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The Nutrient Intake of Homeless Women of Grand Rapids, Michigan

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The Nutrient Intake of Homeless Women of Grand Rapids, Michigan

Emily D. Popma-Metsaars

A Thesis Submitted to the Graduate Faculty of

GRAND VALLEY STATE UNIVERSITY

In

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For the Degree of

Master of Health Science in Biomedical Sciences

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Abstract

Background Homeless individuals comprise about 1% of the American population with 1/3 of this particular population being women¹. And despite the potential for hunger, the homeless population has a similar prevalence of overweight/obese as other Americans.² The Heartside neighborhood of Grand Rapids is a very low-income area of the city, inhabited by the poor and homeless. The Food Access in Michigan Project is studying the relationship between food insecurity and food environments in Michigan.

Objectives The purpose of this study was to determine the characteristics of the diet of homeless women in Heartside. This study examined the level of food insecurity, anthropometrics, and energy, macronutrient and sodium intake of homeless women utilizing soup kitchens and other emergency food shelters in Grand Rapids, Michigan.

Subjects: Women utilizing the overnight facilities of Degage Ministries' *Open Door Program* were recruited to participate.

Methods Participants' three 24-hour diet histories were collected in person using the Nutrition Data System for Research (NDSR).

Participants' demographic characteristics and food security status were collected through a questionnaire. BMI (kg/m^2) was calculated from measured heights and weights.

Analysis: Medians \pm interquartile ranges were used to describe energy intake, macronutrient intake and sodium intake. Means \pm standard deviations were used to describe continuous characteristics and frequencies were used to describe discrete characteristics in this sample.

Results: The majority of the women at the shelter were 50-59 years old (31.3%) and predominantly African American/Black (43.8%). Most of the women had an annual income of less than \$10,000 (87.5%) and 62% of the population had low or very low food security. The median (IQR) daily fruit, vegetable, sodium, and calorie intakes for the participants were 0.83 (1.1), 3.1 (1.2), 3,594.1mg (1,094.4) and 2,218.9kcal (1,283.6), respectively. The median portion of calories from carbohydrates was 49.4%, 12.5% from protein, 12.2% from saturated fatty acids, and 38.9% from fat. Over 30% of this population was identified as overweight by their BMI, and another 37% were class III obese.

Conclusion: Homeless women in Grand Rapids, Michigan exhibit low levels of food security and many were overweight or obese. Their diet contained an overabundance of fat, carbohydrates, sodium, and saturated fatty acids and lacked adequate daily fruit and vegetable intake due their probable low access to healthy foods.

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Abbreviations

Abbreviation	Meaning
BMI	Body mass index
NDSR	Nutrition Data System for Research
SNAP	Supplemental Nutrition Assistance Program
SPSS	Statistical Package for Social Science
USDA	United States Department of Agriculture
WIC	Supplemental Nutrition Program for Women, Infants, and Children

Introduction

The homeless population of the United States is estimated at 2.3 – 3.5 million people.² While roughly 25% of this homeless population reports that they sometimes or often do not get enough to eat, a recent study found that the highest prevalence of obesity is in low-income groups.^{2,3} This food insecure population tends to consume a diet of inexpensive, low nutrient dense foods that are high in fat and added sugars.⁴ These diets also tend to be low in vegetables and fruits, possibly resulting in overweight status and obesity.⁴ Along with obesity, chronic diseases are also more prevalent among the U.S. homeless population than the general population.⁴ When faced with choices about food, hungry homeless people may postpone or forego needed medical care until later stages of disease, choose to buy food over medication, or have difficulty managing health conditions and adhering to treatment plans.³

A common assumption is that homeless adults who lack stable and secure residences and can not afford regular, healthy meals result in an underweight status.⁵ However, multiple studies have found an obesity trend among the homeless, possibly as prevalent as in the general population.^{2,5} The diets of homeless individuals tend to have a high prevalence of inadequate or imbalanced nutrient, vitamin, and mineral intake.⁶ Because of the lack of essential nutrients to promote health, but enough or excess of calories, malnutrition may also exist leading to overweight, obesity, and chronic illness.⁴

An inverse relationship has been found between socio-economic status and obesity of homeless women.² In one study of low-income individuals, obese participants were significantly more likely to be female and more likely to have spent time in a hotel or boarding home than normal weight individuals.⁵ Within the general population, 64% of women are overweight or obese, whereas 74% of homeless women are either overweight or obese.⁵

One likely contributing factor to obesity among homeless adults is that their primary food source is from soup kitchens and shelters.⁵ Only 17% of soup kitchens, food pantries, and shelters surveyed worked with a nutritionist or dietitian.⁵ In a survey of soup kitchens in Grand Rapids, MI, it was found that all kitchens surveyed served food low in magnesium and calcium.⁴ This nutritional absence could potentially increase the risk for hypertension and cardiovascular disease.⁴

The overall objective of this study was to examine the nutrient intake of homeless women in Grand Rapids, MI. This is a unique study as homeless individuals are usually excluded from health and nutritional surveys because they are either inaccessible or ineligible by conventional sampling that defines a household as a sample unit.² This study went beyond what previous research has done by using a more advanced and accurate recall method and by administering the diet recalls in person to develop rapport with the participants.^{3,4,7} Previous research found that low-income adults had a median fruit consumption between 0.3 and 0.6 servings a day and vegetable consumption between 0.7 to 1.0 servings a day⁸. I hypothesized that the homeless women would consume a lower

number of servings of fruits and vegetables than other low-income individuals due to their limited access to healthy foods.

Literature Review

It is well known that proper nutrition is the keystone to one's health. Yet, in urban areas in the United States, the poor continue to be unhealthy and many homeless individuals do not consume enough healthful foods to meet their dietary needs.^{9,10} Every year there are an estimated 2.3 to 3.5 million homeless individuals in the United States.² The US Department of Agriculture's report on household food security for 2013 estimated that 14.3% of American households were food insecure at least sometime during the year.¹¹ The common assumption is that because homeless adults lack stable and secure residences and cannot afford regular, healthy means that they would tend to be underweight, yet many researchers have seen an increased trend in the number of individuals who are overweight or obese among the homeless.^{2,3,5,7,12}

Food security is a multi-tiered issue.¹⁰ It involves qualitative and quantitative issues such as the quantity, quality and diversity of available food. It also involves the psychological aspects of anxiety, restriction of choice, and conflicts in the social construct of food-based interactions with others.¹⁰ On top of health issues, low food security is associated with significantly higher rates of hospitalization for a variety of reasons.³ One study found that 35% of homeless adults reported being hospitalized in the past year and food insufficient respondents had higher rates than food sufficient respondents.³ When faced with choices about food, hungry homeless people may postpone or forego needed medical care until later stages of disease or choose to buy food over medication. They may also experience difficulty in managing health conditions or adhering to treatment plans.³ The diets of homeless individuals have a high prevalence of inadequate or

imbalanced nutrient, vitamin, and mineral content, which can contribute to their poor health.²

Complexity of Homeless Nutrition

When one is both food and shelter insecure the struggle to maintain a healthy diet increases even more. One study of homeless subjects found that users of emergency food shelters tended to consume only 1.9 meals a day⁷. Of those meals, most were eaten at an emergency food shelter⁷. When emergency shelters and soup kitchens become the primary source of nutrition for the homeless, it becomes increasingly important that what food that they do consume be nutritious. Further compounding the issue of poor nutrition of the homeless is the low nutritional literacy among the homeless; in a survey of 75 homeless people, only 16 individuals had heard of the Food Pyramid, a common nutritional tool⁷. Many of these individuals also suffer from addictions, mental illness, and poor dental health, all of which makes their consumption of healthful food that much more difficult¹⁰. While non-profits help alleviate some of this burden, research on the level of impact that these charities have is rare^{10,13}. Of the studies that are performed, there is a conflict between the reports of the nutrition of the food that is served and the actual food consumed by the homeless^{7,13}. It has been shown that nutritional intervention at homeless shelters is rare; in one study of emergency food shelters, only 17% of soup kitchens, food pantries and shelters surveyed worked with a nutritionist or dietitian⁵.

Hunger/Obesity Paradox

While stereotypes and the media often portray homeless individuals as starving and underweight, a study by Koh *et al.* found that obesity among the homeless is just as prevalent as in the general population. Strengthening this finding is a study published in the American Journal of Clinical Nutrition which found that the highest prevalence of obesity is observed in low income populations². These findings confirm a phenomenon known as the hunger-obesity paradox. The hunger-obesity paradox has been observed in developing countries when under-nutrition is complicated by obesity². The paradox exists when individuals consume enough calories to meet or exceed their energy requirements but the calories consumed lack the dietary quality to promote optimal health and prevent chronic disease¹². One likely contributing factor to obesity among the chronically homeless adult population is that their primary food source is from soup kitchens and shelters⁵. Many of these soup kitchens and shelters serve foods that are high in fat and energy dense⁵.

While the conditions that promote the hunger-obesity paradox are understood, there is uncertainty as to the mechanisms through which the paradox occurs². It could be that having fewer economic resources encourages the purchasing of cheap and energy dense but low-nutrient foods. A study by Sisson and Lown measuring the quality of meals served at three Grand Rapids soup kitchens found that all soup kitchens served food low in magnesium and calcium, potentially increasing the risk for hypertension and cardiovascular disease. This type of diet combined with a sedentary lifestyle, sleep debt, and stress would also contribute to obesity². It is also proposed that obesity may be an

adaptive response to inconsistent levels of food availability or that with an inconsistent diet, physiological change may occur to conserve energy².

Nutrient intake in the homeless

Due to the difficulty in tracking the homeless, most research on urban food insecurity tends to focus on low income households¹⁰. The homeless population is usually excluded from health and nutritional surveys because of inaccessibility or ineligibility by conventional sampling². Many times, surveys will define a sample unit as a household, a measurement that is not inclusive of a transient population². When homeless, it is significantly more difficult to prepare food on ones' own⁷. Finding a place to purchase, store, cook, and consume food safely is a challenge faced by many homeless individuals. As a result, many turn to soup kitchens as their primary source of food⁷. These soup kitchens are typically underfunded and staffed primarily by volunteers and others giving back to their community¹³.

In the general population, roughly 64% of women and 72% of men are overweight or obese⁵. Yet, within the homeless community, the numbers change to 74% of women and 52% of men being overweight or obese. In a study of over 400 homeless individuals across 11 cities, obese participants were significantly more likely to be female and Hispanic. They were also more likely to have spent more days in a hotel or boarding home than normal or underweight participants⁵.

Previous research has shown that a likely daily combination of soup kitchen meals provides an excess amount of calories, sodium, and saturated fat⁴. Sisson and Lown examined soup kitchen servings by measuring the food that was served to the soup kitchen recipients at mealtime⁴. A major limitation to this previous work is that it only observed the food that was served and did not consider potential differences due to an individual's actual consumption. Because of the lack of knowledge of the actual nutrient intake of homeless individuals, there is a great need to study the actual nutrient intake of a homeless population using a 24-hour recall method. A recall method would allow for the reporting of actual nutrient intake and would capture this data three times to allow for daily variances. As mentioned earlier, there is a significant discrepancy in the rate of overweight and obesity found in homeless women as compared to housing secure women, yet there is a void in information based solely upon women. This study is unique in that it uses a highly accurate 24-hour diet recall method on an all-female population.

Summary

Previous research shows a trend in increasing obesity within the homeless population. Homeless women seem to be especially prone to this trend, with 74% of homeless women being either overweight or obese as compared to 64% of women in the general population.⁵ Reasons for this increase in obesity may be due to decisions that homeless individuals face in regards to their limited finances. Studies on this population have been limited due to difficulties found in sampling, follow-up, and participation. Previous work by Sisson and Lown examined the food that was served by soup kitchens, but research is lacking in regards to the actual nutrients that were consumed by homeless individuals.

Materials and Methods

Design

This observational study was cross-sectional in nature.

Subject Selection

Convenience sampling was used to select individuals from whom nutrient intake, food security status, anthropometric, and demographic characteristics were collected.

Participants were selected from the residents of Dégagé Ministries' Open Door program and data collected was a subset of the Food Access in Michigan study funded by the U.S. Department of Agriculture. Participants were selected by the following criteria: They must be female, at least 18 years old and had access to Dégagé Ministries for the collection of three 24-hour recalls. Exclusion criteria included: self-identified pregnancy, nursing, serious complications or illnesses, taking weight-loss or appetite-stimulating drugs, reported intentional weight loss or gain. Participants were compensated for their time with \$11 RAPID bus passes or \$10 phone cards at completion of three 24-hour diet recalls.

Sample Size: Statistical Considerations

Dégagé Ministries' Open Door program is limited to 40 individuals per night. Individuals are allowed 3 nights stay before having to create a goal plan, after which they are allowed an extended stay. Due to the size limitations of the facility and the number of semi-permanent residents, the sample size of this study was 21 participants. Participants were given the option to "opt-out" of the survey portion. Due to this, of the 21 participants,

only 16 individuals completed both the diet recall portion and the survey portion of the study and were used in analyses.

Study Procedures

Demographic Characteristics and Food Security

Gender, marital status, age, education, and income information was collect via survey (Appendix B). Food security status was determined using a modified version of the Adult Food Security Survey Module created by the USDA and these questions were included in the previous mentioned survey (Appendix B).¹⁴ Food security status was defined, as typical, by number of affirmative answers and security status was defined as follows:¹⁴

- Raw score zero—High food security among adults
- Raw score 1-2—Marginal food security among adults
- Raw score 3-5—Low food security among adults
- Raw score 6-10—Very low food security among adults

This portion of the interview was administered by paper survey and then entered into Qualtrics.

Body weight, height and waist circumference

Height was measured using a Seca 214 portable stadiometer (Seca, Hanover, MD). Weight was measured using a Tanita BWB-800 digital scale (Tanita Corporation of America, Inc., Arlington Heights, IL). The average of two height and weight measurements was used. Height was measured to the nearest 0.1 inch. Weight was measured to the nearest 0.1 pound. Body mass index was calculated as weight (lbs)/height (inch²) x 703. A Gulick 150 centimeter anthropometric tape was used to measure waist circumference. The waist circumference was measured at the level of the

superior anterior iliac spine of the pelvis. The measurement was made at the normal expiration and measured to the nearest 0.10 inch.

Energy Intake

The researcher was trained to take a five-step multiple pass 24-hour recall following the USDA protocol <http://www.csrees.usda.gov/nea/food/efnep/ers/documentation/24hour-recall.pdf>. The 24-hour recalls were obtained in person at Dégagé Ministries to maximize participation. Subjects were given a chart with 2-dimensional portion sizes and instructed on how to use them during the intake interview. Subjects were shown the two-dimensional portion sizes and then shown a model of a commonly eaten food and asked to choose the closest image size. Food models and household serving utensils were also available to assist in estimating quantities consumed. Training was complete when the subject correctly estimates the size of the models for various common food portions for which size is known. This approach improves portion size estimation, as portion size inaccuracies are a major contributor to underreporting¹⁵. Subjects were interviewed by the researcher to conduct the five-step multiple pass 24-hour recalls on two weekdays and one weekend day. No recalls were made two days before or two days after a major holiday. Information collected from participants was recorded on the 24-hour intake record forms. Steps for a five-step multiple pass 24-hour recall include:

- (a) Use of a “Quick List” where individuals were asked to briefly outline foods consumed.
- (b) Review of the quick list, where an interviewer used memory prompts to help individuals recall forgotten foods.

- (c) Recall of time and occasion of food consumption.
- (d) Food details: individuals were asked to describe foods and beverages by brand name, ingredients and preparation, portion size, and quantity eaten.
- (e) Final review of the list to make sure that nothing was omitted. Diet intake analysis for nutrients was completed by the research team who will use a computerized software program, the “Nutrition Data System for Research” (NDSR), developed by the University of Minnesota Nutrition Coordinating Center¹⁶.

The 24-hour recalls were used to determine the energy, macronutrient, and sodium intake of the women. Food groups of interest were fruits (excluding juices) and vegetables (excluding white potatoes and juices).

Statistical Plan

Data Processing

Heights, weights, and waist circumference were entered and cleaned using the Epi Info statistical software for epidemiology developed by the Centers for Disease Control and Prevention¹⁷. Closed-ended responses were uploaded to IBM’s Statistical Package for the Social Sciences (SPSS) software for quantitative analysis. Individual NDSR results were merged into one representative data set using SAS software.

Data Analysis

Medians \pm interquartile ranges were used to describe energy intake, macronutrient intake and sodium intake. Interquartile ranges were calculated as the difference between Q1 and Q3 as calculated SAS. Means \pm standard deviations were used to describe continuous

characteristics and frequencies were used to describe discrete characteristics in this sample.

Ethical Considerations

Institutional review and approval

To ensure that the basic rights and welfare of the research participants are protected, the protocol for this study was submitted to the Grand Valley State University Human Research Review Committee (HRRC) online, via IRBNet, for evaluation and approval. Research activities did not begin until each office was issued a final written approval of this research proposal.

Informed Consent

Written informed consent (Appendix A) was obtained from each participant; additional consent was obtained to collect information via survey administration (Appendix B).

Summary

This was a cross-sectional study of 16 women utilizing emergency food services. Participants were female residents of Degage Ministries' Open Door program, an overnight shelter for adult women in crisis in Grand Rapids. Participants were required to be over the age of 18 years, not pregnant or nursing, and not actively trying to gain or lose weight. Demographic characteristics and food security information was collected from residents (n= 16) via a questionnaire. Nutrient intake was measured with three 24-hour recalls using the NDSR software. BMI (kg/m^2) were calculated from measured heights and weights. Medians \pm interquartile ranges were used to describe energy intake,

macronutrient intake and sodium intake. Means \pm standard deviations were used to describe continuous characteristics and frequencies were used to describe discrete characteristics in this sample.

Results

The population attending the Open Doors Program was homogenous. The distribution of the women's demographic, BMI, and waist circumference is shown in Table 1. The majority (60%) of these women were over the age of 40 years, they identified as African American (44%), and 68% percent of the women identified as single. The women were characterized by a high prevalence of overweight (31%) and class III obesity (37%). The mean BMI (kg/m^2) result was 34.1 (± 11.0) with 50% having a BMI of over 30 kg/m^2 (obese). There was also a high prevalence of central obesity with 75% experiencing a waist circumference greater than 35 inches with mean waist circumference of 41.7 inches ($\pm 9.2''$).

As shown in Table 2, the majority (88%) of these women lived in poverty, had completed high school (62.5%), were unemployed (50%) and a third were on disability/ sick leave. The results of the food security questions are seen in Table 3. Low food security was observed in 19% of the women, and 44% of the women exhibited very low food security. Food assistance programs were utilized by 81.25% of the population (Table 4).

Results from diet recalls showed that the median daily energy intake (Table 5) was 2,218.9 kcal ($\pm 1,283.56$). The median daily fruit, vegetable, and sodium intakes for the participants were 0.83 (1.1), 3.1 (1.2), and 3,594.1mg (1,094.4), respectively. The median portion of calories from carbohydrates (Table 6) was 49.4%, 12.5% from protein, 12.2% from saturated fatty acids, and 38.9% from fat.

Summary

The majority of the women at the shelter were 50-59 years old (31.3%) and predominantly African American/Black (43.8%). Most of the women had an annual income of less than \$10,000 (87.5%) and 62% of the population had low or very low food security. A high prevalence of overweight (31%) and class III obesity (37%) was observed. The median daily fruit, vegetable, sodium, and calorie intakes for the participants were 0.83 (1.1), 3.1 (1.2), 3,594.1mg (1,094.4) and 2,218.9 kcal (1,283.6), respectively. The median portion of calories from carbohydrates was 49.4%, 12.5% from protein, 12.2% from saturated fatty acids, and 38.9% from fat.

Discussion

This study is one of the few studies to examine the diets of homeless individuals, specifically females. This study is unique in that it measured nutrient intake through three in-person 24-hour recalls in these homeless women. Previous studies have found that meals provided to homeless individuals are in excess of calories, sodium, and saturated fat.^{4,13} This is the first study to use three 24-hour recalls to report that the meals provided by soup kitchens do result in a greater than recommended sodium, fat, and saturated fat intake. Not surprisingly, this also translated into a very low intake of fruit and vegetable servings.

The median caloric intake (Table 5) reported agrees with previous research on the diets of homeless women.^{1,7,18} Previous work in this specific community also found that meals served at soup kitchens typically have a high level of saturated fat.⁴ The women in this study also reported having higher than recommended levels of saturated fat in their diets (Table 6). While caloric intake and the portion of calories from protein is not far from the recommended dietary allowances, the protein source may have contributed to the high level of saturated fat intake.¹⁹ This could be a result of the types of food consumed; it was noted during 24-hour recalls that for many of the meals the protein sources consisted of fried chicken and hamburgers on a frequent basis. Metabolic studies show that diets high in saturated fat increase blood cholesterol, possibly further increasing cardiovascular disease risk for this already older, overweight, female population.²⁰

Previous research into the meals served at Grand Rapids soup kitchens found that the meals are typically high in sodium.⁴ This work on the actual intake of Grand Rapids homeless women showed that the women were consuming much higher levels of sodium than recommended (Table 5). Prior work hypothesized that the soup kitchen recipients would be consuming as high as 4,055mg of sodium⁴, corroborating with the results of this study as well. The median intake of 3,594mg (± 1094 mg) indicates the strength of this study in measuring the actual intake. Excessive consumption of sodium can be detrimental to one's health and puts the women at increased risk for conditions such as high blood pressure, stroke, osteoporosis and kidney disease.²¹

Perhaps one of the most interesting differences between the diets of low-income individuals and homeless women is observed through the differences in daily consumption of fruits and vegetables. A survey of dietary intake by SNAP eligible, low-income adults showed that these individuals consumed a median value of 0.3-0.6 servings of fruit a day, and 0.7-1.0 servings of vegetables. This is much lower than median levels seen in this homeless population (Table 5). This difference could be a result of the purchasing behaviors and motivations of the SNAP eligible individuals, since many of the homeless women did not shop for themselves^{22,23}. It is possible that other low-income adults are choosing cheaper, low nutrient and high-energy foods over produce.⁸ It is also possible that the increased consumption of fruit and vegetables by homeless women in Grand Rapids is a positive outcome of recent changes to the quality of food served in the Heartside neighborhood's soup kitchens.²⁴

Not surprisingly, homeless women exhibited a greater amount of low and very low food security (Table 3) as compared to other low-income populations.⁸ Over 60% of the homeless women reported low to very low food security as compared to the 30% of low-income adults reporting the same food security levels. Over 80% of the women reported being worried that their food supplies would run out before they could purchase more and a staggering 50% said they have gone a whole day without eating because there was not enough money for food (Table 7). And while it is already known that older adults have lower levels of food security, it is disconcerting to observe this trend in a population that is older, already on disability (Table 2), and where only 50% have health insurance.⁶ All of these conditions may create an unfavorable situation for an individual with a yearly income below the Federal Poverty Level.²⁵ Without access to healthy food, these individuals may also be exacerbating their numerous pre-existing conditions.³

Conclusion

Summary of the study

About 1% of the American population is classified as “homeless”. Yet, within this specific population, trends in overweight and obesity do not model the norm. Specifically for women, there tends to be a higher incidence of overweight and obesity. This observed trend could be a result of poor nutrition, as many individuals with housing insecurity turn to emergency food shelters for meals. Due to the difficulties studying homeless individuals, research into their diet quality is scarce.

The purpose of this study was to determine the characteristics of the diet of homeless women in Grand Rapids, Michigan. This study sought to examine the nutrient intake of homeless women utilizing soup kitchens and other emergency food shelters. Specifically, it aimed to use a multi-pass, 24-hour recall method in order to collect the energy, macronutrient, and sodium intake of homeless women. It also aimed to collect demographic information, food security, and anthropometric information on the women utilizing these emergency food services.

The majority of the women at the shelter were 50-59 years old (31.3%) and predominantly African American/Black (43.8%). Most of the women had an annual income of less than \$10,000 (87.5%) and 62% of the population had low or very low food security. The median daily fruit, vegetable, sodium, and calorie intakes for the participants were 0.83 (1.1), 3.1 (1.2), 3,594.1 mg (1,094.4) and 2,218.9 kcal (1,283.6), respectively. The median portion of calories from carbohydrates was 49.4%, 12.5% from

protein, 12.2% from saturated fatty acids, and 38.9% from fat. Over 30% of the women were classified by BMI as overweight, and another 37% were class III obese.

Conclusion

The objectives of this study were to analyze the nutrient intake of women residing at Degage Ministries' Open Door shelter as well as to examine their food security, anthropometric and demographic characteristics. The caloric intake, macronutrient distribution, and body mass ranges were similar to that described in existing literature on low-income adults, but this population differed in terms of fruit and vegetable consumption and food security. I had hypothesized that homeless women would have lower fruit and vegetable intake as compared to low-income adults. Surprisingly, these homeless women had a slightly greater fruit and vegetable intake, but this intake was still significantly below what is recommended. These findings indicate that the dietary intake of homeless women of Grand Rapids, MI does not meet USDA recommendations overall. Without improvement to their diets, these women may find it difficult to manage their present chronic disease and put them at risk for future chronic disease.

Recommendations

The caloric intake of this population was slightly higher than what previous studies reported. This could have been due the higher energy demands of the participants; data was collected in early spring so participants were able to be active outdoors. It would be beneficial to examine the caloric intake of this population while having participants wear an accelerometer to measure activity levels. This would allow for the collaboration of energy intake and expenditure.

Michigan experiences seasonality in its produce offerings. For this reason, I suggest that diet intake be explored further in different seasons to understand what affect, if any, this seasonality has on the diets of homeless individuals.

Future work may build on the findings of this report by expanding the number of participants. A limitation to this study was the small number of women in the nutrient analysis and therefore, may not be completely representative of the nutrient intake in homeless women. Also, all the women sampled were residents of one overnight facility that also had a dinner offering. Since many of the women ate at the shelter before retiring for the evening, it may be beneficial to explore the diets of homeless females outside of this shelter to see if the overnight facilities affect their evening meal choices, and therefore their diets.

Since the diet intake of homeless women does not meet USDA requirements and they receive the majority of their meals from emergency food shelters, it would be beneficial

for these food shelters to provide a greater variety of nutritious foods lower in saturated fat and sodium. Since the women are also unable to shop for themselves, a community kitchen with storage space for personal groceries may accommodate their needs better.

Tables and Figures

Figure 1: Age Distribution of Women at Open Door (n = 16)

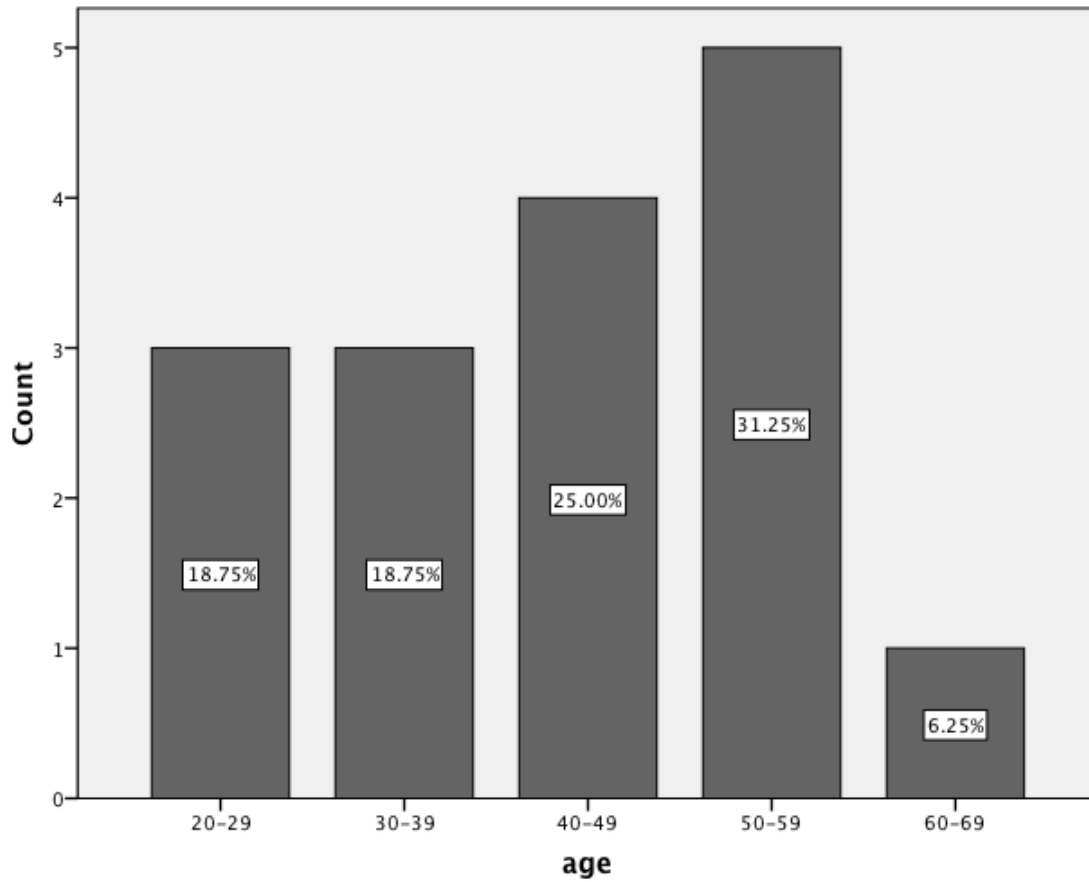
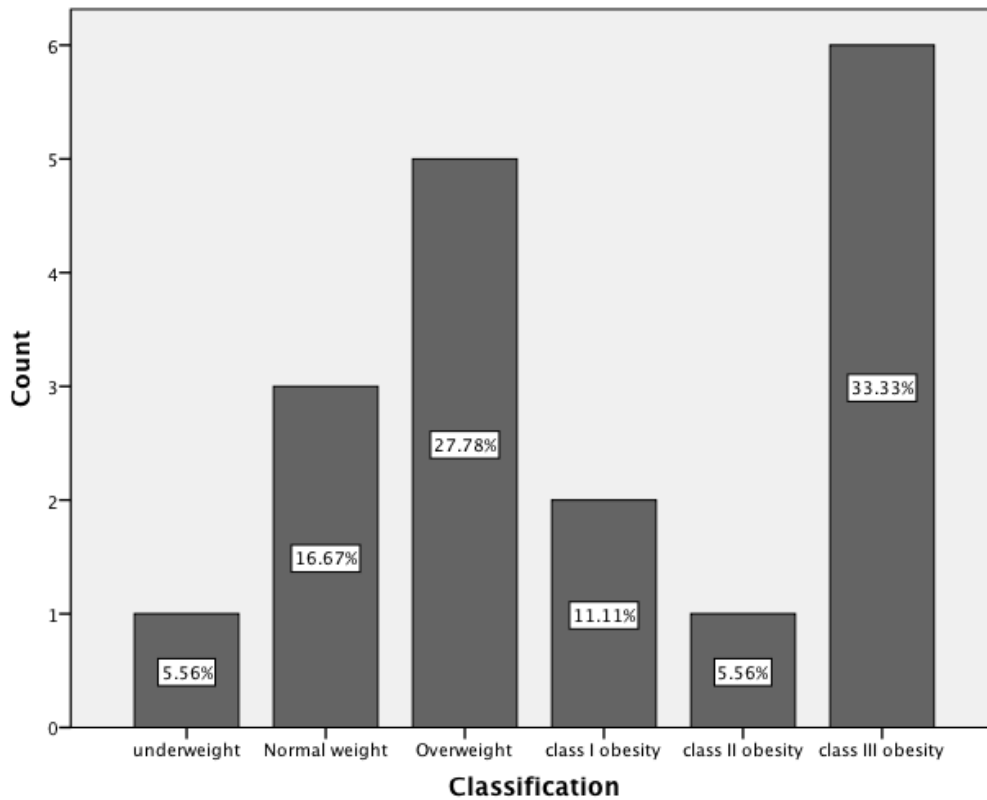


Table 1: Characteristics of Women at Open Door (n = 16)

Variable	Values
Race (%)	
African American	43.75%
White	31.25%
Native American	12.50%
Other	12.50%
Marital Status	
Single	68.75%
Married	6.25%
Divorced/widowed	18.75%
Other	6.25%
Waist Circumference	
Low Risk (<35 inches)	25%
High Risk (> 35 inches)	75%
Mean Waist Circumference, inches (SD)	41.7 (9.2)

Figure 2: Obesity classification based on BMI¹ (n = 16)

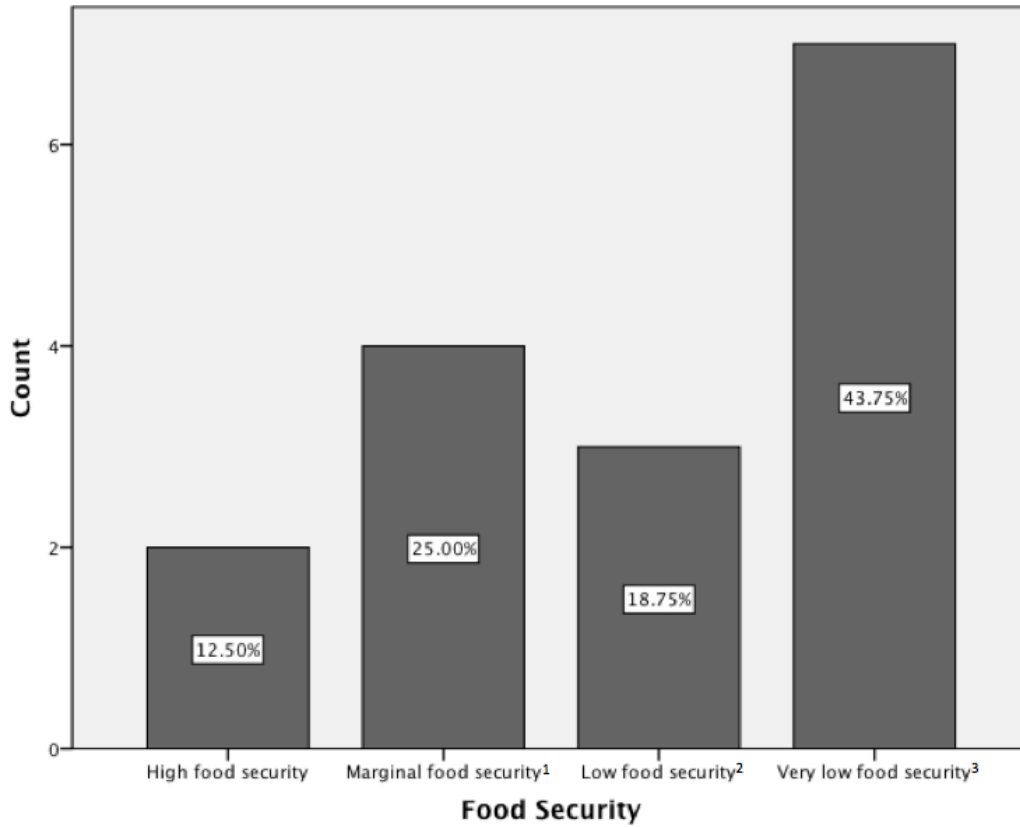


¹BMI=Body Mass Index, (kg/m²)

Table 2: Socio-Economic Measurements of Participants (n = 16)

Variable	Values
Annual Income	
<\$10,000	87.50%
\$10,000-19,999	6.25%
\$20,000 - 29,999	6.25%
Employment Status	
Currently Unemployed, temporarily laid off, or on furlough	50.00%
Currently employed	6.25%
On disability/sick leave OR unable to work	31.25%
Other (retired, homemaker, or caregiver)	12.50%
Variable	Values
Education (%)	
Some high school	25.00%
Graduated high school	62.50%
Some college	12.50%
Insurance coverage	50.00%

Figure 3: Levels Food Security as measured by U.S. Adult Food Security Survey Module (n = 16)



¹ Marginal Food security defined by 1-2 affirmative answers

² Low Food security defined by 3 -5 affirmative answers

³ Very Low food security defined by 6-10 affirmative answers

Table 3: Food Assistance Utilization (n = 16)

Variable	Values
Food Assistance (%)	
SNAP ¹ past 12 months	81.25%
WIC ² past 12 months	6.25%

¹ SNAP = Supplemental Nutrition Assistance Program

² WIC = Special Supplemental Nutrition Program for Women, Infants, and Children

Table 4: Median Nutrient Intake as based on food group (n = 16)

Variable	Value	Recommended ¹
Median daily fruit intake, servings (IQR)	0.83 (1.13)	5-9
Median daily vegetable intake, servings (IQR)	3.125(1.21)	5-9
Median daily iron intake, mg (IQR)	12.6 (6.1)	9
Median daily sodium intake, mg (IQR)	3594.11 (1094.4)	<1,500mg
Median daily energy intake, Kcal (IQR)	2218.9 (1283.56)	2,000 – 2,400

¹Recommendations based upon the dietary reference intakes for women ages 51-70 years, the most predominant age group¹⁹

Table 5: Distribution of Macronutrients in Average Participant’s Diet (n =16)

Variable	Values	Recommended ¹
% Calories from Carbohydrates	49.4 (7.2)	45-65
% Calories from Protein	12.5 (2.9)	10-35
% Calories for Saturated Fatty Acids	12.2 (3.2)	
% Calories from Fat	38.9 (3.6)	20-35

¹Recommendations based upon the dietary reference intakes for women ages 51-70 years, the most predominant age group¹⁹

Table 6: Results of selected Adult Food Security Survey Module questions¹ (n = 16)

Question	Value
Worried whether food would run out before having money to purchase more	81.25%
Food purchased did not last, but there was no money to purchase more	68.75%
Could not afford to eat balanced meals	62.5%
Cut size of own meals because there was not enough money for food	50%
Hungry but did not eat because there was not enough money for food	50%
Lost weight because there was not enough money for food	43.75%
Not eaten for a whole day because there was not enough money for food	50%

¹ A subset of the 10 question USDA Adult Food Security Survey Module

References

1. Davis LRMD, Weller NFD, Jadhav MMPH, Holleman WLP. Dietary Intake of Homeless Women Residing at a Transitional Living Center. *Journal of Health Care for the Poor and Underserved* 2008;19(3):952-62.
2. Koh KA, Hoy JS, O'Connell JJ, Montgomery P. The Hunger-Obesity Paradox: Obesity in the Homeless. *Journal of Urban Health-Bulletin of the New York Academy of Medicine* 2012;89(6):952-964.
3. Baggett TP, Singer DE, Rao SR, O'Connell JJ, Bharel M, Rigotti NA. Food Insufficiency and Health Services Utilization in a National Sample of Homeless Adults. *Journal of General Internal Medicine* 2011;26(6):627-634.
4. Sisson LG, Lown DA. Do Soup Kitchen Meals Contribute to Suboptimal Nutrient Intake & Obesity in the Homeless Population? *Journal of Hunger & Environmental Nutrition* 2011;6(3):312-323.
5. Tsai J, Rosenheck RA. Obesity Among Chronically Homeless Adults: Is It a Problem? *Public Health Reports* 2013;128(1):29-36.
6. Bowman S. Low economic status is associated with suboptimal intakes of nutritious foods by adults in the National Health and Nutrition Examination Survey 1999-2002. *Nutrition Research* 2007;27(9):515-523.
7. Silliman K, Yamanoha MM, Morrissey AE. Evidence of nutritional risk in a population of homeless adults in rural Northern California. *Journal of the American Dietetic Association* 1998;98(8):908-910.
8. Leung CW, Ding EL, Catalano PJ, Villamor E, Rimm EB, Willett WC. Dietary intake and dietary quality of low-income adults in the Supplemental Nutrition Assistance Program. *Am J Clin Nutr* 2012;96(5):977-88.
9. Lesser LI, Hunnes DE, Reyes P, Arab L, Ryan GW, Brook RH, Cohen DA. Assessment of Food Offerings and Marketing Strategies in the Food-Service Venues at California Children's Hospitals. *Academic Pediatrics* 2012;12(1):62-67.
10. Wicks R, Trevena LJ, Quine S. Experiences of food insecurity among urban soup kitchen consumers: Insights for improving nutrition and well-being. *Journal of the American Dietetic Association* 2006;106(6):921-924.
11. Coleman-Jensen A, Gregory C, Singh A. Household Food Security in the United States in 2013. U.S. Department of Agriculture, Economic Research Service; 2014.
12. Tanumihardjo SA, Anderson C, Kalifer-Horwitz M, Bode L, Emenaker NJ, Haqq AM, Satia JA, Silver HJ, Stadler DD. Poverty, obesity, and malnutrition: An international perspective recognizing the paradox. *Journal of the American Dietetic Association* 2007;107(11):1966-1972.
13. Eppich S, Fernandez CP. Study finds Chapel Hill, NC, soup kitchen serves nutritious meals. *Journal of the American Dietetic Association* 2004;104(8):1284-1286.
14. U.S. Adult Food Security Module: Three-Stage Design, with screeners. Economic Research Service, USDA; 2012.

15. Howat P, Mohan C, Champagne C, Monlezun C, Wozniak P, Bray G. Validity and reliability of reported dietary intake data. *Journal of the American Dietetic Association* 1994 94:169-173.
16. Schakel S, Buzzard I, Gebhardt S. Procedures for estimation nutrient values for food composition databases. *Journal of food composition and analysis* 1997;10(2):102-114.
17. Dean A, Dean J, Coulombier D, Brendel K, Smith D, Burton A, Dicker R, Sullivan K, Fagan R, Arner T. Epi Info, Version 6: a word processing, database, and statistics program for public health on IBM-compatible computers.: Centers for Disease Control and Prevention; 1996.
18. Johnson LJ, McCool AC. Dietary intake and nutritional status of older adult homeless women: a pilot study. *J Nutr Elder* 2003;23(1):1-21.
19. Dietary Reference Intakes. In: *Macronutrients DRI*, editor: United States Department of Agriculture National Agriculture Library 2014.
20. Mozaffarian D, Micha R, Wallace S. Effects on Coronary Heart Disease of Increasing Polyunsaturated Fat in Place of Saturated Fat: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Plos Medicine* 2010;7(3).
21. Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). National Institutes of Health; 2002.
22. Rustad C, Smith C. Nutrition Knowledge and Associated Behavior Changes in a Holistic, Short-term Nutrition Education Intervention with Low-income Women. *Journal of Nutrition Education and Behavior* 2013;45(6):490-498.
23. Litt JS, Soobader MJ, Turbin MS, Hale JW, Buchenau M, Marshall JA. The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. *Am J Public Health* 2011;101(8):1466-73.
24. Larsen R. Review shows area soup kitchens serving unhealthy meals, sparks call for healthier donations. *The Grand Rapids Press* 2009.
25. 2014 Poverty Guidelines for the 48 Contiguous States and the District of Columbia. In: *Guidlines P*, editor: Department of Health and Human Services under the authority of 42 U.S.C. 9902(2); 2014.
26. *Physical Status: The Use and Interpretation of Anthropometry*. World Health Organization; 1995.
27. *Obesity: Preventing and Managing the Global Epidemic*. Geneva: World Health Organization; 2000.
28. 2014 Definitions of Food Security. United States Department of Agriculture Economic Research Service.

Appendices

Appendix A

Consent Form

Anthropometrics, Diet and Physical Activity

DIET AND PHYSICAL ACTIVITY IN MICHIGAN

Study Description and Consent Form

I am a faculty member at the Grand Valley State University. My colleagues and I at Michigan State University, the University of Michigan, Lake Superior State University, and the University of Wisconsin are conducting a study funded by the U.S. Department of Agriculture (USDA) that seeks to find out about access to food in Michigan, local production and distribution, as well as food policies in Michigan. We are also trying to learn information on the dietary intake and physical activity of individuals in Michigan.

You have been asked to participate in this study because you live in a geographic area of interest. There is no benefit to you from participating in this research project. This study may increase our knowledge on the diets and physical activity of individuals living in your geographic area.

The information that I collect today will not be published with your name at any time. Instead of using your name, I will use a randomly-generated number to represent you. No one will know that that number is yours. Your participation in this study is entirely voluntary, and you may refuse to answer any questions posed by the researcher.

All responses will be strictly confidential. Records will be kept confidential to the extent provided by federal, state and local law. A summary of the results will be distributed on the web at <http://meldi.snre.umich.edu>. Study participants who want a printed copy of the summary results can request one from the investigator at the address below. Analysis of the data will be presented at conferences and published in academic and popular outlets.

Your participation is voluntary. You may refuse to participate in the study. If you agree to be in this study, we will weigh you, measure your height and your waist circumference. We will also ask for your phone number so that we can call you for your diet information and your address to pick up the accelerometer (pedometer).

You will be asked to wear an accelerometer (pedometer) for 7 days, which measures your physical activity, on your waist except when you are bathing/swimming. You will also be asked to record time in bed and time out of bed. If you find the accelerometer interferes with your comfort and sleep in bed, you may remove the accelerometer during your sleeping time. This will not exclude you from the study.

We will call you three times during the 7 days when you are wearing the accelerometer and ask you what you had to eat the previous day. The time to report your previous day diet intake will take 20-30 minutes for each call.

There are no costs to you to participate in this research project. We ask you to not lose or damage the accelerometers, but you will not have any financial liability for loss or damage to the accelerometers

Do you have any questions about what I have explained so far?

Would you like to participate in this study?

If you have a question later that you didn't think of before, you can call Debbie Lown (616) 331-2335 312 Padnos, Grand Valley State University, 1 Campus Drive, Allendale, MI 49401.

If you have any questions about your rights as a participant in this research project, you may call Grand Valley State University Human Research Review Committee at (616) 331-3197 or hrrc@gvsu.edu

Signing your name at the bottom means that you agree to be in this study. You will be given a copy of this form after you have signed it.

Name of Subject	Date
_____	_____
Signature	Date
_____	_____
Signature of Researcher Administering Consent	Date
_____	_____
<i>Signature of investigator</i>	<i>Date</i>

Appendix B

Data Collection Tool



Food Access Survey

A SURVEY ABOUT FOOD SECURITY IN MICHIGAN

Study Description and Consent Form

I am a member of a research project team based at the University of Michigan, Michigan State University, Grand Valley State University, Lake Superior State University, and the University of Wisconsin. The team is conducting a study funded by the U.S. Department of Agriculture (USDA) that seeks to find out about access to food in Michigan, consumer purchasing behavior, and consumption habits. The study will also try to understand the availability of locally-grown food to Michigan residents, participation in farming activities, and access to outdoor activities in the state. As part of the study, I would like to ask you some questions about food access and your participation in food-related activities. These questions should take about 50 minutes to answer.

The information that I collect today will not be published with your name or address at any time. The data will be reported in an aggregate fashion. Instead of using your name, I will use a randomly-generated number to represent you. No one will know that that number is yours. Your participation in this study is entirely voluntary, and you may refuse to answer any questions posed by the researcher. There are no foreseeable risks to participants for participating in this study. Participants in this study will benefit from the fact that their ideas will help to shape food access and policies in Michigan.

There are no right or wrong answers; please be as open and as forthright with your answers as you can. *All responses will be strictly confidential.* Records will be kept confidential to the extent provided by federal, state and local law. A summary of the results will be distributed on the web at <http://meldi.snre.umich.edu>. Study participants who want a printed copy of the summary results can request one from the investigator at the address below. Analysis of the data will be presented at conferences and published in academic and popular outlets.

Your participation in this survey is voluntary. You may refuse to participate in the study. You may also refuse to answer any questions posed by the researcher. As I mentioned

before, your name or address will never be mentioned publicly or associated with your personal data. If for any reason, there is anything that you don't want me to make public or write about, please indicate it on the survey and I will respect your wishes.

Do you have any questions about what I have explained so far?

- Yes No

Do you agree to participate in this survey?

- Yes No

For further information or to request a summary of the results of the study please contact:

Dorceta E. Taylor, Investigator
University of Michigan – SNRE
Ann Arbor, MI 48109-1115
Phone: 734-763-5327. Fax: 734-763-5327
Email: dorceta@umich.edu

Please also see our website at: <http://meldi.snre.umich.edu>.

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher(s), please contact the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board, 540 E Liberty St., Ste 202, Ann Arbor, MI 48104-2210, (734) 936-0933, or toll free, (866) 936-0933, irbhsbs@umich.edu.

For survey administrators only:

Enter survey code _____

Enter research administrator's code _____

Part I. Demographic Information

1. Which of the following best describes your racial background? Check the one that applies.

- | | |
|--|--|
| <input type="radio"/> White (not Hispanic) | <input type="radio"/> Native American |
| <input type="radio"/> Black or African American (not Hispanic) | <input type="radio"/> Arab or Muslim |
| <input type="radio"/> Hispanic | <input type="radio"/> Other (please specify) |
| <input type="radio"/> Asian | _____ |

2. What is your gender? Check the response that applies.

- Male Female

3. What is your age? Choose one response.

- | | | |
|--------------------------------------|--------------------------------------|---|
| <input type="radio"/> Under 15 years | <input type="radio"/> 40 to 44 years | <input type="radio"/> 70 to 74 years |
| <input type="radio"/> 15 to 19 years | <input type="radio"/> 45 to 49 years | <input type="radio"/> 75 to 79 years |
| <input type="radio"/> 20 to 24 years | <input type="radio"/> 50 to 54 years | <input type="radio"/> 80 to 84 years |
| <input type="radio"/> 25 to 29 years | <input type="radio"/> 55 to 59 years | <input type="radio"/> 85 to 89 years |
| <input type="radio"/> 30 to 34 years | <input type="radio"/> 60 to 64 years | <input type="radio"/> 90 years or older |
| <input type="radio"/> 35 to 39 years | <input type="radio"/> 65 to 69 years | |

4. Including yourself, how many people live in your household? _____

5. How many people under the age of 18 live in your household? Choose one response.

- | | | | |
|-------------------------|-------------------------|-------------------------|----------------------------------|
| <input type="radio"/> 0 | <input type="radio"/> 3 | <input type="radio"/> 6 | <input type="radio"/> 9 |
| <input type="radio"/> 1 | <input type="radio"/> 4 | <input type="radio"/> 7 | <input type="radio"/> 10 or more |
| <input type="radio"/> 2 | <input type="radio"/> 5 | <input type="radio"/> 8 | |

6. What is your marital status? Check the response that applies.

- | | |
|--|---|
| <input type="radio"/> Single | <input type="radio"/> Separated, divorced, or widowed |
| <input type="radio"/> Married | <input type="radio"/> Other (please specify) |
| <input type="radio"/> Living together with partner | _____ |

7. What is your combined annual household income? Choose the response that applies.

- Under 10,000
- 10,000 – 19,999
- 20,000 – 29,999
- 30,000 – 39,999
- 40,000 – 49,999
- 50,000 – 59,999
- 60,000 – 69,999
- 70,000 – 79,999
- 80,000 – 89,999
- 90,000 – 99,999
- 100,000 - 109,999
- 110,000 - 119,999
- 120,000 - 129,999
- 130,000 - 139,999
- 140,000 - 149,999
- 150,000 - 159,999
- 160,000 - 169,999
- 170,000 - 179,999
- 180,000 - 189,999
- 190,000 - 199,999
- 200,000 - 209,999
- 210,000 - 219,999
- 220,000 - 229,999
- 230,000 - 239,999
- 240,000 - 249,999
- 250,000 or more

8. What is your current occupation? Choose the response that applies.

- Management occupations
- Business or Financial Operation occupations
- Computer or Mathematical occupations
- Architecture or Engineering occupations
- Life, Physical, or Social Science occupations
- Community or Social Service occupations
- Legal occupation
- Education, Training, or Library occupations
- Arts, Design, Entertainment, Sports, or Media occupations
- Healthcare Practitioner or Technical occupations
- Healthcare Support occupations
- Protective Service occupations
- Food Preparation and Serving Related occupations
- Building and Grounds Cleaning or Maintenance occupations
- Personal Care and Service occupations
- Sales occupations
- Office and Administrative Support occupations
- Farming, Fishing, or Forestry occupations
- Construction or Extraction occupations
- Installation, Maintenance, and Repair occupations
- Production occupations
- Transportation and Material Moving Occupations
- Other (please specify):

9. What is your current employment status? Check the response that applies.*

- Currently employed
- Currently unemployed
- Temporarily laid off or on furlough
- On disability or sick leave
- On leave
- Retired
- Student -- not in the workforce
- Homemaker or caregiver-- not in the workforce
- Unable to work
- Other _____

*If Currently employed Is Selected, Then Skip To Q 10
If Temporarily laid off Is Selected, Then Skip To Q10
If Currently unemployed Is Selected, Then Skip To Q11
If On disability or sick leave Is Selected, Then Skip To Q10
If Currently employed Is Selected, Then Skip To Q10
If On leave Is Selected, Then Skip To Q11

If Retired Is Selected, Then Skip To Q11
If Student -- not in the workforce is Selected, Then Skip To Q11
If Homemaker or caregiver-- no... Is Selected, Then Skip To Q11
If Unable to work Is Selected, Then Skip To Q11
If Other Is Selected, Then Skip To Q10

10. In which industry are you employed? Choose one response.

- Forestry, fishing, hunting or agriculture support
- Mining
- Utilities
- Construction
- Manufacturing
- Wholesale trade
- Retail trade
- Transportation or warehousing
- Information
- Finance or insurance
- Federal, state or local government (excluding schools and hospitals)
- Real estate or rental and leasing
- Professional, scientific or technical services
- Management of companies or enterprises
- Administrative and support, waste management or remediation services
- Educational services
- Health care or social assistance
- Arts, entertainment or recreation
- Accommodation or food services
- Other services (except public administration)
- Other (please specify):

11. Which of the following best describes your level of education? Check one response.

- Grammar schools (grades 1-5)
- Middle school (grades 6-8)
- Some high school (grades 9-12)
- Graduated high school
- Associates degree (2-year college)
- Some college (4-year college)
- Bachelor's degree
- Master's degree, MBA, Law, or other professional degree
- Doctorate or Ph.D.

12. Do you or anyone in your household receive Supplemental Nutrition Assistance Program (SNAP, Bridge Card, or food stamps) benefits in the last 12 months?

- Yes
- No

13. Do you or anyone in your household participate in the Women, Infant, and Children (WIC) program in the last 12 months?

- Yes No

14. Does anyone in your household receive reduced cost or free breakfast or lunch at school or Head Start in the last 12 months?

- Yes No

15. Do you have health insurance (this could be through you or another member of your family)?

- Yes No

16. Does everyone in your household have health insurance (this could be through you or another member of your family)?

- Yes No

17. What is your address?

Street number and name

City _____

State (two letter abbreviation) _____

Zip Code _____

18. How long (in years) have you been living at this address?

_____ Number of years living at this address

19. Do you or someone in your household own or rent the place in which you currently live? Choose one response.

- I/we own the property I/we rent the property

20. Is the place in which you currently live a: (choose one response)

- | | |
|--|--|
| <input type="radio"/> Single family home | <input type="radio"/> Apartment building |
| <input type="radio"/> Condominium | <input type="radio"/> Shelter or other kind of temporary housing |
| <input type="radio"/> Duplex, town house, or multiplex | <input type="radio"/> Other _____ |

21. What is your family structure? Choose one response.

- | | |
|--|---|
| <input type="radio"/> In a married-couple family | <input type="radio"/> In a group of related subfamilies |
| <input type="radio"/> In a family with female householder, no spouse present | <input type="radio"/> In a group of unrelated subfamilies |
| <input type="radio"/> In a family with male householder, no spouse present | <input type="radio"/> Unrelated individuals |

Part II: Food Expenditures and Consumption

22. Did you or anyone in your household buy food at any of the following food retailers last month? Check one response for each type of food outlet

	Choose one answer for each item					
	Daily	1-3 times in a week	4-6 times in a week	2-3 times in a month	Once in a month	Did not shop here
Supercenters (eg. Walmart, Kmart, Meijer)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Warehouse clubs (eg. Sams Club)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Full-service supermarkets (eg., Kroger, A&P, Glen's)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Organic supermarkets (eg., Whole Foods, Trader Joes)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grocery store (medium-sized stores; not chain stores)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Specialty stores (eg., ethnic food stores, Kosher)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenience stores, corner stores, or mini marts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pharmacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Liquor store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Party store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dollar store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Produce store	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health food stores	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food cooperatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Farmer's markets or farm stands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Urban farm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Community garden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meat or seafood store or market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bakery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dairy store or market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast food place, food stand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other kind of restaurant (not fast food)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. How much does it cost to buy food for your household each month?

_____ Amount spent on food each month

24. How much did you or anyone in your household spend on food at the types of food outlets listed below in the last month? This should include purchases made with Bridge Cards, etc. Fill in amounts only the food retailers (outlets) that apply.

- | | |
|---|--|
| _____ Supercenters (eg. Walmart, Kmart, Meijer) | _____ Produce store |
| _____ Warehouse clubs (eg. Sams Club) | _____ Health food stores |
| _____ Full-service supermarkets (eg., Kroger, A&P, Glen's) | _____ Food cooperatives |
| _____ Organic supermarkets (eg., Whole Foods, Trader Joes) | _____ Farmer's markets or farm stands |
| _____ Grocery store (medium sized stores; not chain stores) | _____ Urban farm |
| _____ Specialty stores (eg., ethnic stores, Kosher) | _____ Community garden |
| _____ Convenience stores, corner stores, or mini marts | _____ Meat or seafood store or market |
| _____ Pharmacy | _____ Bakery |
| _____ Liquor store | _____ Dairy store or market |
| _____ Party store | _____ Fast food place, food stand |
| _____ Dollar store | _____ Other kind of restaurant (not fast food) |

25. In order to buy just enough food to meet your household needs, would you need to spend more than you do now, or could you spend less? Choose one response.*

- Less Same More

*If Less Is Selected, Then Skip To Q26
If Same Is Selected, Then Skip To Q27
If More Is Selected, Then Skip To Q28

26. About how much more would you need to spend each week to buy just enough food to meet your household needs? _____

27. About how much less could you spend each week to buy just enough food to meet your household needs? _____

28. In the past 12 months, did you ever run short of money and try to make your food or your food money go further?

- Yes No

29. In the past 12 months, have you or anyone in your household obtained food from any of the following?

	Never	Rarely	Sometimes	Most of the time	Always
Food bank or food pantry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soup kitchen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shelter (emergency, domestic violence, homeless, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Church or community center	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meals on Wheels or similar program	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Neighbors, family, or friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. Which of these statements best describes the food eaten in your household? (Check the response that best applies.)

- Enough of the kinds of food we want to eat
- Enough but not always the kinds of food we want to eat
- Sometimes not enough to eat
- Often not enough to eat

31. Please tell me whether each of the following statements was often true, sometimes true, or never true for your household in the past 12 months. Choose one response per statement.

	Often True	Sometimes True	Never True
I/We worried whether my/our food would run out before I/we got money to buy more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The food I/we bought just didn't last, and I/we didn't have money to get more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I/We couldn't afford to eat balanced meals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I/We relied on only a few kinds of low-cost foods to feed the household because I/we were running out of money to buy food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I/We didn't feed the children in our household balanced meals because we couldn't afford to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I/We cut the size of the children's portions because I/we couldn't afford enough food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

32. In the past 12 months have you or anyone in your household taken any of the following actions. Choose one response per statement.

	Never	Rarely	Sometimes	Most of the time	Always
Cut the size of your meals or skipped meals because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Were you ever hungry but didn't eat because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lost weight because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not eaten for a whole day because there wasn't enough money for food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. During the past 12 months did you or anyone in your household have, participate in, or do any of the following? Choose one response per item.*

	Yes	No	Don't know
Have a vegetable garden at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have a flower or herb garden at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in community gardening activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in urban farming activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a food cooperative or community supported agriculture (CSA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shop at farmer's markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Currently purchase organic food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Currently purchase locally-grown food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in Double-up Food Bucks or Double-SNAP coupon programs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in nutrition education activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you could afford it, would you purchase organic food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you could, would you grow your own vegetable or herb garden at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ID number: _____

Anthropometric Measurements:

	Measurement 1	Measurement 2
Height (in)		
Weight (lbs)		
Waist circumference (in)		

Definition of Terms

Body Mass Index (BMI)

Body Mass Index is an index of weight-for-height that is used to classify underweight, overweight, and obesity in adults. It is calculated as the weight (kg) divided by the square of the height (m). BMI values are age and gender independent. BMI is considered to be a useful measure of obesity and associated risks.

Overweight

Overweight is defined by the World Health Organization as “the condition of abnormal or excessive accumulation of body to the extent that health may be impaired.”²⁶

Obese is defined as a more severe form of overweight.

The WHO classifies overweight and obesity based on BMI (Table 1).²⁷ Overweight is defined as a body mass index of 25 kg/m^2 . At a BMI of 26-29.99, an individual is considered pre-obese. A BMI of 30-34.99 is considered obese, class I; a BMI of 35-39.99 is considered obese, class II; and a BMI of > 40.0 is considered obese, class III.

Table 1: Classification of Adult underweight, overweight, and obesity according to BMI¹

Classification	BMI
Underweight	< 18.50
Normal Range	18.50 – 24.99
Overweight	≥ 25.00
Pre-obese	25.00-29.99
Obese	≥ 30.00
Obese, class I	30.00 – 34.99
Obese, class II	35.00 – 39.99
Obese, class III	≥ 40.00

¹As defined by the WHO

Federal Poverty Level (FPL)

The Federal Poverty Level is a set minimum amount of gross annual income that a family needs for food, clothing, transportation, shelter, and other necessities. The FPL is determined by the U.S. Department of Health and Human Services yearly and FLP varies according to family size (Table 2).²⁵

Table 2: 2014 Poverty Guidelines

Persons in family/household	Poverty guideline
1	\$11,670
2	15,730
3	19,790
4	23,850

Food Security

Food security is defined as the state of having reliable access to a sufficient quantity of affordable, nutritious food.²⁸ The USDA uses four terms to define food security; high food security, marginal food security, low food security, very low food security. Food

security is measured through the use of surveys such as the *Adult Food Security Survey Module* which have been created by the USDA.¹⁴ The number of affirmative answers to survey questions is used to determine food security. Scoring for the *Adult Food Security Survey Module* is as follows:

- Raw score zero—High food security among adults
- Raw score 1-2—Marginal food security among adults
- Raw score 3-5—Low food security among adults
- Raw score 6-10—Very low food security among adults

Food Secure:

High food security – no reports of reduced quality, variety, or desirability of diet as well as little or no indication of reduced food intake.

Marginal food security – one or two indications of reduced quality, variety, or desirability of diet and little or no indication of reduced food intake.

Food Insecure:

Low food security – reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.

Very low food security - reports of multiple indications of disrupted eating patterns and reduced food intake.