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Unpacking Dietary Acculturation Among New Americans: Results from Formative Research with African Refugees

Crystal L. Patil · Craig Hadley · Perpetue Djona Nahayo

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Abstract Epidemiological studies focusing on Latino immigrant health have found links between acculturation (time and language competency), weight gain, and disease risk. Since time and language competency are not mechanisms by which diets and activities change, associations between acculturation and weight change offer little to public health professionals who aim to develop nutrition and health interventions. We present a conceptual model and use a mixed-methods biocultural approach to address the fine-grained details of diet and activity choice for new arrivals to the USA. The results of our anthropological work with Liberian and Somali Bantu refugees indicate that, in addition to standard surveys (individual-level characteristics, socioeconomic status, employment, and acculturation), epidemiological research would benefit from the data generated from ethnography and more nuanced behavioral studies. A focus on the lived experiences of new Americans and the explicit examination of institutional support, peer support, and interactions between children and caretakers might offer points of intervention for immigrant health which is a growing public health concern.

Keywords Acculturation · Biocultural · Diet · Nutrition · Health · Immigrant · Refugee · Children · Anthropology · Migration · Africa · Liberia · Somali Bantu

C. L. Patil (✉)
Department of Anthropology – BSB 2102 (MC 027), University of Illinois at Chicago, 1007 W. Harrison Street, Chicago, IL 60607, USA
e-mail: cpatil@uic.edu

C. Hadley
Department of Anthropology, Emory University, 207 Anthropology Building, 1557 Dickey Drive, Atlanta, GA 30322, USA

P. D. Nahayo
School of Public Health (MPH Student, Graduation 12/07), St. Louis University, 3545 Lafayette Avenue, St. Louis, MO 63104, USA

Introduction

In support of acculturation hypotheses many epidemiological studies, focusing on Latino migrants,[1] regularly show that two measures of acculturation, English competency and time spent in the USA, are positively related measures of cardiovascular disease risk [1–9]. Some research in western contexts suggests that body mass index (BMI), as one measure of adiposity, increases with time until values among the foreign-born populations come to match, or exceed, those among native-born populations [10–12]. As a result, the links between immigration and "acculturation" have been rehashed as key research areas in public health. Few studies have explicitly addressed the assumed increase in consumption of high-calorie, low-nutrient-dense foods that may be associated with immigration to the USA and even fewer address changes in physical activity [13–15]. We suggest that although acculturation is a convenient way to capture some components of culture change, the generation of explicit hypotheses about how culture interacts with and affects dietary change might be an approach that will help clarify aspects of the

[1] In this context, we are referring to economic migrants, those not born in the USA but who move to the USA for economic reasons; they are distinguished from refugees, who are afforded an official status through specific protocols of international and government agencies.

energy balance equation (caloric intake and energy expenditure). The concept of acculturation is contentious in anthropological circles because of its ambiguity and lack of definition [15–17], however, critiques of acculturation have only recently appeared in public health journals [16, 18–20].

Intuitively, the concept of acculturation makes sense. Although rarely defined, most researchers intend acculturation to mean a process by which sub-groups come to adopt the patterns of some other dominant (yet undefined) cultural group [21]. While epidemiological studies certainly offer compelling evidence that something about time and language, as potential exposures to "western" practices, are important and matter, relying on these two measures is problematic for a several reasons. First, these proxies do not identify *how* and *why* time and/or language have an impact on health and/or diet. Therefore, time and language competence do not speak to any process or mechanism even though the variables are often associated with decrements in aspects of health. Second, the narrowed focus masks historical and geopolitical processes that might limit or enhance language acquisition and access to resources after arrival. Third, local variation in the resettlement services and neighborhoods in which new Americans live is often ignored even though a growing literature suggests that the built environment, as a source of stress and resources, has both direct and indirect effects on health [22–24]. Last, there is a trend showing that the threat of chronic disease is not just a western problem and that there appears to be a global rise in obesity in non-western settings [25–27]. Simplifying acculturation to language competence and time, as many epidemiological studies do, divorces food, diet and activity from the lived experiences of recently arrived new Americans, which further inhibits an understanding of why these variables appear to matter at all.

Based on our past and ongoing ethnographic research with recently resettled refugees living in the USA and our reading of the acculturation literature, we build on a previously published conceptual scheme [28] which organized the diversity of individual experiences into a coherent framework. We present a new conceptual framework specifically identifying some of the mechanisms, and thus hypotheses generation, leading to dietary (and activity) choice (Fig. 1). This model allows for a broad definition of the environment leaving room for historical, political and policy contexts (Political-economy). The next component (Local environment) identifies important aspects of daily life affecting dietary decisions. We present several layers of social organization that were identified as important for the low-income families we work with including institutions, peers, and children. We then use an ethnographically informed, mixed-methods approach to explore five hypotheses generated from the model to address why dietary change occurs and identify possible mechanisms facilitating dietary choice. We refer to these as the food availability, economic-constraints, time-constraints and convenience, children, and the knowledge transfer hypotheses. Our aim is to stimulate research to improve our understanding of the conflicting and interacting roles that these variables play in shaping the health of refugee[2] populations as they move to the USA.

Methods and Data Sources

First, we analyzed the 2003 per capita availability of various food categories for Liberia, Somalia, and the USA. This dataset, published by the United Nations Food and Agricultural Organization (FAO), allowed us to compare national-level data on aspects of food, diet, and agriculture among these countries. The FAOSTAT database provides an indication of the magnitude of the difference in the food environments that African immigrants face upon arrival to the USA; we acknowledge that these data reflect the per capita availability of various food categories and not actual individual-level or subgroup-level consumption patterns. Moreover, these data ignore historical processes that mostly likely affected food availability for refugee populations now living in the USA which include obvious obstacles such as war, discrimination, and residence in refugee camps. However, the data illustrate some very basic differences in what is available in Liberia, Somalia, and the USA.

Second, we used an exploratory ethnographic approach and informally interviewed a sample of nearly 40 individuals representing resettlement agency staff and caseworkers ($n = 10$ interviews), community leaders ($n = 4$), and refugees ($n = 25$) representing the most recent immigration waves. Case workers are an important resource for newly arrived refugees because of their introductory and long-term roles in the resettlement process for refugees. Many of the caseworkers are hired by resettlement agencies because they are educated and, in addition to other languages, speak English well. In the Midwest, all of the caseworkers were also refugees. This makes the caseworkers sympathetic to the needs of their clients but also

[2] The United Nations High Commissioner for Refugees defines a refugee is a person who "owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group, or political opinion, is outside the country of his nationality, and is unable or unwilling to or, owing to such fear, is unwilling to avail himself of the protection of that country…." We specifically worked with refugees and did not work asylum seekers or internally displaced persons, therefore all interviews were with those officially recognized as refugees by the US government.

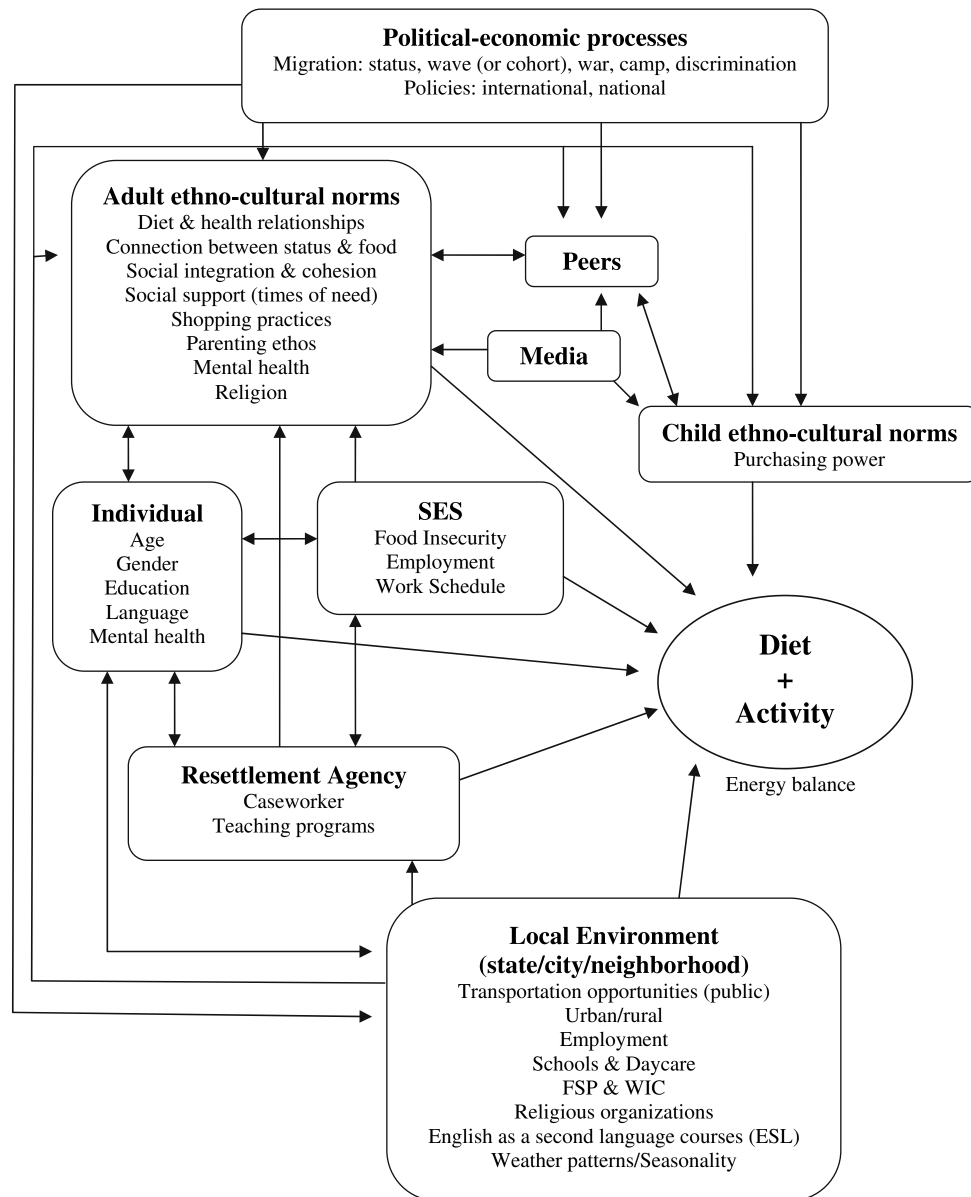

Fig. 1 Conceptual model representing the complex and multiple domains of diet and activity change

creates tensions as the clients expect more from them than their work hours can allow. Moreover, language skills, while important, do not reflect an ability to work with people, thus creating a second form of tension. Refugees tend to relocate in waves and usually the earliest wave represents those who were more educated and economically better-off; this can also create discord in the caseworker–client relationships as many of the caseworkers arrived in earlier waves. In addition, in the Midwest, the caseworkers working with the Somali Bantu are not Somali Bantu, but rather are Somali—members of the groups that actively discriminated against the Somali Bantu at home and in camps [29]. Therefore, while language ability is important, this ability does not translate into preparing a person to be a caseworker. Moreover, the refugees themselves often view their caseworkers as experts on life in America and therefore, regardless of their training, rely on them for expert advice even in areas in which they may have no expertise, such as nutrition. The community leaders interviewed worked in the resettlement agencies or other similar agencies. Two of these leaders were refugees and two were not. Those in the managerial positions had less direct day-to-day contact with refugees whereas the other two worked at agencies that placed them between refugees and other sectors of society and therefore, they felt they could speak on behalf of newly arrived refugees.

In general we interviewed as many new refugee arrivals as we could from a host of countries including: Liberia, Ivory Coast, Burundi, Ethiopia, Somalia, Kenya, and Russia. The purpose of these formative interviews was first to gather information to facilitate the design of our more formal survey which would be conducted with men and women representing the three most recent arrival groups: Liberians, Somali Bantu, and Meskhetian Turks. The second purpose was to qualitatively examine the validity of several hypotheses relating to food availability, economic and time constraints, children, and knowledge transfer. During recorded interviews topics were loosely identified and open conversation was encouraged although food, dietary practices, and health were the primary themes. For purposes of this paper we focus on the experiences of a range of individuals. This is not to suggest that we captured a collective experience, but rather that we culled the interviews for aspects that would allow us to elucidate similarities and differences in aspects of diet and dietary change for the various refugee groups. Although a range of individuals was interviewed, the majority was with Liberians and Somali Bantu because these refugees were among the largest groups to be resettled in the early 2000s. Below we provide some basic background on how refugees from Liberia and Somalia came to be living in the USA.

A series of civil wars are responsible for the displacement and production of both Liberian and Somali Bantu refugees. A 7 year Liberian civil war briefly came to a close in 1996—instability, infrastructure destruction, personal insecurity and death for many Liberians resulted [30, 31]; 150,000 people were killed and another 1.5 million were displaced. In 2003, more civil war resulted in another 105,000 refugees bringing the total to 250,000 Liberian refugees. Between 2003 and 2005, about 12,000 Liberians came to the USA representing waves of Liberians who did not have the opportunity, capacity or ability to leave the situation on their own prior to this time. Many Liberians in these waves of resettlement had lived in several camps in other countries in West Africa before arriving in the USA starting in the early 2000s.

Many Somalis fled to nearby Ethiopia, Kenya, and Tanzania after surviving civil war and famine in the early 1990s [32]. The situation was even more difficult for the Somali Bantu, a collection of Bantu "tribes" who approximately 200 years ago were brought to Somalia as servants and slaves. Despite sharing a common religion (Islam), language (Somali), and being freed from servitude, Somali Bantu, particularly the subset know as the *Mushunguli*, were ill-treated due to their minority status and lack of affiliation with Somali clans [33]. The *Mushunguli* mostly come from rural areas and were among the poorest echelons of Somali society [29]. Resettlement to the USA from Dadaab- and Kakuma-area refugee camps began in 2003 with a total of 12,000 Somali Bantu expected to arrive resettle in the United States over several years [34]. We concentrated on these two African refugee populations, Liberians and Somali Bantu, because they were the most recently resettled and arrived to the USA in fairly large numbers.

Moreover, we conducted surveys with Liberians, Somali Bantu and Meskhetian Turks (refugees from Russia); however, the analysis is only complete for Liberian female caretakers. Therefore we focus on this sub-set and report the results from the two non-probability samples of female Liberian refugee caretakers conducted at the two field sites (East Coast and Midwest). Caretakers are defined as females, married or not, who live with at least one child under the age of 10. The East Coast ($n = 105$) and the Midwest ($n = 52$) Liberian caretakers had been living in the USA for varied amounts of time (1 month–5 years). The East Coast survey is described in detail elsewhere [35] and similar methods were used to recruit caretakers for the Midwest survey, which included recruiting individuals first through a resettlement agency and then using word of mouth to increase the sample and reach segments of the population that might not be reached through the resettlement agency. The surveys were face-to-face interviews carried out by trained female interviewers who were usually from the same sending country as the female interviewee. On these surveys, data were collected on migration patterns, shopping practices, dietary intake, food insecurity, and process and end-point measures of acculturation typically seen on epidemiological surveys. A 24-h dietary recall was collected from caretakers for themselves and their children. Foods were listed and then grouped into food categories to ease comparisons. All procedures were approved by the appropriate review boards and all individuals provided consent.

Results

Food Environments

The FAOSTAT data provide a general overview of the types and amount of foods available to the average consumer in the primary sending countries of participants (Liberia and Somalia) and the USA. Comparing 2003 values from Liberia and Somalia to the 2003 values from the USA illustrates that there are large differences in food environments (Table 1). Differences between Liberia and Somalia are subtle; more substantial differences can be seen by comparing these values to the USA values. Especially relevant is the overall increase in total daily calories (kcal) available to an average person in the USA compared

Table 1 Availability of calories from various food sources for Liberia, Somalia, and the USA[a]

	Liberia	Somalia	USA
Kcalories/capita/day	2578.08	2007.60	3753.74
Vegetable products	95.6%	92.9%	72.1%
Animal products	4.4%	7.1%	27.8%
Cereals	48.4%	50.4%	22.2%
Sugar & sweeteners	4.0%	5.3%	17.5%
Raw sugar	3.9%	5.1%	8.5%
Meat	1.8%	2.7%	12.0%
Fish	0.8%	0.3%	0.7%
Vegetables	1.5%	0.7%	1.9%
Fruits (excluding wine)	3.4%	4.6%	3.1%
Milk (excluding butter)	1.0%	3.0%	10.4%
Vegetable Oils	10.9%	4.8%	16.1%

[a] Data were calculated using FAOSTAT and reflect availability of edible foods and do not reflect actual consumption. Database was accessed on August 15, 2006 at http://faostat.fao.org

to Liberia and Somalia. In Liberia and Somalia, more than 92% of calories come from vegetable food items whereas in the USA 72% of calories come from vegetable items. Meats and dairy make up a substantially greater portion of total daily calories in the USA compared with the African countries. Diets in the USA are marked by an increase in calories from sugars and sweeteners as well. Although the FAO databases mask in-country and individual-level variation they nevertheless imply that at the population level the food environments for those living in Liberia and Somalia are vastly different from the food environments in the USA. By extension, these data suggest refugees moving from Africa to the USA will face a dramatic shift in food environments. Although we highlighted differences between USA and African sending countries, such differences are evident in nearly all South and Central American countries as well. Collectively, these marked differences suggest that a change in food environments faces many newcomers to the USA and certainly plays a role in dietary change among new Americans. We also recognize that physical activity (energy expenditure) and diet (energy intake) make up the energy balance equation (Fig. 1); for this paper, however, we concentrate on the results from our ethnographic work that focus on the intake side of this equation.

Consistent with the population level differences in food availability the literature on immigrant diets suggests both broad and subtle changes in dietary intake among newcomers to the USA. One review article [36] summarizes the findings of several cross-sectional studies of "dietary acculturation" among South Asians and Latinos; the review provides clear evidence that a shift in the food environment is indeed associated with shifts in individual dietary intake. Importantly, the direction of change is inconsistent among the ethnic groups reviewed. For example, Himmelgreen et al. show that for Puerto Rican women, time in the USA is associated with increases in the number of sweetened drinks in the diet but that birthplace and language-use mediate aspects of this relationship; their results suggest that poorer English use was protective against obesity but only for those born outside of the USA [37]. Sub-Saharan immigrants in Australia report that the top-three items added to their diet are pizza, breakfast cereals, and fast foods [38]. Studies with other refugee groups suggest that diet, nutrition, and food are fundamental concerns of refugees once arrived in the USA. A majority of Sudanese refugee respondents ($n = 263$) reported that they were concerned about the foods they were eating [39]. Barriers to "eating better" nominated by the mixed-sex sample of 31 Bosnians, Cubans, and Iranian refugees included the high cost of fresh fruits and vegetables, the inability to have an home garden, limited time to prepare foods, and the ease of purchasing and preparing snack foods [40]. Data from our own studies and the formative research reported here substantiate these claims and show that diets are indeed shifting with greater amounts of time in the USA.

Perceptions of Diet Change

In Table 2, demographic and socioeconomic data are presented for female Liberian refugees surveyed. These caretakers were asked to describe the direction in which their dietary practices changed since arriving in the USA; large perceived and actual changes in dietary patterns were identified. The FAO dataset suggests that Liberian refugees would have had greater access to fruits and vegetables in Liberia (Table 1); but, perceived changes in refugee diets

Table 2 Sample characteristics

Variable	Survey ($n = 157$)
Age (years)	33 (10.8) (range: 18–74)
Household size – #	4.6 SD 2.2
High school education or higher, % yes	50%
Household income <$1,000/month, % yes	48%
Respondent's income <$1,000/month, % yes	64%
Food stamp program – ever, % yes	94%
Food stamp program – currently, % yes	50%
Women, infant, and children's (WIC) – currently	47%
Currently employed, % yes	59%
Self perceive difficulty with English, % yes	47%

Table 3 Perceptions of dietary change among East Coast Liberians

Question	% Yes
More soda consumed in the USA?	72.3
More fruit consumed in USA?	76.0
More vegetables consumed in USA?	78.2
More milk consumed in USA?	84.2
More meat consumed in USA?	86.1
More oil consumed in USA?	53.5 (NS)
More frying while cooking in the USA?	48.5 (NS)

do not reflect this pattern (Table 3). In almost all food categories, respondents expressed that their consumption increased. This increase might reflect a food insecurity situation resulting from civil war and from patterns of food availability in refugee camps which do not match-up to the country-wide patterns published from FAO databases [41]. As shown in Table 3, in five of seven food categories respondents reported changes in dietary practices since arriving in the USA. There were no significant differences in patterning with time for the use of oils and frying as a method of cooking. These findings corroborate refugees' and caseworkers' concerns over changes in dietary intake.

Next, for these same Liberian caretakers ($n = 101$), we compared the types of foods reportedly consumed during 24-h recalls to examine whether broad differences in dietary composition were evident between those individuals who had lived in the USA for less than 2 years and those in the USA more than 2 years (the median time in the USA for the sample). In all, 101 Liberian refugee caretakers reported 1,103 distinct food records for themselves and 968 food records for their children. The number of food items reported increased with child's age, but because there were no differences in age between those who had lived in the USA for more than or less than 2 years, we report unadjusted values here (mean age <2 years in US = 37.6 [23]; mean age >2 years in US = 39.8 (20.3), $P = 0.621$). Results indicate that longer periods of time in the USA were associated with a greater likelihood of reporting consumption of seasonings ($P = 0.041$), hot drinks ($P = 0.019$), vegetables ($P = 0.037$), added sugar and sweets ($P = 0.002$), oils ($P = 0.048$), and, they were also somewhat more likely to consume milk ($P = 0.053$). For children, increased length of time the caretaker lived in the USA was related only to the increased likelihood of children consuming fruits ($P = 0.004$).

Changes in diet and concerns about chronic diseases are also reflected in statements collected during the qualitative interviews as well. An Ethiopian refugee and the executive director of a refugee assistance non-profit organization, working primarily with East African refugees and their children generalizes that East African refugees certainly eat the foods they consider to be "African," but he suggests that they are eating what are considered to be high status foods much more regularly in the USA than they would have at home. He said:

> Because to put fat is a sign of richness because most countries are poor…[At home] to eat fat does not have a significant effect on your body because you eat fatty food during holidays and celebrations… It's the rich people who eat fat, who can afford good food, meat. Here they come and everything's enough. They have goat meat, the Somalis, they will have party food, a nice fat steak, they will cut and make into a sauce…So, blood pressure is increasing… which they didn't have back home… It is serious because we have lost people due to this coronary heart disease… They eat this type of food. So you can see the kids getting weight, getting too much weight….

In addition to changes in the frequency of eating higher status foods, evidence also emerged to suggest that the social context of food consumption was also changing. Nearly all of the Liberian caretakers (86%) reported consuming fewer meals at other's homes than in their home country. This was a sentiment widely heard among informants in the qualitative interviews who noted problems with the individualistic nature of life in the USA. Some Liberian refugees implied that it was more difficult to stop over unannounced at people's homes in the USA, but as we will discuss below, the ability to rely on others in times of food insecurity is important. This quote from a 34-year old refugee from Somalia serves to document the attitude changes she saw in her husband and the advice she got from her relatives before leaving Kenya:

> …something's going on, because my husband was here three years earlier than me…so when I came I found he changed totally, he was different…I didn't know why…he don't want to give me money; it's not like before when he was there [in Kenya], he give me everything, it's different… When I was leaving my country, some people were like when you go to the United States, 'Don't change because those people they give people something, they change totally. Call us, don't forget about us'…The African people they believe that when you come here, they give you tablet. You take some medicine, you change. So they say like, 'don't take that pill'.

In sum, refugees not only perceive changes in their diet since leaving Africa, but once in the USA there appears to be a time-dependent change in the composition of the diet

as well as expectations in social relationships.[3] We now turn to several hypotheses that might explain how time and/or language may actually be associated with these noted changes.

Hypothesis 1: Food Availability

This hypothesis assumes that new Americans prefer to consume foods similar to those they ate in their home country because of links to memories and identity [42–45], and that they are unable to acquire preferred foods because these foods are simply not available in the USA. In other words, procurement difficulties inhibit the inclusion of certain foods commonly consumed in the home country. Therefore, other foods are expected to replace these preferred items.

Participants in our studies are astonished by the range of foods available in chain supermarkets and they find it overwhelming. As one woman said, "*you go there [supermarket] and there is dog and cat food, and if you don't know English, it's very hard*." Since shopping is so difficult immediately after arrival, caseworkers at the resettlement center are usually required to take refugees to the supermarket within a day of arrival into the USA. Initially, refugees only have access to food cards that can be spent at the larger supermarket chains because it takes time to enter the Food Stamps Program (FSP). We asked a caseworker to explain to us how she teaches her clients to shop and she said:

> I explain everything, sometimes even if they do not know the product, I explain to them what [the products are]. For example, they have [the] same tomatoes, but different price. I show them which one is cheapest. And sometimes they ask me 'which one [do] you buy?' and I tell them, 'the cheapest one.' Because it's very bad if you tell them I buy the expensive product…just go with the cheapest one.

Perhaps reflecting a form of global consumerism [46], this caseworker followed with a statement about how she always shows her clients where soda is located even if the client does not ask her about it; implying that she (and her clients) like and value sodas. The active teaching and information exchange between caseworkers and refugees shows that refugees initially rely on others to learn about foods typically found in an American chain supermarket. It is possible that refugees will pick up on the perceived values implied by their caseworker as the caseworker emphasizes certain items that might be interpreted by clients as preferred or prestigious food items in the new food environment. The caseworker can potentially have a dramatic effect on food choice, as he or she walks down the aisles of the supermarket pointing out and explaining the different products and prices.

The food availability hypothesis assumes that refugee diets shift because preferred foods are not available. Our data do not support this hypothesis. Refugees in both mid-sized cities report that there are certainly some foods found in Africa that they cannot buy in the USA (e.g., *mabuyu* (baobab fruits) and camel milk; foods consumed by some East Africans). Contrary to research with sub-Saharan migrants in Australia [38], only 12% of respondents in our sample reported having a difficult time locating the foods they wanted to eat, while the majority reported that locating preferred foods was unproblematic (two respondents had not yet been in the USA long enough to provide an answer). Although preferred foods were perceived to be widely available, some felt these foods were different from those consumed in their sending country. This was especially true for the taste of fruit. A Liberian woman who had been in the USA for just six months said that "*when I came they* [the fruits] *were tasting different, but now I* [am] *used to it*." Three other participants specifically talked about the taste of oranges and said that it took time to get used to the taste of oranges in the USA. Although taste is one reason that refugee diets might change with time, several caseworkers suggested to us that social integration and cohesion might also play a role in how quickly people are exposed to shopping and foods in the USA and that this integration and cohesion appears to vary along ethno-cultural lines. Two caseworkers pointed out that the Meskhetian Turks (from Russia) appear to be more socially cohesive than the Liberian refugee community and one female caseworker said:

> [The Meskhetian Turks] support each other a lot. They come and ask me, 'Are we having any Turk families coming?' and I tell them 'Yes' and they say 'OK, bring [them] to our home. If it's lunchtime bring them for lunch or bring [them] for dinner. They support each other a lot even when they do not know one another.

Immediately upon arrival Turk refugees are exposed to meals prepared by peers who have been in the USA for some time and the Turk refugees have immediate access to information about where to buy the items they will need to maintain a preferred diet. Several employees at the resettlement agency offered an explanation for group-level differences when probed. They explained that the Liberian refugees are different from Turk refugees because they

[3] This is not to suggest that refugees forget about friends or family. In actuality, nearly all the refugees interviewed stated that they were worried about family members at home or in camps and that the inability to send enough money to them was a burden. They also described the mismatch in their expectations and reality of resettlement in the USA. Refugees also mentioned that family members do not realize that life is hard for them in the USA.

suffer from the mistrust generated by the civil war in Liberia; we have not yet asked refugees about the explanation offered by these employees. While Meskhetian Turks may seem to be an unusual comparison group as they did not arrive to the USA as a result of civil war, the Somali Bantu present a unique case and also are not comparable to Liberians. First, the Somali Bantu arrived at the Midwest site mainly as one large group (first wave); therefore, they did have others to rely on at arrival. Second, very few of them spoke any English at all. Third, they were dependent on Somali caseworkers. The inequality in power between the Somali Bantu refugees and their Somali caseworkers has exacerbated the difficulties in the transition to living in the USA. They expressed dismay and talked openly about the discrimination they experienced from their caseworkers; this scenario made accessing information even more difficult for the Somali Bantu. They expressed feeling a sense of betrayal in the resettlement process and local resettlement center for their disregard of this history and assumption that language always unites people. Now, the Somali Bantu are more established and they are participating in national organizations. Moreover, they have organized themselves locally; this sense of betrayal has lead to greater social cohesion. However, we were not able to establish how this specific kind of social cohesion has affected their current food and dietary situation. Perhaps if a second wave of Somali Bantu arrives at this field site, we will know if their social cohesion translates into actions like those seen among the Meskhetian Turks or if they will act more like Liberians. Our ethnographic hunch suggests the former, but we will know more as this fieldwork concludes over the next year.

Contrary to expectation, many foods that African refugees ate in Africa are available in cities in USA and therefore, diet change is less likely to be influenced by the lack of availability of these preferred food items; however, variation in the timing and introduction of new and/or preferred food items appears to be influenced by caseworker preferences, social network and cohesion, and ethnicity. Moreover, respondents were less concerned with the availability of preferred foods and more concerned with the cost of these foods. For example, foods eaten by many Liberians, such as cassava or ingredients for *fufu*, *garri*, or *semolina* (a mixture of yams, plantains, maize, and/or cassava root made into a thick paste and often served with a fish, tomato, and okra sauce), are only found in specialty stores and are described as expensive.

Hypothesis 2: Economic Constraints

The economic constraints hypothesis focuses on the relative cost of foods and assumes that foods favored or typically eaten in Africa are more expensive when found in the USA. The economic constraints hypothesis assumes that individual diets change because new Americans lack the economic resources needed to acquire preferred foods; therefore, their diets shift to accommodate these budgetary constraints. The hypothesis builds on the observation that there is an increase in the global availability of energy-dense, nutrient-poor foods that are stereotyped as "American foods[4]"; and that these foods are less expensive than are fresh fruits and vegetables, meats, and fish [47]. A corollary to this is that many refugees are envisioned to enter the USA and take relatively low-paying jobs [48, 49] that, in turn, prohibit spending on relatively more expensive, but favored foods. In the face of budgetary constraints, individuals alter their dietary practices to more closely match their economic situation which means that with time, new Americans will consume more high-fat and refined sugar foods and beverages as they become more savvy about ways to save money on food.

Our data support several of the latent assumptions of this hypothesis. Approximately half of the women interviewed in both cities reported a total household income of less than $1,000 per month, and approximately 40% were currently unemployed, and half of the participants were in the Food Stamp Program (FSP) which has set income criteria (Table 2). Four small-scale food insecurity studies focusing on African refugees in diverse settings show that more than 70% of these households experience food insecurity (with implications for child hunger) (Fig. 2). Employment and Food Stamp use appear to be related to time lived in the USA (Fig. 3). These patterns in the data support the assumption that it is newly arrived refugees who suffer most from low-income poverty but that with time their economic situation improves.

We did not survey the pricing of African foods, but recent reviews of food prices strongly suggest that those foods regarded as distinctly African by study participants, such as palm butter, goat meat, fish and fresh vegetables are typically more expensive than are energy-dense, nutrient-poor foods that are regarded by study participants as American foods [47]. The cost difference between African and American foods was a repeatedly mentioned in *every* qualitative interview. When we asked about foods that were regularly purchased, participants noted "*we are still African so we buy meat, fish, green beans...*", while

[4] We do not assume that there is one definitive "American" diet but instead are referring to foods that are relatively fast to prepare, widely available, and energy-dense and recognize that the availability of these foods has increased globally. We certainly acknowledge that there are at least regional, seasonal, gender, religious, ethnic, and class differences in diets of people living in the United States but chose to use this term because research participants refer to diets as "American" and "African."

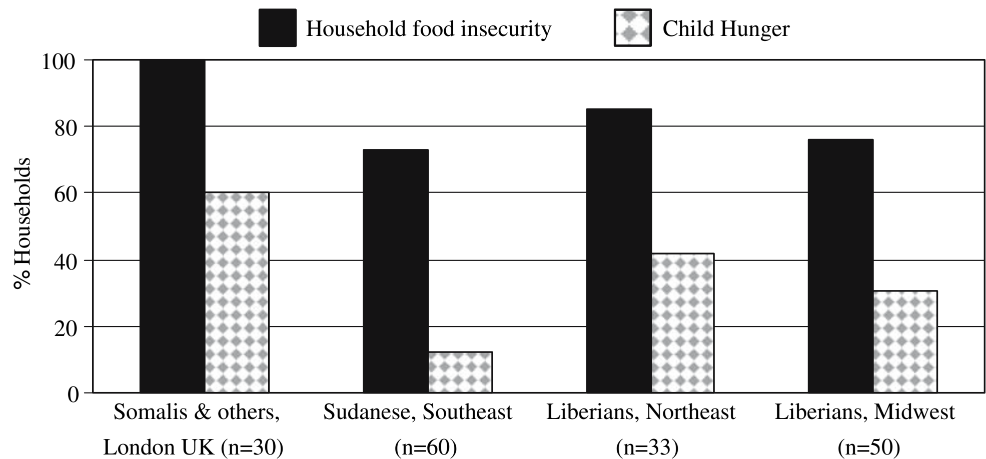

Fig. 2 Studies indicating high levels of food insecurity for newly arrived African refugees in cities in the UK [50] and USA [35, 51]

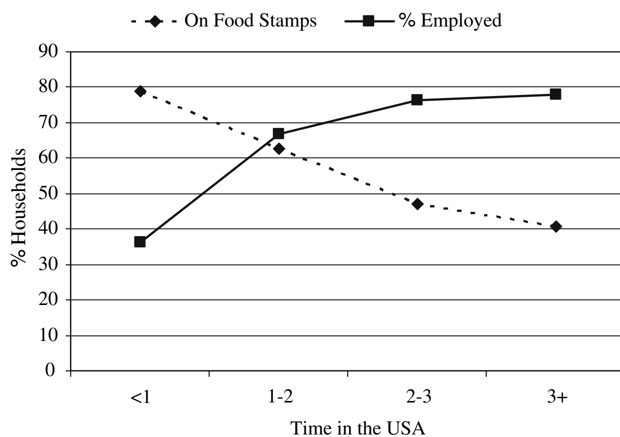

Fig. 3 Change in Food Stamps Program use and employment status by years in the USA for East Coast Liberian refugees

other participants added to the list "*water greens, palm butter...*", "*okra*, [and] *palava* [spicy meat] *sauce...*" Always, the respondent reported that purchasing "African" foods was incredibly expensive. The economic constraints theme is captured in the words of a Burundian female refugee who said the following:

> They try to import African food but it's very expensive. For example, just smoked fish, to find one pound, it's twelve dollars. The pound for smoked fish! And their habit, they are eating a lot of smoked fish. The fact that it's twelve dollars per pound, they can't afford.

Although there is a preference for continuing to eat what the respondents referred to as African foods, they also describe how maintaining this diet is costly and often governs the patterning of foods eaten in any given month. Food stamps (received monthly) are quickly spent at specialty stores. Participants stated that in the first half of the month they tend to purchase and consume a wider variety of African foods and fresh foods, however, in the second half of the month, they tend to eat a more monotonous diet, mostly soups. Several participants noted preparing one batch of soup, and consuming this for many days thereafter. Another woman said that she encouraged her family to drink a lot of water or eat a lot of bread during the time of the month when their meals consisted primarily of soup. Another Liberian refugee used a different strategy that was affirmed by the others that we interviewed. She said:

> I live with my daughter… She has a food stamp. I have a food stamp. I used to use [my] own food stamp from the first to the fourteenth [of the month]. That is the way we have to economize our foods. So she [buys] from the fifteenth to the thirty-first [of the month]. So that is the way. Fifty, fifty.

Two questions on the survey were aimed at capturing the ability to lean on others in times of economic need. One-third of East coast respondents had borrowed food or money in the past. Twenty-one percent of the Midwest respondents surveyed had borrowed money and 44% had borrowed food. Interestingly, Liberian caretakers ($n = 101$) and their children were more likely to report consuming meals at friend's homes if they themselves reported experiencing hunger which suggests that having a social support network is helpful in times of food deprivation [35].

Hypothesis 3: Time Constraints

The time constraints hypothesis states that there is a shift away from fresh fruits and vegetables, meat, and fish to foods that require a relatively shorter preparation time. This hypothesis recognizes that many new Americans take off-shift jobs that may limit time opportunities for cooking as caretakers head to or return from their workplace [15, 37]. A corollary to this hypothesis is that transportation efforts may influence food purchasing and dietary

patterning as access is enhanced or limited by access to and/or quality of a transportation system [52]. For example, if new Americans are more reliant on public transportation, there is an increase in the time it takes to get to/from their destinations; therefore, they might also consider the portability and convenience of foods in diet selection, particularly if they have to travel with young children. Moreover, transportation opportunities may influence shopping patterns which, in turn, will influence dietary patterns [53].

The majority of survey respondents and interviewees work in low-paying jobs (e.g., housekeeping, factory packaging and folding, stacking and food prep) and many of these positions require early morning, evening, and/or night shifts. As suggested by others [15] and corroborated by our research, the type of work influences the time available for food preparation and cooking and the types of food consumed while on breaks from work. Women said that they would sometimes bring rice dishes from home to eat at work, but at other times they bought fast food with preferences for pizza and McDonald's; a pattern similar that of sub-Saharan immigrants in Australia [38, 54]. Over 45% of the survey respondents reported eating fast foods at least once per week.

To accommodate their work schedule, many interviewees said that they would shop and prepare a week's worth of food on their day-off because the African dishes mentioned by informants require a fairly intensive preparation. These dishes usually include rice, fish, meat, and the preparation, mixing and making of sauces, which demands more 2 h of preparation. Surprisingly, in our sample, a majority of survey respondents (74%) felt that they had enough time to shop and cook the foods that they wanted; this means that about one-quarter of respondents felt that the time it takes to get to the store and cook are constraints for them. About one third of survey respondents agreed with the statement that it was hard to get to the store to buy food. An important factor appears to be transportation and whether or not a person relies on public and/or others for transportation to shop. As conveyed by a woman who shops only once per month because she doesn't have a car, she said "*…so if I ask somebody to drive, I just buy everything.*" Economists have shown that low-income Americans relying on the food stamps program are more likely to be infrequent shoppers and this may result in lower food intake in the last week of the month as fresh foods are depleted and supplies are limited which corroborates themes in our qualitative interviews [53].

Hypothesis 4: Children

A forth hypothesis links changes in adult immigrant diets to child dietary preferences and assumes that children bring new ideas about foods into the home and that inclusion of these food items are negotiated through the caretaking process. Children may learn about new food items with increased exposure through various media outlets [55, 56]; institutions like daycare and school food programs [57–59] and potentially through interactions in their peer networks [60–62] which might be coupled with concerns over fitting in as children learn to behave in alternative environments [63, 64]. This hypothesis assumes that children pressure their caretakers to purchase and ultimately consume certain foods [65–67]. The pressure and willingness to purchase and consume energy-dense, nutrient-poor food partially erodes preferences for African diets. Moreover, as suggested by Brewis and Gartin [68], parents' desire to please their children through provisioning their requests will overtime lead to a shift in the dietary practices to accommodate more members of the household, including the children.

The majority of caretakers surveyed in these two cities felt that it was important for their children to eat foods from their home country (75%) but most school-aged children eat two meals a day at school, leaving only the evening and weekend meals to be eaten at home. Due to IRB constraints, children were not interviewed during the formative part of this research, but indeed data from the caretaker interviews suggests a tension between what caretakers want in their children's diets and what they actually feed them which is not uncommon for families in the USA [68].

These and other data provide hints about the role children play as agents in restructuring dietary practices in the home. One Liberian respondent said: "*If I buy meat, fish, cassava leaf, sometimes my children like chips, noodles, all this stuff, so I have to get both foods in the house.*" Another Liberian caretaker lamented:

> my children, they don't like the African food that I buy, they eat American food. But sometimes they will eat the food because it's what I eat. But I can't force them to eat African food if they don't want to eat it.

Another respondent commented that adults prefer foods from their home country and that they especially try to respect religious practices regarding dietary restrictions. This male Ethiopian refugee affirmed that children are agents of diet change and that parents are influenced by their children's preferences and stated that:

> It is my surprise is that every Ethiopian or Somali eats its eats traditional food but the kids like bologna and hot dog. So that is a shift from our civilization. 'I don't want to eat your culture' they say right away. These are American kids…You are not supposed to

> eat pork, so the mothers they know what they like…So one family one day, he cook pork barbeque. I say, 'why do you cook this?' 'Because the children want, and we tasted one time and it looks ok.' But don't tell the priest about it [laughs]. But it looks good, we barbeque it, the kids like it, the kids request it…I think they might have eaten with their friends this pork barbeque. Because the children like it, we tasted. But don't tell the priest. You'll find jokes about this.

One community leader, also an Ethiopian refugee, noted that the parents are aware of the influence of their children and emphasized that although parents can trick children into eating adult-preferred foods, he is quite concerned about the health changes in the children:

> Now the parents, they become sophisticated. They look for kosher type of halal type of food. Hot dogs are made of beef, so the children they won't recognize it, the bologna, the lunch meat, there is also with crackers, there is a type of lunch meat, there is also microwave food. So the kids are Americans. That is a generational conflict and I don't know what they can do about the weight of the children. It is increasing. These foods are high calories, high salt. The kids drink too much soda.

Our work also shows that some refugee caretakers are unsure about what is considered good or bad food for children and that they may turn to their caseworker for advice. A caseworker said that her clients often ask for her opinion on food for their children. She said, "*Parents, they ask me, 'Can I buy chips?" I say, 'Yeah, they can have some chips.*' Then she whispers to us, "*And they don't eat much, not like us so it is OK* [laughs]." The interaction between a caseworker and caretaker can impact subsequent choices of a refugee because often the caseworker has his or her own conceptions of nutrition, economizing, or what is "best" for a client. This raises the issue of power because in general, the interactions between a caseworker and caretaker are unequal.

From the survey component of this formative work, we found that children of caretakers with English difficulties were more likely to consume sodas and snacks and less likely to consume fruits which might indicate a situation where children are driving the diet. Certainly children are requesting foods and when parents are unsure about these food items they may seek the advice of someone they consider to be more "expert" on these decisions. The reliance of refugees on their caseworker for formal and informal knowledge exchanges about diets deserves more attention and will be addressed in future research.

We wanted to understand why parents thought that their children's preferences were important and where parents pinpoint the locus of change or the initiation of exposure to new foods. Given the extent to which television influences US-born children, we expected parents to identify the media. This was not the case: most focused on institutions. One Liberian woman felt that school was the source of change in food preferences for her child. In discussing why children begin to acquire a taste for "American food," she noted that children:

> …eat American food because that's what they learn from school. Like I, when I arrived in this country, my children did not start school, they did not love American food…But by this time, when she comes from school, she says, 'Mommy, I love barbeque and hamburgers'.

Another Liberian caretaker indicated that her toddler voices a preference for certain foods. She explained that he was exposed to new foods at his daycare center, and said:

> My four years old baby, he don't want to eat rice. He don't want to eat the pepper…Hamburger, you know the foods they [serve at] daycare: chicken nuggets, all these small, small food, [like] pizza [and] hamburger…If we pass McDonald's he will tell you to stop.

Themes about the child's satisfaction with food were apparent in many interviews. Parents want their children to be satisfied and want to provide preferred foods. We suggest that parents are genuinely concerned about their children's satisfaction with food. Interviewees said that they do not want their children to feel hungry and that is why they get the children the foods that they prefer. One Liberian woman caring for her young brother summarized these themes by saying that:

> If I make soup, he want to eat pizza…I have to worry about him…It make me sad. I worry I [am] eating and he [is] not eating. I should get money to go get what he needs. I have to fix Irish potatoes [instant potatoes], because he like it…So, I have to find ways to get something for him to eat, then he will not go hungry.

We observed caretakers bringing portable snack foods for their children as they waited in the lobby of the resettlement agency; using treats to elicit quiet behavior was a common strategy for many clients. We surveyed 52 Liberian caretakers to see if they ever used sweets as rewards for good behavior and over 60% of the sample affirmed that they did. Moreover, a slight majority felt that children were not capable of eating too much (53%). A large majority felt that children should be fed every time they said they were hungry (72%). However, Liberian

caretakers were not inclined to push their children to eat more or finish a meal if they said they were no longer hungry (62%). In the course of our fieldwork, the resettlement agency changed its policy about providing candy to clients and their children. Workers are no longer allowed to make lollipops or candies available on their desks. The agency felt that this was sending a poor health message to their clients as parents would use these treats to keep their children quiet while waiting for meetings. However, they did not elect to remove vending machines, perhaps because they wanted to have something available to clients who may have long waits at the agency or so that staff would have continued access to these snack foods. Moreover, as a non-profit organization, it might have been in the financial interest of the agency to keep the vending machines in the lobby.

Hypothesis 5: Knowledge Transfer

A fifth hypothesis is that refugees want to consume foods they regard as distinctly American but are unable to do so because they lack the knowledge to purchase, prepare, and cook new foods and/or read recipes for these foods. Refugees and caseworkers point out that pizza is quickly a favorite new food and refugees do learn to make a specialized form of pizza at home. This adaptation is similar to James' complex picture of ethnic pizzas being linked to both identity and globalization at the same time [54]. On the survey less than half of the Liberian caretakers agreed that that they eat the foods they do because they do not know how to cook alternative foods. In other words, over 40% of the sample felt that their knowledge of alternative food preparations was limited. At interviews, we asked respondents about their feelings toward eating and cooking of American foods. Most felt that American foods were good and were accustomed to some of the new foods introduced to them, and even referred to instant mashed potatoes as the American equivalent of *fufu*. Despite feeling that they wanted their children to eat foods from home, Liberian respondents did not seem to feel that incorporating American foods into their diets was a threat to their cultural identity. Liberian caretakers were more concerned when they could not provide their children with the foods that they liked. Moreover, when we asked five caretakers if they would attend American cooking classes, they responded excitedly about the prospect and listed the types of foods they would like to learn to cook (e.g., fried chicken). This theme is captured in the following by a newer Liberian arrival who said that:

> When some people invite me to go eat, and I go eat, I can see some food that I like. And I can see it [at the store], I buy it and carry it home. Sometimes I will be ashamed to ask if they can help [me learn]. People are busy. To ask somebody to come teach you something, it is not easy.

Another Liberian woman who has been in the USA for nearly 2 years said:

> Even the Americans themselves, [do] not [prepare] every food in their country. They eat some food on holidays, special food, [and] special dish…So, if you know how to fix it, you can continue [to cook it] at home…You can get used to it. But we don't know how to fix any of this food. We like them [American food]. We eat them [American food]. We love them [American food], but we don't know how [to cook American foods].

An older Liberian respondent noted:

> I want to eat it too, but I don't know how to fix it, so my children know how to fix it. Like her [indicates 14 year old granddaughter], she is bigger now, so she know the food to buy. She can carry it and fix it…It's very important for me to cook my own food…So I want to learn how to cook the American food, and even know how to buy it, to know the names and to buy it. Because they [the children] are already used to it now…If I know how to cook the American food it would not be a problem for me, but now most of the time I eat my African food.

Several others pointed out that they would take pride in being able to cook American foods. One Liberian woman said that, "*I want to know how to make American food because, whenever I go home, I* [will] *have to make it for myself so my people will know I'm from America*." Liberian caretakers were aware of the recipes and directions printed on food cartons, but many of the women are not able to read. One woman said, "*you read the word and you don't understand what it mean…The pancake, it got a recipe on the back. You read, you don't know nothing to mix it with. I didn't know*." The four Liberian women we discussed this topic in-depth with spoke English but were unable to read; they felt this limitation excluded them from a variety of cooking opportunities.

Discussion

Our aim here has been to identify possible mechanisms to explain how the diets of newly arrived refugees and immigrants change with increasing amounts of time in the USA and with language competency. Of the five hypotheses proposed to account for dietary choice, we are only

able to partially reject the food availability hypothesis. However, our data are limited to urban contexts which preclude us from rejecting this hypothesis in its entirety because other researchers show that there is less variety in rural settings [69, 70]. The four remaining hypotheses enjoy some support from both the survey and the qualitative data. Some respondents find that economics and time availability constrain their dietary choices. Nearly all of the participants had some comment about their monthly expenses. The perceptual link between social mobility and diet certainly needs more in-depth exploration; it will be important to understand what high status foods mean to overall wellbeing. For example, one explanation accounting for more fruit in the diet of Liberian refugees who have been here longer is that their economic status improves with time. Fruit may be a highly valued dietary item that is initially foregone due to economic constraints. A competing hypothesis is that over time Liberians get used to flavor differences and with time accept the taste differences in fruits. More research is needed to explore the meaning of and definitions of high status foods in various immigrant populations since food is often a marker of social change [45].

The role that children play in structuring and creating family diet was a dominant theme. The negotiation of food preferences between caretakers and children clearly indicates a bilateral interactive relationship. The school or daycare environment may speed up children's exposure to poorer quality foods while it introduces cultural dissonance in the home and complicates the caretaker's task of feeding household members [71]. This dissonance also points to a crucial link between food and identity, as the caretaker watches a child becoming "American" as the child eats more and more American foods. We could locate only one study focusing on immigrants, dietary change, and health which showed children as purveyors of specific nutritional education [72]. The study showed that Asian immigrant women do trust the nutritional advice that is passed to them from public schools (through their children). Parents admitted that they would try to adjust meals to reflect this new knowledge about healthy eating. Last, although retaining diets similar to those in Africa is important, respondents in this research are open to learning new recipes and would like to include a wider variety of dishes but language and literacy appear to interfere with this knowledge transfer process which limits new cooking ideas.

The examples from our ethnographic fieldwork illustrate that there are a number of key nodes in the social networks of refugee populations that potentially influence dietary practices. Our examples show the influences of social support and social networks on multiple levels including government programs (e.g., FSP, school meal programs), the resettlement center, caseworkers, and friends and family. A social network may offer an option for eating when food access is insecure. In addition to borrowing food or money, eating with others is an option. However, the health impact of this option may depend not only on socioeconomics, but also on ethno-cultural beliefs. Some Southeast Asian refugee groups disallow the consumption of high status foods, such as meats, when they eat at others homes as a result of low food supplies. The African refugees we worked with, however, do not distinguish between helping others in times of need and guests; they feed everyone the same foods they are eating regardless of the guest's food supply situation. Thus, just collecting survey data on social support in times of need does not indicate anything about the quality of the food consumed at other's homes while avoiding hunger. Therefore, knowledge about culturally appropriate forms of social support in times of food insecurity needs to be documented because just acknowledging availability of a network may not explain anything about quality of the diet in times of need because the cultural rules governing these relationships may vary.

Transportation is another key theme arising from our research. Relying on others for transportation suggests that individuals might shop less often, perhaps only once per month. Although "big" shopping occurs less often when transportation is limited, we suggest that there may be a compensatory increase in buying at convenience stores located close to work, bus stops, or home for other needs throughout the month. Convenient stores tend to be more expensive and stock less healthy foods which has implications for population health [52]. Moreover, a work schedule and the quality of the public transportation system can also influence shopping, particularly if refugees are doing shift work which requires traveling at off-peak times.

The Conceptual Model

We use these results as an empirical basis to explore a more integrated biocultural conceptual model of dietary choice that ultimately links to multiple health outcomes (Fig. 1). The larger forces at work that lead to migration certainly affect current dietary choices. Many new Americans left their home country for political and/or economic reasons hoping that life in the new setting will offer more security for multiple life domains. It is not uncommon for those who spent time in refugee camps to have experienced food shortages in camps [41]. Several researchers have noted that episodic abundance of food supplies might be linked with binge or disordered eating which is ultimately associated with weight gain [73–76]. The initial low-income poverty associated with being a refugee may trigger binge responses in the USA because our research, and that of others, shows that the monthly Food Stamps cycle is associated with periods of food insecurity and hunger [53].

Another component of dietary change that is often neglected in the USA is seasonality. The food security cycle and weather patterns may be related. Bhattacharya, DeLeire and colleagues [77] show that poor American families reduced their caloric intakes by 10% in order to compensate for seasonal (hot or cold) bill expenditures. A recurring theme among the participants in our studies was the stress associated with the high costs of heating; indeed, weather was one of the most commonly noted hardships of living in the USA. The seasonal nature of these bills may lead to poorer nutritional choices in certain months and contribute to fluctuations in food insecurity [77, 78]. It is well established that refugees are disproportionately poorer than the general population thus making poverty a certain confounder in any relationship between health and diet.

Two other components of the model (Fig. 1) need expansion through hypotheses generation and testing. The first is to identify how people are exposed to foods they consider to be new (peers, children, and institutional) and the second is to identify how the various social institutions interact to affect the food environment, particularly in times of need since low-income poverty is common for newly arrived refugee populations. For example, research testing hypotheses regarding interactions between children and caretakers would be a fruitful endeavor as new communication pattern and exchanges will develop over time. Direct observations and surveys designed to capture caretaking interactions in various settings, including cell phone conversations or direct interactions while shopping [65], institutional information communications [72], or exposure and influence of mass media might show exactly when and how children influence their caretakers' food purchasing and cooking choices.

Children, once in a daycare or school, certainly learn English quickly; the social environment demands it because of interactions with peers and English-speaking teachers. However, the jobs often taken by refugees participating in our studies (e.g., hotel cleaning, factory work, and janitorial work) require less social interaction among employees and offer little opportunity to learn English from work peers. In turn, this means that the impact of advertising will have a greater effect on children than their parents. Research in the USA shows that children do remember commercials and the commercials that they remember often correlate with what they actually eat [66, 79]. The discordance in language skills between children and caretakers complicates caretaking because there is a power shift through with differential rates of language acquisition among children and adult caretakers [80]. As a child becomes more proficient in English and perhaps surpasses the skills of their caretakers [21, 81], the caretakers might rely and trust them more. This trust may translate into greater purchasing power for the child. Moreover, as children get older, they will consume more foods outside of the home which are likely to include sweetened beverages and fast food [82]. Adults may also turn to other adults, who might know very little about nutrition, for advice. However, to the best of our knowledge, there are no studies focusing on how the discord in the rates of English competency for adults and children translates into purchasing power through requests at the grocery store (or over the cell phone, a tactic mentioned in qualitative interviews) and the preparation of certain foods at home. Therefore, we advocate for more research focusing on children as subjects of research to flush out the intricacies of these dietary negotiations.

Conclusions

Our primary aim was first to evaluate the fit between our quantitative and qualitative data and several hypotheses generated from our conceptual model (Fig. 1) to clarify possible mechanisms of dietary change for refugees who represent one group of new Americans. A secondary aim was to bring a mixed-methods approach to the study of an important human biological process that has social and biological implications [83] to produce other testable hypotheses. These data show that the reasons underlying dietary change are complex and multidimensional and are likely to vary with the ecocultural environment in which refugees find themselves. There appears to be a wholesale increase in total calories consumed for refugees just as among other new Americans. However, the dietary patterns creating this overall caloric increase remain unclear although others have shown that sweetened drinks and snack foods constitute much of this change [82] among Puerto Ricans and other Latino groups in the USA [37].

The key predictions we draw from our model are that the relationships between ethnicity, immigration, social dynamics, and dietary change are likely to be complex and highly variable across broadly defined communities. This framework and the selected examples illustrate that the influences of dietary choice operate across several organizational domains. We highlight the need for more nuanced investigations aimed at disentangling the meaning of time and language-use to explain how these might mediate information flows among and between institutions, people in positions of power, and generations as refugees enter the USA through a formalized system that varies from city to city and resettlement center to resettlement center.

In our research, we employed mixed-methods and increased the magnification to hone in on the everyday lives of newly arrived African refugees to address possible mechanisms affecting dietary choices. In doing so, we suggest that diet change or "dietary acculturation" is

multifaceted and may not be easily captured in standard epidemiological surveys that tend to emphasize socioeconomics, time spent in the USA, and language skills (i.e., acculturation). We reviewed and evaluated the explanatory power of several hypotheses which do not have to be linked to the concept of acculturation to account for how diets might change as new Americans (migrant or refugee) transition into living in the USA. Understanding the reasons for how and why diets change may help practitioners to encourage retention of the healthy aspects of diet in the face of challenges found in changing food environments [38] and may also offer insight into more general patterns or key determinants of behavior that may help define areas of focus for nutrition intervention programs. In conclusion the model presented offers an opportunity to move beyond traditional acculturation surveys by relying on the knowledge generated from several disciplines (anthropology, human nutrition, psychology, consumer behavior, and economics). In the model we present an innovative and integrative view of how energy balance (diet and activity) might change as environments change with migration. The model is theoretically informed and empirically grounded. As such, it has depth enough to allow for multidisciplinary quantitative and qualitative investigations for alternative explanations for dietary change beyond those typically associated with acculturation on epidemiological surveys (time and language competence). Nutrition interventions would benefit from more nuanced behavioral studies focusing on the lived experiences of new Americans (e.g., economic migrants, refugees, asylum seekers, etc.). Defining these mechanisms is a major challenge in nutrition research; this paper is one step beyond description toward explanation.

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