behaviors, and provide services to manage chronic health conditions the aging populations can endeavor to postpone or avoid disability and institutionalization.

The research investigated was aimed at answering the questions of “how predictive are the South Carolina’s older adult state-based home-delivered meals, group meals, home care visits, transportation, and health promotion activity services at improving the participants’ activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status scores?” A longitudinal study design of a secondary data set was analyzed including ANOVA and regression analyses. Findings posted herein will be used for future program evaluation efforts as well as future program development.

CHAPTER 2

LITERATURE REVIEW

2.0 Overview

Nutritional needs of older adults have been well documented, and it is the goal of this author to present the nutritional status of older adults receiving OAA services in South Carolina. The maintenance of proper nutritional health is fundamental to functioning, the prevention or delayed onset of chronic disease and disease-related complications, and quality of life for older adults (Institute of Medicine, 2003, Kronl et al., 2008 and Sharkey, 2003). Older adult programs aimed at reducing the risk of premature chronic diseases in vulnerable elderly persons by providing opportunities for nutritional and social support via health promotion programs, home delivered meals and congregate dining services have demonstrated great promise (Kronl et al., 2008).

2.1 General Literature Review Section

According to 2010 Census data, there are approximately 40 million older adults aged 60 years and older. The expected growth of this population is estimated to be 72.1 million by 2030 with the vast majority of these older adults living independently in their communities (CDC, 2013). Gerontologists, public health professionals, and community health practitioners have focused collective efforts to improve the nutritional status of older adults as a means to promote health and prevent illnesses (Lyons, 2013). Nutritional risks such as feelings of hunger,

consumption of highly caloric foods, and/or lack of nutrient-dense foods can accelerate the aging process and can be exacerbated by living situations, attainment and access to nutritional support services, and socioeconomic status. Independent elderly couples have the lowest risk while single individuals are at increased risk of not eating regularly, particularly men, unless opportunities to socialize and share congregate meals are made available (Kronl et al, 2008). The individuals identified at highest nutritional risk are homebound older adults with limited family support. Payette and Shatenstein (2005) found that independently living individuals above the age of 60 who conveyed high levels of loneliness or social remoteness revealed negative correlations with nutritional quantity and quality. Other research has revealed that it may not just be the number of friends that one may have, but the quality of those relationships which is most important to nutritional status. Lack of social engagement has long been shown to be a major risk factor for depression in older adults, and it is also critical to the ability to live independently, maintain functionality and mobility, and manage self-care (Kronl et al, 2008).

In addition to marital status and social engagement, rural residency and transportation availability also affect nutritional status in older adults. McLaughlin and Jensen (1998) reported that approximately 25% of older adults in the United States live in rural areas making them at risk for food insecurity. Food security requires the availability of nutritionally adequate and safe food, and the ability to acquire these foods in a legal, acceptable way (Campbell, 1991). Meal programs such as congregate dining and home-delivered meals are therefore critical resources for older adults living in rural areas (Kronl et al, 2008).

The Older Americans Act (OAA), requires that each state have a designated State Unit on Aging which submits a State Plan on Aging detailing how federal funding will be used to serve the older citizens of the state. In South Carolina, the State Unit is The South Carolina Lieutenant

Governor's Office on Aging (LGOA). The LGOA provides aging services designed to enhance the independence and safety of older adults (AoA, n.d.). These services include: congregate dining, home-delivered meals, transportation, home care, and legal and employment services (LGOA, 2013). Services are offered in a coordinated manner; for example, if a client indicates they need home-delivered meals due to lack of transportation, there will be follow-up to determine if they also need transportation for medical appointments.

2.2 Literature Review Part One

Activities of daily living (ADL) and instrumental activities of daily living (IADL) have served as important indicators when estimating or measuring an older individual's health risks. According to the World Health Organization (WHO) the definition of health is, "the complete state of physical, mental, and social well-being, not merely the absence of disease or infirmity," (1946). This definition serves as a reminder that researchers should not limit their assessment of older adults' health or health risk status solely on usage of healthcare services. Measures of ADLs and IADLs may better enable public health practitioners and aging agencies to better anticipate the health and quality of life needs of older adults, which is a major Healthy People 2020 goal (Altarum Institute, 2012; CDC, 2013; DHHS, 2010).

Measurements and Health Implications of Activities of Daily Living (ADLs) of Older Adults

To predict or estimate health status of older adults, measurements of activities of daily living (ADLs) and instrumental activities of daily living (IADLs) are often used as proxies for health status (Hyer & Intrieri, 2006). When an older adult is indicating an inability to perform daily activities this may signify a restriction on their engagement in life and ability to live

independently. Factors such as lack of mobility, transferring, or inability to cook or clean for oneself narrows an older person's participation in events or activities that bring enjoyment and meaning to life. This loss of ability to care for oneself safely and appropriately means further loss of independence, and can often lead to dependence on family members, friends, or institutional settings (CDC, 2013). One of the best ways to evaluate the health status of older adults is through functional assessments such as the Katz Index of Independence Activities of Daily Living Scale, which provides objective data that may indicate future decline or improvement in health status. This assessment allows the health practitioner, nurse or even caregiver to plan and intervene when and where necessary (Katz, 1976). The scale is most effectively used among older adults, aged 60 and older in a vast array of health care settings. (Brorsson & Asberg, 1984). The six indicators which are measured within the Katz Index of Independence of ADL Scale are the following: total independence and total dependence in bathing, dressing, toileting, transferring, continence and feeding (Katz, 1976). Use of the instrument is optimized when baseline measurements are taken when the client is in relatively good health before receipt of aging services so that comparisons can be made at periodic intervals after services have been rendered (Wallace, 2012).

Measurements and Health Implications of Instrumental Activities of Daily Living (IADLs) of Older Adults

The Lawton Instrumental Activities of Daily Living Scale (IADL) is an instrument created with the intention to assess independent living skills of older adults (Lawton & Brody, 1969). The instrument is used specifically to identify and subsequently quantify how an older person is currently functioning. The completion of these skills are considered more difficult to

execute than the basic Katz Index of ADLs, and are viewed as imperative should the older adult wish to continue their independent living situation (Graf, 2007).

The Lawton IADL Scale also has the ability to discern among task completion rates including both the amount of assistance and amount of time required to finish each task. There are eight domains of function assessed with the Lawton IADL scale which are as follows: preparing meals, light housekeeping, heavy housekeeping, telephone use, money management, shopping, medication management, driving or the use of public transportation (Lawton & Brody, 1969).

Nutritional Needs of Older Adults

Nutritional health is crucial to maintaining functionality and quality of life as well as preventing chronic disease for older adults (Institute of Medicine, 2003; Sharkey, 2003). Although some researchers report that severe nutritional deficits are rare among older adults in the US (Weimer, 1997), self-reports from older adults reveal that many are at “high risk” of nutrient deficiencies in their diets (1997). When assessing inadequate food intake, defined as lack of access to nutritionally dense foods or lacking an adequate supply of food, other researchers have found it to be a prevalent problem among people aged 60 and older (Alatarium Institute, 2012). Salmon and Gooden (n.d.) suggest that nutritional risk is correlated with being homebound, having low income, having functional limitations, and being a minority (Klesges et al., 2001; Lee et al., 1995; Mayo and Rainey, 2001; Payette et al., 1995; Quandt and Chao, 2000; Schoenberg, 2000; Schoenberg et al., 1997; Sharkey and Haines, 2001; Weimer, 1997). In South Carolina, of the more than 917,000 persons over the age of 60, at least 42 percent have at least one disability which makes them more likely to live below the poverty level; 10.4% live below

100 percent poverty level \$11,170, and one in every five of those individuals age 65 and older survives on an average of \$7,500 a year (Census, 2011; LGOA, 2012).

Nutritional Status of Older Adults in South Carolina

The United States Department of Agriculture (USDA) provides funding for various food assistance programs targeting older adults. Such programs include the Food Stamp Program (SNAP), the Child and Adult Care Food Program, Nutrition Program for the Elderly, and the Commodity Supplemental Food Program-Elderly (USDA, 2013). SNAP specifically is known as the largest program in the domestic hunger safety net. It supplies nutritional assistance to millions of eligible, low-income individuals and families and provides economic benefits to communities (USDA, 2013).

In South Carolina specifically, only three out of ten eligible seniors receive SNAP dollars which on average amounts to approximately \$200/month (LGOA, 2013). Unfortunately, this monthly allocation tends to not be significant enough to provide sustained nutritionally adequate food for an older individual. Another issue that arises is the older adult's ability to purchase foods eligible for SNAP funds as this requires safe and adequate transportation to and from the food source, as well as the physical ability to navigate and purchase food. Without adequate financial resources or federal assistance such as SNAP, older adults remain at high risk for nutritional deficiencies as well as resulting chronic diseases and disabilities (Kronl, 2008; Wilcox et al., 2000).

State-Based Services

Although the LGOA offers many services to older South Carolina residents, for the purpose of this dissertation only a few services will be identified and examined for their impact on health. These services include: home-delivered meals, congregate or group meals,

home care visits, transportation, and health promotion services and allocation of the services are tracked by the LGOA. This dissertation will examine the correlations between LGOA services received and self-reported client nutritional status and ADL and IADL abilities.

Home-delivered meals are balanced meals that are brought to home-bound older adults. These meals ensure that seniors who are homebound receive at least one nutritionally balanced meal five days a week in order to enhance nutritional status (LGOA, 2005).

Congregate or group meals are nutritious meals served five days a week in a community setting such as a senior center or other designated place which are accompanied by fellowship opportunities with other older adults residing in the area (LGOA, 2005). In addition to the meals, the congregate meal program includes nutrition education and other activities designed to promote health and wellness among participants.

Home care visits are provided by certified caregivers to assist with tasks such as meal preparation, cleaning, laundry or shopping as needed by the individual or the individual's primary caregiver (LGOA, 2005).

Transportation services allow seniors who do not have transportation the ability to travel to and from important activities such as medical appointments, educational and social activities, shopping, meal sites and social service agencies (LGOA, 2005).

Health promotion services include routine health screenings, nutritional assessment, counseling and follow-up; health promotion programs, physical fitness programs, and accident prevention activities.(LGOA, 2005). The goals of these programs are 1) to reduce risk factors associated with illness, disability, or disease; 2) delay the onset of disease; 3) preserve functional

ability, and 4) manage chronic disease. These programs are implemented in a variety of community settings, including senior centers (LGOA, 2005).

The aforementioned state-based services have the overarching goal of not only improving the health and quality of life of older adults in South Carolina, but to also allow them to live independently as long as possible. For example, 60 percent of congregate meal participants and 92 percent of home-delivered meal participants reported that these services allowed them to continue living in their own homes (AoA, 2014). Of those who used transportation services, 53 percent reported relying on them for the majority of their trips to meal sites, doctors' offices, pharmacies, and other essential activities of independent living (AoA, 2014).

2.3 Literature Review Part Two

This manuscript investigates the relationship of the State of South Carolina's Office on Aging home-delivered meals service with participants' self-reported nutritional status, and perceptions of food insecurity and food insufficiency. Although self-reported food insufficiency and food insecurity are not specific goals of the LGOA, existing research has identified them as major contributory factors for nutritional risks within the older adult population (Sharkley, 2003). More specifically, a significant amount of research has been conducted on the association between home-delivered meals, improved nutritional status, and reduced perceptions of food insecurity and food insufficiency with older adults and has found that although home-delivered meal programs require a considerable financial and time commitment, they are successful in improving the nutritional status of program participants (Sharkley, 2003).

Food Insufficiency

Food insufficiency is defined as having restricted household food stores and food insecurity is viewed as a more severe version of food insufficiency which includes the available food resources (Scott and Wehler, 1998). Whereas food insufficiency might be described as hunger, insecurity is defined as the inability to obtain nutritionally adequate food (Scott and Wehler, 1998). To obtain information about whether Americans and especially low-income Americans obtain enough to eat, the United States Department of Agriculture (USDA) has established the “food insufficiency question.” The following question, and reiterations of it, have appeared in numerous surveys since the 1970’s. People are asked to think about food consumption, food availability, and affordability in the previous 12 months and then respond to the statement “Which of these statements best describes the food eaten in your household” (2013)?

1. Enough of the kinds of food we want to eat,
2. Enough but not always the kinds of food we want to eat,
3. Sometimes not enough to eat, or
4. Often not enough to eat.

To serve as a proxy for the food insufficiency questions above, this questions from the SC LGOA Assessment/Reassessment instrument was used: “Do you have less than a three day supply of food on hand?” (See Appendix E Supporting Document 5.6-1 South Carolina Lieutenant Governor’s Office on Aging Assessment/Reassessment). Responses reflect increasingly severe conditions associated with the adequacy and variety of the household’s diet

and levels of consumption (Gundersen and Ribar, 2007). In contrast, the food insecurity scale is often deduced from a variety of questions such as “Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn’t enough money for food,” (Gundersen and Ribar, 2007) or in the case of this research “Have you ever gone without food because you could not afford it?” (See Appendix E Supporting Document 5.6-1 South Carolina Lieutenant Governor’s Office on Aging Assessment/Reassessment). There are clear differences between the items used to measure food insecurity which address conditions of food anxiety or incidences of skipped meals, and food insufficiency. However, both measures are similar in describing the adequacy and availability of food. For example, Nord et al. (2004) found that the food insecurity measures reveal that participants might have “difficulty meeting food needs” stemming from “a lack of money or other resources.”

Food Insecurity

Food insecurity is the effect of the inability to access or consume enough food for a healthy active life, and is viewed as a more severe version of food insufficiency (Campbell, 1991). To be food secure, one must have the availability of nutritionally adequate and safe food, and have the ability to acquire personally acceptable foods in a legal way. Food insecurity exists whenever food security is limited or uncertain (Campbell, 1991). Since food insecurity statistics have been calculated, the highest proportion of food insecure households was in 2008 in which almost 50 million Americans were food insecure (Nord et al., 2009).

In a recent study by the American Association of Retired Persons (AARP) among adults aged 50 and older, 15.6 million persons faced the threat of hunger (i.e. were marginally food insecure), 8.8 million faced the risk of hunger (food insecure), and 3.5 million faced hunger (low

food secure). This is an increase of 66%, 79%, and 132%, respectively, from the levels of food insecurity in 2001 among this population (2011). In South Carolina approximately one in every 11 older adults is at risk for hunger. This puts South Carolina as one of the top ten states with 9.66% of older adults at risk and 11.27% of those ages 50 to 60 at risk (LGOA, 2013). Hunger risk of older adults is not equally distributed as the risk for African Americans and Hispanics being twice that of whites (Bono, n.d.).

History of the Home-Delivered Meal Program (Service) in South Carolina

Nutritional risk is generally high in the older adult population (Lee et al., 1995; Sharkey and Haines, 2001); and those eligible for enrollment in the home-delivered meal program have even greater risk (Coulston et al., 1996; Sharkey, 2001). Typically, the older adult population is screened for placement eligibility before being placed on the waiting list for home-delivered meals. Traditionally, this population is assessed to be homebound and unable to prepare adequate meals for themselves.

The home-delivered meal program targets those older adults identified as having the greatest susceptibility for food insecurity and hunger because of social and economic constraints such as low income, ethnic minority membership, disability, limited English proficiency, rural residence, and risk of institutional care. (AoA, 2002). Typically, the older adult is screened for placement eligibility criteria, such as being homebound and being unable to prepare adequate meals for themselves, before being placed on the waiting list for home-delivered meals. (Warren et al., 2012).

2.4 Conclusion

Nutritional health is crucial to maintaining functionality and quality of life as well as preventing chronic disease for older adults (Institute of Medicine, 2003, Kronl et al., 2008; Sharkey, 2003). In a recent AARP study 15.6 million persons faced the threat of hunger (i.e. were marginally food insecure), 8.8 million faced the risk of hunger (food insecure), and 3.5 million older adults faced hunger (low food security) an increase of 66%, 79%, and 132%, respectively, from the levels of food insecurity in 2001 among this population (2011). In South Carolina nearly one in every 11 older adults is at risk for hunger, which puts South Carolina as one of the top ten states with 9.66% of older adults at risk of going hungry (LGOA, 2013).

Food insecurity is viewed as a more severe version of food insufficiency and includes the inability to access or consume enough food for a healthy, active life (Campbell, 1991). To be food secure, one must have the availability of nutritionally adequate and safe food, and have the ability to acquire personally acceptable foods in a legal, acceptable way (Campbell, 1991). The attainment of proper nutritional health is essential to functioning, the prevention or delayed onset of chronic disease and disease-related complications, and quality of life for older adults (Institute of Medicine, 2003, Kronl et al., 2008; Sharkey, 2003).

Activities of daily living (ADL) and instrumental activities of daily living (IADL) have served as important indicators, and even proxies, when estimating or measuring an older individual's health risks. The Centers for Disease Control in 2013 indicated that if older adults are experiencing an inability to perform daily activities such as lack of mobility, transferring, or ability to cook or clean for oneself this may signify a restriction on their engagement in life and ability to live independently. Such restrictions have shown to decrease an older adult's

enjoyment, quality of life, and can often lead to dependence on family members, friends, or institutional settings when the limitations become too great.

Older adult health promotion programs, home delivered meals and congregate dining services provide nutritional and social support and have demonstrated promise for reducing the risk of premature chronic diseases in vulnerable elderly persons (Kronl et al., 2008). This dissertation addresses a gap in the literature regarding an examination of the association between participation in the home-delivered meal program and participant self-reported perceptions regarding food insecurity and food insufficiency among clients of the South Carolina LGOA.

CHAPTER 3

EVALUATION OF SOUTH CAROLINA OLDER ADULT STATE-BASED SERVICES

3.0 Abstract

Purpose: The purpose of this study was to investigate the association between requested and/or received OAA program services including home-delivered and congregate meal programs, transportation, health promotion, and home care programs and client self-report of ability to perform activities of daily living (ADL), instrumental activities of daily living (IADL) and nutritional status. **Methods:** Secondary data analyses were conducted using data collected by Area Agency on Aging/Aging Disability Resource Center (AAA/ADRC) staff with the South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment instrument from men and women (N=33,123) over 60 years of age who had requested or were currently receiving state-based services. Independent variables were demographic characteristics and requests or receipt of state-based services. Dependent variables included self-reported ADL, IADL, and nutritional status of participants. **Results:** Regression analysis showed statistically significant predictive relationships of nutritional and IADL status among participants who reported receiving transportation (β -0.02, $p<0.05$) (β -0.02, $p<0.05$) and health promotion-based services (β -0.01, p -value 0.04) (β -0.02, $p<0.05$). Hot home-delivered meals significantly predicted ADL (β 0.07, $p<0.05$) status while congregate meals significantly predicted IADL (β -0.01, p -value 0.03) status. Regression analysis also indicated significant predictive relationships among low income, African American widows who were rurally located, and had an educational attainment

of high school graduate ($p < 0.05$). **Conclusions:** Data analyses revealed a significant predictive relationship between request and/or receipt of transportation and health promotion program services with self-reported nutritional status of program participants. Based on these findings, it is reasonable to assume that expansion of these programs would prove instrumental in meeting the nutritional needs of older adults in South Carolina.

3.1 Introduction

The purpose of this chapter is to serve as a framework for the following manuscript and the research, analysis, and findings stated within. First will be a description of how the Older Americans Act (OAA) guides the goals and mission of the South Carolina Lieutenant Governor's Office on Aging (LGOA) followed by background information about the LGOA. Relevant statistics and data were provided where appropriate to provide justification, and illustrate the need for state-based older adult programs to maintain or improve the health of older South Carolina residents. Next the purpose of the research is stated as well as the specific research aims and research questions the research design and methodology, and conclusions and implications.

3.2 Background

72 million or nearly 20% of the entire population will be aged 65 and older by the year 2030 (CDC, 2013). Older adults are faced with greater physical and financial burdens than in previous decades due to a significant shift from infectious diseases to chronic diseases such as heart disease, diabetes and degenerative illnesses (Bryant et al., 2006). In addition, nearly two out of every three older adults in American has multiple chronic conditions (CDC, 2013). Decreased productivity, mobility, loss of independence, and an overall decreased quality of life

have all been associated with the rise of chronic and degenerative diseases (Bryant et al., 2006). The resulting costs both direct and indirect account for approximately 66% of the health care budget in the United States (CDC, 2013).

The projected growth of this population, coupled with the anticipated increase in chronic disease burdens, demands that public health professionals and clinicians to create programs and services tailored to meet their needs. These programs and services may include access to healthcare, food, shelter, transportation, and social support. Public health professionals are at work locally and nationally advocating for older adults who are in need by connecting individuals and communities to accessible services, as well as promoting healthy aging in all personal, societal, cultural, economic, and environmental facets (Wilcox et al., 2000).

The Older Americans Act (OAA)

In anticipation of the projected growth of older Americans, the Administration on Aging (AoA) challenged each State Unit on Aging (SUA) to design and implement policies to accommodate and serve their aging populations. The South Carolina Lieutenant Governor's Office on Aging (LGOA) is the designated State Unit on Aging (SUA) for the state of South Carolina.

As specified by the Older Americans Act (OAA) in 1985, each state must submit a State Plan on Aging in order to fulfill their requirements to become eligible for their programs to obtain federal funding under the OAA. This legislation established authority for the allocation of monies to States for community planning, research and development projects, and personnel training in consideration of older adults. The law also allowed for the AoA to administer newly created grant programs, and to function as the Federal focal point for matters regarding older

persons (AoA, n.d.). This plan attempts to outline the state's aims as they pertain to the coordination of services for older adults as well as acquiring data from various needs assessments carried out throughout the state and from aging network partners.

Population Growth

In 2013, the Director of the National Institute on Aging (NIA) stated there were approximately 39 million Americans aged 65 years and older (Hodes, 2013). The NIA credited growth of this population to the use of medical advancements, technology and prescription medicine (Hodes, 2013). South Carolina is experiencing a similar growth in the number of older adults. The 2010 Census revealed that South Carolina ranked 17th in the nation for the highest percentage of age 60+ residents, and it is projected that by 2030, the percentage of older adults in South Carolina will be 22% reflecting an increase to 1,450,487 from 917,000 in 2010; over a 50% increase in twenty years (Census, 2011). In terms of income, 11.5% of older adults in South Carolina live below the poverty rate with a growing proportion of them living in non-family households which indicates dependence on external services and assistance for care (LGOA, 2012).

With this population's growth and need for assistance and services comes the demand for public health professionals and clinicians to create effective, evidence-based programs to address their needs for transportation, access to healthcare, food, shelter, and social support so that they can optimize nutritional status, mobility and functionality. In order for programs to be considered evidence-based, they must be rigorously evaluated and this dissertation research contributes to the need to evaluate AoA funded programs in South Carolina.

South Carolina Lieutenant Governor's Office on Aging

The mission for LGOA is to “enhance quality of life for seniors through advocating and developing resources in partnership with state and local governments, non-profits and the private sector, to meet the present and future needs of seniors (LGOA, 2005, p. 3). The values of the LGOA include: customer-centered service, excellence in government, senior-friendly communities, supporting quality of life for seniors, and research-based decision-making. Finally, the vision of the South Carolina Lieutenant Governor's Office on Aging is to become a state where seniors enjoy an enhanced quality of life, are economically secure, contribute to communities, and receive support and services necessary to age with dignity (LGOA, 2005). In order to achieve this vision, the LGOA must provide efficacious health promotion programs and services to prevent and manage chronic conditions in order to delay or avoid disability and/or institutionalization.

In their 2011 Annual Accountability Report, the LGOA indicated their challenge to adapt to changing times and embrace new paradigms for better coordinating services and generating new revenues for them which will require better needs assessment processes, more consumer choices, private pay and cost sharing for services (LGOA, 2012).

3.3 Purpose of Research

It is the goal and mission of public health program evaluators to intervene effectively wherever risks may be modified or prevented to improve health-related outcomes (Bryant et al., 2006). Resources and funding are always limited, and by using them purposefully and strategically public health professionals accomplish the goal of effectively designing, implementing and evaluating health promotion initiatives.

There is an underlying assumption that these health promotion initiatives should be based upon peer-reviewed research in program design, implementation, and evaluation.. The research reported here contributes to efforts to evaluate outcomes associated with receipt of OAA program services. The purpose of the study was to investigate the association between requested and/or received OAA program services including home-delivered and congregate meal programs, transportation, health promotion, and home care programs and client self-report of ability to perform activities of daily living (ADL), instrumental activities of daily living (IADL) and nutritional status.

Self-reported ability to perform ADLs, IADLs are used as proxies for health status because they may signify a lack of mobility, transferring, or ability to cook or clean for oneself which greatly limits participation in events or activities that bring enjoyment, and meaning to life. This loss of ability to care for oneself safely and appropriately means further loss of independence and can often lead to dependence on family members, friends, or institutional settings (CDC, 2013). Client self-reported ability to perform ADLs and IADLs and their perceived nutritional status were examined for their relationship to receipt of congregate or group dining, home-delivered meals, home care, transportation, and health promotion services.

3.4 Research Questions

With approximately 89% or \$30,220,404 of the LGOA budget being allocated for services which are designed to improve the quality and length of life for South Carolina's seniors, it is imperative to objectively evaluate the success of such programs (LGOA, 2012).

The research questions for the current study were:

What is the predictive relationship between receipt of home-delivered meals, congregate meals, home care visits, transportation, and health promotion programs with client self-report of activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status scores?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of nutritional status, ADL, and IADL values, and A2 represents those values after receipt of program services and subsequent assessment. The researcher hypothesizes that predicted nutritional status scores and ADL and IADL values will improve, or decrease, with each additional unit of receipt of home-delivered meals, congregate meals, home care visits, transportation, and health promotion programs.

3.5 Literature Review

Outcome Measures

The following review examined the use of ADL and IADL variables such as walking, eating, bathing, and grooming as proxies for mobility and overall health status for older adults. Included in the review is a description and reach of state-based services delivered by South Carolina Lieutenant Governor's Office on Aging.

Measurements and Health Implications of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADL) of Older Adults

Mobility is essential to engagement in ADLs and IADLs while diminished mobility is directly correlated with an array of adverse health outcomes (Kronl et al., 2008; Sharkley, 2003). To estimate health status of aging residents, measurements of ADLs and IADLs are often used as proxies for health status (Travis and McAuley, 1990). When older adults report diminished ability to perform daily activities it should serve as a warning of their ability to live independently. Risk factors such as lack of mobility, bathing, or ability to cook for oneself narrows an older adult's participation in events or activities that bring great enjoyment to their lives. This loss of ability to care for oneself safely and appropriately means further loss of independence and future dependence on family members, friends, or institutional settings (CDC, 2013). Measuring functional disability in the older adult population has become synonymous with activities of daily living as measured by Katz (Travis and McAuley, 1990; German, 1981). Katz's ADL scale included self-perceptions of bathing, dressing, toilet use, transferring, continence, and feeding (Katz, 1976). General acceptance of a patterned progression of dependency in ADLs has led to the widespread practice of simply counting the individual's basic ADL dependencies to reflect his or her self-care needs and level of impairment which are reflected within the Katz ADL scoring scale which has proven efficacious in detecting a scaled pattern of dependency thus allowing meaningful comparisons among individuals and between groups (Travis and McAuley, 1990).

Similar to the Katz ADL Scale, the Lawton Instrumental Activities of Daily Living (IADL) Scale is designed to assess independent living skills of older adults (Lawton & Brody, 1969). The instrument is used to identify and predict functioning and mobility limitations of

older adults by measuring the ability to engage in: shopping, housekeeping (light and heavy), transportation (driving or public), telephone use, preparing meals (including microwave use), money management and medication management. IADL skills are considered to be more difficult to perform than the basic Katz Index of ADLs, and are viewed as critical should the individual wish to remain living independently (Lawton & Brody, 1969).

Nutritional Needs of Older Adults

Adequate nutrition is fundamental to the prevention and delayed onset of chronic disease, disease-related complications, and mobility, and therefore is essential to the quality of life of older adults (Institute of Medicine, 2003 and Sharkey, 2003). When nutritional risk is left untreated, it can lead to increased demand for nutritionally-based services, increased disability and morbidity (Galanos et al., 1994; Jensen et al., 1997; Posner et al., 1994; Robertson, 2000) and expensive institutionalization (Robertson, 2000; Sharkey, J. R., 2003).

The Supplemental Nutrition Assistance Program (SNAP) (\$908 net which is approximately \$200 month) currently service only three out of ten eligible seniors in South Carolina (LGOA, 2013). This federally-funded program helps millions of low-income individuals and families' nationally with nutritional assistance while economically benefitting communities. While SNAP is known as the largest program in the domestic hunger safety net (USDA, 2013), Weimer (1997) states that severe or life-threatening nutritional shortfalls are infrequent among older adults in the US but acknowledges that his finding contrasts with the views of many elders who report deficient intakes of several essential nutrients. Those most likely to have nutritional risk are homebound, have low income, have functional limitations, are members of minority groups, and have barriers to effective nutritional practices (Salmon and Gooden n.d.; Klesges et al., 2001; Lee et al., 1995; Mayo and Rainey, 2001; Payette et al., 1995;

Quandt and Chao, 2000; Schoenberg, 2000; Schoenberg et al., 1997; Sharkey and Haines, 2001; and Weimer, 1997).

Inadequate food intake is estimated to affect approximately 37% to 40% of people 65 and older living in the community and roughly 80% of those sampled have insufficient diets that need improvement (White, 2001).

Predictors

State-Based Services

The impact of home-delivered meals, congregate or group meals, home care visits, transportation, and health promotion services on self-reported ADL, IADL and nutritional status was investigated within this report:

Home-delivered meals are balanced meals that are brought to home-bound older adults. Hot home-delivered meals are almost always delivered daily. Frozen meals are delivered either daily, or as a weekly pack. These meals ensure that seniors who are homebound receive at least one nutritionally balanced meal five days a week delivered to their own homes so they may maintain a maximum level of health (LGOA, 2005). In addition, the volunteers or staff members delivering the meals have an important and unique opportunity to provide social contact for the homebound elder. This provision may allow a family caregiver to continue to work as well as provide care for a loved one in the morning before work and in the evening. Home-delivered meals provide a vital service as a part of a formal coordinated and comprehensive service delivery system which individualizes care for older adults and their families (Greenlee, 2011).

Congregate or group meals are nutritious meals served in a community setting accompanied with fellowship opportunities with other older adults in the area (LGOA, 2005).

Congregate meals are provided daily, five days a week to older adults at senior centers or other designated places. In addition to the meals, this program includes volunteer opportunities (Greenlee, 2011), nutrition education, and other activities designed to promote health and wellness among participants. Nutritional services such as home-delivered and congregate meals are not merely access to food, but to a system that provides health, social service, and food security needs (Greenlee, 2011).

Health promotion services include health education and disease prevention information as well as encouragement of physical fitness (LGOA, 2005). These activities have the goal of helping seniors to maintain and hopefully improve their health status. The targets of the activities are to 1) reduce health risk factors that are associated with illness, disability, or disease; 2) delay onset of disease; 3) preserve functional ability, and 4) manage chronic disease. Activities might include: routine health screenings; nutritional assessments, counseling; physical fitness programs; and accident prevention activities. These activities occur in an array of senior centers and community settings (LGOA, 2005). The classes must be certified as evidence-based programs, which in most cases require training.

Home care visits are provided by trained and certified caregivers to assist participants with tasks such as shopping, meal preparation, cleaning, or laundry services (LGOA, 2005). Home care services include a broad range of activities, and are based on the level of need of the individual and that individual's primary caregiver.

Transportation services provide seniors who do not have transportation the ability to travel to and from important activities such as medical appointments, educational and social activities, shopping, meal sites and social services (LGOA, 2005).

Demographics of Program Participants

The OAA does not formally require states to serve all of their older adult populations, nor are they means tested, however it does require that services be targeted. In general, nutrition programs by the OAA are targeted to those with the greatest levels of food insecurity, including those who are near or below the federal poverty line, socially isolated or rurally isolated, functionally impaired, and classified as being in poor overall health. The national AoA nutrition program evaluation, *Serving Elders at Risk*, revealed that participants are predominately older and poorer minorities with poorer health and nutritional status who live independently, with greater mobility impairments than non-participating older adults (Greenlee, 2011).

The following are participant characteristics of OAA nutritional programs nationally as identified by the 2009 National Survey of Older Americans Act:

For the home-delivered meals programs:

- 55 percent of participants are white, 63 percent are African American
- 44 percent are in poverty
- 52 percent are at high nutritional risk
- 24 percent do not have enough money or food stamps to purchase enough food to eat;
- 63 percent rely on their home-delivered meals for at least one-half of their total food for the day;
- 17 percent report they choose between purchasing food and medications;
- 38 percent of Hispanic home-delivered meal participants report their health as fair to poor.

For the congregate meals programs:

- 27 percent of participants are white, 38 percent are African American
- 34 percent are in poverty and 19 percent are at high nutritional risk;
- 13 percent do not have enough money or SNAP benefits to purchase enough food to eat;
- 58 percent rely on their congregate meals for at least one-half their total food for the day,
- 26 percent of meal participants report their health as fair to poor

(Greenlee, 2011).

**Table 3.5-1 National and State Comparisons of Older Adults in State OAA Programs
(2011-2012)**

Demographics		National	South Carolina	Georgia	North Carolina
Population >60 years of age		59,967,334	952,587	1,599,728	1,846,182
Gender	Women	33,167,785	527,093	893,868	1,031,785
	Men	26,849,662	425,494	705,860	814,397
Living in Poverty		5,824,861	99,820	184,056	177,421
Race	Minority Persons	13,544,274	225,652	439,638	384,103
	African American	8.8%	20.9%	22.2%	16.6%
	Hispanic	8.7%	1.2%	2.3%	1.7%
Persons with mobility limitations		12,080,598 (20.6%)	204,912 (21.9%)	349,455 (22.3%)	391,349 (21.7%)
ADLs	0	N/A	4,062	2,834	11,487
	3+	N/A	4,561	12,587	6,716
IADLs	0	N/A	1,652	1,026	1,274
	3+	N/A	9,017	15,945	21,985
Living in Rural Areas (Census, 2010)		13,163,978	334,796	491,337	698,234
High Nutritional Risk (2011)		746,248	10,267	8,370	18,619

(AoA, 2013)

South Carolina has demonstrated growth within their older adult population similar to national averages and demographically similar to their neighboring states Georgia and North Carolina.

(See Table 3.5-1 National and State Comparisons of Older Adults in State OAA Programs 2011-2012).

Existing literature signifies the need for older adult programming in South Carolina based on historical demographics of the state and the risk factors identified such as poverty, low-education, and minority status (Lee, 2002).

Older adult program evaluation efforts vary by state and are inconsistent in their methodologies. There are numerous reasons for nutritional status to wane in older aged populations, but with specifically dedicated efforts such as congregate meals and home-delivered meal service, the nutritional status of participants is thought to improve (AoA, 2013; Kronl et al., 2008; Sharkley, 2003).

The AoA estimates that nearly one million older adult diets are supplemented through home-delivered meal programs every year (2011), and states that additional benefits include social interaction, as well as verification of well-being by meal deliverers although Frongillo et al (2010) found that only half of home-delivered meal participants actually saw and spoke with their meal deliverer. The AoA also states that approximately 85 percent of both home-delivered and congregate meal participants claim to eat healthier meals due to the home-delivered meal program and that 58 percent of congregate meal and 93 percent of home-delivered meal program participants assert that these services have enabled them to continue to live independently within their communities (Greenlee, 2011).

The national findings are encouraging, but the state of South Carolina must conduct its own analysis of relationships between receipt of home-delivered meals, congregate meals, home care, transportation, and health promotion services with measures of participant nutritional status

and ability to engaged in, ADLs and IADLs. Evaluation efforts such as these would enable the LGOA to more efficiently allocate available resources to those with greatest need in order to better prevent health risks for chronic disease and mobility limitations.

3.6 Methodology

The methodology used in this study was a secondary analysis of quantitative data collected between 1999 and 2013 by AAA/ADRC staff using the LGOA Assessment/Reassessment instrument. The original data set included approximately 100,500 observations, however approximately 67% of respondent data were dropped because dependent variable information was unavailable or subsequent assessment information was missing which could be due to attrition, the end of service needs, or death. Table 3.6-1 describes the final analytic sample of older adult participants (N= 33,173).

**Table 3.6-1: Sample Description of South Carolina Lieutenant Governor’s Office on
Aging Assessment**

Variable	Mean/Standard Deviation
Age	73/ 8.3
Gender: Female	74%
Educational Attainment	
> 3 rd Grade	11.2%
3 rd – 8 th Grade	17.7%
Some High School	21.1%
High School Graduate	24.9%
Some College	7.1%
College Graduate	4.6%
Marital Status	
Widowed	51%
Divorced	8.5%
Separated	2.3 %
Married	24.4%
Single	11.2%
Rural	67%
Monthly Income	\$1,072.91/ 0.860
Race	
White	43.0%
African American/Black	56.3%
Other Race	0.6%

N= 33,173 * US Census (2011) indicated poverty threshold of \$907.50/month/household

For the purpose of this research, the dependent variables were self-reported ADLs, IADLs, and nutritional status. All three dependent variables were quantitative with the greater scores (value) indicating worse outcomes. The independent variables were participation in the following services: congregate meals, home-delivered meals, home care visits, transportation, and health promotion services. The predictive relationship of additional independent variables such as marital status, rural status, monthly income, age, race, educational attainment and gender with the dependent variables were also investigated. Marital status was categorized as currently married, single (divorced or never married), and widowed.

Rural status was indicated if a participant lived in any area that was not defined as urban. Urban areas were defined as areas which included a central place and its adjacent densely populated territories with a combined minimum population of 50,000, and/or a place designated by the census with 20,000 or more inhabitants (AoA, n.d.). The two categorizations for rural status were rural (yes) or urban (no).

Monthly income included the following forms of monetary payment to the participant: job, social security, supplemental security income, veteran affairs payments, pension, and any other uncategorized form of payment. Income values remained as a continuous quantitative variable.

The participant indicated race as most closely identifying with one of the following races: African American/Black, American Indian/Alaskan, Asian, Hawaiian/Pacific Islander, or White. The participant could also indicate their racial designation as some other race, or as two or more races. The responses were designated into the following two categories: African American and Other Race.

Educational attainment was indicated through participant choice of the following categories to best define their level of educational completion: less than 3rd grade, 3rd-8th grade, some high school, high school graduate, some college, and college graduate. Gender was indicated as male or female. Participants who did not indicate their rural status, income, marital status, race, educational attainment or gender were excluded from the data analysis.

Age served as a confounding variable as the older an individual is the more mobility issues and overall health issues they tend to have on average (Kronl, 2008; Greenlee, 2011). As

such, participant findings were limited to two consecutive years to minimize the effect of age on mobility or nutritional status.

Inclusion Criteria

Only participants enrolled in one or more of the following program(s) being evaluated: group/congregate meals, home-based meals, home care visits, transportation, or health promotional services, such as management of chronic disease, and those whom have completed subsequent assessments was included in the study.

Exclusion criteria

Data from program participants under the age of 60, and from those who had not completed a reassessment were not included in the analysis.

Nutritional Status Scoring

For the purpose of this research, nutritional status scores were derived via summation of the nutritionally based questions adopted from the Nutrition Screening Initiative (See Appendix C Table 5.6-3 Nutritional Scoring).

Activities of Daily Living (ADL) Scoring

The ADL scale is based on the 6-level Katz Index of Independence of ADL Scale (Katz, 1976). The three questions asked respondents how often they needed assistance with the following tasks: (1) walking, (2) dressing, (3) eating, (4) transferring, (5) toilet use, (6) bathing, and (7) grooming (See Appendix B Table 5.6-2 Katz Index of Independence of ADL). Participants responded to questions on a Likert type scale (1-8) when referencing walking, dressing, and eating with 1= independent (needing no assistance), 2 = supervision or coaching

necessary, 3 = limited assistance, 4 or 6 = extensive assistance, 8 = total dependence. When referencing transferring, toilet use, bathing or grooming slightly different values were associated (1-5) with 1 = independent (needing no assistance), 2 = supervision or coaching necessary, 3 = limited assistance, 4 = extensive assistance, 5-8 = total dependence. The scores (1–8 and 1-5) were summed to create the ADL scale (possible range 7-46), with higher scores indicating worse ADL status.

Activities of Daily Living (ADL) Reliability and Validity

To assess Sidney Katz's Index of Independence in Activities of Daily Living internal reliability and validity of the scale a study was conducted within a Department of Internal Medicine in Sweden (Brorsson & Asberg, 1984). The study used nurses to independently assess 100 older adult patients. Inter-observer variability and scalability were tested with Guttman scale-analysis. Results found the ranked activities, which were summarized into a cumulative scale, to be reliable and valid. These findings were concluded as patients representing a lower ADL cumulative score to have shorter hospitalization stays, and to be discharged at a higher rate than patients who reported higher ADL cumulative scores thus representing themselves to be more dependent on instruments or others for their needs such as bathing, grooming, or transferring. The ADL scale's predictive value was also substantiated as the study reevaluated their patients after a year and found that the dependent patients, those with high ADL values, were either dead or living in institutions. Based on these findings, the Katz 6-level ADL Dependency Scale is recommended as a basic measure of functional ability among older adults (Brorsson & Asberg, 1984). Cronbach's Alpha test to indicate scale consistency and reliability were conducted on the current data, and were shown to have a value of 0.61 indicating an above average reliability score (Hair, 2006).

Instrumental Activities of Daily Living Scoring

The Lawton Instrumental Activities of Daily Living Scale (IADL) was used to assess independent living skills (Lawton & Brody, 1969) of older adults within the South Carolina Lieutenant Governor's Office of Aging's Assessment/Reassessment. These independent skills are considered more difficult by the individual than the basic activities of daily living as measured by the Katz ADL scale mentioned previously (Graf, 2007). The instrument is most helpful in identifying how a person is functioning currently, and to ascertain areas of progress or deterioration over time. There are eight domains of function measured with the Lawton IADL scale (Graf, 2007); however the scale being used measured nine domains. The nine domains measured by the Assessment were the ability to do the following: preparing meals, microwave use, light housekeeping, heavy housekeeping, telephone use, money management, shopping, medication management, and driving or using public transportation (Refer to Appendix F Supporting Documentation 5.6-2). The difference between Lawton's traditional eight domains and the current assessment's nine domains was the division of the category of housekeeping. In Lawton's traditional scoring scale the housekeeping question did not differentiate between light and heavy housekeeping abilities which the scale within the current assessment has done. The resulting value would be slightly higher than the traditional scale represents, however the resulting increase is inconsequential as directionality is the sole concern of this researcher.

Clients were scored according to their highest level of functioning in each category or domain with a cumulative score ranging from 0 (independent), 1 (needing some assistance) to 2 (low function, dependence). The lowest score that a person could achieve would be a 0 indicating complete independence to manage the tasks while a score of 18 would indicate complete dependence. In short, the higher IADL cumulative score the worse IADL status, and

thus greater difficulty with which the individual would be facing these instrumental activities of daily living.

Instrumental Activities of Daily Living (IADL) Reliability and Validity

The Lawton Instrumental Activities of Daily Living Scale (IADL) internal reliability was established successfully at 0.70 utilizing Cronbach's Alpha test for reliability within this secondary data set (Hair, 2008). The original study of the scale's reliability and validity also tested concurrently with the Physical Maintenance Scale (PSMS). The reliability of this scale was validated when an interviewer interviewed twelve subjects with a second rater present; however the second rater was not participating in the interview process. The Lawton IADL Scale was also tested to determine its validity. Four scales were used which measured domains of functional status and they were as follows: the Physical Classification (6-point rating of physical health), the Mental Status Questionnaire (10-point test of orientation and memory), Behavior and Adjustment rating scales (4-6-point measure of intellectual, person, behavioral and social adjustment), and the PSMS (6-item ADLs). A total of 180 research subjects participated in the study, to determine the correlation of the functionality of the individuals with whom the scales were monitoring. Few received all five evaluations, however all correlations were significant at the .01 or .05 level thus demonstrating validity of the scales themselves. In particular, the Lawton IADL assessment tool is widely used both in research and in clinical practice (Graf, 2007).

Participation in State-based Services

Participation in state-based older adult services was measured with the following guidelines (See Table 3.6-3: State-based Services and Associated Measurements).

Table 3.6-3 State-based Services and Associated Measurements

Service	Unit of Measurement
Transportation	Each mile driven equates to 1 unit of service.
Health Promotion Services	Each hour spent on teaching various health promotion classes equates to 1 unit of service.
Congregate Meals	Each meal consumed equates to 1 unit of service.
Home-delivered Meals	Each meal delivered (frozen or hot) equates to 1 unit of service.
Home Care Services (1-3)	Each hour spent with older adult equates to 1 unit of service

Regression analysis was used to determine the effectiveness of the older adult state-based services currently being provided. Regression analyses was also used to examine the presence of significant correlations among various independent variables (Isell, 2009) such as age, income, gender, marriage status, and program participation on ADL, IADL, and nutritional status. Effectiveness was determined as the net difference between ADL, IADL, and nutritional scores from the baseline assessment to the subsequent assessment. Baseline assessment values were prior to state-based services being rendered, thus effectiveness was indicated if ADL, IADL, and nutrition scores improved after the establishment of the state-based services to the participants represented via the subsequent assessment values.

3.7 Results

From the sample population 24, 574 were female and 8,549 were males (N= 33,123). Approximately 67% (N= 22,254) of the participants were classified as living in rural areas of South Carolina and the majority, 56.3%, (N=18,649) were African American. More than half,

51%, of the older adults were widowed (N=16,729) and approximately 29% (N=8,260) of respondents were high school graduates.

Nutritional Status

Regression analyses showed statistically significant predictors of nutritional status among participants after receiving transportation and health promotion-based services (See Table 3.7-1: Older Adult State-based Service Evaluation on Nutritional Status). Transportation (p-value <0.05, β -0.02) services indicated that with each additional unit of transportation used, nutritional status was predicted to decrease (improve) by 0.02 units. Health Promotion also proved beneficial (p-value 0.04, β -0.01) with each additional health promotion unit used, nutritional status was predicted to decrease (improve) by 0.01 units. The R^2 measure of variance however was weak at 6% which may be interpreted as the variables presented only having the ability to explain or predict 6% of the variability of nutritional status of the individual being sampled. The predictive relationship of age on nutritional status was also significant (p-value <0.05, β -0.03) indicating that with each increased unit of age (increase of one year) nutritional status was predicted to decrease or improve by 0.03 units. The predictive relationship of income on nutritional status was also significant (p-value <0.05; β 0.04) thus acknowledging that with each increased unit of income nutritional status was predicted to increase (worsen) by 0.04 units. The predictive relationship of educational attainment on nutritional status was also significant (p-value <0.05; β 0.03) in that every additional categorical increase in educational attainment (i.e. some high school to high school graduate), participants' nutritional status was predicted to increase (worsen) by 0.03 units.

An additive predictive effect was also viewed between health promotion services and level three home care and nutritional status. When participants received both health promotion activity services and level three home care services, nutritional status is statistically significantly affected (p-value 0.04; β -0.01). Specifically, with each additional unit of health promotional activity and level three home care services received, nutritional status was predicted to improve (decrease) by 0.01 value points (See Table 3.7-1: Older Adult State-based Service Evaluation on Nutritional Status).

Table 3.7-1: Regression Analysis of Older Adult Home-delivered Meal Service on Nutritional Status

Variables	Nutritional Status		
	Coefficients		
	B	SE β	P
Health Promotion Services	-0.012	0.001	0.044
Transportation Services	-0.024	0.000	0.000
Health Promotion*Home Care Level 3	-0.012	0.202	0.044
Monthly Income	0.038	0.028	0.000
Age	-0.031	0.015	0.000
Educational Attainment	0.028	0.015	0.000

ADL Status

With reference to ADL status, hot home-delivered meals (p-value <0.05; β 0.07) demonstrated a statistically significant predictive relationship in that with each additional unit of

hot home-delivered meals received, ADL status was predicted to increase (worsen) by 0.07 value points (See Table 3.7-2: Older Adult State-based Service Evaluation on ADL Status). The R^2 measure of variance value however was weak at 7% which may be interpreted as the variables presented only having the ability to explain or predict 7% of the variability of ADL status of the model being sampled. The predictive relationship of income on ADL status was also significant (p-value 0.04; β 0.01) indicating that with each increased unit of income ADL status was predicted to increase (worsen) by 0.01 units. The predictive effect of educational attainment on ADL status was also significant (p-value <0.02; β 0.01) in that with every categorical decrease in educational attainment (i.e. some high school to high school graduate), participants' ADL status was predicted to decrease (improve) by 0.01 units. The effect of rural status (p< 0.05; β 0.02) and on ADL status was also statistically significant with the most significant relationship found to be between rural residing (56.3%) participants.

Table 3.7-2: Older Adult Home-delivered Meal Service Evaluation on ADL Status

Variables	ADL Status		
	Coefficients		P
	B	SE β	
Hot Home-delivered Meals	0.067	0.017	0.000
Monthly Income	0.012	4.033	0.037
Educational Attainment	0.014	2.034	0.017
Rural	0.019	6.481	0.000

IADL Score

Transportation services showed a significance predictive relationship with IADL status (p-value <0.05; β -0.02) indicating that with each additional mile of transportation used, IADL status was predicted to decrease (improve) by 0.02 value points (See Table 3.7-3: Older Adult State-based Service Evaluation on IADL Status). Congregate Meal services illustrated significant predictive associations (p-value <0.00; β 0.04) indicating that with each additional congregate meal attended, IADL status was predicted to increase (worsened) by 0.04 value points. Health Promotion services were also found to be significant predictors of IADL status (p-value 0.01; β -0.02) in that with each additional unit of health promotional services received, IADL status was predicted to decrease (improve) by 0.02 value points.

The R^2 measure of variance value however was weak at 9% which may be interpreted as the variables presented only having the ability to explain or predict 9% of the variability of IADL status of the model being sampled. The predictive effect of educational attainment on nutritional status was also significant (p-value 0.02; β -0.02) in that every additional categorical increase in educational attainment (i.e. some high school to high school graduate), participants' IADL status was predicted to decrease or improve by 0.02 units. The predictive relationship of age on IADL status was also significant (p-value <0.05, β 0.09) indicating that with each increased unit of age (increase of one year) nutritional status was predicted to increase or worsen by 0.09 units. The predictive effect of marital status (p-value <0.05; β 0.05), and gender (p-value 0.03; β 0.01) on IADL status were all statistically significant. Most significantly was the predictive relationship among widows (51%), with an educational attainment of high school graduate (29%) with IADL values (p-value <0.05) (See Table 3.7-3: Regression Analysis of Older Adult State-based Service Evaluation on IADL Status).

An additive predictive effect was also viewed between congregate meal services and level three home care and nutritional status. When participants received both congregate meal services and level three home care, IADL status was statistically significantly affected (p-value <0.00; β 0.03) indicating that with each additional unit of congregate meals attended and level three home care services used, IADL status was predicted to worsen (increase) by 0.03 value points (See Table 3.7-3: Older Adult State-based Service Evaluation on IADL Status).

Table 3.7-3: Regression Analysis of Older Adult State-based Service Evaluation on IADL Status

Variables	IADL Status		
	Coefficients		P
	β	SE β	
Health Promotion Services	-0.016	0.001	0.006
Transportation Services	-0.023	0.000	0.000
Congregate Meals	0.039	0.000	0.000
Congregate Meals * Home Care Level 3	0.028	0.033	0.000
Educational Attainment	-0.018	0.012	0.002
Age	0.088	0.013	0.000
Gender	0.014	0.051	0.025
Marital Status	0.054	0.009	0.000

3.8 Summary

Self-reported nutritional status as well as IADL abilities were significantly positively predicted by transportation and health promotion services. Interestingly, additive effects were

predicted when participants received both health promotion services and level three home care services as well as congregate meal services and level three home care services. Nutritional status, ADL and IADL statuses were all correlated significantly with rurally residing residents whom were high school graduates.

3.9 Conclusion

Within the current study, the older adult programs that predicted improvement in nutritional status were transportation and health promotion services. Predictive additive effects by both health promotion services and level three home care services produced an improvement in nutritional status; however, level three home care services and congregate meal participation demonstrated a worsening IADL predicted value.

Research from the OAA suggests that programs such as transportation services, health promotion services and home care become integral components of a network of community-based assistance services which support medical and health care systems, helping to prevent hospital readmissions with timely health education, provides transport to doctor appointments, and provides support and assistance to older adults in their homes by helping them around their homes with minor chores or basic health needs. Research further shows that these services are critical for the nearly three million older adults who receive in-home services specifically (Greenlee, 2011).

Congregate meals, home care (when not coupled with health promotion services), and hot home-delivered meals were not associated with any predicted nutritional, ADL or IADL improvements in participants. Research from Frongillo, Isaacman, Horan, Wethington and Pillemer (2010) suggest that perhaps the success of the home-delivered meals is partially

dependent upon the cooking and reheating behaviors of the participants. These researchers suggest that unsafe reheating habits such as allowing food to “heat up” while leaving it on the counter to come to room temperature allows a large opportunity for bacteria to grow within the food thus worsening the nutritional status of participants which adopt such habits. Other barriers to meal compliance, and thus nutritional improvement include dislike for meal choices resulting in the disposal of food (both in congregate and home settings) as well as the habit of sharing food which diminishes the benefit of the food for the participant in which it was allocated. With home care it is important to mention that only a small population (N=122) used such services therefore limiting the strength of the benefit or service effectiveness of the sampled population.

ADL status was not predictably improved by any state-based older adult service. In fact, hot home-delivered meals exhibited a negative predictive correlation, with each additional unit of service resulting in a significant predicted decrease in ADL status. Receipt of health promotion program services as well as transportation services were also shown to improve predicted IADL levels. These findings are expected as the Lawton IADL Scale measures transportation and health promotion services using items that related to the ability to utilize transportation effectively, and to engage in health promotion services such as medication management, hygiene (housekeeping), and using the telephone.

According to Krondl et al, (2008) there are two sets of factors affecting nutritional risk with the first being good health, whether one is widowed, male, or female, and the ability to drive and remain independent in dietary self-management regiment. The other set of factors is being in poor health without adequate services or assistance, with continuous difficulties obtaining appropriate home or health-care support. These individuals tend to have little social support and contact with limited food preparation abilities and dietary intake (Krondl et al.,

2008). In this analysis of South Carolina SUA services, nutritional status and ADL and IADL abilities were all statistically associated with rurally residing African American widows, who were high school graduates.

Given the duration of the data collection, estimated turnover of LGOA program staff, attrition of participants, and self-reported assessment findings the obtainment of high quality data can be challenging. Further, variability in interpretation of data items and the diversity of assessment collectors across locations (threats to inter-rater reliability) introduce additional concerns regarding the functionality of the assessments' data sets as viable sources of information that can inform effectively on programmatic outcomes. It is this researcher's suggestion that these findings should serve as a springboard for future program evaluation efforts. Due to the limitation in data quality, the authors hesitate to make definitive conclusions, but anticipate that additional analysis of the SC LGOA dataset will validate the findings, and provide a stronger basis upon which to modify and/or improve the delivery of aging services in SC.

3.10 References

- Administration on Aging (AoA). 2002. Fact Sheet: The Older Americans Act Nutrition Programs. Retrieved February 19, 2014, from <http://www.aoa.dhhs.gov/nutrition/OAANP-FS.htm>.
- Administration on Aging (AOA). n.d. Administration for Community Living. United States Department of Health and Human Services (DHHS). Retrieved from http://www.aoa.gov/AoA_programs/OAA/ on March 5, 2015.
- Administration on Aging (AOA). 2013. Administration for Community Living. United States Department of Health and Human Services (DHHS). Retrieved from <http://www.agid.acl.gov/DataGlance/SPR/> on June 25, 2015
- Administration on Aging (AoA). 2006. Unofficial Compilation of the Older Americans Act of 1965 As Amended In 2006 (Public Law 109-365). Retrieved from http://www.aoa.gov/AoA_programs/OAA/oaa_full.asp on February 19, 2014.
- Administration on Aging (AoA). 2014. Disease Prevention and Health Promotion Services (OAA Title IIID). Retrieved February 19, 2014, from http://www.aoa.acl.gov/AoA_Programs/HPW/Title_IIID/index.aspx
- Altarum Institute. 2012. Recommendations to Promote Health and Well-Being Among Aging Populations. Retrieved from <http://healthyamericans.org/assets/files/Prevention%20Recommendations%20for%20Aging%20Populations2.pdf> on December 15, 2013.

- American Association of Retired Persons (AARP) Foundation. August 2011. Food Insecurity Among older Adults. Retrieved from http://www.aarp.org/content/dam/aarp/aarp_foundation/pdf_2011/AARPFoundation_HungerReport_2011.pdf on February 5, 2014.
- Bono, Mark. n.d. Changing Faces of South Carolina: A Profile of South Carolina Senior Citizens.
- Brorsson, B., Asberg, KH. 1984. Katz Index of Independence in ADL. Reliability and Validity in Short-Term Care. *Scandinavian Journal of Rehabilitative Medicine*. 16(3):125-32
- Bryant, Lucinda L., Whitelaw, Nancy A. June 2006. Evaluation of Health Promotion Programs for Older Adults: An Introduction. *Journal of Applied Gerontology*, 25 (3). 197-213. (17)
- Campbell, C. C. (1991). Food Insecurity: a Nutritional Outcome or a Predictor Variable? *The Journal of Nutrition*, 121(3), 408-415.
- Centers for Disease Control. 2013. The State of Aging and Health in America 2013. Retrieved from <http://www.cdc.gov/aging/pdf/state-aging-health-in-america-2013.pdf> on December 18, 2013.
- Centers for Disease Control (CDC). 2013. The State of Aging Health in America 2013. Retrieved from <http://www.agid.acl.gov/DataGlance/> on May 5, 2015.
- Centers for Medicaid and Medicare Services. Tuesday, July 11, 2006. Medicaid Spending Projections Down Again, Reflecting Effective Federal and State Steps to Slow Spending Growth.

- Centers for Medicaid and Medicare Services. 2013. National Health Expenditure Projections 2012-2022 Forecast Summary. Retrieved from <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/National-Health-Expend-Data/Downloads/Proj2012.pdf>
- Coulston, Ann M., Lisa Craig, and Anne C. Voss. 1996. Meals-on-Wheels Applicants Are A Population at Risk for Poor Nutritional Status. *Journal of the American Dietetic Association*, 96(6), 570–573
- Dwyer. 1991. Screening Older Americans' Nutritional Health: Current Practices and Future Possibilities. Washington, DC: The Nutrition Screening Initiative
- Frongillo, E. A., Isaacman, T. D., Horan, C. M., Wethington, E., & Pillemer, K. (2010). Adequacy of and Satisfaction with Delivery and Use of Home-Delivered Meals. *Journal of Nutrition for the Elderly*, 29(2), 211–226. doi:10.1080/01639361003772525
- Galanos, Anthony N., Carl F. Pieper, Joan C. Cornoni-Huntley, Connie W. Bales, and Gerda G. Fillenbaum. 1994. Nutrition and Function: Is There a Relationship Between Body Mass Index and the Functional Capabilities of Community-Dwelling Elderly? *Journal of the American Geriatric Society*, 42, 368–373.
- German, P. S. November 1981. "Measuring Functional Disability in the Older Population." *American Journal of Public Health* 71, no. 11:1197-99.
- Graf, Carla. MS, APRN., B. 2007. The Lawton Instrumental Activities of Daily Living (IADL) Scale. The Hartford Institute for Geriatric Nursing. New York University, College of Nursing.23.

Greenlee, Kathy. June 21, 2011. Senior Hunger and the Older Americans Act Testimony.

Committee on Health, Education, Labor and Pensions Subcommittee on Primary Health and Aging United States Senate. U.S. Department of Health and Human Services (HHS).

Retrieved from <http://www.hhs.gov/asl/testify/2011/06/t20110621a.html> on June 1, 2015.

Gunderson, Craig. Ribar, David C. 2007. Food Insecurity and Insufficiency at Low Levels of Food Expenditures. *Review of Income & Wealth*. Vol. 57 Issue 4, p704-726. 23p.

Hair J, Anderson R, Tatham R and Black W. 2006. *Multivariate Data Analysis*. NJ: Pearson/Prentice Hall, Incorporated.

Hodes, Richard J. M.D., 2013. About NIA. National Institute on Aging (NIA). National Institute of Health. Retrieved from <http://www.nia.nih.gov/about> on February 19, 2013.

Hyer, Lee., Intrieri, Robert C. 2006. *Geropsychological Interventions in Long-Term Care*. Springer Publishing Company. New York, New York.

Institute of Medicine (2003) *The Role of Nutrition in Maintaining Health in the Nation's Elderly*. National Academy Press, Washington, D.C.

Issel, L. Michele, PhD, RN. 2009. *Health Program Planning and Evaluation: A Practical and Systematic Approach for Community Health*. Second Edition. Jones and Bartlett Publishing. Boston, Massachusetts. 461.

Jensen, Gordon L., Kimberly Kita, Judith Fish, Duane Heydt, and Carolin Frey. 1997. Nutrition Risk Screening Characteristics of Rural Older Persons; Relation to Functional Limitations and Health Care Charges. *American Journal of Clinical Nutrition* 66, 819–828.

Katz, S., and A. Akpom. 1976. "A Measure of Primary Socio-Biological Functions." *International Journal of Health Services* 6, no. 3:493-508.

- Klesges, Lisa M., Marco Pahor, Ronald I. Short, Jim Y. Wan, Jeff D. Williamson, and Jack M. Guralnik. 2001. Financial Difficulty in Acquiring Food Among Elderly Disabled Women: Results from the Women's Health and Aging Study. *American Journal of Public Health*, 91(1), 68–75.
- Kronld, M. and Coleman, P., Lau, D. 2008. Helping Older Adults Meet Nutritional Challenges. *Journal of Nutritional Elder*. 27(3-4):205-20.
- Lawton, M.P., & Brody, E.M. (1969). Assessment of Older People: Self-Maintaining and Instrumental Activities of Daily Living. *The Gerontologist*. 9(3), 179-186.
- Lee, Chung Ja, Susan Templeton, and Changzheng Wang. 1995. Meal Skipping Patterns and Nutrient Intakes of Rural Southern Elderly. *Journal of Nutrition for the Elderly*, 15(2), 1–14.
- Lee, J. S. (2002). Understanding Targeting in the Elderly Nutrition Program: Focus of Food Insecurity: UMI Dissertation Services, ProQuest Information and Learning, Ann Arbor, MI.
- Lyons, Beverly P., 2013. Nutrition Education Intervention with Community-Dwelling Older Adults: Research Challenges and Opportunities. *Journal of Community Health*. 2014. 39:810–818.
- Mayo, Rachel M. and Cheryl J. Rainey. 2001. What We Think They Think: Health Professionals Views of Nutritional Beliefs and Practices of Low Income Older Women. *Journal of Nutrition for the Elderly*, 20(4), 19-41.
- McLaughlin, D. K. , & Jensen , L. 1998. The Rural Elderly: A Demographic Portrait . In R. T. Coward & J. A. Krout (Eds.), *Aging in Rural Settings: Life Circumstances & Distinctive Features*. New York: Springer; 15 – 43.

- 64

- Salmon, Mary Anne P., PhD., Gooden, Jessalyn. Food Insecurity and Hunger among Homebound Older Adults in the Rural South: A Study of People on the Waiting List for Home-Delivered Meals.
- Schoenberg, Nancy E. 2000. Patterns, Factors, and Pathways Contributing to Nutritional Risk Among Rural African American Elders. *Human Organization*, 59(2), 234–244.
- Schoenberg, Nancy E., Raymond T. Coward, Gregg H. Gilbert, and Russel A. Mullens. 1997. Screening Community-Dwelling Elders for Nutritional Risk: Determining the Influence of Race and Residence. *Journal of Applied Gerontology*, 16(2), 172–189.
- Scott, R.I. Wehler, C.A. 1998. Food Insecurity/Food Insufficiency: An Empirical Examination of Alternative Measures of Food Problems in Impoverished U.S. Households. Institute for Research on Poverty Discussion Papers
- Sharkey, J. R. (2003). Risk and Presence of Food Insufficiency Are Associated with Low Nutrient Intakes and Multimorbidity Among Homebound Older Women Who Receive Home-Delivered Meals. *The Journal of Nutrition*, 133(11), 3485-3491.
- Sharkey, Joseph R., and Pamela S. Haines. 2001. Black/White Differences in Nutritional Risk Among Rural Older Adults: The Home-Delivered Meals Program. *Journal of Nutrition for the Elderly*, 20 (3), 13–27.
- Sinnett, Stephanie. 2009. The Ability of the Nutrition Screening Initiative Determine Checklist to Evaluate the Nutrition Risk Status of Older Georgians.
- South Carolina Lieutenant Governor’s Office on Aging (LGOA). September 2005. Annual Accountability Report FY 2004-2005.
- South Carolina Lieutenant Governor’s Office on Aging (LGOA). September 17, 2012. Annual Accountability Report FY 2011-2012.

- South Carolina Bar Public Services Division and the Lieutenant Governor's Office on Aging (LGOA). 2013. South Carolina Senior Citizens' Handbook: A Guide to Laws and Programs Affecting Senior Citizens.
- Travis, Shirley S., McAuley, William J. 1990. Hospitalization Experiences in the Long-Term Care Trajectories of a Medicaid Cohort. *Applied Nursing Research* 5(1):20-25
- United States Census. November 2011. The Older Population: 2010. 2010 Census Briefs.
- United States Department of Agriculture (USDA). 2013. Supplemental Nutrition Assistance Program (SNAP). Retrieved from <http://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program-snap> on February 13, 2014.
- United States Department of Health and Human Services (DHHS). 2010. Secretary's Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020 Healthy People 2020: An Opportunity to Address Societal Determinants of Health in the U. S.
- Shelkey, Mary. Wallace, Meredith. 2012. Katz Index of Independence in Activities of Daily Living (ADL). The Hartford Institute for Geriatric Nursing, New York University, College of Nursing. Retrieved from The Gerontological Society of America.
- Warren, Cael. Owen, Greg. Ulstad, Karen. April 2012. A Review and Comparison of Current Service Models for Title III Funded Home-Delivered Meals. Wilder Research
- Weimer, Jon P. 1997. Many Elderly at Nutritional Risk. *Food Review*, 20(1), 42–49.
- Werner, Carrie. November 2011. The Older Population: 2010. 2010 Census Briefs. US Department of Commerce Economics and Statistics Administration. United States Census Bureau. Retrieved from <https://www.census.gov/prod/cen2010/briefs/c2010br-09.pdf> on May 21, 2015.

- White, Jane V. 2001. "Issue of Concern to Older Americans." FDCH Congressional Testimony.
- Wilcox S, Castro C, King AC, Houseman R, Brownson RC. 2000. Determinants of Leisure-Time Physical Activity in Rural Older and Ethnically Diverse Women in the United States. *Journal of Epidemiology and Community Health*. 54:667-672.
- World Health Organization (WHO). June 19-22, 1946. Constitution of the World Health Organization. International Health Conference, New York.

CHAPTER 4

EVAUATION OF SOUTH CAROLINA OLDER ADULT STATE-BASED HOME- DELIVERED MEAL PROGRAM

4.0 Abstract

Purpose: To analyze data obtained by staff working at regional Area Agencies on Aging (AAA) and or Aging and Disability Resource Centers (ADRCs) using the South Carolina Lieutenant Governor's Office (LGOA) on Aging Assessment/Reassessment instrument between the years of 1999-2013 for relationships between receipt of hot and frozen home-delivered meals and participants' self-reported perceptions of food insufficiency and food insecurity. **Methods:** Secondary data analyses were conducted among men and women (N=28,115) over 60 years of age who had requested or received home-delivered meals through the AAAs or ADRCs. Perceptions of food insufficiency were measured by the item: "Do you have less than a three day supply of food on hand," perceptions of food insecurity were measured by the item: "have you ever gone without food because you could not afford it?". **Results:** Participants in the frozen home-delivered meal program showed a significant predictive increase (p-value <0.05) of perceived food insufficiency (p-value 0.02; β -0.02). Food insecurity did not have a significant predictive relationship among hot or frozen home-delivered meal participation. Rurally located, African American widows, who were high school graduates (p-value<0.05) all reflected significant predictive relationships with program participation. **Conclusions:** Study findings indicate that state-based home-delivered frozen meal delivery program significantly increased

participant's predictive sense of food insufficiency; however perceptions of predictive food insecurity were not significant. The home-delivered meal program needs to be re-examined to determine its predictive value within South Carolina's state-based older adult services program.

4.1 Introduction

This manuscript investigated the success of the State of South Carolina's Office on Aging home-delivered meals service as indicated by improved predictive nutritional status, and reduced predictive perceptions of food insecurity and food insufficiency among program users. The researcher examined predicted nutritional status of those who regularly received home-delivered meals, and completed baseline and subsequent reassessments. Findings were self or caregiver reported, and were collected by the State of South Carolina's Office on Aging staff.

4.2 Background

Nutritional Needs of Older Adults in South Carolina

Current data stipulate that approximately 37% to 40% or roughly six million older adults have faced the threat of hunger, and roughly 80% of those sampled have diets that require improvement (Greenlee, 2011; Ziliak & Gunderson, 2008; White, 2001). It is further estimated that half of these at-risk older adults have incomes above the Federal poverty line yet they have had difficulty acquiring nutritionally adequate and safe foods due to a lack of resources (Greenlee, 2011). When nutritional risk is left untreated, it can lead to increased risk of chronic diseases (Ziliak & Gunderson, 2008), need for services, increased disability and mobility, and subsequently morbidity (Galanos et al., 1994; Jensen et al., 1997; Posner et al., 1994; Robertson, 2000, Ziliak & Gunderson, 2008) and expensive institutionalization (Robertson, 2000 & Sharkey, 2003).

In South Carolina only three out of ten eligible seniors participate in the Supplemental Nutrition Assistance Program (SNAP) (\$908 net which is approximately \$200 month) (LGOA, 2013). SNAP is a federally-based program which offers nutrition assistance to millions of eligible, low-income individuals and families.

4.3 Purpose

For the purpose of this research, the dependent variables are nutritional status and perceptions of food insecurity and food insufficiency. Nutritional status was quantitative with the greater scores (values) indicating worse outcomes, and self-perceptions of food insecurity and food insufficiency were dichotomous (yes/no answers). The independent variables were home-delivered meals and demographic variables such as age, marital status, rural status, monthly income, race, educational attainment, and gender were also investigated as to their relationship with participant outcomes.

ANOVA and regression analyses were conducted to determine the relationship between the aforementioned dependent variables, and the independent demographic variables and home-delivered meal services. The data were obtained by the South Carolina Lieutenant Governor's Office on Aging between the years of 1999-2013. This secondary data analyses consisted of quantitative data with a robust data sample of approximately 28, 551 observations.

ANOVA analyses were used as it allowed for repeated investigation of change over time, from one assessment to the next, the data sets were not exclusive of one another, and included both quantitative and qualitative values representing perceptions of food insecurity and food insufficiency (Issel, 2009).

Regression analyses was used to examine the influence of various independent variables such as age, race, educational attainment, monthly income, gender, marital status, and rural residency, on predicted nutritional status, and feelings of food insecurity and food insufficiency values of program participants. To address the increase of potential physical disabilities, cognitive impairments, chronic diseases manifestations, and other general declines in health as one ages (CDC, 2013), the researcher restricted data assessment/reassessment findings to only two years of consecutive data per client.

4.4 Research Question

How does the state's home-delivered meal program impact and predict participants' sense of food insecurity and/or food insufficiency?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of food insecurity and food insufficiency values, and A2 are those values after program services have been rendered and subsequent assessments obtained.

The researcher hypothesized that as home-delivered program resources are used predicted nutritional values will be reduced illustrating improvement, and predicted perceptions of food insufficiency and food insecurity values will decrease to again reflect improvement.

4.5 Literature Review

Home-delivered Meal Program History

The home-delivered meals program provides nutritious meals to homebound individuals who cannot easily access a senior center for meals or who experience trouble with either shopping or cooking due to mobility limitations resulting from physical or mental health problems (Frongillo, 2010). For many, nutritious meals delivered to the home are crucial for healthy aging and the prevention of chronic disease and further disability (Frongillo, 2010; CDC, 2013, Sharkley et al., 2001 and Salmon and Gooden, n.d.). The home-delivered meal program also provides a unique opportunity for area volunteers or staff members delivering the meals to provide social contact and support for the homebound participants.

Food Insufficiency

Food insufficiency is defined as having restricted household food stores, and food insecurity is viewed as a more severe version of food insufficiency which includes the available food resources (Scott and Wehler, 1998). Whereas food insufficiency might be described as hunger, insecurity is defined as the inability to obtain nutritionally adequate food (Scott and Wehler, 1998). This question from the SC LGOA Assessment/Reassessment instrument was used to assess food insufficiency: “Do you have less than a three day supply of food on hand?” (See Appendix E Supporting Document 5.6-1 South Carolina Lieutenant Governor’s Office on Aging Assessment/Reassessment).

Food Insecurity

Food insecurity is the effect of the inability to access or consume enough food for a healthy active life, and is viewed as a more severe version of food insufficiency (Campbell,

1991). To be food secure, one must have the availability of nutritionally adequate and safe food, and have the ability to acquire personally acceptable foods in a legal way. Food insecurity exists whenever food security is limited or uncertain (Campbell, 1991). Since food insecurity statistics have been calculated, the highest proportion of food insecure households was in 2008 in which almost 50 million Americans were food insecure (Nord et al., 2009).

The Nutrition Screening Initiative

Proper nutrition has long been considered to be a foundational element in one's health, playing a dominant role in disease prevention, quality of life, and independent living (Dwyer, 1991; Posner & Levine 1991; Posner, et al., 1987, and Posner et al., 1994). Risk for adverse health outcomes and chronic diseases increases with age, but Posner et al. (1991) estimated that proper nutrition could improve the health status of nearly 85% of older adults with one or more chronic conditions. The Nutrition Screening Initiative was born from an effort to quantify and assess the nutritional status of older persons. The screening's checklist was designed as a short self-administered risk appraisal including 14 items derived from peer-reviewed research on associations between nutritional behaviors and adverse health outcomes. The items, answered by "yes" or "no" responses, are listed below (Posner, 1994):

1. Because of an illness, I have changed the kind or amount of food I eat.
2. I usually eat less than two meals per day.
3. I eat few fruits and vegetables or milk products.
4. I have three or more drinks of beer, liquor, or wine almost every day.
5. I have tooth or mouth problems that make it hard for me to eat.
6. I have swallowing problems that make it hard for me to eat.
7. Sometimes I don't have enough money to buy the food I need.

8. I eat alone most of the time.
9. I take three or more different prescribed or over-the-counter drugs a day.
10. I have three or more different vitamin or mineral pills a day.
11. Without trying to, I have lost 10 or more pounds in the past 6 months.
12. Without trying to, I have gained 10 or more pounds in the past 6 months.
13. I am not always physically able to shop, cook, and/or feed myself.
14. I am 80 years old or older.

Based upon risk appraisal responses, nutritional risk may be quantified to predict overall perceived health status and identify persons whose estimated nutrient intakes fall below current recommended daily allowances (RDAs) as stated by the USDA (Posner, 1994).

The nutritional scoring tool that was investigated within this research was a direct subset of the questions identified by Posner and associates in 1993.

The Nutrition Screening Initiative checklist is recommended and used by the American Academy of Family Physicians, The American Dietetic Association, and the National Council of the Aging. However, some researchers question its ability to correctly predict nutritional deficiencies in community dwelling older adults (Sinnott, 2007). Posner and colleagues (1994) tested the checklist for its sensitivity and specificity, but not for reliability and validity. Nevertheless, the checklist's ease of use and ability to predict nutritional status has continued to make this tool popular with researchers. A subset of the checklist items is included in the LGOA Assessment/Reassessment instrument but reliability and validity of the items were not calculated for this study as the LGOA dataset only includes aggregate values.

4.6 Methodology

The methodology used in this study was a secondary analysis of quantitative data collected between 1999 and 2013 by AAA/ADRC staff using the LGOA Assessment/Reassessment instrument. The original dataset included approximately 100,500 observations, however approximately 67% of respondent data were dropped because dependent variable information was unavailable or subsequent assessment information was missing which could be due to attrition, the end of service needs, or death. The final analytic sample included 28,551 observations.

Food Insufficiency and Food Insecurity Measurements

Participant perceptions of food insufficiency reflect increasingly severe conditions associated with the adequacy and variety of the household's diet and subsequently with their levels of consumption (Gundersen and Ribar, 2007). However, the food insecurity scale is often derived from a myriad of questions such as "Did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food," (Gundersen and Ribar, 2007) or in the case of this research "Have you ever gone without food because you could not afford it?" (See Appendix D Supporting Document 5.6-1). There are clear distinctions between food insecurity and insufficiency measurement techniques, with food insecurity addressing conditions of food anxiety, or incidences of skipped meals that the food insufficiency question does not address. Both measures however, are similar in describing the adequacy and availability of food. For the purpose of this research the dependent variables were food insecurity "gone without food because you could not afford it" and for food insufficiency "do you have a three day supply of food on hand?"

Nutritional statuses were quantitative with the greater scores (values) indicating worse outcomes while food insufficiency and food insecurity were assessed using “yes” or “no” answers.

For the purpose of this research, nutritional status scores were derived via summation of the nutritionally based questions adopted from the Nutrition Screening Initiative (See Appendix C Table 5.6-3 Nutritional Scoring). Nutritional status can decline with advancing age due to lack of transportation or lack of access to nutritious food, but group meal programs and home-delivered meal service can prevent or reduce this decline (AoA, 2013; Krondl et al., 2008; Sharkley, 2003).

For the purpose of this research, the dependent variables were participant perceptions’ of food insufficiency, food insecurity, and nutritional status. The food insufficiency and food insecurity dependent variables are dichotomous with “yes” or “no” answers while nutritional status remained quantitative with the greater scores (value) indicating worse outcomes. The independent variables are participation in the LGOA state-based home-delivered meal services, marital status, age, rural status, monthly income, race, educational attainment and gender and were investigated as to their relationship with receipt of LGOA services. Marital status was categorized as currently married, single (divorced or never married), and widowed categories. Rural status was indicated if a participant lived in any area that was not defined as urban. Urban areas were defined as areas which included a central place and its adjacent densely populated territories with a combined minimum population of 50,000, and/or a place designated by the census with 20,000 or more inhabitants. The two categorizations for rural status were rural (yes) or urban (no).

Monthly income included the following forms of monetary payment to the participant: job, social security, supplemental security income, veteran affairs payments, pension, and any other uncategorized form of payment. Income values remained as a continuous quantitative variable.

The participant indicated race as most closely identifying with one of the following races: African American/Black, American Indian/Alaskan, Asian, Hawaiian/Pacific Islander, or White. The participant could also indicate their racial designation as some other race, or as two or more races. The responses were designated into the following two categories: African American and Other Race.

Educational attainment was indicated as the participant chose one of the following categories to best define their successful level of educational completion: less than 3rd grade, 3rd-8th grade, some high school, high school graduate, some college, and college graduate.

Gender was indicated with a male or female answer. Participants whom chose to provide an answer of refused or unknown value for their rural status, income, marital status, race, educational attainment or gender were coded as missing and henceforth excluded from the data analysis.

Data Analysis

Data were collected between 1999 and 2013 by AAA/ADRC staff using the LGOA Assessment/Reassessment instrument and 28,115 observations were analyzed. Regression analysis was used to determine the relationship between receipt of home-delivered meals service with self-reported participant nutritional status and perceptions of food insufficiency and food

insecurity both at baseline assessment and subsequent assessment approximately one year after home-delivered meal services were rendered.

Regression analyses was used to examine the presence of significant correlations among various independent variables (Isell, 2009) such as age, income, gender, marriage status, educational attainment, and home-delivered meal service participation. Food insecurity and food insufficiency values were converted to quantitative scores which allowed the researcher to answer the following question, “To what extent is there a decline in food insecurity or food insufficiency from one assessment to another?.” Effectiveness of the state’s home-delivered meal service was indicated by improved nutritional scores representing nutritional status and improved participant perceptions of food insufficiency and food insecurity (See Appendix A Table 5.6-1: Recoding Key).

4.7 Results

Of the sample population 21,128 were female and 7,423 were males (N=28,551). Approximately 68% (N=19,414) of the participants were classified as living in rural areas of South Carolina and the majority, 55.1%, (N=15,731) were African American. More than half, 51%, of the older adults were widowed (N=14,561) and approximately 29% (N=8,280) of respondents were high school graduates (See Table 4.7-1: Sample Description of South Carolina Lieutenant Governor’s Office on Aging Assessment). Approximately 73% of respondent data were dropped because dependent variable information was unavailable or, subsequent assessment information was missing, due in part to attrition, end of service needs, or death.

**Table 4.7-1: Sample Description of South Carolina Lieutenant Governor’s Office on
Aging Assessment**

Variable	Mean/Standard Deviation
Age	73/ 8.3
Gender: Female	74%
Educational Attainment	
> 3 rd Grade	12.9%
3 rd – 8 th Grade	20.3%
Some High School	24.4%
High School Graduate	28.8%
Some College	8.2%
College Graduate	5.3%
Marital Status	
Widowed	51.3%
Divorced	9.0%
Separated	2.3%
Married	24.3%
Single	10.8%
Rural	67.9%
Monthly Income	\$1,072.91/ 0.004
Race	
White	44.1%
African American/Black	55.1%
Other Race	0.63%

N=28,551 * US Census (2011) indicated poverty threshold of \$907.50/month/household

Regression analysis showed no statistically significant improvement in predicted nutritional status among participants after receiving hot home-delivered meals or frozen home-delivered meals (See Table 4.7-2: Older Adult Home-delivered Meal Service Evaluation on Nutritional Status).

Age, monthly income, and marital status of program participants were highly correlated with predicted nutritional status. The effect of age on nutritional status was significant (p-value <0.05, β -0.03) indicating that with each unit of age (increase of one year) nutritional status was

predicted to improve (decrease) by 0.03 units. The effect of income on nutritional status was also significant (p-value <0.05; β 0.05) illustrating that with each decreased unit of income nutritional status was predicted to worsen by 0.05 units. The effect of marital status on nutritional status was also significant (p-value <0.05; β -0.04) illustrating that with each categorical unit of marital status (i.e. moving from married to widowed) nutritional status was predicted to improve by 0.04 units. The R^2 measure of variance however was weak at 5% which may be interpreted as the variables of age and monthly income having the ability to explain or predict only 5% of the variability of nutritional status of the individual being sampled.

Table 4.7.2: Older Adult Home-delivered Meal Service Evaluation on Nutritional Status

Variables	Nutritional Status		
	Coefficients		P
	β	SE β	
Age	-0.032	0.017	0.000
Monthly Income	0.045	0.031	0.000
Marital Status	-0.040	0.063	0.000

Food Insecurity and Food Insufficiency

Participants in the frozen home-delivered meal program showed significant decrease in that for every frozen food unit, participants' sense of food insufficiency was predicted to worsen by 0.02 units. Age (p-value 0.03; β -0.02), income (p-value <0.05; β 0.04), educational attainment (p-value 0.01; β 0.02), and rural status (p-value 0.02; β 0.02) all demonstrated statistically significant predictive relationships with relation to food insufficiency perceptions. With every additional categorical increase in educational attainment (i.e. some high school to high school graduate), participants' sense of food insufficiency were predicted to improve 0.02

units. With every additional categorical increase in age (i.e. those aged 60-65 to those aged 66-70), food insufficiency perceptions were predicted to worsened by 0.02 units. (See Table 4.7-2: Older Adult Home-delivered Meal Service on Perceptions of Food Insufficiency and Food Insecurity). The effect of rural status on perceptions of food insufficiency were also significant (p-value <0.05, β 0.02) indicating that with each unit increase (movement from urban to rural) food insufficiency was predicted to improve by 0.02 units. The effect of income on perceptions of food insufficiency were also significant (p-value <0.05; β 0.04) thus acknowledging that with each increased unit of income food insufficiency perceptions were predicted to improve by 0.04 units.

While hot home-delivered meals showed no statistically predictive significant relationship with nutritional status, food insecurity did not have a significant predictive relationship among hot (p-value 0.57) or frozen (p-value 0.71) home-delivered meal participation. Age (p-value <0.05; β -0.05) and income (p-value <0.05; β -0.08) were all significantly associated with predictive perceptions of food insecurity. With every additional categorical increase in age (i.e. those aged 60-65 to those aged 66-70), food insecurity perceptions were predicted to worsen by 0.05 units. (See Table 4.7-3: Older Adult Home-delivered Meal Service on Perceptions of Food Insufficiency and Food Insecurity). The effect of income on perceptions of food insecurity indicated that with each increased unit of income food insecurity perceptions were predicted to worsen by 0.08 units.

Further analysis was conducted to investigate the possibility of additive effects from both hot and frozen home-delivered meal services on predicted nutritional status, perceptions of food insecurity, and food insufficiency however no statistical significances were observed. These findings however unfortunate did reflect existing research which has shown the following

characteristics: being homebound, having low income, having functional limitations, and being members of minority groups, have all been linked to higher than normal nutritional risk and/or barriers to good nutritional practices (Klesges et al., 2001; Lee et al., 1995; Mayo and Rainey, 2001; Payette et al., 1995; Quandt and Chao, 2000; Schoenberg, 2000; Schoenberg et al., 1997; Sharkey and Haines, 2001; Weimer, 1997; and Salmon and Gooding, n.d.)

4.7.3: Regression Analysis of Older Adult Home-delivered Meal Service on Food Insufficiency and Food Insecurity

Perceptions of Food Insufficiency and Food Insecurity

Variables	Food Insufficiency		
	Coefficients		P
	β	SE β	
Frozen Meals	-0.018	0.048	0.021
Educational Attainment	0.021	0.002	0.007
Age	-0.017	0.002	0.034
Rural Status	0.018	0.007	0.017
Monthly Income	0.037	0.004	0.000
Food Insecurity			
Age	-0.050	0.003	0.001
Monthly Income	-0.078	0.005	0.000

4.8 Summary

Participants in the frozen home-delivered meal program showed a significant increase of predicted perceived food insufficiency (72%) while food insecurity did not have a significant

relationship with hot home-delivered meal participation. These frozen meal delivery service was designed to allow the participants the freedom to consume the meal at their leisure and convenience, however it does not take into account the difficulty that participants face with warming or cooking the food. The AoA reported in 2014 that approximately 9,000 older adults in South Carolina experience three or more difficulties with instrumental activities of daily living (IADLs), and over 4,500 older adults are experiencing major mobility issues as denoted by a score of three or more on Katz's activities of daily living (ADLs) scale (Katz, 1976). These ADL and IADL scales include residents' ability to cook, clean, microwave, etc. independently (Lawton and Brody, 1969; Katz, 1976). All of these abilities are essential to benefitting from frozen home-delivered meal services, and negating these limitations could counteract the benefit and expense of such services.

Frongillo, Isaacman, Horan, Wethington and Pillemer attest in their 2010 study which examined the adequacy and satisfaction levels of home-delivered meal program participants that approximately a quarter of the recipients were not satisfied with their meals in terms of taste, variety, ease of preparation, cultural or religious accommodations or healthiness. The participants whom reported the greatest satisfaction were receiving predominately hot food, did not experience major hearing, mobility, or emotional health issues, and they enjoyed high levels of social and religious support (Frongillo et al., 2010). Furthermore, because perceptions of food insufficiency among older adults are often coupled with progressively severe conditions associated with nutritional deficiencies and hunger (Gunderson & Ribar, 2007).

There was no significant predictive increase or decrease in nutritional status among participants after receiving hot home-delivered meals or frozen home-delivered meals. This finding is troubling in that the very purpose of the home-delivered meal program is to ensure that

eligible older adults who are homebound receive at least one nutritionally balanced meal five days a week to their own homes so they may maintain a maximum level of nutritional health (AoA, 2014; Greenlee, 2011). These findings suggest that these home-delivered meals are not predictive in reaching their goal of providing a nutritional health benefit, and are falling very short of their goal to provide a maximum level of nutritional health. Upon investigation of national, Georgia, and North Carolina state-based older adult nutritional program comparisons it became increasingly apparent that states which are faced with such high proportions of low income, rurally located, disabled older adults (DHHS, 2015) any nutritional program would be facing an uphill battle.

4.9 Conclusion

The home-delivered meal services offered by the State of South Carolina serves an older population of primarily African American women whom are living in rural towns and cities and at the time of the assessment were widowed. The average age of their clients is 67 and the majority of these participants were high school graduates. The home-delivered meal program in 2012 served over 11,000 clients, 1.8 million units of meals, with an expense estimated to be above 4.1 million dollars. Findings suggest that perceptions of food insufficiency and food insecurity were not predicted to benefit by participation in home-delivered meal program. Overall nutritional status scores were not impacted by the hot or frozen home-delivered meal services program either. One of the strategic objectives of the home-delivered meal program is to provide nutritious meals to homebound older adults in South Carolina (LGOA, 2005) and this program seems to be falling short of their goal. If hot or frozen home-delivered meals cannot predict and benefit the nutritional needs of program users, it is this author's suggestion that future evaluation efforts are needed and program leaders should reevaluate program efforts to

determine what needs are not being met. The nutritional scoring tool should also be investigated as to its ability to correctly predict nutritional status in this population.

Another suggestion mentioned by Kathy Greenlee during her Senior Hunger and the Older Americans Act Testimony in 2011 includes the encouragement and assistance of state agencies and area agencies on aging to concentrate resources to develop greater alignment of goals, and encourage the creation and execution of comprehensive and coordinated systems. If South Carolina works with demographically similar states, such as North Carolina and Georgia, perhaps a system of best practices for older adult nutritional programming protocol may begin to further expand the correlations between home-delivered meals and nutritional improvements so that they may become in time statistically significant.

Given the duration of the data collection, to include the estimated turnover of LGOA program staff, attrition of participants, and self-reported assessment findings the obtainment of high quality data can be challenging. Further, variability in interpretation of data items and the diversity of assessment collectors across sites (threats to inter-rater reliability) introduce additional trepidations regarding the utility of the assessments' data sets as viable sources of information that can inform effectively on programmatic outcomes. It is this researcher's suggestion that these findings should serve as a springboard for future program evaluation efforts. Because of some limitations in data quality, the authors hesitate to make definitive conclusions, but anticipate that additional analysis of the SC LGOA dataset will validate our findings and provide a stronger basis upon which to modify and/or improve the delivery of aging services in SC.

4.10 References

- Administration on Aging (AoA). 2014. Disease Prevention and Health Promotion Services (OAA Title IIID). Retrieved February 19, 2014, from http://www.aoa.acl.gov/AoA_Programs/HPW/Title_IIID/index.aspx
- American Association of Retired Persons (AARP) Foundation. August 2011. Food Insecurity Among older Adults. Retrieved from http://www.aarp.org/content/dam/aarp/aarp_foundation/pdf_2011/AARPFoundation_HungerReport_2011.pdf on February 5, 2014.
- Bryant, Lucinda L., Whitelaw, Nancy A. June 2006. Evaluation of Health Promotion Programs for Older Adults: An Introduction. *Journal of Applied Gerontology*, 25 (3). 197-213. (17)
- Campbell, C. C. (1991). Food Insecurity: a Nutritional Outcome or a Predictor Variable? *The Journal of Nutrition*, 121(3), 408-415.
- Centers for Disease Control. 2013. The State of Aging and Health in America 2013. Retrieved from <http://www.cdc.gov/aging/pdf/state-aging-health-in-america-2013.pdf> on December 18, 2013.
- Centers for Disease Control (CDC). 2013. The State of Aging Health in America 2013. Retrieved from <http://www.agid.acl.gov/DataGlance/> on May 5, 2015.
- Frongillo, E. A., Isaacman, T. D., Horan, C. M., Wethington, E., & Pillemer, K. (2010). Adequacy of and Satisfaction with Delivery and Use of Home-Delivered Meals. *Journal of Nutrition for the Elderly*, 29(2), 211–226. doi:10.1080/01639361003772525

- Galanos, Anthony N., Carl F. Pieper, Joan C. Cornoni-Huntley, Connie W. Bales, and Gerda G. Fillenbaum. 1994. Nutrition and Function: Is There a Relationship Between Body Mass Index and the Functional Capabilities of Community-Dwelling Elderly? *Journal of the American Geriatric Society*, 42, 368–373.
- Greenlee, Kathy. June 21, 2011. Senior Hunger and the Older Americans Act Testimony. Committee on Health, Education, Labor and Pensions Subcommittee on Primary Health and Aging United States Senate. U.S. Department of Health and Human Services (HHS). Retrieved from <http://www.hhs.gov/asl/testify/2011/06/t20110621a.html> on June 1, 2015.
- Gunderson, Craig. Ribar, David C. 2007. Food Insecurity and Insufficiency at Low Levels of Food Expenditures. *Review of Income & Wealth*. Vol. 57 Issue 4, p704-726. 23p.
- Jensen, Gordon L., Kimberly Kita, Judith Fish, Duane Heydt, and Carolin Frey. 1997. Nutrition Risk Screening Characteristics of Rural Older Persons; Relation to Functional Limitations and Health Care Charges. *American Journal of Clinical Nutrition* 66, 819–828.
- Katz, S., and A. Akpom. 1976. "A Measure of Primary Socio-Biological Functions." *International Journal of Health Services* 6, no. 3:493-508.
- Klesges, Lisa M., Marco Pahor, Ronald I. Short, Jim Y. Wan, Jeff D. Williamson, and Jack M. Guralnik. 2001. Financial Difficulty in Acquiring Food Among Elderly Disabled Women: Results from the Women's Health and Aging Study. *American Journal of Public Health*, 91(1), 68–75.
- Kronld, M. and Coleman, P., Lau, D. 2008. Helping Older Adults Meet Nutritional Challenges. *Journal of Nutritional Elder*. 27(3-4):205-20.

- Lawton, M.P., & Brody, E.M. (1969). Assessment of Older People: Self-Maintaining and Instrumental Activities of Daily Living. *The Gerontologist*. 9(3), 179-186.
- Lee, Chung Ja, Susan Templeton, and Changzheng Wang. 1995. Meal Skipping Patterns and Nutrient Intakes of Rural Southern Elderly. *Journal of Nutrition for the Elderly*, 15(2), 1–14.
- Lee, J. S. (2002). Understanding Targeting in the Elderly Nutrition Program: Focus of Food Insecurity: UMI Dissertation Services, ProQuest Information and Learning, Ann Arbor, MI.
- Mayo, Rachel M. and Cheryl J. Rainey. 2001. What We Think They Think: Health Professionals Views of Nutritional Beliefs and Practices of Low Income Older Women. *Journal of Nutrition for the Elderly*, 20(4), 19-41.
- McLaughlin, D. K. , & Jensen , L. 1998. The Rural Elderly: A Demographic Portrait . In R. T. Coward & J. A. Krout (Eds.), *Aging in Rural Settings: Life Circumstances & Distinctive Features*. New York: Springer; 15 – 43.
- Nord. 2009. Food Insecurity in Households with Children: Prevalence, Severity, and Household Characteristics. ERS Report Summary. US Department of Agriculture.
- Payette, Hélène, Katherine Gray-Donald, Renée Cry, and Véronique Boutier. 1995. Predictors of Dietary Intake in a Functionally Dependent Elderly Population in the Community. *American Journal of Public Health*, 85(5), 677–683.
- Posner, Barbara Millen, Jette, Alan., Smigelski, Charles., Miller, Donald., and Mitchell, Paul. 1994. Nutritional Risk in New England Elders. *Journal of Gerontology (Medical Sciences)* 49(3),M123–132.

- Posner, Barbara Millen., Smigelski, Charles., Krachenfels, MM. 1987. Dietary Characteristics and Nutrient Intake in an Urban Homebound Population. *Journal of the American Dietary Association*. 87:452-6
- Posner, Barbara Millen., Levine, EL. 1991. Nutrition Services for Older Americans: In *Geriatric Nutrition: A Health Professional's Handbook*. Gaithersburg, MD. Aspen Publishers
- Quandt, Sara A., and Dinnie Chao. 2000. Gender Differences in Nutritional Risk Among Older Rural Adults. *The Journal of Applied Gerontology*, 19(2), 138–150.
- Robertson, Robert E. 2000. Food Assistance-Options for Improving Nutrition for Older Americans. FDCH Government Account Reports. Report to Congressional Requesters.
- Salmon, Mary Anne P., PhD., Gooden, Jessalyn. Food Insecurity and Hunger among Homebound Older Adults in the Rural South: A Study of People on the Waiting List for Home-Delivered Meals.
- Schoenberg, Nancy E. 2000. Patterns, Factors, and Pathways Contributing to Nutritional Risk Among Rural African American Elders. *Human Organization*, 59(2), 234–244.
- Schoenberg, Nancy E., Raymond T. Coward, Gregg H. Gilbert, and Russel A. Mullens. 1997. Screening Community-Dwelling Elders for Nutritional Risk: Determining the Influence of Race and Residence. *Journal of Applied Gerontology*, 16(2), 172–189.
- Scott, R.I. Wehler, C.A. 1998. Food Insecurity/Food Insufficiency: An Empirical Examination of Alternative Measures of Food Problems in Impoverished U.S. Households. Institute for Research on Poverty Discussion Papers
- Sharkey, J. R. (2003). Risk and Presence of Food Insufficiency Are Associated with Low Nutrient Intakes and Multimorbidity Among Homebound Older Women Who Receive Home-Delivered Meals. *The Journal of Nutrition*, 133(11), 3485-3491.

- Sharkey, Joseph R., and Pamela S. Haines. 2001. Black/White Differences in Nutritional Risk Among Rural Older Adults: The Home-Delivered Meals Program. *Journal of Nutrition for the Elderly*, 20 (3), 13–27.
- Sinnott, Stephanie. 2009. The Ability of the Nutrition Screening Initiative Determine Checklist to Evaluate the Nutrition Risk Status of Older Georgians.
- South Carolina Lieutenant Governor's Office on Aging (LGOA). September 2005. Annual Accountability Report FY 2004-2005.
- South Carolina Bar Public Services Division and the Lieutenant Governor's Office on Aging (LGOA). 2013. South Carolina Senior Citizens' Handbook: A Guide to Laws and Programs Affecting Senior Citizens.
- United States Department of Agriculture (USDA). 2013. Supplemental Nutrition Assistance Program (SNAP). Retrieved from <http://www.fns.usda.gov/snap/supplemental-nutrition-assistance-program-snap> on February 13, 2014.
- United States Department of Health and Human Services (DHHS). 2015. Data-at-a-Glance (SPR). Administration for Community Living Aging Integrated Database. Retrieved from <http://www.agid.acl.gov/DataGlance/> on June 1, 2015.
- Weimer, Jon P. 1997. Many Elderly at Nutritional Risk. *Food Review*, 20(1), 42–49.
- White, Jane V. 2001. "Issue of Concern to Older Americans." FDCH Congressional Testimony.
- Ziliak, James P., Gundersen, Craig. March 2008. "The Causes, Consequences, and Future of Senior Hunger in America." University of Kentucky. Retrieved from [http://www.nfesh.org/wp-content/uploads/2013/03/Causes+Consequences+and+Future+of+Senior+Hunger+2008.p](http://www.nfesh.org/wp-content/uploads/2013/03/Causes+Consequences+and+Future+of+Senior+Hunger+2008.pdf)df on May 20, 2015.

CHAPTER 5

CONCLUSION

5.0 Overview

The goal of this dissertation was to serve as a program evaluation for the South Carolina Lieutenant Governor's Office on Aging services. The research conducted investigated the success of the State of South Carolina's Office on Aging older adult services on improving participant activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status. The home-delivered meal program was also investigated as to its ability to benefit participants' nutritional status and perceptions of food insufficiency and food insecurity. The relationships identified via the program evaluations of the older adult programs made available by the South Carolina Lieutenant Governor's Office on Aging will be used to make program modifications in subsequent program development strategies.

During a search of existing research related to societal factors and nutritional risks two subsets become apparent. One subset of participants is widowed individuals in good health, regardless of gender are in good health, and who continue to drive and remain independent in their dietary self-management regiment. The other subset is those participants in poor health without adequate services or assistance, who experience continuous difficulties obtaining appropriate home or health-care support. These individuals tend to have little social support and contact, are at increased nutritional risk, and their food preparation abilities and dietary intakes

are substantially limited (Kronl et al., 2008). It is apparent that existing research supports the findings of those older adults participating in the South Carolina state-based services as all dependent variables of nutritional status, ADL and IADL were all statistically associated with rurally residing African American widows, whom were high school graduates.

Older adult programs that proved successful in their attempt to improve nutritional status were transportation and health promotion services. Congregate meals, home care, and home-delivered meals were not associated with any nutritional improvements of the residents in which they served. ADL status was not improved by any state-based older adult service. In fact, hot home-delivered meals exhibited a negative correlation and as with each additional unit of service ADL status decreased significantly. IADL status was worsened by the congregate meal program suggesting the burdening effects, specifically physical demands, experienced while attending congregate meal program by the program users. Health promotion program services as well as transportation services were also shown to better IADL levels in those that participated in such services.

The congregate and home care services currently being rendered by the state did not prove useful in detecting decreased (better) nutritional, ADL or IADL statuses among program service users.

Home-delivered meals did not prove beneficial in lowering the perception of food insufficiency with hot or frozen home-delivered program users.

5.1 Research Questions and Research Findings

Manuscript 1: How effective are the state's home-delivered meals, group meals, home care visits, transportation, and health promotion activity services at improving the participants'

activities of daily living (ADLs), instrumental activities of daily living (IADLs), and nutritional status scores?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of nutritional status, ADL, and IADL values, and A2 are the data collection values upon subsequent assessment(s).

The researcher must reject the null hypothesis and state that health promotion services and transportation services did impact nutritional status and IADL levels beneficially. The null hypothesis is also rejected with relation to ADL and hot home-delivered meals as they served to worsen ADL status. The author cannot reject, and therefore fails to reject the null hypothesis with respect to frozen home-delivered meals and home care visits as they did not impact ADL, IADL or nutritional status negatively or positively (Refer to Table 5.1-1 Program Evaluation Findings).

Manuscript 2: How does the state's home-delivered meal program impact participants' sense of food insecurity/food insufficiency?

H0: $A1 = A2$

Ha: $A1 > A2$

A1 is the baseline assessment of nutritional status, ADL, and IADL values, and A2 are the data collection values upon subsequent assessment(s).

The researcher must reject the null hypothesis and state home-delivered meals did impact perceived food insufficiency levels however they did so negatively. The author cannot reject, and therefore must fail to reject the null hypothesis with home-delivered meals services as they

did not impact nutritional status or perceptions of food insecurity negatively or positively (See Table 5.1-1 Program Evaluation Findings).

Table 5.1-1 Program Evaluation Findings

Services	Improvement or Worsening in Nutritional, ADL or IADL status and/or Perceived Food Insufficiency and Insecurity
Home-delivered Meals	Hot home-delivered meals worsened ADL status and Frozen home-delivered meals worsened perceptions of food insufficiency.
Congregate Meals	In the presence of level 3 home care which worsened IADL status.
Home Care (Levels 1-3)	None observed unless in the presence of health promotion services which improved nutritional status.
Transportation	Nutritional status and IADL status improved
Health Promotion	Nutritional status and IADL status improved

5.2 South Carolina Lieutenant Governor’s Office on Aging: Suggestions Moving Forward

This researcher would suggest that the South Carolina Lieutenant Governor’s Office on Aging needs to re-evaluate their congregate and home care services currently being rendered as they did not prove useful in positively affecting nutritional, ADL or IADL statuses among program service users. In 2012 alone, approximately 14,000 older adults received over 1.1 million units of home care and congregate meal services (LGOA, 2012). Funding for these services is estimated at 4.9 million dollars and based on the findings above this researcher

believes that it would be the state's fiscal responsibility to decrease these services while they are being realigned and/or restructured so that they may reattempt to better the nutritional needs of those participants in which they serve.

The home-delivered meal program which in 2012 served over 11,000 clients, 1.8 million units of meals, with an expense estimated to be above 4.1 million dollars (LGOA, 2013). This program's hot or frozen home-delivered meal services did not prove useful in benefitting the nutritional status, ADL or IADL status of program participants. The demand for the Office on Aging to realign their mission with their programs is paramount. If home-delivered meals cannot benefit the nutritional needs of program users it is this author's suggestion that they delay full funding and reevaluate program leaders to determine what needs are not being met.

The transportation services program in 2012 served over 5,000 residents with approximately 5.9 million miles of assistance, and cost the state just over 3.5 million dollars (LGOA, 2013). This service alone improved nutritional status and IADL values of participating residents as did health promotion services, however the population served and units and cost were not available. The potential for these services is promising and program developers should investigate as to the possibility of expanding current program reach so that more residents might receive such beneficial services.

It is this researcher's suggestion that these findings should serve as a springboard for future program evaluation efforts. Because of some limitations in data quality, the authors hesitate to make definitive conclusions, but anticipate that additional analysis of the SC LGOA dataset will validate our findings and provide a stronger basis upon which to modify and/or improve the delivery of aging services in South Carolina.

5.3 Research Limitations

The effect of age on nutrition, mobility, and overall health status of individuals has long been investigated and proven. It is difficult to overcome such an effect, as represented within the regression models above with an R^2 measure of variance with regards to nutritional status above 70% and ADL status at 90%. This does leave a limited quantity with which programs or services may play a beneficial role.

The data being analyzed is only as good as the data being collected from the participant or from the participant's caregivers. Self-reported surveys and their findings reported within have historically shown to be biased in favor of the participant (Jeffrey, 1996). With a state-based survey from which need based services are rendered it might behoove the survey participant to indicate lower nutritional, mobility and functionality limitations to illustrate their need for limited state-based services. It was previously noted but worth reiterating that more than 70% of the secondary data set had to be dropped and excluded from the data analysis due to poor data quality, inconsistencies, and missing information on programs and program participants. These exclusions are necessary to allow for better variable significance, but leave the possibility of missed correlations or statistically significant relationships considerable.

To address the increase of potential physical disabilities, cognitive impairments, chronic diseases manifestations, and other general declines in health as one ages (CDC, 2013), the researcher restricted data assessment/reassessment findings to only two years of consecutive data per client. Perhaps services such as home-delivered meals, congregate meals, and home care service benefits take longer than two years to improve nutrition, ADL, IADL values and perceptions of food insufficiency and insecurity.

5.4 Discussion

The Meals on Wheels Association of America sponsored research in 2008 which found that approximately six million older adults in the United States are currently facing or have faced the threat of hunger (Ziliak and Gunderson, 2008; and Greenlee, 2011). Surprisingly half of these at-risk older adults had incomes which exceed the Federal poverty line and subsequently reported difficulty in providing nutritionally adequate and safe foods due to a lack of available resources (Greenlee, 2011). Yet, study after study confirm that adequate food and nutrition are important for promoting health, decreasing the risk of chronic disease, maintaining functionality, and helping older adults remain independent at home, and in their communities (Ziliak and Gunderson, 2008; and Greenlee, 2011).

Frongillo, Isaacman, Horan, Wethington and Pillemer attest in their 2010 study which examined the adequacy and satisfaction levels of home-delivered meal program participants that approximately a quarter of the recipients were not satisfied with their meals in terms of taste, variety, ease of preparation, cultural or religious accommodations or healthiness. The participants whom reported the greatest satisfaction were receiving predominately hot food, did not experience major hearing, mobility, or emotional health issues, and they enjoyed high levels of social and religious support (Frongillo et al., 2010). Furthermore, because perceptions of food insufficiency among older adults are often coupled with progressively severe conditions associated with nutritional deficiencies and hunger (Gunderson & Ribar, 2007).

In this researcher's attempt to compare and contrast South Carolina's bordering states to examine their progress in terms of improving the older adult population at high nutritional risk and the results are shown within Table 5.4-1: Older Adult OAA Nutritional Program Comparisons (2011-2013). It becomes apparent that although each state has different program offerings with different methodologies and tracking tools, nutritional risk remains a large problem for states which have, as the research has shown, large populations of older adults who live alone remotely, have low educational attainment with resulting low income thresholds. Definite progress has been made with improvements in nutritional status of 5% nationally, 12.2% in South Carolina, 24.5% in Georgia and worsening nutritional status in North Carolina of 2.3% from the baseline scores in 2011 (DHHS, 2015).

In 2014 the AoA reported approximately 9,000 older adults in South Carolina experience three or more difficulties with instrumental activities of daily living (IADLs), and over 4,500 over the age of sixty are experiencing mobility issues as denoted by a score of three or more on Katz's activities of daily living (ADLs) scale (Katz, 1976). These ADL and IADL scales include residents' ability to cook, clean, microwave, etc. independently (Lawton and Brody, 1969; Katz, 1976). All of these skills are necessary to receive a benefit from frozen home-delivered meal services; it should be noted that negating these limitations could counteract the benefit and exacerbate the expense of such services.

Further research should be investigated to suggest better scoring methods, measurement instruments, and/or greater clinical substantiation of nutritional, ADL, IADL, and perceptions of food insecurity and food insufficiency all of these suggestions aimed at better interpreting self-reported health claims paired with incorporation of best-practices by state as not to squander allocated services to such needy and growing populations.

Table 5.4-1: Older Adult OAA Nutritional Program Comparisons (2011-2013)

	Risks and Services	National	South Carolina	Georgia	North Carolina
2011	High Nutritional Risk	746,248	10,267	8,370	18,619
	Home-Delivered Meals	439,583	7,005	6,364	12,887
	Congregate Meals	310,906	3,898	2,100	5,732
	% Difference in Nutritional Risk (2010 to 2011)	0.42%	24.3%	17.3%	-0.79%
2012	High Nutritional Risk	747,407	9,772	7,840	19,222
	Home-Delivered Meals	439,439	6,776	5,921	13,667
	Congregate Meals	298,210	3,721	2,029	5,555
	% Difference in Nutritional Risk (2011 to 2012)	-0.16%	4.90%	6.54%	-3.19%
2013	High Nutritional Risk	712,823	11,582	7,792	18,894
	Home-Delivered Meals	434,718	7,338	5,923	13,490
	Congregate Meals	289,668	5,054	1,966	5,404
	% Difference in Nutritional Risk (2012 to 2013)	4.74%	-17.0%	0.61%	1.72%
	Net Difference (2011-2013)	5% Improvement	12.2% Improvement	24.5% Improvement	-2.30% Worsening

Source: (Department of Health and Human Services (DHHS). 2015. Data-at-a-Glance (SPR). Administration for Community Living Aging Integrated Database.)

5.5 References

- Administration on Aging (AoA). 2014. Disease Prevention and Health Promotion Services (OAA Title IIID). Retrieved February 19, 2014, from http://www.aoa.acl.gov/AoA_Programs/HPW/Title_IIID/index.aspx
- Frongillo, E. A., Isaacman, T. D., Horan, C. M., Wethington, E., & Pillemer, K. (2010). Adequacy of and Satisfaction with Delivery and Use of Home-Delivered Meals. *Journal of Nutrition for the Elderly*, 29(2), 211–226. doi:10.1080/01639361003772525
- Greenlee, Kathy. June 21, 2011. Senior Hunger and the Older Americans Act Testimony. Committee on Health, Education, Labor and Pensions Subcommittee on Primary Health and Aging United States Senate. U.S. Department of Health and Human Services (HHS). Retrieved from <http://www.hhs.gov/asl/testify/2011/06/t20110621a.html> on June 1, 2015.
- Gunderson, Craig. Ribar, David C. 2007. Food Insecurity and Insufficiency at Low Levels of Food Expenditures. *Review of Income & Wealth*. Vol. 57 Issue 4, p704-726. 23p.
- Jeffery RW. 1996. Bias in Reported Body Weight as a Function of Education, Occupation, Health and Weight Concern. *Addict Behavior*.;21:217–22.
- Katz, S., and A. Akpom. 1976. "A Measure of Primary Socio-Biological Functions." *International Journal of Health Services* 6, no. 3:493-508.
- Kronl, M. and Coleman, P., Lau, D. 2008. Helping Older Adults Meet Nutritional Challenges. *Journal of Nutritional Elder*. 27(3-4):205-20.

- Lawton, M.P., & Brody, E.M. (1969). Assessment of Older People: Self-Maintaining and Instrumental Activities of Daily Living. *The Gerontologist*. 9(3), 179-186.
- Lee, Chung Ja, Susan Templeton, and Changzheng Wang. 1995. Meal Skipping Patterns and Nutrient Intakes of Rural Southern Elderly. *Journal of Nutrition for the Elderly*, 15(2), 1–14.
- Scott, R.I. Wehler, C.A. 1998. Food Insecurity/Food Insufficiency: An Empirical Examination of Alternative Measures of Food Problems in Impoverished U.S. Households. Institute for Research on Poverty Discussion Papers
- South Carolina Bar Public Services Division and the Lieutenant Governor’s Office on Aging (LGOA). 2013. South Carolina Senior Citizens’ Handbook: A Guide to Laws and Programs Affecting Senior Citizens.
- Ziliak, James P., Gundersen, Craig. March 2008. “The Causes, Consequences, and Future of Senior Hunger in America.” University of Kentucky. Retrieved from [http://www.nfesh.org/wp-content/uploads/2013/03/Causes+Consequences+and+Future+of+Senior+Hunger+2008.p](http://www.nfesh.org/wp-content/uploads/2013/03/Causes+Consequences+and+Future+of+Senior+Hunger+2008.pdf)dfon May 20, 2015.

5.6 Appendix

List of Tables

Appendix A Table 5.6-1 Recoding Key for South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment Data

Appendix B Table 5.6-2 Katz Index of Independence of ADL

Appendix C Table 5.6-3 Nutritional Scoring

Appendix D Table 5.6-4 Definitions of Terms

List of Supporting Documents

Appendix E Supporting Document 5.6-1: South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment

Appendix F Supporting Document 5.6-2: Instrumental Activities of Daily Living (IADL) Scale

Appendix A

Table 5.6-1: Recoding Key for South Carolina Lieutenant Governor's Office on Aging

Assessment/Reassessment Data

Variables		Original Code	Recoded	ANOVA
Marriage Status	Married	Unmarried or Single Married Widowed Divorced/Separated	Unmarried or Single Married Widowed Divorced/Separated	Unmarried/Single;
	Unmarried			Married;
	Widowed			Widowed
ADLs	Walking	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
	Dressing	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
	Eating	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4 or 6; Total Dependence =8	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence

	Transferring	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
	Toilet Use	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
	Bathing	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =5	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
	Grooming	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =7	Independent =1; Supervision or Coaching & Assistive Technology =2; Limited Assistance =3; Extensive Assistance =4; Total Dependence =7	Independent; Supervision or Coaching & Assistive Technology; Limited Assistance; Extensive Assistance; Total Dependence
IADLs	Telephone Use	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Food Preparation	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent

	Light Housekeeping	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Heavy Housekeeping	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Modes of Transportation	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Shopping	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Managing Medications	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
	Managing Finances	Independent Needs Some Assistance Dependent	Independent =0; Needs Some Assistance =1; Dependent =2	Independent Needs Some Assistance Dependent
Food Insufficiency	Food Insufficiency	“Do you have a three day supply of food on hand?”	Yes No	Yes = 0 No = 1
Food Insecurity	Food Insecurity	“Gone without food because you could not afford it”	Yes No	Yes = 1 No = 0
Nutritional Status	Nutritional Status	Quantitative Format	Remaining in Numerical Format	Remaining in Numerical Format
Rural Status	Rural as Indicated by Zip Code	Qualitative Format	False = 0 True = 1	False = 0 True = 1
Race	Race	Qualitative Format	Other Race = 0 African American = 1	African American Other Race

Income	Monthly Income	Quantitative Format	Continuous Quantitative Format	<\$99; \$100-\$499; \$500-\$999; \$1,000-\$1,499; \$1,500-\$2,499; \$2,500- \$3,400; \$3,500- \$4,400; \$4,500+
Educational	Educational Attainment	<3rd grade; 3rd-8th grade Some HS; HS Grad; Some College; College Grad	<8th grade=0 Some HS=1; HS Grad=2; Some College=3; College Grad=4	<8th grade Some HS; HS Grad; Some College; College Grad
Age	Date of Birth	Quantitative Format	<65 = Missing; >65 = 1	<65 = Missing; >65

Appendix B

Table 5.6-2: Katz Index of Independence of ADL

Improvement/Independence

Functional Level (0) - Independent

Functional Level (1) - Dependent Bathing

Functional Level (2) - Dependent Bathing and Dressing

Functional Level (3) - Dependent Bathing, Dressing, and Toileting

Functional Level (4) - Dependent Bathing, Dressing, Toileting, and Transferring

Functional Level (5) - Dependent Bathing, Dressing, Toileting, Transferring, and

Continence

Functional Level (6) Dependent Bathing, Dressing, Toileting, Transferring, Continence,

and Feeding (Katz, 1976)

Appendix C

Table 5.6-3 Nutritional Scoring

Nutritional Scoring Questions	Possible Answers	Answer Values
Do you have an illness or condition that has made you change the kind or amount of food you eat?	Yes or No	Yes = 2; No = 0
Do you eat fewer than two meals a day?	Yes or No	Yes = 3; No = 0
Do you eat a few (or less) fruits, vegetables, or milk products a day?	Yes or No	Yes = 2; No = 0
Do you have three or more drinks of beer, liquor, or wine almost every day?	Yes or No	Yes = 2; No = 0
Do you have tooth or mouth problems that make it hard for you to eat?	Yes or No	Yes = 2; No = 0
Do you sometimes not have enough money to buy the food you need?	Yes or No	Yes = 4; No = 0
Do you eat alone most of the time?	Yes or No	Yes = 1; No = 0
Do you take three or more different prescribed or over the counter drugs per day?	Yes or No	Yes = 1; No = 0
Without wanting to, have you lost or gained ten pounds within the last six months?	Yes or No	Yes = 2; No = 0
Are you sometimes physically unable to shop, cook, or feed yourself?	Yes or No	Yes = 2; No = 0
Maximum Points Possible		21

(Posner, 1993)

Appendix D

Table 5.6-4: Definitions of Terms

Terms	Definitions
Activities of Daily Living (ADL)	Activities of daily living (ADLs) include requiring the assistance of other persons with eating, using the toilet- including getting to the toilet, bathing or showering, dressing, getting in or out of bed or chairs, and getting around inside the home (CDC, 2009).
Instrumental Activities of Daily Living (IADL)	Instrumental activities of daily living (IADLs) include daily household chores, shopping doing necessary business, or getting around for other purposes (CDC, 2009).
Food Insufficiency	Food insufficiency is defined as having restricted household food stores (Scott and Wehler, 1998).
Food Insecurity	Food insecurity is defined as the inability to obtain nutritionally adequate food (Scott and Wehler, 1998).

Appendix E

Supporting Document 5.6-1: South Carolina Lieutenant Governor's Office on Aging Assessment/Reassessment

Lieutenant Governor's Office on Aging Assessment/Re-Assessment

☐ New Client ☐ Annual Reassessment ☐ Significant Change in Condition

Initial Contact Date: _____

Status: _____

Unique ID#: _____

Assessment Score: _____

DOB: ____/____/____ ☐ Refused

Nutrition Score: _____

Client Type: ☐ Client/Care Receiver ☐ Caregiver

Target Score: _____

County: _____ Region#: _____

Caregiver Score: _____

Individual Intake Information

Last Name: _____

First Name: _____ Middle Name: _____

Home Phone: (____) _____ Work Phone: (____) _____

Cell Phone: (____) _____ Email: _____

Emergency Contact Information

E Contact Name: _____ E Relationship: _____

E Contact Phone: (____) _____ E Cell Phone: (____) _____ E e-mail: _____

Physical Address: _____

Apt, Lot, Box: _____

City: _____ State: SC Zip: _____

Mailing Address If Different: _____

City: _____ State: SC Zip: _____

Race: (check one) ☐ Refused

- ☐ African American/Black
- ☐ American Indian/Alaskan
- ☐ Asian
- ☐ Hawaiian/Pacific Islander
- ☐ White
- ☐ Some Other Race
- ☐ 2 or more Races
- ☐ Race Missing

Ethnicity: (check one)

- ☐ Hispanic/Latino
- ☐ Non-Hispanic or Non-Latino
- ☐ Unknown
- ☐ Refused

Monthly Family Household Income (Client, Spouse, Dep. Child)

\$ _____ ☐ Refused
\$ _____ Job
\$ _____ SS
\$ _____ SSI
\$ _____ VA
\$ _____ Pension
\$ _____ Other

\$ _____
Total Family Household Income

Total # in Household: # _____
(Client, Spouse, Dep Child) ☐ Refused

DOB Verification ☐ Marriage Certif
☐ Birth Certificate ☐ Verbal
☐ Driver's License ☐ None

Gender: ☐ M ☐ F ☐ Refused

Marital Status

- ☐ Married ☐ Divorced
- ☐ Single ☐ Separated
- ☐ Widowed ☐ Unknown
- ☐ Other

Monthly Expenses: (best estimate)

\$ _____ Food
\$ _____ Prescriptions
\$ _____ Medigap
\$ _____ Housing
\$ _____ Utilities
\$ _____ Phones
\$ _____ Other

\$ _____ **Total Expenses**

Limited English Proficiency: ☐ Yes ☐ No

Primary Language: _____

Appendix F

Supporting Documentation 5.6-2: Instrumental Activities of Daily Living (IADL) Scale

INSTRUMENTAL ACTIVITIES OF DAILY LIVING SCALE (IADL)

M.P. Lawton & E.M. Brody

A. Ability to use telephone

- | | |
|---|---|
| 1. Operates telephone on own initiative; looks up and dials numbers, etc. | 1 |
| 2. Dials a few well-known numbers | 1 |
| 3. Answers telephone but does not dial | 1 |
| 4. Does not use telephone at all. | 0 |

B. Shopping

- | | |
|---|---|
| 1. Takes care of all shopping needs independently | 1 |
| 2. Shops independently for small purchases | 0 |
| 3. Needs to be accompanied on any shopping trip. | 0 |
| 4. Completely unable to shop. | 0 |

C. Food Preparation

- | | |
|--|---|
| 1. Plans, prepares and serves adequate meals independently | 1 |
| 2. Prepares adequate meals if supplied with ingredients | 0 |
| 3. Heats, serves and prepares meals or prepares meals but does not maintain adequate diet. | 0 |
| 4. Needs to have meals prepared and served. | 0 |

D. Housekeeping

- | | |
|--|---|
| 1. Maintains house alone or with occasional assistance (e.g. "heavy work domestic help") | 1 |
| 2. Performs light daily tasks such as dish-washing, bed making | 1 |
| 3. Performs light daily tasks but cannot maintain acceptable level of cleanliness. | 1 |
| 4. Needs help with all home maintenance tasks. | 1 |
| 5. Does not participate in any housekeeping tasks. | 0 |

E. Laundry

- | | |
|---|---|
| 1. Does personal laundry completely | 1 |
| 2. Launders small items; rinses stockings, etc. | 1 |
| 3. All laundry must be done by others. | 0 |

F. Mode of Transportation

- | | |
|--|---|
| 1. Travels independently on public transportation or drives own car. | 1 |
| 2. Arranges own travel via taxi, but does not otherwise use public transportation. | 1 |
| 3. Travels on public transportation when accompanied by another. | 1 |
| 4. Travel limited to taxi or automobile with assistance of another. | 0 |
| 5. Does not travel at all. | 0 |

G. Responsibility for own medications

- | | |
|--|---|
| 1. Is responsible for taking medication in correct dosages at correct time. | 1 |
| 2. Takes responsibility if medication is prepared in advance in separate dosage. | 0 |
| 3. Is not capable of dispensing own medication. | 0 |

H. Ability to Handle Finances

- | | |
|---|---|
| 1. Manages financial matters independently (budgets, writes checks, pays rent, bills goes to bank), collects and keeps track of income. | 1 |
| 2. Manages day-to-day purchases, but needs help with banking, major purchases, etc. | 1 |
| 3. Incapable if handling money. | 0 |

Source: Lawton & Brody, 1969