Northern Illinois University

Huskie Commons

Graduate Research Theses & Dissertations

Graduate Research & Artistry

2017

A study of nutrition quality in homeless shelter meals

Samantha Harmon

Follow this and additional works at: https://huskiecommons.lib.niu.edu/allgraduate-thesesdissertations

Recommended Citation

Harmon, Samantha, "A study of nutrition quality in homeless shelter meals" (2017). *Graduate Research Theses & Dissertations*. 654.
https://huskiecommons.lib.niu.edu/allgraduate-thesesdissertations/654

This Dissertation/Thesis is brought to you for free and open access by the Graduate Research & Artistry at Huskie Commons. It has been accepted for inclusion in Graduate Research Theses & Dissertations by an authorized administrator of Huskie Commons. For more information, please contact jschumacher@niu.edu.

ABSTRACT

A STUDY OF NUTRITION QUALITY IN HOMELESS SHELTER MEALS

Samantha Harmon, M.S.
School of Health Studies
Northern Illinois University, 2017
Dr. Josephine Umoren, Director

For residents of homeless shelters, food served on-site is a main source of nutrition. Due to pervasive health issues, there is a genuine need for this population to receive proper nutrition during their stay at shelters. However, there is limited research examining the nutritional quality of the meals served at these facilities and there are no existing nutrition regulations on the food provided unless the shelter is receiving financial assistance from a state or federal program. The purpose of the study was three-fold: a) to evaluate the nutritional quality of food provided by homeless shelters, b) to determine if the nutritional quality of meals differed between shelters that have volunteers provide meals and shelters that provide meals themselves, c) to determine if the nutritional quality of meals differed in shelters that set nutritional standards for their meals from those that did not. One hundred and ninety-five eligible shelters were asked to participate by completing an online survey and submitting dinner information. A total of 21 shelter directors volunteered and completed the survey, along with 11 of those directors submitting information on three of their dinner meals. Due to this low response rate, it could not be determined if there was a significant relationship between shelter policies and nutrition. Additional open-ended questions were asked of participants to obtain qualitative data for analysis. Nutritional analysis of the shelter meals revealed the nutrients that did not meet 1/3 of the Dietary Reference Intakes (DRI) were calories for men, carbohydrates, total fiber, calcium, and vitamin D across all

genders, while sodium was over twice the recommended amount. Nutrition standards were used by 14 shelters and they consisted of food groups that must be represented at each meal, with some requiring specific amounts of each food group. Barriers to following their standards included the use of food donations, the use of volunteer-provided meals, lack of resources, and the special dietary needs of clients. Shelter directors described three ways registered dietitians could help shelters: 1) provide nutrition education and counseling to shelter clients, 2) aid in meal planning to improve meal nutrition, 3) identify food to serve clients with specific dietary needs. The qualitative data gathered suggests food donations are the main factor in meal planning and override nutrition standards. Therefore, future research should focus on the nutritional value of food donations and how to encourage healthful food donations.

NORTHERN ILLINOIS UNIVERITY
DEKALB, ILLINOIS

DECEMBER 2017

A STUDY OF NUTRITION QUALITY IN HOMELESS SHELTER MEALS

BY
SAMANTHA HARMON

A THESIS SUBMITTED TO THE GRADUATE SCHOOL

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE

MASTER OF SCIENCE

SCHOOL OF HEALTH STUDIES

Thesis Director:
Dr. Josephine Umoren

ACKNOWLEDGEMENTS

Thank you to my thesis advisor, Dr. Josephine Umoren, for your guidance and support throughout my thesis and graduate coursework. I also wish to thank Dr. Priyanka Ghosh Roy and Dr. Thomas Smith for their time and guidance on my thesis. In addition, I appreciate the help I received from Mylaan Trussell in recruiting participants. Last, thank you to my family and friends for your continuous support and love.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

According to the U.S. Department of Housing and Urban Development, in 2014 almost 1.49 million people in the U.S. were homeless and stayed in a shelter.[1] Of those who were sheltered, 60.6% were adults ages 25 and older.[1] Types of shelters available to people who are homeless include emergency or temporary shelters, transitional housing that typically provides housing up to 24 months, and safe havens that provide temporary housing and services to hard-to-serve individuals.[1]

Compared to the general population, the homeless consume less food and have diets lower in nutritional quality. In a study by Burt and Cohen,[2] the homeless reported eating fewer meals per day than other low-income Americans, and more than a third reported eating nothing for one or more days in the week prior to their interview. A study conducting 24-hour recalls for 319 homeless adults in Rhode Island found over 94% of the participants were food insecure, with 64% of those who were food insecure experiencing hunger.[3] The mean food intake of participants did not meet USDA recommendations for the number of daily servings for vegetables, fruit, dairy, and meats/beans.[3]

Many shelters provide food to their residents in addition to housing and other services. A 1992 national study of 1,704 homeless individuals found that the primary sources of food for homeless adults were soup kitchens (63%) and shelters (51%).[4] However, there are no existing regulations on the food provided unless the shelter is receiving financial assistance from a state or federal program. Even so, some assistance programs have minimal regulations. For example,

the federal Emergency Shelter Grants Program has only one minimal requirement for emergency shelters.[5] The requirement merely states food preparation areas must have suitable space and storage and that equipment and food served must be safe and sanitary.[5] On the state level, the state of Illinois's Emergency Food and Shelter Program requires shelters to serve at least one meal per day in facilities that meet local health and safety code requirements.[6] Some programs available to shelters do, however, go beyond the minimal requirement, such as the USDA Child and Adult Food Program (CACFP), which requires shelters to meet nutritional guidelines.[7] The majority of shelters also do not set their own internal nutrition regulations or standards. A recent study of Boston shelters found that only 1 of the 9 shelters had any of their own internal nutrition standards in place, and only 2 of the 9 had consulted with a nutritionist.[8]

For residents of homeless shelters, food served on-site is a main source of nutrition. Residents especially rely on the meals provided by the shelters when their shelter rooms do not have cooking or food storage facilities.[9,10] There is limited research examining the nutritional quality of the meals served at these facilities. The available research on the diet quality of young children living in homeless shelters found the food served did not meet the nutritional requirements for young children.[11,12] A study on the dietary intake of adult women living in a transitional shelter found the food served did not meet USDA recommendations.[9] The participating residents felt the food had little variety, poor taste, poor nutritional quality, and did not help them manage their chronic illnesses.[9] Studies on dietary intake of shelter residents often mention financial constraints and individual shelter food policies as barriers to meeting nutritional needs.[9,10,12]

There are many shelter polices that could possibly affect residents' diets and the nutritional quality of food provided. These policies regulate meal times, the availability of food

outside of standard meal times, food storage, cooking facility availability, food budget, and whether volunteers plan the meals. Numerous shelters rely on volunteers to plan, purchase, and prepare the meals served to residents. If volunteers can plan and prepare the meals using their own recipes, the nutritional quality of meals could vary between volunteers.

Importance of the Study

People who are homeless suffer from more health problems than non-homeless and live with unmet health care needs.[13-15] The most prevalent health problems identified include respiratory, dermal conditions, injuries, and digestive issues.[13] Due to low diet quality, they are at risk for developing nutrition-related disorders including malnutrition, obesity, and cardiovascular diseases.[16-18] There is a genuine need for this population to receive proper nutrition during their stay at shelters, due to their pervasive health issues.

Nutrition professionals can be of use to this neglected population. In a survey of 259 family shelters, 87% reported willingness to integrate recommendations from medical providers and nutritionists for meal planning.[19] Professionals can aid not only in meal planning but in food acquisition, food preparation and education of staff. Lending their expertise to shelters providing meals would not only increase nutritional quality of the food but also variety, taste and overall quality. There is also a void in assistance to homeless people in the management of nutrition-related diseases. Professionals can develop nutrition education programs in homeless shelters as well as provide specialized menus or food options. To correctly assist shelter staff and residents, nutrition professionals need to understand budget constraints, food policies and practices of the shelter.

Purpose

The purpose of the study was to evaluate the nutritional quality of food provided by homeless shelters and examine the effect of shelter meal policies on the nutritional quality of meals provided. Specifically, the study aimed to determine if the nutritional quality of meals differ between shelters that have volunteers provide meals and shelters that provide meals themselves. It also aimed to determine if the nutritional quality of meals differed in shelters that set nutritional standards for their meals and those that do not. The nutritional quality of meals provided was evaluated by comparing it to the Dietary Reference Intakes (DRIs) for adult men and women, considering relatively few studies have been done in recent years with this age group.

Research Questions

Question 1

The first question was: How do the nutrients in meals served at homeless shelters compare to the Dietary Reference Intakes (DRIs) for adult males and females?

The variable of interest was satisfaction of DRI criteria for each nutrient. The nutrients measured include protein, carbohydrate, fiber, total fat, saturated fat, cholesterol, sodium, iron, calcium, folate, and vitamins A, C, and D. Calories were also measured. Each measured nutrient was defined as meeting the DRI if its measured amount was at least 33% of the DRI.

Question 2

The second question was: Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have outside volunteers provide meals and shelters that provide meals themselves?

The independent variable for this question was method of meal provision, and the dependent variable was meeting Dietary Reference Intakes (DRIs). The methods of meal provision were either volunteers or shelter staff purchased and planned a meal to be served at a shelter.

Question 3

The third question was: Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have nutrition standards for meals served and shelters that do not?

The independent variable for this question was nutrition standards, and the dependent variable was meeting Dietary Reference Intakes (DRIs). Nutrition standards were defined as any followed rules or guidelines used by shelters that directed what food was to be served to make meals nutritious.

Operational Definitions

1. A homeless shelter is a building or program providing temporary residence to homeless individuals. This includes the wide-spread PADS program, in which the shelter moves locations every night.
2. A shelter director is a staff member who manages the overall operation of a homeless shelter. For this study, this may include an individual who oversees the food service operation but not the overall operation.

3. The nutrient content of meals is determined using the Nutritionist Pro Diet Analysis Software.[20]
4. The method of meal provision is how the shelter serves meals to its clients.
5. Nutrition standards refers to any followed rules or guidelines used by shelters that direct what food is to be served to make meals nutritious.
6. Dietary Reference Intakes (DRIs) are sets of nutrient intake values recommended by the Institute of Medicine (IOM) to meet the nutrition needs of healthy people (Appendix C).
7. A nutrient is considered to meet the DRI if it is found in amounts that are at least 33% of the DRI listed for adult men and women. This percentage was derived from the assumption that an individual is consuming three meals per day. This standard was used in the 1995 USDA regulations for the National School Lunch Program, which states meals must contain one-third of the 1989 RDA for lunch and one-fourth of the RDA for breakfast.[21]

CHAPTER II

METHODOLGY

Study Design

The purpose of this study was to evaluate the nutritional quality of food provided by homeless shelters and examine the effect of shelter meal policies on the nutritional quality of meals provided. For the first research question, the variable of interest was satisfaction of DRI criteria for each nutrient. For the second research question, the independent variable was method of meal provision, and the dependent variable was meeting Dietary Reference Intakes (DRIs). The methods of meal provision were either volunteers or shelter staff purchased and planned a meal to be served at a shelter. For the third research question, the independent variable was nutrition standards, and the dependent variable was meeting Dietary Reference Intakes (DRIs).

This study was initiated as a correlational research design, with a purposive sampling method, but ended up being a mixed-methods study with a qualitative portion. Data were originally collected as planned through an online survey and self-reporting. However, due to a low response rate, there were not enough participants to complete the statistical analysis required to answer the second and third research questions. The qualitative assessment was subsequently added to help enrich the study results.

Participants

Participating shelters were selected through a purposive sampling method. To be eligible shelters must have served at least one dinner per week on-site and have adult residents. Targeted shelters were also all located in the Midwest. All shelters found to meet these criteria were recruited, and recruitment began after the Northern Illinois University's Institutional Review Board (IRB) approved the study. The recruitment letter was sent by mail or email to the directors or staff members in charge of food service operations at the shelters (see Appendix D). The recruitment letter included a link to an online survey through Qualtrics (see Appendix B). The first page of the survey included a letter of informed consent. Directors gave their consent by completing the online survey. It was expected that the study would have a 30% response rate, with at least 50 shelters participating in the study after expecting to target 170 shelters. A minimum of 30 shelter participants was needed, including at least 15 with volunteer-provided meals and at least 15 with shelter staff-provided meals. These 30 shelter participants also needed to include at least 15 with meals from shelters with nutrition standards and at least 15 with meals from shelters with no nutrition standards. A shelter's method of meal provision and nutrition standards overlap when categorizing meals to meet these minimums. These minimum numbers of participants were calculated to ensure that a large-enough sample size would be available to produce reliable results when using one-way MANOVA to answer the second and third research questions.

Instruments

Online Survey

Participants were given a link to an online survey on the Qualtrics website. The survey questions asked participants for basic information on the shelters, including shelter type, number of beds, number of people served for each meal, and if the shelters had male and/or female clients. To confirm eligibility for the study, participants were asked if their clients were 18 years or older and the meal types served at the shelter. Questions 9 and 10 measured the independent variables for the second and third research questions (method of meal preparations and use of nutrition standards, respectively). Questions 11 and 12 obtained qualitative data by asking the participants to describe their guidelines regarding food or explain why they do not have guidelines. Participants were asked to describe their guidelines to see if their guidelines include nutrition standards. This data was also used to identify common nutrition standards among shelters. If a shelter did not have guidelines regarding food, they were asked to explain why in order to identify common reasons shelters do not have nutrition standards. Questions 16-22 collected demographic information on the participant filling out the online survey. The full list of questions from the online survey can be found in Appendix B.

Data Preparation

After completion of the online survey, shelter directors were notified of which dates to send dinner information to the researcher for analysis. Dinner was chosen because it is the most consistently served meal across shelters, and it is most likely to be a complete meal. For each participating shelter, the nutrient content of three dinners was assessed individually. The dinner menu, all available recipes, and portion sizes were requested to be sent electronically or by mail in a stamped and addressed return envelope provided to them. If recipes or portion sizes were not

available or provided, applicable recipes and portion sizes were determined by the researcher. These were determined using the Nutritionist Pro Diet Analysis Software,[20] which has recipes and standard portion sizes in its database. The nutrients of the three dinners were then averaged to represent the average nutrient content of one dinner served at each shelter. The nutrients analyzed included protein, carbohydrate, fiber, total fat, saturated fat, cholesterol, sodium, iron, calcium, folate, vitamin A, vitamin C, and vitamin D. Calories was also calculated. These nutrients were chosen because they are either nutrients that have been overrepresented in shelter meals, such as fat,[22] or nutrients known to be deficient in the socioeconomically disadvantaged populations such as iron.[23] The Nutritionist Pro Diet Analysis Software[20] was used to determine the nutrient content of each meal. Additional questions for qualitative data collection were sent via e-mail to participants who reported dinner information.

Additional Qualitative Questions

Due to a low response rate, additional questions were asked of participants to provide more data. The following additional questions were asked:

1. Please list any barriers to following your listed guidelines regarding food when planning meals.
2. Would you describe your shelter as having adequate staff for meal planning?
3. Would you describe your shelter as having adequate staff for cooking?
4. Would you describe your shelter as having adequate cooking space for providing meals to your guests?
5. Please list any ways you believe a registered dietitian could help your shelter with providing meals to your guests.

CHAPTER III

RESULTS

Characteristics of the Participating Homeless Shelters

Recruitment letters were sent to 195 homeless shelters who met eligibility requirements in the Midwest, and 21 shelters agreed to participate. This represented a 10.77% response rate. Of those who participated, all served clients over the age of 18, which was an eligibility requirement. One shelter had only male clients and two shelters had only female clients, with the remaining having both male and female clients (85.71%). For type of shelter, 11 (52.38%) were emergency/temporary/overnight, 4 (19.05%) were transitional housing and 6 (28.57%) were both. The number of beds available in the shelters ranged from 21 to 400 beds, with an average of 105 ± 89.62 beds. The average number of people served in a meal ranged from 18 to 250 people, with an average across all participating shelters of 91.24 ± 61.73. Out of the 21 shelters that participated, 20 served breakfast, 20 served lunch, 21 served dinner, and 11 served snacks to their clients. This meant that all participating shelters served three meals per day, except for one shelter that served only dinner. The breakfast times ranged from 5am-11am, lunch times from 11am-2:30pm (with some offering bag lunches in the morning), and dinner times ranged from 4pm-9pm. Snack times varied. These characteristics of the homeless shelters that participated in the study are reported in Table 1.

Table 1

Characteristics of Homeless Shelters (N=21)

Variable	Frequency (Percent)
Client Gender	
Male Only	1 (4.76%)
Female Only	2 (9.52%)
Both	18 (85.71%)
Housing Type	
Emergency/Temporary/Overnight	11 (52.38%)
Transitional Housing	4 (19.05%)
Both	6 (28.75%)
Mean Beds (±SD)	105 ± 89.62
Mean Clients Served at Meals (±SD)	91.24 ± 61.73
Meal Types Served	
Breakfast	20
Lunch	20
Dinner	21
Snacks	11
Meal Time Ranges	
Breakfast	5am-11am
Lunch	11am-2:30pm[a]
Dinner	4pm-9pm
Snacks	Varied

[a]Some offered bag lunches in the mornings

Characteristics of Participating Shelter Directors

A shelter director is a staff member who manages the overall operation of a homeless shelter. For the purpose of this study, the shelter director included individuals who oversaw the food service operation, but not the overall operation. Staff members designated as in charge of the food service operation were better able to provide dinner information than a shelter director who oversaw an entire shelter operation. However, not every shelter had this designated staff, or their contact information was not as readily available. Therefore, shelter directors were contacted if a food service director was not identified. There were 9 (42.86%) male and 12 (57.14%)

female participating shelter directors. Ages ranged from 24 to 69 years old, with a mean age of 45.05 ± 13.5 years. The education level of the directors ranged from high school diploma to a doctorate degree, with the majority (38.1%) holding an undergraduate degree. Only 2 out of the 21 (9.52%) completed a culinary degree. As for employment at the homeless shelter, 18 (85.71%) were full-time employees. Fourteen of the directors (66.67%) were involved with planning meals. The characteristics of shelter directors who participated in the study are reported in Table 2. The shelter directors were also asked to list any nutrition education they had received. Nine reported to having completed at least one nutrition course, including one participant who was a registered dietitian and one who received their Master in Public Health degree.

Table 2

Characteristics of Shelter Directors (N=21)

Variable	Frequency (Percent)
Gender	
Male	9 (42.86%)
Female	12 (57.14%)
Age (±SD)	45.05 ± 13.5
Education Level	
High School Diploma	3 (14.29%)
Some College	5 (23.81%)
Associate Degree	2 (9.52%)
Undergraduate Degree	8 (38.1%)
Master's Degree	2 (9.52%)
Doctorate Degree	1 (4.76%)
Culinary Degree	
Yes	2 (9.52%)
No	19 (90.48%)
Employment	
Full-Time	18 (85.71%)
Part-Time	2 (9.52%)
Other	1 (4.76%)
Plans Meals	
Yes	14 (66.67%)
No	7 (33.33%)

Nutrient Adequacy/Quality of Dinners Meals

To answer the first question: "How do the nutrients in meals served at homeless shelters compare to the Dietary Reference Intakes (DRIs) for adult males and females," the dinner menus provided were analyzed for nutrient content and compared to the DRI. Out of the 21 shelters that agreed to participate in the study, 11 (52.38%) sent dinner information, with a total of 31 dinners reported. Ten out of the eleven shelters reported information for three dinners while one shelter reported information for only one dinner. The nutrients of each dinner were analyzed, then averaged across meals to represent the average nutrient content of one meal served at each shelter. Then those representative meals were averaged to find the overall mean nutrients in a

shelter meal. If the overall mean nutrient was less than 1/3 of the Dietary Reference Intakes (DRI), then it was categorized as nutritionally inadequate. Overall mean nutrients that did not meet 1/3 of the DRI were calories for men only, carbohydrates, total fiber, calcium, and vitamin D for both men and women. The average level of sodium was over twice the recommended amount. The nutrient analysis of these dinners is shown in Table 3. The most frequent foods served for these dinners are shown in Table 4. The foods are listed by food group and are listed from most frequently served to least frequently served.

Table 3

Overall Nutrition Quality of Homeless Shelter Dinners (N=31*)

		Males 19-50		**Females 19-50**	
Nutrient	Mean ± SD	1/3 of DRI	Percentage of 1/3 DRI	1/3 of DRI	Percentage of 1/3 DRI
Calories	767.68 ± 266	866.67	88.58%	666.67	115.15%
Protein (g)	35.17 ± 11.56	18.67	188.38%	15.33	229.42%
Carbohydrates (% of calories)	43.63 ± 8.9	45-65% of calories	67.12-96.96%	45-65% of calories	67.12-96.96%
Fat (% of calories)	38.22 ± 8.7	20-35% of calories	109.2-191.1%	20-35% of calories	109.2-191.1%
Saturated Fat (g)	11.2 ± 5.77	0	-	0	-
Cholesterol (mg)	127 ± 81.59	0	-	0	-
Total Fiber (g)	7.32 ± 3.04	12.67	57.78%	8.33	87.88%
Sodium (mg)	1086.95 ± 394.57	500	217.39%	500	217.39%
Iron (mg)	7.1 ± 7.87	2.67	265.92%	6	118.33%
Calcium (mg)	269.42 ± 188.72	333.33	80.83%	333.33	80.83%
Folate (μg)	167.24 ± 68.97	133.33	125.43%	133.33	125.43%
Vitamin A (RAE)	423.88 ± 255.82	300	141.29%	233.33	181.67%
Vitamin C (mg)	37.84 ± 22.25	30	126.13%	25	151.36%
Vitamin D (μg)	2.18 ± 3.4	5	43.6%	5	43.6%

*A total of 31 dinners were reported by 11 homeless shelters.

Table 4

Most Frequently Served Foods by Food Group

Food Group	Frequent Foods Served
Dairy	Milk, Cheese (cheese slices, shredded cheese, cheese sauce)
Grains	Bread (bread slices, dinner rolls, garlic bread, buns, bread sticks, baguette, submarine), Noodles, White Rice, Wheat Tortilla, Tortilla Chips, Cornbread
Fruit, Fruit Juices	Fresh Fruit Salad, Orange Juice, Canned Fruit Cocktail, Watermelon, Canned Peaches, Canned Pears, Mandarin Oranges, Strawberries, Grapes, Cantaloupe, Apple Juice, Grape Juice, Cinnamon Applesauce, Pineapple Tidbits
Vegetables	Potatoes (mashed, baked, fried, potato chips, tater tots), Mixed Salad Greens, Green Beans, Carrots, Canned Corn, Canned Mixed Vegetables, Canned Peas, Onion, Broccoli, Cole Slaw, Marinara Sauce, Salsa, Asparagus, Green Onion, Pickles
Protein	Ground Beef (hamburger patty, meatloaf, meatballs, meat sauce), Baked Chicken, Beans (baked, refried, black), Ham, Bacon, Lunch Meat, Hot Dogs, Fish Sticks, Tuna, Ribs, Turkey Roast Slices
Fats, Oils	Salad Dressing (Ranch, Italian), Butter, Margarine, Mayonnaise, Gravy, Creamer, Vegetable Oil, Sour Cream
Sweets, Baked Goods	Cookies, Pie, Brownies, Cake, Cupcake, Jell-O
Sweetened Beverages	Lemonade, Sprite, Coke
Combined Foods	Pizza, Lasagna, Taco Pie, White Chicken Chili, Chicken and Rice Casserole, Potato Soup, Cream of Mushroom Soup, Quiche

Method of Meal Provision on Nutrition Quality of Meals

The second question: "Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have outside volunteers provide meals and shelters that provide meals themselves," was answered by comparing the average nutrient content of meals prepared by volunteers to those prepared by shelter staff. Of the participating shelters, 18 had staff-planned meals and 3 had volunteer-planned meals. Of those that provided dinner information, nine shelters had staff-planned meals and two had volunteer-planned meals. Eight out of the nine shelters with staff-planned meals sent information for all three dinners, and the remaining shelter sent information for one dinner. This makes a total of 25 staff-planned dinners reported. The two shelters with volunteer-planned meals sent information for all three dinners, making a total of six volunteer-planned dinners reported. Table 5 shows the results of the nutrient analysis for staff-planned dinners and Table 6 reports results for volunteer-planned dinners. For staff-planned dinners, the mean nutrients that did not meet 1/3 of the DRI were calories for men only, carbohydrates, total fiber, iron for women, calcium, and vitamin D for both genders. Sodium was over twice the recommended amount for both genders (Table 5). For volunteer-planned dinners, mean nutrients that did not meet 1/3 of the DRI were calories and total fiber for men only, calcium and vitamin D for both genders. Sodium was also over twice the recommended amount for both genders (Table 6).

Table 5

Nutrition Quality of Staff-Planned Dinners (*n*=25*)

Nutrient	Staff-Planned Mean ± SD	95% Confidence Interval	1/3 of DRI for Males age 19-50	1/3 DRI for Females age 19-50
Calories	760.8 ± 296.29	(638.49, 883.11)	866.67	666.67
Protein (g)	36.59 ±12.43	(31.46, 41.73)	18.67	15.33
Carbohydrates (% of calories)	40.97 ± 9.84	(21.68, 60.26)	45-65% of calories	45-65% of calories
Fat (% of calories)	39.57 ± 9.78	(20.4, 58.74)	20-35% of calories	20-35% of calories
Saturated Fat (g)	11.38 ± 6.37	(8.75, 14.01)	0	0
Cholesterol (mg)	139.67 ± 85.34	(104.44, 174.9)	0	0
Total Fiber (g)	6.79 ± 2.53	(5.75, 7.83)	12.67	8.33
Sodium (mg)	1080.28 ± 438.39	(899.31, 1261.24)	500	500
Iron (mg)	4.84 ± 1.57	(4.19, 5.48)	2.67	6
Calcium (mg)	291.39 ± 185.98	(214.62, 368.16)	333.33	333.33
Folate (μg)	172.27 ± 75.89	(140.94, 203.6)	133.33	133.33
Vitamin A (RAE)	422.33 ± 221.15	(331.03, 513.62)	300	233.33
Vitamin C (mg)	33.63 ± 18.31	(26.07, 41.19)	30	25
Vitamin D (μg)	2.39 ± 3.73	(0.85, 3.93)	5	5

*Twenty-five dinners reported were staff planned.

Table 6

Nutrition Quality of Volunteer-Planned Dinners (*n*=6*)

Nutrient	Volunteer-Planned Mean ± SD	95% Confidence Interval	1/3 of DRI for Males age 19-50	1/3 DRI for Females age 19-50
Calories	798.63 ± 53.69	(742.28, 854.99)	866.67	666.67
Protein (g)	28.77 ± 0.52	(28.22, 29.31)	18.67	15.33
Carbohydrates (% of calories)	55.02 ± 20.31	(15.21, 94.83)	45-65% of calories	45-65% of calories
Fat (% of calories)	32.4 ± 19.11	(-5.06, 69.86)	20-35% of calories	20-35% of calories
Saturated Fat (g)	10.37 ± 2.45	(7.79, 12.94)	0	0
Cholesterol (mg)	69.98 ± 18.88	(50.17, 89.8)	0	0
Total Fiber (g)	9.72 ± 5.26	(4.2, 15.23)	12.67	8.33
Sodium (mg)	1116.97 ± 131.14	(979.32, 1254.62)	500	500
Iron (mg)	17.27 ± 18.62	(-2.28, 36.81)	2.67	6
Calcium (mg)	170.58 ± 235.77	(-76.89, 418.05)	333.33	333.33
Folate (μg)	144.61 ± 15.43	(128.41, 160.81)	133.33	133.33
Vitamin A (RAE)	430.85 ± 512.91	(-107.5, 969.2)	300	233.33
Vitamin C (mg)	56.78 ± 37.26	(17.67, 95.9)	30	25
Vitamin D (μg)	1.22 ± 1.53	(-0.39, 2.82)	5	5

*Six dinners reported were volunteer planned.

Due to the small sample size, a statistical analysis could not be performed to determine if there was a significant relationship between method of meal provision and nutrition quality of meals. Therefore, the researcher asked participants additional open-ended questions to further explore shelter staff-planned meals, presented later.

Shelter's Use of Nutrition Standards and Nutrition Quality of Meals

The third question: "Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have nutrition standards for meals served and shelters that do not," was answered by examining the observed sample differences in the

nutrition quality of meals prepared using standards and those prepared without any nutrition standards. Results of the use of nutrition standards showed that 14 (66.67%) had nutrition standards and 7 (33.34%) had no nutrition standards. Table 7 shows the nutrition standards used by the participating shelters. The nutrition standards consisted of food groups that must be represented at each meal served, with some requiring specific amounts from each food group. In most shelters (52.38%), the kitchen manager, food service manager, or lead cook was responsible for ensuring the nutrition standards were being followed. Other strategies used by shelters to ensure the standards were being followed included training the staff responsible for cooking the food and requiring management to check the menus. Of the participants who provided dinner information, eight (72.73%) had nutrition standards and three (27.27%) did not have any nutrition standards. All eight of the shelters with nutrition standards sent information for three dinners, making a total of 24 dinners planned with nutrition standards reported. Two out of the three shelters without nutrition standards sent information for three dinners, and the remaining shelter sent information for one dinner. This makes a total of seven dinners planned without nutrition standards reported. Table 8 shows the results of the nutrient analysis of dinners with nutrition standards and Table 9 shows the results of those prepared without nutrition standards. For shelters where nutrition standards were used, the nutrients that did not meet 1/3 of the DRI were calories for men only, iron for women only, and carbohydrates, total fiber, and vitamin D for both genders. The average sodium content was over twice the recommended amount (Table 8). For shelters that prepared meals without nutrition standards, the nutrients that did not meet 1/3 of the DRI were calories, total fiber, calcium, folate, vitamin A, vitamin C, and vitamin D for both genders.

Table 7

Listed Shelter Nutrition Standards for Dinner Planning

Nutrition Standards
Must include: Protein, Starch, Vegetable, Salad, Fresh Fruit, Bread, Dessert
Must include: Protein, Vegetable, Salad, Bread, Dessert
Must include: Protein, Grain or Starch, Vegetable, Fruit, Bread. If using pork, there must be another type of protein also.
Must include: 2-3oz Protein, 1 cup Starch, 1 cup Vegetables, 1 cup Fruit, 2 slices of Bread or 1 cup Pasta, 1 serving Dessert. Approximately 1 cup Milk, 1 cup Juice, 1 cup Coffee with sugar
Must include: 4-6oz Protein, 2 Vegetables with at least 1 Leafy Green Vegetable, Fruit and/or Fruit Juice, no more than 1 Starch
We are part of the Child and Adult Care Food Program just like the schools are. Dinner must include: 2oz Meat/Meat Alternative, ½ cup Vegetable, ½ cup Fruit, 2oz equivalents Grains. At least one serving per day must be whole grain-rich.
Follow Child and Adult Care Food Program guidelines
Provide a meat protein, veggie, salads, starch, beverage, dessert, and optionally bread. Incorporate any miscellaneous donations that are available. Use proper serving sizes, promote healthy choices if possible. No alcoholic beverages are allowed on the premises.
Follow basic nutritional guidelines using the food groups
Serve a balanced meal: Protein, Vegetable, Starch, Grain, Limited sugar (dessert items)
Try to always serve a balanced meal: Protein, Vegetables, Fruit
Try to include: Protein, Starch, Non-Starchy Vegetable
Try to include: Protein, Starch, Vegetable, Fruit (canned or fresh)
Try to serve high calorie, depending on food available

Table 8

Nutrition Quality of Dinners Prepared with Nutrition Standards (*n*=24*)

Nutrient	Nutrition Standards Mean ± SD	95% Confidence Interval	1/3 of DRI for Males age 19-50	1/3 DRI for Females age 19-50
Calories	834.38 ± 274.8	(718.32, 950.43)	866.67	666.67
Protein (g)	36.84 ± 13.33	(31.21, 42.47)	18.67	15.33
Carbohydrates (% of calories)	42.8 ± 10.1	(23, 62.6)	45-65% of calories	45-65% of calories
Fat (% of calories)	39.62 ± 9.98	(20.06, 59.18)	20-35% of calories	20-35% of calories
Saturated Fat (g)	12.58 ± 6.21	(9.96, 15.2)	0	0
Cholesterol (mg)	143.17 ± 90.01	(105.16, 181.19)	0	0
Total Fiber (g)	7.05 ± 1.81	(6.28, 7.81)	12.67	8.33
Sodium (mg)	1216.5 ± 367.17	(1061.44, 1371.57)	500	500
Iron (mg)	5.02 ± 1.35	(4.45, 5.59)	2.67	6
Calcium (mg)	344.69 ± 161.98	(276.28, 413.1)	333.33	333.33
Folate (μg)	182.04 ± 60.17	(156.62, 207.45)	133.33	133.33
Vitamin A (RAE)	512.01 ± 228.49	(415.51, 608.51)	300	233.33
Vitamin C (mg)	43.01 ± 21.71	(33.84, 52.18)	30	25
Vitamin D (μg)	2.92 ± 3.76	(1.33, 4.51)	5	5

*Twenty-four dinners reported were prepared with nutrition standards.

Table 9

Nutrition Quality of Dinners Prepared with No Nutrition Standards (*n*=7*)

Nutrient	No Nutrition Standards Mean ± SD	95% Confidence Interval	1/3 of DRI for Males age 19-50	1/3 DRI for Females age 19-50
Calories	589.8 ± 155.62	(445.87, 733.73)	866.67	666.67
Protein (g)	30.71 ± 2.32	(28.57, 32.85)	18.67	15.33
Carbohydrates (% of calories)	46.79 ± 18.86	(9.82, 83.76)	45-65% of calories	45-65% of calories
Fat (% of calories)	32.95 ± 17.77	(-1.88, 67.78)	20-35% of calories	20-35% of calories
Saturated Fat (g)	7.51 ± 1.83	(5.82, 9.2)	0	0
Cholesterol (mg)	83.89 ± 33.08	(53.29, 114.49)	0	0
Total Fiber (g)	8.06 ± 5.81	(2.69, 13.43)	12.67	8.33
Sodium (mg)	741.47 ± 245.81	(514.12, 968.81)	500	500
Iron (mg)	12.64 ± 15.48	(-1.68, 26.96)	2.67	6
Calcium (mg)	68.71 ± 56.23	(16.7, 120.72)	333.33	333.33
Folate (μg)	127.8 ± 88.9	(45.58, 210.02)	133.33	133.33
Vitamin A (RAE)	188.86 ± 174.87	(27.12, 350.6)	300	233.33
Vitamin C (mg)	24.03 ± 20.79	(4.81, 43.26)	30	25
Vitamin D (μg)	0.18 ± 0.11	(0.08, 0.28)	5	5

*Seven dinners reported were prepared with no nutrition standards.

Results of the Qualitative Assessment

Due to the small sample size, a statistical analysis could not be executed to determine if there were any significant relationships between the shelter meal policies and nutritional content of meals. The eleven homeless shelters that provided dinner information were contacted electronically and asked five additional questions to help get more insight into the researcher's questions. Nine out of the eleven responded to these questions (81.82%). Table 10 below shows the qualitative assessment questions and the themes identified from the participant's responses. These questions were asked in order to further explore potential barriers to providing a nutritious

meal, such as lack of staff or cooking space. The last question was asked to learn how dietitians could benefit shelters because previous research has suggested dietitians could be of use.[7,8,16]

Table 10

Qualitative Assessment and Identified Themes

Qualitative Assessment	Shelter Group Asked (Sample Size)	Themes
Please list any barriers to following your listed guidelines regarding food when planning meals.	Meals with Nutrition Standards (*n*=7)	1. Use of food donations 2. Lack of resources 3. Special dietary needs of clients
Would you describe your shelter as having adequate staff for meal planning?	Staff-Planned Meals (*n*=7)	1. Meal planning involves prioritizing foods that need to be used first
Would you describe your shelter as having adequate staff for cooking?	Staff-Planned Meals (*n*=7)	1. Have at least one cook, but rely on volunteers to help with cooking and serving of meals
Would you describe your shelter as having adequate cooking space for providing meals to your guests?	All Shelters (*n*=8)	1. Adequate cooking space, fully functioning kitchens
Please list any ways you believe a registered dietitian could help your shelter with providing meals to your guests.	All Shelters (*n*=9)	1. Provide nutrition education and counseling to shelter clients 2. Aid in meal planning to improve meal nutrition 3. Identify food to serve clients with specific dietary needs

Barriers to Following Nutrition Standards

To further explore shelter nutrition standards, participants were asked to list any barriers they had to following their nutrition standards. The common themes identified from the participants' responses (*n*=7) included the use of food donations, lack of resources, and the special dietary needs of clients. The most prevalent barrier described by shelter directors was the use of food donations. Shelters do not get to choose the nutritional value of the food donated.

> Due to limited funds, and relying mainly on donations, we do not have the luxury of choosing our ingredients… A high degree of what we get is heavy in carbohydrates and sugar… We never get fresh fruit! The fruit we get is expired or old.

Participants also described how they had to use donated items first because the foods donated were often close to expiring or expiration date. Using these donated items first often changed the planned meal that had taken into consideration the nutrition standards.

> My biggest barrier is I never know what's going to be donated and when the expiration date is. From seven pallets of fries to 160lbs of chicken. Fresh product is even harder to count on. Potato salad that needs to be eaten today, bananas that have at most two days of shelf life, or day-old bagels that have four days before they are not serviceable.

> Planning is usually not the issue. The issue comes in when we have donations that we must use quickly. At that point, we have to serve those items.

Another identified theme, the use of volunteer provided meals, was a barrier because shelters could only encourage, not force, volunteers to provide healthy meals.

> We offer "soft" guidelines; I encourage volunteers to consider low-sodium foods and to incorporate fresh fruits and vegetables. We are working on creating a meal of healthy recipes. However, we cannot force volunteers to purchase healthy foods, as they are volunteers. Our shelter does not have the capacity to purchase healthy food every night, so we need volunteer-provided food.

> Since many are untrained, they desire to give and give as much as they can, and some give more than others, unfortunately resulting in overeating and discouraging eating fruits and vegetables. We need somebody to stand by the serving line and enforce basic rules, since even our volunteers ignore them.

Other themes included the lack of resources to make a nutritious meal, such as funding and staffing (*n*=2), and the special dietary needs of clients altering meal plans, such as food allergies, needing low sodium for heart disease, or not eating pork for religious reasons (*n*=2).

> A major barrier that is common are those with religious beliefs that do not allow them to eat specific kinds of meat such as pork. However, our shelter and program have a series of backup plans put in place so that we are able to still provide a hot meal to those in need…We also have concerns with those who need special diets for medical or health concerns. We do our best to provide for those who may have high blood pressure or diabetes. As a whole we try to limit adding salt and sugar when possible. We cater to those who have food allergies by trying to accommodate through the use of substitution from our premade backups.

> If using pork for the protein, I make a different protein choice as some do not eat pork for religious reasons.

Staff and Cooking Space

The second question asked participants if they thought their shelters had adequate staff for meal planning. Four out of the seven participants who responded to this question felt their shelter had adequate staff. The most common theme found from responses was prioritizing foods that needed to be used first. Participants described that this is a main consideration when planning meals.

> Staffing the kitchen takes precedence to meal planning, and for some time, meal planning has been simplified and more like a triage of what needs to be used first and what simple meals to hand off to volunteer groups.

> Yes [we have adequate staff]. I would, but if I miss a day I miss seeing what came in for donations that day. I might find them two days later than the use date.

> Yes [we have adequate staff], we prepare the week's menu on Monday and will only make adjustments based on large donations which have a small window to use the item(s).

Participants explained that when meal planning, foods expiring soon were used first and at the same time they had to be mindful of the donations received daily. Menus were altered to

use the newly received large donations and donations that would expire soon. The third question asked participants if they thought their shelter had adequate staff for cooking. For this question, only two out of seven felt their shelter had adequate staff. The majority stated they had at least one cook but relied on volunteers to help with cooking and serving of meals.

> No. I have lots of product I can't get to in my hours at work. And definitely need help. I think I could offer more raw foods if I had more hands.
>
> Yes, I have a lunch cook and dinner cook for each day of the week, plus we have kitchen volunteers through the week who are here to help with prep.
>
> No. Staffing is always an issue here. Currently, I am short two full-time and one part-time cook. Finding people who are willing to work the hours of a cook is hard. Due to lack of cooking staff, I have to pick up some shifts, which cuts into my ability to do my job as Food Service Administrator planning the meals.

The fourth question asked participants if they thought their shelter had adequate cooking space for providing meals to their clients. Six out of the eight participants who responded to this question felt they had adequate cooking space, describing their kitchens as fully functioning.

> My kitchen was an afterthought, and with servicing about 400 daily, I need more kitchen space to be a production kitchen.
>
> Yes, we have three 6-8 feet prep tables, two convection ovens, a Rational oven which allows for cooking either 100% steam, 100% convection or a combination, a 20-gallon kettle and a two-burner stove top.
>
> We have a fully functioning industrial-sized kitchen, with the use of both convection and conventional ovens, a braising pan, industrial gas stove, multiple prep areas, multiple sinks, and two walk in freezers, a walk-in cooler, and eight industrial reach-in coolers. We have plenty of space to have at least eight people prepping with adequate space.

How Participants Think Registered Dietitians Could Help with Homeless Shelter Meals

Participating shelter directors (*n*=9) were asked to describe any ways in which they believed a registered dietitian could help their shelters with providing nutritious meals to their shelter clients. There were three themes identified from the directors' responses regarding how a

registered dietitian could help homeless shelters: 1) provide nutrition education and counseling to shelter clients, 2) aid in meal planning to improve meal nutrition, and 3) identify food to serve clients with specific dietary needs.

Many shelter directors (*n*=5) identified nutrition education as a valuable service a registered dietitian could provide to shelter clients. As they described, homeless shelter clients could use nutrition education to improve their eating habits while at the shelter, but more importantly once they leave the shelter and are obtaining food on their own. The clients also need help finding affordable food and resources as well as learning how to eat healthy on a budget.

> A registered dietitian would be helpful in teaching classes on nutritional cooking to the clients and teach them how to make and cook healthy choices when they leave the shelter.

> I believe having a registered dietician could benefit us in providing various healthy food options as well as educating our guests in this field.

Shelter directors recognized that a registered dietitian involved in meal planning would improve nutrition content of the meals served. They believed a dietitian could also help improve meal variety and creativity. Specific tasks directors mentioned they would like a dietitian to do were to reduce sodium, make better use of the foods the shelter has, and provide large-scale healthy recipes.

> We would be able to more thoughtfully prepare meals that would allow us to balance all the nutritional needs of children and adults. It would allow us to prevent repetition of meals, which sometimes happens here randomly—we might see pizza here three times in a week and then not again for months!

> We work with a variety of people; it can be difficult to cater to every need seeing as how needs are different for each and every person. The best way a dietitian could assist us is by providing more knowledge on healthy recipes that are able to be made on a large scale.

Some homeless shelter clients have special dietary needs due to various health conditions. Often, these special requirements go unmet because the homeless shelter is unprepared or unable to accommodate them. Shelter directors identified that registered dietitians, with their specific knowledge in the area, could solve this problem. One director stated the following:

> Currently, I am acting as the dietitian. Whenever the nurse has a client who is looking for a special diet it falls to me to determine what the appropriate diet should be based on my culinary training and research.
>
> Meals would likely be more nutritious, more creative and make better use of the food that we have on hand. Additionally, there are individuals with special food needs - diabetics, heart disease, gastrointestinal disorders, allergies - that go unmet in most cases as there is no one to help plan meals for them.

CHAPTER IV

DISCUSSION

Nutrient Analysis of Homeless Shelter Dinners

The first question asked was: "How do the nutrients in meals served at homeless shelters compare to the Dietary Reference Intakes (DRIs) for adult males and females," and from the nutrient analysis of participating shelter dinners, it was found that the mean nutrients that did not meet 1/3 of the DRI were calories for men only, carbohydrates, total fiber, calcium, and vitamin D for both genders. This trend was followed throughout the different categories of shelter meals analyzed (staff-planned meals, volunteer-planned meals, meals with nutrition standards, meals without nutrition standards), with slight variations. Staff-planned meals showed a similar trend, except, in addition to the other inadequacies, they did not meet 1/3 of the iron DRI for women. Volunteer-planned meals met the carbohydrate requirements and the total fiber requirements for women. Meals with nutrition standards met the calcium requirements but, like the staff-planned meals, did not meet 1/3 of the iron DRI for women. Meals without nutrition standards were the most varied from the average meal across all shelters. The mean nutrients that did not meet 1/3 of the DRI for meals without nutrition standards were calories, total fiber, calcium, vitamin D, folate, vitamin A, and vitamin C for both genders. Dinners without nutrition standards only met 20.61% of calcium and 3.6% of vitamin D requirements, compared to the mean across all shelters which met 80.83% of calcium and 43.6% of vitamin D requirements. The mean sodium level was twice the recommended amount for all shelter meals, staff-planned meals, volunteer-

planned meals, and meals where nutrition standards were used. Total fat, saturated fat, and cholesterol were also over the recommended amounts. The nutritional inadequacies in these meals can be attributed to the foods available to shelters for cooking. In addition, shelters ranged in size, with varying levels of resources and available staff to produce nutritious meals. The lack of nutritional guidelines for meal planning can also contribute to nutritional inadequacies, as seen in the nutrient analysis. The low amounts of calcium and vitamin D can be explained by the small amounts of dairy served in meals. Many meals did not contain foods from the dairy group, and the most some contained were small servings such as a cheese slice in a sandwich. Storage availability was not explored in this study, however; a possible explanation could be that shelters do not have adequate storage for perishable products such as dairy.

These findings are like other available research on the nutritional content of homeless shelter meals and the homeless population's diet. Research on the nutritional quality of food served has found it to be high in fat and low in whole grains, fresh fruits and vegetables.[9,11,12] In their study focusing on the homeless adult population, Silliman and Wood[22] analyzed the nutritional adequacy of meals served in rural shelters or soup kitchens in northern California and found that the meals were low in fiber, high in fat, and provided less than 33% of the RDA/DRI for folate, calcium, magnesium, and zinc.[22] The current study did not analyze for magnesium or zinc, but results were similar in that shelter meals were low in fiber and calcium and high in fat. In addition to nutrition quality of homeless shelters, the research analyzing homeless individuals' diets also found that they are inadequate in vitamins and minerals and are high in sodium, saturated fat, and cholesterol.[17,23-26] A study in New York city that collected 24-hour recalls with 41 homeless individuals found the participants' diets were low in zinc, vitamin B6, vitamin A, and calcium.[24] Another study in Hawaii that used a similar 24-hour recall method to analyze

diets of 57 homeless families found that their diets were also low in fiber, calcium, and vitamin A.[25] Similarly, an assessment of the nutritional status of 55 homeless urban adults at a New York medical center found participants' diets were inadequate in most nutrients but high in sodium, saturated fat, and cholesterol.[23] Last, a 1992 study of homeless women and children reported diets less than 50% of the 1989 Recommended Dietary Allowances (RDA) for iron, magnesium, zinc, folic acid, and calcium.[26] Overall, results from the study and previous research are in agreement in showing that homeless individuals' diets are inadequate in fiber and calcium and are high in sodium, fat, and cholesterol.

Method of Meal Provision on Nutrition Quality of Meals

The second question asked was: "Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have outside volunteers provide meals and shelters that provide meals themselves." In this study, the average nutrient content of meals between volunteer and staff planned was similar in that they both were below 1/3 of the DRI for calcium and vitamin D, and both types of meals provided well over twice the sodium requirements. Surprisingly, staff-planned meals fell short of 1/3 the DRI for certain nutrients that volunteer-planned meals did not. These included carbohydrates for all genders, total fiber for women, and iron for women. This could be due to the fact that staff-planned meals relied on donated foods for their meal preparation, which made it difficult to follow nutrition standards. To date there are no other studies that have examined nutrient content of solely volunteer-planned meals.

Shelter's Use of Nutrition Standards and Nutrition Quality of Meals

The third question was: "Is there a difference in how well meals meet Dietary Reference Intakes (DRIs) between homeless shelters that have nutrition standards for meals served and shelters that do not," and in this study, 14 out of 21 shelters had nutrition standards that they used to plan meals for their clients. The shelter nutrition standards listed by participants consisted of food groups that must be represented at each meal, with some shelters specifying amounts of food to be supplied in each food group. There are currently no governmental regulations or national standards for the nutrition of food served at homeless shelters. Therefore, it is up to shelters to create their own nutrition standards if they desire. The education of shelter directors may play an important part in their decision to establish nutrition standards. Those who are educated may be more aware of the need for nutrition standards when planning meals. In this study, 85% of shelter directors had attended college while the rest had high school diplomas. In addition, nine (42.86%) reported having completed at least one nutrition course, which would increase their likelihood of valuing nutrition. In a 2015 study by Koh et al.,[8] only one out of the nine shelters had nutrition standards. To help improve nutrition, some cities have developed nutrition standards for shelters at the local level. For example, in 2008, New York City government implemented standards for foods purchased and served by city agencies, including shelters and soup kitchens.[8] The standards require a minimum number of fruits and vegetables; requires beverages to be 100% juice, water, or low-fat milk; and recommends serving whole grains.[8] The city government also prohibits agencies from accepting donations of candy and sugar-sweetened beverages.[8] These are more specific and targeted nutrition standards than those that only require certain food groups at each meal. Requiring whole grains rather than simply a starch would greatly improve the well-established finding that homeless diets are low in fiber.

Prohibiting certain foods from being donated such as sugar-sweetened beverages would also improve the healthfulness of meals. In the current study, 66.67% of the shelters had standards without a government mandate.

The qualitative results provided more insight into the shelter directors' views regarding nutrition needs of the shelters. Themes from their responses about barriers to following nutrition standards included the use of food donations, the use of volunteer-provided meals, lack of resources, and the special dietary needs of clients. Shelters explained they do not get to choose the nutritional value of food donated, and donated food must be used first, which often changes the meal plan considering the nutrition standards. A Canadian study examining the effect of food donations on nutrition found 14 out of the 18 participating programs used food donations, with the majority also purchasing some food.[27] The total energy contributed by donated foods varied widely, as well as the amount of food donations from one meal to the next.[27] This supports what directors in this study stated pertaining to the unpredictable nature of the use of food donations on nutrition quality of meals prepared. To help overcome the donations barrier, the 2015 study by Koh et al.[8] recommends shelter staff should encourage healthy food donations rather than the common high-starch, high-sugar donations. In turn, corporate and community partners can be more cognizant and provide these healthier options.[8] Scouten et al.[28] also acknowledged this, stating shelters should ask for specific food items rather than only working with what is donated.

How Registered Dietitians Could Help with Homeless Shelter Meals

A 2001 research study found 87% of shelters had a willingness to integrate recommendations from medical providers and nutritionists into meal planning.[19] In the current study, one of the themes identified was how a registered dietitian could be of help to homeless

shelters. The participants stated that one of the ways a registered dietitian could be of assistance was to provide nutrition education and counseling to shelter clients. This need was also identified in the 2015 study by Koh et al.,[8] in which only one out of nine shelters provided food education to guests and two out of eight provided food education to kitchen staff. While previous studies have shown that nutrition education is an effective tool in increasing nutrition knowledge of homeless shelter clients and staff, they have also reported that it alone does not improve quality of the diet.[11,12] In one study, the cafeteria staff's ability to demonstrate their learning was impeded by the constraints of food donations, thus limiting the shelter client's ability to choose healthful options.[12] Nutrition intake does not improve unless policies are also implemented to ensure healthful food is available for shelter clients. The second identified theme pertaining to registered dietitian need was to aid in meal planning to improve meal nutrition, and the third theme was to identify food to serve clients with specific dietary needs. Many shelters do not have the resources or specific knowledge required to help clients with specific dietary needs due to various health conditions. A study by Davis et al.[9] revealed shelter clients believe the food may even contribute to their health conditions. Many shelter residents stated they believed the shelter food contributed to poor management of chronic illness or caused them to suffer symptoms such as constipation, headaches, fatigue, and weight gain.[9]

Limitations

The primary limitation of this study is a small sample size, due to a 10.77% response rate. The low response rate suggests that shelter directors who did respond were more motivated and/or valued the role nutrition on health more than those who did not respond. Therefore, the shelters that participated may have better nutrition or policies related to nutrition than other

shelters. This was reflected in that 85.7% of those who responded had staff-planned meals rather than volunteer-planned meals. In addition, some shelters may have lacked the staff and/or were too busy serving clients. Indeed, when contacted, those who did not participate stated they were too busy, short staffed, or unwilling to coordinate with volunteers who planned meals.

Another limitation was the data collection method due to limited time and budget. The original plan was to observe the meals and serving sizes at the participating shelters, but the plan was revised due to a lack of time. As a result, dinner information was self-reported rather than observed, and the amount of food consumed by shelter clients was not determined. Therefore, the meals reported may not be representative of the actual nutrients consumed. In addition, some shelter dinner information reported was more detailed than others, varying the level of accuracy for each shelter.

Last, the 1/3 DRI set as the standard for comparison for the nutrient analysis was conservative. As previous research has reported, many homeless only consume two meals a day.[22] A goal of 50% of DRI is more appropriate for the homeless population.[22] It is also conservative because as Tse and Tarasuk[27] discuss in their research, the DRI estimates apply to healthy adults, and research shows this population are in poor health with nutrition deficiencies.

CHAPTER V

CONCLUSION

This study aimed to find if the method of meal provision (staff-planned versus volunteer-planned meals) and nutrition standards influenced nutrition quality of meals served. Due to a small sample size, the relationship between shelter nutrition policies and nutrition quality of meals served could not be determined. The qualitative data gathered suggests food donations are the main factor in limiting meal planning and override nutrition standards. Therefore, future research should focus on the nutritional value of food donations and how to encourage healthful food donations.

The findings on the nutrient analysis of dinner meals from 11 shelters suggest that homeless shelter dinners may be inadequate overall in calories, carbohydrate, fiber, calcium, and vitamin D and are excessive in sodium, fat, and cholesterol. Most of the shelters were lacking in dairy products and only provided water and/or juice with meals. Shelters could set a nutrition standard of providing dairy products with meals to improve the calcium and vitamin D content of meals. To improve fiber, shelters could change the common nutrition standard of providing a starch with every dinner to providing a whole-grain product with every dinner. Shelters could request the services of registered dietitians to volunteer or consult at shelters to help improve the nutrition quality of meals and address the themes identified in this study. Shelters would like help with meal planning, nutrition education of clients, and identifying foods for clients with special dietary needs.

REFERENCES

1. The U.S. Department of Housing and Urban Development. *Annual Homeless Assessment Report to Congress, 2014.* Part 1. Washington, DC: U.S. Government Printing Office; 2014.

2. Burt MR, Cohen BE. Differences among homeless single women with children, and single men. *Soc Probl.* 1989;36(5):508-524.

3. Martins DC, Gorman KS, Miller RJ, Murphy L, Sor S, Martins JC, Vecchiarelli ML. Assessment of food intake, obesity, and health risk among the homeless in Rhode Island. *Public Health Nurs*. 2015;32(5):453-461.

4. Cohen BE, Chapman N, Burt MR. Food sources and intake of homeless persons. *J Nutr Educ.* 1992;24(1):45S-51S.

5. The U.S. Department of Housing and Urban Development. *ESG Minimum Habitability Standards for Emergency Shelters and Permanent Housing.* Washington, DC: U.S. Government Printing Office; 2014.

6. Illinois Department of Human Services. *The Emergency Food Assistance Program: Section III – Emergency Food Program (Statue: 7 CFR Chapter 2 Part 251).* Illinois Department of Human Services Web site. https://www.dhs.state.il.us/page.aspx?item=77455#a_toc6. Accessed October 28, 2015.

7. United States Department of Agriculture Food and Nutrition Service. *CFR 226 Child and Adult Care Food Program.* Washington, DC: U.S. Government Printing Office; 2013.

8. Koh KA, Bharel M, Henderson DC. Nutrition for homeless populations: shelters and soup kitchens as opportunities for intervention. *Public Health Nutr*. 2015;19(7):1-3.

9. Davis LR, Weller NF, Jadhav M, Holleman WL. Dietary intake of homeless women residing at a transitional living center. *J Health Care Poor Underserved.* 2008;19(3):952-962.

10. Richards R, Smith C. The impact of homeless shelters on food access and choice among homeless families in Minnesota. *J Nutr Educ Behav*. 2006;38(2):96-105.

11. Kelly E. Assessment of dietary intake of preschool children living in a homeless shelter. *Appl Nurs Res.* 2001;14(3):146-154.

12. Yousey Y, Leake J, Wdowik M, Janken JK. Education in a homeless shelter to improve the nutrition of young children. *Public Health Nurs*. 2007;24(3):249-255.

13. Vredevoe DL, Brecht ML, Shuler P, Woo M. Risk factor for disease in a homeless population. *Public Health Nurs*. 1992;9(4):263-269.

14. 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. *J Gen Intern Med.* 2011;26(6):627–634.

15. Luder E, Boey E, Buchalter B, Martinez-Weber C. Assessment of the nutritional status of urban homeless adults. *Public Health Rep*. 1989;104(5):451–45.

16. Baggett TP, O'Connell JJ, Singer DE, Rigotti NA. The unmet health care needs of homeless adults: A national study. *Am J Public Health*. 2010;100(7):1326-1333.

17. Luder E, Ceysens-Okada E, Koren-Roth A, Martinez-Weber C. Health and nutrition survey in a group of urban homeless adults. *J Am Diet Assoc.* 1990;90(10):1387-1392.

18. Koh KA, Hoy JS, O'Connell JJ, Montgomery P. The hunger-obesity paradox: obesity in the homeless. *J Urban Health: Bull N Y Acad Med*. 2012;89(6):952-964.

19. Kourgialis N, Wendel J, Darby P, Grant R, Kory WP, Pruitt J, Seim L, Redlener I. *Improving the nutritional status of homeless children: guidelines for homeless family shelters.* Children's Health Fund Web site. http://www.childrenshealthfund.org/advocacy-and-research/research-publications. Published May 2001. Accessed September 14, 2015.

20. Nutritionist Pro Diet Analysis Software. Axxya Systems LLC 2017.

21. Institute of Medicine (US) Committee on Nutrition Standards for National School Lunch and Breakfast Programs; Stallings VA, Taylor CL, editors. *Nutrition Standards and Meal Requirements for National School Lunch and Breakfast Programs: Phase I. Proposed Approach for Recommending Revisions.* Washington (DC): National Academies Press (US); 2008.

22. Silliman K, Wood S. Evidence of nutritional inadequacy of meals served to homeless populations in rural Northern California. *Ecol Food Nutr.* 2001;40(3):285-297.

23. Luder E, Boey E, Buchalter B, Martinez-Weber C. Assessment of the nutritional status of urban homeless adults. *Public Health Rep*. 1989;104(5):451–457.

24. Wiecha JL, Dwyer JT, Dunnstrohecker M. Nutrition and health-services needs among the homeless. *Public Health Rep*. 1991;106(4):364-374.

25. Derrickson J, Gans DA. Assessment of dietary intake and food-related behaviors of gatekeepers in homeless families in Hawaii. *J Nutr Educ.* 1996;28(3):168-172.

26. Drake MA. The nutritional status and dietary adequacy of single homeless women and their children in shelters. *Public Health Rep.* 1992;107(3):312-318.

27. Tse C, Tarasuk V. Nutritional assessment of charitable meal programmes serving homeless people in Toronto. *Public Health Nutr.* 2008;11(12):1296-1305.

28. Scouten S, Lucia VC, Wunderlich T, Uhley V, Afonso NM. An assessment of needs of church coordinators providing meals to a homeless shelter. *J Health Care Poor Underserved.* 2016;27(3):1211-1219.

APPENDIX A

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Homelessness is an economic and social problem in the United States. According to the U.S. Department of Housing and Urban Development, the country is making progress to lower homelessness.[1] Nevertheless, there is still work to be done. Almost 1.49 million people in the U.S. were homeless and stayed in a shelter in 2014.[1] This review of research reveals that the homeless are not only at risk for malnutrition but also have an array of health issues including physical illness, mental illness, and substance abuse. These health issues, especially those related to diet, cause the nutritional adequacy of food served at shelters to be imperative. Unfortunately, existing research has found the homeless do not receive adequate nutrition in shelters, and shelter food policies can negatively affect their diets.

Homeless Food Sources and Nutrition

A 1992 national study of 1,704 homeless individuals found that the primary sources of food for homeless adults were soup kitchens (63%) and shelters (51%).[2] Other lesser sources of food included restaurants (29%), grocery stores (20%), friends and family (18%), garbage cans (9%), and food pantries (5%).[2] Of the 51% receiving food from a shelter, over half ate there every day.[2] On average, those who relied on meals provided by shelters ate there five out of seven days per week.[2] The study also found that 54% of shelters served three meals per day, compared to only 3% of the soup kitchens.[2] Therefore, more than twice as many meals per day are served to homeless in shelters than in soup kitchens.[2]

Food sources can vary among homeless subgroups, as found in a 1991 review of nutrition and related health problems among the homeless.[3] It found single adult males used more soup kitchens than families and were more likely to live on the street or in emergency shelters that do not provide all three meals.[3] The review also concluded that the mentally ill were less likely to use soup kitchens and shelters and more likely to obtain food from garbage cans.[3] Where a homeless person lives can also affect food sources and diet quality. A 1993 study found those living in hotels spent more on food, had less access to food, and were less likely to be satisfied with their diets. Individuals living in shelters spent the least on food.[4] A year later, a study in 1994 also found adults living in hotels had poorer intakes than those living in shelters.[5] In addition, homeless families living in shelters had a more adequate diet than low-income but non-homeless families.[5]

Due to their low incomes, most homeless individuals are eligible for food assistance programs. However, studies have shown food assistance programs are underutilized by these individuals.[6,7] A study of 319 homeless adults in Rhode Island found that only 55% of the participants were currently receiving Supplemental Nutrition Assistance Program (SNAP) benefits.[7] Another study, by Richards and Smith[6] found that 60% of participants regularly used food assistance.[6] To apply for SNAP, an individual must visit the local state or county office or complete an online application.[8] To be eligible, an individual must meet resource, income, deduction, and employment tests.[8] If eligible, the individual will then receive benefits through an electronic benefit transfer (EBT) card.[8] Richards and Smith[6] conducted seven focus groups in two homeless shelters serving families in Minneapolis, Minnesota. The focus groups identified barriers to homeless SNAP participation that included waiting periods for approval and limited accesses to food storage and cooking facilities.[6] The focus groups revealed that shelter policies

on storing food limited the amount of food as well as what type of food (perishable versus non-perishable) they could purchase with food assistance.[6] Due to these difficulties, individuals would sometimes sell food stamps to pay for other needs such as cell phones or clothes.[6]

Richards and Smith[6] also found that the homeless use other strategies besides food stamps to acquire food at grocery stores. Strategies described in the focus groups included eating food while shopping, stealing food, eating food samples, acquiring a line of credit, and asking to work for food.[6] The participants also used economical shopping habits such as using coupons, looking for the best deals, buying in bulk, purchasing canned foods, and purchasing in-season fruits and vegetables.[6]

Some homeless individuals resort to scavenging in dumpsters for food. As previously mentioned, the mentally ill, who are less likely to live in shelters, are more likely to eat food from garbage cans.[3] Those who eat food from garbage cans are at higher risk of food poisoning and dietary inadequacy.[3] In the study by Richards and Smith,[6] the majority of the sheltered participants said they had not used garbage cans as a source of food but might if their situation became drastic enough. Methods described to obtain food from garbage cans included trying to get food that had been thrown out in the same day and going to fast food restaurants after closing time.[6]

Compared to the general population, the homeless consume less food and have diets lower in nutritional quality. In a study by Burt and Cohen,[9] the homeless reported eating fewer meals per day than other low-income Americans, and more than a third reported eating nothing for one or more days in the week prior to their interview. Another study, by Cohen et al.,[2] interviewed 1,704 homeless individuals to make a one-day food list. The list, on average, took 7-8 minutes to create and was not as in depth as a 24-hour recall.[2] The study found 65% had not

consumed any milk or milk products during that day, 43% had not consumed fruits or vegetables, 30% had not consumed grain products, and 20% had not consumed meat or meat alternatives.[2] A study conducting 24-hour recalls for 319 homeless adults in Rhode Island found that the mean food intake of participants did not meet USDA recommendations for the number of daily servings for vegetables, fruit, dairy, and meats/beans.[7] It also found their diets to have an excessive intake of fats.[7] Over 94% of the participants were food insecure, with 64% of those who were food insecure experiencing hunger.[7] A similar study using 24-hour recalls was conducted in the United Kingdom with 40 homeless families.[10] It also found that the families' diets were low in fruits, vegetables, and dairy compared to recommendations.[10]

Homeless individuals' diets are lacking in vitamins and minerals and are high in sodium, saturated fat, and cholesterol.[3,11-14] A study in New York City conducted 24-hour recalls with 41 homeless individuals.[3] It found the participants' diets were low in zinc, vitamin B6, vitamin A, and calcium.[3] A study in Hawaii that conducted 24-hour recalls with 57 homeless families found diets low in fiber, calcium, and vitamin A.[11] An assessment of the nutritional status of 55 homeless urban adults at a New York medical center found participants had inadequate diets with high intakes of sodium, saturated fat, and cholesterol.[12] The participants in this study were an average of 47.3 years old, ranging from 24 to 72 years old.[12] By ethnicity, 31 were White and 24 were Black.[12] A similar 1990 study found that the homeless participants had a low dietary adequacy score based on the 1956-1992 basic four food groups (vegetables and fruits, milk, meat, and grain products), and their diets had a high level of saturated fat and cholesterol.[13] Last, a 1992 study of homeless women and children found diets less than 50% of the 1989 Recommended Dietary Allowances (RDA) for iron, magnesium, zinc, folic acid, and calcium.[14]

There are certain characteristics of the homeless that may put them at greater risk for undernutrition. A study of 529 homeless adults in Los Angeles County found that undernutrition was significantly predicted by more drug use, fewer free food sources, less income, and being male.[15] A 1991 review of homeless nutrition stated that homeless groups at risk for nutritional deficiencies included alcoholic, diabetic, hypertensive, pregnant, lactating, menopausal, elderly, growing children, lactose intolerant, taking medicinal or street drugs, and eating from dumpsters.[16]

Homeless Health

Individuals who are homeless have pervasive health issues. A study looking at risk factors for disease found the homeless had more health problems than non-homeless.[17] The most prevalent health problems were respiratory, dermal conditions, injuries, and digestive issues.[17] Risk factors related to these problems included drug and alcohol abuse, smoking, sedentary lifestyles, and obesity.[17] The sample was taken from a walk-in clinic for the homeless with a sample size of 1,252 people.[17] The sample was 91.4% male and 65% were between the ages of 18 to 40 years.[17]

A study by Nikoo et al.[18] researched the prevalence of self-reported chronic physical health conditions among homeless individuals. The survey was given in Vancouver, British Columbia, Canada.[18] Half of the participants were living on the streets and half were living in a shelter.[18] By gender, 200 of the participants were female and 299 were male. By ethnicity, 56% of participants were White and 39.8% Aboriginal.[18] The average age of participants was 37.9 years.[18] The most common self-reported conditions were head injury, back problems, chronic hepatitis, migraine headaches, and arthritis.[18] High blood pressure was reported by 15.6% of the

participants and chronic obstructive lung disease by 15.8%. There were also 7.6% who reported being HIV-positive and/or having AIDS.[18]

A 2005 study of 137 sheltered homeless women in the Midwest found the most frequent self-reported diseases were asthma, chronic bronchitis, and hypertension.[19] Nearly 68% reported at least one physical disease, and 35% had two or more physical diseases.[19] As previously stated, smoking is a risk factor for health problems.[19] In this study, 68.6% of participants used tobacco, with 47.5% using one or more packs of cigarettes per day.[19] By ethnicity, 53.3% of participants were White and 43.8% were African American.[19]

As previously mentioned, it has been found that the homeless have poor diets, resulting in increased risk of nutrition-related diseases. A study involving 55 homeless urban adults found their diets to be high in sodium, saturated fat, and cholesterol, in addition to having decreased lean body mass with increased body fat.[12] These findings show a risk of developing nutrition-related diseases.[12] A similar study involving a health and nutrition survey of 96 urban homeless adults also found their diets to be inadequate.[13] Cholesterol levels were above the desired limit in 82% of the participants, and there was a prevalence of hypertension, obesity, and a high risk of developing cardiovascular disease.[13] There was also a study of 288 homeless women and children living in shelters that found diets did not meet Recommended Daily Allowances (RDA).[14] These participants were at risk for iron deficiency anemia, obesity, and hypercholesterolemia.[14]

Although many would think food insecure individuals such as the homeless would be underweight, the homeless are actually at risk for obesity. The prevalence of obesity was shown in a large study looking at BMI distribution for homeless adults.[20] It reviewed charts of medical records from patients in the Boston Health Care for the Homeless population from 2007 to

2008.[20] The sample contained 5,632 male and female homeless adults, all over the age of 20 years.[20] In the sample, over 30% were obese and 5.6% were morbidly obese.[20] The mean BMI was 28.4, which is categorized as overweight.[20] Additionally, a study of 319 homeless adults in Rhode Island found 29.4% of participants were overweight and 39% were obese.[7] The hunger-obesity paradox is given as an explanation for these findings.[20] The hunger-obesity paradox is the presence of hunger and obesity in an individual and is more common than one might think.[21] In fact, the highest prevalence of obesity in the United States is in low-income groups.[20] The mechanism is still unclear, but it is hypothesized that individuals who lack money purchase and consume more cheap and energy-dense high-fat foods or that increased body fat is a physiological response to food insufficiency.[20,21]

Due to pervasive health issues, the homeless have higher rates of hospitalization and emergency department use than the general public.[22,23] A study by Baggett et al.[22] found that food insufficiency was related to higher rates of hospitalization and emergency department use in the homeless. The study examined a 2003 Health Care for the Homeless (HCH) User Survey of 966 adults at 79 HCH clinic sites in the US.[22] Of those surveyed, 25% were food insufficient and the chronically homeless were the most likely to be food insufficient.[22] Baggett et al.[22] explain food insufficiency could lead to poor disease self-management, and some may have to make the choice between food and medications. Some homeless emergency department users have also reported that their main reason for visiting was to obtain food.[22]

Many homeless individuals also live with unmet health care needs. A study of 966 homeless adults found "73% of the respondents reported at least one unmet health need, including an inability to obtain needed medical or surgical care (32%), prescription medications (36%), mental health care (21%), eyeglasses (41%), and dental care (41%)."[24] The study also

found 60% of participants were uninsured, 46% reported having two or more medical conditions, and 48% reported a history of treatment of mental illness.[24] Another study of 137 sheltered homeless women found dental and vision were the greatest unmet health care needs, with nearly 50% having not received either of these services in over two years.[19] The most common reported barriers to health care included money (63.5%) and transportation (32.1%).[19]

Nutrition in Homeless Shelters

Considering the homeless are at risk for poor health and diet quality, food served at homeless shelters becomes increasingly important. Research on the nutritional quality of food served has found it to be high in fat and low in whole grains, fresh fruits and vegetables.[25-27] Within these findings, studies have evaluated if food is meeting the nutrition recommendations for different age groups, many of which focus on children.

Research on the nutrition for young children who are homeless have found shelter meals do not meet nutrition recommendations. In 2001, Kelly[25] conducted research to find if food served at a homeless shelter was nutritionally adequate for young children. This research came about after shelter staff and mothers noticed behavior changes in the children due to eating patterns.[25] In the sample, 50 volunteer mothers residing in the shelter completed a one-day food record and questionnaire about their children's health.[25] There were a total of 75 children in the study, all between the ages of 1 and 5 years 11 months. By gender, 56% were boys and 44% were girls. By ethnicity, 75% were African American, 16% Hispanic, and 9% Caucasian.[25] The shelter was located in an industrial section of a large city in the southwestern United States.[25] There were no grocery stores or other food sources besides the shelter nearby.[25] Food policies of the shelter included no food allowed in rooms and no snacks available to children.[25] Results of

the study found the daily menu did not meet the USDA food pyramid's recommended number of daily servings for bread and vegetables.[25] Fruit, meat, and dairy products met the minimal recommendations.[25] Sweets and fats exceeded the recommended amount.[25] Besides increasing the daily servings of breads, fruits and vegetables, and decreasing sweets, it was suggested the shelter should make the dining room a more family-friendly environment and make snack times available to children and pregnant women.[25] It was also mentioned that a nutritionist would be of help to the shelter food program.[25]

Yousey et al.[26] also looked at the nutritional status of homeless children and found results supporting Kelly's[25] findings. The study evaluated a shelter's educational program for mothers and cafeteria staff designed to improve children's nutritional status.[26] The program was at a homeless shelter for women and children in a southeastern metropolitan area.[26] The sample consisted of 56 mothers with children between the ages of 18 months and 6 years and three cafeteria staff.[26] The mothers attended four nutrition classes developed by a registered dietitian (RD) taught by clinic nurses.[26] The cafeteria staff attended three nutrition classes taught by the RD.[26] The results found the mothers' nutrition knowledge increased, but nutritional quality of foods served did not.[26] Therefore, the mothers could not apply their knowledge and provide better nutrition for their children.[26] Constraints on food donations were cited for the inability of kitchen staff to improve nutritional quality.[26] To evaluate nutritional quality, an observation checklist was formed and data was entered into the Nutritional Analysis Tools and System (NATS, 1998).[26] It was then analyzed to summarize percentages of DRIs. The intake of fiber was 12% of DRI, suggesting that there was a low intake of whole grains, fruits and vegetables.[26] This is consistent with Kelly's[25] findings, showing shelters are not meeting nutritional recommendations for children.

While there have been studies looking at children's nutrition in shelters, studies focusing on adult nutrition have been more scarce. In 2008, Davis et al.[27] looked at the nutritional status of adult women in a transitional living center. They state that most previous studies on the topic have not been done in 15 years or more from the time their study was conducted, and relatively few had been done on adult women.[27] The transitional living center was located in a large, urban area of the southwestern United States.[27] It housed single women and families, with most adults recovering from addiction, domestic violence, and childhood abuse.[27] By ethnicity, the residents were approximately 70% African American, 15% Hispanic, and 15% White.[27] For the samples, 81 women participated in the nutritional assessment with an average age of 36.5 years, and 22 women of unknown ages participated in the focus groups.[27] The Block Rapid Food Screener was used to assess fat and fruit/vegetable/fiber intake during three dinners.[27] After analyzing the data, it was found the women's dietary intake did not meet USDA recommendations.[27] Specifically, fruit/vegetable/fiber intake was below the recommendations, and fat exceeded recommendations.[27] This is similar to the findings on homeless children's intake in shelters. The study also found, through focus groups, that residents thought the food to be inadequate in taste, nutritional quality, and choice.[27] They also believed it contributed to their chronic diseases and symptoms.[27]

Another study focusing on the homeless adult population analyzed the nutritional adequacy of meals served in rural shelters or soup kitchens in northern California.[28] A total of 106 meals at thirteen sites were analyzed and cooks at all the sites were interviewed.[28] The study found that meals were low in fiber, high in fat, and provided less than 33% of the RDA/DRI for folate, calcium, magnesium, and zinc.[28] The study also found that none of the cooks at the sites were using the USDA food guide pyramid to plan meals.[28]

Homeless Shelter Food Policies

Shelter policies and practices can affect the diets of shelter residents. Richards and Smith[6] researched strategies of homeless families to acquire food and the factors that influence their food choices. They conducted seven focus groups in two homeless shelters serving families in Minneapolis, Minnesota.[6] The focus group participants consisted of 53 parents or guardians with children aging from 2 to 12 years old.[6] Participants indicated that the food options at their homeless shelter were poor in quality and lacked variety.[6] Participants described certain breakfast items as "stale" and meat served at dinner as often undercooked or overcooked.[6] Overall, the study found that the organization and policies of shelters influenced dietary intakes of families.[6] For example, early dinner meal times (4:30-5:30 p.m.), with no snacks available, caused children to be hungry at night.[6] The study also found that the lack of food storage facilities inhibited residents' food choices and lowered their diet quality.[6] The first shelter had limited storage space and a policy not allowing perishable foods in their rooms.[6] Residents reported buying less healthful food and a change in typical eating habits.[6] Small refrigerators in rooms of the second shelter also caused residents to change shopping habits and buy less healthy food.[6] They bought canned fruits and vegetables instead of fresh and, especially in meat products, had to buy smaller, more expensive packaged items instead of less expensive bulk packages.[6] After these findings it was suggested nutritionists could assist in food service management of shelters.[6]

Due to concerns over shelter food policies inhibiting homeless children from receiving adequate nutrition, the Children's Health Fund created a report surveying family shelters and state homeless coordinators on shelter policies and practices regarding nutrition.[29] Included in these practices were cooking facilities, meal provision, food storage, and requirements to vacate

during the day.[29] There were 259 respondents to the survey; however, there was a sampling bias.[29] Those responding may have been more motivated and possibly had better shelter practices than others due to the fact that the questionnaire was lengthy, and only 259 out of 1,000 responded.[29] A notable result was that 60% of shelters did not allow residents to store food in their rooms.[29] This is meaningful because of findings from the aforementioned Richards and Smith[6] study, which found the lack of food storage facilities inhibits residents' food choices and lowers their diet quality. Another result of concern was that many shelters did not take advantage of certain government resources regarding food.[29] Only 18% reported to be knowledgeable of USDA programs directed at homeless children, and only 9% reported having applied for a Child and Adult Care Food Program grant.[29]

There are currently no governmental regulations or national standards for the nutrition of food served at homeless shelters. However, some cities have developed nutrition standards for shelters at the local level. In 1987, Philadelphia, Pennsylvania, established the Shelter Standards Committee that created standards adopted by the Office of Emergency Shelter Services (OESS) and the Voluntary Council on Emergency Food and Shelter.[29] The standards created regarding the provision of food require shelters to work with residents' schedules, including providing breakfast early for children who have to go to school and setting meals aside for adults who are at work.[29] Other requirements include that shelters must serve three meals a day, and meals must meet the Recommended Daily Allowances (RDA).[29] Every effort should be made to accommodate residents with special dietary needs or restrictions, including those based on medical conditions.[29] There are multiple other standards shelters must follow regarding food, including additional standards for shelters that serve very young children.[29] In 2008, New York City implemented standards for foods purchased and served by city agencies, including shelters

and soup kitchens.[30] The standards require a minimum number of fruits and vegetables; require beverages to be 100% juice, water, or low-fat milk; and recommend serving whole grains.[30] It also prohibits agencies from accepting donations of candy and sugar-sweetened beverages.[30] Other cities that have created standards for shelter food service include Columbus, Ohio, and Detroit, Michigan; however, they are minimal and far less extensive than Philadelphia's and New York City's.[29] These cities demonstrate how funding could be used to address the poor nutritional quality of food served in shelters. Federal, state, and local government can make an impact by creating nutrition standards for any agencies receiving funding.

Homeless Nutrition Intervention

The poor health and nutrition of the homeless population indicate a need for nutrition intervention. In addition, research has shown that the homeless population would be receptive to a well-designed nutrition intervention. In a 2016 survey of 394 homeless adults, the prevalence of modifiable health risk factors was high, but the desire to change those risk factors was also high.[31] Therefore, homeless adults need resources through intervention to help them actualize their desire for change. A study of 137 women living in homeless shelters found participants practiced all of the following health behaviors: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management.[19] However, the lowest behaviors practiced were nutrition and physical activity, indicating a need for intervention targeting those specific health behaviors.[19] The researchers noted that if the opportunity for health-promoting behavior is not readily available, it is unlikely homeless women will participate; situational influences are a critical motivator for this population.[19] Considering this, a nutrition intervention held in a homeless shelter may be the most effective way to reach this

population. An additional target population for nutrition intervention is shelter food service staff, as shelter directors have reported difficulty providing nutritious meals.[5]

Multiple homeless nutrition interventions have been piloted over the years. In a 1999 study, The USDA Special Supplement Nutrition Program for Women, Infants, and Children (WIC) staff visited homeless shelters and soup kitchens to certify people for WIC.[32] There were 214 homeless clients certified for WIC within a 1-year period.[32] The WIC program not only provided food packages but intensive nutrition and health education.[32] In a 2009 study, nutrition education was provided to 50 women living in two homeless shelters in Las Vegas, NV.[33] The participants attended a series of four, 2-hour nutrition classes conducted bi-weekly.[33] The four topics covered in the classes were weight management through nutritious meals; shopping for nutritious and economical foods; information on vitamins, minerals, and herbs and their function in the diet; and nutrition for children and women.[33] Through pre- and post-tests, the study found that participants demonstrated significant improvement in food knowledge, as well as consumption of fruit, vegetables, yogurt, bread, cereal, pasta, and rice.[33]

From 2009 to 2012, a nutrition education, physical activity, and media literacy program for children was implemented in two Bronx, New York, homeless shelters.[34] The 15-week program met for 1 hour every other week and had a total of 162 participants.[34] The curriculum was designed to be understood with inconsistent attendance, due to the transience of the homeless population.[34] The program was facilitated by a health educator and administrative coordinator.[34] A qualitative study evaluating the effectiveness of the program found changes in children's knowledge and attitudes as well as intention to change behaviors.[34] In 2016, a 4-week diet and physical activity intervention was implemented in a single homeless shelter.[35] There were 17 participants who received educational newsletters, pedometers with step goals, and fruit

and vegetable snacks twice a day.[35] Compared to the control group, participants were significantly more physically active, but there was no significant difference in fruit and vegetable consumption.[35]

A unique intervention using creative participatory action research methods including photo-elicitation was recently conducted at a homeless service provider in the United Kingdom.[36] Six male participants took photos of their food activities over a 10-day period, then met to discuss the photos in two focus groups (n=3 each).[36] The themes of the discussions were power and empowerment, occupation, emotion and meaning of food, and space and place.[36] The study showed that creative expression with food can cause reflection, empowerment, and connectedness.[36] The discussion also revealed that having the homeless participate in meal preparation and building occupational food skills has the potential for many benefits such as empowerment.[36] These studies show nutrition intervention in homeless shelters can be effective in improving health behaviors, nutrition knowledge, and diet quality of the homeless population.

Summary

From this body of research, it is known that people who are homeless have pervasive health issues and poor diet quality. If living in a shelter, the food provided does not meet nutrition recommendations, and certain shelter policies and practices can affect the diet quality of the residents. This study further explores this topic by focusing on the impact of shelter meal policies and practices on the nutritional quality of meals. The nutritional quality of meals was evaluated based on the Dietary Reference Intakes (DRIs) for an adult population. This study focuses on the adult population because 60.6% of shelter residents in America are adults ages 25 and older[1] and many recent studies concentrate only on children.

REFERENCES

1. The U.S. Department of Housing and Urban Development. *Annual Homeless Assessment Report to Congress, 2014.* Part 1. Washington, DC: U.S. Government Printing Office; 2014.

2. Cohen BE, Chapman N, Burt MR. Food sources and intake of homeless persons. *J Nutr Educ.* 1992;24(1):45S-51S.

3. Wiecha JL, Dwyer JT, Dunnstrohecker M. Nutrition and health-services needs among the homeless. *Public Health Rep*. 1991;106(4):364-374.

4. Wiecha JL, Dwyer JT, Jacques PF, Rand WM. Nutritional and economic advantages for homeless families in shelters providing kitchen facilities and food. *J Am Diet Assoc.* 1993;93(7):777-83.

5. Goyings N, Csete J. Dietary-intake of homeless families in Wisconsin - lessons for nutrition educators. *J Nutr Educ.* 1994;26(2):62-68.

6. Richards R, Smith C. The impact of homeless shelters on food access and choice among homeless families in Minnesota. *J Nutr Educ Behav*. 2006;38(2):96-105.

7. Martins DC, Gorman KS, Miller RJ, Murphy L, Sor S, Martins JC, Vecchiarelli ML. Assessment of food intake, obesity, and health risk among the homeless in Rhode Island. *Public Health Nurs*. 2015;32(5):453-461.

8. Supplemental Nutrition Assistance Program (SNAP): Eligibility. USDA Food and Nutrition Service Web site. https://www.fns.usda.gov/snap/eligibility. Published October 20, 2016. Accessed January 11, 2017.

9. Burt MR, Cohen BE. Differences among homeless single women with children, and single men. *Soc Probl.* 1989;36(5):508-524.

10. Jenkins M. An assessment of homeless families' diet and nutrition. *Community Pract*. 2014;87(4):24-27.

11. Derrickson J, Gans DA. Assessment of dietary intake and food-related behaviors of gatekeepers in homeless families in Hawaii. *J Nutr Educ.* 1996;28(3):168-172.

12. Luder E, Boey E, Buchalter B, Martinez-Weber C. Assessment of the nutritional status of urban homeless adults. *Public Health Rep*. 1989;104(5):451–457.

13. Luder E, Ceysens-Okada E, Koren-Roth A, Martinez-Weber C. Health and nutrition survey in a group of urban homeless adults. *J Am Diet Assoc.* 1990;90(10):1387-1392.

14. Drake MA. The nutritional status and dietary adequacy of single homeless women and their children in shelters. *Public Health Rep.* 1992;107(3):312-318.

15. Gelberg L, Stein JA, Neumann CG. Determinants of undernutrition among homeless adults. *Public Heal reports (Washington, DC 1974-)*. 1995;110(4):448-454.

16. Strasser JA, Damrosch S, Gaines J. Nutrition and the homeless person. *J Community Health Nurs.* 1991;8(2):65-73.

17. Vredevoe DL, Brecht ML, Shuler P, Woo M. Risk factor for disease in a homeless population. *Public Health Nurs*. 1992;9(4):263-269.

18. Nikoo N, Motamed M, Nikoo M, Strehlau V, Neilson E, Saddicha S, Krausz M. Chronic physical health conditions among homeless. *J Health Dispar Res Pract.* 2015;8(1):81-97.

19. Wilson M. Health-promoting behaviors of sheltered homeless women. *Fam Community Health*. 2005;28(1):51-63.

20. Koh KA, Hoy JS, O'Connell JJ, Montgomery P. The hunger-obesity paradox: obesity in the homeless. *J Urban Health: Bull N Y Acad Med*. 2012;89(6):952-964.

21. Scheier, LM. What is the hunger-obesity paradox? *J Am Diet Assoc.* 2005;105(6):883-885.

22. 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. *J Gen Intern Med.* 2011;26(6):627–634.

23. Karaca Z, Wong HS, Mutter RL. *Characteristics of Homeless and Non-Homeless Individuals Using Inpatient and Emergency Department Services, 2008: Statistical Brief #152*. Agency for Healthcare Research and Quality (US); 2006. http://www.ncbi.nlm.nih.gov/pubmed/23678514. Accessed December 12, 2016.

24. Baggett TP, O'Connell JJ, Singer DE, Rigotti NA. The unmet health care needs of homeless adults: A national study. *Am J Public Health*. 2010;100(7):1326-1333.

25. Kelly E. Assessment of dietary intake of preschool children living in a homeless shelter. *Appl Nurs Res.* 2001;14(3):146-154.

26. Yousey Y, Leake J, Wdowik M, Janken JK. Education in a homeless shelter to improve the nutrition of young children. *Public Health Nurs*. 2007;24(3):249-255.

27. Davis LR, Weller NF, Jadhav M, Holleman WL. Dietary intake of homeless women residing at a transitional living center. *J Health Care Poor Underserved.* 2008;19(3):952-962.

28. Silliman K, Wood S. Evidence of nutritional inadequacy of meals served to homeless populations in rural Northern California. *Ecol Food Nutr.* 2001;40(3):285-297.

29. Kourgialis N, Wendel J, Darby P, Grant R, Kory WP, Pruitt J, Seim L, Redlener I. *Improving the nutritional status of homeless children: guidelines for homeless family shelters.* Children's Health Fund Web site. http://www.childrenshealthfund.org/advocacy-and-research/research-publications. Published May 2001. Accessed September 14, 2015.

30. Koh KA, Bharel M, Henderson DC. Nutrition for homeless populations: shelters and soup kitchens as opportunities for intervention. *Public Health Nutr*. 2015;19(7):1-3.

31. Taylor E, Kendzor D, Reitzel L, Businelle M. Health risk factors and desire to change among homeless adults. *Am J Health Behav*. 2016;40(4):455-460.

32. Hamm LA, Holden EW. Providing WIC services to homeless families. *J Nutr Educ.* 1999;31(4):224-229.

33. Johnson L, Myung E, McCool A, Champaner E. Nutrition education for homeless women—challenges and opportunities: a pilot study. *Journal Of Foodservice Business Research*. 2009;12(2):155-169.

34. Rodriguez J, Applebaum J, Stephenson-Hunter C, Tinio A, Shapiro A. Cooking, Healthy Eating, Fitness and Fun (CHEFFs): Qualitative evaluation of a nutrition education program for children living at urban family homeless shelters. *Am J Public Health.* 2013;103(S2):S361-S367.

35. Kendzor DE, Allicock M, Businelle MS, Sandon LF, Gabriel KP, Frank SG. Evaluation of a shelter-based diet and physical activity intervention for homeless adults. J Phys Act Health. 2016;24:1-28.

36. Pettinger C, Parsons JM, Cunningham M, Withers L, D'Aprano G, Letherby G, Sutton C, Whiteford A, Ayres R. Engaging homeless individuals in discussion about their food experiences to optimize wellbeing: A pilot study. *Health Educ J.* 2017;76(5):557-565.

APPENDIX B

QUALTRICS SURVEY QUESTIONS

Q0 Dear Participant,

My name is Samantha Harmon, a nutrition and dietetics graduate student at Northern Illinois University. I am conducting a thesis project as part of the requirements for my M.S. in nutrition and I need your assistance. You are invited to participate in my graduate thesis project regarding food practices and guidelines at homeless shelters.

This survey will take approximately 10 minutes to complete. Please respond to the questions on this survey truthfully and to the best of your ability. After completion, the researcher will ask you to send information on three dinners served at your shelter. These dinners will be on dates of the researchers choosing. The information requested will be the menu, all available recipes, and portion sizes. You may choose to send this information by email or by mail. Any information that could identify you or your shelter will be removed from any reported data. The data and contact information will be stored on a password-protected computer and in a password-protected file. After full participation, you can request the results of the study by contacting the researcher, Samantha Harmon, at sharmon1@niu.edu. Results will help you understand how adequately your shelter and other shelters in Illinois meet the nutrition needs of clients.

Completion of this online survey implies you consent to participate in this study. Consent to participate does not constitute a waiver of any legal rights or redress you might have as a result of participation. Participation is voluntary and may be withdrawn at any time without penalty or prejudice. If you have any questions concerning this study, please contact the researcher, Samantha Harmon, at sharmon1@niu.edu, or her thesis committee chair, Dr. Josephine Umoren, at jxu1@niu.edu. If you would like further information regarding your rights as a research subject, you may contact the Office of Research Compliance at Northern Illinois University at (815) 753-8588. I have read and understand the above information. By clicking the "yes" button to enter the survey, I am giving my consent and volunteering to participate in the study.

- ❍ Yes, I wish to participate in the study and complete the survey (1)
- ❍ No, I do not wish to participate in the study and complete the survey (2)

Condition: No, I do not wish to partic... Is Selected. Skip To: End of Survey.

Q1 Please fill in the following information about yourself. This information will only be used by the researcher to contact you about the study. It will be removed from any reported data.

Shelter Name (1)
Your Name (2)
Your Position at Shelter (3)
Phone Number (4)
Email (5)
Do you prefer to be contacted by phone or email? (6)
Do you prefer to submit meal information (menu, recipes, portion sizes) by mail or email? You will only be asked to submit information for one meal. (7)

Q2 Do you serve clients that are 18 years or older?
- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

Q3 Do you have male clients?
- ❍ Yes (1)
- ❍ No (2)

Q4 Do you have female clients?
- ❍ Yes (1)
- ❍ No (2)

Q5 Which shelter type does your shelter program that serves meals identify with?
- ❍ Emergency/Temporary/Overnight (1)
- ❍ Transitional Housing (2)
- ❍ Other, please specify: (3) _____

Q6 What is the average number of people served for a meal at your shelter?

Q7 How many beds does your shelter have?

Q8 Please select all of the meal types you serve. Then, in the text boxes list the time frame in which each meal is served.
- ❑ Breakfast (1) _____
- ❑ Lunch (2) _____
- ❑ Dinner (3) _____
- ❑ Snacks (4) _____

Q9 Who plans the meals to be served? If planning is done by both volunteers and shelter staff, select "Both" and explain. If you have a different or more complicated system of planning meals, select "Other" and explain thoroughly. Please note: This is not a question about who prepares the meals. It is inquiring about who plans what is to be prepared.
- ❍ Volunteers (1)
- ❍ Shelter Staff (2)
- ❍ Both Volunteers and Shelter Staff, please explain: (3) _____
- ❍ Other, please explain: (4) _____

Q10 Do you have any guidelines regarding food that are followed when planning meals?
- ❍ Yes (1)
- ❍ No (2)

Display This Question:
If Do you have any nutrition standards that are followed when planning meals? Nutrition standards are any followed rules or guidelines that direct what food is to be served with the purpose of making... No Is Selected

Q11 Please explain why your shelter does not follow any guidelines regarding food or nutrition.

Display This Question:
If Do you have any nutrition standards that are followed when planning meals? Nutrition standards are any followed rules or guidelines that direct what food is to be served with the purpose of making... Yes Is Selected

Q12 Please list all of your guidelines regarding food that are followed when planning meals.

Display This Question:
If Do you have any guidelines regarding food that are followed when planning meals? Yes Is Selected

Q13 How does your shelter make sure the guidelines are being followed? Is there a specific person who ensures they are being followed?

Display This Question:
If Who plans the meals to be served? If planning is done by both volunteers and shelter staff, select "Both" and explain. If you have a different or more complicated system of planning meals, select ... Shelter Staff Is Not Selected
And Do you have any guidelines regarding food that are followed when planning meals? Yes Is Selected

Q14 Are the volunteers involved in planning the meals trained to follow the guidelines regarding food?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Volunteers are not involved in planning meals (3)

Display This Question:
If Who plans the meals to be served? If planning is done by both volunteers and shelter staff, select "Both" and explain. If you have a different or more complicated system of planning meals, select ... Volunteers Is Not Selected
And Do you have any guidelines regarding food that are followed when planning meals? Yes Is Selected

Q15 Is the staff involved in planning the meals trained to follow the guidelines regarding food?

- ❍ Yes (1)
- ❍ No (2)
- ❍ Staff is not involved in planning meals (3)

Q16 Are you personally involved in planning the meals to be served at your shelter?
- ❍ Yes (1)
- ❍ No (2)

Q17 Do work at the shelter full-time or part-time?
- ❍ Full-time (1)
- ❍ Part-time (2)
- ❍ Other: (3) _____

Q18 What is your gender?

Q19 What is your age?

Q20 What is the highest level of education you have completed?
- ❍ High School Diploma (1)
- ❍ Some College (2)
- ❍ Associate Degree (3)
- ❍ Undergraduate Degree (4)
- ❍ Masters Degree (5)
- ❍ Doctorate Degree (6)

Q21 Do you have a degree in the culinary arts?
- ❍ Yes (1)
- ❍ No (2)

Q22 Please list any nutrition education or experience you have.

APPENDIX C

DIETARY REFERENCE INTAKES (DRIs) CHARTS

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Total Water and Macronutrients

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Total Water[a] (L/d)	Carbohydrate (g/d)	Total Fiber (g/d)	Fat (g/d)	Linoleic Acid (g/d)	α-Linolenic Acid (g/d)	Protein[b] (g/d)
Males							
9–13 y	2.4*	**130**	31*	ND	12*	1.2*	**34**
14–18 y	3.3*	**130**	38*	ND	16*	1.6*	**52**
19–30 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
31–50 y	3.7*	**130**	38*	ND	17*	1.6*	**56**
51–70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
> 70 y	3.7*	**130**	30*	ND	14*	1.6*	**56**
Females							
9–13 y	2.1*	**130**	26*	ND	10*	1.0*	**34**
14–18 y	2.3*	**130**	26*	ND	11*	1.1*	**46**
19–30 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
31–50 y	2.7*	**130**	25*	ND	12*	1.1*	**46**
51–70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**
> 70 y	2.7*	**130**	21*	ND	11*	1.1*	**46**

NOTE: This table (take from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDA) in **bold type** and Adequate Intakes (AI) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all (97–98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breast-fed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

a Total water includes all water contained in food, beverages, and drinking water.
b Based on g protein per kg of body weight for the reference body weight, e.g., for adults 0.8 g/kg body weight for the reference body weight.

c Not determined.

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002/2005) and *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2005). The report may be accessed via www.nap.edu.

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Vitamins

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Vitamin A (µg/d)[a]	Vitamin C (mg/d)	Vitamin D (µg/d)[b,c]	Vitamin E (mg/d)[d]	Vitamin K (µg/d)	Thiamin (mg/d)	Ribo-flavin (mg/d)	Niacin (mg/d) [e]	Vitamin B_6 (mg/d)	Folate (µg/d) [f]	Vitamin B_{12} (µg/d)	Panto-thenic Acid (mg/d)	Biotin (µg/d)	Choline (mg/d)[g]
Males														
9–13 y	**600**	**45**	**15**	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**900**	**75**	**15**	**15**	75*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	25*	550*
19–30 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
31–50 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.3**	**400**	**2.4**	5*	30*	550*
51–70 y	**900**	**90**	**15**	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[h]	5*	30*	550*
> 70 y	**900**	**90**	**20**	**15**	120*	**1.2**	**1.3**	**16**	**1.7**	**400**	**2.4**[h]	5*	30*	550*
Females														
9–13 y	**600**	**45**	**15**	**11**	60*	**0.9**	**0.9**	**12**	**1.0**	**300**	**1.8**	4*	20*	375*
14–18 y	**700**	**65**	**15**	**15**	75*	**1.0**	**1.0**	**14**	**1.2**	**400**[i]	**2.4**	5*	25*	400*
19–30 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
31–50 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.3**	**400**[i]	**2.4**	5*	30*	425*
51–70 y	**700**	**75**	**15**	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*
> 70 y	**700**	**75**	**20**	**15**	90*	**1.1**	**1.1**	**14**	**1.5**	**400**	**2.4**[h]	5*	30*	425*

NOTE: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all (97–98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breast-fed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

a As retinol activity equivalents (RAEs). 1 RAE = 1 µg retinol, 12 µg β-carotene, 24 µg α-carotene, or 24 µg β-cryptoxanthin. The RAE for dietary provitamin A carotenoids is two-fold greater than retinol equivalents (REs), whereas the RAE for preformed vitamin A is the same as RE.
b As cholecalciferol. 1 µg cholecalciferol = 40 IU vitamin D.
c Under the assumption of minimal sunlight.
d As α-tocopherol. α-tocopherol includes *RRR-α-tocopherol,* the only form of α-tocopherol that occurs naturally in foods, and the *2R*-stereoisomeric forms of α-tocopherol (*RRR-, RSR-, RRS-,* and *RSS*-α-tocopherol) that occur in fortified foods and supplements. It does not include the *2S*-stereoisomeric forms of α-tocopherol (*SRR-, SSR-, SRS-,* and *SSS*-α-tocopherol), also found in fortified foods and supplements.
e As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0–6 months = preformed niacin (not NE).
f As dietary folate equivalents (DFE). 1 DFE = 1 µg food folate = 0.6 µg of folic acid from fortified food or as a supplement consumed with food = 0.5 µg of a supplement taken on an empty stomach.
g Although AIs have been set for choline, there are few data to assess whether a dietary supply of choline is needed at all stages of the life cycle, and it may be that the choline requirement can be met by endogenous synthesis at some of these stages.
h Because 10 to 30 percent of older people may malabsorb food-bound B_{12}, it is advisable for those older than 50 years to meet their RDA mainly by consuming foods fortified with B_{12} or a supplement containing B_{12}.
i In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 µg from supplements or fortified foods in addition to intake of food folate from a varied diet.
j It is assumed that women will continue consuming 400 µg from supplements or fortified food until their pregnancy is confirmed and they enter prenatal care, which ordinarily occurs after the end of the periconceptional period—the critical time for formation of the neural tube.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2005); and *Dietary Reference Intakes for Calcium and Vitamin D* (2011). These reports may be accessed via www.nap.edu.

Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, Elements

Food and Nutrition Board, Institute of Medicine, National Academies

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (g/d)	Sodium (g/d)	Chloride (g/d)
Males													
9–13 y	**1,300**	25*	**700**	2*	**120**	**8**	**240**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	**1,300**	35*	**890**	3*	**150**	**11**	**410**	**1,250**	**55**	**11**	4.7*	1.5*	2.3*
19–30 y	**1,000**	35*	**900**	4*	**150**	**8**	**400**	**700**	**55**	**11**	4.7*	1.5*	2.3*
31–50 y	**1,000**	35*	**900**	4*	**150**	**8**	**420**	**700**	**55**	**11**	4.7*	1.5*	2.3*
51–70 y	**1,000**	30*	**900**	4*	**150**	**8**	**420**	**700**	**55**	**11**	4.7*	1.3*	2.0*
> 70 y	**1,200**	30*	**900**	4*	**150**	**8**	**420**	**700**	**55**	**11**	4.7*	1.2*	1.8*
Females													
9–13 y	**1,300**	21*	**700**	2*	**120**	**8**	**240**	**1,250**	**40**	**8**	4.5*	1.5*	2.3*
14–18 y	**1,300**	24*	**890**	3*	**150**	**15**	**360**	**1,250**	**55**	**9**	4.7*	1.5*	2.3*
19–30 y	**1,000**	25*	**900**	3*	**150**	**18**	**310**	**700**	**55**	**8**	4.7*	1.5*	2.3*

Life Stage Group	Calcium (mg/d)	Chromium (µg/d)	Copper (µg/d)	Fluoride (mg/d)	Iodine (µg/d)	Iron (mg/d)	Magnesium (mg/d)	Phosphorus (mg/d)	Selenium (µg/d)	Zinc (mg/d)	Potassium (g/d)	Sodium (g/d)	Chloride (g/d)
31–50 y	**1,000**	25*	**900**	3*	**150**	**18**	**320**	**700**	**55**	**8**	4.7*	1.5*	2.3*
51–70 y	**1,200**	20*	**900**	3*	**150**	**8**	**320**	**700**	**55**	**8**	4.7*	1.3*	2.0*
> 70 y	**1,200**	20*	**900**	3*	**150**	**8**	**320**	**700**	**55**	**8**	4.7*	1.2*	1.8*

NOTE: This table (taken from the DRI reports, see www.nap.edu) presents Recommended Dietary Allowances (RDAs) in **bold type** and Adequate Intakes (AIs) in ordinary type followed by an asterisk (*). An RDA is the average daily dietary intake level sufficient to meet the nutrient requirements of nearly all (97–98 percent) healthy individuals in a group. It is calculated from an Estimated Average Requirement (EAR). If sufficient scientific evidence is not available to establish an EAR, and thus calculate an RDA, an AI is usually developed. For healthy breast-fed infants, an AI is the mean intake. The AI for other life stage and gender groups is believed to cover the needs of all healthy individuals in the groups, but lack of data or uncertainty in the data prevent being able to specify with confidence the percentage of individuals covered by this intake.

SOURCES: *Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride* (1997); *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B_6, Folate, Vitamin B_{12}, Pantothenic Acid, Biotin, and Choline* (1998); *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc* (2001); *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate* (2005); and *Dietary Reference Intakes for Calcium and Vitamin D* (2011). These reports may be accessed via www.nap.edu.

Dietary Reference Intakes (DRIs): Additional Macronutrient Recommendations

Food and Nutrition Board, Institute of Medicine, National Academies

Macronutrient	Recommendation
Dietary cholesterol	As low as possible while consuming a nutritionally adequate diet
Trans fatty acids	As low as possible while consuming a nutritionally adequate diet
Saturated fatty acids	As low as possible while consuming a nutritionally adequate diet
Added sugars[a]	Limit to no more than 25% of total energy

a Not a recommended intake. A daily intake of added sugars that individuals should aim for to achieve a healthful diet was not set.

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002/2005). The report may be accessed via www.nap.edu.

Dietary Reference Intakes (DRIs): Acceptable Macronutrient Distribution Ranges

Food and Nutrition Board, Institute of Medicine, National Academies

	Range (percent of energy)		
Macronutrient	**Children, 1–3 y**	**Children, 4–18 y**	**Adults**
Fat	30–40	25–35	20–35
n-6 polyunsaturated fatty acids[a] (linoleic acid)	5–10	5–10	5–10
n-3 polyunsaturated fatty acids[a] (α-linolenic acid)	0.6–1.2	0.6–1.2	0.6–1.2
Carbohydrate	45–65	45–65	45–65
Protein	5–20	10–30	10–35

a Approximately 10 percent of the total can come from longer-chain *n*-3 or *n*-6 fatty acids.

SOURCE: *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (2002/2005). The report may be accessed via www.nap.edu.

Estimated Calorie Needs per Day, by Age, Sex, and Physical Activity Level

MALES

AGE	Sedentary[a]	Moderately active[b]	Active[c]
19-20	2,600	2,800	3,000
21-25	2,400	2,800	3,000
26-30	2,400	2,600	3,000
31-35	2,400	2,600	3,000
36-40	2,400	2,600	2,800
41-45	2,200	2,600	2,800
46-50	2,200	2,400	2,800
51-55	2,200	2,400	2,800
56-60	2,200	2,400	2,600
61-65	2,000	2,400	2,600
66-70	2,000	2,200	2,600
71-75	2,000	2,200	2,600
76 and up	2,000	2,200	2,400

[a] Sedentary means a lifestyle that includes only the physical activity of independent living.
[b] Moderately Active means a lifestyle that includes physical activity equivalent to walking about 1.5 to 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.
[c] Active means a lifestyle that includes physical activity equivalent to walking more than 3 miles per day at 3 to 4 miles per hour, in addition to the activities of independent living.

[d] Estimates for females do not include women who are pregnant or breastfeeding.
Source: Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington (DC): The National Academies Press; 2002.

FEMALES[d]

AGE	Sedentary[a]	Moderately active[b]	Active[c]
19-20	2,000	2,200	2,400
21-25	2,000	2,200	2,400
26-30	1,800	2,000	2,400
31-35	1,800	2,000	2,200
36-40	1,800	2,000	2,200
41-45	1,800	2,000	2,200
46-50	1,800	2,000	2,200
51-55	1,600	1,800	2,200
56-60	1,600	1,800	2,200
61-65	1,600	1,800	2,000
66-70	1,600	1,800	2,000
71-75	1,600	1,800	2,000
76 and up	1,600	1,800	2,000

APPENDIX D

RECRUITMENT LETTER

Date

Name of recruit
Address

Re: The Relationship Between Homeless Shelter Meal Policies and Nutrition by Samantha Harmon

Dear [Name],

My name is Samantha Harmon and I am a graduate student from the Nutrition & Dietetics department at Northern Illinois University. I must complete a thesis research project in order to graduate, and I am asking you to participate in my research. I am looking at food served at homeless shelters, as well as any guidelines shelters may follow regarding the food served. You are eligible for my study because your shelter provides at least one dinner per week to the adult homeless population, and is located in the state of Illinois.

If you decide to participate in this study, you will complete a short online survey on your shelter's food practices. This survey should only take about ten minutes to complete. I will then ask you to send me information on three dinners served at your shelter. These dinners will be on dates of my choosing. The information requested will be the menu, all available recipes, and portion sizes. You may choose to send this information by email or by mail. After participating in the study, if requested, results will be sent to you. Results will help you understand how adequately your shelter and other shelters in the state of Illinois are meeting the nutrition needs of clients.

This is a completely voluntary study. If you'd like to participate, please complete the short online survey found at the following link: <Qualtrics survey link> After completion, the researcher will contact you with further instructions on sending dinner information.

If you have any questions about the study, please contact me at sharmon1@niu.edu, or at (734) 417-7282. For questions you may also contact my thesis committee chair, Dr. Josephine Umoren, at jxu1@niu.edu or at (815) 753-6351.

Thank you very much!

Sincerely,

Samantha Harmon