

UTILIZATION OF THE SOCIO-ECOLOGICAL MODEL  
TO EVALUATE OLDER OKLAHOMANS' ABILITY TO  
GROCERY SHOP, PREPARE FOOD AND EAT

By

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Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
DOCTOR OF PHILOSOPHY  
July, 2011

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## ACKNOWLEDGMENTS

First of all, I would like to offer my heartfelt gratitude to the almighty who bestowed me with a wonderful opportunity to accomplish PhD in Human environmental sciences. No book is ever written alone and no research endeavor is ever taken in solitude. I owe my deep gratefulness to many wonderful people who contributed greatly to the information contained in this dissertation. First and foremost, my sincere thanks to Dr. Janice Hermann, my PhD advisor, for her invaluable support I have received over the months of “writing dissertation” for each segment of the work and the work as a whole. The timely advice and support of my committee members; Dr. Stephany Parker, Dr. Edralin Lucas and Dr. Warde is very greatly appreciated. My special thanks are given to Dr. Christine Johnson for stepping in and agreed to be on my committee when Dr. Warde passed away.

I would also like to thank Chandra Sterling and Carley Booher for their assistance during the data collection period. My grateful appreciation goes to my parents, brother and sister-in-law for their endless support, love and their encouragement in all aspects of my life. Last but not the least; I extend my sincere thanks to the participants of my study whose consent for the inclusion in the study was helpful in the outcome of my work.

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## CHAPTER I

### INTRODUCTON

Aging is an ongoing process that involves gradual changes in the physiological functioning of the body and increased susceptibility to disease. As a result, aging is often perceived as an unwanted occurrence that contributes to functional decline. Nevertheless, advances in nutrition and health care and transformations in social, cultural and economic foundations have contributed to increased life expectancy and improved quality of life among older adults (Kline, 2007).

Despite the significant increase in the longevity and quality of life among older adults in the U.S., some community dwelling older adults are at increased risk of poor nutritional status, degenerative chronic diseases, and functional disability. The risk of poor nutritional status is more evident among older adults who are economically unstable (Evans, 2005). Poor quality diet is a major underlying cause of nutrition related diseases (Weddle et al., 2007). Among older adults, decreased food intake is a major contributor to poor diet quality and low energy intake, which can lead to increased risk of poor nutritional status, as evidenced by weight loss and chronic disease progression (Chen et al., 2001).



Several studies have investigated the effect of numerous factors such as physical wellbeing, emotional wellbeing, functional ability, finances and social support on older adults' food intake and nutritional status (Wylie et al., 1999; Shoenberg, 2000; Sharkey et al., 2002; Ferry et al., 2005; Iizaka et al., 2008). In addition, inability to grocery shop, prepare food, and eat can be a barrier for older adults achieving good nutrition and adequate food intake (Hern, 1995; Sharkey, 2002; Dewolfe & Millan, 2003; Keller & McKenzie, 2003; Evans, 2005; Kiosses & Alexopolous, 2010). Although many factors have been identified as being related to older adults' food intake, limited research has been conducted evaluating factors directly related to older adults' ability to grocery shop, prepare food and eat, particularly within the framework of the socio-ecological model.

The socio-ecological model can provide a framework from which to evaluate the complexity of factors affecting older adults' ability to shop, prepare food, and eat (Fitzgerald, 2009). The purpose of this study was to design an instrument evaluating theoretical factors related to older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal and community socio-ecological model levels of influence. An additional purpose of this study was to determine the instruments construct factors validity and to determine how effective construct factors were in explaining older adult's ability to grocery shop, prepare food, and eat.

## Objectives

The objectives of this study were to:

1. Design an instrument evaluating theoretical factors related to older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal, community socio-ecological model levels of influence.
2. Determine the instrument's construct validity (determine if construct factors are in agreement with the theoretical factors related to older adults' ability to grocery shop, prepare food, and eat).
3. Determine how effective construct factors are in explaining older adult's ability to grocery shop, prepare food, and eat.

## Null Hypotheses

The null hypotheses of this study were:

HO1: There will be no agreement between the construct factors and the theoretical factors related to older adults' ability to grocery shop, prepare food, and eat.

HO2: No construct factors will significantly explain older adults' ability to grocery shop, prepare food, and eat.

## Assumptions

Assumptions of this study were:

1. Participants were 65 years of age or older and had participated in the Supplemental Nutrition Assistance Program (SNAP).
2. Participants accurately understood the survey questions.
3. Participants answered the survey questions honestly.
4. Participants felt comfortable answering the survey questions.

## Limitations

1. Participants answered the survey questions based on their perceptions of the questions.
2. Results of this study cannot be generalized to all limited resource older adults.
3. Participant responses were limited to a five point Likert scale.
4. Technology such as answering machines and caller identification may have contributed to the low response rate.
5. Only older adults 65 years of age and older who had participated in the Supplemental Nutrition Assistance Program (SNAP) with a listed telephone number were solicited to participate in this study.

## Definitions

1. Low income older adults for this study were persons aged 65 and above, who had participated in the Supplemental Nutrition Assistance Program (SNAP).
2. The socio-ecological model is a conceptual framework to understand factors influencing the individual within and across multiple levels of influence such as intrapersonal, interpersonal, and community (Fitzgerald, 2009)..
3. Theoretical factors for this study were based on the literature related to issues which may affect older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal and community socio-ecological model levels of influence.
  - a. For this study, within the intrapersonal level, theoretical factors included "Physical wellbeing," "Emotional wellbeing," "Functional ability," and "Finances and housing."
  - b. For this study, within the interpersonal level, theoretical factors included "Social interaction" and "Social support."
  - c. For this study, within the community level, theoretical factors included "Food assistance programs," "Food availability/access" and "Public transportation."
4. Construct factor analysis is a pattern detection method that reduces the number of items by finding factors that are composed of correlated items (Decoster, 1998).
  - a. For this study, within the intrapersonal level, construct factors included "Emotional wellbeing," "Physical wellbeing," "Dental," "Functional ability," "Finances," and "Housing."
  - b. For this study, within the interpersonal level, construct factors included "Family

interactions,” “Friend interactions” and “Social support.”

c. For this study, within the community level, construct factors included “Food programs,” “Food access,” “Food stamps,” “Food cost and service,” “Public transportation,” and “Free or reduced cost transportation.”

5. Usable response rate in survey research refers to the total number of people who completed the survey divided by the total number of elements of the population attempted to survey minus foreign elements. Usable response rate is usually expressed in the form of a percentage (Warde, 1990).

6. Target population is the population from which the researcher would like to draw inference (Warde, 1990).

7. Survey population is defined as the population from which a valid statistical inference can be drawn (Warde, 1990).

8. Frame is a method of locating all the elements of the survey population uniquely (Warde, 1990).

9. Foreign elements are the elements which appear in the frame, but are not the elements of the survey population. In this study, the foreign elements were disconnected (not in service), no one 65 years of age or older, wrong number, no phone number, and outside the calling area (Warde, 1990).

## CHAPTER II

### REVIEW OF LITERATURE

#### Older Adult Population in the United States

Advances in nutrition and health care have had a dramatic impact on life expectancy in the United States (U.S.) (American Dietetic Association [ADA], 2005). From 1900 to 1990, life expectancy in the U.S. increased from 47 to 76 years, and the percentage of older adults aged 60 and above increased from 6.4% to 18.4% (U.S. Department of Agriculture, 1998). In 2001, life expectancy in the U.S. further increased to 77 years (Congressional Research Service, 2006).

The U.S. ranks second in the world for the number of older adults (Center for Disease Control and Prevention, 2003). Currently, 33 million older adults are estimated to be living in the U.S. and the number of older adults is expected to reach 71 million by 2030, and one billion by 2050 (Schmucker et al., 2001; Center for Disease Control and Prevention, 2003).

A shift in the age-spectrum has also been observed. Between 1900 and 2000 there was a 40-fold increase in older adults aged 85 and above, a 17-fold increase in those aged 75 to 84, and only a 8-fold increase in those aged 65 to 74 (Kline, 2007). U.S. population growth-patterns have also shown region-wide variations in the older adult population, with a higher concentration of older adults living in the South and West (Kline, 2007).

Approximately six million older adults aged 60 and above, are estimated to be living in Oklahoma, which represents approximately 17.8% of the population. In addition, approximately 23.3% of Oklahoma households have one or more persons aged 65 or above (Department of Human Services, Administration on Aging, 2010).

The increased number of older adults, particularly those 85 years of age and older, has been associated with a higher incidence of chronic diseases and a parallel increase in morbidity. This in-turn can create an economic burden on the U.S. Health Care System (Jensen et al., 2001). As a result there is a large demand to promote healthy aging and functional independence among older adults.

### Older Adult's Food Intake

Optimal nutrition has a role in decreasing the risk of chronic disease such as type 2 diabetes, cardiovascular disease and certain types of cancer, which are major contributors to increased morbidity among older adults over 65 years of age. By decreasing disease risk, optimal nutrition can help reduce older adults' medical expenditures and dependency (Sasser et al., 2002; Drewnowski & Shultz, 2001).

Despite the evidence of the importance of good nutrition, some community dwelling older adults are at increased risk of poor nutritional status, degenerative chronic diseases, and functional disability (Evans, 2005). A major underlying cause of these nutrition related diseases is decreased food intake and consumption of a poor quality diet (Weddle et al., 2007).

Unfortunately, many U.S. older adults consume poor quality diets. The USDA Continuing Survey of Food Intakes by Individuals (CSFII) 1994-96 assessed the diet quality of older adults, aged 65 and above, using the Healthy Eating Index (HEI). Older adults had an average HEI score of 67.2, which was categorized as “diet needs improvement.” Older adults had low average HEI scores for milk, fruits, vegetables, grains, milk, meat, saturated fat, and diet variety indicating older adults were not consuming recommended amounts of food from major food groups (Juan et al., 2004). Similarly, the National Health and Nutrition Examination Survey II (NHANES II) reported less than one-third of older Americans met recommended intakes for fruits and vegetables (Wakimoto & Block, 2001).

Low income older adults are particularly vulnerable to poorer quality diets (Gaston et al., 2001; Sasser et al., 2002). The U.S. Department of Agriculture, Center for Nutrition Policy and Promotion reported low income older adults, aged 65 and above, had lower HEI scores than higher income older adults’ from 1989-1990 to 1999-2000 (Juan et al., 2004). Similar findings were reported in a cross sectional study of 63 females and 59 males, aged 65 to 93 years, in two rural southern counties in North Carolina (Vitolins et al., 2007). This study reported low income older adults had low HEI scores and consumed less than recommended amounts of food from major food groups;



however, dietary intake of fats and oils were high (Vitolins et al., 2007). According to the Nutrition and Health Characteristics of Low-Income Populations study based on NHANES-III 1988-94 data, older adult food stamp participants consumed fewer meals, including breakfast compared to higher income older adults (U.S. Department of Agriculture, 2005). Zizza et al. evaluated 24 hour recall data from the National Health and Nutrition Survey 1999-2002 and reported lower income older adults consumed fewer snacks compared to higher income older adults (Zizza et al., 2007).

Decreased food intake is a major contributor to poor diet quality among older adults. Decreased food intake can result in energy imbalance, which can lead to increased risk of poor nutritional status, as evidenced by weight loss and progression of chronic disease (Chen et al., 2001). The USDA CSFII (1994-1996) study on food intake reported, among older adults 70 and above, women had a median calorie intake between 1,296 and 1,358 calories and men had a median calorie intake between 1,606 and 1,746 calories (Wakimoto & Block, 2001; Patterson et al., 1990). In addition, the Health and Nutrition Examination Survey reported nearly 16% of community dwelling older adults in the U.S. consumed less than 1,000 calories per day (Evans, 2005). In several surveys, lower calorie intake has been reported to result in inadequate intake of protein as well as many vitamins and minerals; including calcium, iron, zinc, thiamin, vitamin A, vitamin C and vitamin E (Zheng & Rosenberg, 1989; Blumberg, 1997; Bidlack & Smith, 1998). Nutrient intakes below recommended amounts may contribute to the risk of sub-clinical deficiencies among older adults which could affect their functional capacity (Zheng & Rosenberg, 1989; Blumberg, 1997).

Several studies have investigated the effect of numerous factors such as physical wellbeing, emotional wellbeing, functional ability, finances and social support on older adults' food intake and nutritional status (Wylie et al., 1999; Shoenberg, 2000; Sharkey et al., 2002; Ferry et al., 2005; Iizaka et al., 2008). In addition, inability to grocery shop, prepare food and eat can be a barrier for older adults achieving good nutrition and adequate food intake (Hern, 1995; Sharkey, 2002; Dewolfe & Millan, 2003; Keller & McKenzie, 2003; Evans, 2005; Kiosses & Alexopolous, 2010).

## Factors Affecting Older Adults Food Intake

### Physiological Factors

Many physiological factors such as changes in appetite, oral health, sensory functions, mobility, and disease conditions can affect older adults' food intake possibly by influencing their ability to grocery shop, prepare food and eat.

### Appetite and Satiety

Many age related physiological changes in older adults can affect appetite and satiety which can result in decreased food intake (Chen et al., 2001). For example, an age-associated decrease in the central feeding drive can result in a reduction in endogenous opioid peptides and receptors, which can lead to decreased appetite (Donini et al., 2003). In addition, age associated increases in the production of cholecystokinin, a satiety hormone, signals earlier satiety which in turn can result in reduced food intake.

Similarly, an age related decrease in fundus adaptive relaxation and increase in antrum relaxation slows down gastric emptying, resulting in an increased feeling of fullness, and in early meal termination (Donini et al., 2003).

### Oral and Esophageal Health

Oral and esophageal health can significantly affect older adult's food intake possibly by affecting eating ability. Age related decreases in salivary glands can cause mouth and throat dryness, which can interfere with chewing and swallowing (Donini et al., 2003; Elsner, 2002). Other oral factors such as poor oral health, tooth loss, and ill-fitting dentures can also reduce chewing and swallowing ability (Elsner, 2002). In addition, disease conditions such as Parkinson's disease and cerebrovascular diseases which affect the brain and central nervous system can contribute to chewing and swallowing problems (Donini et al., 2003). Swallowing disorders, which are very common among older adults, can result in decreased food intake due to problems with choking and risk of food aspiration (Donini et al., 2003). Additionally, medications such as anticholinergic drugs and muscle relaxants can also affect chewing and swallowing ability (Donini et al., 2003).

### Sensory Functions

Age related physiological changes in sensory functions such as vision, hearing, taste and smell can influence older adults' food intake and nutritional status (Chen et al., 2001). Vision and hearing impairment can affect older adults' food intake by influencing their ability drive, cross busy streets, grocery shop and prepare food (Fernandes, 1981; Bofill, 2004).

Aging related decreases in taste and smell sensitivity which can result in food being less appealing can influence food intake. Because taste is enhanced by chemicals released from food during chewing, wearing dentures that cover the soft palate may further reduce taste sensitivity (Chen et al., 2001). In addition, many medications used by older adults can affect taste and smell (Donini et al., 2003).

### Mobility

Many physiological changes that occur with aging can affect older adults' mobility. For example, age related muscle loss is associated with decreased physical strength, weakness, fatigue, poor balance, loss of coordination and functional disability (Fernandes, 1981; Bofill, 2004).

Many joint disorders such as osteoporosis and arthritis can cause severe joint pain which can restrict mobility. For example, locked elbow and ankle joints can limit leg and hand movement. Similarly, musculoskeletal disorders involving nerves, tendons, muscles, and supporting structures such as intervertebral discs can cause severe pain, numbness and tingling sensations. Decreased mobility can have a tremendous impact on older adults' food intake potentially by interfering with their ability to grocery shop and prepare food. For example, joint pain can potentially interfere with older adults' ability to carry grocery bags, move or bend over grocery carts and reach items on shelves (Fernandes, 1981).

Some older adults are able to overcome functional disabilities and maintain activities of daily living by getting support from family, friends, and the community (Fernandes, 1981). In addition, regular physical activity can help prevent loss of lean

body mass and increase muscle size and strength (Drewnowski & Evans, 2001).

### Disease Conditions

It is not uncommon for diseases conditions such as cancer, diabetes, or cardiovascular disease to affect the food intake of older adults. Several factors associated with many diseases such as dietary modifications, altered nutrient absorption, surgery, and chronic pain can interfere with food intake (Fernandes, 1981). In addition, many diseases can adversely affect food intake by affecting functional independence. Many individuals with diabetes suffer from lower extremity complications such as peripheral vascular diseases, peripheral neuropathy, myopathy, and amputations which can interfere with activities of daily living (ADL) such as eating and instrumental activities of daily living (IADL) such as grocery shopping and food preparation (Langa et al., 2002). Older adults with cardiovascular disease are prone to breathlessness and chest pain on exertion which can interfere with ADLs and IADLs (Ahto et al., 1998).

Degenerative neurological diseases such as Alzheimer's, multiple sclerosis and Parkinson's disease alter neurological and sensory functions such as taste and smell which can impact older adults' food intake (Donini et al., 2003). Dementia is another important disease condition which can result in apraxia (inability to carry out learned purposeful movements) and agnosia (inability to recognize people, sounds, smells, and shapes). As a result, many older adults suffering from dementia are not able to recall their last meal, identify the taste and smell of food, or feed themselves which can result in inadequate food intake (Donini et al., 2003). In addition to disease conditions themselves, many medications used for cardiovascular disease, hypertension, Parkinson's disease,

cancer, and infections can alter taste, smell and appetite which can result in decreased food intake (Donini et al., 2003).

### Income

Income is an additional factor which can affect older adults' food intake and nutritional status. Higher income older adults have been reported to spend more money on food and generally have more nutritionally adequate diets. Higher income older adults have also been reported to consume more nutrient dense foods such as fresh fruits, vegetables, whole grains and have higher nutrient intakes of fiber, folate, protein, calcium, iron, thiamine, magnesium, and vitamin B6 (Herne, 1995; Howarth 1989a; Howarth, 1989b).

Poverty can put older adults at risk of food insecurity and poor nutritional status (Lee et al., 2001; Herne, 1995). Poverty rates tend to increase with age often due to retirement and decreased income. Older adults living in poverty or on a fixed income may be forced to choose to reduce their food intake when other expenditures such as utilities, prescription medications and medical care costs increase (ADA, 2000). Even though Medicare and Medicaid assist low income older adults in meeting partial health care costs, older adults often have higher health care expenditures leaving fewer financial resources for food (Curch & Thomas, 2006; ADA, 2000).

Limited resources for transportation to the grocery store can also impact food intake and diet quality. Low income older adults who do not live close to large grocery stores have been reported to frequently miss meals and consume fewer but more expensive convenience foods and restaurants meals (Herne, 1995). Larger grocery stores

typically have a wider variety of foods, particularly fruits and vegetables, and lower prices than smaller local markets. As a result, low income older adults may have to adjust their food purchases within available foods at smaller local markets which can compromise their food choices and intake (Herne, 1995).

In addition, limited resources can impact diet variety. The Health Education Authority's study reported many low income older adults repetitively purchase the same food items to avoid wasting money in trying new foods. Fear of wasting money and uncertainty related to preparing new foods can result in older adults consuming a repetitive and monotonous diet which lacks interest and appeal. Low income older adults in this study were also reported to have low dietary diversity scores and consumed fewer than five foods per day (Herne, 1995).

Low income older adults suffering from hunger and food insecurity are more concentrated in the south and central cities (ADA, 2005). Although the national household income is rising and poverty rates are falling, Oklahoma's per capita income is considerably below the national average (Oklahoma Council of Public affairs, 2001; U.S. Census Bureau, 2010). Oklahoma has been reported to be "one of the hungriest states in America" (Oklahoma State Senate, 2008).

### Education

Education has been associated with older adults' food intake and nutritional status. Older adults with a higher education level have been reported to have increased knowledge about the importance of nutrition in relation to health and to consume a nutritional adequate diet (Herne, 1995; Howarth, 1989a; Howarth, 1989b). In addition

education can affect income which can influence older adults' financial ability to purchase food both before and possibly after retirement (Fusillo & Beloian, 1977).

### Social Factors

Social factors can have a vital role in older adult's food intake and nutritional status (Herne, 1995) by enhancing appetite (Okamoto et al., 2007) as well as ability to grocery shop (Curch & Thomas, 2006) and prepare food (Sidenvall et al., 2000).

Social interaction is a significant factor that can help decrease boredom, loneliness, and depression (Sidenvall et al., 2000). Decreased social interaction can lead to social isolation and loneliness which has been reported to be related to decreased food intake (Chen et al., 2000). Many circumstances that accompany aging can contribute to decreased social interaction and loneliness including children moving away, retirement, and loss of friends and family (Sidenvall et al., 2000; Rozenweig et al., 1997).

Eating alone is a major factor affecting older adults' food intake. Eating alone has been reported to affect older adults' food choices and appetite (Bofill, 2004). Sidenvall et al. (2000) reported eating alone resulted in older adults being more likely to skip meals and eat out less frequently. In a study of community dwelling older adults, those who ate alone more often were found to be at higher nutritional risk (Hendy et al., 1998); whereas, increased appetite was reported among older adults when they had meals with family and friends (Wikby & Fagerskiold, 2004). In particular, loneliness and bereavement associated with widowhood, has been reported to negatively influenced food intake among older adults (Wylie et al., 1999). Widowhood has been reported to result in decreased interest in food related activities which may significantly contribute to



decreased food intake and weight loss among widowed older adults (Shahar et al., 2001). In addition to social interaction, social support from family and friends is important for older adults who have difficulty with grocery shopping, preparing food, and eating (Quigley, et al., 2005).

### Psychological Well-being

A close association has been reported between psychological well-being and food intake among older adults (Evans, 2005). Psychological factors can influence appetite which can play a prominent role in food intake (Okamoto et al., 2007). Older adults' appetite is often influenced by internal factors such as mood and attitude as well as external factors such as stable relationships with friends and family. Pleasure derived from eating can improve food intake and quality of life. However, many older adults experience anxiety due to social, financial, medical or personal instabilities which can negatively affect appetite and desire to eat (Wikby & Fagerskiold, 2004).

Some older adults have difficulty coping with stress, disappointment and conflict which can contribute to depression. Loneliness, low self esteem, retirement, loss of friends and family are all psychological aspects which can increase the risk of depression. Depression has been shown to affect appetite and food intake among older adults (Donini et al., 2003).

Besides depression, paranoia is another psychological condition that can occur in later life resulting in refusing to eat due to mistrust of others or the belief that they are being poisoned (Berry & Marcus, 2000). Indirect self-destructive behavior is another psychological abnormality sometimes observed among older adults who, for various

reasons, have given up on life (Berry & Marcus, 2000). Indirect self-destructive behavior is a condition in which older adults purposely stop eating, refuse to take medicines and ignore prescribed treatments with the unconscious intention of terminating their life (Berry & Marcus, 2000).

### Housing

The home environment can affect older adults' food choices and food intake. Due to limited resources, older adults may live in inadequate or smaller residences that do not provide adequate cooking facilities or food storage space (Herne, 1995). In addition, many older adults may choose to live in smaller residences with limited storage space or cooking facilities due to increased physical limitations such as arthritis and limited mobility (Herne, 1995).

### Retirement

Retirement can also affect older adults' food intake due to social as well as financial changes. The sudden transition from a working environment to a socially disconnected environment after retirement has been reported to result in decreased meals and a subsequent decline in food intake. In addition to feeling socially disconnected, some older adults may feel a loss of role and purpose after retirement which can psychologically result in decreased food intake (Sidenvall et al., 2000).

Retirement may also affect where older adults eat. One study reported retirees consumed more meals prepared at home, whereas pre-retirees were found to consume more meals away from home. Decreased spendable income was one reason given for retirees consuming more meals at home; whereas, reasons given for pre-retirees

consuming more meals away from home were higher spendable income, better physical health, and less time to prepare meals at home. Hence, for pre-retirees the “utilitarian” purpose of eating away from home was more important than the “recreational” purpose (Paulin & Duly, 2002).

### Transportation

Lack of transportation is a major factor which can influence older adult’s food intake by affecting access to the grocery store, choice of grocery store, prices paid for food, and the variety of foods available (Herne, 1995). Many factors may affect older adults ability to drive including traffic problems (Curch & Thomas, 2006), difficulties with vision or hearing, and inadequate resources to own an automobile or pay for gasoline, insurance and maintenance (Paulin & Duly, 2002). Older adults who are unable to drive may have to use public transportation or depend on family, friends, or free community transportation in order to grocery shop (National Association of Areas Agencies on Aging, 2007).

### Federal Food Programs

#### Supplemental Nutrition Assistance Program (SNAP)

In the United States, the Supplemental Nutrition Assistance Program (SNAP) plays a major role in defending against hunger and under nutrition. However, in 2005 only 65% of eligible individuals were participating in SNAP and approximately 13 million eligible individuals were not receiving assistance. A nationwide survey in 2000, revealed 56% of eligible non-participant households contained older adults or individuals

with disabilities and only 5% of eligible older adults were participating in SNAP (Food Research and Action Center, 2008).

Older adults may not participate in SNAP for several reasons. According to a survey by the U.S Government Accountability Office (GAO), many older adults perceived the overall cost of applying to SNAP; in terms of money, time, hassle, and stigma, outweighed the benefits. Older adults reported dissatisfaction with many aspects of applying for SNAP including the amount of time and number of office visits required to apply, distance to the SNAP office, and limited office hours. Furthermore, many older adults reported they worried about how their family and friends would perceive them if they participated in the program. In addition, uncertainty about program eligibility requirements and unawareness of the program itself kept many older adults from participating in SNAP (Food Research and Action Center, 2008).

#### Older Americans Nutrition Program:

The Older Americans Act Nutrition Program (OAANP) is the largest federally funded nutrition program for older adults. The OAANP offers congregate and home delivered meals to adults aged 60 and above. In addition to providing meals, OAANP also provides nutrition screening, education, counseling and other health services (Wellman et al., 2002). Many OAANP participants are lower income and at higher nutritional risk, particularly home delivered OAANP participants. Home delivered OAANP participants must be homebound, often due to physical disabilities, which can limit their access to food.

A national study reported the OAANP was effective in improving the nutrition status of many older adults, particularly minorities and the homebound (Wellman et al., 2002). However, some limitations with the program have been reported such as recruiting volunteers to drive to remote rural areas to deliver meals, negative attitude towards receiving meals, and meals not adequately meeting special diet, cultural or religious needs. Furthermore, many older adults living in rural areas were often unaware of the program (Lee & Frongillo, 2001).

#### Barriers to Accessing Federal Food Programs

Many barriers have been identified for accessing federal food programs. Older adults have reported poor customer service, the application process, application length, not being able to reach representatives by telephone, eligibility criteria, lack of public transportation to reach application sites, and lack of program awareness as barriers to participating in federal food programs (World Hunger Year, 2007). An additional limitation for many older adults is that many federal food programs are beginning to use online applications which require older adults to have computer access (World Hunger Year, 2007).

Immigrants face several additional barriers to accessing federal food programs. For many immigrants language is an important barrier for completing applications in English. Furthermore immigrants who have become permanent residents are disqualified from participating in certain federal food programs, such as SNAP, during their first five years of residency (World Hunger Year, 2007).

## Theoretical framework: Socio-ecological Model

### Socio-ecological Model

As previously mentioned, many factors, such as physical wellbeing, emotional wellbeing, housing, transportation, finances, social support, food access, and ability to grocery shop, prepare food, and eat, may either independently or collectively, influence older adults' food intake. Although many of these factors have been indentified as being related to older adults' food intake, limited research has evaluated these factors directly related to older adults' ability to grocery shop, prepare food, and eat. These factors can be grouped into individual and various environmental levels.

A model that can be used to explain the complexity of factors affecting older adults' ability to grocery shop, prepare food, and eat within the individual and environmental levels is the socio-ecological model. The socio-ecological model provides a framework to understand the individual within their environment by emphasizing the interaction and integration of factors within and across the levels of influence (Brofenbrenner, 1977; McLeroy et al., 1988; Richard et al., 1996; Kok et al., 2008; Robinson, 2008; Fitzgerald, 2009).

Brofenbrenner proposed that an individual's behavior is affected by and affects several levels of influence. Brofenbrenner's ecological perspective is considered "a nested arrangement of structures, each contained within the nest" (Brofenbrenner, 1977). Brofenbrenner categorized levels of influences on behavior as microsystems, mesosystems, exosystems and macrosystems. In Brofenbrenner's ecological perspective,

the microsystem consists of interactions between the individual and the immediate environment such as home, school or work place. The mesosystem consists of interactions among microsystems containing the individual such as interactions among family, school and workplace. The exosystem consists of larger social systems that may not necessarily contain the individual, but influence the behavior of the individual by interfering with the immediate settings in which the individual lives, such as mass media, and agencies of government (local, state and national governments). The macrosystem consists of cultural beliefs, social, economic, educational and political systems. According to Bronfenbrenner, the ecological environment is not unidirectional. This means the environment and the individual influence each other. Thus, not only does the environment shape, sustain and constrain the behavior of the individual, but the individual can also create and change the environment (Bronfenbrenner, 1977).

Variations of Bronfenbrenner's socio-ecological model have been developed which categorize the environment into different levels of influence related to health promotion programs (McLeroy et al., 1988; Richard et al., 1996; Kok et al., 2008; Robinson, 2008). In general, socio-ecological models for health promotion categorize levels of influence as intrapersonal, interpersonal, organizational/institutional, community, and public policy. In these models the intrapersonal level consists of characteristics of the individual; the interpersonal level consists of social networks and social support systems; the organizational/institutional level consists of organizational characteristics; the community consists of relationships among organizations, institutions, and informal networks in a geographic area; and the public policy level consists of local, state, and national laws and policies (McLeroy et al., 1988; Richard et al., 1996; Kok et

al., 2008; Robinson, 2008). An additional level included by some is the supranational level which consists of multiple societies (Richard et al., 1996; Kok et al., 2008).

Fitzgerald used a socio-ecological model to describe barriers to a healthy eating and physical activity lifestyle behaviors. The levels of influence in Fitzgerald's socio-ecological model were classified as intrapersonal, interpersonal, community, and public policy. The intrapersonal level consisted of individual characteristics such as health status, knowledge, skills and self-confidence; the interpersonal level consisted of social relationships such as social networks and social support; the community level consisted of community characteristics such as public transportation, food availability and food access; and the public policy level consisted of local, state and federal policies (Fitzgerald, 2009).

Even though there are several variations of the socio-ecological model approaches to health behavior, some overarching principles are that health behavior is considered to be a function of the individual and various levels of their environment. The socio-ecological model conceptualizes the individual and various environmental levels using a "nested structure" which focuses on the interrelationships of the individual and the various levels of their environment. The socio-ecological model emphasizes reciprocal determinism between the individual and the various environmental levels (Robinson, 2008; Green et al. 1995). In addition, factors within the various levels can function as either barriers or assets towards the individuals' health behavior (Fitzgerald, 2009; Robinson, 2008).

### Barriers



Research indicates perceived barriers play a major role in an individual's behavior (Sword, 1999). However, in most studies barriers have been identified from the researcher's perspective rather than the individual's perspective. Barriers identified in this way may not clearly reflect the actual barriers individuals are facing. Investigating barriers from the individual's perspective is more appropriate for effective implementation of health care at the community level (Sword, 1999).

### Assets

There is growing evidence that building capacity can significantly influence an individual's health and well-being (Pan et al., 2005; Mannes et al., 2005). Asset building is grounded in research on development, resilience, and prevention and provides a framework to build capacity to promote health and well being (Lafferty et al., 2003; Mannes et al., 2005). Asset building is a strength-based approach that emphasizes identifying and utilizing strengths or assets, including those within the individual, social networks and community organizations, to build capacity (Pan et al., 2005; Mannes et al., 2005; Hufford et al., 2009).

The principles of asset building have been used to address a variety of diverse issues including health, education, safety, individual access and economic development (Pan et al., 2005). The asset building approach differs from the traditional risk-based approach which focuses on needs, deficits or barriers (Pan et al., 2005; Hufford et al., 2009). The goal of asset building is to identify and build on assets to decrease risk behaviors and promote health and well-being (Pan et al., 2005; Mannes et al., 2005; Hufford et al., 2009). Traditional risk-based approaches can limit opportunities to

promote well-being and may leave individuals feeling helpless and discouraged (Lafferty et al., 2003).

### Contributions to the Literature

Although many factors have been identified as being related to older adults' food intake, limited research has been conducted evaluating factors directly related to older adults' ability to grocery shop, prepare food and eat; particularly within the framework of the socio-ecological model. In addition, assets and barriers to older adult's ability to grocery shop, prepare food, and eat have not been well explored from the older adult's perspective.

## CHAPTER III

### METHODOLOGY

#### Purpose

The purpose of this study was to design an instrument evaluating theoretical factors related to older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal, and community socio-ecological model levels of influence. An additional purpose of this study was to determine the instrument's construct factors validity and to determine how effective the construct factors were in explaining older adult's ability to grocery shop, prepare food, and eat.

## Instrument

### Instrument Development

Theoretical factors were developed based on the literature related to issues which affect older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal and community socio-ecological model levels of influence. Within the intrapersonal level, theoretical factors included "Physical wellbeing," "Emotional wellbeing," "Functional ability," and "Finances and housing." Within the interpersonal level, theoretical factors included "Social interaction" and "Social support." Within the community level theoretical factors included "Food assistance programs," "Food availability/access" and "Public transportation."

The following operational definitions were developed for this study:

Within the intrapersonal level, the theoretical factor "Physical wellbeing" was related to physical abilities such as vision, hearing, dental health, smelling, tasting, chewing, swallowing, muscle strength, mobility, hand and joint movements. Also, within the intrapersonal level, the theoretical factor "Emotional wellbeing" was related to emotional health, fulfillment with life, attitude about happiness, peace of mind, energy level, and feelings about future. Additionally, within the intrapersonal level, the theoretical factor "Functional ability" was related to ability to deal with health issues, manage money, make decisions, and drive. Within the intrapersonal level, "Finances" was related to money available for basic needs, transportation, food, and medical care. Also, within intrapersonal level, the theoretical factor "Housing" was related to dry food

storage space, cold food storage space, and appliances for cooking which can affect grocery shopping, cooking and eating.

Within the interpersonal level, the theoretical factor “Social interactions” was related to number of personal contacts, quality of personal contacts, telephone contacts. Also, within interpersonal level, the theoretical factor “Social support” was related to current and anticipated help from others with household tasks, transportation, finances, and emotional support.

Within the community level, the theoretical factor “Food programs” was related to participation in older adult meal programs, church and community meals, food stamps, and food banks or pantries. Also, within community level, the theoretical factor “Food access” was related to availability of grocery stores, ability to get to grocery stores, number of times able to go to the grocery store, food prices at the grocery store, customer service at the grocery store, availability of places to eat out, ability to get to places to eat out, number of times eat out, and food prices at places to eat out. Additionally, within community level, the theoretical factor “Public transportation” was related to availability of public transportation, ability to get to public transportation, use of public transportation, availability of free or reduced price transportation, ability to get to free or reduced price transportation, and use of free or reduced priced transportation.

Items were developed for each theoretical factor using a 5 point symmetrical Likert scale; very poor, poor, average, good, and very good. Some items were selected and modified from Performance Outcomes Measures Project (POMP) including the Demographic Intake form (POMP, 2003a), Physical Functioning and Health survey

(POMP, 2003b), Social Functioning survey (POMP, 2003c); Emotional Wellbeing survey (POMP, 2003d); CDC Health Related Measure (Center for Disease Control and Prevention, 2005); Beck's Depression scale (Segal et al., 2008); and Duke's Social questionnaire (Goodger et al., 1999).

Three dependent variable items were developed related to participants' perception of their ability to grocery shop, prepare food, and eat using the same 5 point symmetrical Likert scale; very poor, poor, average, good, and very good. The instrument also included questions to obtain demographic information including gender, age, ethnicity, race, education, living arrangement, size of town, type of residence, ability to leave residence, employment, and income using the 2009 federal poverty guidelines (U.S. Department of Health and Human Services, 2009).

#### Instrument Validity

Expert face validity of the draft instrument was determined using a panel of four experts from Oklahoma State University. A revised draft instrument was developed based on recommendations from the expert panel. Face validity of the revised draft instrument was determined by a group of six low income older adults, 65 years of age or older. A final instrument was developed based on recommendations from the group of indigenous older adults, 65 years of age and older.

#### Rationale for Telephone Survey

For this study, data was collected using the developed instrument via a telephone survey. Telephone surveys have been increasingly used to investigate population

characteristics, identify chronic disease trends and risk factors, and evaluate intervention programs (Kempf & Remington, 2006). Telephone surveys save travel time and are helpful in locating hard to reach participants. Data collection and entry can be rapidly completed with telephone surveys. Telephone surveys also provide high quality control over the entire data collection (Babbie, 2007)

Some difficulties with hearing, understanding or recalling have been reported with older adults using telephone surveys. As a result, some older adults perceive telephone surveys as a stressful and respondent burdening method. Older adults not owning a telephone has been reported to be a limitation; however, telephone ownership has increased to 88% in older adult households which is similar to the general population (Worth & Tierny, 1993). Many of these difficulties can be overcome if telephone surveys with older adults are straight forward and avoid questions that require recall. Some telephone survey difficulties with older adults were minimized by allowing sufficient time for responses and repeating questions if necessary (Worth & Tierny, 1993). In addition, experience and practice to improve interviewing skills make telephone surveys an appropriate method for collecting information from older adults (Worth & Tierny, 1993).

## Subjects

### Subject population

The subjects for this study were low income older adults, aged 65 and above, who had participated in the Supplemental Nutrition Assistance Program (SNAP). The sample size identified for this study was four hundred (Yamane, 1967).

### Sampling Procedure

A list of 9,275 older adults, aged 65 and above, who participated in the Supplemental Nutrition Assistance Program (SNAP) from June to July, 2009 was provided by Oklahoma Health and Human Services for forty-six Oklahoma counties whose population of older adults, 65 years and above, and poverty rate were above the average Oklahoma older adult population and poverty rates. The list of older adults was randomized using a random number generator.

### Target population

Low income older adults aged 65 and above in the state of Oklahoma and had participated in the Supplemental Nutrition Assistance Program (SNAP) in the state of Oklahoma.

### Survey population

Low income older adults aged 65 and above, who had a phone number and had participated in the Supplemental Nutrition Assistance Program (SNAP) in the state of Oklahoma from June to July 2009.

### Frame

A list of phone numbers of older adults aged 65 and above, who had participated in the Supplemental Nutrition Assistance Program (SNAP) in the state of Oklahoma from



June to July 2009 from forty-six Oklahoma counties whose population of older adults, 65 years and above, and poverty rate were above the average Oklahoma older adult population and poverty rates.

## Data Collection

### Institutional Review Board Approval

The research protocol and participant informed consent for this study were approved by the Oklahoma State University Institutional Review Board for Human Subjects prior to data collection.

### Telephone Survey Protocol

For each individual called, data was recorded on the number of “refusals,” “call backs,” and “participants.” “Refusal” was defined as individuals stating they did not want to participate, disconnected telephone number, no one over 65 years of age, hang-ups, wrong telephone numbers, no phone number, and communication barrier. “Call backs” were defined as no answer, answering machine, busy signal, outside the calling area, and scheduled call back (individuals who indicate they would be willing to complete the telephone survey but would like to be called back later). Within the category of “call backs” for “outside the calling area” and “answering machine” a message was left regarding the purpose of the telephone survey and that they will be called back later. “Participant” was defined as individuals who were initially willing to do the telephone survey. Subsequently, “completed” was defined as participants who completed the total

survey and “in-completed” was defined as participants who did not complete the total survey.

The telephone survey protocol was modeled after that used by the Oklahoma State University Bureau of Social Research (Stanley et al., 2006). The first 100 randomized older adults were solicited to participate in the telephone survey. When 50% of the first 100 randomized individuals was a “refusal” or at least six attempts had been made on “call backs” then the next 50 individuals were included for solicitation. On “call backs” up to 12 attempts were made to get a “refusal” or a “participant.” After twelve attempts, if the individual was not willing to participate in the telephone survey, it was defined as a “refusal.”

Three female interviewers were trained to conduct the telephone survey. Older adults aged 65 and above, who volunteered to participate in the telephone survey gave their verbal consent. The interviewers read each survey question and response options and recorded the participants’ responses. Completed telephone surveys took approximately 15 to 20 minutes.

### Response Rate

Survey response rate is a measure of responses completed and or returned (Warde, 1990). Several factors such as data collection method, timing, providing incentives, questionnaire length, confidentiality of responses, sponsorship, advanced survey notification, interviewer, and deadlines can affect response rate (Warde, 1990).

Response rates are strongly influenced by the data collection method. For example, mail questionnaires have been reported to have a higher non-response rate compared to in-person and telephone interviews. In addition, more interaction between the potential respondent and the interviewer has been reported to increase response rate (Warde, 1990). For this study useable response rate was calculated as: Usable response rate = # completed surveys / (# elements of the population attempted to survey) – (#foreign elements)

### Statistical Analyses

Item responses were coded as; very poor = 1, poor = 2, average = 3, good = 4, and very good = 5. Statistical analysis procedures were conducted with PC SAS, Version 9.1 for Windows (SAS Institute, Cary, NC). The level of significance was set at  $p \leq 0.05$ .

Only completed surveys were included in the data analyses. Participant demographic data was analyzed using means and frequency procedures. Construct factors were validated using exploratory factor analysis with varimax rotation. Factor analysis is a pattern detection method that reduces the number of items by finding factors that are composed of correlated items. Factor analysis produces orthogonal factors which are independent and equally weighted and avoids problems with multicollinearity (Decoster, 1998). Items were not included in a construct factor if the loading was  $\leq 0.4$ . Construct factors with only one item were not retained. Cumulative multiple logistic regression was used to determine how effectual construct factors were in explaining older adults' ability to grocery shop, prepare food and eat. Cumulative multiple logistic regression was used

because it fit the ordinal nature of the data and the models use all the data and all sub-models (Alison, 1995).

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Results

Four hundred and twelve older adults, 65 years of age and above, who participated in the Supplemental Nutrition Assistance Program (SNAP) in the state of Oklahoma from June to July 2009, initially agreed to participate in the telephone survey; however, 370 completed the survey. A summary of the telephone survey outcomes is presented in Table 1.

For this study 2,545 individuals were contacted from a randomized list of 9,275 older adults and the response rate was 21%. Telephone surveys typically have refusal rates greater than 50% (Ward, 1990). The lower response rate of telephone surveys may be explained by the use of answering machines and caller identification which allows individuals to easily identify the caller and ignore calls. An additional factor that may have affected this study's response rate was the lack of incentives and instrument length. Although offering an incentive can sufficiently improve survey response rates (Ward, 1990), no incentives were offered in this study due to the lack of funds.

Table 1. Telephone survey outcomes.

Outcome Categories	Number of Individuals
COMPLETED	370
IN-COMPLETED	42
REFUSAL	
Refusal	812
Disconnected	590
No one > 65	91
Hang up	253
Wrong number	22
No phone number	103
Communication barrier	14
CALL BACK	
No Answer	155
Answering machine	77
Busy signal	12
Outside calling area	2

## Demographics

Demographic characteristics of the participants in this study are presented in Table 2. The majority of participants were females (84%), Caucasian (84%), and 65 to 74 years of age (55%). Sixty-eight percent of participants reported living alone and 32% reported living with others. The majority of participants reported living in a house (64%); however, 16% and 15% reported living in an apartment or mobile home, respectively. Only 2% of participants reported living in a retirement center, all of which reported they had kitchen facilities. Eighty-three percent of participants reported they were able to leave their home on their own. Eighty-five percent of participants stated their annual income was less than \$11,000 and 96% reported they were unemployed.

The racial and ethnic representation of participants in this study was similar to the state of Oklahoma. Among study participants 84% were white, 8% were Native Americans, 7% were African Americans, <1% were Asian, and < 1% were others; in addition, 4% were Hispanic and 96% were non-Hispanic. According to 2009 Oklahoma Quick Facts for the state of Oklahoma as a whole, 78% were White, 8.1% were African American, 8% were Native American, 1.7% was Asian and 4.1% reported two or more races were 4.1%; in addition 8.2% were Hispanic and 70.8% were non-Hispanic (U.S. Census Bureau, 2010).

Table 2. Demographic characteristics of older adult participants, 65 years of age and older, who received supplemental nutrition assistance.

Demographic Variable	N	(%)*
Gender (n = 370)		
Male	57	(16%)
Female	310	(84%)
Age (n= 370)		
65-74 years	203	(55%)
75-84 years	137	(37%)
85+	30	(8%)
Ethnicity (n= 281)		
Hispanic	12	(4%)
Non-Hispanic	269	(96%)
Race (n=363)		
Asian	1	(< 1%)
African American	27	(7%)
Native American	29	(8%)
White (Caucasian)	305	(84%)
Other	1	(< 1%)
Highest level of Education (n=362)		
Less than high school	127	(35%)
High school	125	(34%)
Technical school	30	(8%)
Some college or associate degree	68	(19%)
Bachelor degree	8	(2%)
Graduate work	4	(1%)
Living arrangement ( n = 361)		
Living alone	246	(68%)
Lives with others	115	(32%)
Size of town (n=362)		
< 10000	253	(70%)
10,000 – 50,000	103	(28%)
> 50,000	6	(2%)
Type of residence (n=356)		
House, duplex	230	(64%)
Apartment, condo	57	(16%)
Retirement center	7	(2%)
Mobile home	52	(15%)
Other	10	(3%)
Able to leave home on own (n=362)		
No	65	(18%)
Yes	297	(83%)



Income (n=349)		
Less than \$ 11,000	297	(85%)
\$ 11, 000 - \$ 15000	46	(13%)
\$ 18000 - \$ 22,000	4	(1%)
Over \$ 22,000	2	(< 1%)
Employed (363)		
No	347	(96%)
Yes, part time	12	(3%)
Yes, full time	4	(1%)

\*Percents for a demographic category may not total to 100 due to rounding.

### Theoretical verses construct factors

The theoretical factors for this study included “Physical wellbeing,” “Emotional wellbeing,” “Functional ability,” “Finances and housing,” “Social interactions,” “Social support,” “Food programs,” “Food access,” and “Public transportation.” Exploratory factor analysis with varimax rotation identified 15 construct factors which were defined as “Emotional wellbeing,” “Physical wellbeing,” “Dental,” “Functional ability,” “Finance,” “Housing,” “Family interactions,” “Friend interactions,” “Social support,” “Food programs,” “Food access,” “Food stamps,” “Food cost and service,” “Public transportation,” and “Free or reduced cost transportation.” Theoretical and construct factors are presented in Table 3. The following are differences between the theoretical and construct factors.

- From the theoretical factor “Physical wellbeing,” the items “dental health” and “how well you can chew” loaded into a separate construct factor “Dental.”
- From the theoretical factor “Emotional wellbeing,” the item “energy level” loaded into the construct factor “Physical wellbeing.”
- From the theoretical factor “Functional ability,” the item “how well you can drive” loaded into the construct factor “Food access.”

- From the theoretical factor “Finances and housing,” the items “the amount of money you have for your basic needs,” “the amount of money you have for transportation,” “the amount of money you have for food,” and the amount of money you have for medical care” loaded into a separate construct factor “Finances.” The remaining items “the amount of dry food storage space in your home,” “the amount of cold food storage space in your home,” and “the appliance you have for cooking in your home” loaded into a separate construct factor “Housing.”
- From the theoretical factor “Social interactions,” the items “the number of personal contacts you have with your family,” “the quality of personal contacts you have with your family,” and “the number of telephone contacts you have with your family” loaded in a separate construct “Family interactions.” The remaining items, “the number of personal contacts you have with your friends,” “the quality of personal contacts with your friends,” and “the number of telephone contacts you have with your friends,” loaded into a separate construct factor “Friend interactions.”
- From the theoretical factor “Social support,” the items “emotional support you get from others” and “the emotional support you think you would get from others if you needed it” loaded into the construct factor “Family interactions.”
- From the theoretical factor “Food programs,” the item “the benefit of food stamps to you” loaded into a separate factor; however, this construct factor was not retained because it only included one item.

- From the theoretical factor “Food access,” the items “the food prices at the grocery store where you shop” and “the customer service at the grocery store where you shop” loaded into a separate construct factor “Food cost and service.”
- From the theoretical factor “Public transportation,” the items “the availability of free or reduced price transportation” and “your ability to get free or reduced transportation” loaded into a separate construct factor “Free or reduced cost transportation.”

Table 3. Theoretical and construct factors based on factor analysis with varimax rotation.

<b>Theoretical Factors<sup>1</sup></b>	<b>Construct Factors<sup>2</sup></b>
<p><b>Physical wellbeing</b></p> <p>Your physical health            Your vision            Your dental health            How well you can chew            How well you can swallow            How well you can smell and taste            Your muscle strength            How well you can walk or stand            How well you hands or fingers</p>	<p><b>Physical wellbeing</b></p> <p>Your physical health            Your vision  <i>Loaded into dental</i>  <i>Loaded into dental</i>            How well you can swallow</p> <p>Your muscle strength            How well you can walk or stand            How well you hands or fingers  <i>Your energy level</i></p>
<p><b>Emotional wellbeing</b></p> <p>Your emotional wellbeing            Your fulfillment with life            Your level of happiness            Your peace of mind            Your energy level            How you feel about your future</p>	<p><b>Dental</b></p> <p>Your dental health            How well you can chew</p> <p><b>Emotional wellbeing</b></p> <p>Your emotional wellbeing            Your fulfillment with life            Your level of happiness            Your peace of mind  <i>Loaded into Physical wellbeing</i>            How you feel about your future</p>
<p><b>Functional ability</b></p> <p>How well you can deal with health issues            How well you can manage money            How well you can make decisions            How well you can drive</p>	<p><b>Functional ability</b></p> <p>How well you can deal with health issues            How well you can manage money            How well you can make decisions  <i>Loaded into Food access</i></p>
<p><b>Finances and housing</b></p> <p>The amount of money you have for your basic needs            The amount of money you have for transportation            The amount of money you have for food            The amount of money you have for medical care            The amount of dry food storage space in your home            The amount of cold food storage space in</p>	<p><i>Loaded into Finances</i></p> <p><i>Loaded into Finances</i></p> <p><i>Loaded into Finances</i>  <i>Loaded into Finances</i></p> <p><i>Loaded into Housing</i>  <i>Loaded into Housing</i></p>

your home  
The appliances you have for cooking in  
your home

*Loaded into Housing*

---

**Finances**

The amount of money you have for your  
basic needs

The amount of money you have for  
transportation

The amount of money you have for food

The amount of money you have for  
medical care

---

**Housing**

The amount of dry food storage space in  
your home

The amount of cold food storage space in  
your home

The appliances you have for cooking in  
your home

---

**Social interactions**

The number of personal contacts you have  
with your family

The quality of personal contacts you have  
with your family

The number of personal contacts you have  
with your friends

The quality of personal contacts you have  
with your friends

The number of telephone contacts you  
have with your family

The number of telephone contacts you  
have with your friends

*Loaded into Family interactions*

*Loaded into Family interactions*

*Loaded into Friend interactions*

*Loaded into Friend interactions*

*Loaded into Family interactions*

*Loaded into Friend interactions*

---

**Family interactions**

The number of personal contacts you have  
with your family

The quality of personal contacts you have  
with your family

The number of telephone contacts you  
have with your family

*The emotional support you get from others*

*The emotional support you think you  
would get from others if you needed it*

### **Social support**

---

- The help you get from others with household tasks
- The help you think you would get from others if you needed it with household tasks
- The help you get from others with transportation
- The you think you would get from others if you needed it with transportation
- The help you get from others with money
- The help you would think would get from others if you needed it with money
- The emotional support you get from others
- The emotional support you think you would get from others if you needed it

### **Food programs**

---

- The benefit of the older adult meal program to you
- The benefit of free church meals to you
- The benefit of free community meals to you
- The benefit of food stamps to you
  
- The benefit of food banks or pantries to you

### **Food access**

---

- The availability of grocery stores in your community
- Your ability to get to grocery stores
- The number of times you are able to go to grocery stores
- The food prices at the grocery store where you shop
- The customer service at the grocery store

### **Friend interactions**

---

- The number of personal contacts you have with your friends
- The quality of personal contacts you have with your friends
- The number of telephone contacts you have with your friends

### **Social support**

---

- The help you get from others with household tasks
- The help you think you would get from others if you needed it with household tasks
- The help you get from others with transportation
- The you think you would get from others if you needed it with transportation
- The help you get from others with money
- The help you would think would get from others if you needed it with money

*Loaded into Family interactions*

*Loaded into Family interactions*

### **Food programs**

---

- The benefit of the older adult meal program to you
- The benefit of free church meals to you
- The benefit of free community meals to you
- Loaded into separate factor with one item; therefore not retained*
- The benefit of food banks or pantries to you

### **Food access**

---

- The availability of grocery stores in your community
- Your ability to get to grocery stores
- The number of times you are able to go to grocery stores
- Loaded into Food cost and service*
  
- Loaded into Food cost and service*

where you shop  
The availability of places to eat out in your community  
Your ability to get to places to eat out  
The number of times you eat out  
The food prices at places where you eat out

The availability of places to eat out in your community  
Your ability to get to places to eat out  
The number of times you eat out  
*Loaded in to food cost and service*

How well you can drive

---

**Food cost and service**

The food prices at the grocery store where you shop  
The food prices at places where you eat out  
The customer service at the grocery store where you shop

---

**Public transportation**

The availability of public transportation in your community  
Your ability to get to public transportation  
Your use of public transportation

---

**Public transportation**

The availability of public transportation in your community  
Your ability to get to public transportation  
Your use of public transportation

The availability of free or reduced price transportation in your community  
Your ability to get to free or reduced transportation  
Your use of free or reduced price transportation

*Loaded into free or reduced transportation*

*Loaded into free or reduced transportation*

*Loaded into free or reduced transportation*

---

**Free or reduced cost transportation**

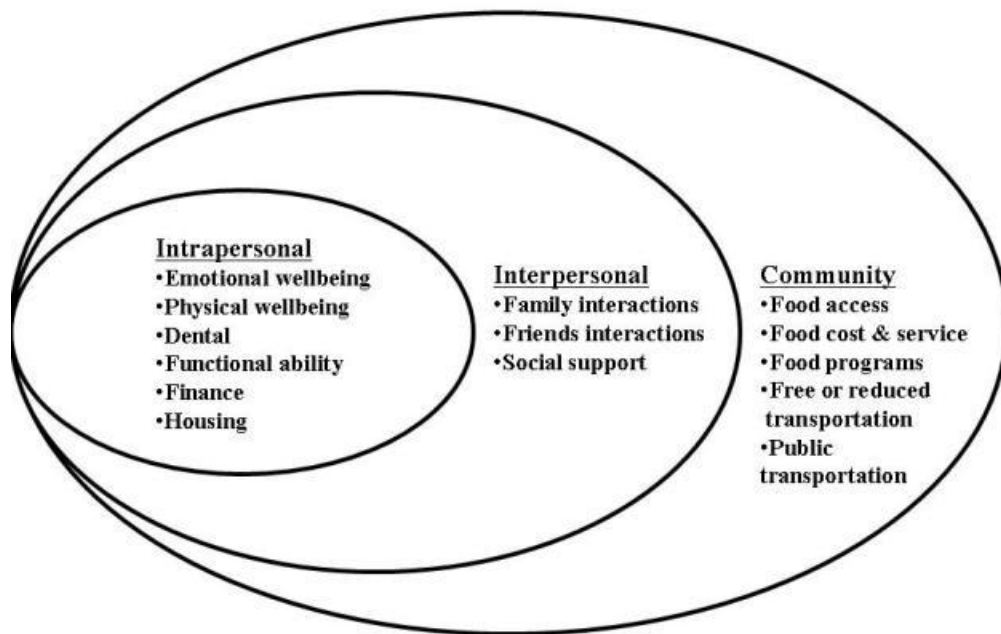
The availability of free or reduced price transportation in your community  
Your ability to get to free or reduced transportation  
Your use of free or reduced price transportation

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<sup>1</sup>Theoretical factors related to older adults' ability to grocery shop prepare food and eat. <sup>2</sup>Construct factors based on exploratory factor analysis with varimax rotation. Survey items were not included in a construct factor if loadings were  $\leq 0.4$ . Construct factors with only one item were not retained. Survey items in italics loaded into a construct factor different from the theoretical factor.

The construct factors related to older adult's ability to grocery shop, prepare food and eat identified from factor analysis can be categorized into the intrapersonal, interpersonal and community socio-ecological model levels of influence as depicted in Figure 1.

Figure 1: Categorization of construct factors as conceptualized within multiple levels of the socio-ecological model.



### Cumulative Multiple Logistic Regression

Cumulative multiple logistic regression analysis was used to determine how effective construct factors were in explaining older adult's ability to grocery shop, prepare food, and eat.



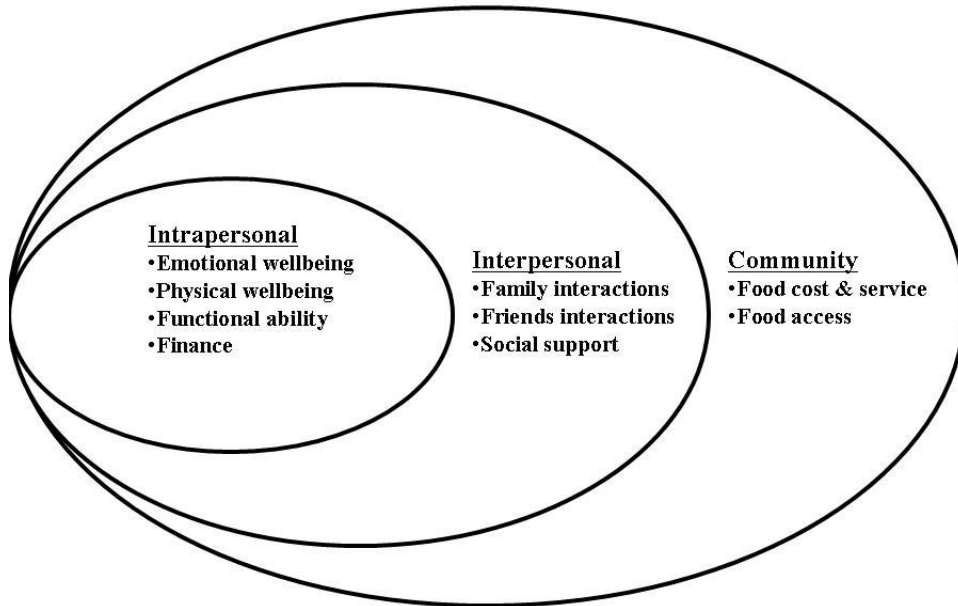
Ability to grocery shop: Construct factors that were significant in explaining older adult's ability to grocery shop were "Emotional wellbeing" (p<0.0001), "Physical wellbeing" (p<0.0001), "Social support" (p<0.0001), "Food access" (p<0.0001), "Family interactions" (p<0.005), "Finances" (p<0.0004), "Friend interactions" (p<0.0009), "Functional ability" (p<0.0001), and "Food cost and service" (p<0.0017) (Table 4). The construct factors that were significant in explaining older adults' ability to grocery shop can be categorized into multiple levels of socio-ecological model as depicted in Figure 2.

Table 4. Effect of construct factors in explaining older adults' ability to grocery shop.

Parameter	$\beta$ Estimate	Standard Error	Chi-Square	Probability <sup>1</sup>
Intercept 5	-2.0079	0.1685	141.91	<0.0001
Intercept 4	-0.3621	0.1334	7.3679	0.0066
Intercept 3	1.1489	0.1441	63.5719	<0.0001
Intercept 2	3.1711	0.2177	212.2378	<0.0001
Emotional wellbeing	0.4936	0.1008	23.9903	<b>&lt;0.0001</b>
Physical wellbeing	1.2337	0.1184	108.5362	<b>&lt;0.0001</b>
Social support	-0.5600	0.1028	29.6874	<b>&lt;0.0001</b>
Food access	1.1089	0.1122	97.7469	<b>&lt;0.0001</b>
Family interactions	0.2760	0.0983	7.8744	<b>0.0050</b>
Finances	0.3606	0.1013	1.6773	<b>0.0004</b>
Friend interactions	0.3296	0.0993	11.0105	<b>0.0009</b>
Functional ability	0.5535	0.1023	29.2727	<b>&lt;0.0001</b>
Free or reduced transportation	0.1855	0.0994	3.4819	0.0620
Public transportation	-0.0025	0.0989	0.0007	0.9793
Food cost & service	0.3148	0.1004	9.8215	<b>0.0017</b>
Housing	0.0806	0.1000	0.6494	0.4203
Food programs	0.0373	0.1009	0.1370	0.7112
Dental	0.1086	0.0990	1.2044	0.2725
Food stamps	0.0978	0.0984	0.9378	0.3203

<sup>1</sup> Cumulative multiple logistic regression analysis.

Figure 2. Construct factors within multiple levels of the socio-ecological model significant in explaining older adults' ability to grocery shop.



Ability to prepare food: Construct factors that were significant in explaining older adult's ability to prepare food were "Emotional wellbeing" ( $p < 0.0001$ ), "Physical wellbeing" ( $p < 0.0001$ ), "Social support" ( $p < 0.0001$ ), "Food access" ( $p < 0.0001$ ), "Family interactions" ( $p < 0.0003$ ), "Friend interactions" ( $p < 0.0002$ ), "Functional ability" ( $p < 0.0001$ ), and "Housing" ( $p < 0.0408$ ) (Table 5). The construct factors that were significant in explaining older adult's ability to prepare food can be categorized into multiple levels of socio-ecological model as depicted in Figure 3.

Table 5. Effect of construct factors in explaining older adults' ability to prepare food.

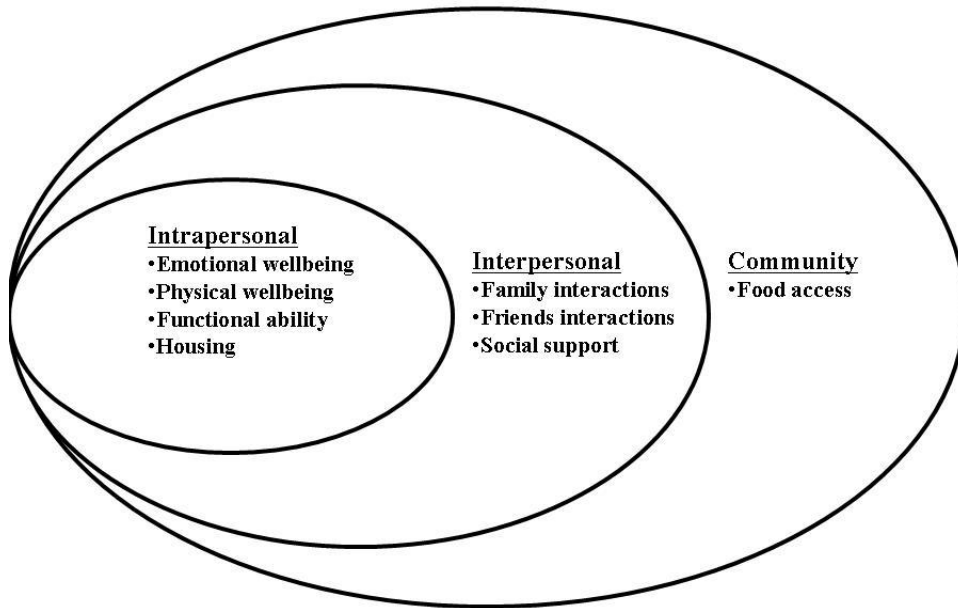
Parameter	$\beta$ Estimate	Standard Error	Chi-Square	Probability <sup>1</sup>
Intercept 5	-1.9468	0.1674	135.2564	<0.0001
Intercept 4	0.2014	0.1289	2.4404	0.1182
Intercept 3	1.6261	0.1517	114.9464	<0.0001
Intercept 2	3.6202	0.2444	219.9464	<0.0001
Emotional well being	0.5056	0.1006	25.2665	<b>&lt;0.0001</b>
Physical wellbeing	1.3479	0.1227	120.7373	<b>&lt;0.0001</b>
Social support	-0.4536	0.1009	20.2120	<b>&lt;0.0001</b>
Food access	0.7284	0.1036	49.4474	<b>&lt;0.0001</b>
Family interactions	0.3563	0.0987	13.0172	<b>0.0003</b>
Finances	0.1360	0.0996	1.8648	0.1721
Friend interactions	0.3646	0.0991	13.0172	<b>0.0002</b>
Functional ability	0.4898	0.1003	23.8429	<b>&lt;0.0001</b>
Free or reduced transportation	0.1214	0.0994	1.4920	0.2219
Public transportation	-0.0057	0.0989	0.0034	0.9536
Food cost and service	0.1510	0.0990	2.3236	0.1274
Housing	0.2041	0.0998	4.1829	<b>0.0408</b>
Food programs	0.0260	0.1011	0.0663	0.7967
Dental	-0.0091	0.0986	0.0086	0.9259
Food stamps	-0.0261	0.0980	0.0708	0.7901

<sup>1</sup> Cumulative multiple logistic regression analysis.

Figure 3. Construct factors within multiple levels of the socio-ecological model

significant in explaining older adults' ability to prepare food.

Figure 3. Construct factors within multiple levels of the socio-ecological model significant in explaining older adults' ability to prepare food.



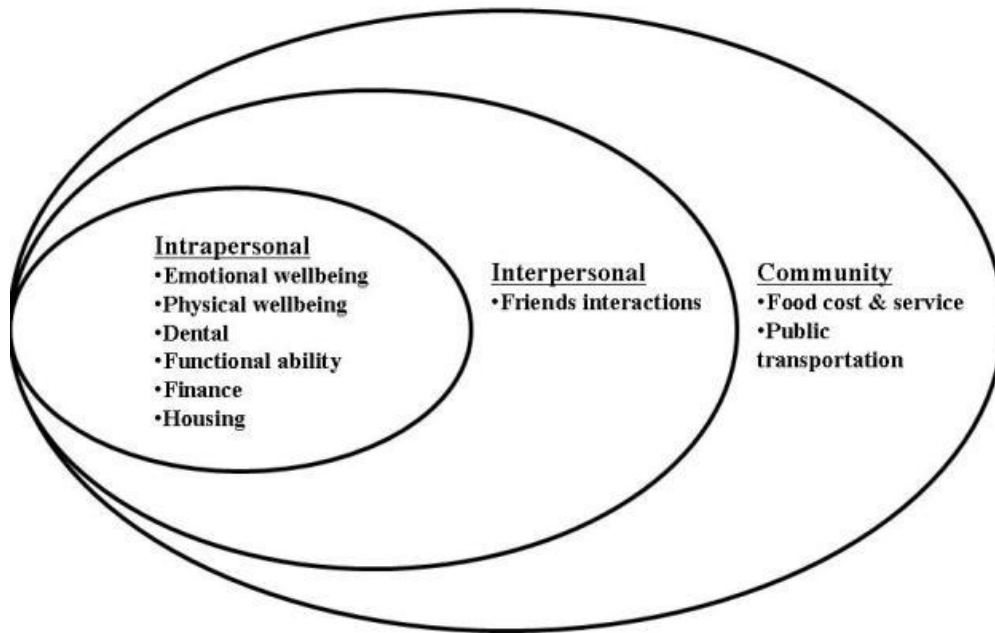
Ability to eat: Construct factors that were significant in explaining older adult's ability to eat were "Emotional wellbeing" ( $p < 0.0001$ ), "Physical wellbeing" ( $p < 0.0001$ ), "Finances" ( $p < 0.0025$ ), "Friend interactions" ( $p < 0.0001$ ), "Functional ability" ( $p < 0.0002$ ), "Public transportation" ( $p < 0.0152$ ), "Food cost and service" ( $p < 0.003$ ), "Housing" ( $p < 0.0239$ ), and "Dental" ( $p < 0.0001$ ) (Table 6). The construct factors that were significant in explaining older adults' ability to eat can also be categorized into multiple levels of socio-ecological model as depicted in figure 4.

Table 6. Effect of construct factors in explaining older adults' ability to eat.

Parameter	$\beta$ Estimate	Standard Error	Chi-Square	Probability <sup>1</sup>
Intercept 5	-1.3146	0.1415	86.3090	<0.0001
Intercept 4	0.7595	0.1296	34.3604	<0.0001
Intercept 3	2.5445	0.1863	186.6262	<0.0001
Intercept 2	5.1001	0.4334	138.4518	<0.0001
Emotional well being	0.4612	0.1010	20.8517	<b>&lt;0.0001</b>
Physical wellbeing	1.0581	0.1165	82.4185	<b>&lt;0.0001</b>
Social support	-0.0220	0.0998	0.0484	0.8259
Food access	0.0816	0.0993	0.6758	0.4110
Family interactions	-0.0909	0.0994	0.8350	0.3608
Finances	0.3065	0.1016	9.1051	<b>0.0025</b>
Friend interactions	0.3868	1.1004	14.8440	<b>0.0001</b>
Functional ability	0.3688	0.1000	13.6039	<b>0.0002</b>
Free or reduced transportation	0.0122	0.0992	0.0151	0.9023
Public transportation	-0.2447	0.1008	5.8950	<b>0.0152</b>
Food cost and service	0.3666	0.1014	13.0838	<b>0.0003</b>
Housing	0.2288	0.1013	5.1013	<b>0.0239</b>
Food Programs	0.00728	0.0985	0.0055	0.9411
Dental	0.7197	0.1058	46.2957	<b>&lt;0.0001</b>
Food stamps	-0.1121	0.0996	1.2674	0.2603

<sup>1</sup> Cumulative multiple logistic regression analysis

Figure 4. Construct factors within multiple levels of the socio-ecological model significant in explaining older adults' ability to eat.



## Discussion

The results of the present study demonstrated numerous factors within multiple socio-ecological model levels of influence were significantly associated with older adults' ability to grocery shop, prepare food or eat. Previous studies have investigated factors similar to the current study such as physical wellbeing, emotional wellbeing, finances, social support (Wylie et al., 1999; Shoenberg, 2000; Sharkey et al., 2002; Ferry et al., 2005; Iizaka et al., 2008), as well as ability to grocery shop, prepare food and eat (Sharkey, 2002; Dewolfe & Millan, 2003; Keller & McKenzie, 2003; Kiosses & Alexopolous, 2010); however, the focus of these studies was on the relationship of these factors on older adults food intake or nutritional status.

Limited research is available regarding the association of multiple factors directly related to older adults' ability to grocery shop, prepare food and eat. Among studies, which have investigated factors influencing older adults' ability to grocery shop, prepare food, and eat most have evaluated one or two isolated factors, chiefly focusing on physical issues. For example, Raina et al. (2004) and Crews et al. (2006) observed older adults with vision or hearing problems were more likely to report having difficulty with grocery shopping or meal preparation. In a study by Shigili & Hebbal (2010), after receiving dentures older adults were less likely to report having dental problems that made eating difficult. In a study by Keller (2005), muscle strength, muscle size, and fear of falling were significantly associated with being dependent on others for either grocery shopping or meal preparation (Keller, 2005). Similarly, in the current study, "Physical

wellbeing” and “Dental” were factors significantly associated with older adults’ ability to either grocery shop, prepare food or eat.

A study by Quigley et al. (2005); however, did evaluate the association of multiple factors including mobility, social interaction, emotional wellbeing, living arrangement, financial security, financial management and appliances on congregate and home-delivered Older American Act Nutrition Program (OAANP) participants’ ability to grocery shop, prepare food and eat. Quigley et al. reported among congregate participants, the factors mobility and financial management were significantly associated with older adults’ reported ability to grocery shop, prepare food and eat. In addition, among home-delivered meal participants, the factors mobility and social interaction were significantly associated with older adults’ reported ability to grocery shop, prepare food and eat. In the present study, similar factors including “Physical wellbeing,” “Finances,” “Family interactions,” and “Friend interactions” were found to be significantly associated with older adults’ ability to either grocery shop, prepare food or eat. A difference between the study by Quigley et al. (2005) and the present study is that Quigley et al. investigated the effect of various factors on OAANP participants’ ability to grocery shop, prepare food and eat collectively; whereas, in the current study the association of various factors were examined related to older adults’ ability to grocery shop, prepare food or eat as individual activities.

Unlike the present study, none of the previous studies specifically utilized the socio-ecological model to evaluate the relationship of multiple factors on older adults’ ability to grocery shop, prepare food, and eat. Keller et al. (2006) however, did conducted a qualitative study, using semi-structured interviews, to identify barriers and assets



influencing low income older adults food access utilizing the socio-ecological model framework. In this study, various factors influencing limited income older adults' food access were identified within multiple levels of the socio-ecological model. Factors identified by limited income older adults within the intrapersonal level that affected food access were health, budget and living alone. Within the interpersonal level, factors identified included informal support with transportation and food provision and socialization. City transportation, grocery store environment and community agencies were factors identified within the community level as affecting food access. The factors identified by Keller et al. (2006) are consistent with factors significantly associated with older adults' ability to either grocery shop, prepare food or eat in the current study including "Physical wellbeing," "Finances," "Family interactions," "Friend interactions," "Social Support," "Food access," and "Public transportation."

The results of the present study, Quigley et al. (2005) and Keller et al. (2006) demonstrate the importance of developing older adult nutrition education programs and services using integrated approaches at multiple levels of the socio-ecological model. Many nutrition education programs and services address only one factor or factors at one level, ignoring other significant factors at different levels of influence that may be effectual. For example, SNAP specifically may address older adults' financial needs; however, many other factors such as physical wellbeing, emotional wellbeing, housing, and functional ability at the intrapersonal level; social support and social interactions at the interpersonal level; and food access and public transportation at the community level may also need to be addressed in order to effectually impact older adults food intake. The Older Americans Act Nutrition Program (OAANP) is an example of an integrated

community based program which addressed multiple factors at various levels including nutritional intake, physical and mental health, socialization, transportation, and connecting to other older adult community programs (Wellman et al., 2007). To effectively impact the nutritional health of low-income older adults, Rainey & Cason (2001) also emphasized the importance of integrated approaches utilizing the socio-ecological model. As a result, Rainey & Cason (2001) used the socio-ecological approach to assess the nutritional status of limited income elderly women at five levels of influence to inform the development of integrated nutrition education modules and messages. Providing integrated approaches to nutrition programs can widen the scope and variety of programs and services offered which can enhance older adults' health, independence, and quality of life (Rainey & Cason, 2001; ADA, 2005; Wellman et al., 2007).

## CHAPTER V

### SUMMARY AND CONCLUSION

#### Summary

The purpose of this study was to design an instrument evaluating theoretical factors related to older adults' ability to grocery shop, prepare food, and eat within the intrapersonal, interpersonal and community socio-ecological model levels of influence. An additional purpose of this study was to determine the instruments construct factors validity and to determine how effective construct factors were in explaining older adult's ability to grocery shop, prepare food, and eat.

Hypothesis one stated there will be no agreement between the construct factors and the theoretical factors related to older adults' ability to grocery shop, prepare food and eat. Based on the results present in Table 3, there was agreement between the construct factors and the theoretical factors related to older adult's ability to grocery shop, prepare food and eat. Therefore, hypothesis one was rejected.

Hypothesis two stated no construct factors will significantly explain older adults' ability to grocery shop, prepare food and eat. Based on the results presented in Tables 4, 5 and 6, numerous construct factors within multiple levels of the socio-ecological model were significant in explaining older adults' ability to grocery shop, prepare food and eat. Therefore, hypothesis two was rejected.

### Conclusion

In this study, the significant association of numerous factors related to older adult's ability to shop, prepare food and eat indicates the need for developing integrated nutrition education programs and services addressing multiple levels of influence. Many current nutrition education programs and materials target one or two factors without addressing other significant factors that may be effectual. Integrated approaches addressing multiple levels of influence can widen the scope and variety of programs and services offered to further enhance older adult's health, independence, and quality of life.

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## APPENDICES

APPENDIX A

Oklahoma State University Institutional Review Board

Date: Monday, February 01, 2010  
IRB Application No HE103  
Proposal Title: Utilization of the Socio-ecological Model to Evaluate Low-Income Older Oklahomans' Ability to Grocery Shop, Prepare Food and Eat  
Reviewed and Exempt  
Processed as:

Status Recommended by Reviewer(s): Approved Protocol Expires: 1/31/2011

Principal Investigator(s): /  
Kiranmayi Korlagunta Janice Hermann  
301 HES 301 HES  
Stillwater, OK 74078 Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely



Shella Kennison, Chair  
Institutional Review Board

## APPENDIX B

### Telephone introduction script

Hello, my name is-----, and I am calling from the Nutrition Sciences Department at Oklahoma State University. We are conducting a research survey on factors affecting older Oklahomans' ability to grocery shop, prepare food and eat. The information obtained from this survey will be used to develop educational materials to help older Oklahomans' with grocery shopping, preparing food and eating.

The survey will take approximately 15 minutes to complete. Your name will not be recorded and all of your answers will be kept confidential. Your participation is voluntary. You can choose to skip any question you do not wish to answer or stop the survey at any time.

Would you be willing to complete the survey? Would this be a good time to do the survey?

If you have any questions about the survey you may contact Dr. Janice Hermann, Department of Nutrition Sciences, Oklahoma State University, Stillwater, OK, 405-744-4601. If you have any questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

### Telephone recall script

Hello, my name is -----, and I am calling from the Nutrition Sciences Department at Oklahoma State University. We spoke with ----- earlier this week regarding a survey about factors affecting older Oklahomans' ability to grocery shop, prepare food and eat. I am calling now to finish that survey. Would this be a good time?

If you have any questions about the survey you may contact Dr. Janice Hermann, Department of Nutrition Sciences, Stillwater, OK, 405-744-4601. If you have any questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

Oklahoma State Univ.
IRB
Approved <u>2/1/10</u>
Expires <u>1/31/11</u>
IRB# <u>HE-10-3</u>

## VITA

Kiranmayi Korlagunta

Candidate for the Degree of

Doctor of Philosophy

Thesis: UTILIZATION OF THE SOCIO-ECOLOGICAL MODEL TO EVALUATE OLDER OKLAHOMA'S ABILITY TO GROCERY SHOP, PREPARE FOOD, AND EAT

Major Field: Nutritional Sciences

Biographical:

Education: Received Bachelor of Home science from Sri Padmavathi Women's College, Tirupathi, Andhra Pradesh, India in 1994; received a Master of Arts degree in Women's Studies at Alagappa University, Karaikudi, Tamil Nadu, India in October 2002; received a Master of Science degree in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma, USA in July 2006; received a PhD in Human Environmental Sciences with special emphasis in nutritional sciences at Oklahoma State University, Stillwater, Oklahoma in July 2011

Experience: Dietician, SVIMS, Tirupathi, India, 1998 to 2000; Research Investigator, TATA institute of Social Sciences, Mumbai, India, June 2000 – December 2000; Field Supervisor, TATA institute of Social Sciences, Mumbai, India, August 2002 – December 2002; Research Investigator, Government Area Hospital, Medak, India, November 2002 – June 2003; Graduate Research Assistant, Department of Nutritional Sciences, Oklahoma State University, USA, August 2003 – May 2011; Graduate Teaching Assistant, Department of Nutritional Sciences, Oklahoma State University, USA, August 2004 – December 2009.



Name: Kiranmayi Korlagunta

Date of Degree: July, 2011

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: UTILIZATION OF THE SOCIO-ECOLOGICAL MODEL TO  
EVALUATE OLDER OKLAHOMAN'S ABILITY TO GROCERY  
SHOP, PREPARE FOOD AND EAT

Pages in Study: 72

Candidate for the Degree of Doctor of Philosophy

Major Field: Human Environmental Science, Nutritional Science

Scope and Method of Study:

Findings and Conclusions: The objective of this study was to evaluate factors affecting older adult's ability to grocery shop, cook and eat within multiple socio-ecological model levels of influence. Questions were developed using a 5 point symmetrical Likert scale based on theoretical factors affecting older adults' ability to shop, cook and eat within the intrapersonal, interpersonal and community socio-ecological model levels of influence. Data were collected via a telephone survey from a randomized list of adults, aged 65 and above, who participated in the supplemental nutrition assistance program (SNAP).

Construct factors were identified using factor analysis with varimax rotation. Cumulative multiple logistic regression analysis was used to determine construct factors significant in explaining older adults' ability to shop, cook and eat. Three hundred and seventy older adults completed the survey. Fourteen construct factors were identified. The results of this study indicate that construct factors significant in explaining older adult's ability to grocery shop were physical wellbeing, emotional wellbeing, functional ability, finances, social support, family interactions, friend interactions, food access, and food cost and service. Construct factors significant in explaining older adult's ability to prepare food were physical wellbeing, emotional wellbeing, functional ability, housing, social support, family interactions, friend interactions, and food access. Construct factors significant in explaining older adult's ability to eat were physical wellbeing, emotional wellbeing, dental, functional ability, finances, housing, friend interactions, and food cost.

Older adults' ability to grocery shop, prepare food and eat is influenced by factors within multiple levels of influence. Educational programs and services addressing multiple levels of influence are suggested to improve older adults overall well-being.

ADVISER'S APPROVAL: Janice Hermann

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