

FOOD SECURITY, NUTRITION AND HEALTH
OF FOOD PANTRY PARTICIPANTS

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PARTICIPANTS

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DEDICATION

This dissertation is dedicated to my team of supporters. To my husband, Andrew, thanks for your continual words of encouragement. You kept me focused. To Boone, Seymour, Marcie and the great ones before you, Homer and Katy Sue, thanks for all of your help with writing. You made me smile along the way.

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FOOD SECURITY, NUTRITION AND HEALTH OF FOOD PANTRY PARTICIPANTS

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ACADEMIC ABSTRACT

This research examines the relationship between food security and nutrition and health in food pantry participants, who utilize food pantries served by the Central Missouri Food Bank (CMFB). In this cross-sectional study, food security and self-reported health information were collected in face-to-face interviews with 1,314 food pantry participants at 58 different pantry locations in central and northeast Missouri. In order to include only frequent pantry users, a subset (n=928) was used in this research. Results suggest that food security was not predictive of whether gardening or hunting/fishing was used as a means of acquiring food. Each point increase on the food security scale, and thus moving toward a more insecure state, resulted in a .564 decrease in all fruit and vegetable intake. Overweight and obesity were not predictive of food security. As food insecurity increased, the odds of having diabetes, hypertension or elevated blood cholesterol also increased. Given the prevalence of these diseases, food pantries offer a unique setting in which food and nutrition professionals can become involved in improving the health of a vulnerable, and often overlooked, population.

CHAPTER 1: LITERATURE REVIEW

The Food Pantry as an Emergency Food Relief System

Food Bank System

The hunger-relief distribution system in the United States is complex. There is much variation in how food is ultimately provided to those in need. At the core of the United States hunger-relief distribution is the concept of food banking. The idea of food banking began in the late 1960s in Phoenix, Arizona, and is a concept still in place today (1). Donated food items are “banked” or stored and later distributed to those in need. The food bank serves as a supplier of food to hunger relief agencies, such as soup kitchens and food pantries (2).

America’s Second Harvest Network is the nation’s largest hunger-relief organization (1) and is an umbrella organization to many food banks around the country. Instead of dumping unwanted food, America’s Second Harvest Network encourages growers, processors, retailers, manufactures, wholesalers and restaurants to donate food to the organization. America’s Second Harvest also receives food from United States (U.S.) government programs and purchases food. Once received, America’s Second Harvest then distributes food to food banks around the country. Food banks subsequently distribute food to local hunger-relief sites, such as food pantries and soup kitchens (1).

The Central Missouri Food Bank (CMFB) is affiliated with America’s Second Harvest and provides food to hunger-relief sites in 33 counties in central and northeast Missouri. These sites include food pantries, soup kitchens, shelters for the abused and homeless, programs for low-income children and senior citizens, and rehabilitation

centers (2). Unlike most food banks in the country, the CMFB is *unique* in that it provides the food *free* to these hunger-relief sites (2). In order to provide food free to its hunger-relief sites, the CMFB relies on funding from a variety of sources. In 2005, the CMFB received funds from the following: 58% fundraisers and donations, 19% grants, 10% United Way, 9% United States Department of Agriculture (USDA) contract, 4% rental income. Of the revenue, 98.1% was used for food acquisition and distribution (3).

Food Pantries and Their Clientele

Food pantries, also called food shelves, are emergency feeding sites, which distribute non-prepared foods and other grocery products to needy clients. These individuals then prepare and use these items where they live (4). The physical structures of the pantries are diverse. The CMFB provides food to pantries that are mobile, drive through, within another building such as a church, or stand-alone. At self-serve pantries, such as the CMFB Pantry in Columbia, Missouri, clients do their own grocery shopping, as they would in a regular grocery store. This type of format is rare and most of the pantries served by the CMFB offer the client little, if any, self-selection.

Along with variation in physical pantry structure, pantries differ in the types of foods available. Food availability becomes important because food pantries are major contributors to one's diet. In Minnesota, it is estimated that food shelves are responsible for as much as 25% of an individual's total monthly food supply (5). Food availability is dependent upon what is provided by the food bank and private donors. Foods commonly desired, but not readily available to food pantry participants, include fresh dairy products (not powdered), more meat products (fresh, frozen, or canned), more fresh and seasonal vegetables and fruits, increased variety of vegetables, and coordinated meal items (i.e. a

staple to coordinate with a meat or vegetable item or meat to coordinated with a staple or vegetable item (5). It is noted that pantries occasionally gave large bags of frozen meats, but the whole bag would have to be thawed for the meats to be used (6), thereby creating a food safety issue. At many pantries, limited storage facilities, including refrigerators and freezers, determined what foods are offered. Food pantry users have also suggested the need for more age-specific foods, such as 100% juice for children or softer foods such as oatmeal and puddings for elderly (5). When donors were questioned, many noted that they did not consciously consider nutrition when deciding which foods to donate (5).

In addition to donated food items, many of the pantries served by the CMFB offer USDA commodity foods through The Emergency Food Assistance Program (TEFAP). Under this program, the USDA buys the food, processes and packages it, and ships the packaged food to individual states. Food banks are designated as destinations for the USDA commodities (7) and the CMFB is one of those food banks. The food bank then distributes the commodities to the pantries. In order to receive these commodities, the individual must meet state-specific income and/or eligibility criteria (7). A wide variety of foods is offered through TEFAP (8) but only a small number are available at any given time at the pantry.

The pantry clientele are as diverse as the pantries themselves. On a national level, pantry users tend to be female (68.5%), have a high school degree (60.4%) and are non-Hispanic white (40%) (4). In the same survey, 47.9% of pantry users lived in suburban/rural areas. Of pantry client households, 42.3% live in a house. The average annual income for the pantry client household was \$11,560 in 2004. Using 2005 federal

poverty guidelines, the average monthly pantry household income was 74.8% of the federal poverty level (4).

Data describing the nutrition and health status of pantry users are sparse and not systematically collected in large, national surveys. In the Emergency Food Assistance System (EFAS) survey of 2,397 pantry clients, the nutritional status of the food pantry population was not investigated (9). America's Second Harvest conducted surveys of nearly 38,000 pantry client households and included only one personal health question, in which pantry participants were asked to rate their health from excellent to poor (4). Contributing to this lack of data, food pantry users tend to be omitted from federal or state surveys which require telephone contact (9).

The lack of data for food pantry users in Missouri is similar. A non-systematic survey of the CMFB population was conducted in 1998. No information pertaining to nutrition and health status was provided in the final report. Aside from finances, factors influencing food intake were not explored. Alternative methods for obtaining food were limited to a single question about participation in federal food programs (10).

Food Security

Definition

Food security is a concept used to describe access to, and availability of, a household's food supply. The term is not reflective of food bioterrorism or indicative of food safety, rather it is a universal measure of household well-being as it relates to food access and availability. Numerous definitions, with slight variations depending upon the source, have been established to describe food security and insecurity. As a working

definition, *food security* is access by all people, at all times, to sufficient food for an active, healthy life (11) without the need to resort to use of emergency food supplies, stealing, begging or scavenging for food (12). *Food insecurity* is the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (13). The USDA presents the following food security classifications (14):

Food secure-households show no or minimal evidence of food insecurity

Food insecure without hunger-food insecurity is evident in household members' concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members' food intake is reported.

Food insecure with hunger (moderate)-food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food insecure households with children, such reductions are not observed at this stage for children.

Food insecure with hunger (severe)-All households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake.

The moderate to severe food insecure with hunger categories may be combined into one category called food insecure with hunger (14).

In 2005 the USDA changed the terminology used to describe food security status. The terms “low food security” and “very low food security” replaced “food insecurity without hunger” and “food insecurity with hunger,” respectively (11). The wording of the questionnaire used to measure food security remained unchanged and although the word, *hungry*, was retained in the questions (11), *hunger* was eliminated from the new classifications. The removal of hunger from definitions was done because the physiologic experience of hunger was not adequately assessed in the food security questions (11). It is noted that in the recent USDA report, low food security and very low food security continue to be collectively referred to as food insecure (11). Given that the research in this dissertation was conducted before the new terminology was adopted, the use of food insecure with and without hunger will be used except when referring to rates from 2005. Furthermore, prior to the development of the food security scale, food insufficiency was used in published research. Food insufficiency is defined as inadequate food intake due to lack of money or resources (15).

Prevalence

The most recent food security rates available are for 2005. Nationally, the number of food secure households increased from 2004. In 2005, 89% of households were food secure (11), up 0.9% from the previous year (16). Of the remaining 11% of food insecure households, 3.9% had very low food security and this rate was unchanged from the previous year (11). State-specific data are present in three-year increments. Combining the data for three years was done to provide more reliable statistics (11). During 2003-2005 in Missouri, the rate of food insecurity was 11.7 % , of which

4.0 % had very low food security (11). During the previous reporting period (2002-2004), in Missouri, the rate of food insecurity was 11.3%, of which 3.9% were food insecure with hunger (16). The number of food insecure in Missouri has increased but households reporting hunger has decreased.

Certain subgroups of the U.S. population are at higher risk of having low food security. Rates for all food insecurity (both low and very low food security) were higher than the national average in the following groups: households below the federal poverty line (36.0%), single parent households (30.8% for women, 17.9 % for men), black households (22.4%) and Hispanic households (17.9%) (11). Elderly households and households with more than one adult and no children had food insecurity rates below the national average (11). Furthermore, location impacted the prevalence of food insecurity. In the same survey, food insecurity rates were higher for households outside metropolitan areas than those within metropolitan areas (11). Regional differences were also reported. As compared to the national average for food insecurity, rates were higher in the south (12.0%), lower in the northeast (9.1%) and similar in the Midwest (11.1%) and west (10.8%) (11). During a three-year period, the prevalence of food insecurity was lowest for North Dakota (6.4%) and highest for New Mexico (16.8%) (11).

Because pantry users rely on emergency food aid, it is likely that they are at higher risk for food insecurity than the general U.S population. Among pantry client households, only 29.8% were food secure (4). When addressing the issue of hunger, 31.1% of pantry client households were categorized as food insecure with hunger (4). Normally, about 20% of food insecure households received emergency food aid from a pantry at some point during the year (16).

Measurement of Food Security

The rate of food insecurity in the United States is tracked by the USDA and these levels have been measured since 1995 (11,17). It is noted that before the implementation of the food security scale in 1995, the term food insufficiency was often used. The telephone survey of food security is administered once a year as a supplement to the Current Population Survey, conducted by the U.S. Census Bureau (14). In 2005 approximately 47,500 households completed the survey and were a representative sample of the civilian, non-institutionalized U.S population (11). The survey is administered each December (11).

The food security questions are collectively called the U.S. Household Food Security Module (HHFSM) (14). The number of questions is dependent upon whether children are present in the home. The module is comprised of 18 and 10 questions for households with and without children, respectively. A shorter, six question format has also been used (14). This standard short form has been shown to have reasonably high specificity and sensitivity and minimal bias with respect to the 18-question measure (18). A limitation of using the shortened scale, however, is the inability to identify households with child hunger (14).

Questions on the food security scale reflect the different stages households go through as security worsens (19). In such instances, households are forced to make choices, which ultimately impact food intake. While the HHFSM does not measure food intake, it does examine factors influencing food intake. The HHFSM questions address the following issues: fear and anxiety related to the insufficiency of the food budget to meet basic needs, food shortages without having the financial resources to purchase

more, perceived quality and quantity of food consumed by household members, atypical food usage, such as substituting fewer or cheaper foods, and episodes of reduced food intake, hunger or weight loss by household members (14,19).

Interpretation of the responses to questions must be carefully considered because in the survey households are asked if they have experienced a condition *at any time* in the last 12 months (16). For example, this means that being placed in the food insecure with hunger category can be based on reporting a single, episodic event of hunger. In such a case, food insecurity with hunger would reflect an occasional state and not a chronic state. The Economic Research Service examined how often people in food insecure with hunger households were actually hungry and found that about one-third of households that were food insecure with hunger at any time during the year experienced the condition rarely or occasionally (16). About 30 percent of food insecure with hunger households had frequent or chronic occurrence, meaning that hunger occurred almost every month (16).

Causes of Food Insecurity

Poverty is the major cause of food insecurity and hunger in the United States (19). In 2005 in the general population, food insecurity was five times more prevalent when households had an annual income below 185 percent of the federal poverty guideline (28.3%) as compared to households above that level (5.2%) (11). Among pantry households, 68.3% reported income at or below the federal poverty level (4).

However, the cause of food insecurity is more complex than income. Researchers noted that food insecurity is often triggered by an event that stresses the household budget, such as loss of a job or assistance benefits, or gaining a household member (20).

While these life events may burden the household budget, they may not be captured in annual income measures (11). Furthermore, not all food insecure households are living in poverty. Using data from the 1995-1997 Current Population Survey, researchers found that 20 percent of food insecure households had midrange or high incomes (21). As noted above, the HHFSM uses questions that ask whether the event has occurred *at any time in the past 12 months* (11). Therefore, it is possible that a single episode of food insecurity in the last year could classify the household as food insecure.

As previously noted, the food pantry population is at high risk for food insecurity. Aside from income, other population characteristics can contribute to the state of being food insecure. Formal education is limited. Nationally, more than 75% of pantry users report no more than a high school education, with more than one-third having never completed high school (4). Secondly, the population is generally resource poor. Among clients having a place to live, only slightly more than one-fourth own their dwelling (4). Transportation is often lacking, thereby making it difficult to obtain food. In the EFAS survey, 49% of households lacked access to a working car, truck or motorcycle (9). Lastly, pantry users are burdened by health issues. Nearly one-third of pantry households report having at least one family member in poor health (4).

Coping Strategies among Food Insecure

With less household income, there is less money available for food. Food secure households spent 31% more on food than food insecure households with the same size and household composition (16). The typical U.S. household spends \$40 per person per week on food. However, this figure understates food consumption in households that acquire a substantial amount of their food from gardening, hunting or fishing (16). In

1998, 44.9% of CMFB respondents reported sometimes going without buying food in order to pay other bills (10). With less money for household food spending, there is a greater concern for compromised nutritional status.

Food insecure households, either with or without hunger, have developed coping strategies for obtaining food. Use of food assistance programs is one strategy. More than half (55.2%) of food insecure households received food assistance during the last year. Assistance came from the following programs: National School Lunch Program (36%), Food Stamp Program (29.7%) and the Women, Infants and Children Supplemental Food Program (WIC) (13.6%) (16). Other strategies involve reliance on other people as a support system. Pantry participants reported cooking with other people, eating at other people's homes and getting food from the workplaces as a means to acquire food (6). In addition, pantry users look for alternative methods for acquiring income. Other means of obtaining financial resources include pawning, selling one's blood, gambling, participating in research and begging (6).

Furthermore, food pantry use is also a coping strategy for food insecurity. Food insecure households were 17 times more likely than food secure households to obtain food from a food pantry. A food insecure with hunger household was twice as likely to use a food pantry as a food insecure without hunger household (16).

Subsistence Methods of Acquiring Food

Gardening and Food Security

Gardening, as a method of food acquisition, is a coping strategy for food insecurity. Community gardens have been found to promote community food security

(19). Advocates recognize the potential of urban gardening as a significant link in urban food security in the United States (22). When examining food security status of households in a rural Appalachian county, researchers found that hunger was associated with a lack of a garden (23). In focus groups of participants from various low-income agencies, such as food pantries and soup kitchens, gardening was identified as a means to acquire food and decrease expenses (6). Researchers further noted that home gardening was generally practiced to maintain food sufficiency in more rural areas but not urban areas (6).

Hunting and Fishing

Like gardening, hunting and fishing, as a method of food acquisition, is a coping strategy for food insecurity. In a survey of hunters, 25% reported hunting primarily for the meat (24). In the Black Hills of South Dakota, 7.1% of resident and non-resident hunters reported that hunting, as a way to bring home meat for food, was their top reason for deer hunting (25). In personal interviews, catching fish, as a means to stretch one's food dollar, was identified as a motivation for fishing (26). Salvaging roadkill and using it as a food source is also a coping strategy for food insecurity. In focus groups of participants from various low-income agencies, such as food pantries and soup kitchens, participants identified finding roadkill as an opportunistic means of obtaining food (6).

Although hunting and fishing are two separate leisure time activities, when referring to coping strategies for food insecurity, they are often combined into one category to represent one activity. In the above-mentioned study of food pantry and soup kitchen users, hunting/fishing was identified as a means to acquire food and decrease expenses (6). It is noted that there are expenses associated with hunting and fishing.

Equipment, transportation and permits can add to the cost of acquiring food. In Missouri, as in all states, hunting for game and fishing require permits and costs vary depending upon the type of hunting or fishing (27).

Nutritional Implications of Subsistence Methods

Of these abovementioned subsistence methods of acquiring food, gardening and hunting/fishing are of particular interest because of their ability to enhance the diet of food insecure individuals. Consumption of vegetables offers a source of numerous micronutrients, phytochemicals and fiber-rich carbohydrates. As will be noted in latter sections of this document, fruit and vegetable consumption is reduced in food insecure households. Meat, obtained through hunting, fishing or consuming roadkill, provides a protein source to the diet. Meat is also one of the more expensive food items and therefore, limited in consumption by food insecure households. In the Hunger in America 2006 study, 60.9 % of pantries reported needing meat, poultry, fish, beans, eggs and nuts from the food banks (4), the request being higher for this food category than any other listed. It was reported that when cost constraints increase, there is a decreased proportion of energy intake from meat and dairy (28).

Fruit and Vegetable Consumption

Recommendations

The recommendation for fruit and vegetable intake for Americans was recently revised. According to the Dietary Guidelines for Americans 2005, healthy Americans need 5-13 servings of fruits and vegetable daily, a recommendation dependent upon

caloric need. An individual consuming 1,200 total calories per day should eat five servings and those servings increase to 13 per day for a 3,200 kcal per day diet (29). As a commonly used reference, an individual with a daily caloric need of 2,000 should consume nine servings of fruits and vegetables per day. When translated into common household measurements, this equates to approximately two cups of fruit and 2 ½ cups of vegetables (29).

Although it is too soon to know whether the increased recommendations will result in increased consumption, it is suspected that, based on previous recommendations and intake comparisons, dietary intake of fruits and vegetables will fall below recommendations. Given the previous recommendation of five servings of fruits and vegetables per day, researchers found that over 50% of men and women ate less than five servings of fruits and vegetables per day (30). According to the Behavioral Risk Factor Surveillance System (BRFSS), a national telephone survey of behaviors impacting health, fruit and vegetable consumption falls short of recommendations (31). In 2005, 76.8% of Americans consumed fruits and vegetables less than five times a day and for Missourians the trend was slightly worse with 77.4% of the population eating fruits and vegetables less than five times per day (31).

Cost

Cost may be a contributing factor to suboptimal fruit and vegetable intake. Less nutrient-dense foods are often cheaper. There is an inverse relationship between energy density and energy costs. Foods composed of refined grains, added sugars or fats may represent the lowest-cost option to the consumer (32). Researchers noted that inadequate nutrient intake of micronutrients, such as calcium or vitamin C, was significantly

associated with lower monthly incomes and lesser amounts of money spent on food (33). On average, low-income households spent \$3.59 per capita per week on fruits and vegetables in 2000, as compared with \$5.02 for higher income households (34).

Furthermore, cost related to fruit and vegetable consumption can be broken down into cost to *buy* fruits and vegetables and the cost to *eat* fruits and vegetables. The cheapest way to purchase fruit was in the form of either fresh, canned or as a juice. When eating fruit, the cheapest type was fresh (35). These patterns differ when it comes to vegetables. Since fresh and frozen vegetables are generally more expensive per pound, canned vegetables were the least expensive to buy. However, the canned vegetables are the most expensive to eat per serving because the weight of canned vegetables includes the packing liquid, whereas the serving size reflects a drained amount (35).

Role of Food Security in Fruit and Vegetable Consumption

Food insecurity alters the types and amounts of food consumed. Poor quality diets are common among those of low socioeconomic status (36). In focus groups in Washington state food pantry users, participants reported omitting meats and stretching meals through use of filling ingredients such as potatoes and noodles. Canned and frozen vegetables were substituted for of fresh vegetables (37). Food insecure women consumed fewer fruits and vegetables than recommended as compared to food secure women (38). Olson noted that women's roles in managing family feeding made them more vulnerable to food insecurity and that fruit and vegetable intakes were sacrificed initially as hunger approached (39). In a study examining the results of NHANES III, younger adults (20-59 yrs) from food insufficient families were more likely to report less

frequent consumption of fruit/fruit juices and vegetables than younger adults from food secure families(40).

Because of adjusted food intake, nutrient intake can also be altered. When assessing the dietary intake of food pantry and soup kitchen users, researchers found that calcium, vitamin C and thiamin were most likely to be the lowest as compared to other nutrients (33). Reduced intakes of fruits and vegetables resulted in significantly lower intakes of potassium, fiber and vitamin C in food insecure women (38). Food insufficiency was associated with lower intakes of vitamins A, C, E, B₆, magnesium, thiamin and niacin (41). Food insufficient individuals were more likely to have calcium and vitamin E intakes below 50% of recommended amounts (40).

Role of Fruit and Vegetable Intake and Chronic Diseases

The health benefits of adequate fruit and vegetable consumption have been well documented. In a review, researchers found numerous ecological, case-control and cohort studies supporting a significant protective association between consumption of fruit and vegetables or surrogate nutrients and coronary heart disease (42). Using the National Health and Nutrition Examination Survey Epidemiologic Follow-up Study, there was an inverse association of fruit and vegetable intake with the risk for cardiovascular disease (43). In a meta-analysis of cohort studies, higher intakes of fruits and vegetables were associated with a lower risk of stroke (44). Compared to those who ate small amounts of fruits and vegetables, those who eat greater amounts had less risk of type 2 diabetes mellitus (29). Fruit and vegetable consumption also affects weight status. Individuals with a high fruit and vegetable intake had the lowest energy density values and the lowest obesity prevalence (45). In a clinical trial, obese women who consumed

significantly more low-energy dense foods such as fruits and vegetables showed a 40% greater weight loss after six months than a comparison group (46).

Whole Grains

Recommendations

In addition to fruits and vegetables, the Dietary Guidelines for Americans 2005 emphasize consumption of whole grains. This is the first time that the guidelines have quantified the amount of whole grains recommended (29). Total amount of whole grains consumed is dependent on the rationale for the use. Individuals should consume ≥ 3 one-ounce equivalents of whole grains daily to decrease the risk of chronic disease and to potentially help with weight maintenance (29). For all calorie levels, it is recommended that an individual consume at least half the grains as whole grains to meet fiber needs (29). Average consumption in the U.S. is 5.7 servings per day and 1 serving per day for refined and whole grains, respectively (47).

Sources

The amount of whole grains in products depends on the refining of those grains. A whole grain consists of the bran, germ and endosperm. The bran and germ provide nutrients and phytochemicals and the endosperm provides starch (48). When comparing food with and without whole grains, those made with whole grains contain fiber, vitamins, minerals, phenolic compounds and phytoestrogens, which would otherwise be removed in the refining process (49). Whole grains can be consumed as a single food,

such as popcorn, wild rice or buckwheat or they can be part of a multi-ingredient food, in which the specific whole grains are identified on the ingredient list (50).

Role of Food Security in Whole Grain Consumption

The relationship between the consumption of whole grains and food security is not well documented. The nutrient intake of food insecure individuals has been studied (38). However, it was not defined as to whether whole grains were the source of those nutrients.

Role of Whole Grain Intake and Chronic Diseases

The emphasis on whole grains stems from evidence that whole grains may reduce the risk of chronic diseases. Increased whole grain intake was associated with a decreased risk of coronary heart disease (51). There was an inverse relationship between whole grain intake and type II diabetes mellitus (52). Whole grain intake has been associated with lower risk of cancers, including colorectal, gastric, and endometrial cancers (53).

Health Status and Food Insecurity

General Physical and Mental Condition

Food insecurity has been described as a *preventable* threat to the health of the U.S. population (17) and has notable health consequences. There is a step-wise gradation in poor health associated with progressively lower incomes (54). Physical impairments such as illness and fatigue are related to insufficient food (55). Using the HHFSM, it was found that adults in food insecure households were significantly more likely to rate their

health as poor/fair. They also scored significantly lower on physical and mental health scales (56). Among Canadians, individuals from food insufficient households had a higher odds of reporting health as poor/fair, of having poor functional health, noting restricted activity and suffering from major depression and distress (57). When adult food pantry participants were asked to describe their health, the greatest percentage (31%) reported *fair* health status (4).

Body Mass Index

The excessive weight status of Americans has often been described as reaching “epidemic” proportions. This weight status is typically characterized using the body mass index (BMI) scale, which is derived from the calculation of weight in kg/height in m² (58). The following BMI classifications are used: underweight <18.5, normal 18.5-24.9, overweight 25-29.9, obese ≥ 30 (58). Obesity can be further classified as grade I-III, with grade III representing a BMI of ≥ 40 (58). Although BMI correlates with the amount of body fat, it is not a direct measure of body fat. Athletes with a large amount of muscle mass may have a high BMI because of muscularity rather than increased body fat (59).

According to the BMI calculations from the National Health and Nutrition Examination Survey (NHANES) for 1999-2002, an estimated 65% of US adults aged 20 and older are either overweight or obese (60). While NHANES uses actual (measured) heights and weights to determine BMI, self-reported heights and weights used in the BRFSS show a similar trend. Nationally, there was a 3.9 % increase in overweight and 10.5 % increase in obesity from 1990-2002 (61). In Missouri, the prevalence of overweight increased from 34.3% to 37% over twelve years and obesity jumped from

11.9% in 1990 to 23.2% in 2002 (61). The most recent BFRSS data available (2005) indicate that 37% and 26.9% of Missourians are overweight and obese, respectively (31). According to the Trust for America's Health, which in part used BRFSS data, Missouri's adult population ranked 14th heaviest in the country (62).

The physical health implications of being overweight or obese are significant. According to the Centers for Disease Control and Prevention (CDC), overweight and obese individuals are at greater risk for the following: hypertension, dyslipidemia, type II diabetes mellitus, coronary artery disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, and cancers, such as endometrial, breast and colon (59). In a ten-year period, the risk of developing diabetes, gallstones, hypertension, heart disease and stroke (men only) increased with severity of overweight among both women and men (63). As weight increases, so does the risk of chronic conditions. In Missouri, 6.9% of overweight and 9.3% of obese individuals reported having heart disease as compared to 4.1% of healthy weight individuals (64). There is also a relationship between excess weight and high blood pressure among Missourians. It was reported that 27.6% of overweight and 40.6% of obese individuals had reported high blood pressure as compared to 16.5% of those at a healthy weight (64).

Role of Food Security in Weight Status

The state of being food insecure places one at greater risk of being overweight or obese. Drewnowski found that the highest rates of obesity occurred among population groups with the highest poverty rates (32). Researchers reported a greater prevalence of obesity in food insecure (31%) than food secure (16.2%) women (65). When controlling for demographic factors, household food insecurity was positively related to BMI

($p=0.06$) (66). Compared with women in households that were fully food secure, women in marginally food secure households were significantly more likely to be obese and likely to gain at least 4.5 kg over a year (67). Furthermore, gender differences exist. Women are at higher risk for overweight related to food insecurity than men (68).

A definitive rationale for the association between food insecurity and excess weight remains unclear. Hunger and obesity are known to exist within the same person and within the same household (69), a situation coined the “hunger-obesity” paradox (70). Under such circumstances, the *quality* and *quantity* of the diet can be affected. Food quality is generally affected before quantity (71). Low-income families may consume lower cost, higher calorie foods to ward off hunger (19). The association between food insecurity and obesity might be attributed to the low cost of energy dense foods and reinforced by the pleasing taste of sugar and fat (28). In terms of quantity, chronic highs and lows in food availability can cause people to eat more than they normally would when food is available (72). Over time, this pattern results in weight gain (68). The mechanism for this binge-like eating is unclear (70).

Role of Food Security in Chronic Diseases

The prevalence of diet-related chronic conditions has received much attention in recent years. The Dietary Guidelines for Americans has shifted focus to reduce the risk of chronic diseases (29), as opposed to previous emphasis on nutrient deficiencies. In Missouri in 2003, diseases of the heart, cerebrovascular disease and diabetes mellitus were the first, third and sixth leading causes of death for all races, respectively (73).

The relationship between food insecurity and chronic diseases is less clear. In Canada, individuals in food insufficient households were more likely to report conditions

of heart disease, diabetes and high blood pressure (57). Six percent of diabetic adults, participating in NHANES III, reported food insufficiency (74). In the same study, food insufficient diabetics were more likely to report their health status as fair to poor than those who were not (63% vs. 43%, respectively) (74). In a cohort of emergency room patients and their parents, chronic illnesses, including diabetes, hypertension and heart problems, were predictive of hunger (OR=2.1) (75). Among households in rural Appalachian Ohio counties, food insecure participants had higher self-reported rates of diabetes than food secure participants (12).

Summary

Implications

This research will contribute to the understanding of the health and nutritional needs of food pantry users in central and mid-Missouri. Specifically, it will address the relationship between food security and the following: subsistence methods of acquiring food, fruit and vegetable, and whole grain consumption, weight, health and nutritional status. As this project represents a collaboration between a privately funded food bank, the CMFB, and the University of Missouri, valuable data will be generated that can be used to benefit both parties. It will put a face on those who rely on food pantries as a means to survive.

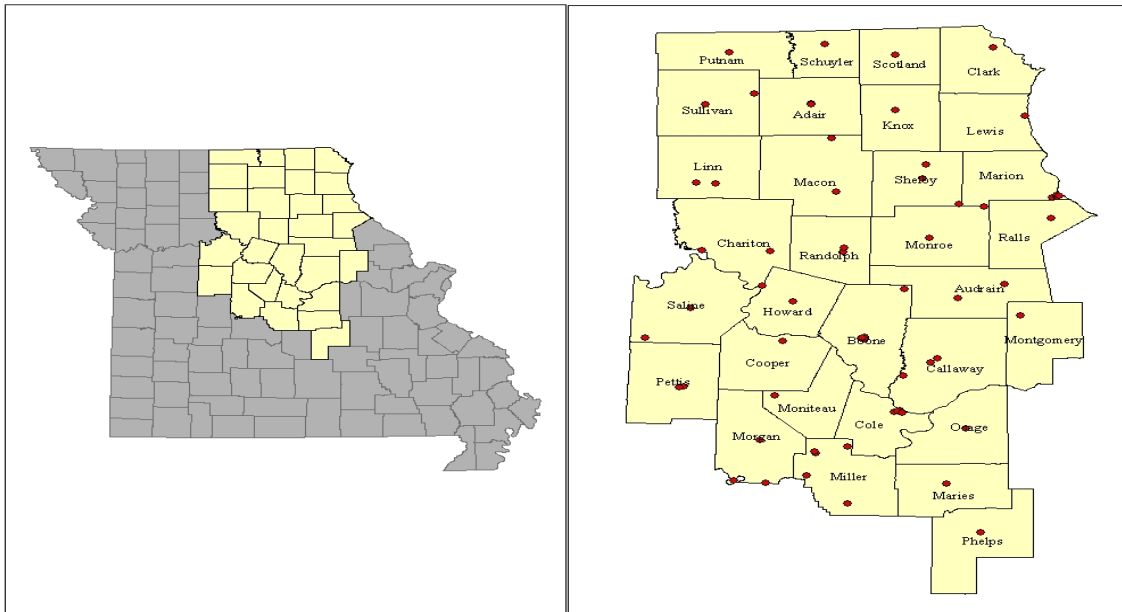
CHAPTER 2: SUBJECTS AND METHODS

Food Pantries

Location

This research utilized food pantry sites served by the Central Missouri Food Bank (CMFB). The CMFB currently supplies food to 33 counties in the central and northeast regions of Missouri. However, two of those counties, Camdenton and Bennett, were not added to the service area until after the study was implemented and, therefore, were not included in this research. With the exception of Monroe county, all of the counties shown (Figure 1) were included in this study. Numerous attempts were made to survey the pantry in Monroe county but because of scheduling conflicts, this was not feasible. The data presented in this study are from 47 different pantry locations and 11 mobile pantry stops.

The counties in this study area (Figure 1) represented a mix of metropolitan (>50,000 people), micropolitan (10,000-50,000 people) and non-metropolitan (<10,000 people) statistical areas (76). With the exception of Boone and Cole counties, all counties fit the Census Bureau's category of having the fewest number of persons per square mile (77).



Courtesy of Matt Foulkes, PhD, Geography Department, MU (used with permission)
Figure 1. Counties Served by the CMFB (Study Area)

Profile of Clientele

In Missouri, 84.9% and 11.2 % of the population are white and black or African American, respectively (78). Over 90% of the population in the northern and southern study regions is white. In the central counties, there is slightly greater racial diversity. Approximately 85-93% of persons in these counties are white (79). In 2000, approximately 9% of the population of Saline county was Hispanic or Latino (80). The state is 48.6% male, 51.4% female and the median age is 36.1 years (78).

The study region was representative of all income categories for the state (81). Personal per capita income for 2002 ranged from \$14,218 to \$41,126. The average for Missouri was \$28,512. Boone and Cole counties fell into the highest per capita personal income category (\$24,999.01-\$41,126.00), while Miller county was placed into the lowest category (\$14, 218.00-\$19,999.00) (81).

Income eligibility is a criterion for receiving USDA food commodities at pantries. However, there are not clear income guidelines for receiving other pantry foods. Persons picking up food at the pantries must be 18 years or older and reside in the county in which they are visiting the pantry. Because of the age guideline, all persons interviewed for this research project were a minimum of 18 years old.

Structure and Organization

Each pantry varied in terms of its physical structure and organization. Throughout the study, time was taken to ensure a consistent approach in dealing with each pantry. Interviewers received training on the project in a one-day workshop and whenever possible also attended biweekly research meetings.

The structure of the pantry was either mobile, drive through, within another building such as a church, or stand-alone. Depending upon the set-up, pantry shoppers did or did not have input into the types of groceries they received. At self-serve pantries, clients did their own shopping as they would in a regular grocery store. At full-serve pantries, participants had little if any input into the types of groceries they received. Limited-serve pantries offered some self-selection. In addition to the variation in types of pantries and methods of shopping, there was variation in the foods offered. Each pantry had different foods available, depending upon what they receive from the CMFB and other private donations. Many pantries did not have refrigerators or freezers; this limited the variety of items available.

Each pantry had a different operating schedule. The days open for service and the hours of operation varied greatly from pantry to pantry. For example, a pantry might be open from 1-3 pm only on the first Tuesday of the month, whereas others were open five

days a week for the entire month. Interviewers telephoned the contact person for each pantry to determine the best time to survey patrons. When possible, interviewers tried to conduct interviews during peak pantry usage times. For pantries that were open more frequently, interviewers visited on different days of the week and at different times to ensure a more representative sample.

Sampling

In order to determine which pantries to use, a master list of CMFB pantries was obtained with permission from the CMFB. Although the CMFB serves sites other than pantries, such as rehabilitation centers and homeless shelters, only pantries, including mobile pantries, were included in this research.

To determine the number of surveys to complete from each pantry, the following formula was used: monthly number of individuals served by a particular pantry/monthly total individuals served by all pantries. Specifically, the pantry-reported numbers of clients served from May through August 2004 were used as a reference point. These dates were selected because they reflected the same months that this research was to be conducted. June-August is one of the two peak times for pantry use, in part because of lack of food availability from the National School Breakfast and Lunch Programs. Data collection began in mid May, prior to the release of most elementary and secondary schools, so as to be more representative of food pantry use at times when school is in and out of session. Because researchers were using a four month interval, a list that averaged each pantry's percentage of total served by all pantries over the four months was used. This method ensured that sampling was proportional to the number of individuals served

by each pantry and was based on the same months as the University of Missouri research study.

The sample was further narrowed. If a pantry served less than 0.5% of the regional total of individuals served, it was removed. This was done because these sites would have generated very few surveys, often only one or two surveys. Given this low survey number, the time needed to schedule interviews and travel to sites would not have been justified. In this process, 20 pantries, serving less than 7% of the total pantry population, were eliminated from the perspective study sample.

Given the above sampling design, a total of 51 pantries were to be included in the study. However, during the course of the summer, four pantries were removed because they either no longer existed or their volume of patronage was too low to warrant resources to administer the survey. Allocated survey numbers from these pantries were shifted to nearby pantries.

A sample of 1,200 surveys was targeted and this number was based upon the number of surveys needed to ensure +/- 3% accuracy at the 95% confidence interval. However, two factors led to a higher number of surveys completed. First, researchers oversampled by more than 10% in Cole and Pettis counties. Secondly, interviewers were instructed to oversample by no more than 10% at each location, in order to account for incomplete surveys or unusable data. A total of 1,314 surveys were completed.

Survey Design

A survey instrument (Appendix 1) was crafted by the interdisciplinary team of researchers, Rikoon, Hermsen, Foulkes, Whiting and Raedeke. It included five different sections: pantry use, food security, food sources, nutrition and health and demographic

information. Questions pertaining to food consumption were included in the nutrition and health section. The survey took approximately 15-20 minutes to administer. The survey was pretested and then revised. The instrument was reviewed by members of the CMFB and they were in agreement with the final instrument.

Data Collection

Six upper division undergraduate students from the University of Missouri-Columbia conducted the majority of the interviews. Foulkes and Raedeke also completed some of the interviews. In some instances, paraprofessionals from the University of Missouri Extension-Nutritional Sciences program were used, particularly for pantries in which bilingual interviewers were required. An interviewer-training workshop was conducted by researchers prior to the start of the project to ensure consistency in survey administration.

The interviews were conducted face-to-face with patrons at each pantry. In-person surveys were conducted to get a more inclusive sample. Patrons were not aware in advance that they were to be interviewed. No incentive was provided for pantry user participation.

To minimize sampling bias, a protocol was followed for requesting participation in the study. Interviewers approached every third participant as they came through the door at each pantry. If that person refused, the interviewer contacted the next person until someone agreed to be interviewed.

Conceptual Model

Subsistence and Fruit and Vegetable Intake

The conceptual model that guided the analysis regarding subsistence methods of acquiring food and fruit and vegetable intake is illustrated (Figure 2). The independent variables were selected because of their perceived relationships to subsistence and consumption. The role of food security status and its influence on gardening, hunting/fishing or fruit and vegetable consumption was of particular interest and therefore is highlighted in the model.

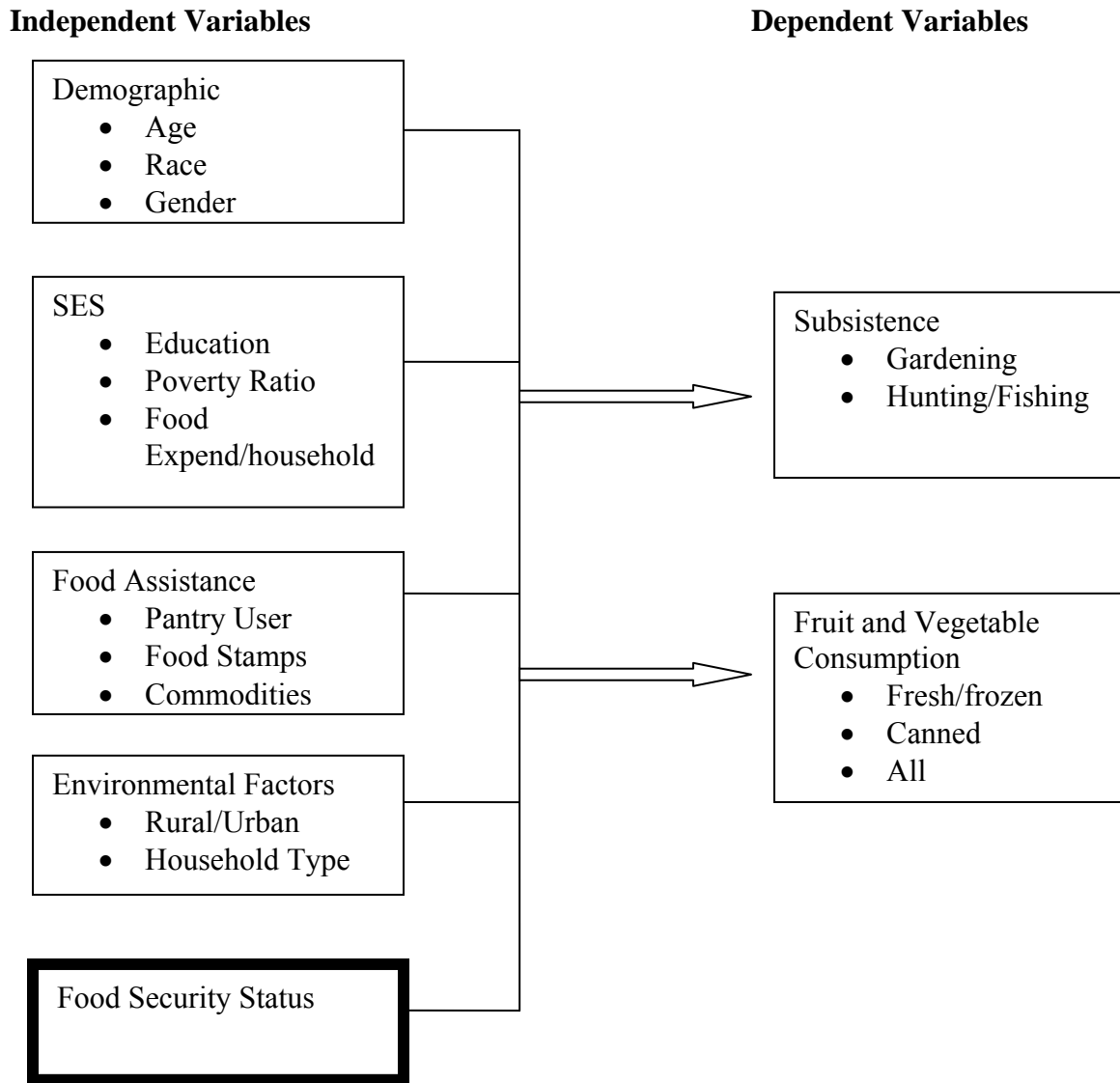


Figure 2. Conceptual Model of the Relationship between Background Characteristics and Subsistence and Fruit and Vegetable Consumption

Body Mass Index (BMI)

The conceptual model for the analysis of BMI is shown (Figure 3). The independent variables were selected because of their perceived relationships to BMI. The role of food security status on BMI was of particular interest and is therefore highlighted in the model.

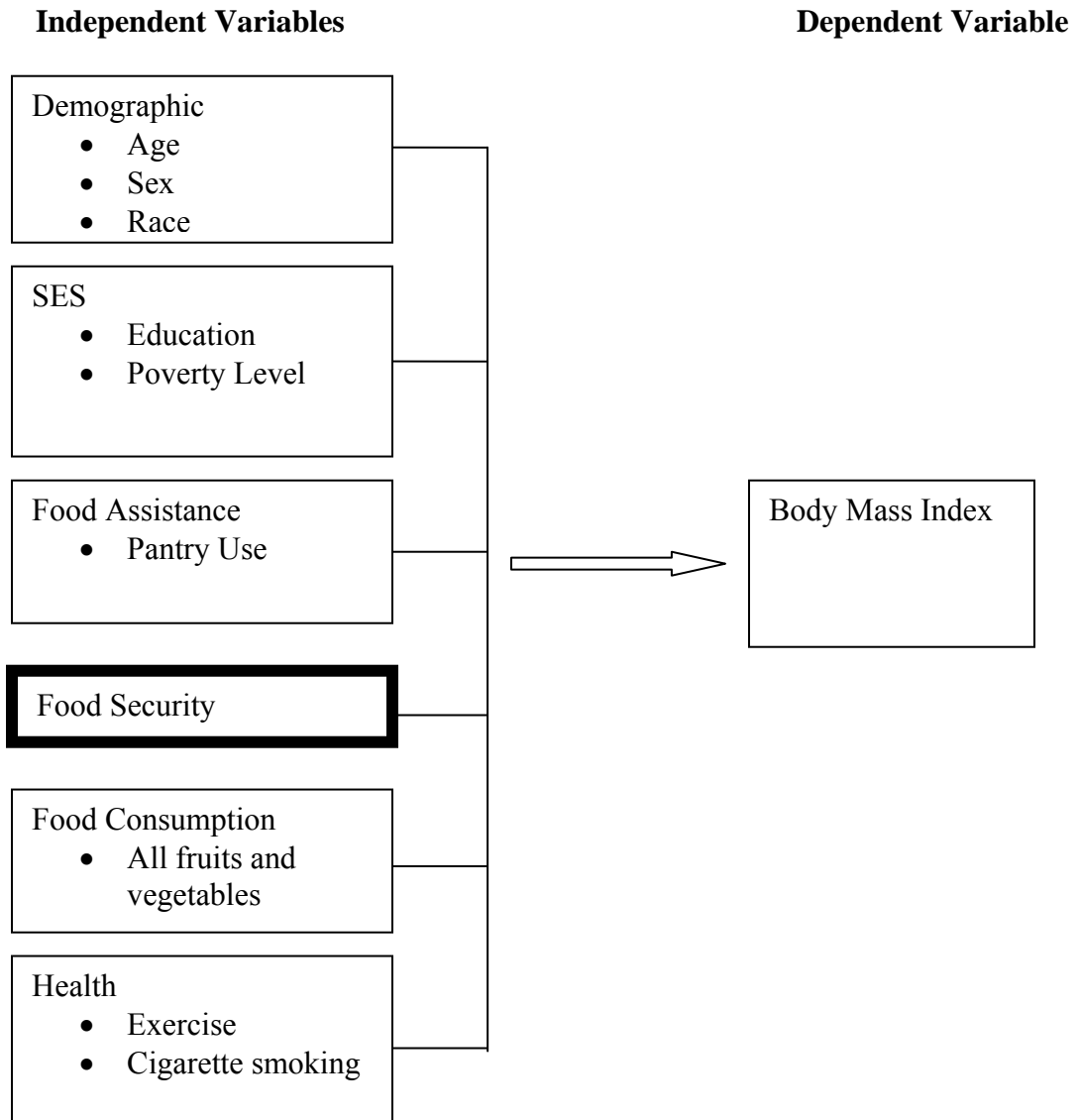


Figure 3. Conceptual Model of Background Characteristics and BMI

Health

The conceptual model depicting independent and dependent variables used in the health analysis is shown (Figure 4). The health conditions of interest were diabetes mellitus (referred to as diabetes throughout this report), hypertension and high blood cholesterol.

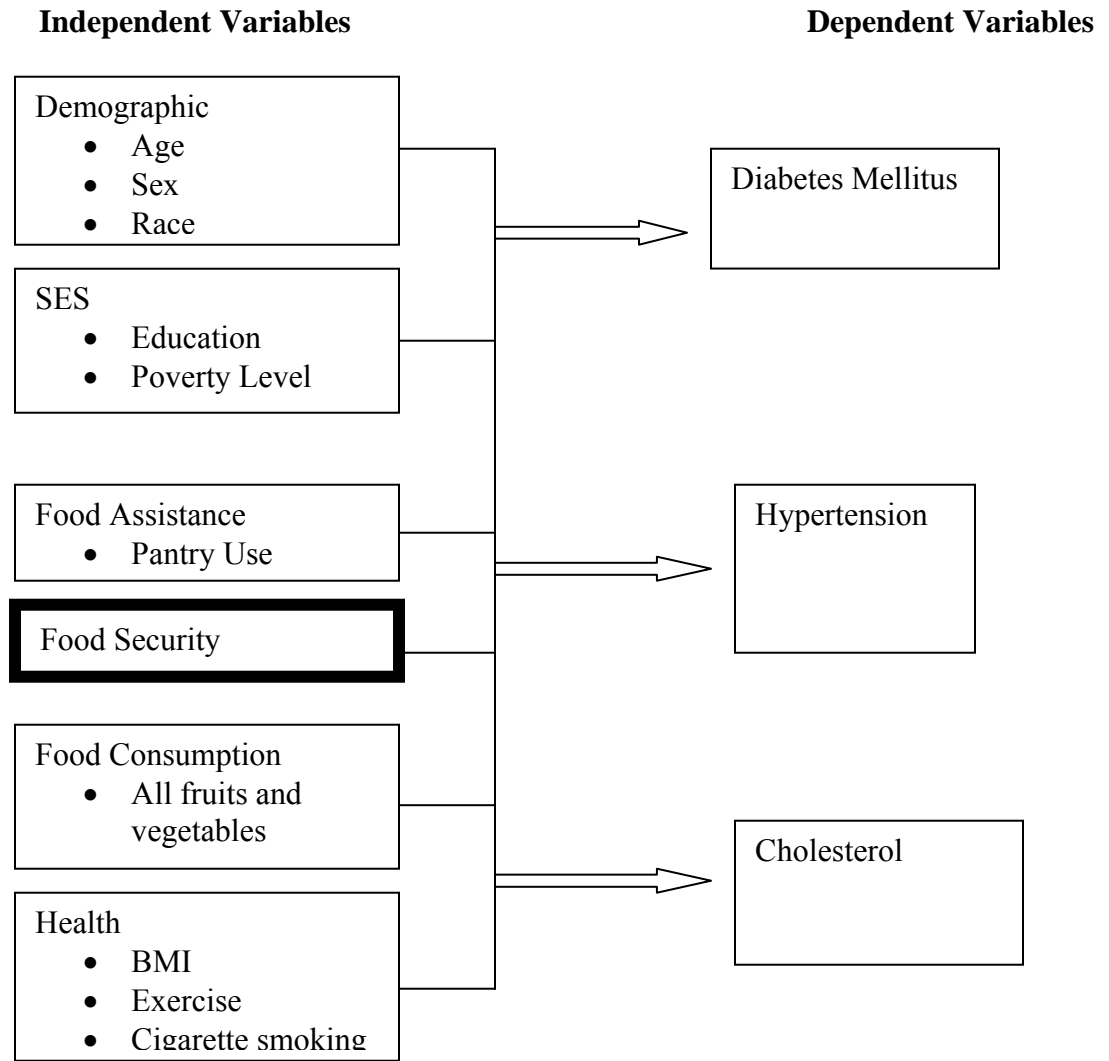


Figure 4. Conceptual Model of Background Characteristics and Health

Categorization of Dependent Variables

Subsistence

The subsistence strategies of gardening and hunting and fishing are of particular interest because of their relationship to nutrition. Gardening suggests a means to consume vegetables. Eating meat obtained by hunting and fishing offers a dietary protein source to pantry users.

Gardening. Participants were asked to state their frequency of gardening as a way to provide food in the last year as never, one to two months, some months but not all, and always. Given the use of greenhouses or indoor gardening, it is possible to grow food year round in Missouri. Because few people gardened, a dichotomous gardening variable was created to reflect never gardening or at least some gardening.

Hunting/Fishing. Hunting and fishing were included as a single variable, as this is how they were queried in the survey. The frequency of hunting and fishing over the last year was stated by participants as never, one to two months, some but not all months, and always. Because few pantry participants hunted or fished, a dichotomous hunting and fishing variable was created to represent never hunting or fishing or at least some hunting and fishing.

Fruit and Vegetable Intake

Because of variation in nutrient content, fruit and vegetable intakes were divided according to type. Consumption of fresh and frozen fruits and vegetables were measured separately from canned fruit and vegetable intake. Juice, as a source of any fruit or

vegetable intake, was excluded because it differs in composition of fiber and calories. The recently revised USDA MyPyramid, released in April 2005, recommended not to rely on juice as a source of fruit servings (82).

Fresh/Frozen Fruits and Vegetables. Participants were asked to quantify weekly consumption of fresh and frozen fruits and vegetables, in terms of how often they ate these foods. Given similarities in nutrient composition, such as low sodium, fresh and frozen fruits and vegetables were given as a single category.

Canned Fruits and Vegetables. Participants were asked to state how often during a week canned fruits and vegetables were consumed.

All Fruits and Vegetables. This variable reflects weekly consumption of all fruits and vegetables, excluding juice. It was created by adding the consumption of fresh/frozen and canned fruits and vegetables.

Assessment of total dietary intake was limited by study parameters. Given that only 15-20 minutes were allotted to conduct the entire survey, there was insufficient time to complete a food frequency questionnaire. Secondly, caution was often taken to avoid a conflict of interest regarding consumption of specific foods and foods offered at the pantry. The CMFB relies primarily on food donations and therefore has limited control over the types of food it provides to the pantries. For example, more expensive protein foods, such as meats and dairy products, are typically unavailable. Therefore, consumption of these foods was not probed.

Weight and Health Measures

Due to the desire of the CMFB to avoid direct measurements on pantry participants and because of limited research funds, health findings were based on

self-report. Self-reported health data are frequently used in nationally recognized health surveys, such as the BRFSS (31).

Three variables used to address health were diabetes mellitus (referred to in this document as diabetes), hypertension and hypercholesterolemia. These questions were taken for the most part from the BRFSS (31). In each case, the participant was asked whether they had been told by a healthcare professional that they had the condition of interest. If affirmative, they were queried regarding intervention, such as medication use.

Body Mass Index (BMI). Self-reported heights and weights were used to determine BMI. Given that the data were collected in pounds and feet, body mass index was computed as follow: $[\text{weight (lb)}/\text{height (in)}^2] * 703$ (83). After computation, BMI was classified according to the following CDC criteria: $< 18.5 \text{ kg/m}^2$ underweight, $18.5\text{-}24.9 \text{ kg/m}^2$ normal weight, $25.0\text{-}29.9 \text{ kg/m}^2$ overweight, $\geq 30 \text{ kg/m}^2$ obese (83). It should be noted that in some of the models, BMI was also used as an independent variable.

Diabetes. A dummy variable was created for the presence or absence of diabetes. Those that responded with either pre or borderline diabetes were excluded from the sample.

Hypertension. A dummy variable was created for the presence or absence of hypertension.

Hypercholesterolemia. A dummy variable was created for the presence or absence of high blood cholesterol.

All Health Conditions. The number of health problems (diabetes, hypertension, high blood cholesterol) per participant was determined. In addition, each participant was categorized as either having a BMI as underweight/normal or overweight/obese. Normal

or underweight was considered as no health problem. The number of health conditions plus weight status was then summed to create the following scale: 0-4 with zero indicative of no health problems and being under or normal weight; and, a score of four indicates all three health problems and being overweight or obese.

Diabetes Severity. Those with diabetes were divided into two groups: taking medication (either insulin, diabetes pills or both) or not taking medication. A dichotomous variable representing present plus no medication or present plus medication was created.

Hypertension Severity. Those reporting hypertension were divided into two groups: taking medication or not taking medication. A dichotomous variable representing hypertension without medication or hypertension plus medication was created.

Cholesterol Severity. Those reporting high blood cholesterol were divided into two groups: taking medication or not taking medication. A dichotomous variable representing high cholesterol without medication or high cholesterol with medication was created.

Categorization of Independent Variables

Demographics

Age. The age of the study participant was recorded. It is a requirement of the pantry that those picking up food at the pantry be at least 18 years old. Age was used as a continuous variable.

Race. Race was identified by the participant as either white, black, Asian, American Indian or other. A participant of any race may have been Hispanic, as Hispanic was treated as a separate question in the survey. A dummy variable was created to represent white and non-white.

Gender. As needed, participants were asked to identify their gender. When obvious to the interviewer, the answer was just documented. A dummy variable was created to represent female and male.

Socioeconomic Status

Education. Education was used as a proxy for income with the assumption that with more education, there is greater potential for a higher wage. Respondents were put into one of five educational categories with the minimum being less than high school and the maximum being graduate or professional degree.

Income-to-Poverty Ratio. The poverty ratio was selected as a marker of socioeconomic status because it takes into account both total income and the poverty threshold. The poverty threshold is the dollar amount below which a family is viewed as living in poverty and is used for official population poverty statistics (84). A simplified version of the poverty threshold is the poverty guideline, which is used to determine program eligibility criteria (84). The poverty ratio, also called the income-to-poverty ratio, is the household's income divided by their poverty threshold (84). The poverty ratio variable was categorized as follows: 0-50%, 51-100%, 101-130% and $\geq 131\%$ of poverty level.

Food Assistance

Pantry Use. This variable was limited to those that reported using the pantry at least once a month. Pantry use represented the number of months that the respondent had been a fairly regular visitor to the pantry. The word, fairly, was used in the survey and was not further defined.

Food Stamps. Food stamp usage over the past year was recorded as never, only one or two months, some months but not all, or every month. This scale of food stamp usage was then recoded into a dummy variable, indicating either some use at any level or never using food stamps.

Commodities. Commodity usage over the past year was recorded as never, only one or two months, some months but not all, or every month. This scale of commodity usage was then recoded into a dummy variable, indicating either some use at any level or never using commodities.

Environmental Factors

Urbanization. Based upon respondent's county of residence, these counties were then categorized as metropolitan, micropolitan or rural. A dummy variable was then created to represent metropolitan and micropolitan or rural areas.

Type of Residence. The type of residence was listed as one-family home, including duplex or townhouse, mobile home in a mobile home park, stand-alone mobile home, apartment or no regular place, such as being homeless or living in a vehicle. This variable was collapsed to create home ownership or no home ownership. Those living in a one-family dwelling were considered home owners.

Food Security Status

Food Security. Food security was measured using the six-question HHFSM (14). The responses to this survey were used to construct a 12-month analysis of food insecurity. Based on this scale, the three categories of food security status were determined as food secure, food secure without hunger or food secure with hunger (14). Due to time constraints in the interviewing process, the six-question, as opposed to the 18-question, scale was used. Food security status is based on the number of affirmative responses to the six questions. This categorization is as follows (14):

0-1 Affirmative responses = food secure

2-4 Affirmative responses = food insecure without hunger

5-6 Affirmative responses = food insecure with hunger

This standard short form has been shown to have reasonably high specificity and sensitivity and minimal bias with respect to the 18-question measure (18). A limitation is that it is unable to identify households with child hunger (14). However, the researchers in this study interviewed only adults aged 18+ or older so the six-item scale was appropriate.

For descriptive purposes, food security was used as both a categorical and continuous variable. Where important to be able to state a respondent's food security status as secure, insecure without hunger or insecure with hunger, the categorical variable was used. It was created using the abovementioned scale based upon the number of affirmative responses. In the regression analyses, the continuous food security scale, ranging from zero to six, was used.

Body Mass Index (BMI). Body mass index was used as an independent variable in several of the health models.

Exercise. The presence or absence of monthly physical activity, excluding job-related exercise, was used as a dummy variable.

Smoking. Cigarette smoking was stated as either none, less than one pack per day (ppd), one to two ppd or two or more ppd. Although from that description, the same number of cigarettes is used in two different categories, it did not matter in the analysis because the variable was collapsed into never smoke or smoke.

Hypotheses and Statistical Models

Subsistence

It was hypothesized that as household food security increases, pantry users are more likely to use subsistent methods of acquiring food. This analysis investigated the relationship between gardening or hunting/fishing and food security.

Contingency tables were used to assess the bivariate associations between food security status and gardening using the χ^2 test. SPSS (version 14.0, 2006, SPSS, Inc., Chicago, IL) was used for this analysis and all subsequent analyses. A logistic regression model was run to predict the probability of gardening. This regression was based on the conceptual model (Figure 2). The same process was used to determine the relationship between hunting/fishing and level of food security.

Fruit and Vegetable Intake

It was hypothesized that as household food security decreases, pantry users are more likely to eat fewer fruits and vegetables. This analysis evaluated the relationship between fruit and vegetable intake and food security. Fruit and vegetable intake included consumption of fresh/frozen and canned vegetables. These types of fruits and vegetables were analyzed separately and then combined to create an “all fruits and vegetables” variable. Contingency tables were used to assess the bivariate associations between food security status and total consumption of fruits and vegetables using the χ^2 test. For each of these variables, a separate multiple linear regression model, based on the controlling variables listed (Figure 2), was completed.

Body Mass Index (BMI)

It is hypothesized that as household food security decreases, BMI increases for pantry users. This analysis explored the relationship between weight status and food security. A bivariate correlation between BMI and the food insecurity scale was calculated. A multiple linear regression model, controlling for the independent variables (Figure 3), was used to determine the relationship between BMI and food security.

Health Status

It was hypothesized that as household food security decreases, pantry users are more likely to have diabetes mellitus, hypertension or high blood cholesterol. This analysis examined the relationship between food security and the separate health variables of diabetes mellitus, hypertension and high blood cholesterol. Contingency tables were used to assess the bivariate associations between food security status and

each health condition using the χ^2 test. Logistic regression, using independent variables listed (Figure 4), was done to predict the probability of having diabetes. The same process was repeated for both hypertension and high blood cholesterol.

It was hypothesized that as household food security decreases, pantry users are more likely to have multiple health conditions. This analysis explored the relationship between food security and the “all health variable,” which included diabetes mellitus, hypertension, high blood cholesterol and BMI. Contingency tables were used to assess the bivariate associations between food security status and the magnitude of health problems using the χ^2 test. A multiple regression, using independent variables (Figure 4), was conducted.

It was hypothesized that as household food security decreases, pantry users are more likely to use medication to control their disease. This analysis investigated the relationship between food security and the severity of each of the following conditions: diabetes mellitus, hypertension and high blood cholesterol. Contingency tables were used to assess the bivariate associations between food security status and the severity of health problems using the χ^2 test. For each health condition, logistic regression, using independent variables (Figure 4), was done to predict the severity of each condition.

CHAPTER 3: RESULTS

Survey Completion

A total of 1,314 surveys were completed. The overall completion rate was 75.1%. No incentives were used to enhance participation. An additional 2.8% of patrons agreed to be interviewed but had to terminate the interview before completion, often because the participant had to collect their food package. The refusal rate was 22.1%.

Client Profile

Background Characteristics

This research provided valuable descriptive information about the pantry clientele served by the CMFB. Descriptive data pertaining to demographic, socioeconomic status, food assistance, environmental factors and food security characteristics are discussed in this section. Descriptive features for subsistence, food intake, BMI and health will be addressed in their respective sections.

It is noted that this study focused on frequent or regular pantry users rather than occasional or sporadic users. The sample was limited to those responded that they used a pantry once a month or more frequently (Appendix 1). This was done so that pantry use's influence on lifestyle and food acquisition might be captured in the sample. Based upon the needs assessment data compiled from this research, possible interventions with pantry users could be designed. Those interventions should target pantry users and if they were based upon data that relied upon input from individuals who rarely went to a pantry, the interventions may be ineffective or inappropriate. Therefore, the dataset was reduced to 928 surveys of regular users and is reflected in the subsequent results.

Sample characteristics are shown (Table 1, Table 2). The average age of the person picking up food at the pantry was 47 years. Average length of pantry use was 29 months. A typical household spent an average of \$67.13 per week on food eaten at home or in restaurants (Table 1). The per capita food expenditure was \$23.43 (data not shown). A poverty ratio of 2.0551 was a categorical value and implied that, on average, pantry users were between 51-100% of the federal poverty level (Table 1). More than half (52.7%) fell within this poverty level and of the total, 76% were living at or below the federal poverty level (Table 2).

Pantry users were predominately white, either Caucasian or Hispanic, and female (Table 2). Nearly all (95.3%) had less than a college degree (Table 2) and the average educational level was a high school graduate or having obtained a general equivalency degree (GED) (Table 1).

Pantry users received food assistance from various government programs. Although data were collected on use of various food programs, only programs that directly provided food to the participant were included in the analysis. Women, Infants and Children (WIC) was not included because eligibility is restricted to pregnant or breastfeeding mothers and children five years and younger. The frequency for food stamp or commodity usage revealed that participants either rely on the services every month or never (Table 2).

Environmental factors were also examined. Slightly more than one-fourth (26.9%) of participants lived in a rural area (Table 2). The majority of pantry users (57.2%) lived in a one family house, a definition, which for this research, included a duplex or townhouse (Table 2).

Table 1. Mean Values for Sample Characteristics

	n	Mean	Standard Deviation
Demographic			
Age (yrs)	927	47.30	15.401
Race	926	1.39	.998
Gender	928	1.22	.414
Socioeconomic Status			
Education	926	1.99	.888
Income-to-Poverty Ratio	864	2.0845	.83439
Food Expenditures per household (\$)	831	67.13	53.358
Food Assistance			
Pantry Use (mo)	908	29.13	39.869
Food Stamps	926	2.56	1.483
Commodities	925	2.99	1.391
Environmental Factors			
Rural/Micro/Metro	885	1.0407	.75995
Household Structure	928	1.97	1.246

Table 2. Frequency of Sample Characteristics

Characteristic	n	%
Demographics		
Age		
18-39	324	35.0
40-59	392	42.3
60+	211	22.8
Race		
White	763	82.4
Black	85	9.2
American Indian	39	4.2
Other	39	4.2
Gender		
Female	724	78.0
Male	204	22.0
Socioeconomic Status		
Education		
< high school	291	31.4
High school/GED	409	44.2
Some College	182	19.7
College Graduate	28	3.0
Graduate/Prof	16	1.7

Table 2 continued.

Characteristic	n	%
Poverty Ratio		
0-50%	201	23.3
51-100%	455	52.7
101-130%	142	16.4
≥131 %	66	7.6
Food Expenses (\$/wk)		
0-25	196	23.6
26-50	240	28.9
51-75	139	16.7
76-100	136	16.4
101+	120	14.4
Food Programs		
Pantry Use (mo)		
1-11	283	31.4
12-23	220	24.4
24-35	142	15.7
36+	257	28.5
Food Stamp Reliance		
Never	432	46.7
1-2 months	11	1.2
Some months	11	1.2
Every month	472	51.0
Commodity Reliance		
Never	296	32.0
1-2 months	10	1.1
Some months	24	2.6
Every month	595	64.3
Environmental Factors		
Location		
Rural	238	26.9
Micropolitan	373	42.1
Metropolitan	274	31.0
Residence		
House	531	57.2
Mobile in park	88	9.5
Mobile only	121	13.0
Apartment	181	19.5
No regular place	7	0.8

Food Security Characteristics

The results of the six-question food security module are listed in Table 3. Based upon these results, approximately 25.3% of the population was food secure (0-1

affirmatives), 39.2% food insecure without hunger (2-4 affirmatives) and the remaining 35.5% food insecure with hunger (5-6 affirmatives). Nearly three-fourths of the population experienced food insecurity at some level. The mean on the food insecurity scale was 3.2028 (standard deviation 2.03847), indicative of food insecurity without hunger.

Table 3. Frequency of Food Security

Food Security Scale (number of affirmatives)	n	%
0	73	7.9
1	161	17.4
2	205	22.1
3	80	8.6
4	79	8.5
5	132	14.2
6	197	21.3
Total	927	100.0

Contingency tables were created to assess the bivariate associations between food security and various demographic, socioeconomic, food assistance and environmental factors. For this analysis, where necessary, continuous data were collapsed to create categorical variables. The findings are listed in Table 4.

The demographic variables were age, race and gender. Those reporting food security were more likely to be young, as 36.1% of the food secure was age 18-39. The racial composition of the food security groups was similar and the gender for each food security level was similar as well (Table 4).

In terms of socioeconomic status, the educational backgrounds showed similar patterns, regardless of food security level. When looking at the income-to-poverty ratio, of those in the food insecure without hunger category, 21.1% were severely impoverished. However, of those that were food insecure with hunger, 30.7% suffer the

greatest poverty. Over half of the households that were food insecure with hunger spent \$50 or less per week on food consumed both at home and in restaurants (Table 4).

Three forms of food assistance were examined in relationship to food security status in Table 4. The trend for reliance on food stamps was similar for each food security level. Regardless of food security level, households either relied on food stamps every month or never used food stamps. A similar trend was seen for USDA commodities as for food stamps.

Environmental factors, including location and type of residence, are listed in Table 4. The greatest percentage in each of the food security levels lived in micropolitan areas with 41.5, 41.4 and 43.6% being food secure, insecure and insecure with hunger, respectively. Regardless of food security level, the greatest percentage of respondents lived in a single family home, including a duplex or townhouse.

Table 4. Food Security Levels among Pantry User Characteristics (n=928)

	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
Age (years)			
18-39	36.1 (84)	29.9 (109)	39.8 (131)
40-59	33.5 (78)	43.4 (158)	47.4 (156)
≥ 60	30.5 (71)	26.6 (97)	12.8 (42)
Race			
White	81.5 (190)	84.3 (307)	80.9 (266)
Black	11.2 (26)	9.9 (36)	7.0 (23)
Asian	0	0	0
American Indian	3.4 (8)	2.7 (10)	6.4 (21)
Other	3.9 (9)	3.0 (11)	5.5 (19)
Gender			
Female	77.8 (182)	78.3 (285)	77.8 (256)
Male	22.2 (52)	21.7 (79)	22.2 (73)
Education			
< high school	30.6 (71)	32.1 (117)	31.3 (103)
High school/GED	46.6 (108)	43.1 (157)	43.5 (143)
Some College	17.7 (41)	21.2 (77)	19.5 (64)
College Graduate	3.9 (9)	2.2 (8)	3.3 (11)
Graduate/Prof	1.3 (3)	1.4 (5)	2.4 (8)

Table 4 continued.

	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
Income-to-Poverty Ratio			
0-50%	15.6 (32)	21.1 (72)	30.7 (97)
51-100%	55.6 (114)	54.1 (185)	49.1 (155)
101-130%	18.5 (38)	17.8 (61)	13.6 (43)
≥131 %	10.2 (21)	7.0 (24)	6.6 (21)
Food Expenses (\$/wk)			
0-25	22.1 (46)	22.4 (72)	25.6 (77)
26-50	28.8 (60)	29.6 (95)	28.2 (85)
51-75	17.3 (36)	16.2 (52)	16.9 (51)
76-100	22.1 (46)	17.4 (56)	11.3 (34)
101+	9.6 (20)	14.3 (46)	17.9 (54)
Pantry Use (mo)			
1-11	25.8 (58)	32.1 (113)	34.6 (112)
12-23	30.2 (68)	23.0 (81)	21.6 (70)
24-35	17.8 (40)	15.6 (55)	14.5 (47)
36+	26.2 (59)	29.3 (103)	29.3 (95)
Food Stamp Reliance			
Never	53.2 (124)	47.1 (171)	41.6 (137)
1-2 months	0	1.1 (4)	1.8 (6)
Some months	0.9 (2)	1.1 (4)	1.5 (5)
Every month	45.9 (107)	50.7 (184)	55.0 (181)
Commodity Reliance			
Never	28.2 (66)	36.1 (131)	30.0 (98)
1-2 months	0.9 (2)	0.8 (3)	1.5 (5)
Some months	2.1 (5)	2.2 (8)	3.4 (11)
Every month	68.8 (161)	60.9 (221)	65.1 (213)
Location			
Rural	32.8 (75)	29.3 (102)	19.9 (61)
Micropolitan	41.5 (95)	41.4 (144)	43.6 (134)
Metropolitan	25.8 (59)	29.3 (102)	36.5 (112)
Residence			
House	60.3 (141)	56.3 (205)	56.2 (185)
Mobile in park	8.1 (19)	9.3 (34)	10.6 (35)
Mobile only	14.1 (33)	15.4 (56)	9.7 (32)
Apartment	17.5 (41)	18.7 (68)	21.6 (71)
No regular place	0	0.3 (1)	1.8 (6)

Subsistence

Sample Characteristics

This survey queried participants on subsistence methods of acquiring food, including the use of gardening and hunting or fishing. When looking at frequencies, nearly two-thirds of respondents never relied on gardening and hunting or fishing (Table 5). Because of this, a dichotomous variable was created to indicate either using the subsistence method or not using the method.

Table 5. Frequency of Subsistence Methods (n=928)

Method	n	%
Gardening		
Never	567	61.1
1-2 mo	147	15.8
Some mo	169	18.2
Every mo	45	4.8
Hunting/Fishing		
Never	601	64.8
1-2 mo	120	12.9
Some mo	148	15.9
Every mo	59	6.4

Relationship to Food Security

The χ^2 analysis was used to assess bivariate association between frequency of gardening and levels of food security. The model was significant ($p=0.020$). The results are shown in Table 6. In the χ^2 analysis of gardening and the income-to-poverty ratio, there was a statistically significant difference between the groups ($p=.022$) (data not shown).

Table 6. Gardening * Food Security Level

Frequency of Gardening	Food Secure	Food Insecure with Hunger	Food Insecure without Hunger
% (n)			
Never	56.8 (133)	60.7 (221)	64.4 (212)
1-2 months	17.5 (41)	17.6 (64)	12.8 (42)
Some months	17.1 (40)	17.3 (63)	20.1 (66)
Every month	8.5 (20)	4.4 (16)	2.7 (9)
Total	100 (234)	100 (364)	100 (329)

In logistic regression, the food security status was not predictive of whether a pantry user gardened (Table 7). Predictors of gardening that were significant were race, sex, income-to-poverty ratio and rural/urban. Whites are 2.032 times more likely to garden than non-whites. The odds of gardening were 64% higher for females than males. For each categorical increase in the income-to-poverty ratio, there was a 22.0% increase in odds of gardening. For pantry users living in urban areas, the odds of gardening were 33.4% lower.

Table 7. Logistic Regression Predicting Gardening among Pantry Users (n=731)

Variable	Coefficient	OR
Age	.005	1.005
White	.709*	2.032
Female	.497*	1.643
Education	.089	1.094
Income-to-Poverty Ratio	.199*	1.220
Food Expenditures	.002	1.002
Pantry Use	-.002	.998
Food Stamps	-.110	.896
Commodities	.307	1.359
Urban	-.407*	.666
Home	.250	1.284
Food Insecurity	-.027	.973
Constant	-2.291***	.101

p<.05*, p<.01**, p<.001***

$\chi^2=45.524***$, df=12, Nagelkerke $R^2=.082$

Hunting and fishing use among food pantry users was also explored. Using χ^2 to examine the relationship between the frequency of hunting/fishing and food security level, no statistically significant findings were found ($p=0.454$). The results are shown in Table 8. In the χ^2 analysis of the frequency of hunting/fishing and the income-to-poverty ratio, there was no statistically significant difference between the groups ($p=.119$) (data not shown).

Table 8. Hunting/Fishing * Food Security Level

Frequency of Hunting/ Fishing	Food Secure	Food Insecure with Hunger	Food Insecure without Hunger
% (n)			
Never	62.8 (147)	66.2 (241)	64.4 (212)
1-2 months	15.4 (36)	12.1 (44)	12.2 (40)
Some months	13.2 (31)	16.2 (59)	17.6 (58)
Every month	8.5 (20)	5.5 (20)	5.8 (19)
Total	100 (234)	100 (364)	100 (329)

In the logistic regression model, food insecurity was not predictive of who hunts or fishes ($p=.377$) but the income-to-poverty ratio was predictive ($p=.049$). A one-year increase in age reduced the odds of hunting or fishing by 1.3%. For each dollar increase in food expenditure, the odds of hunting or fishing increased only slightly (0.7%). The odds of hunting or fishing were 56.0% lower for pantry users living in urban areas than those living in rural areas (Table 9).

Table 9. Logistic Regression Predicting Hunting/Fishing among Pantry Users (n=731)

Variable	Coefficient	OR
Age	-.013*	.987
White	.251	1.285
Female	-.236	.790
Education	.090	1.094
Income-to-Poverty Ratio	.201*	1.222
Food Expenditures	.006***	1.007
Pantry Use	-.001	.999

Table 9 continued.

Variable	Coefficient	OR
Food Stamps	-.055	.946
Commodities	.323	1.381
Urban	-.820***	.440
Home	.127	1.136
Food Insecurity	-.036	.965
Constant	-.625	.535

p<.05*, p<.01**, p<.001***

$\chi^2=60.418***$, df=12, Nagelkerke $R^2=.109$

Fruit and Vegetable Consumption

Sample Characteristics

Table 10 provides the average weekly consumption of fresh/frozen, canned and all fruits and vegetables. On average, pantry users ate fresh/frozen fruits and vegetables less than four times per week and canned fruits and vegetables less than five times per week. Average frequency of consumption of all fruits and vegetables was eight times per week.

Assuming that each time a fruit or vegetable was consumed, it was a standard serving, comparisons to national recommendations for fruit and vegetable intake could be made. According to the Dietary Guidelines for Americans, five servings of fruits and vegetables per day, with emphasis on whole fruits and vegetables and not juice, is recommended when following a 1,200 calorie diet (29). Based on this minimum recommendation of five fruits and vegetables per day, or 35 servings per week, the CMFB average food pantry user's intake was 23.5% of recommended levels. [(8/(5*7)]. In reality, many adults require more than 1,200 calories per day. The food labels lists 2,000 calories as a typical caloric need for Americans and at this level, the recommended number of fruits and vegetables is nine (29). Based on this typical American calorie

level, total weekly fruit and vegetable intake among the average pantry user was 13.1% of recommended levels [(8/(9*7)).

Table 10. Average Weekly Consumption of Fruits and Vegetables

Variable	n	Mean	Standard Deviation
Fresh/Frozen	912	3.80	4.500
Canned	923	4.34	3.430
All	917	8.1309	6.22296

Relationship to Food Security

The χ^2 analysis was used to test the bivariate relationship between frequency of fresh or frozen fruits and vegetable consumption and food security level. It was significant ($p=.001$). The results are shown in Table 11. Regardless of food security level, consumption was predominantly 1-7 times per week or less.

Table 11. Fresh/Frozen Consumption * Food Security Level

Fresh/Frozen Fruit and Vegetable Consumption	Food Secure	Food Secure without Hunger	Food Secure with Hunger
% (n)			
None	7.3 (17)	15.1 (54)	19.2 (63)
1-7 x/week	82.0 (191)	77.6 (277)	77.4 (254)
8-14 x/week	6.9 (16)	5.6 (20)	2.7 (9)
15-21 x/week	2.6 (6)	1.1 (4)	0.6 (2)
22-70 x/week	1.3 (3)	0.6 (2)	0 (0)
Total	100 (233)	100 (357)	100 (328)

The χ^2 analysis was used to test the bivariate relationship between frequency of canned fruit and vegetable consumption and food security level. It was nearing significance ($p=.063$). The results are shown in Table 12.

Table 12. Canned Consumption * Food Security Level

Canned Fruit and Vegetable Consumption	Food Secure	Food Secure without hunger	Food Secure with Hunger
% (n)			
None	5.6 (13)	6.9 (25)	9.8 (32)
1-7 x/week	89.6 (207)	86.0 (312)	85.1 (279)
8-14 x/week	2.2 (5)	6.3 (23)	4.6 (15)
15-21 x/week	2.2 (5)	0.6 (2)	0.6 (2)
22-28 x/week	0.4 (1)	0.3 (1)	0 (0)
Total	100 (231)	100 (363)	100 (328)

The χ^2 analysis was used to test the bivariate relationship between frequency of all fruit and vegetable consumption and food security level. It was significant ($p=.000$).

The results are shown in Table 13.

Table 13. Fruit and Vegetable Consumption * Food Security Level

All Fruit and Vegetable Consumption	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
None	2.2 (5)	2.5 (9)	3.7 (12)
1-7 x/week	39.4 (91)	50.4 (180)	63.1 (207)
8-14 x/week	48.1 (111)	38.1(136)	28.4 (93)
15-21 x/week	4.8 (11)	5.6 (20)	3.7 (12)
22-70 x/week	5.6 (13)	3.4 (12)	1.2 (4)
Total	100 (231)	100 (357)	100 (328)

A multiple regression analysis was done to predict consumption of fruits and vegetables (Table 14). In model 1, food insecurity was significantly related to intake of fresh or frozen fruits and vegetables. For each point increase in food insecurity, there was a .454 reduction in consumption of fresh or frozen fruits and vegetables. Gardeners had .810 greater consumption of fresh and frozen fruits and vegetables than non-gardeners. For every dollar increase in food expenditures, consumption of fresh and frozen fruits and vegetables increased by .006. Other independent variables of significance in model 1 were race and education. As compared to non-whites, whites

reported significantly less consumption of fresh and frozen fruits and vegetables. An increase in education significantly increased one's consumption of fresh or frozen fruit and vegetables. Overall, model 1 explains 9.1% of the variation in consumption of fresh and frozen fruits and vegetables.

Model 2 was not interpreted as the F-value was not statistically significant. Therefore, this model was not predictive of who consumes canned fruits and vegetables. Model 3 represents all fruit and vegetable intake. Each point increase on the food security scale, and thus moving towards a more insecure state, resulted in a .564 decrease in all fruit and vegetable intake. Those with more education consumed more fruits and vegetables. Those who spent more money on food ate more fruits and vegetables. Race and gardening were no longer predictive of intake. Receiving commodities decreased consumption of fresh fruits and vegetables by .933.

Table 14. Multiple Regression for Weekly Fruit and Vegetable Consumption

Predictor	Model 1	Model 2	Model 3
Constant	3.753***	2.522	6.563***
Age	.003	.008	.009
White	-1.004**	.413	-.609
Female	.025	.414	.415
Education	.766***	.159	.867***
Income-to-Poverty Ratio	.013	.132	.159
Food Expenditures	.006*	.007	.013**
Pantry Use	.001	.003	.003
Food Stamps	.233	.002	.201
Commodities	-.506	-.426	-.933*
Urban	.153	.427	.543
Home	-.106	-.078	-.220
Food Insecurity	-.454***	-.121	-.564***
Gardening	.810**	.001	.761
Adjusted R ²	.091	.012	.061
F-value	6.593***	1.673	4.626***

p<.05*, p<.01**, p<.001***

Model 1: Fresh/Frozen Fruits and Vegetables (n=728)

Model 2: Canned Fruits and Vegetables (n=729)

Model 3: Combined Fresh/Frozen and Canned Fruit and Vegetable Intake (n=727)

Body Mass Index

Sample Characteristics

Of the 860 pantry users who reported height and weight, the mean BMI was 31.1334 (SD 8.61215). Nearly 74% of the pantry population was overweight or obese (Table 15) and of those, almost half were obese. Interestingly, when asked if the participant had ever been told by a doctor or nurse to lose weight for health reasons, nearly 61% answered “no.”

Table 15. Frequency of BMI among Pantry Users (n=860)

BMI Category	n	%
Underweight	19	2.2
Normal Weight	205	23.8
Overweight	230	26.7
Obese	406	47.2

Relationship to Food Security

Using categorical values for BMI and food security, the crosstab analysis was not significant ($p=.359$) (Table 16). The trends of weight distribution were similar, regardless of the food security level.

Table 16. BMI Category * Food Security Level

BMI Category	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
	% (n)		
Underweight	1.9 (4)	2.7 (9)	1.6 (5)
Normal Weight	23.1 (49)	20.8 (70)	27.7 (86)
Overweight	29.7 (63)	25.8 (87)	25.8 (80)
Obese	45.3 (96)	50.7 (171)	44.8 (139)
Total	100 (212)	100 (337)	100 (310)

The results of the multiple regression analysis are provided in Table 17. A total of 5.4% of the variance in BMI can be explained by using race, poverty ratio, pantry use,

smoking and exercise to estimate BMI. There was a 1.854 decrease in BMI for pantry users who exercised as compared to those who did not exercise. As the amount of cigarettes smoked increased, the BMI decreased by 2.085. Compared to non-whites, white pantry users had a 1.704 higher BMI. For each increase in the income-to-poverty ratio, there was a .998 increase in BMI. For each one month increase in pantry use, there was a .017 increase in BMI.

Table 17. Multiple Regression Predicting BMI (n=785)

Variable	Model 1
Constant	32.739***
Age	-.041
White	1.704*
Female	-.095
Education	.262
Income-to-Poverty Ratio	.998**
Pantry Use	.017*
Food Insecurity	.132
Fruits and Vegetables	.047
Cigarettes	-2.085***
Exercises	-1.854**
Adjusted R ²	.054
F-value	5.484***

p<.05*, p<.01**, p<.001***

Presence of Separate Health Conditions

Sample Characteristics

Most of the health questions were framed to elicit “yes/no” responses. Therefore, the means for these questions are not shown. The frequencies for the health variables are provide in Table 18. Data in Table 18 indicate that approximately two-thirds of the population participated in physical activity aside from their job-related activities. Slightly over half of the sample did not smoke cigarettes. Of those that smoked, the

majority smoked less than one pack per day. Over 80% of respondents reported having been to a doctor or nurse in the last year.

Table 18. Frequency of Health Characteristics

Variable	n	%
Exercise in Past Month		
Yes	591	63.7
No	337	36.3
Cigarettes		
No	532	57.5
<1 ppd	223	24.1
1-2 ppd	157	17.0
2+ ppd	13	1.4
Doctor or Nurse Last Year		
Yes	767	82.7
No	161	17.3
Diabetes		
Yes	215	23.2
No	699	75.3
Pre-diabetes/Borderline	14	1.5
Taking Insulin		
Yes	55	26.3
No	154	73.7
Taking Diabetes Pills		
Yes	147	70.0
No	63	30.0
All Diabetes Medication		
Both Insulin and Pills	34	16.7
At least one type of Med	121	59.6
No Medications	48	23.6
High Blood Pressure		
Yes	378	45.1
No	461	54.9
Taking Blood Pressure Medication		
Yes	270	72.2
No	104	27.8
High Blood Cholesterol		
Yes	273	43.1
No	361	56.9
Taking Chol Meds		
Yes	166	60.6
No	108	39.4

ppd=packs per day

Relationship to Food Security

The χ^2 analysis was used to test the relationship between chronic disease and food security level. The model was not significant for diabetes, hypertension or high blood cholesterol (p=.871, .537, .320, respectively). The results are shown in Table 19.

Table 19. Chronic Disease * Food Security Level

Chronic Disease	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
Diabetes			
Yes	23.3 (54)	24.4 (87)	22.8 (74)
No	76.7 (178)	75.6 (269)	77.2 (251)
Total	100 (232)	100 (356)	100 (325)
Hypertension			
Yes	41.9 (93)	45.6 (150)	46.7 (134)
No	58.1 (129)	54.4 (179)	53.3 (153)
Total	100 (222)	100 (329)	100 (287)
High Blood Cholesterol			
Yes	38.9 (65)	42.7 (106)	46.6 (102)
No	61.1 (102)	57.3 (142)	53.4 (117)
Total	100 (167)	100 (248)	100 (219)

Food insecurity was predictive of the prevalence of diabetes among pantry users (Table 20). For every increase in the food insecurity scale, indicating worsening food insecurity, there was a 16% increase in odds of having diabetes. As BMI increased, so did the likelihood of reporting diabetes. For each increase in BMI, there was a 10.5% increased odds of reporting diabetes. Consumption of fruits and vegetables was important in predicting whether one had diabetes. For every additional fruit or vegetable consumed, there was a 5.4% increase in odds of having diabetes. As participants increased in age, so did the odds of developing diabetes. For each year of age, there was a 4.6% increase in odds of having diabetes.

Table 20. Logistic Regression Predicting Diabetes among Pantry Users (n=774)

Variable	Coefficient	OR
Age	.045***	1.046
Female	-.145	.865
White	-.338	.713
Education	-.077	.925
Income-to-Poverty Ratio	-.076	.927
Pantry Use	-.002	.998
Food Insecurity	.148**	1.160
All Fruits and Vegetables	.053**	1.054
BMI	.100***	1.105
Exercises	-.355	.702
Cigarettes	-.079	.924
Constant	-6.511***	.001

p<.05*, p<.01**, p<.001***

$\chi^2=148.041***$, df=11, Nagelkerke $R^2=.262$

The presence or absence of hypertension among pantry users was also examined. Table 21 shows that food insecurity was predictive of hypertension. In this sample, for each increase on the food security scale and thus, worsening security status, there was a 12.2% increase in odds of having hypertension. As one ages, the risk of developing high blood pressure increases. Among pantry users, for each year of increase in age, the odds of having hypertension increased 3.8%. For each increase in BMI, the odds of having hypertension increased by 3.4%.

Table 21. Logistic Regression Predicting Hypertension among Pantry Users (n=715)

Variable	Coefficient	OR
Age	.038***	1.038
Female	-.217	.805
White	-.251	.778
Education	-.092	.912
Income-to-Poverty Ratio	-.007	.993
Pantry Use	-.003	.997
Food Insecurity	.115**	1.122
All Fruits and Vegetables	-.002	.998
BMI	.034***	1.034
Exercises	-.086	.918
Cigarettes	-.185	.831
Constant	-2.481***	.084

p<.05*, p<.01**, p<.001***

$\chi^2=79.268***$, df=11, Nagelkerke $R^2=.141$

Food insecurity was predictive of high blood cholesterol levels, as shown in Table 22. For each increase in the food insecurity scale and thus increasingly worse food security, the odds of having high blood cholesterol increased by 14.9%. For each increase in BMI, the odds of having elevated blood cholesterol increased by 3.2%. Age also was predictive of high blood cholesterol. For each additional year, there was a 3.8% increase in the odds of having high blood cholesterol. Whites were 2.109 times more likely to have high blood cholesterol than non-whites.

Table 22. Logistic Regression Predicting Hypercholesterolemia among Pantry Users (n=538)

Variable	Coefficient	OR
Age	.038***	1.038
Female	-.065	.938
White	.746**	2.109
Education	-.136	.873
Income-to-Poverty Ratio	.064	1.066
Pantry Use	-.003	.997
Food Insecurity	.138**	1.149
All Fruits and Vegetables	.009	1.009
BMI	.032**	1.032
Exercises	.178	1.195
Cigarettes	.119	1.126
Constant	-4.463***	.012

p<.05*, p<.01**, p<.001***

$\chi^2=55.710***$, df=11, Nagelkerke $R^2=.132$

Presence of All Health Conditions

Sample Characteristics

In this pantry sample, 9.5% of respondents were under/normal weight and had no health problems. Overweight/obesity plus the three health problems were prevalent in 12.9% of the participants (Table 23).

Table 23. Frequency of Health Conditions

Number of Health Conditions	n	%
0	53	9.5
1	146	26.2
2	162	29.1
3	124	22.3
4	72	12.9
Total	557	100.0

Relationship to Food Security

The χ^2 analysis was used to assess the bivariate relationship of the number of health conditions and food security level (p=.938). The results are shown in Table 24.

Table 24. Health Conditions * Food Security Level

Number of Health Conditions	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
None	9.5 (14)	8.3 (18)	10.8 (21)
One	25.2 (37)	28.7 (62)	24.2 (47)
Two	31.3 (46)	28.7 (62)	27.8 (54)
Three	22.4 (33)	20.4 (44)	24.2 (47)
Four	11.6 (17)	13.9 (30)	12.9 (25)
Total	100 (147)	100 (216)	100 (194)

As shown in

Table 25. Multiple Regression of All Health Conditions (n=512), the level of food security was predictive of the number of health conditions. For each increase on the food security scale, there was a .066 increase in the number of health conditions. For each year of increase in age, there was a 0.019 increase in the number of health conditions. As smoking increased, the number of health conditions declined by .151. A total of 7.6% of the variance in health conditions among pantry users was accounted for in this model.

Table 25. Multiple Regression of All Health Conditions (n=512)

Variable	Model 1
Age	.019***
Sex	-.066
White	.232
Education	-.073
Income-to-Poverty Ratio	.049
Pantry Use	-.001
Food Insecurity	.066*
All Fruits and Vegetables	.012
Exercises	-.075
Cigarettes	-.151*
Adjusted R ²	.076
F-value	5.202***

p<.05*, p<.01**, p<.001***

Severity of Health Conditions

Sample Characteristics

Severity of health conditions was determined based on the presence or absence of medication to control the condition. Because medication is prescribed when health markers, such as blood glucose, serum cholesterol and high blood pressure are elevated, people taking medication are considered to have more severe health conditions. The severity of diabetes, hypertension and high blood cholesterol was examined. As indicated in Table 26, the majority of respondents took medication to control their condition. A reported 77.5% of diabetics, 72.7% of hypertensives and 61.0% of those with hypercholesterolemia took medication to control their health problems.

Table 26. Frequencies for Severity of Health Conditions

Health Condition	n	%
Diabetes		
No medication	45	22.5
Medication	155	77.5
Hypertension		
No medication	101	27.3
Medication	269	72.7
Blood Cholesterol		
No medication	106	39.0
Medication	166	61.0

Using the χ^2 analysis, the relationship between severity of health conditions and food security level was assessed. The model was not significant for diabetes, hypertension or elevated blood cholesterol ($p=.532, .902, .195$, respectively). The results are shown in Table 27. Regardless of food security level, medication was used to control the disease of interest.

Table 27. Severity of Disease * Food Security Level Crosstabulation

Medication Use in Chronic Disease	Food Secure	Food Insecure without Hunger	Food Insecure with Hunger
% (n)			
Diabetes Medication	75.5 (37)	81.5 (66)	74.3 (52)
No Medication	24.5 (12)	18.5 (15)	25.7 (18)
Total	100 (49)	100 (81)	100 (70)
Hypertension Medication	72.8 (67)	71.4 (105)	73.8 (96)
No Medication	27.2 (25)	28.6 (42)	26.2 (34)
Total	100 (92)	100 (147)	100 (130)
High Blood Cholesterol Medication	51.6 (33)	65.1 (69)	62.7 (64)
No Medication	48.4 (31)	34.9 (37)	37.3 (38)
Total	100 (64)	100 (106)	100 (102)

In the logistic regression for diabetes (Table 28), food insecurity was not predictive of the severity of diabetes. As age increased, the odds of taking either insulin or diabetes pills to control the disease increased 6.2%. As BMI increased, the odds of taking medication increased 5.4%.

Table 28. Logistic Regression Predicting Diabetes Severity among Pantry Users (n=169)

Variable	Coefficient	OR
Age	.060**	1.062
Female	-.314	.730
White	.080	1.083
Education	-.206	.814
Income-to-Poverty Ratio	-.054	.948
Pantry Use	.002	1.002
Food Insecurity	.039	1.040
All Fruits and Vegetables	.039	1.039
BMI	.053*	1.054
Exercises	-.225	.798
Cigarettes	.089	1.093
Constant	-3.591	.028

p<.05*, p<.01**, p<.001***

$\chi^2=23.858^*$, df=11, Nagelkerke $R^2=.199$

Food security increased the likelihood of having to take medication to control high blood pressure (Table 29). For each increase in food insecurity, there was a 21.3% increase in the odds of needing medication to control hypertension. Each year of age increased the odds of having to take blood pressure medication by 7.1%. For each increase in BMI, there was a 5.3% increase in the odds of needing medication. The odds of needing medication were 58.7% lower for those that engaged in some physical activity over the month as compared to those who did not.

Table 29. Logistic Regression Predicting Hypertension Severity among Pantry Users (n=308)

Variable	Coefficient	OR
Age	.069***	1.071
Female	.239	1.270
White	-.772	.462
Education	-.145	.865
Income-to-Poverty Ratio	.082	1.086
Pantry Use	.007	1.007
Food Insecurity	.193*	1.213
All Fruits and Vegetables	-.001	.999
BMI	.052**	1.053
Exercises	-.885**	.413
Cigarettes	.000	1.000
Constant	-3.783**	.023

p<.05*, p<.01**, p<.001***
 $\chi^2=65.615***$, df=11, Nagelkerke $R^2=.279$

Food security was not predictive of the severity of high blood cholesterol (Table 30). For each year of increase in age, the odds of needing cholesterol medication increased 6.9%. As compared to non-whites, the odds for whites with high blood cholesterol needing medication were 70.4% lower. For each increase in BMI, the odds of needing medication to control elevated blood cholesterol levels increased 5.1%.

Table 30. Logistic Regression Predicting Hypercholesterolemia Severity among Pantry Users (n=231)

Variable	Coefficient	OR
Age	.067***	1.069
Female	-.429	.651
White	-1.218*	.296
Education	-.159	.853
Income-to-Poverty Ratio	-.184	.832
Pantry Use	-.003	.997
Food Insecurity	.103	1.109
All Fruits and Vegetables	-.016	.985
BMI	.050*	1.051
Exercises	-.395	.674
Cigarettes	.217	1.242
Constant	-2.797	.061

p<.05*, p<.01**, p<.001***

$\chi^2=41.201***$, df=11, Nagelkerke $R^2=.223$

CHAPTER 4: DISCUSSION

Key Points

With the rising prevalence of chronic diseases in the United States, efforts have been made to identify at-risk populations. However, in large food pantry studies, little attention has been devoted to the health of pantry users (4, 9). The pantry population is a subgroup of concern, as they have limited resources to purchase food. In turn, they rely on the availability and quality of donated food. Many have little choice for self-selection of food at the pantries. It is assumed that acquiring food is only one of many daily challenges faced by this population. Unlike studies which only use poverty as a predictor of health, this research focused on food insecurity as a more comprehensive measure to capture these daily struggles. This study showed that food insecurity is a risk factor for poorer health in the pantry population.

Role of Food Security

Subsistence

The hypothesis that food secure pantry users were more likely to use subsistence methods of acquiring food was not supported. Regardless of food security level, the frequency of gardening, hunting or fishing was low. For each category of food security, over half of the respondents never used these activities as a means for acquiring food.

Several reasons may explain the limited reliance on subsistence methods. It is suspected that the cost of these activities prohibits more frequent use. For example, when hunting or fishing one must buy licenses as well as equipment. Depending upon the location of these activities, travel expenses are also incurred. Secondly, food insecure

households use food assistance programs (4). These households may already be receiving adequate food, including fruits, vegetables and protein and therefore do not see the value of gardening, hunting or fishing for food. With respect to gardening, the availability of community gardens may play a role in the limited number of gardeners. While this study did not examine the availability of gardens in each community, it was shown that living in an urban area decreased gardening among pantry users. In a survey of program coordinators, 60% reported that the reason people used the urban gardens was to provide a food source for low income households (85). If participants had access to produce through farmers' markets, they might not rely on gardening. Because pantry users who gardened were more likely to consume fresh/frozen fruits and vegetables, perhaps the pantries could promote community gardens and farmers' markets to their clientele, especially to those who do not garden or have access to a garden.

Fruit and Vegetable Intake

Fruit and vegetable intake among pantry users followed a trend of inadequacy. The rate of Missourians consuming fruits and vegetables five or more times per day is 22.6% (31). The BRFSS includes juice as a fruit. It is noted that the BRFSS questions did not specify 100% juice (31) so that fruit intake may be overestimated. In the food pantry study, less than 1% of respondents had a fruit and vegetable intake of five or more servings per day.

Of the types of fruits and vegetables examined, the average pantry user consumed more canned than fresh/frozen fruits and vegetables. This can be explained, in part, by the USDA commodities offered by the pantry. Many of the commodities are either canned fruits or vegetables (7) and therefore pantry users have access to these types of

fruits and vegetables. Secondly, canned produce tends to be cheaper than fresh or frozen. When looking at vegetables, it was found that for most of the kinds of vegetables examined, those in the fresh form had the highest price per pound (35). In order to better understand the nutrient adequacy of pantry users' fruit and vegetable intake, questions pertaining to specific categories of fruits and vegetables, such as citrus fruits or dark green vegetables, should be probed.

Food insecurity was predictive of fresh/frozen fruit and vegetable consumption. As food insecurity increased, intake decreased. Lack of access to fresh/frozen fruits and vegetables at the pantries likely contributes to this finding. There are several reasons for this limited availability. First, the pantries rely on donations from individuals and corporations. Therefore, there is little control over what type of food comes to the pantry. Secondly, if a pantry does have fresh fruits and vegetables available, these are the seconds from grocery stores and have a blemished appearance. Thirdly, many pantries lack storage space for fresh or frozen fruits and vegetables. The shortened hours of operation (i.e. 3 hours/month) do not warrant storage of fresh produce. Lastly, as previously described, most pantries in this study were full-serve, meaning that the patron had little to no choice about what groceries they received from the pantry.

As food insecurity increased, total consumption of all fruits and vegetables decreased, thus supporting the hypothesis. The effect of combined fruit and vegetable intake on food insecurity is likely due to the consumption of fresh/frozen, as canned fruits and vegetables alone were not predictive of food insecurity.

One subset of the study population that appears to be consuming fruits and vegetables is diabetics. Those with higher fruit and vegetable consumption for all forms

of fruits and vegetables were more likely to have diabetes. While it is not possible to determine from this study that fruit and vegetable consumption contributes to the development of diabetes, it is an interesting phenomenon. Because it has been established that the majority of diabetic pantry users are type II diabetics and that excess weight is a contributing factor to type II, it is suspected that these pantry users are consuming excess calories, possibly including those from fruits and vegetables. Secondly, they might be relying on canned fruits in heavy syrup. Furthermore, it is possible that diabetics are making a conscious effort to consume more fruits and vegetables. Fruits and vegetables offer a source of increased fiber and decreased refined sugars, important for weight loss and glucose control.

Body Mass Index

The pantry population was overwhelmingly overweight or obese. Because the large national food pantry surveys do not assess height and weight, the best comparison measure is the BRFSS. The latest prevalence data for the BRFSS, 2005, indicate that 37% and 26.9% of Missourians are overweight and obese, respectively (31). The percentage of obese pantry users is approximately 20 percentage points higher than the general Missouri population. As a result of the large number of overweight and obese pantry users, the hypothesis that food insecurity predicts weight of pantry users was not supported. Regardless of food security state, the population was exceedingly overweight or obese. This likely contributed to the lack of association between food security level and BMI in our sample. Furthermore, it is suspected that occurrence of overweight and obesity is actually higher than what is reported by pantry users. This research utilized self-reported height and weight to calculate BMI. When self-reporting,

it is typical that individuals underestimate weight and overestimate height. Researchers found that, compared to NHANES, the BRFSS underestimated overall prevalence of obesity and overweight by 9.5% and 5.7%, respectively (86).

Chronic Diseases

This study presented insight into the scope of chronic diseases among users of the CMFB pantries. The diabetes prevalence rate of 23.5% was nearly three times higher than for general population of Missourians (8.3%) (31). Caution needs to be taken, however, when comparing pantry rates for diabetes to those of the general Missouri population. The pantry research failed to specify if diabetes was *only* related to pregnancy. An affirmative response to the pantry question, “was this related to pregnancy,” could mean that diabetes occurred preconception or postpartum. However, after pregnancy 5% to 10% of women with gestational diabetes are found to have type II diabetes. Over the next 5-10 years, 20% to 50% of women previously diagnosed with gestational diabetes will develop diabetes (87). Therefore, in the pantry research, it is acceptable to include potential gestational diabetics in our overall diabetes measure.

The majority of diabetic pantry users were type II. Diabetes pills (70%) were the primary medication used to control glucose levels. Among these type II diabetics, some (16.7%) were using both diabetes pills and insulin. Given the large number of type II diabetics, the ability of BMI to predict the presence of the disease is likely because BMI is a risk factor for type II diabetes (63).

High blood pressure was the most prolific of the chronic conditions. Among pantry users who had had their blood pressure checked, 45.1% were told it was high, as

compared to 27.3% for the Missouri population (31). Hypertensive pantry users overwhelmingly (72.2%) relied on medication to control blood pressure.

Unlike diabetes and hypertension, the prevalence of high blood cholesterol among pantry users (43.1%) was similar to the state trend (38.7%) (31). Pantry goers with high cholesterol were taking cholesterol lowering medication (60.6%).

Regardless of the health condition, medication was widely used. Given this financially-constrained population, the amount of money spent to pay for these medications, and whether the pantry user substituted food money for medication money, should be considered. This survey attempted to explore the trade-off and found that nearly half of pantry households reported having to choose between food or paying for medicine or medical care. However, medicine and medical care were categorized into one group so results are not indicative of only the substitution between food and medicine.

Food insecurity was associated with health, thus supporting the hypothesis. As food insecurity worsened, the chances of having a single health problem increased. Food insecurity also increased the likelihood of having multiple health problems, including being overweight and obese.

A plausible explanation lies in the frequency of food insecurity within a household. National data suggest that the majority of food insecure households experience the situation as occasional or recurrent rather than chronic (11). It is likely that individuals within these households are unable to develop a routine in response to ever changing circumstances. Under such an environment, healthful eating and regular exercise become less of a priority, thus contributing to poor health.

It is suspected that food insecurity acts as a stressor in a pantry user's life. The HHFSM measures food availability based on affordability (14). Lack of money to buy food creates stress. Stress has been associated with numerous health conditions, such as hypertension (88).

In this pantry population, food insecurity was predictive of health but the poverty ratio was not significant. This finding is important because some federal food programs, such as WIC, strive to improve the health of their clientele (89). These programs use the federal poverty level to determine eligibility. Therefore, basing program eligibility on the poverty level may not capture those in need of improving health outcomes.

Limitations

Clearly, the lack of comprehensive food intake data is a limitation. At a minimum, intake of all the food groups should be assessed so inferences regarding the whole diet can be made. Furthermore, a more in-depth analysis of types of food and frequency of consumption should be done. This would best be achieved by using a food frequency questionnaire. Using a food frequency questionnaire would provide data on both frequency (times) and amounts (servings) consumed. This would help achieve a better understanding of food and nutrient intakes of the food pantry clientele.

This study relied on self-reported weight and health data. Ideally, conducting research that included measured height, weight and biochemical markers would offer a more objective picture of the health status of the population. As previously noted, the height and weight, as measured in this study, may underestimate the prevalence of overweight and obesity.

The HHFSM reflects household food security status and not individual food security status. Only the individual within that household who was picking up food at the pantry was interviewed. As with much of the research on food insecurity, it is assumed that the food security status of the individual interviewed is the same as that for the entire household. It is possible that, on occasion, an individual's food security status was not reflective of household food security status.

The findings of this study are specific to pantry clients of northeastern and central Missouri. Because the CMFB is the only private food banks in the state, the methods for acquiring and distributing food may vary and this may impact what food is available at the pantries. Therefore, the findings from this population may not be generalized to other pantry populations.

Future Studies

Because extensive dietary data were excluded from this study, nutritional assessment cannot be determined. In order to assess the nutritional status of the CMFB pantry population, a comprehensive examination of the nutrition and health status should be explored. This includes measured heights, weights and biochemical markers. A complete blood lipid profile would be better to characterize the nutritional status of the population because, in addition to total cholesterol, it would provide LDL-cholesterol, HDL-cholesterol and triglyceride levels. Blood pressure could also be measured. Dietary information could be gathered using a food frequency questionnaire. This data collection method would provide the necessary nutritional assessment needed before intervention studies could be conducted. Interventions must be tailored to the needs of the population and doing a nutritional assessment of this population would provide that information. As a

secondary result, comparisons could be made between self-reported data, compiled in the current study, and measured heights, weights, biochemical markers and blood pressure.

Subsequent interventions to improve the health of pantry users should be considered. These intervention studies can include either education, provision of healthful foods or both. Education strategies include individual and/or group counseling, cooking demonstrations with recipe samplings and written education materials such as newsletters. Future studies might examine whether greater availability of fresh produce at pantries results in increased consumption by pantry goers. Outcomes would measure the effectiveness of the intervention on improving health or increasing intake of fruits and vegetables.

Aside from the CMFB, there are five other food banks in Missouri, which distribute food to pantries throughout the state. A similar study as the current survey could be done in these pantry populations. Unlike the pantries served by the CMFB, these pantries have to pay for the food received. Therefore, comparisons could be made on food availability at these pantries and the health status of these populations as compared to those served by the CMFB. It could be determined if there are differences in the health status of pantry participants in different parts of the state and served by different food banks. Another approach would be to compare, using similar methodology such as face-to-face interviews, the pantry population to a general Missouri population.

Implications

This research provided preliminary findings about the health and nutrition of food pantry users served by the CMFB. Aside from guiding researchers toward future studies, this study will provide useful data to the CMFB, as representatives from the food bank

attempt to put a face on their pantry clientele. The CMFB can use the information to encourage donation of more healthful foods such as low sodium products or fresh or frozen produce. In addition, the CMFB can use the data to apply for additional grants which focus on improving health of food insecure populations such as the pantry population.

CHAPTER 5: DRAFT PAPER: FOOD SECURITY AND HEALTH OF FOOD PANTRY PARTICIPANTS

Abstract

Objectives To determine the prevalence of obesity, diabetes, hypertension and high blood cholesterol in a food pantry population and to examine the relationship between food security and these health issues.

Design In this cross-sectional study, food security and self-reported health information were collected in face-to-face interviews with 1,314 food pantry participants at 58 different pantry locations, served by the Central Missouri Food Bank (CMFB). In order to include only frequent pantry users, a subset (n=928) was used in this research.

Setting Thirty-one counties in Central and Northeast Missouri.

Subjects Nine hundred twenty-eight food pantry patrons, aged 18 years and older.

Statistical Analysis Multiple and logistic regression.

Results Compared to the general population, the rate of diabetes was three times higher in food pantry users. The prevalence of hypertension and hypercholesterolemia was also greater in the pantry population. As food insecurity increased, the odds of having diabetes, hypertension and elevated blood cholesterol increased 16%, 12.2% and 14.9%, respectively. For each increase on the food security scale, which indicates worsening food security status, there was a .066 increase in the number of health conditions.

Conclusions Food pantry users had higher rates of obesity and chronic disease than the general population. When determining risk factors for chronic disease among pantry users, food security should be considered. The food security scale was predictive of the

presence of diabetes, hypertension and high blood cholesterol. Given the prevalence of these diseases, food pantries offer a unique setting in which food and nutrition professionals can become involved in improving the health of a vulnerable, and often overlooked, population.

Introduction

Concern about the prevalence of chronic diseases, such as diabetes, hypertension and hypercholesterolemia, in Americans has been well documented (29) and the rise of overweight and obesity is the focus of much attention (31). Low-income individuals are considered a population at high risk for chronic diseases (90). While federal food programs focused on improving the health of clients often use the poverty level to determine eligibility (89), income or poverty level does not capture individual perceptions of need and the resultant eating behaviors when food is unaffordable or unavailable. Measuring household food security, however, addresses issues of anxiety related to an insufficient food budget to meet basic needs, food shortages because of lack of money and subsequent behaviors, such as skipping meals (11, 19, 91).

Food insecurity refers to limited or uncertain availability and access to nutritionally adequate and safe foods (11) and has been described as a *preventable* threat to the health of the U.S. population (17). Food insecurity has notable health consequences. Physical impairments, such as illness and fatigue, are related to insufficient food (55). Food insecurity was associated with health-related quality of life deficits (92). Adults in food insecure households were more likely to rate their health as poor/fair (57).

Food insecurity is associated with excess weight and chronic diseases. Food insecure individuals are likely to be overweight or obese (66,67,68). Women from food insecure households are particularly at risk for overweight and obesity (67). Causes for the relationship between overweight and obesity and food insecurity have been suggested. Both the quality and quantity of diets of food insecure individuals should be considered. Low-income families consume lower cost, higher calorie foods (19). Chronic highs and lows in food availability can cause people to overindulge when food is available (72), creating a binge-like eating pattern that results in weight gain (68).

The relationship between food insecurity and chronic diseases, such as diabetes, hypertension and hypercholesterolemia, is less well documented. Individuals in food insufficient households were more likely to report conditions of heart disease, diabetes and high blood pressure (57). Six percent of diabetic adults, participating in NHANES III, reported food insufficiency (74). In a cohort of emergency room patients and their parents, chronic illnesses including diabetes, hypertension and heart problems, were predictive of hunger (75). Among households in rural Appalachian Ohio counties, food insecure participants had higher self-reported rates of diabetes than food secure participants (12).

Food pantries provide a unique setting in which to investigate the health of a population vulnerable to food insecurity and to determine their health status. Use of emergency feeding sites, such as food pantries, has been identified as a coping strategy for food insecurity (16). Among pantry client households, 70.2% were food insecure (4). When adult food pantry participants were asked to describe their health, the greatest percentage (31%) reported fair health status (4). It was not defined as to what constitutes

fair health. Furthermore, in large national surveys of food pantry users, information regarding specific health conditions has not been reported (4,9).

This study examined the association between food insecurity and health among food pantry users. The objectives of this study were to determine the prevalence of chronic diseases among pantry users and to examine the relationship between food security and overweight and obesity, diabetes mellitus, hypertension and elevated blood cholesterol. It is hypothesized that household food insecurity increases the likelihood of having one or more of these conditions.

Methods

Sample

This research utilized food pantries served by the Central Missouri Food Bank (CMFB), which provides food to hunger-relief sites in 33, primarily rural, counties in central and northeast Missouri. The data presented were gathered from 47 different pantry locations and 11 mobile pantry stops. Unlike most food banks in the country, the CMFB is unique in that it provides food free to the pantries (2).

To determine the number of surveys to complete from each pantry, the following formula was used: monthly number of individuals served by a particular pantry/monthly total individuals served by all pantries. These were compiled from self-reported pantry numbers of clients served. A list that averaged each pantry's percentage of the total served by all pantries from the months of May-August was used. This ensured a sample that was proportional to the number of individuals served by each pantry and was based on the same months this study was conducted. If a pantry served less than 0.5% of total

pantry users, it was removed from the sample because the site would have generated too few surveys to justify time to schedule interviews and travel costs. In this process, 20 pantries, serving less than 7% of the total pantry population, were eliminated from the perspective study sample. During the research, four pantries were removed because they no longer existed or their volume of patronage was too low. Allotted surveys were then shifted to nearby pantries.

Study Design and Data Collection

A research study, entitled “Pantry Use as a Coping Strategy for Food Insecurity,” was approved by the Institutional Review Board at the University of Missouri-Columbia. This was a cross-sectional study, in which surveys were administered face-to-face at each pantry or at a mobile pantry stop. A total of 10 interviewers, who were upperclassman, faculty and University of Missouri Extension-Nutritional Sciences program paraprofessionals, surveyed pantry users. An interviewer-training workshop was conducted by researchers prior to the start of the project to ensure consistency in survey administration. Patrons were not aware in advance that they were to be interviewed. To minimize sampling bias, interviewers approached every 3rd participant at the pantry. If the person refused, the interviewer contacted the next person until someone agreed to be interviewed. No incentive was provided for pantry user participation.

Variables

The dependent variables in this study were body mass index (BMI), diabetes, hypertension and high blood cholesterol. Questions related to these conditions were the same as used for the Behavioral Risk Factor Surveillance System (BRFSS) (31). Self-

reported height and weight were used to calculate BMI according to Centers for Disease Control and Prevention (CDC) equations (83). For the health conditions of diabetes, hypertension and hypercholesterolemia, participants were asked whether they had been told by a doctor or nurse that they had the condition of interest. A dichotomous variable was created for the presence or absence of diabetes. Borderline or pre diabetics were excluded because we wanted the presence of diabetes to reflect only those that had a definitive diagnosis. For each, hypertension and elevated blood cholesterol, a dichotomous variable was created to indicate the presence or absence of the condition.

The number of health problems per participant was also determined. Using CDC criteria (83), each participant was categorized as either having a BMI that was underweight/normal or overweight/obese. The number of health conditions plus weight status were then summed to create a scale, with the lowest value representing under/normal weight and no health problems and the highest value representing over/obese weight and all three health issues (diabetes, hypertension, high blood cholesterol).

The independent variables were demographic (age, sex, race), socioeconomic status (education, income to poverty ratio,) food assistance (length of pantry use), food security, fruit and vegetable consumption (excluding juice) and health (BMI, exercise, cigarette smoking). Researchers chose to control for these variables because of their potential contributions to health.

Food security was measured using the six-question Household Food Security Module (HHFSM) (14) to accommodate a speedier administration of the entire survey. This standard short form has been shown to have reasonably high specificity and

sensitivity and minimal bias with respect to the 18-measure questionnaire (18). Because researchers in this study interviewed only adults aged 18 years and older, the six-item scale was appropriate.

Analytical Methods

Descriptive statistics, χ^2 analysis, multiple linear regression and logistic regression were calculated using SPSS (version 14, 2006, SPSS Inc., Chicago, IL). For all statistical tests, the minimum significance was set at $p < .05$.

Results

A total of 1,314 surveys were completed. The overall completion rate was 75.1%. An additional 2.8% of patrons agreed to be interviewed but had to terminate the interview before completion, often because the participant had to collect their food package. The refusal rate was 22.1%. Because this research focused on frequent or regular pantry users, the dataset was reduced to 928 useable surveys.

Pantry users were predominantly white, either Caucasian or Hispanic, and female (Table 31). The average age was 47 years. Nearly all (95.3%) had less than a college degree and 76% were living at or below the federal poverty level (Table 31). The average duration of the pantry use was 29 months.

Health issues were examined. Nearly all (92.1%) report eating fruits and vegetables, excluding juice, two or less times per week (Table 31). Overweight or obesity is prevalent (73.9%) (Table 31). The monthly rate of participation in physical activity was 63.7% and 42.5% of the sample smoked cigarettes (Table 31). Of those that smoked, the majority smoked less than one pack per day. The prevalence of diabetes

mellitus, hypertension and elevated blood cholesterol was 23.5%, 45.1% and 43.1%, respectively (Table 31). Nearly all (90.5%) reported having at least one health problem (Table 31).

Table 31. Characteristics of Pantry Users

Characteristic	n	%
<i>Demographics</i>		
Age (yrs)		
18-39	324	35.0
40-59	392	42.3
60+	211	22.8
Race		
White	763	82.4
Black	85	9.2
American Indian	39	4.2
Other	39	4.2
Gender		
Female	724	78.0
Male	204	22.0
<i>Socioeconomic Status</i>		
Education		
< high school	291	31.4
High school/GED	409	44.2
Some College	182	19.7
College Graduate	28	3.0
Graduate/Prof	16	1.7
Income-to-Poverty Ratio		
0-50%	201	23.3
51-100%	455	52.7
101-130%	142	16.4
≥131 %	66	7.6
Food Expenses (\$/wk)		
0-25	196	23.6
26-50	240	28.9
51-75	139	16.7
76-100	136	16.4
101+	120	14.4
<i>Food Programs</i>		
Pantry Use (mo)		
1-11	283	31.4
12-23	220	24.4
24-35	142	15.7
36+	257	28.5

Table 23 continued.

Characteristic	n	%
Food Security Level		
Food Secure	234	25.2
Food Insecure without Hunger	364	39.3
Food Insecure with Hunger	329	35.5
Weekly Fruit and Vegetable Intake		
None	26	2.8
1-7	479	52.2
8-14	340	37.1
15-21	43	4.7
22+	29	3.2
BMI (kg/m²)		
<18.5	19	2.2
18.5-24.9	205	23.8
25.0-29.9	230	26.7
≥ 30	406	47.2
Exercise		
Presence	591	63.7
Absence	337	36.3
Cigarettes		
No	532	57.5
<1ppd*	223	24.1
1-2 ppd	157	17.0
2+ ppd	13	1.4
Diabetes		
Presence	215	23.5
Absence	699	76.5
Hypertension		
Presence	378	45.1
Absence	461	54.9
Hypercholesterolemia		
Presence	43.1	43.1
Absence	56.9	56.9
Multiple Health Conditions		
None		
One	53	9.5
Two	146	26.2
Three	162	29.1
Four	124	22.3
	72	12.9

*ppd=packs per day

The food security status of a population is referred to as food secure, food insecure without hunger and food insecure with hunger (14). In order to characterize our pantry population using that terminology, the categorical variable was used in the analysis shown (Table 32). However, to better capture the variance in the population, a continuous food security status variable was used in the subsequent regression analyses. Among pantry users, 74.8% of households were food insecure and of those, 35.5% were food insecure with hunger (Table 31). The trends of excess weight and diabetes were similar, regardless of food security status (Table 32).

Table 32. Distribution of Health Problems by Food Security Level

Food Security Level	Overweight/Obese	Diabetes	Hypertension	Elevated Blood Cholesterol
Food Secure	75% (159)	23.3%(54)	41.9% (93)	38.9% (65)
Food Insecure without Hunger	76.6% (258)	24.4% (87)	45.6% (150)	42.7% (106)
Food Insecure with Hunger	70.6% (219)	22.8% (74)	46.7% (134)	46.6% (102)

Food insecurity increased the likelihood of having chronic diseases ($p < .01$). In this population, for each increase on the food security scale, which indicated becoming more insecure, there was a 16%, 12.2% and 14.9% increase in odds of having diabetes, hypertension and elevated blood cholesterol, respectively (Table 33). Increasing BMI and getting older also raised the chances of having health problems (Table 33).

Table 33. Logistic Regression Predicting Health Problems

Variable	Diabetes (n=774)		Hypertension (n=715)		Elevated Blood Cholesterol (n=538)	
	Coefficient	OR	Coefficient	OR	Coefficient	OR
Age	.045***	1.046	.038***	1.038	.038***	1.038
Female	-.145	.865	-.217	.805	-.065	.938
White	-.338	.713	-.251	.778	.746**	2.109
Education	-.077	.925	-.092	.912	-.136	.873
Income-to-Poverty Ratio	-.076	.927	-.007	.993	.064	1.066
Pantry Use	-.002	.998	-.003	.997	-.003	.997
Food Security	.148**	1.160	.115**	1.122	.138**	1.149
Fruit and Vegetable Intake	.053**	1.054	-.002	.998	.009	1.009
BMI	.100***	1.105	.034**	1.034	.032**	1.032
Exercises	-.355	.702	-.086	.918	.178	1.195
Cigarettes	-.079	.924	-.185	.831	.119	1.126
Constant	-6.511***	.001	-2.481***	.084	-4.463***	.012

p<.05*, p<.01**, p<.001***

Diabetes: $\chi^2=148.041$ ***, df=11, Nagelkerke $R^2=.262$

Hypertension: $\chi^2=79.268$ ***, df=11, Nagelkerke $R^2=.141$

Cholesterol: $\chi^2=55.710$ ***, df=11, Nagelkerke $R^2=.132$

As food insecurity increased, so did the chance of having multiple health problems. For each increase on the food security scale, which indicated worsening food security status, there was a .066 increase in the number of health conditions (Table 34). A total of 7.6% of the variance in health conditions among pantry users was accounted for in this model.

Table 34. Multiple Regression of All Health Conditions (n=512)

Variable	Model 1
Age	.982***
Female	-.066
White	.232
Education	-.073
Income-to-Poverty Ratio	.049
Pantry Use	-.001
Food Insecurity	.066*
All Fruits and Vegetables	.012
Exercises	-.075
Cigarettes	-.151*
Adjusted R ²	.076
F-value	5.202***

p<.05*, p<.01**, p<.001***

^aThis model was also run excluding BMI from the dependent variable. Food security was predictive of health (p=.000).

Discussion

With the rising prevalence of chronic diseases in the United States, efforts have been made to identify at-risk populations. Food pantry users represent one potential at-risk population. However, in large food pantry studies, little attention has been devoted to the health of pantry users. The pantry population is a subgroup of concern, as they have limited resources to purchase food. In turn, they rely on the availability and quality of donated food. Many have little choice for self-selection of food at the pantries. It is assumed that acquiring food is only one of many daily challenges faced by this population.

The pantry population was overwhelmingly overweight or obese. In order to put the findings in context to that of the general population, the BRFSS prevalence rates were used as comparison. The percentage of obese pantry users was approximately 20 percentage points higher than the general Missouri population (31). The prevalence of excess weight, regardless of food security status, likely contributed to the lack of

association between food security level and BMI in our sample (data not shown).

Furthermore, it is suspected that the prevalence of overweight and obesity is actually higher than what is reported by pantry users. This research utilized self-reported height and weight to calculate BMI. When self-reporting, it is typical that individuals underestimate weight and overestimate height. Researchers found that the BRFSS underestimated overall prevalence of obesity and overweight by 9.5% and 5.7%, respectively (86).

This study provided insight into the prevalence of chronic health conditions among users of the CMFB pantries. The diabetes prevalence rate was nearly three times higher for pantry users than for either the general state or national population (31). Rates for hypertension and elevated blood cholesterol also exceeded state and national rates (31).

Unlike studies which only use poverty as a predictor of health, this research focused on food insecurity as a more comprehensive measure to capture daily struggles related to food affordability and availability. This study showed that food insecurity was a risk factor for chronic disease in the pantry population. Food insecurity increased the chances of having single and multiple health problems. A plausible explanation lies in the frequency of food insecurity within a household. National data suggest that the majority of food insecure households experience the situation as occasional or recurrent rather than chronic (11). It is possible that in such a chaotic environment, healthful eating and regular exercise become less of a priority. Aside from impacting food choices and consumption, food security might be affecting health through stress, which was not measured in our study.

The use of pantries themselves can challenge health because of the foods available and the limited option to self-select foods. Furthermore, the inherent nature of pantries, with minimal storage facilities, including refrigerators and freezers, and hours of operation (i.e. 3 hours/month), can limit healthful food options. While this research does not attempt to identify causality between foods available at pantries and health, it is an important factor to consider when determining strategies to improve the health of pantry users. Researchers have shown that pantry users desire more fresh dairy products, meats and fresh and seasonal fruits and vegetables (5).

This study has limitations. It relies on self-reported information. Secondly, it is assumed that the individual's food security level is the same as that of the household, which is measured in the HHFSM. While this is a widely accepted method and used in many studies (56,68,93), it is possible that, on occasion, an individual's food security status might not be reflective of that within a household. Thirdly, because of the interdisciplinary nature of the entire survey and time constraints in administering a verbal survey, a food frequency or 24-hour recall was not feasible. With the exception of fruits and vegetables, this study did not examine the role of food consumption in food insecurity and health.

Conclusions

This research highlights the vulnerability of health among pantry users, as shown by the prevalence of chronic conditions. Food security has been shown to be predictive of single health conditions of diabetes, hypertension and high blood cholesterol, as well as multiple health issues. Food and nutrition professionals can utilize this information to target intervention strategies aimed at improving the well-being of pantry users.

APPENDIX 1

Missouri Food Pantry Survey



Date: _____

Interviewer: _____

Food Pantry Name: _____

Food Pantry ID#: _____

Survey ID#: _____

Notes:

INTERVIEWERS: CODE ANSWERS IN BLANKS AT RIGHT, UNLESS ANSWER AREA AT RIGHT IS SHADED

Style Code:

WORDS IN CAPS ARE DIRECTIONS FOR THE INTERVIEWER AND DO NOT NEED TO BE READ DURING THE INTERVIEW

WORDS IN BOLD ARE DIRECTIONS AND QUESTIONS THAT YOU WILL READ OUT LOUD DURING THE INTERVIEW

Words in regular type are usually possible answers to your questions.

Oral Consent: READ OR TELL TO POTENTIAL PARTICIPANTS

Before we begin, I want to tell you what we are doing. My name is _____, and I'm really glad you are willing to visit with me. The Central Missouri Food Bank, which provides some of the food distributed by _____ (local pantry name), wants to improve its program. By knowing more about the folks who use food pantries, the Food Bank and other groups can provide better services and food to meet your needs.

It will take us about 15 minutes to do this survey. Your participation is totally voluntary and I assure you I will not be asking or writing your name or your street address.

Also, your opinions and your answers will have absolutely no impact at all on your ability to use this pantry or any other program. If there is any question you do not wish to answer, just tell me and we'll move on to the next one.

I am going to leave you with this page (DISTRIBUTE PROJECT HANDOUT) that describes our project and gives the names and numbers of people to call if you have any questions.

Do you have any questions for me? IF "NO", GO TO NEXT QUESTION.
IF "YES," TRY TO ANSWER ALL QUESTIONS, AND WHEN SUBJECT HAS NO MORE QUESTIONS, GO ON TO NEXT QUESTION

Do you agree to participate in this survey? IF "YES," GO TO NEXT QUESTION
IF "NO," TERMINATE SURVEY.

ASK ONLY IF QUESTIONABLE OK, I just need to ask if you are 18 years of age or older?

IF "YES," BEGIN SURVEY

IF "NO," TERMINATE SURVEY

<p><u>Food Pantry Use</u></p> <p>To begin, I'd like to talk for a minute about your use of food pantries.</p> <p>1. How many miles is this pantry from where you live?</p> <p>2. Can you tell me how you found out about this pantry, like where it is and when it is open? OPEN-ENDED; PROMPT IF NECESSARY (Was it from)</p> <p>1. Family member/relatives 2. Friends, Coworkers, Neighbors 3. Pastor/Religious Leaders 995. Don't know/Remember 4. Healthcare providers 996. Refused 5. Public agencies 6. Media (radio, tv, newspapers) 7. Others (write-in): _____</p> <p>3. How often do you visit a food pantry—this one and any others. Would you say it is</p> <p>1. Once a month or more frequently → GO TO 3A 2. Once every few months → GO TO Q4 INTRO 3. Hardly ever → GO TO Q4 INTRO</p> <p>3A. As best as you can remember, for how many months or years have you been a fairly regular visitor to a food pantry? RECORD RESPONSE AS TOTAL # OF MONTHS</p> <p>Great, this is really helpful. Okay, some of the next questions ask about your household. By household I mean the people who have regularly lived with you over the last 12 months in your house or apartment or mobile home or wherever you live. This can include family members and unrelated people. A person living alone, or a group of unrelated people sharing a place, such as partners, is also a household.</p> <p>First, I would like you to tell me more about your household.</p> <p>4. Including yourself, how many adults 18 years of age or older live in your household?</p> <p>5. Now, how many children, 17 years of age or younger, live in your household? IF ANY → That's great, can you tell me their ages?</p>	<p>MILES _____</p> <p>PANINF _____</p> <p>PUSEFRE _____</p> <p>PUTIME _____</p> <p>HLDAD _____</p> <p>HLDCH _____</p> <p>CH1AGE _____</p> <p>CH2AGE _____</p> <p>CH3AGE _____</p>
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<p><i>Food Security</i></p> <p>These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year, and whether you were able to afford the food you need.</p> <p>IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHESES; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD;" IF UNKNOWN OR AMBIGUOUS, USE PLURALS.</p> <p>First, I'm going to read you two statements that people have made about their food situation. Please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months.</p> <p>6. The first statement is “The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.” Was that often true [1], sometimes true [2], or never true [3] for (you/your household) in the last 12 months? Don’t Know = 995; Refused = 996</p> <p>IF RESPONSE TO Q6 is 1 OR 2, ASK Q6A IF RESPONSE TO Q6 is 3, 4, or 5, GO TO Q7</p> <p>6A. As best as you can estimate, for how many total months or years have you worried whether your food would run out before you could buy more? RECORD RESPONSE AS TOTAL # OF MONTHS</p> <p>7. The second statement is this: “(I/we) couldn’t afford to eat balanced meals.” Was that often true, sometimes true, or never true for (you/anyone in your household) in the last 12 months? Often true = 1; Sometimes true = 2; Never true = 3 Don’t Know = 995; Refused = 996</p> <p>8. In the last 12 months, since last (name of current month), did (you/ anyone in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?</p> <p>1. Yes → GO TO Q8A 2. No → GO TO Q9 995. DK or 996. Refused → GO TO Q9</p>	<p>CH4AGE _____ CH5AGE _____ CH6AGE _____</p> <p>FSQU1 _____</p> <p>FSQ1F _____</p> <p>FSQU2 _____</p> <p>FSQU3 _____</p> <p>FSQ3F _____</p>
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<p>8A. How often did this happen---almost every month [1], some months but not every month [2], or in only 1 or 2 months [3]?</p>	<p>FSQU4 _____</p>
<p>9. In the last 12 months, did (you/anyone in your household) ever eat less than (you/they) felt (you/they) should because there wasn't enough money to buy food? Yes=1 No=2 Don't Know=995 Refused=996</p>	<p>FSQU5 _____</p>
<p>10. In the last 12 months, were you (anyone in your household) ever hungry but didn't eat because you couldn't afford enough food?</p> <p>1. Yes → GO TO Q10A 2. No → GO TO Q11 995. DK or 996. Refused → GO TO Q11</p>	<p>FSQ5F _____</p>
<p>10A. How often did this happen---almost every month [1], some months but not every month [2], or in only 1 or 2 months [3]?</p>	<p>COMP1 _____ COMP2 _____</p>
<p>11. In the past 12 months, have you or anyone in your household ever had to choose between . . . REPEAT FORMAT (yes=1; no=2; dk=995; ref=996)</p>	<p>COMP3 _____ COMP4 _____</p>
<p>Buying the food you need and paying for medicine or medical care Buying the food you need and paying for utilities Buying the food you need and paying for rent or mortgage Buying the food you need and paying for gas</p>	<p>WKFD _____</p>
<p><u>Food Sources</u>: Okay, now I'd like to talk about getting food for your household.</p>	
<p>12. First, can you tell me around how much money your household spends in an average week on food, and include both food you buy to use at home and food you buy at any kind of restaurants.</p>	
<p>13. People use different sources of money to buy food. I'm going to read through a list of these. For each, I'd like you to think about the last year or so, and tell me if you used these sources never at all [1], only one or two months [2], some months but not all [3], or every month [4]. You can use this card [CARD#1] Don't Know = 995 Refused = 996</p>	<p>FDSRC1 _____ FDSRC2 _____ FDSRC3 _____ FDSRC4 _____ FDSRC5 _____ FDSRC6 _____</p>
<p>1. Wages and salaries 2. Odd Jobs 3. General Assistance</p>	

<ul style="list-style-type: none"> 4. TANF (Temporary Assistance to Needy Families) 5. Social Security Payments 6. Disability Payments 	FDSRC7 _____ FDSRC8 _____ FDSRC9 _____
<p>14. Some people get food through various programs, like food stamps. Using the same card, can you tell me how often you use</p>	
<ul style="list-style-type: none"> 1. Food Stamps 2. Commodity Programs (USDA) 3. WIC Programs (Women, Infant and Children) 	FDSRC10 _____ FDSRC11 _____ FDSRC12 _____ FDSRC13 _____ FDSRC14 _____
<p>15. Finally, some people get food, or get money to buy food, in other ways, like from churches or by gardening. Still thinking about the last 12 months and using the same card, please tell me how often you</p>	
<ul style="list-style-type: none"> 1. Get food from churches or religious groups (NOT pantries) 2. Gardens 3. Hunting/Fishing 4. Trade food with other people 5. Pawn items to get money to buy food 	FDSRC11 _____ FDSRC12 _____ FDSRC13 _____ FDSRC14 _____ _____
<p>16. Besides buying food, people may rely on friends and family and other folks in their communities to get food. So, I am going to read a short list of people from who you may have obtained food from over the last 12 months. Again, I'd like you tell me if you obtained food from them never at all [1], only one or two months [2], some months but not all [3], or every month [4] [STILL USING CARD#1]</p>	FDPEOP1 _____ FDPEOP2 _____ FDPEOP3 _____ FDPEOP4 _____ _____
<ul style="list-style-type: none"> 1. Relatives 2. Friends 3. Coworkers 4. Neighbors 	_____
<p><u>Nutrition and Health</u></p>	
<p>You're being so helpful. Now, I'll change topics. Food pantries want to provide foods that fit your health and nutritional needs, so the next group of questions asks about the foods <u>you</u> eat and any special health requirements <u>you</u> may have.</p>	FVEGNO _____
<p>17. First, in a typical week, how many times do you normally eat fresh or frozen fruits and vegetables, not counting juice?</p>	_____

<p>18. And in a typical week, how many times do you consume <u>canned</u> fruits or vegetables, again not counting juice?</p>	<p>CVEGNO _____</p>
<p>19. Again, in a normal week, how many times do you consume chips or cookies or pies or cake or candy or chocolate?</p>	<p>SWTNO _____</p>
<p>20. And in a typical week, how many times do you consume whole grains? Here I have in mind things like whole wheat, oats/oatmeal, popcorn and whole-grain corn, brown rice and wild rice, whole rye and barley, and buckwheat. (GIVE CARD #2 IF APPROPRIATE)</p>	<p>GRNO _____</p>
<p>21. Finally, thinking about a typical day, I'd like to know how many ounces of <u>regular, non-diet soda</u> you drink? (ONE CAN=12 OUNCES; ONE 2-LITER BOTTLE=68 OUNCES)</p>	<p>SODA _____</p>
<p>22. During the past month, other than as part of a job, did you participate in any physical activities or exercises such as running, gardening, playing sports, or walking for exercise?</p> <p>1. Yes → 22A. Roughly how many hours per week do you do these activities?</p> <p>2. No 995. Don't know/Not sure 996. Refused</p>	<p>EXCER _____</p> <p>HREX _____</p>
<p>23. If you smoke, about how many cigarettes do you smoke per day?</p> <p>1. Do not smoke</p> <p>2. Less than one pack (20) or less per day</p> <p>3. One to two packs per day (20-39)</p> <p>4. Two or more packs per day (40+)</p> <p>995. Don't Know</p> <p>996. Refused</p>	<p>CIG _____</p> <p>HLVIS _____</p>
<p>24. Have you been to see a doctor or nurse for your own health in the last year? 1=Yes 2=No 995=Don't Know 996=Refused</p>	<p>DAB _____</p>
<p>25. Have you ever been told by a doctor that you have diabetes?</p> <p>1. Yes → IF FEMALE, DO QUESTIONS 25A, 25B, and 25C IF MALE, DO QUESTIONS 25B and 25C</p> <p>2. No → GO TO QUESTION 26</p> <p>3. Pre-diabetes or borderline diabetes [VOLUNTEERED] → GO TO 26</p> <p>995. Don't know/Not sure → GO TO 26</p> <p>996. Refused → GO TO 26</p>	<p>GDIAB _____</p>

<p>25A. Was this related to a pregnancy? (gestational d.) → GO TO 25B 1=YES 2=NO</p>	<p>INSUL _____</p>
<p>25B. Are you now taking insulin? 1=YES 2=NO 995=DK 996=Ref</p>	<p>DPILL _____ CKHBP _____</p>
<p>25C. Are you now taking diabetes pills? 1=YES 2=NO</p>	<p>HBP _____</p>
<p>26. Have you ever had your blood pressure checked by a doctor, nurse or other health worker?</p>	
<p>1. Yes → 26A. Were you told that you have high blood pressure?</p>	
<p>1. Yes → IF FEMALE, DO QUESTIONS 26B and 26C</p>	
<p>1. Yes → IF MALE, GO TO QUESTION 26C</p>	
<p>2. No → GO TO Q27</p>	<p>PRHBP _____</p>
<p>2. No → GO TO Q27</p>	<p>MEDHBP _____</p>
<p>995. Don't know/Not sure → GO TO Q27</p>	<p>_____</p>
<p>996. Refused → GO TO Q27</p>	
<p>26B. Was this only when you were pregnant? → GO TO 26C</p>	<p>WGHT _____</p>
<p>26C. Are you currently taking a prescribed medicine for high blood pressure? 1=YES 2=NO 995=DK 996=Ref</p>	
<p>27. Now, can you please tell me how much you weigh without shoes? (ANSWER SHOULD BE IN POUNDS; ROUND FRACTIONS TO NEAREST NUMBER) 995 Don't know/Not sure 996 Refused</p>	<p>WGT1YR _____</p>
<p>28. How much did you weigh a year ago (without shoes)? (FOR FEMALES IF APPROPRIATE, If you were pregnant a year ago, how much did you weigh before your pregnancy?) IF NO CHANGE, → Q30</p>	<p>WGCH _____</p>
<p>29. Was the change between your current weight and weight a year ago intentional? 1=Yes 2=No 3=No change</p>	<p>HGTFT _____</p>
<p>30. And about how tall are you without shoes? ANSWER SHOULD BE IN FEET AND INCHES ROUND UP FRACTIONS 995 Don't know/Not sure 996 Refused</p>	<p>HGTIN _____</p>
<p>30. And about how tall are you without shoes? ANSWER SHOULD BE IN FEET AND INCHES ROUND UP FRACTIONS 995 Don't know/Not sure 996 Refused</p>	<p>LSWGT _____</p>
<p>31. Have you ever been told by a doctor, nurse, or other health professional that you need to lose weight for health reasons? 1=YES 2=NO 995=DK 996=REFUSED</p>	<p>CKCOL _____</p>

<p>32. And last for this part, have you ever had your blood cholesterol checked by a doctor, nurse or other health worker?</p> <p>1. Yes → 32A. Were you told that you have high cholesterol? Yes → GO TO QUESTION 32B No → GO TO Q33</p> <p>2. No → GO TO Q33</p> <p>995. Don't know/Not sure → GO TO Q33</p> <p>996. Refused → GO TO Q33</p> <p>32B. Are you currently taking a prescribed medicine for high cholesterol? 1=YES 2=NO 995=DK 996=REFUSED</p> <p><i>Demographic Questions</i></p> <p>Okay, we are now in the last section of the survey, and this is where I want to know about more about you (IF MORE THAN 1 PERSON HOUSEHOLD) and the people in your household.</p> <p>33. First, can you tell me your age? 996=REFUSED</p> <p>34. Second, how many paying jobs, if any, are you working right now? IF ANY JOBS → 34A. How many total hours a week do you work?</p> <p>35. ASK ONLY IF NECESSARY! [Sex: Female (1) Male (2)]</p> <p>36. Next, what is the highest level of education you completed? Is it 1. Less than high school 4. Undergraduate college degree 2. High school graduate or GED 5. Graduate or professional degree 3. Some college, but not graduated (incl. 2-yr. degree)</p> <p>37. Are you currently married, living with a partner, widowed, divorced, separated, or never been married? 1. Married 4. Divorced 2. Living w/partner 5. Separated 3. Widowed 6. Never been married</p> <p>38. What county do you live in?</p> <p>39. Do you live inside a city or town's limits?</p>	<p>HGCHL _____</p> <p>MEDCHL _____</p> <p>AGE _____</p> <p>RESJOBS _____</p> <p>RESHRS _____</p> <p>SEX _____</p> <p>EDUC _____</p> <p>MARST _____</p> <p>COUNTY _____</p> <p>LIMITS _____</p> <p>MIOUT _____</p> <p>ZIP _____</p>
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<p>1. YES → GO TO QUESTION 40 2. NO → 39A. How many miles from the nearest city/town do you live?</p>	RESTYPE ____
<p>40. Please tell me your zip code? I do not need your address, only zip.</p>	
<p>41. Which of these best describes your current place? Is your place a</p> <ol style="list-style-type: none"> 1. 1-Family house (including duplex, townhouse) 2. Mobile home in a mobile home park 3. Mobile home by itself (not in park) 4. Apartment building (including condos) 5. No regular place (e.g., homeless, living in vehicle) → GO TO Q44 	RESPAY ____
<p>42. Where you live, does your household currently (1) pay rent, (2) own it/pay mortgage, or (3) have some other arrangement OR FOR MOBILE HOME ONLY: (4) pay rent-to-own or contract for deed</p>	HSCST _____ UTCST _____
<p>IF 1 or 2 (or 4) → GO TO 42A; IF no pay, → GO TO 43</p>	RESLEN ____
<p>42A. How much does your household pay now for housing costs, including rent and lot rent or mortgage, but not including utilities?</p>	
<p>42B. And how much does your household usually pay for utilities (electricity, gas, water)?</p>	MOVE# ____
<p>43. How many months or years have you lived in your current place? Convert Response To Months IF LESS THAN 24 MONTHS → GO TO QUESTION 43A IF 24 MONTHS OR MORE → GO TO QUESTION 44</p>	OLDZIP ____
<p>43A. How many times have you moved in the last 2 years?</p>	MORAT ____
<p>44. What was the zipcode of your previous residence? DK=995 REF=996</p>	RACE ____
<p>45. Why did you move out of your previous residence? Summarize answer:</p>	HISID ____
<p>_____</p> <p>_____</p>	AD1AGE _____ AD1JOBS

<p>46. Would you describe yourself as:</p> <p>1. White 4. American Indian 996. Refused 2. Black 5. Other 3. Asian 995. Don't Know</p>	<p>AD1HRS _____</p> <p>AD2AGE _____</p>
<p>47. Are you of Hispanic or Latino descent or ethnicity?</p> <p>1. Yes 995. Don't Know 2. No 996. Refused</p>	<p>AD2JOBS _____</p> <p>AD2HRS _____</p>
<p>IF HOUSEHOLD INCLUDES OTHER ADULTS, GO TO Q48 IF NO OTHER ADULTS, GO TO INTRO OF Q49</p>	<p>AD3AGE _____</p>
<p>48. You mentioned that there are (X) adults over the age of 18 living in your household, other than yourself.</p>	<p>AD3JOBS _____</p> <p>AD3HRS _____</p>
<p>Starting with the oldest, I would appreciate it if you could tell me their ages and how many paying jobs, if any, they are working right now?</p>	<p>AD4AGE _____</p> <p>AD4JOBS _____</p>
<p>NOTE: FOR ANY WORKING ADULT, FOLLOW-UP WITH “How many total hours a week does this person work?”</p>	<p>AD4HRS _____</p>
<p>#1 adult: Age _____ #2 adult: Age _____ #3 adult: Age _____ #4 adult: Age _____</p>	<p>WSINC _____</p>
<p>Finally, I have just three questions about your household income. (I want to remind you that your answers are completely anonymous.)</p>	<p>DISINC _____</p>
<p>49. First, can you tell me your household's present monthly income from all <u>salaries and wages</u>? (PRETAX OR GROSS)</p>	<p>TOTINC _____</p>
<p>50. Next, what is your household's current monthly income from all <u>disability payments</u>? (PRETAX OR GROSS)</p>	<p>_____</p>
<p>51. And last, and as best as you can estimate, what is your household's current total monthly income from <u>ALL sources</u>. (PRETAX OR GROSS) Please include all types of income received by your household, including earnings, pensions, child support, TANF, Social Security and disability. Do not include the value of things like food stamps or WIC.</p>	<p>_____</p>
<p>Great, that's the end of the survey. I really appreciate your help!!!!</p>	<p>_____</p>

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