Dietary Intake, Food Security, and Acculturation Among Somali Refugees in the United States: Results of a Pilot Study

By: Jigna M. Dharod, Jamar Croom, Christine G. Sady, Dale Morrell

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Abstract:

The pilot study was conducted to test the appropriateness of a nutrition and food security survey and estimate the prevalence of food security and its relationship with dietary intake habits among Somali refugees (n = 35) resettled in the United States. The other main objective was to estimate the association between acculturation and dietary intake habits. The interviews with the Somali mothers indicated that 72% of households were food insecure and, in comparison, the intake of fruits and green leafy vegetables was significantly lower among the food insecure households than among secure households ($p < .05$). Both of the acculturation indicators used in this survey, living in the United States for four years or more and having English language proficiency, were associated with a high intake of snack items among participants. Future studies examining the influence of food security and acculturation on health outcomes such as body weight are warranted among refugees in the United States.

Keywords: acculturation | dietary intake | food insecurity | refugees | Somali

Article:

INTRODUCTION

Refugees from Somalia represent one of the fastest-growing groups in the United States (Jefferys & Martin, 2008). Research has shown that refugees often face difficulties in adapting to their new food environment and struggle in retaining their own culture, values, and religious practices after resettling in a developed country such as the United States (Carroll et al., 2007;Hadley & Patil, 2009; Patil, Hadley, & Nahayo, 2008). To understand nutrition-related issues and develop cutomized nutrition education interventions for Somali refugees in the United States, a

quantitative needs assessment survey was designed. The primary objectives of the main survey were (a) to understand the prevalence and severity of food insecurity; (b) to assess the relationship between food insecurity and dietary intake and; (c) to estimate the influence of acculturation on food insecurity and dietary intake among Somali families. Before conducting the main survey, a pilot test of the survey was carried out with 35 Somali women in Lewiston, Maine. This article describes the process involved in the development of a culturally appropriate nutrition and food security survey tool and the results of the pilot study.

A few studies in the United States indicate that, in addition to poor economic conditions, limited acquaintance with the new food environment often acts as a mediating factor for the high prevalence of food insecurity among the refugee population (Hadley, Zodhiates, & Sellen, 2006; Hadley & Sellen, 2006; Sellen & Hadzibegovic, 2003).

According to the United States Department of Agriculture (USDA) and the World Health Organization (WHO), food security can be defined as access to food of sufficient quantity and quality for all household members at all times through socially acceptable ways. Food insecurity is a key indicator of health and well-being because a growing number of studies have shown that food insecurity is associated with poor dietary practices, limited social capital, morbidity, and, paradoxically, obesity among women (Rose, 1999; Townsend, Peerson, Love, Achterberg, & Murphy, 2001; Vozoris & Tarasuk, 2003). Compared with the native population, immigrants and refugees in the United States may experience a high level of food insecurity due to relatively lower incomes and shifts in the food environment and diet-related practices upon arrival. A pilot study by Hadley et al. (2006) found that 85% of Liberian refugee households were food insecure and among them 42% experienced severe levels of food insecurity or child hunger. A similar study conducted among West African refugees also indicated high levels of food insecurity (Hadley et al., 2007). Results of the study indicated that 53% of caregivers had experienced some level of food insecurity in the past 6 months, with 37% experiencing mild food insecurity and 16% experiencing a severe level of food insecurity. Both studies showed that food insecurity was more common among families with lower incomes, less educated caregivers, and those who were unemployed.

Immigrants go through the process of acculturation as they adapt to the lifestyle of the dominant society. The length of residency and fluency in the indigenous language are two major factors which contribute to the level of exposure to the host country's culture and in turn to acculturation. A review paper by Ayala, Baquero, and Kilinger (2008) on acculturation and health outcomes among immigrants in the United States indicated that length of residence and English proficiency are common indicators of acculturation.

Acculturation that results in a better economic condition may act as a protective factor for food insecurity. However, acculturation has also been linked to poor dietary intake among the immigrant population. A review of studies examining the relationship between acculturation and diet among Latinos in the United States showed that a higher acculturation score was a risk

factor for a poor diet (Ayala et al., 2008). Additionally, length of stay in the United States was positively associated with the intake of sugar-sweetened beverages and overall sugar intake in Latino families. Different community-based studies indicate a negative association between acculturation and fruit and vegetable intake (Gregory-Mercado et al., 2006;Neuhouser, Thompson, Coronado, & Solomon, 2004; Sharma et al., 2004). In a study by Burns (2004), 45 Somali women who had been living in Australia for less than 5 years were interviewed to assess the dietary changes due to migration. Results showed that although the women were eating their traditional meals regularly, their intake of Western convenience foods such as pizza, potato chips, and instant noodles had increased significantly after moving to Australia. Likewise, focus groups with Somali women in Lewiston, Maine indicate that they consume more processed foods and fast foods since arriving in the United States. The women reported that this was especially the case for their children (Decker, 2006). Considering a high prevalence of food insecurity and the varied influence of acculturation, a better understanding of how acculturation and food insecurity influence dietary intake is warranted to maintain and promote positive health among immigrants and refugee groups in the United States.

The pilot survey (n = 35), conducted before the main study, was analyzed to estimate the prevalence of food insecurity and the sociodemographic and acculturation differences between food secure and insecure Somali households. In addition, the pilot survey results were used to assess the relationship between dietary intake, food insecurity, and acculturation.

This study was carried out in collaboration with the University of Southern Maine and St. Mary's Regional Medical Center in Lewiston, Maine. The Institutional Review Board at the University of Southern Maine approved the study.

METHODS

Survey Questionnaire Development

Survey questionnaire development was informed by discussion groups with the Somali community conducted by the authors in 2005 (Decker, 2006). Focus group results pointed to a need to gain a greater understanding about the dietary intake, food security, and acculturation status of this community; therefore, the survey was created using these items as major domains.

To make the survey questionnaire appropriate for the Somali community, three bilingual Somali women, who were employed as health workers at a local clinic, reviewed the first draft of the survey. Each question and its options were reviewed for clarity, language use, and cultural relevance. Before starting the review process, reviewers were informed about the purpose of the survey, the survey methodology (face-to-face), and the intended survey participants (Somali women in Lewiston). Once the reviewers understood the purpose and nature of the survey, they were then asked to rate each question by the following two criteria: (1) language use and clarity, and (2) relevance and applicability to the Somali culture. The review of the questionnaire was carried out in three meetings, each lasting for approximately 4 hours. Each reviewer orally

provided their feedback based on the aforementioned criteria. The changes suggested by any reviewer were first discussed with the other reviewers and authors, and consensus was made before making any changes. Once all the questions for the questionnaire were finalized, the options under each question were reviewed to make sure that they were culturally appropriate for the Somali community.

Based on the reviewers' feedback, a number of changes were made to the questions and options under each domain of the survey. For instance, in the case of education, an option for no formal education was added. Similarly, an option of "halal market" was added to the question on food shopping locations.

A short food frequency instrument was included in the questionnaire to measure dietary intake. During the review process, Somali health workers suggested a number of Somali dishes and food items for each major food group. For instance, okra and *bagal* (a radish-like vegetable) were included in the vegetable group, while *anjeera* (a fermented bread made from sorghum flour) was included in the grain food group. Since intake of goat meat called *mutton* is common in this community, it was included as an example under the meat food group. Additionally, based on the reviewers' feedback, black tea with sugar was added under the sweetened beverage group in the food frequency questionnaire. Common Somali sweet dishes like *halwa* and *malawa* were also added to the sweets food group.

To assess food security status, the Radimer/Cornell Hunger Scale was selected; while the Acculturation and Nutrition Needs Assessment Questionnaire, developed for low-income Latino families, was used to assess sociodemographic and acculturation indicators (Connecticut Family Nutrition Program, 1998).

The 10 items of the Radimer/Cornell Hunger Scale represent different situations related to food insecurity. The scale follows a progression that begins with worry over food affordability, followed by reductions or alterations in the adult diet. The last two statements of the scale refer to reductions or alterations in the children's diet, representing severe food insecurity or child hunger. During a review of the 10 statements, Somali health workers or reviewers were not able to pick up the core concept of Statements 2 and 8. Statement 2 inquires about the variety in the diet: "We eat the same thing for several days in a row because we only have a few different kinds of food on hand and do not have the money to buy more." The Somali reviewers felt that having the same kind of food every day was considered normal in this community and variations in meals were usually made in certain situations such as festivals, gatherings or illness in the family. To explain the concept of variety, the following example was provided along with Statement 2: "I ate rice and milk every day and I didn't have money to buy meat or fish, rice, fruits, and vegetables for our daily meal." In the case of Statement 8, "I cannot give my child(ren) a balanced meal because I cannot afford that," the word "balanced" was found to be difficult to understand. The reviewers mentioned that the term *balanced meal* was not used commonly in Somali, hence the following example explaining the concept of a balanced meal

was provided with the original statement: “I cannot afford a meal of rice, vegetables, fruits, and meat or lentils for my children due to a shortage of money.”

The wording and options for certain acculturation and sociodemographic questions were revised to make them more relevant to the Somali community. For instance, since the word “employed” was not common in Somali, the question “Are you employed?” was revised to “Do you work for money?” Similarly, based on the feedback from the reviewers, in addition to English and Somali, an Arabic-language option was added under the question “What language do you speak at home?” After revisions, the original English questionnaire was translated into Somali, which was then translated back into English by a third party. Based on the back translation results, questions in the survey were revised to resolve any inconsistencies. Before conducting the pilot survey, three Somali health workers, who were recruited as interviewers, went through multiple training sessions on conducting face-to-face interviews, obtaining informed consent as well as collecting and maintaining the confidentiality of the data. The training sessions included role-playing, discussions of a number of scenarios to clarify the selection criteria and procedures for implementation of the research protocol. During the training period, it was discovered that the interviewers, though conversant in Somali, were not used to reading Somali. They preferred to read the English questionnaire and then verbally translate it to Somali for the interview. Several training sessions were required to help the interviewers feel comfortable reading directly from the Somali questionnaire. The training, role-playing, and regular check-ins with the study staff helped the field workers conduct the survey in accordance with the survey protocol.

Recruitment and Data Collection

Interviewers used the “snowball” technique, including word-of-mouth, telephone invitations, and networking, to recruit a convenience sample of 35 participants for the pilot test of the survey. The snowball technique was used due to the interviewers’ insights regarding the best venues to reach the participants using the oral traditions of this community. Participants were selected for the survey if they met the following criteria: (a) a Somali mother with at least one child 12 years old or younger; (b) the main meal preparer of the household, and (c) a resident of Lewiston, Maine. If Somali women expressed interest and met the selection criteria, they were read an informed consent form in English or Somali and were asked to sign the form. All of the interviews were conducted in the participants’ language of choice, English or Somali, at the participants’ homes. The interview lasted approximately 45 minutes and the participants were each paid $15 upon completion of the interview.

The responses to the short food frequency questionnaire were converted to assess whether participants consumed food from a particular food group at least once a day. Dietary intake habits were measured for the following food groups: (a) grains; (b) beans or lentils; (c) meats; (d) eggs; (e) dairy; (f) starchy vegetables; (g) green leafy vegetables; (h) other vegetables; and (i) fruits. In addition, information about dietary intake of snack items, sweets, and sugar-sweetened beverages was collected. In the case of food insecurity, scores were calculated based on the

affirmative responses to the 10 Item Radimer/Cornell Hunger Scale. Originally, each item had three possible response options (*never true*, *sometimes true*, *often true*), which was collapsed into two categories and scored as 0 for *never true* and 1 for *sometimes true* or *often true*. Households giving negative answers (*never true*) to all the 10 items or with a 0 score were considered food secure, while scores from 1 to 10 indicated different levels of food insecurity. The scale was divided into four categories: (a) 0: Food secure; (b) 1–4: Household level food insecurity; (c) 5–7: Adult level food insecurity; and (d) 8–10: Child hunger.

During the interview, in addition to the participant's age, education, employment, and marital status, information on household size, monthly income, and participation in federal food assistance programs such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) and the Supplemental Nutrition Assistance Program (SNAP), was collected. SNAP provides low-income households with monthly financial benefits that they can use to purchase food items and supplement their food budget. SNAP eligibility is determined by a number of criteria, including but not limited to household size, income, and assets. WIC is a nutrition program for low-income (up to 185% of the U.S. poverty guidelines) pregnant women, breastfeeding mothers, and infants and children under the age of five. WIC participants receive vouchers to purchase approved food items such as milk, breakfast cereals, and infant formula.

Participants were also asked to indicate their English proficiency and their length of residency in the United States. These two variables were used as acculturation indicators.

DATA ANALYSES

Descriptive frequencies were used to analyze the sociodemographic characteristics and the prevalence of food insecurity in the target community. The proportion of affirmative responses was calculated for each item of the Radimer/Cornell Hunger Scale. The chi-square test for categorical variables and the independent sample *t* test for continuous variables were used to estimate the association between sociodemographic characteristics and the food security status of the household. Categorical variables tested were (a) participation in the SNAP (yes vs. no), (b) marital status (married vs. single or widowed or divorced), and (c) education (no education or some high school vs. high school or more). The monthly household income was tested as a continuous variable. In terms of acculturation indicators, the English-language skill variable was grouped into two categories: (a) no or very poor fluency in English and (b) good or very good fluency in English. Number of years in the United States was tested as continuous variable. To test associations between dietary intake and food insecurity and acculturation indicators, a chi-square test was carried out. Results were considered statistically significant at a probability value of $\leq .05$.

RESULTS

As shown in Table 1, the mean age of the survey participants was 32 years. Respondents had lived in the United States for an average of 6 years. The household size was approximately six

individuals, of which three to four were usually children (<18 years). Monthly household income among survey participants ranged from $500 to $2,500. Of the sample, 74% of the participants were married and nearly 50% of them had no formal education. Most participants (65%) reported very poor or no fluency in English, while Somali was the primary language spoken at home. Nearly, two thirds (77%) of surveyed respondents reported participating in SNAP and WIC (Table 1). Of those participating in SNAP, 55% reported that the benefit amount lasted for only 15 to 20 days.

Table 1. Sociodemographic and Acculturation Characteristics of the Survey Participants (n = 35)

Sociodemographics	***M* ± *SD***
Mother's age	32 ± 5.70
Total household size	6 ± 2.33
Children (less than 18 yrs. old)	4 ± 2.10
Monthly household income	1271 ± 439
	n (%)
Marital status	
Single	5 (14)
Married	26 (74)
Separated/divorced/widowed	4 (12)
Education	
No formal education	16 (46)
Less than high school	8 (23)
High school or higher	11(31)
Primary language spoken at home	
Somali only	19 (54)
Somali and English	9 (26)
Other language (Arabic, Mai Mai, Amharic, etc.)	7 (20)
Live in predominately Somali Neighborhood	22 (63)
Participation in SNAP	27 (77)
Participation in WIC	27 (77)
Use services of food pantry	13 (37)
Acculturation indicators	
Years in U.S.: *M + SD*	6 ± 6.14
Speak “very good” or “good” English: *n* (%)	23 (65)

Note. SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children.

The proportion of families experiencing some level of food insecurity was 72%. The mean food insecurity score was 4.3 (±3.65), with 46% experiencing either household or adult-level insecurity. Child hunger was found in 26% of households (Table 2). As shown in Table 2, the proportion of affirmative responses decreased with the progression of the scale from food affordability to reducing food intake. For instance, 63% of the respondents were worried about the food supply while 32% reported eating less due to a limited budget. Cronbach's alpha was

0.84, suggesting acceptable internal consistency of statements on the food insecurity scale. Among sociodemographic variables, a significant association with food insecurity was seen by monthly household income and participation in SNAP. Compared to food insecure households, monthly household income was significantly higher among food secure households (food secure: $1,570 ± 561.84/month; food insecure: $1,152 ± 320.36/month; $F = 7.76$; $p = .009$). Though marginally significant, prevalence of food insecurity was higher among SNAP recipients (79%) than non-recipients (43%, $p = .061$). Other characteristics, such as a respondents' age, education level, and marital status, did not predict food security or insecurity status in Somali refugee families. Similarly, acculturation indicators such as English proficiency and the number of years in the United States were not found to be protective against food insecurity.

Table 2. Items on the Radimer/Cornell Hunger Scale and Proportion of Affirmative Responses ($n = 35$)

		Affirmative
Level	**Items**	**response[a] (%)**
Household	1. I worry whether my food will run out before I get money to buy more.	63
	2. We eat the same thing for several days in a row because we only have a few different kinds of food on hand and do not have money to buy more.	65
	3. The food that I bought just did not last, and I did not have money to get more.	50
	4. I ran out of the foods that I needed to put together a meal and I did not have money to get more food.	56
Adult	5. I am often hungry, but I do not eat because I cannot afford enough food.	38
	6. I eat less than I think I should because I do not have enough money for food.	32
	7. I cannot afford to eat properly.	38
Child	8. I cannot give my child(ren) a balanced meal because I cannot afford that.	38
	9. My child(ren) is/are not eating enough because I just cannot afford enough food.	29
	10. I know my child(ren) is/are hungry sometimes, but I just cannot afford more food.	23

[a]Affirmative response refers to the following options: sometimes true or always true.

Results of the food frequency questionnaire indicate that intake of foods from the grains, dairy, and other vegetables group was found to be more common as ≥80% reported eating these food groups at least once a day. In estimating the association between reported daily intake of foods from different food groups and food insecurity, a significant difference was found in the daily intake of green leafy vegetables and fruits (Table 3). Intake of green leafy vegetables and fruits was significantly higher in food secure than insecure households ($p < .05$). In addition,

consumption of sugar-sweetened beverages and snack food items such as crackers and chips was more common in food secure households ($p < .05$).

Table 3. Association Between Daily Intake of Food Items From Different Food Groups and Food Security Status ($n = 35$)

	Food secure	**Food insecure**	
Food groups	**households**	**households**	
(examples)	**%**	**%**	***p*** [a]
Grains (bread, *anjeera*)	80	78	.813
Beans (lentils, chick peas)	60	44	.392
Meat (chicken, goat)	70	68	.908
Eggs	44	40	.822
Dairy	90	88	.867
Starchy vegetables (potato, yam)	80	64	.357
Green leafy vegetables (spinach, turnip greens)	90	44	.013
Other vegetables (okra, tomato)	90	80	.478
Fruits (banana, mango)	95	64	.028
Sweets (*malawa*, cookies)	70	40	.109
Snacks (crackers, chips)	60	24	.043
Sugar-sweetened beverages (sunny delight, soda)	90	40	.007

[a]Chi-square; percentage refers to the number of participants reported having food items from the tested food groups at least once a day.

In investigating the association between acculturation indicators and dietary intake, as shown in Table 4, a significant difference was seen in the intake of snack food items. The intake of snack foods was higher in acculturated respondents than in their counterparts. As shown in Table 4, intake of snack food items was more common among participants who were in the United States for 4 years or more and those who reported speaking “good” or “very good” English.

Table 4. Relationship Between Dietary Intake and Acculturation Indicators among Somali Caretakers ($n = 35$)

	Speak “very poor”	**Speak “very good”**		**In U.S. for 3**	**In U.S. for 4**	
	or “poor” English	**or “good” English**		**years or less**	**years or more**	
Food groups	**(%)**	**(%)**	***p*** [a]	**(%)**	**(%)**	***p*** [a]
Grains	83	75	.593	76	83	.612

Beans	39	67	.122	41	56	.395
Meat	70	67	.861	65	72	.632
Eggs	47	33	.460	31	50	.296
Dairy	96	75	.068	88	89	.952
Starchy vegetables	61	83	.174	65	72	.632
Green vegetables	56	58	.918	59	56	.845
Other vegetables	82	83	.957	94	72	.086
Fruits	74	75	.944	71	78	.627
Sweets	39	67	.122	47	50	.862
Snacks	22	58	.030	18	50	.044
Sugar-sweetened beverages	52	50	.903	53	50	.862

[a]Chi-square; for food groups, percentage refers to the number of participants reported having food items from the tested food groups at least once a day.

DISCUSSION

Participation of Somali health workers as reviewers during the survey development facilitated the creation of a culturally appropriate survey questionnaire. A review of each question and its options by set criteria made the review process effective in developing a survey that was clear, easy to understand, and applicable for the Somali mothers in Lewiston. Somali food items identified during the review process were useful in developing a short food frequency questionnaire relevant to this community. Along with a high internal consistency, a significant positive relationship between food security and income indicates that changes made based on the reviewers' feedback were effective in capturing the core experience of food insecurity among Somali mothers. To ensure minimal response bias, all the interviews were carried out by Somali women fluent in participants native language (i.e., Somali).

Like West African and other refugee population in the United States (Hadley et al., 2007; Hadley & Sellen, 2006), the majority of the participants were low-income and were participating in food assistance programs. SNAP benefits are meant to supplement the monthly food budget; however, most of the participants in our study reported finishing it earlier than the monthly cycle. Hadley et al. (2007) also found this pattern of exhaustion of SNAP benefits early in the month. Food insecurity may cause participants to over purchase food items at the beginning of the month. In

such a phenomenon, Somali mothers may be more food insecure at the end of the benefit cycle than at the beginning.

The results of this pilot assessment indicate that the prevalence of food insecurity is high in this community and falls within the range reported by other studies with refugee populations (Hadley et al., 2007; Hadley & Sellen, 2006;Sellen & Hadzibegovic, 2003). For instance, similar to our study results, Hadley et al. (2007) found that more than two thirds of Liberian refugee mothers were experiencing some level of food insecurity. The results of our study indicated that compared to food secure households, monthly household income was significantly lower in food insecure households. Food security occurs when people have access or power to purchase food at all times, hence low income is a strong predictor of food insecurity, which was reflected in our study results. In addition, the study results indicated that the prevalence of food insecurity was almost two times higher among SNAP participants than non-SNAP participants. Households need to fall under the low-income criteria to participate in SNAP. Hence, as seen among relatively low-income households, food insecurity was more common in SNAP participants than non-SNAP participants. Unlike the Sellen et al. (2006) study with West African refugees, we did not find a positive association between food security and acculturation indicators, such as length of stay in the United States and proficiency in the English language. Future studies with a larger sample that tests the effects of acculturation on food insecurity are warranted.

The results of our study indicate that while the daily intake of dairy and meat items once a day was equal among both the food-secure and food-insecure households, the intake of green leafy vegetables and fruits at least once a day was significantly lower among food-insecure households. In Somali culture, meat is considered the main ingredient of a meal. Hence, when having to make a choice due to financial constraints, Somali families may prefer to give up fruits and vegetables rather than meat. The Hadley et al. (2007) study indicated a similar dietary relationship at extreme levels of food insecurity in children. No difference was seen in meat intake, but daily intake of fruit was significantly lower in Liberian refugee children experiencing hunger. Like most studies, we utilized a food frequency questionnaire to assess dietary intake. While this tool was sufficient in establishing the participants' dietary trends over time, the assessment could have been strengthened by the use of a 24 hour dietary recall instrument and qualitative observations of participants' dietary behaviors. In order to gain a greater insight in the dietary habits of refugee populations, future studies should consider using multiple methods to assess dietary behaviors.

In examining the relationship of food insecurity to household food supplies among Latino households, Kaiser et al. found a significant negative association between the food insecurity score and fruit and vegetable supplies in the household (Kaiser et al., 2003). After controlling for education of Latino mothers, food insecurity was associated with lower household supplies of fruits and vegetables (Pearson correlation, fruit = –.36, vegetable = –.29, $p < .001$). In addition to the cost, perceptions that fruits and vegetables do not satisfy hunger may deter low-income households from buying them.

It was also observed that the intake of snacks and sugar-sweetened beverages was high in food-secure households. Higher incomes may allow food-secure households to buy sodas and snack items, as these items are considered “luxury” items in developing countries. Furthermore, easy access and relatively low cost may allow food-secure households to afford snacks, sugar-sweetened beverages, and similar items even with a small increase in income. Drewnowski (2004) demonstrated that calorie-dense foods high in fat and sugar cost less than nutrient-rich foods in the United States.

Acculturation is a process during which individuals simultaneously learn about certain aspects of the new culture and modify aspects of their culture of origin (Marin & Gamba, 1996). In assessing dietary intake in relation to acculturation indicators, we found that Somali mothers who were in the United States for more than 3 years had significantly higher intakes of snacks than their counterparts. The English-proficiency indicator also reflected the same relationship; snack consumption was higher among those who were speaking English fluently or very well compared to their counterparts. A review of acculturation studies by Ayala et al. (2008) indicated that acculturation leads to an increased intake of sugar and high-calorie food items among Mexican families in the United States. In a study with Puerto Rican families, Himmelgreen, Perez-Escamilla, Bretnall, Peng, and Bermudez (2005) showed that time in the United States was associated with increased intake of sweetened drinks. Especially for non-U.S.-born Puerto Ricans, poor English-language skills were protective against the intake of high-calorie foods. In a study by Burns (2004), it was seen that after arriving in Australia, the intake of Westernized food items such as pizza, chips, and sodas increased significantly among Somali women. While only 7% reported drinking soda every day in Somalia, over two thirds (69%) consumed it every day in Australia. Patil et al. (2008), in a recent study with African refugees in the United States, indicated that underlying factors such as time constraints, children's demands, and the high cost of traditional foods played a major role in dietary acculturation and the intake of fast foods in refugee families. We hypothesize that other factors such as increase in income, familiarity with the food environment, and children's demand for certain foods may play a role in explaining the relationship between acculturation indicators and snack intake. It is our expectation that our full-scale study (n = 195) will further illuminate this relationship.

IMPLICATIONS

Due to the small sample size and convenience sampling, it is not possible to generalize our findings to the larger Somali population in the United States; however, the results highlight future study needs and represent a good first step toward understanding dietary intake, food insecurity, and acculturation among Somali refugees in the United States. Our findings of a significant correlation between food insecurity and income indicate that a culturally appropriate 10-item Radimer/Cornell Hunger Scale can be used to assess food insecurity and its related issues in Somali populations. Besides income, participation in SNAP is another indicator for poor economic condition. And so as expected, prevalence of food insecurity was higher in SNAP participants than non-SNAP participants. Food insecurity was examined within the context of

four components: quantity of food, quality of food, certainty of getting food, and food acceptability. The high prevalence of food insecurity (72%) in our study population may be explained by the fact that in addition to compromising on the quantity of food due to economic constraints, quality and acceptability may also be highly compromised in our study group due to social and cultural barriers. The differences in food shopping practices, unfamiliar food choices, and language barriers, may exacerbate the occurrence and severity of food insecurity. Future studies focusing on understanding the influence of social and cultural barriers are warranted to better understand the noneconomical causes of food insecurity among the Somali population in the United States. For most of the participants, SNAP benefits were exhausted before the end of the month. Besides, a decrease in SNAP purchasing value due to the increase in food prices, poor food budgeting, and money management practices may be the cause of early completion of food assistance benefits. In such a case, culturally competent nutrition education programs focusing on food resource management and cost-effective recipes may be effective in maximizing the monthly food budget and decreasing food insecurity.

A decrease in the intake of green leafy vegetables and fruits among food insecure Somali mothers raises the concern that they may be at higher risk of poor nutritional status such as low blood iron and vitamin C levels. Differences in dietary intake between food-insecure and food-secure households warrant the pursuit of a better understanding of the influence of different levels of food insecurity on the food shopping, dietary intake habits and thereby nutritional status among Somali population. The high intake of snack foods in food secure and acculturated households indicates that like other immigrant population, acculturation to the way of life in the United States may lead to increased intake of calorie dense foods. To revert this trend, education programs providing information and skills on making healthful food choices while navigating through the host country's food system, are warranted.

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