

Food Insecurity: Its Relationship to Dietary Intake and Body Weight among Somali Refugee Women in the United States

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Abstract:

Objective: To examine the association between food insecurity, dietary intake, and body mass index among Somali refugee women living in the United States.

Methods: Cross-sectional study utilizing the snowball sampling method.

Results: Most (67%) participants experienced some level of food insecurity, which was common among recent arrivals and those who spoke only Somali at home ($P < .05$). Intake of meat and eggs was higher, whereas intake of fruits and vegetables was lower, among food insecure than secure participants. Food insecurity was positively related to overweight and obesity (odds ratio: 2.66; confidence interval: 1.25-5.69; $P < .01$).

Conclusions and Implications: Somali refugees experienced high levels of food insecurity upon resettlement. Poor dietary habits and the high overweight/obesity rate among insecure families call for future research in understanding what role family structure, cultural norms, and food preference play in predicting food security and dietary habits among Somali and overall African refugees in the United States.

Keywords: Somali refugee | food insecurity | overweight/obesity

Article:

Introduction

The number of refugees who are unable or unwilling to return to their country of nationality because of a well-grounded fear of persecution is on the rise because of several political and humanitarian emergencies.¹ Approximately 15 million individuals currently hold refugee status. In seeking a durable solution, approximately 100,000 refugees are expected to settle in developed countries like the United States (US), Canada, and Australia.¹ In 2006-2007, more than 89,000 refugees arrived in the US; 134,708 arrived in 2008-2009.^{2 and 3} In recent years, there has been a significant increase in African refugees, particularly from Somalia.⁴ According to a recent refugee report, in the US, the majority of African refugees are of Somali origin.²

Food insecurity, defined as limited access to nutritionally sound and safe food and an inability to acquire acceptable food in socially acceptable ways,⁵ has become increasingly prevalent in the US. In 2008, 14.6% of US households (17 million) were food insecure at some time during the year.⁶ The American Dietetic Association, in a 2006 position paper on food security issued before the economic downturn, and in its revised 2010 position paper, states that eradicating food insecurity is one of the key factors in achieving health and well being for the US population.^{7 and 8}

Food insecurity is a major public health concern, because people who are food insecure have been found to have nutritionally inadequate diets, including a lower intake of fruits and vegetables and a less varied diet.^{9, 10 and 11} Food insecurity is associated with a number of poor health conditions, including hypertension and hyperlipidemia,¹² high cholesterol and heart disease,¹³ and metabolic syndrome.^{14 and 15} Studies also indicate that food insecurity is linked to poor social-emotional health status.¹⁶ Specifically, women who mainly manage the family food budget and food supply are more vulnerable to the negative outcomes of food insecurity. In women, food insecurity has been linked to overweight, as measured by body mass index (BMI).^{17 and 18}

In terms of food insecurity risk factors, poor economic conditions such as income below poverty level and low educational attainment are positively associated with food insecurity.^{6, 12 and 19} Single-parent families, families with children, and those who have a work-limiting disability are also at risk for food insecurity.^{6, 19 and 20} After controlling for income and education, there is strong evidence that non-US-born families are more prone to food insecurity than native-born families.^{21, 22, 23, 24, 25, 26, 27 and 28} Though limited in number, studies with refugee families indicate that they are more prone to food insecurity and hunger upon resettlement. Hadley et al, in a study with Liberian refugees, identified a high prevalence of food insecurity and hunger.²⁶ Around one third of the participants experienced some level of food insecurity, of whom 60% were severely affected and reported child hunger. In a study by Piwowarczyk et al in the northeast region of the US, 13% of the refugees/asylum seekers in the study reported often or frequently going to bed hungry.²⁸

Refugees from developing countries are likely to experience a drastic shift in food choices and in shopping and budgeting practices. In a study by Hadley et al, refugee mothers who experienced difficulty understanding store staff and who had limited information on local stores and readily available food choices were more likely to experience food insecurity.²⁶ In a recent study, Bhutanese refugee families reported buying only certain items such as milk, potatoes, and onions from the regular food stores as a result of unfamiliarity with other food options and communication issues with the store staff.²⁹

Though this limited literature demonstrates the high prevalence of food insecurity among refugees upon resettlement, to the authors' knowledge, there are no published studies that explain the relationship between food insecurity, dietary intake habits, and health outcomes, such as body weight, among refugee women. In an effort to close the gap in knowledge, a culturally appropriate nutrition needs assessment survey was carried out among Somali refugee women in Lewiston, Maine. Since 2001, Lewiston, the second largest city in the state of Maine, has become home to a large number of Somalis. By 2006, the city of Lewiston (population 35,000) had registered 1,963 immigrants from Somalia in the city's General Assistance Program.

In the present study with Somali women, the authors hypothesized that food insecurity was associated with a lower intake of nutrient-dense food, such as fruits and vegetables, and a higher intake of calorie-dense food, and that overweight/obesity was more common among Somali women who indicated food insecurity than among food-secure Somali women. In addition, socioeconomic factors and acculturation proxy indicators were also examined in the context of the prevalence of food insecurity.

Methods

Design and Participants

This study was approved by the Institutional Review Board of the University of Southern Maine. Between October, 2006 and December, 2007, a convenience sample of 195 Somali women was recruited to participate in a cross-sectional survey. The eligibility criteria for the study were: being (1) a Somali woman; (2) a resident of Lewiston, Maine; (3) the mother of at least 1 child 12 years of age or younger; and (4) the main meal preparer of the household. Eligible participants were recruited using a snowball sampling method. Eligible Somali women had the study explained to them. For those who expressed interest, informed consent was read in English or Somali and written consent to participate in the study was acquired. Interviews were conducted by 3 trained, bilingual interviewers at participants' homes. Each interview, which took approximately 45 minutes, was conducted in the participant's preferred language (English or Somali). At the end of the interview, the participant's height and weight were measured using a standard protocol. A portable wooden stadiometer was used to measure height, and a portable digital scale (Seca Clara 803; Seca, Hanover, MD) was used to measure weight. In order to standardize the weight measurement, the field workers were required to calibrate the portable

digital scale with a standardized weight on a weekly basis. Before taking the weight measurement, field workers placed the scale on a flat, noncarpeted floor and instructed the participants to remove slippers and extra clothing such as shawls or scarves. Two weight measurements were collected, and the average was used for the analyses. Likewise, the portable stadiometer was placed upright on a firm, noncarpeted floor and against a flat wall; height was measured to the nearest eighth of an inch. Upon completion, participants were each paid \$15 for their time.

Survey Questionnaire

As a first step, preexisting surveys used with immigrant populations and others were reviewed to develop the first draft of the survey for this study.^{30, 31 and 32} To test for face validity, as a next step, interviewers were asked to review the initial draft of the survey. They were asked specifically to review questions and options for clarity, language use, and cultural relevance. During this systematic review process, 3 reviewers rated each question using 2 criteria: (1) language use and clarity, and (2) relevance and applicability to the Somali culture. Changes suggested by any reviewer were first discussed and consensus was reached before making final revisions. Further information on the review process and changes made can be found in the authors' previous paper.²⁷

The major domains of the survey questionnaire and the preexisting/validated instruments that were used to develop the initial survey draft were:

1. Socioeconomic and Acculturation Factors: Information on socioeconomic variables such as household size, total household income, educational attainment, and participation in the Supplemental Nutrition Assistance Program (SNAP) and other food assistance programs, was collected. To measure the degree of acculturation, information was collected on 2 commonly used proxy indicators (ie, English language proficiency and length of time in the US).^{25, 26 and 30}

2. Dietary Intake: Regular dietary intake was assessed by a short food frequency questionnaire (FFQ), adapted mainly from a questionnaire that had been shown to be reliable when used with low-income Latino families.³⁰ In FFQ, questions were asked to estimate how often (per day, week, and month) the following food items were eaten: (1) grains; (2) beans/lentils; (3) meats; (4) eggs; (5) dairy; (6) starchy vegetables; (7) green leafy vegetables; (8) other vegetables; and (9) fruit. Previous discussion group results were used to identify the specific examples of food items under each food group.³³ For instance, goat meat (called *mutton*) and camel meat were included as examples for the meat food group. For analyses, responses for each food group were converted to estimate whether the participants ate a food item from a particular group at least once a day versus less than once per day.

3. Food Security: Because of its reduced response burden and ability to assess child hunger, the 10-item Radimer/Cornell Hunger Scale was used to measure food security/insecurity among participants,³⁴ instead of the commonly used 18-item USDA Food Security Scale.

Before initiating this study or main survey, a pilot study (n = 35) was carried out to establish overall face validity of the instrument, and establish the reliability of the food insecurity scale among the study population.²⁷

Data Analysis

Sample size was calculated to detect differences in the frequency of the intake of fruits and vegetables at least once a day versus less than once a day between food-secure and -insecure women using an α level of .05 and 80% power. Using these criteria, the sample size estimated was 210, which is 7% larger than the actual sample size (195) of this study. All data were analyzed using SPSS (version 17, SPSS Inc, Chicago, IL, 2005). As a first step, normality of the data was tested by normal probability plot and by comparing kurtosis and skewness values to the variables means. All of the variables, including demographics, demonstrated normal distribution plot and kurtosis/skewness values in the expected range. Descriptive statistics and bivariate tests (chi-square, independent-sample *t* test) were conducted to detect differences in sociodemographic and acculturation indicators between food-secure and -insecure households. An English language variable, which was used as an acculturation proxy indicator, was grouped into 2 categories: (1) very poor or poor fluency in English, and (2) good or very good fluency in English. Another acculturation proxy variable, length of residence in the US, was split by a median of 3 years (ie, less than 3 years vs more than 3 years).

To estimate food insecurity, original responses to the Cornell/Radimer Hunger Scale ranged from 0-10, which was divided into the following 4 tested and validated categories: (1) food security (0 score); (2) household-level food insecurity (1-4 score); (3) adult-level food insecurity (5-7 score); and (4) child hunger (8-10 score).³⁵

Multinomial logistic regression was used to elucidate the association between food insecurity and dietary intake. A 2-tailed *P* value of < .05 was used as the criterion for statistical significance. In the logistic regression model, the independent variable was coded as an intake of less than 1 serving per day (0) versus daily intake of at least 1 serving (1). Food security status was entered as a dependent variable, and “food secure” was used as the reference category.

Two height and weight measurements were averaged to calculate BMI (BMI = [weight in lbs/height in inches²] × 703), and participants were grouped into standard categories: underweight < 18.5; normal weight 18.5-24.9; overweight 25-29.9; and obese ≥ 30.0.³⁶ Descriptive frequencies were used to explain the BMI distribution of the study population. To assess the effect of food security as well as socioeconomic and acculturation indicators on weight status, forced-entry dichotomous logistic regression was used. In the model, the dependent variable was BMI status. Normal BMI was entered as the reference category (0), whereas overweight/obese was a comparison variable with a value of 1. All the sociodemographic dependent variables except educational status were categorized by median.

Participants with a 0 score on the Cornell instrument were classified as food secure, whereas participants with a score between 1 and 10 were grouped as food insecure.

Finally, daily intake of various food groups (intake of less than once per day vs intake of at least once per day) was compared among normal weight and overweight/obese individuals using the chi-square test. Results were considered statistically significant at a probability value of $P \leq .05$.

Results

On average, the household size of the study population was 5, and 3 of the 5 members of the household were children. As shown in Table 1, the mean household income was less than \$1,000 per month. Approximately half of the study participants reported no formal education (49%) and had been living in the US for 3 years or less (56%). The majority of the participants were married or living with a partner. With regard to language, more than half of the participants spoke only Somali (and/or Arabic) at home, whereas 72% reported their English speaking skills as “fair,” “poor,” or “very poor.” Most of the study participants received SNAP and WIC program benefits (Table 1).

Table 1. Sociodemographic Characteristics of Food-Secure and -Insecure Somali Refugee Mothers in Maine, United States

Characteristics	All (n = 195)	Food Secure (n = 64)	Food Insecure (n = 131)
Total household size (mean \pm SD)	5.59 \pm 2.10	5.69 \pm 2.36	5.54 \pm 1.96
Number of children < 18 y (mean \pm SD)	3.84 \pm 1.86	3.93 \pm 2.09	3.79 \pm 1.74
Monthly household income (mean \pm SD) ^a	947.39 \pm 480.41	1127.90 \pm 525.45	875.73 \pm 458.44**
Age, y (mean \pm SD)	33.60 \pm 8.26	34.23 \pm 9.87	33.29 \pm 7.37
Time in US, y (n[%])			
≤ 3	109 (56)	25 (39)	83 (64)***
>3	86 (44)	39 (61)	47 (36)
Education (n[%])			
No formal schooling	95 (49)	27 (42)	66 (51)*
Some school	79 (40)	25 (39)	55 (42)
High school or more	21 (11)	12 (19)	9 (7)
Marital status (n[%])			
Have partner	142 (73)	20 (31)	33 (25)
No partner	53 (27)	44 (69)	98 (75)
Language spoken at home (n[%])			
Only Somali (and/or Arabic)	113 (58)	46 (70)	66 (51)**
Somali and English	82 (42)	18 (30)	64 (49)
Ability to speak English (n[%])			
Good/very good	55 (28)	29 (45)	25 (19)***

Fair/poor/very poor	140 (72)	35 (55)	106 (81)
Current SNAP participation (n[%])			
Yes	180 (92)	60 (94)	120 (92)
No	15 (8)	4 (6)	11 (8)
Current WIC program participation (n[%])			
Yes	147 (75)	45 (70)	102 (78)
No	48 (25)	19 (30)	29 (22)

SNAP indicates Supplemental Nutrition Assistance Program; WIC, The Special Supplemental Nutrition Program for Women, Infants, and Children.

Note: To compare food-secure and -insecure groups, chi-square for categorical variables and independent-sample *t* test for continuous variables are used.

* $P \leq .05$ ** $P \leq .01$ *** $P \leq .001$ ^a $n = 183$; 12 missing cases (8 insecure group; 4 secure group).

The majority of participants experienced food insecurity (67%). The proportion of families with adult-level food insecurity was 29%, whereas 23% of them reported severe food insecurity or child hunger. On a continuous scale, the mean insecurity score was 7.45 (\pm 2.38; range: 2-10) among food-insecure households.

The occurrence of food insecurity was associated with a number of acculturation and sociodemographic variables. Food-insecure households had a significantly lower monthly income compared to the food-secure households ($P < .001$), as shown in Table 1. Respondents' education was also associated with food insecurity. As shown in Table 1, Somali women with a high school education or higher were less likely to experience food insecurity ($P = .03$). Acculturation proxy indicators such as length of stay in the US ($P < .001$), primary language spoken at home, and self-reported English-speaking skills ($P < .001$) were associated with the level of food insecurity. In particular, those who spoke primarily Somali at home, recent arrivals (3 years or less), and those with limited English speaking skills were more prone to food insecurity than their counterparts (Table 1).

Results of the FFQ showed that besides the intake of grains, the intake of meat and dairy was very common. Eighty-nine percent reported eating dairy and 87% reported eating meat, respectively, at least once a day. In estimating the association between food insecurity and dietary intake, logistic regression results showed that intake of eggs was significantly higher among families experiencing a severe level of food insecurity or child hunger (Table 2). Child hunger was 20 times higher among families who reported eating eggs at least once a day (odds ratio [OR]: 21.20; confidence interval [CI]: 7.83-57.34; $P < .001$). As shown in Table 2, higher intake of eggs did not predict mild or moderate levels of food insecurity. Additionally, intake of meat predicted food insecurity; those who reported eating meat every day were more likely to be food insecure than their counterparts. In contrast, daily intake of fruit and different groups of vegetables predicted food security (Table 2). For instance, the odds of being food insecure were 70%-80% lower when participants reported eating leafy green vegetables at least once a day (OR: 0.20; CI: 0.08-0.51; $P < .001$).

Table 2. Differences in Dietary Intake Habits between Food-Secure and -Insecure Somali Refugee Mothers in Maine, United States (n = 195)

	Food Secure (n = 65)	Household Food Insecure, OR (CI) (n = 56)	Adult Food Insecure, OR (CI) (n = 30)	Child Hunger, OR (CI) (n = 44)
Grains (eg, rice, <i>anjeera</i>)	1.00	1.18 (0.21-6.49)	2.28 (0.42-12.28)	0.86 (0.22-3.43)
Beans and lentils	1.00	0.18 (0.06-0.55)**	0.13 (0.05-0.34)***	0.30 (0.13-0.70)**
Meat (eg, <i>mutton</i> , chicken)	1.00	1.02 (0.34-3.00)	3.31 (1.01-10.84)*	11.21 (1.41-89.19)*
Dairy (eg, milk, yogurt)	1.00	4.29 (0.51-36.05)	1.03 (0.35-3.07)	3.18 (0.64-15.78)
Eggs	1.00	1.32 (0.43-4.06)	1.93 (0.79-4.76)	21.20 (7.83-57.34)***
Green leafy vegetables (eg, spinach, lettuce)	1.00	0.20 (0.08-0.51)***	0.15 (0.07-0.35)***	0.16 (0.07-0.39)***
Other vegetables (eg, okra, tomatoes)	1.00	0.07 (0.02-0.26)***	0.05 (0.01-0.18)***	0.10 (0.03-0.32)***
Starchy vegetables (eg, potatoes, yams)	1.00	0.13 (0.05-0.37)***	0.12 (0.05 - 0.28)***	0.47 (0.21-1.04)
Fruits (eg, papaya, bananas)	1.00	0.18 (0.05-0.67)**	0.06 (0.02-0.20)***	0.20 (0.06-0.69)**
100% fruit juices	1.00	0.32 (0.11-0.92)*	0.37 (0.15-0.92)*	0.03 (0.01-0.10)***

CI indicates confidence interval; OR, odds ratio.

Note: Multinomial logistic regression. Independent variable: less than a daily intake of 1 serving (0), daily intake at least 1 serving (1); dependent variable: food security (reference category) versus different levels of food insecurity (household; adult and child hunger).

* $P \leq .05$ ** $P \leq .01$ *** $P \leq .001$.

Descriptive frequencies showed that 35% of the participants had a normal BMI score (18-24.9); 41% had a BMI score indicating overweight (25-29.9), whereas 24% had a BMI score of ≥ 30 , indicating obesity. In estimating predictors of overweight/obesity, binomial logistic regression showed significant positive association between food insecurity and higher BMI. As indicated in Table 3, after controlling for income, acculturation indicators, and other demographic variables such as age and educational level, food-insecure participants were almost 3 times more likely to be overweight or obese compared to food-secure women (OR: 2.66; CI: 1.25-5.69; $P = .01$).

Table 3. Determinants of Overweight/Obese Body Mass Index in Somali Refugee Mothers in Maine, United States (n = 183)

Controlling Variables	OR	95% CI	<i>P</i> ^a
Age, y			
≤ 33	1.00		
≥ 34	1.85	0.90-3.81	.10
Education			
High school or more	1.00		
8th grade or some high school	0.98	0.24-4.01	.97
No formal schooling	1.48	0.44-4.94	.52
Marital status			
Married	1.00		
Single/separated/divorced	0.82	0.37-1.80	.62
Time in the United States, y ^b			
> 3	1.00		
≤ 3	0.90	0.39-2.02	.80
Ability to speak English			
Good/very good	1.00		
Fair/poor/very poor	1.88	0.67-5.28	.23
Number of children in the household ^b			
≤ 4	1.00		
≥ 5	1.07	0.48-2.41	.86
Monthly household income, \$ ^b			
> 900	1.00		
< 900	1.08	0.49-2.36	.85
Food security status			
Secure	1.00		
Insecure	2.66	1.25-5.69	.01

CI indicates confidence interval; OR, odds ratio.

Note: Dependent variable is body mass index status: normal category (n = 65) vs overweight/obese category (n = 118).

^a Binomial logistic regression ^b Categorized by median.

In estimating the association between BMI scores and daily intake from different food groups, a significant difference was noted in the fruit, vegetables, and beans groups. Intake from all of these food groups at least once a day was less common among overweight/obese participants than in normal-weight individuals (Figure).

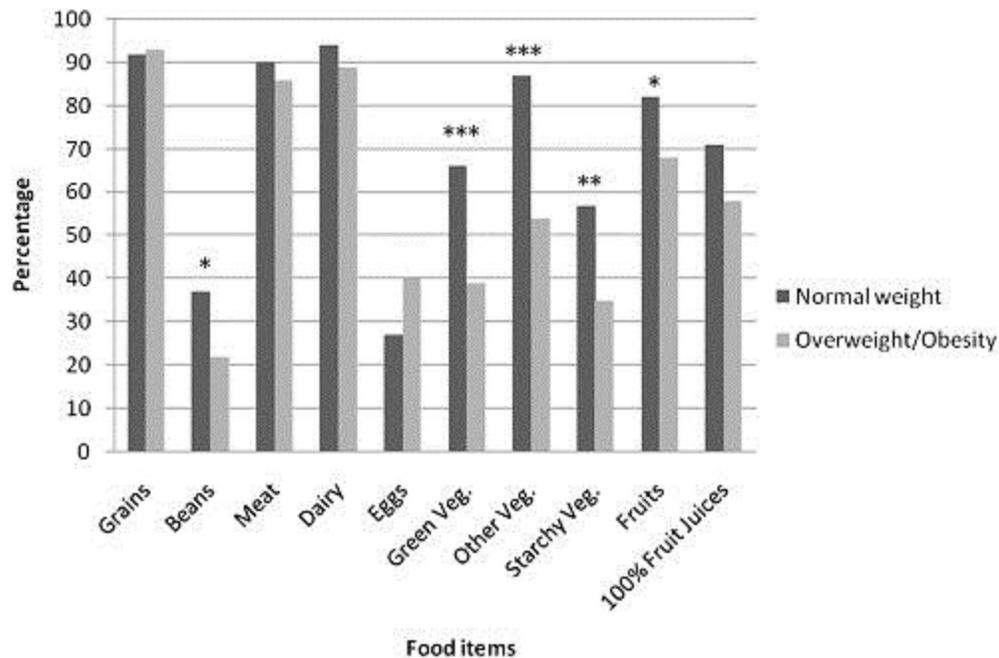


Figure. Differences in daily intake of different food groups by body mass index status in Somali refugee mothers in Maine, United States (n = 191). Veg indicates vegetables. * $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$. Note: Chi-square test was carried out to compare intake of different food groups by body mass index.

Discussion

As expected, the prevalence of food insecurity in this study population is significantly higher than the national rate. To a certain extent, the difference in prevalence can be attributed to the use of different scales; however, the food insecurity rate of these study subjects is within the range of previous food insecurity studies with African refugee populations in the US.^{25, 26, 27 and 28}

In estimating risk factors, the results of this study indicated that besides income, acculturation proxy indicators, such as length of stay in the US and language spoken at home, are associated with food insecurity. For instance, results of a study among Liberian refugees indicated that the prevalence of food insecurity decreased with an increase in the number of years in the US.²⁶ Moreover, a number of immigrant and refugee studies indicate that the occurrence of food insecurity is more common among those who do not speak English at home or have poor English-speaking abilities.^{25, 26, 37 and 38} In accordance with the findings of Dhokarh et al and Kaiser et al,^{37 and 38} native language as the primary language spoken at home was associated with food insecurity in the present study. It is possible that being bilingual or fluent in English provides social mobility and better navigation within the new infrastructure, including the food environment. Hadley et al reported higher levels of food insecurity when refugee women experienced language barriers and difficulty understanding store staff.²⁶ Similarly, Bhutanese

refugee women found it easier to shop in the small ethnic stores than regular grocery stores because of the language barrier, distance, and plethora of unfamiliar food choices.²⁹

This may be the first study exploring the association between dietary intake and food insecurity among refugee women in the US. The results indicated that the daily intake of various fruits and vegetables was associated with food security, whereas the intake of meat and eggs predicted greater likelihood of food insecurity and hunger. Previous focus group discussions conducted with Somali men and women reveal an interesting cultural perspective: a meal without meat is not a complete meal. Specifically, meat is considered a key staple of the Somali meal. In contrast, fruit and vegetables are generally viewed as complementary food items.³³ Therefore, when financial constraints limit food shopping decisions, Somali families may choose to reduce their intake of fruits and vegetables, rather than reduce their intake of meat. It is also likely that Somalis who were in refugee camps prior to arriving to the US may have had limited access to meat within these camps, which may partially explain why meat is a highly valued food item. Another plausible theory is that Somali women may not be acquainted with the numerous varieties of fruits and vegetables in the US, and as such, they may prefer to buy more familiar cultural staples such as meat and eggs.

The prevalence of overweight and obesity was high within this study's target population, as more than two thirds of the study population was overweight or obese. Overweight and obesity as an indicator of poor health is a Western norm; historically, in sub-Saharan Africa, heavy body weight has been considered a sign of prosperity and used as a strategy to protect from food shortages in the dry season.³⁹ This traditional preference for big body size may partly explain such a high prevalence of overweight/obesity among this study population. The multivariate analysis indicated that after controlling for income and acculturation, food insecurity posed a risk for heavier weight. To manage a limited food budget, Somali women might be compromising on nutrient-dense food items, such as fruits and vegetables, and relying more on calorie-dense items, such as meat and eggs. As with the food-insecure participants, significantly lower intake of fruits and vegetables was seen among overweight/obese participants.

The limitations of this study include an inability to make any causal inference because of the cross-sectional design of the study. In the future, a prospective longitudinal study design will help to improve the understanding of the influence of acculturation on food insecurity and body weight among refugee populations upon resettlement. Additionally, the lack of information on pre- and peri-migration weight status limits the ability to conclude whether the high overweight/obesity rate among participants was solely a post-resettlement issue. Although this study may be subjected to bias and measurement error because of its use of a non-probability sampling method (ie, snowball sampling), this technique is generally accepted for research involving "hard-to-reach" immigrant populations when a proper sampling frame cannot be obtained.⁴⁰ The sample size was slightly smaller than the original number needed to achieve 80% power (sample size = 195 vs original calculation of 210 participants), which may have contributed to the wide variability in the effect size estimates in the presented regression models.

Furthermore, FFQ is not a quantitative measure of food intake behaviors; however, food frequency data help to understand associations between diet and food insecurity. In terms of the validity and reliability of the survey instrument, the initial pilot study mainly tested face validity. Hence, future studies assessing the construct validity and reliability of FFQ and food security scales in the Somali and overall refugee population would be helpful.

Implications for Research and Practice

These findings call for future research illuminating the coping mechanisms and the food-related decision-making processes of this study population. Moreover, in-depth qualitative studies investigating the different sociocultural beliefs and habits related to food choices and body size are warranted. Finally, a clear understanding of how cultural beliefs, food preferences, and other related factors affect food management and coping mechanisms will help to elucidate the pathway of food security status among Somali and other African refugees in the US.

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