

THE PREVALENCE AND DISTRIBUTION OF FOOD INSECURITY
AMONG
OLDER GEORGIANS RECEIVING AGING SERVICES

by

KENDALL D SMITH

(Under the Direction of Jung Sun Lee)

ABSTRACT

This study examined the prevalence and distribution of food insecurity among older Georgians receiving aging services across the state, by county, by Program Service Area (PSA), and by residence type. This study used data assessed and derived from the Georgia Aging Information Management Systems (n=48,649, mean age 74.3 ± 11.9 years, 69.7% female, 51.1% white). Food insecurity was assessed using the 6-item Household Food Security Survey Module. Approximately 29% of participants were food insecure, and there was a substantial variation in the prevalence of food insecurity across the state. Northwest Georgia (42.7%) and the Georgia Mountains (38.9%) PSAs showed the highest food insecurity prevalence. Proportions of participants who were living in food deserts were highest in the Southwest Georgia (34.9%) and Southern Crescent (34.6%) PSAs. Understanding the distribution of food insecurity in vulnerable older Georgians could help to better meet their critical needs for food and aging programs and services.

INDEX WORDS: Older adults; food insecurity; Older Americans Act Nutrition Program

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DEDICATION

I would like to dedicate this work in memory of two very important men in my life. First, I would like to dedicate this to my wonderful, inspiring, and selfless grandfather, “Pa Pa”. If I could be half the person you were, I would consider my life a success. Thank you for always letting me be your best buddy. Also, I would like to dedicate this to my cousin Sean. Thank you for being the big brother I never had. Thank you both for always believing in me and pushing me to become the person I am. I miss you both every day.

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CHAPTER 1

INTRODUCTION

The older population in the United States (U.S.) is rapidly growing and projected to double over the next fifty years, and Georgia has already experienced this type of growth in the older population in the past decade (1, 2). A primary concern with the U.S. population aging is that most older adults have at least one chronic condition, with many living with multiple chronic conditions (3). Some of the most common chronic conditions in older populations (i.e., hypertension, heart disease, diabetes) can be diet-related and the prevention and management of these diseases, and other age-related conditions, often focuses on manipulating the diet (4, 5). However, many older adults do not always have access to affordable, healthful food sources in order to manipulate their diet.

Food insecurity (FI) “exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (6). FI in the older population is multifactorial and associated with not only factors affecting their financial resources such as income, education level, and minority status, but also by factors affecting their ability to gain access to (e.g., transportation), prepare, and consume food including functional impairments, health problems, and community characteristics (5, 7, 8).

FI has been determined based on the U.S. Household Food Security Survey Module (HFSSM) in several nationally representative surveys since 1995. According to the United States Department of Agriculture (USDA), about 14.5% of U.S. households, 8.9% of households with an older adult, and 9.1% of older adults living alone were food insecure in 2012 (9). The overall

FI prevalence in Georgia was 16.9%, statistically significantly higher than the national average of 14.5% (9). In 2011, the prevalence of FI in U.S. older adults was 11.1%, which is higher than the national average, and raises alarm because FI can cause many adverse nutritional and non-nutritional outcomes, further exacerbated by the natural process of aging (5, 10). Many negative outcomes associated with FI include under- or overweight, lower nutrient intakes, psychosocial issues, and the choice between food or basic needs (5, 7). All of these can cause the onset of diseases, worsen current diseases, diminish quality of life, and decrease the ability to maintain independence.

In 1965, congress passed the Older Americans Act (OAA) in order to help older individuals live independently in their homes and provide a continuum of care (7, 11). A variety of OAA programs are provided through the aging services network that are available to everyone over the age of 60, but are specifically targeted to those exhibiting the greatest social or economic need (12). In Georgia, these services are provided through the twelve Area Agencies on Aging (AAAs), or Program Service Areas (PSAs) throughout the state, which make up the “Wellness Program” (7, 13). These programs are federally funded, and supplemented by other federally funded programs, state, and local funds (12). The OAA Nutrition Program (OAANP) aims to reduce FI by providing nutritious meals (e.g., congregate meals and home-delivered meals) and nutrition education (7). Although OAANP has been shown to make a significant contribution to improve food security in vulnerable older Georgians, significant unmet needs exist for the OAANP in Georgia due to chronically limited resources to meet the increasing demands of older Georgians, especially during the Great Recession; more efforts are needed to increase the capacity of OAANP and other OAA programs to better understand and meet the needs of vulnerable older Georgians (14, 15).

The HFSSM was originally validated for determining FI status mainly among women and children, but not among older adults; however, the GA Advanced Performance Outcomes Measures Project 6 (GA Advanced POMP6) examined the validity of a modified 6-item HFSSM among new and current OAANP participants, and waitlisted individuals in Georgia, through self-administered mail surveys (14). Results from this project showed that 57.4% of participants reported FI, significantly higher than the national average of 11.1% (16). Psychometric properties from this study were comparable to those from the national FI data collected in the 2006 Current Population Survey- Food Security Supplement (CPS-FSS) elderly households data. This module is now included on the Home and Community-Based Services (HCBS) client registration form in Georgia, which all new and active OAA program and services participants complete (14). The data from these forms are stored and managed on the Georgia Aging Information Management System (GA AIMS), which provides a first ever opportunity to better estimate FI and understand needs for OAANP among older adults in the state of Georgia.

The main purpose of this study was to estimate the prevalence of FI among older Georgians receiving aging services across the state, by county, by PSA, and the type of residence areas (i.e., food deserts). Another purpose was to examine factors associated with FI among older adults receiving aging services in Georgia using the first-ever statewide FI data assessed based on the validated modified 6-item HFSSM and derived from the GA AIMS. The findings of this analysis could serve as a basis to determine the need for and to evaluate the outcomes of the OAA programs including OAANP.

The data from this study could aid in identifying the distribution of older adults in need of food, nutrition, and aging services, across the state. Also, such data can be used to examine the impacts of food, nutrition, and aging programs, which could lead to the improvement of

protocols or programs, such as expanding services and access to services in areas of higher need or changing current delivery of services. Overall, these benefits allow for the state to improve provision of OAA programs and services, and to better plan and use funding to reach those most in need.

The chapters for this thesis are outlined below:

Chapter 2 is a review of the literature pertaining to demographic aging trends, FI and related factors, the OAA, and aging services in Georgia. Chapter 3 describes the methods used for this study. Chapter 4 includes the findings of this project along with relevant tables and figures.

Chapter 5 is the discussion of the results and implications for further research and analysis of service provision for this population.

CHAPTER 2

LITERATURE REVIEW

Aging Population

The U.S. population is aging, with the older population projected to double over the next five decades to 92 million in 2060, which represents about 25% of the total estimated population (1). Several factors contribute to the population projections including the aging of the baby boomer population, longer life expectancy, and lower birth rates (1). In addition to the growth of the older adult population, as a whole, the 85+ age group is also expected to experience large growth, reaching 6.6 million in 2020, up from 5.6 million in 2009 (4). The older population is also becoming more racially diverse. Between 2010 and 2050, the minority older population will increase from 8.5% to 11.9% in African Americans, and from 6.9% to 19.8% in people of Hispanic origin (1). However, non-Hispanic whites are projected to continue to be the predominate race (1).

In 2009, most older adults were married, and men were more likely to be married than women (4). However, the number of older adults who were divorced or separated increased by 6.6% since 1980, representing 11.9% of the older population (4). About 30% of older adults lived alone in 2009, and the number of persons living with a spouse decreased with age (4). Also, 8.9% of older adults were below the poverty level, and this was higher in women than men (4). Along with the older adult population growing, their education level is increasing, with the percentage of those with a high school degree rising from 28% in 1970 to 78% in 2009 (4). However, disparities among races still exist, and minority races had less education (4).

Approximately 91% of older adults have at least one chronic condition, and two out of three older adults have multiple chronic conditions (3). The most common chronic conditions among older adults during 2006-2008 were diagnosed arthritis (50%), hypertension (38%), all types of heart disease (32%), any cancer (22%), and diabetes (18%) (4). Prevention and management of age-related chronic conditions can be associated with diet (5). However, many older adults do not always have access to affordable, healthful food sources (5).

According to Census data, the state of Georgia has already experienced such growth in the older adult population. Between 2000 and 2010, the population of Georgian adults, aged 60 or older, grew from just over one million individuals to 1.5 million (2). With a 42.7% change in this segment of the population, Georgia saw the 5th largest growth among all the states in the past decade (2). It is estimated, in Georgia, 25% of the older population lived alone and 11% lived below the poverty level in 2009 (13). In 2010, 6.7% of adults over the age of 60 lived with a grandchild in the household, which is above the U.S. average of 5.5% (17). Georgia has a more diverse older adult population, in terms of race, and in 2012, about 20.5% of those age 65+ were African American, which increased slightly since 2005 (19.5%) (17, 18). However, minorities comprised 22.2% of the older Georgian population in 2005, and that number has increased to 25% in 2012, which was higher than the national average of 20.1% (17, 18). In 2010, 20% of older Georgians had a Bachelor's level education or higher, which was lower than the national average of 21% (17). However, only 14.3% of older Georgians had a Bachelor's level education or higher in 2002, so, like the U.S. older population, older Georgians are also experiencing an increase in education levels (18, 4). Among older Georgians, chronic conditions that are of the greatest concern include cardiovascular disease, particularly heart disease and stroke, arthritis,

and diabetes (18). Due to the substantial increase in the older Georgian population, it is imperative to address their needs.

Older Americans Act Programs and Services

In 1965, congress passed the OAA as a response to concern about the lack of social services available for older adults (11). The purpose of the OAA was to help older individuals live independently in their homes and to provide a continuum of care (7). The OAA, through original legislation and subsequent amendments, allowed for state grants for social services and community planning, research, the aging services network, and training in the field of aging for employees (7, 11). The aging services network includes the U.S. Department of Health and Human Services (U.S. DHHS) Administration on Aging (AoA), State Units on Aging (SUAs), AAAs, and various local service provider organizations (7). The state unit on aging in Georgia is the Georgia Department of Human Services Division of Aging Services (DAS), and there are twelve AAAs (or PSAs), which are responsible for the coordination of the community based services (13). The PSAs with their associated counties are listed in **Table 1**.

Table 1: List of Georgia Program Service Areas and their associated counties

PSA	Counties
1-Northwest Georgia	Bartow, Catoosa, Chattooga, Dade, Fannin, Floyd, Gilmer, Gordon, Haralson, Murray, Paulding, Pickens, Polk, Walker, Whitfield
2-Georgia Mountains	Banks, Dawson, Forsyth, Franklin, Habersham, Hall, Hart, Lumpkin, Rabun, Stephens, Towns, Union, White
3-Atlanta Region	Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, Rockdale
4-Three Rivers/Southern Crescent	Butts, Carroll, Coweta, Heart, Lamar, Meriwether, Pike, Spalding, Troup, Upson
5-Northeast Georgia	Barrow, Clarke, Elbert, Greene, Jackson, Jasper, Madison, Morgan, Newton, Oconee, Oglethorpe, Walton
6-River Valley/Lower Chattahoochee	Chattahoochee, Clay, Crisp, Dooly, Harris, Macon, Marion, Muscogee, Quitman, Randolph, Schley, Stewart, Sumter, Talbot, Taylor, Webster
7-Middle Georgia	Baldwin, Bibb, Crawford, Houston, Jones, Monroe, Peach, Pulaski, Putnam, Twiggs, Wilkinson
8-Central Savannah	Burke, Columbia, Glascock, Hancock, Jefferson, Jenkins, Lincoln, McDuffie, Richmond, Screven, Taliaferro, Warren, Washington, Wilkes
9-Heart of GA Altamaha	Appling, Bleckley, Candler, Dodge, Emanuel, Evans, Jeff Davis, Johnson, Laurens, Montgomery, Tattnall, Telfair Toombs, Treutlen, Wayne, Wheeler, Wilcox
10-Southwest Georgia	Baker, Calhoun, Colquitt, Decatur, Dougherty Early, Grady, Lee, Miller, Mitchell, Seminole, Terrell, Thomas, Worth
11-Southern Georgia	Atkinson, Bacon, Ben Hill, Berrien, Brantley, Brooks, Charlton, Clinch, Coffee, Cook, Echols, Irwin, Lanier, Lowndes, Pierce, Tift, Turner, Ware
12-Coastal Georgia	Bryan, Bulloch, Camden, Chatham, Effingham, Glynn, Liberty, Long, McIntosh

OAA programs and services are available to everyone over the age of 60, but are specifically targeted to those exhibiting the greatest social or economic need (12). Means testing is not legal, but participants can make voluntary contributions for services they receive, if able (12). OAA is federally funded, and then supplemented by other federally funded programs (i.e.,

Medicaid) as well as state and local funds (12). States are responsible for the distribution of funds to the AAAs based on formulas developed by each state (12). In fiscal year (FY) 2012, the total federal funding for OAA was \$1.913 billion, with 71% of that appropriated for Title III programs (State & community programs on aging) (19). Specifically, \$816.3 million (42.7% of OAA funding) was appropriated for nutrition services, and \$20.9 million (1.1%) for health promotion and disease prevention (19).

OAANP aims to reduce FI by providing nutritious meals (e.g., congregate meals and home-delivered meals) and nutrition education (7). At the local level, nutrition, disease prevention, and health promotion services are mainly provided through senior centers (7). In Georgia, these community-based services make up the “Wellness Program” and are managed by a “Wellness Coordinator” within each of the 12 AAAs (7). During FY 2012, 3,977,489 meals were served in the state of Georgia, including 1,453,470 congregate meals and 2,524,019 home-delivered meals (20). More specifically, 28,244 people were served home-delivered meals and 18,870 were served congregate meals (20). These programs help older Georgians improve food security, as shown in the GA Advanced POMP6 survey which revealed that OAANP significantly aided in achieving food security compared to those on the waiting list for services (16). Given the growing older Georgian population, these programs are facing many significant challenges to meet needs, due to lack of resources (16).

Food Insecurity

FI, as defined by the Life Sciences Research Office (LSRO), “exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain” (6). In turn, food security (FS) is “access by all

people at all times to enough food for an active, healthy life” (6). FI is a complex issue affected by numerous variables; factors that puts one at a greater risk of FI include living at or below the poverty level, having less than a high school degree, being African American or Hispanic, living in a Southern state, or being divorced or separated (5, 7, 8). Among older adults receiving OAANP services in Georgia, 62.3% reported living at or below the poverty line, which could increase their risk of FI (16). Unique to older adults, other issues affecting FS status include factors influencing the ability to gain access to (e.g., transportation), prepare, and consume food, such as physical and cognitive functional status, health status, living with a grandchild, and community characteristics (e.g., food deserts) (5, 7). Physical functional status is typically assessed by the ability to carry out activities of daily living (ADLs) and instrumental activities of daily living (IADLs). Limitations in ADLs and IADLs could not only prevent older individuals from living alone, but also prevent them from having access to and obtaining affordable, healthful foods. According to the AoA, 20% of population, over the age of 65, had some type of ADL limitation, and that number is expected to increase to 21.4% in 2040, due to the expected growth of this population subgroup (21).

FI can be the cause of many adverse outcomes in the general population. However, the natural process of aging can further exacerbate the complications associated with FI and increase risk for poor health and its related outcomes (5). Some of the negative outcomes experienced with FI include lower nutrient intakes, unhealthy weight, physical limitations, lower cognitive function, psychosocial issues (e.g., anxiety or depression), and decreased quality of life (7, 22, 23, 24). Furthermore, FI can introduce or worsen nutrition-related chronic diseases such as heart disease (7, 25, 26, 27).

FI can also cause households, including older adults, to choose between basic needs like heating air conditioning, healthcare, and food (7). Many older adults have multiple chronic conditions, and must take many medications for each condition (polypharmacy). FI can force older individuals to choose between adhering to a prescribed medical treatment or obtaining food (7, 28, 29). All of the aforementioned adverse effects of FI can be detrimental to overall health, diminish quality of life, and decrease the ability for older adults to maintain independence.

Measurement of Food Insecurity

The Food Security Measurement Project was established by Congress in 1992, in order to develop a standard measure of food insecurity for use at national, state, and local levels (30). In 1995, the U.S. Census Bureau utilized the first FSS with its CPS (30). Analysis of the 1995 data led to the creation of a numerical FS scale and a categorical scale, and its subsequent use for FS data collection over the years, among major population subgroups, has validated the tool (30). The CPS-FSS contains a set of 18 “core” questions, also known as the U.S. HFSSM, which has been utilized in several nationally representative surveys like the National Health and Nutrition Examination Survey (NHANES), and the Continuing Survey of Food Intakes by Individuals (CSFII) (30). The 18-item form is used for households with children, and there is also a 10-item form for use in households without children (30). A validated 6-item form of the HFSSM has also been developed (30, 31).

National-level FS, since 1995, has been measured using the HFSSM; however, the HFSSM has not been used for state and locally representative surveys targeted toward older adults (14). Also, many concerns about using this measurement tool for older adult populations have surfaced, including an underestimation of the extent of FI (14). This can be attributed to the fact that the HFSSM does not address some of the unique challenges that older adults face in gaining access to or using food (i.e., transportation, functional status, and isolation) (14). However, analysis of the 1998-2000 CPS- FSS, showed that the HFSSM is reasonable for measuring FI among the older adult population because of the lack of differential interpretation or response patterns between nonelderly and elderly households (14).

As mentioned in a previous section, one goal of the OAANP is to reduce FI; however the federal government has not provided standard guidelines on how to measure FI at the state and local level (14). Lee et al (2011) conducted the GA Advanced POMP6 to test the validity of a modified version of the 6-item HFSSM in a sample of low-income older adults in need of OAANP; therefore, Georgia is the first state to use standardized measures to gather the statewide FI data among OAANP participants and waitlisted individuals. The GA Advanced POMP6 consisted of cross-sectional and longitudinal self-administered mail surveys that were completed by individuals identified through the state of Georgia client database systems; these included community-dwelling current and new OAANP participants and waitlisted individuals (14). A shortened version (6 items), rather than the full-length HFSSM (10 or 18 items), was used because researchers were concerned that the longer survey would present a high response burden for older adults (14). The survey also included questions regarding socioeconomic status and nutritional health status, all of which adapted from previously validated tools (14). The 6-item short form HFSSM assessed household FS within the last 30 days, and an affirmative answer to

an item resulted in one point toward the overall score. The scores ranged from 0 to 6, with higher scores equating to higher levels of FI. These scores classified households into one of four levels of FS: high FS, marginal FS, low FS, and very low FS. These FI levels were defined by the USDA as follows (32):

- **High FS:** “no reported indications of food-access problems or limitations”
- **Marginal FS:** “one or two reported indications--typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake”
- **Low FS:** “reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake”
- **Very Low FS:** “reports of multiple indications of disrupted eating patterns and reduced food intake”

High FS and marginal FS are categorized as FS, and low FS and very low FS comprise FI in the dichotomous FI variable.

Psychometric properties (interpretation of questions and response patterns) from this study were comparable to those from the national FI data collected in the 2006 CPS-FSS elderly households, and researchers concluded FI status could be validly measured in older adults requesting nutrition and aging services in Georgia, using the modified 6-item HFSSM (14). This 6-item short form of the HFSSM was included in the HCBS client registration form for all new and active OAANP recipients in Georgia, the data from which is kept on the GA AIMS. This database system allows clients from all programs to be tracked over time, which has now allowed for the compilation of FI data needed for this study.

Prevalence of Food Insecurity

According to the USDA, about 14.5% of U.S. households were food insecure in 2012, with very little change from 2011, and about 5.7% (7 million households) experienced very low FS (9). While the prevalence of FI has remained essentially the same since 2008, the prevalence significantly increased from that before 2008 (9). FI prevalence significantly rose from 2007 (11.1%) to 2008 (14.6%), which was the highest since the first national FS survey was conducted in 1995 (33). This increase can be greatly attributed to the Great Recession that began in 2008. In 2012, 8.9% of households with an older adult were food insecure, and about 9.1% of older adults living alone were food insecure (9).

The overall FI prevalence in Georgia was 16.9% in 2012, which is statistically significantly higher than the national average of 14.5% (9). In addition to the national prevalence of FI increasing after 2008, the Georgia prevalence also significantly increased from about 13.0% to 14.2% in 2008 (33, 34). Specific to Georgia's older population, in 2011, 15.2% experienced marginal FS, 8.4% experienced low FS, and 3.2% experienced very low FS (10). Overall, 11.6% of the older Georgian population was food insecure in 2011. Based on the GA Advanced POMP6, which surveyed new OAANP participants and waitlisted individuals from 2008-2009, 57.4% reported FI at baseline (16). This FI prevalence is higher than national and state levels.

Food Deserts

Food deserts are areas that lack readily accessible fresh, affordable, and healthful food (35). Rather than having a variety of supermarkets and grocery stores, these areas may be primarily serviced by convenience and fast food stores, which can contribute to poor diet and its

related conditions (35). Specifically, the USDA identifies food deserts as “low income/low access” areas (35). Low income communities have census tracts with a poverty rate of at least 20% or a median family income at or below 80% of the area’s overall median family income (35). Low access communities have census tracts in which 33% of the population live greater than one mile from a supermarket in urban areas, and greater than 10 miles in rural areas (35). The USDA Economic Research Service has identified around 6,500 food desert areas in the U.S, and about 29.7 million people lived in these areas in 2010 (36). Demographic characteristics of these areas can vary depending on rural and urban classification, but there are common demographics between the two (37). Regardless of rural or urban classification, high poverty areas are more likely to be food deserts, and their inhabitants are more likely to have lower education levels and income, and to be a minority (37). Although there are not great differences in actual distance to supermarkets between the older and younger population, older adults could face additional barriers in gaining access due to functional limitations or transportation issues (38).

In addition to having lower food access, individuals in food deserts often must pay greater prices due to less buying power of smaller stores (37, 38). Research suggests that the poorest households may pay 0.5 to 1.3% higher for the same grocery items than those making slightly higher incomes, which further limits their access to foods (38). Also, those living further from supermarkets spend significantly more time traveling to the store and often make fewer trips (38). Focus groups, individual interviews, and observations of shopping trips have allowed researchers to examine the effects of food deserts on older adults, and the potential contribution to FI (39, 40). Older adults living in urban areas may choose to walk to the grocery store, even if physical limitations exist, in order to avoid paying fares for transportation services, which can

put them at a greater risk of falling or other injuries (40). Older adults, in particular, are more likely to shop at one store, rather than make trips to several stores, which can decrease access to a variety of foods, higher quality foods, and to competitive prices. Also, many older adults live on fixed incomes, so higher food prices often equates to less food purchased (39, 40). All of these factors could lead these individuals to purchase more ready-to-eat foods, or foods that require very little preparation, more energy-dense foods, and less nutrient-dense foods like fruits and vegetables (38).

Study Aims

The objective of this project was to examine the prevalence and distribution of FS among older Georgians in need of OAA programs based on the data derived from the GA AIMS. The research question this study addressed was “What is the distribution of food insecure older Georgians receiving aging services across the state, by county, by PSA, and by residence area?” The first specific aim was to perform descriptive analyses of the data in order to examine characteristics among all study participants and then by FS status. The second specific aim was to describe the prevalence of FS by county and by PSA in order to identify areas with higher levels of FI among OAA recipients.

CHAPTER 3

METHODS

Data Source and Study Sample

The Georgia aging information system has been recognized nationally as one of the best practice system models by the National Association of State Units on Aging (NASUA) (41). It was originally developed in 1999, and was upgraded significantly in 2000 and 2011. The Georgia aging information systems consist of two main entities: GA AIMS and Elder Services Program/Client Health Assessment Tool (ESP/CHAT). The GA AIMS is the web-based, client-centered tracking, accountability and payment system that documents all aging services contracted between the GA DAS, the 12 PSAs, and the network of contract service providers (13). The GA AIMS is a database that provides for centralized data collection regarding planning and contracting, authorizing providers and services, tracking client data, and generating programmatic data that drives reimbursements for PSAs and service providers. The GA AIMS is developed and maintained by the GA DAS and the Department of Human Services (DHS) Office of Information Technology (OIT), with assistance from the PSAs and aging service network providers. This system enables consumers and payments for all programs and services to be tracked over time. The GA AIMS data are utilized to provide data for HCBS which are a component of the National Aging Program Information System (NAPIS). The ESP/CHAT was developed by the Atlanta Regional Commission (the PSA serving the Atlanta, Georgia area) to determine eligibility and priority for HCBS and Community Care Services Programs (CCSP, Medicaid waiver program), and to manage information about the waitlisted people. Two aging

information systems collect key common measures including selected demographics, service use, the type of and length to disposition status of clients, and two client needs assessment scales (i.e., Determination of Need assessment instrument (DON-R) and Nutrition Screening Initiative DETERMINE Checklist (NSI)). Currently these two systems communicate directly, but not all client data is shared between the two. The incompatibility between the GA AIMS and ESP/CHAT has been the concern among the PSAs (41).

This study used the data derived from the GA AIMS, from the HCBS Client Registration form, which produced a total of 85,604 records with FI assessment conducted between 2011 and 2014 for 51,823 participants. All participants had at least one FI assessment, but some had up to 10 reassessments. However, there were concerns about the quality of reassessment data entry, so only the initial FI assessment was used for this study, for the 51,823 participants. Among them, 48,675 participants' addresses were geocoded for Geographic Information Systems (GIS) analysis. Twenty six participants of those geocoded were living outside of the Georgia state boundaries, therefore 48,649 participants were included in the GIS analysis estimating the prevalence of FI by county, by PSA, and by the type of residence.

Measures

Data for this study were collected from completed HCBS Client Registration Forms from GA DAS. All persons receiving aging services completed this form, which was administered by the Aging and Disability Resource Connection (ADRC) or PSA staff. The registration form assessed FI, functional impairments, and demographic information. FI was determined using the validated 6-item short form HFSSM, which is shown in **Table 2**.

Table 2: Validated modified 6-item short form Household Food Security Survey Module

Question	Responses
1. During the last 30 days, how often was this statement true? The food that we bought just didn't last, and we didn't have money to get more.	Often
	Sometimes
	Never
2. During the last 30 days, how often was this statement true? We couldn't afford to eat balanced meals.	Often
	Sometimes
	Never
3. In the past 30 days, did you or other adults in your households ever cut the size of your meals because there wasn't enough money for food?	Yes
	No
4. In the past 30 days, did you or other adults in your households ever skip meals because there wasn't enough money for food?	Yes
	No
5. In the past 30 days, did you eat less than you felt you should because there wasn't enough money for food?	Yes
	No
6. In the past 30 days, were you ever hungry but didn't eat because you couldn't afford enough food?	Yes
	No

Functional status was assessed by ADLs and IADLs. ADLs are basic self-care behaviors like eating, bathing, grooming, dressing, transferring, and continence (42). IADLs determine ability to live independently through behaviors like managing money, telephoning, preparing meals, housekeeping, and routine health (42). ADLs and IADLs that were assessed are included in **Table 3**, with the first six functions being ADLs (score of 0 to 18) and the remaining nine functions being IADLs (score of 0 to 27).

Table 3: Activities of Daily Living and Instrumental Activities of Daily Living assessment

	Function	Level of impairment
ADL	1. Eating	0 1 2 3
	2. Bathing	0 1 2 3
	3. Grooming	0 1 2 3
	4. Dressing	0 1 2 3
	5. Transferring	0 1 2 3
	6. Continence	0 1 2 3
IADL	7. Managing Money	0 1 2 3
	8. Telephoning	0 1 2 3
	9. Preparing Meals	0 1 2 3
	10. Laundry	0 1 2 3
	11. Housework	0 1 2 3
	12. Outside Home	0 1 2 3
	13. Routine Health	0 1 2 3
	14. Special Health	0 1 2 3
	15. Being Alone	0 1 2 3

The client registration form also assessed demographics such as age, gender, race, socioeconomic information, marital status, and living arrangements. Addresses of the aging service recipients, obtained from the registration form, were geocoded using Environmental Systems Research Institute's (ESRI) ArcMap software package (v. 10.2) (43). ESRI's World Geocode Service was used to obtain point or street level matches for most records, with the

remainder manually completed based on Google Maps searches. Some addresses were not matched, and geocoded outside of Georgia's state boundaries. Geocoding determined whether the participant lived in urban or rural areas, and in a food desert. Finally, health measures like ADL and IADL impairments, sensory impairments (i.e., hearing and vision loss), self-reported illness severity, hospital use and hospital stays within the last 180 days were assessed.

Data Analysis

SPSS Statistics Software (Version 22) (44) was used for all statistical analyses. To examine characteristics of food insecure aging service recipients, various characteristics that have been shown to be related to FI were considered in the analysis, including race, gender, age, urban vs. rural dwelling, marital status, food deserts, poverty, functional impairments (ADLs and IADLs), and living arrangements. Descriptive statistics for each of these variables, including means, standard deviations, frequencies, or percentages were analyzed. Also, the Chi-square test was used to determine the significance level for all categorical variables, and independent t-tests were used for all continuous variables (e.g., age, ADLs score, and IADLs score). A p-value of less than 0.01 was considered significant.

To estimate the prevalence of FI by county and by PSA, frequencies, and percentages were calculated for the dichotomous FI variable and the four category FI variable. The FI rank among counties and among PSAs was determined through the Microsoft Excel program based on the proportion of food insecure participants from the dichotomous FI variable. The Chi-square test was also used for the categorical dichotomous FI variable to determine statistical significance.

A series of maps were then developed to show the extent of FI among older Georgians receiving aging services by census tract, by county, and by PSA, and the distribution of FI among older Georgians receiving aging services and living in food deserts by census tract level. To determine food deserts, the USDA definition of low income/low access was used.

CHAPTER 4

RESULTS

Characteristics of the Study Sample

The characteristics of the study sample by FI status are provided in **Table 4**. The mean age of the participants was 74.3 ± 11.9 (SD) years. About 41.4% of the participants were between the ages of 60 and 75 years old, 51.1% were white, 69.7% were female, and 43.7% lived alone. The majority of the sample lived in urban areas (82.1%), lived outside of food deserts (73.4%), were widowed (41.9%), and were at or below the poverty line (53.8%). Participants were more likely to report vision or hearing loss (21.5% and 15.6%, respectively), than they were to report being legally blind (2.3%) or deaf (0.4%). The average score, from 0 to 18, on the ADL items was a 5.6 ± 4.9 (SD), and the average score, from 0 to 27, on the IADL items was a 10.7 ± 7.9 (SD); higher ADL and IADL scores equate to more functional impairments.

Overall, 28.9% of the study sample were food insecure. Specifically, 6.6% experienced marginal FS, 21% experienced low FS, and 7.9% faced very low FS. All chi-square and t-test results showed significant differences in key characteristics between food insecure and food secure participants. The average age of the food insecure participants was 71.2 ± 11.7 (SD), about four years younger than the average of the food secure participants, whose average age was 75.6 ± 11.8 (SD). Compared to their food secure counterparts, food insecure participants were more likely to be male, black, live alone, live in urban areas, live in food deserts, and live at or below the poverty line. Also, food insecure participants were less likely to fall into the “married” category of the marital status variable.

The results from the analysis of health related variables show that food insecure participants were more likely to suffer from sensory impairment including vision impairment and hearing loss. They were also more likely to be legally blind and deaf. The average ADLs score for food insecure participants was 6.6 ± 4.4 (SD), and the average IADLs score for these individuals was 11.8 ± 6.7 (SD). Both of these scores were higher than those of the food secure participants: average ADLs score of 5.2 ± 5.0 and average IADLs score of 10.2 ± 8.3 . This suggests that food insecure individuals had more functional impairment than food secure participants, in regards to ADLs and IADLs. In addition, food insecure participants were more likely to report their illness severity as “poor”, to have one or more hospital visits within the last 180 days, and to have longer hospital stays than food secure participants.

Prevalence of Food Insecurity, and living in Food Deserts, among Older Georgians receiving Aging Services by County

The prevalence of FI in the 159 Georgia counties is shown in **Table 5** and **Figure 1**. FI ranged from 61.4%, in Thomas County, to 4.3% in Taliaferro County. On a scale of 0 to 6, with an increasing score equating to a higher level of FI, participants in Thomas County had an average score of 2.8 on the HFSSM, while those in Taliaferro County had an average score of 0.2. Also, in Thomas county, 35.2% of participants experienced High FS, 3.4% Marginal FS, 26.3% Low FS, and 35.2% Very Low FS. All but two counties (Lee and Taliaferro) had a higher level of FI than the national average of FI among households with an older adult (8.9%) (9).

Table 4: Characteristics of the study sample by food insecurity status

Characteristic (% or mean \pm SD)	Total	Food insecure	Food secure	p-value*
	(n=48,649)	(n=14,036, 28.9%)	(n=34,613, 71.1%)	
Age Category	n=48,568	n=14,013	n=34,555	
(in years) ^a	74.33 \pm 11.92	71.18 \pm 11.65	75.61 \pm 11.79	<0.0001
<60 ^b	7.1	10.6	5.6	<0.0001
60-74	41.4	50.3	37.8	
75-84	31.8	26.7	33.8	
85+	19.8	12.4	22.8	
Gender^b	n=48,649	n=14,036	n=34,613	<0.0001
Female	69.7	68.2	70.3	
Male	30.2	31.7	29.6	
Race^b	n=46,357	n=13,243	n=33,114	<0.0001
White	51.1	47.9	52.5	
Black	40.1	40.7	39.9	
Other/Did not disclose	8.7	11.5	7.6	
Live Alone^b	n=47,996	n=13,793	n=34,203	<0.0001
Yes	43.7	47.7	42.0	
No	56.3	52.3	58.0	
Marital Status^b	n=47,967	n=13,795	n=34,172	<0.0001
Married	26.6	23.5	27.8	
Widowed	41.9	37.1	43.9	
Other	31.5	39.4	28.3	
Rural/Urban^b	n=48,649	n=14,036	n=34,613	<0.0001
Urban	28.9	32.8	27.3	
Urbanizing	17.0	18.6	16.4	
Suburban	36.1	32.6	37.5	
Rural growth	10.8	10.4	11.0	
Rural declining	7.1	5.5	7.7	
Urban	82.1	84.1	81.3	
Rural	17.9	15.9	18.7	
Living in food deserts^b	n=48,649	n=14,036	n=34,613	<0.0001
Yes	26.6	28.6	25.8	
Poverty Rates^b	n=45,532	n=12,927	n=32,605	<0.0001
\leq FPL	53.8	63.2	50.0	
>FPL	35.7	27.8	38.8	
Did not disclose	10.6	9.0	11.2	
Legally blind^b	n=48,649	n=14,036	n=34,613	<0.0001
Yes	2.3	2.9	2.1	

Deaf^b	n=48,649	n=14,036	n=34,613	0.001
Yes	0.4	0.5	0.3	
Hearing loss^b	n=48,649	n=14,036	n=34,613	<0.0001
Yes	15.6	17.2	15.0	
Vision impairment^b	n=48,649	n=14,036	n=34,613	<0.0001
Yes	21.5	25.6	19.8	
ADL problems^a	n=48,635	n=14,033	n=34,602	<0.0001
	5.60 ± 4.88	6.56 ± 4.36	5.20 ± 5.02	
IADL problems^a	n=48,631	n=14,032	n=34,599	<0.0001
	10.65 ± 7.91	11.79 ± 6.74	10.19 ± 8.29	
Illness severity^b	n=20,348	n=6,642	n=13,706	<0.0001
Fair	52.7	55.3	51.4	
Good	20.7	13.6	24.2	
Poor	26.6	31.1	24.4	
Hospital use within the last 180 days^b	n=19,962	n=6,490	n=13,472	
No	57.6	51.8	60.3	<0.0001
1 visit	26.2	28.1	25.3	
2 visits	9.0	10.6	8.3	
3+ visits	7.2	9.5	6.1	
Hospital admission days within the last 180 days^b	n=19,547	n=6,373	n=13,174	
0	64.3	59.8	66.5	<0.0001
1-7 days	22.6	25.6	21.1	
8-14 days	5.7	6.1	5.6	
15+ days	7.4	8.6	6.8	

* Values are means ± SD or percentages

^a Independent t-tests were used to examine differences by FI status (Continuous Variables)

^b Chi-Square tests were used to examine differences by FI status (Categorical variables)

Table 5: Prevalence and ranking of food insecurity in older Georgians receiving Aging

Services by county

PSA	County Name	Food Insecurity	
		%	Rank
10	Thomas	61.4	1
1	Murray	59.4	2
1	Whitfield	55.2	3
1	Floyd	51.8	4
1	Bartow	49.5	5
2	Stephens	48.2	6
1	Pickens	47.6	7
2	Dawson	46.6	8
2	Hall	46.1	9
2	Banks	45.7	10
2	Lumpkin	45.1	11
12	McIntosh	44.9	12
2	Habersham	42.4	13
1	Fannin	41.5	14
7	Peach	41.4	15
11	Atkinson	41.1	16
1	Walker	41.0	17
12	Bulloch	40.7	18
2	Franklin	40.7	18
1	Gilmer	40.7	18
7	Baldwin	40.4	21
1	Polk	40.2	22
12	Camden	39.7	23
11	Brooks	39.3	24
10	Decatur	38.7	25
11	Coffee	38.6	26
2	Hart	38.4	27
5	Oconee	38.3	28
1	Gordon	38.1	29
6	Marion	37.9	30
11	Brantley	37.7	31
1	Chattooga	37.6	32
11	Lanier	37.6	32
12	Liberty	37.3	34
1	Paulding	37.2	35
7	Twiggs	36.7	36

PSA	County Name	Food Insecurity	
		%	Rank
2	Rabun	36.5	37
8	Jenkins	35.4	38
11	Berrien	34.9	39
2	Forsyth	34.3	40
6	Quitman	34.1	41
12	Glynn	34.0	42
7	Crawford	33.9	43
1	Haralson	33.3	44
7	Houston	33.2	45
7	Bibb	33.0	46
6	Crisp	33.0	46
6	Muscogee	33.1	46
5	Madison	32.8	49
7	Wilkinson	32.8	49
11	Tift	32.5	51
9	Wheeler	32.4	52
6	Clay	32.1	53
9	Dodge	32.0	54
10	Mitchell	32.0	54
10	Terrell	31.9	56
6	Webster	31.6	57
6	Chattahoochee	31.3	58
9	Evans	31.3	58
11	Ware	31.3	60
5	Clarke	30.7	61
11	Ben Hill	30.6	63
1	Catoosa	30.6	63
2	Towns	30.6	63
11	Pierce	30.4	65
3	Gwinnett	30.2	66
11	Cook	29.9	67
6	Sumter	29.8	68
3	Fulton	29.7	69
12	Long	29.3	70
12	Bryan	29.0	71
11	Lowndes	28.8	72

PSA	County Name	Food Insecurity	
		%	Rank
9	Telfair	28.8	73
7	Pulaski	28.7	74
2	White	28.7	74
11	Charlton	28.6	76
12	Chatham	28.5	77
8	Screven	28.5	77
9	Jeff Davis	28.4	79
11	Turner	28.2	80
4	Upson	28.0	81
11	Clinch	27.6	82
3	DeKalb	27.6	82
10	Calhoun	27.5	84
1	Dade	27.3	85
9	Laurens	26.7	86
9	Toombs	26.6	87
10	Dougherty	26.4	88
3	Henry	26.3	89
7	Putnam	26.2	90
3	Cherokee	25.4	91
11	Bacon	25.2	92
6	Randolph	25.2	93
8	Glascock	25.0	94
6	Macon	25.0	94
6	Stewart	25.0	94
2	Union	24.7	97
9	Wayne	24.7	97
4	Spalding	24.2	99
8	Jefferson	23.8	100
4	Carroll	23.7	101
9	Bleckley	23.6	102
7	Jones	23.6	102
4	Coweta	23.3	104
9	Tattnall	23.3	104
5	Barrow	23.0	106
12	Effingham	22.8	107
9	Candler	22.7	108
7	Monroe	22.7	108
8	Richmond	22.7	108
8	Burke	21.6	111

PSA	County Name	Food Insecurity	
		%	Rank
10	Grady	21.6	111
3	Douglas	21.5	113
3	Rockdale	21.5	113
6	Dooly	21.4	115
8	Washington	21.3	116
6	Schley	21.2	117
9	Appling	20.6	118
5	Jackson	19.6	119
5	Jasper	19.4	120
4	Pike	19.3	121
9	Montgomery	19.2	122
6	Taylor	19.2	122
5	Walton	19.0	124
11	Irwin	18.9	125
4	Butts	18.6	126
5	Newton	18.6	126
9	Emanuel	18.4	128
10	Colquitt	18.0	129
4	Meriwether	18.0	129
3	Clayton	17.4	131
8	Wilkes	17.2	132
4	Heart	16.9	133
9	Wilcox	16.7	134
5	Morgan	16.6	135
10	Worth	16.0	136
6	Talbot	15.9	137
5	Greene	15.8	138
5	Oglethorpe	15.6	139
8	Columbia	15.3	140
4	Lamar	15.2	141
10	Seminole	14.9	142
9	Johnson	14.3	143
10	Miller	13.5	144
4	Troup	13.4	145
5	Elbert	13.2	146
11	Echols	13.1	147
10	Baker	12.5	148
8	McDuffie	12.1	149
8	Hancock	11.6	150

PSA	County Name	Food Insecurity	
		%	Rank
6	Harris	11.6	150
9	Treutlen	11.1	152
3	Fayette	10.7	153
3	Cobb	10.5	154
8	Warren	10.5	155

PSA	County Name	Food Insecurity	
		%	Rank
8	Lincoln	9.9	156
10	Early	9.3	157
10	Lee	8.2	158
8	Taliaferro	4.3	159

Table color code:

PSA	1 Northwest Georgia	2 Georgia Mountains	3 Atlanta Region
	4 Southern Crescent	5 Northeast Georgia	6 River Valley
	7 Middle Georgia	8 Central Savannah River	9 Heart of Georgia/Altamaha
	10 SOWEGA	11 Southern Georgia	12 Coastal Georgia

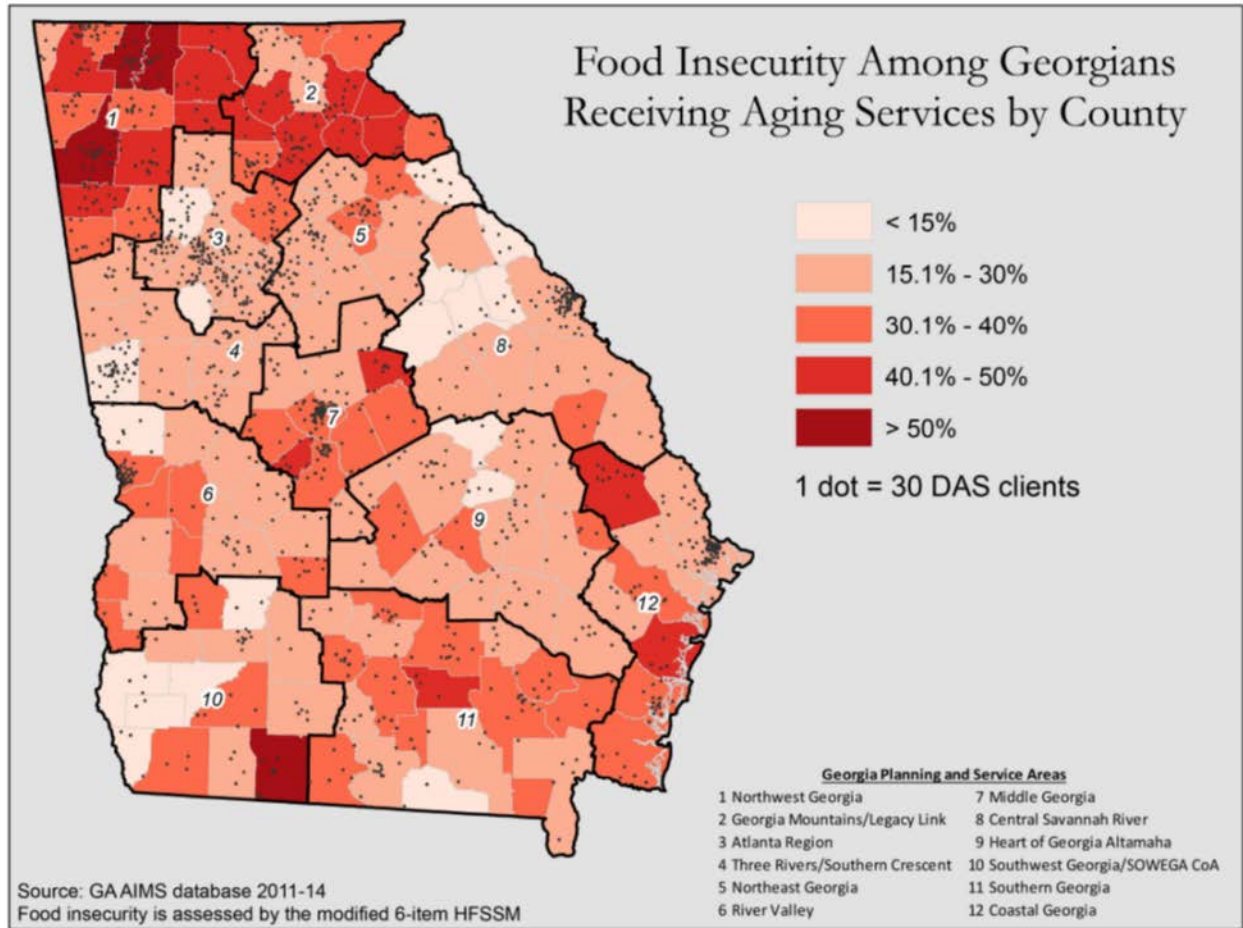


Figure 1: Food insecurity among older Georgians receiving Aging Services by Program Service Area and county

The prevalence of participants living in food deserts is shown in **Table 6** and **Figure 2**. All participants in five counties (Clay, Dade, Randolph, Thomas, and Towns) live in food deserts, however, 61 counties had no participants living in food deserts. Most of the food deserts are located in the more rural areas of Georgia, especially the southernmost portion of the state. The population of older adults receiving aging services is less dense in these areas as well. A trend exists where counties with higher levels of reported FI were more likely to be areas with a higher level of participants living in food deserts. For example, Thomas County has the highest

prevalence of FI, and also has all of its participants live in a food desert, meaning that food deserts could be a large contributing factor to FI among those participants.

Table 6. Older Georgians receiving Aging Services and living in food deserts by county

PSA	County Name	Living in Food Deserts	
		%	Rank
6	Clay	100.0	1
1	Dade	100.0	1
6	Randolph	100.0	1
10	Thomas	100.0	1
2	Towns	100.0	1
11	Bacon	92.2	6
11	Clinch	88.9	7
4	Spalding	86.2	8
2	Union	79.8	9
10	Calhoun	79.7	10
11	Cook	79.2	11
8	Richmond	78.2	12
10	Mitchell	71.0	13
1	Haralson	69.9	14
1	Bartow	67.0	15
5	Greene	65.7	16
2	Dawson	61.0	17
9	Wheeler	59.5	18
1	Catoosa	58.9	19
10	Lee	57.3	20
4	Lamar	56.0	21
7	Houston	55.4	22
11	Pierce	54.0	23
4	Troup	53.1	24
5	Newton	52.2	25
2	Forsyth	51.7	26
2	Banks	51.6	27
11	Berrien	50.4	28
11	Lanier	50.2	29
3	Fulton	47.8	30
2	Hart	47.4	31

PSA	County Name	Living in Food Deserts	
		%	Rank
11	Lowndes	47.1	32
1	Pickens	46.5	33
3	Cobb	46.0	34
10	Grady	45.7	35
6	Crisp	44.2	36
3	Cherokee	43.9	37
9	Dodge	43.8	38
12	Bryan	43.2	39
10	Miller	42.9	40
6	Macon	42.7	41
9	Tattnall	41.8	42
7	Putnam	40.9	43
8	Jefferson	40.8	44
8	Wilkes	40.7	45
3	Rockdale	40.6	46
10	Colquitt	40.6	47
5	Jackson	40.5	48
12	Effingham	38.2	49
11	Ware	38.2	50
6	Dooly	37.8	51
12	Long	37.6	52
1	Gilmer	35.8	53
6	Chattahoochee	35.6	54
1	Walker	35.1	55
1	Fannin	34.8	56
1	Paulding	33.9	57
11	Ben Hill	33.6	58
1	Polk	33.1	59
9	Emanuel	32.6	60
2	Habersham	30.7	61
6	Webster	30.5	62

		Living in Food Deserts	
PSA	County Name	%	Rank
4	Upson	30.4	63
11	Brooks	29.9	64
9	Evans	29.7	65
11	Brantley	29.5	66
11	Coffee	29.4	67
6	Schley	28.8	68
11	Tift	27.8	69
2	Franklin	27.5	70
5	Walton	25.8	71
1	Gordon	25.0	72
7	Bibb	24.5	73
10	Decatur	24.0	74
6	Quitman	23.9	75
4	Meriwether	23.5	76
6	Muscogee	22.3	77
7	Monroe	21.5	78
2	Lumpkin	21.2	79
3	Douglas	20.6	80
4	Carroll	20.5	81
2	White	20.2	82
10	Early	19.5	83
10	Worth	19.2	84
6	Taylor	17.8	85
10	Seminole	17.6	86
9	Bleckley	17.3	87
12	Liberty	16.1	88
7	Crawford	14.8	89
9	Treutlen	14.6	90
7	Wilkinson	11.3	91
2	Stephens	9.3	92
6	Marion	8.1	93
8	Columbia	7.9	94
1	Murray	7.5	95
5	Oconee	6.1	96
6	Harris	3.0	97
1	Chattooga	0.0	98
9	Appling	0.0	100
11	Atkinson	0.0	100

		Living in Food Deserts	
PSA	County Name	%	Rank
10	Baker	0.0	100
7	Baldwin	0.0	100
5	Barrow	0.0	100
12	Bulloch	0.0	100
8	Burke	0.0	100
4	Butts	0.0	100
12	Camden	0.0	100
9	Candler	0.0	100
11	Charlton	0.0	100
12	Chatham	0.0	100
5	Clarke	0.0	100
3	Clayton	0.0	100
4	Coweta	0.0	100
3	DeKalb	0.0	100
10	Dougherty	0.0	100
11	Echols	0.0	100
5	Elbert	0.0	100
3	Fayette	0.0	100
1	Floyd	0.0	100
8	Glascok	0.0	100
12	Glynn	0.0	100
3	Gwinnett	0.0	100
2	Hall	0.0	100
8	Hancock	0.0	100
4	Heart	0.0	100
3	Henry	0.0	100
11	Irwin	0.0	100
5	Jasper	0.0	100
9	Jeff Davis	0.0	100
8	Jenkins	0.0	100
9	Johnson	0.0	100
7	Jones	0.0	100
9	Laurens	0.0	100
8	Lincoln	0.0	100
5	Madison	0.0	100
8	McDuffie	0.0	100
12	McIntosh	0.0	100
9	Montgomery	0.0	100

		Living in Food Deserts	
PSA	County Name	%	Rank
5	Morgan	0.0	100
5	Oglethorpe	0.0	100
7	Peach	0.0	100
4	Pike	0.0	100
7	Pulaski	0.0	100
2	Rabun	0.0	100
8	Screven	0.0	100
6	Stewart	0.0	100
6	Sumter	0.0	100
6	Talbot	0.0	100
8	Taliaferro	0.0	100

		Living in Food Deserts	
PSA	County Name	%	Rank
9	Telfair	0.0	100
10	Terrell	0.0	100
9	Toombs	0.0	100
11	Turner	0.0	100
7	Twiggs	0.0	100
8	Warren	0.0	100
8	Washington	0.0	100
9	Wayne	0.0	100
1	Whitfield	0.0	100
9	Wilcox	0.0	100

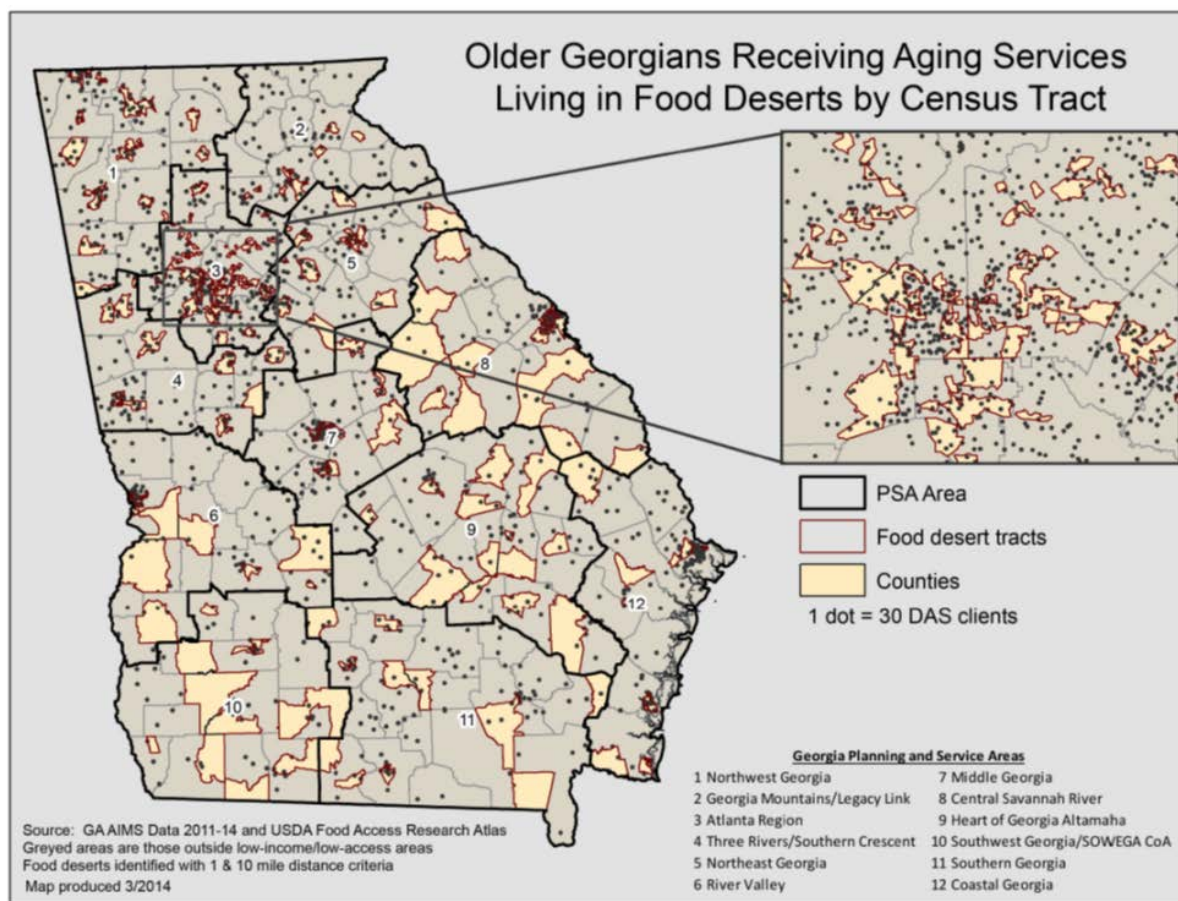


Figure 2: Older Georgians receiving Aging Services living in food deserts by Census tract

Prevalence of Food Insecurity, and living in Food Deserts among Older Georgians receiving Aging Services by PSA

The prevalence of FI by PSA is shown in **Table 7**, and the prevalence of participants living in food deserts by PSA is shown in **Table 8**. Among PSAs, FI ranged from 42.7% in PSA 1 (Northwest Georgia) to 18.9% in PSA 4 (Three Rivers/Southern Crescent). The majority of the counties within the top 10 most food insecure counties were located within two PSAs: five within PSA 1 and four within PSA 2; these two PSAs are the two with the highest level of FI. Many of the counties with the lowest FI ranks were located in PSA 8, which is also the PSA with the second to lowest proportion of food insecure participants (20.5%). The average score on the HFSSM for participants in PSA 1 was 1.4, but for those in PSA 4, the average score was 0.7. Although PSA 1 has the highest FI prevalence, PSA 10 (SOWEGA) ranks the highest in participants living in food deserts (34.9%). In PSA 1, 53.1% of participants experienced High FS, 4.1% experienced marginal FS, 33.7% experienced low FS, and 9% experienced very low FS. PSA 1 experienced higher levels of low FS than the total sample (21%), but also experienced more of the most severe form of FI, very low FS (7.9%).

The PSAs with higher levels of participants living in food deserts were PSAs 10 (34.9%), 4 (34.6%), and 8 (34.3%), all of which are located in more rural, poorer areas of the state. Larger areas of food deserts exist in the southernmost parts of the state, which could be why a larger number of participants in these areas reside in food deserts.

Table 7: Prevalence and ranking of food insecurity in older Georgians receiving Aging Services by Program Service Area

PSA	Food Insecurity	
	%	Rank
1. Northwest Georgia	42.70	1
2. Georgia Mountains	38.85	2
7. Middle Georgia	32.70	3
11. Southern Georgia	31.71	4
12. Coastal Georgia	31.17	5
6. River Valley	28.56	6
10. SOWEGA	27.68	7
3. Atlanta Region	24.33	8
9. Heart of Georgia/Altamaha	24.03	9
5. Northeast Georgia	21.67	10
8. Central Savannah River	20.52	11
4. Southern Crescent	18.93	12

Table 8: Older Georgians receiving Aging Services and living in food deserts by Program Service Area

PSA	Living in Food Deserts	
	%	Rank
10. SOWEGA	34.94	1
4. Southern Crescent	34.64	2
8. Central Savannah River	34.25	3
1. Northwest Georgia	33.27	4
5. Northeast Georgia	32.54	5
9. Heart of Georgia/Altamaha	31.18	6
6. River Valley	30.04	7
7. Middle Georgia	25.69	8
11. Southern Georgia	23.79	9
3. Atlanta Region	23.00	10
12. Coastal Georgia	16.59	11
2. Georgia Mountains	9.66	12

CHAPTER 5

DISCUSSION

The findings of this study demonstrate a significantly higher burden of FI in older Georgians receiving aging services than a national sample of older adults. About 29% of the older Georgians receiving aging services were food insecure, which is much higher than those reported in the latest USDA annual FI report in 2012 (i.e., 14.5% of all U.S. households and 8.8% of households with older adults) (9). Compared to the statewide data based on the CPS, between 2001-2009 (i.e., 15.2% marginal FS, 8.4% low FS, and 3.2% very low FS), study participants not only experience higher levels of FI than the national and state average (across all households and among older adults), but also have a greater prevalence of the most severe level of FI (10). Food insecure participants in our study sample showed similar characteristics that have been previously reported (5, 7, 8). They were more likely to live at or below the poverty line, be black, live in food deserts, have poorer health, and have functional impairments. This means that older Georgians receiving aging services may be at a heightened risk for experiencing the negative effects of FI, and therefore may have a higher need for aging services.

There was a substantial variation in the burden of FI among older Georgians receiving aging services across the state, by county, by PSA, and the type of residence area. A high concentration of FI exists in Northwest Georgia (PSA 1) and the Georgia Mountains (PSA 2) areas, both in the northernmost portion of Georgia. There are other counties in the state that also have a high prevalence of FI, but the same level of FI does not exist within their PSA, indicating that some factors are uniquely affecting that county, contributing to a higher level of FI.

Therefore, more research should be conducted in these counties in order to assess what factors are contributing to the high prevalence of FI. Such findings showed the usefulness of measuring FI among this population as part of routine evaluations in order to determine need status and demand for programs. These data can be used to ensure that not only are there enough services available, but also to ensure that they are accessible and are fulfilling their purpose of reducing FI by providing nutritious meals and nutrition education (7).

Older Georgians receiving aging services and living in food deserts were mainly concentrated in more rural parts of Georgia, mainly in the Southwest Georgia (PSA 10), and Southern Crescent (PSA 4) areas. In addition, there were five counties where all of the participants lived in food deserts, putting these individuals at a greater risk of FI.

Such data could be used to examine whether or not food, nutrition, and aging services are available and accessible for older Georgians who are food insecure and/or living in food desert areas. The data could also be used for identifying strategies to improve food, nutrition, and aging services access.

Strengths

To our knowledge this is the first study to collect statewide FI data, using a standardized FI measurement tool through the aging services client database system among older adults receiving aging services. Another strength is that the data includes all of those receiving OAA services, therefore any programs or planning can be specifically targeted toward their specific needs. For example, more resources can be appropriated or policies created in areas where greater needs among participants have been identified, such as a lack of transportation to supermarkets in food deserts. This study was a part of an effort to test the feasibility of using the

GA AIMS to better understand the needs for and performance of all OAA programs over time. Although GA AIMS based data are collected for administrative purposes and must undergo intensive data cleaning processes before conducting statistical analysis, the findings and experiences learned from this study could provide a basis to further establish the system and ways to use the resulting data to better manage the internal client and service information at the state and local level and meet federal accountability. Not only can this data be useful for state and local purposes, but this study can also provide methodology and information for other states' use.

Limitations

Although this study has provided invaluable information regarding FI status in a statewide sample of aging service recipients, it does present with several limitations. The first limitation is that data for this study was collected from those who are receiving or requesting aging services only. This data does not include older Georgians who are food insecure but are not requesting or receiving aging services at this time. Therefore, the extent of FI reported in this study may not be reflective of that in a statewide sample of all older Georgians. Another limitation is that the data does not provide information on waitlisted status which is critical in determining the targeting and performance of aging services.

Implications

This study shows that administrative data collected by a state level aging services client database system can be utilized in determining FI status of older individuals in need of nutrition and aging services. Such data have a potential to serve as a basis for further research, program,

and policy decisions to improve FS among vulnerable older adults. The findings of this study suggest that much of the FI is concentrated in the Northern portion of Georgia, which can allow GA DAS to evaluate programs and services available in these areas, specifically. Further research can be conducted to determine why older individuals receiving OAA programs and services in these areas reported higher rates of FI than those in other areas with poorer sociodemographic and economic conditions.

Furthermore, this study revealed a higher prevalence of participants living in food deserts in the Southern areas of the state, or the more rural areas with a lower population density. Therefore, GA DAS, these PSAs, and their wellness coordinators can develop strategies to enhance access to affordable, healthful food sources for nutrition and aging services recipients. Potential interventions include introducing transportation services, beginning farmer's markets, or introducing mobile grocery services (13). Overall, the identification of areas where there is a greater distribution of FI and lack of food access can be instrumental in aiding GA DAS to fulfill the objective of the OAA programs and to reduce FI by targeting those with the greatest social and economic need (12).

Aging services client database system should continue routinely collecting FI and other demographic and socioeconomic characteristics in order to track the needs of participants as well as the success of programs. In addition, the aging services client database system should collect other information that are essential to determine the needs and performance for OAA programs including statewide FI status of all older adults, specifically those not receiving aging services and participation or waitlisted status of aging services recipients. These data are critical for targeting programs and services to those most in need. Such systems and resulting data can be

used as a guide for other states to replicate since no standardized method has been established to conduct this type of evaluation using the administrative data.

In conclusion, the FI prevalence among older Georgians receiving aging services is much higher than both national and state averages, and this FI prevalence is concentrated mainly in the northern parts of the state. Also, a higher percentage of participants residing in food deserts are located in the southern, more rural areas of the states. Identification of these areas is helpful in evaluating current delivery of programs and services to better improve access to food and aging services. Therefore, this type of data should be routinely collected and monitored by GA DAS in order to aim to improve FS status among aging services recipients.

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APPENDIX A
HOME AND COMMUNITY-BASED SERVICES CLIENT REGISTRATION
FORM IN GEORGIA

Client ID: _____ New Assessment

Client SSN: _____ Reassessment

DHS - Division of Aging Services
HCBS - Client Registration Form

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BASIC CLIENT INFORMATION

1. SSN: _____ 2. Last Name: _____ 3. First Name: _____ 4. Middle/MI: _____

5. Residential Address: _____ 6. Apartment/Suite No: _____

7. City: _____ 8. State: _____ 9. Zip Code: _____ - _____

10. County: _____ 11. PSA/AAA: _____ 12. No Direct Contact?

13. Phone #: _____ 14. Email: _____

Phone Number	Ext	Primary	Phone Type			
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax

MAIL ADDRESS

Complete if Mailing Address is Different from Residential Address

15. Mailing Address: _____ 16. Apartment/Suite No: _____

17. Mail City: _____ 18. Mail State: _____ 19. Mail Zipcode: _____ - _____

ADDITIONAL CLIENT INFORMATION

20. DOB: _____ 21. Age: _____ 22. Gender: Male Female

23. Income Level:	24. Race:	25. Ethnicity:	26. Marital Status:
<input type="checkbox"/> Above Poverty	<input type="checkbox"/> American Indian or Alaskan Native	<input type="checkbox"/> Did Not Disclose	<input type="checkbox"/> Did Not Disclose
<input type="checkbox"/> At/Below Poverty	<input type="checkbox"/> Asian	<input type="checkbox"/> Hispanic, Latino or Spanish origin	<input type="checkbox"/> Divorced
<input type="checkbox"/> Did not disclose	<input type="checkbox"/> Black, African American	<input type="checkbox"/> Not Hispanic, Latino or Spanish origin	<input type="checkbox"/> Married
	<input type="checkbox"/> Native Hawaiian/Pacific Islander		<input type="checkbox"/> Never Married
	<input type="checkbox"/> Other:		<input type="checkbox"/> Other:
	<input type="checkbox"/> White		<input type="checkbox"/> Separated
	<input type="checkbox"/> Did Not Disclose		<input type="checkbox"/> Widowed

27. Limited English Proficiency (LEP) 28. If LEP, Language Spoken: _____

29. Veteran:

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment

Client SSN: _____ Reassessment

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30. Referral Source: _____

32. Sensory Impairment: _____

- Deaf
- Hearing Loss/Partial Hearing Loss
- Legally Blind
- Vision Impaired/Low Vision

33. Medicare #: _____

34. Medicaid #: _____

31. Living Arrangement: _____

- Alone
- Did Not Disclose
- Group Setting w/ Non-Relatives
- Living With Relatives
- ~~Longterm~~ Care Facility
- Other
- Transient/Homeless
- With Child
- With Domestic Partner
- ~~With~~ Others Not Spouse/Child
- With Spouse Only
- With Spouse and Others

35. Medicaid Type: _____

- Denied
- MAO
- Other
- PMAO
- SSI

36. Other Insurance: _____

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment

Client SSN: _____ Reassessment

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CONTACTS:

1. Last Name: _____ 2. First Name: _____ 3. Middle Name/MI: _____

4. Is Primary 5. Type of Contact: _____ 6. Relationship: _____ 7. Contact Begin Date: _____

<input type="checkbox"/> Did Not Disclose	<input type="checkbox"/> Medical	<input type="checkbox"/> Child	<input type="checkbox"/> Grandparent	<input type="checkbox"/> Service Provider
<input type="checkbox"/> Emergency Contact	<input type="checkbox"/> Power of Attorney	<input type="checkbox"/> Did Not Disclose	<input type="checkbox"/> Guardian	<input type="checkbox"/> Sibling
<input type="checkbox"/> Law Enforcement	<input type="checkbox"/> Referral Source	<input type="checkbox"/> Domestic Partner	<input type="checkbox"/> Neighbor	<input type="checkbox"/> Spouse
<input type="checkbox"/> Legal Guardian	<input type="checkbox"/> Spouse	<input type="checkbox"/> Friend	<input type="checkbox"/> Other Relative	
		<input type="checkbox"/> Grandchild	<input type="checkbox"/> Parent	

8. Contact End Date: _____

9. Contact Address 1: _____ 10. Contact Address 2: _____

11. City: _____ 12. State: _____ 13. Zipcode: _____ 14. County: _____

15. Email: _____ 16. Phone #: _____

Phone Number	Ext	Primary	Phone Type			
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax

CONTACTS:

1. Last Name: _____ 2. First Name: _____ 3. Middle Name/MI: _____

4. Is Primary 5. Type of Contact: _____ 6. Relationship: _____ 7. Contact Begin Date: _____

<input type="checkbox"/> Did Not Disclose	<input type="checkbox"/> Medical	<input type="checkbox"/> Child	<input type="checkbox"/> Grandparent	<input type="checkbox"/> Service Provider
<input type="checkbox"/> Emergency Contact	<input type="checkbox"/> Power of Attorney	<input type="checkbox"/> Did Not Disclose	<input type="checkbox"/> Guardian	<input type="checkbox"/> Sibling
<input type="checkbox"/> Law Enforcement	<input type="checkbox"/> Referral Source	<input type="checkbox"/> Domestic Partner	<input type="checkbox"/> Neighbor	<input type="checkbox"/> Spouse
<input type="checkbox"/> Legal Guardian	<input type="checkbox"/> Spouse	<input type="checkbox"/> Friend	<input type="checkbox"/> Other Relative	
		<input type="checkbox"/> Grandchild	<input type="checkbox"/> Parent	

8. Contact End Date: _____

9. Contact Address 1: _____ 10. Contact Address 2: _____

11. City: _____ 12. State: _____ 13. Zipcode: _____ 14. County: _____

15. Email: _____ 16. Phone #: _____

Phone Number	Ext	Primary	Phone Type			
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax
_____	_____	<input type="checkbox"/>	<input type="checkbox"/> Home	<input type="checkbox"/> Cell	<input type="checkbox"/> Work	<input type="checkbox"/> Fax

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment

Client SSN: _____ Reassessment

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DON-R ASSESSMENT

Program: _____ **Assessment Date:** _____ **Assessed By Staff:** _____ **Assessment Method:** _____ **DON-R Status:** _____
 Face-to-Face Completed
 Telephone Pended

Type of Assessment: 6-Month Follow-up Assessment Derived Initial NSI Follow-up Re-Assessment Re-Screening Screening



Function	Level of Impairment	Unmet Need of Care	Case Comments: Identify resources, describe special needs and circumstances that should be taken into account when developing a care plan
1. Eating	0 1 2 3	0 1 2 3	
2. Bathing	0 1 2 3	0 1 2 3	
3. Grooming	0 1 2 3	0 1 2 3	
4. Dressing	0 1 2 3	0 1 2 3	
5. Transferring	0 1 2 3	0 1 2 3	
6. Continence	0 1 2 3	0 1 2 3	
7. Managing Money	0 1 2 3	0 1 2 3	
8. Telephoning	0 1 2 3	0 1 2 3	
9. Preparing Meals	0 1 2 3	0 1 2 3	
10. Laundry	0 1 2 3	0 1 2 3	
11. Housework	0 1 2 3	0 1 2 3	
12. Outside Home	0 1 2 3	0 1 2 3	
13. Routine Health	0 1 2 3	0 1 2 3	
14. Special Health	0 1 2 3	0 1 2 3	
15. Being Alone	0 1 2 3	0 1 2 3	

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment
 Client SSN: _____ Reassessment

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	Impairment Scores	Unmet Need Scores	
ADL:	_____	_____	Total Number of ADL's (0-6): _____
IADL:	_____	_____	Total Number of IADL's (0-9): _____
TOTAL:	_____	_____	Total Impairment and Unmet Need Score: _____
Weighted Scores:	_____	_____	Total Weighted Impairment and Unmet Need Score: _____

Illness Severity:	Prior Hospital Use within last 180 Days:	Hospital Admission days during same period:	Total Risk Score	Risk Level:
<input type="checkbox"/> Good	<input type="checkbox"/> No Visits	<input type="checkbox"/> No Days	_____	<input type="checkbox"/> Low
<input type="checkbox"/> Fair	<input type="checkbox"/> 1 Visit	<input type="checkbox"/> 1 -7 Days		<input type="checkbox"/> Medium
<input type="checkbox"/> Poor	<input type="checkbox"/> 2 Visits	<input type="checkbox"/> 8-14 Days		<input type="checkbox"/> High
	<input type="checkbox"/> 3+ Visits	<input type="checkbox"/> 15+ Days		

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NSI ASSESSMENT

Program: _____ **Assessment Date:** _____ **Assessed By Staff:** _____ **Type of Assessment:** _____

6 Month Follow-up Assessment
 Initial Assessment
 Reassessment
 Screening

NSI Checklist:

Question	Yes
I have an illness or condition that made me change the kind and/or amount of food I eat.	<input type="checkbox"/>
I eat fewer than 2 meals per day.	<input type="checkbox"/>
I eat few fruits or vegetables.	<input type="checkbox"/>
I eat few dairy/milk products.	<input type="checkbox"/>
I have 3 or more drinks of beer, liquor or wine almost every day.	<input type="checkbox"/>
I have tooth or mouth problems that make it hard for me to eat.	<input type="checkbox"/>
I don't always have enough money to buy the food I need.	<input type="checkbox"/>
I eat alone most of the time.	<input type="checkbox"/>
I take 3 or more different prescribed or over-the-counter drugs a day.	<input type="checkbox"/>
Without wanting to, I have lost or gained 10 pounds in the last 6 months.	<input type="checkbox"/>
I am not always physically able to shop, cook and/or feed myself.	<input type="checkbox"/>

Nutritional Status: _____

NSI Checklist Score (0-21): _____

Level 1 Screening: Administered by Agency Staff
 Referred to Health Care Professional

Medical Foods: Do Not Know
 Modified Diet
 Not Needed
 Supplement
 Therapeutic Diet

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment

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HCBS INCOME WORKSHEET

Entry Date: _____

Number in Household: _____

Income Source Information:

No.	Source of Monthly Income	Amount
1	Wages or Salary (earned income)	_____
2	Net Wages from Self-Employment (farm/non-farm)	_____
3	Social Security Pensions, Survivor Benefits, Disability Payments	_____
4	Public Assistance (TANF, SSI, General Assistance)	_____
5	Dividends, Interest, Royalties	_____
6	Private Pensions, Annuities, Other Retirement Benefits	_____
7	Unemployment Compensation	_____
8	Workers Compensation	_____
9	Alimony	_____
10	Child Support	_____
11	Veteran's Pension	_____
12	Military Allotment	_____
A. Total Monthly Income		_____
B. Cost of Out-of-Pocket Health care, RX, OTC meds, CCSP cost share		_____
C. Adjusted Monthly Household Income (A-B)		_____
D. Annual Household Income (C x 12)		_____

Calculations: Service - Provider Units & Costs:

Service	Provider	Est # of Units per	Unit Cost	Total Cost	Pct of Cost Share	Amount of Cost Share
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

Total Monthly Income: _____

Date Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____

Client ID: _____ New Assessment

Client SSN: _____ Reassessment

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FOOD SECURITY SURVEY

Date: _____

Staff Name: _____

1. During the last 30 days, how often was this statement true?
The food that we bought just didn't last, and we didn't have money to get more.
- a. Often
 b. Sometimes
 c. Never
2. During the last 30 days, how often was this statement true?
We couldn't afford to eat balanced meals.
- a. Often
 b. Sometimes
 c. Never
3. In the past 30 days, did you or other adults in your households ever cut the size of your meals because there wasn't enough money for food?
- a. Yes
 b. No
4. In the past 30 days, did you or other adults in your households ever skip meals because there wasn't enough money for food?
- a. Yes
 b. No
5. In the past 30 days, did you eat less than you felt you should because there wasn't enough money for food?
- a. Yes
 b. No
6. In the past 30 days, were you ever hungry but didn't eat because you couldn't afford enough food?
- a. Yes
 b. No

Total Score: _____

- High or Marginal Food Security
 Low Food Security
 Very Low Food Security

Data Entry Initials: _____ Date: _____ Provider: _____ Provider Site: _____