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Dietary Issues for Burmese Refugee Adults

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Table of Contents

Executive Summary

1. This research is part of a larger, 4-year community-focused project among the Burmese refugee community in Tampa focusing on their health and nutrition needs. The Burmese community includes people from a number of different ethnic backgrounds including Karen, Kaya, Shan, and Chin. Each group speaks a different language, and most adults do not speak English. Fleeing the violence that has plagued Burma in past decades, they left their villages and farms for Thailand. Some lived in one of many refugee camps in northern Thailand for as long as 15 years before being resettled in the U.S. in the past 1-7 years. This report includes the anthropometric, weekday food consumption, and ethnographic data from adult Burmese refugees living in Tampa.
2. Methods: Adults from 16 families in the Burmese community were sampled (n=40). Participants were weighed and measured and dietary recalls were collected on two separate weekdays. Participant observation in family homes and semi-structured interviews were also conducted.

3. Findings: The majority of adults are stunted but have weights comparable to average Americans indicating a risk for becoming overweight. While males are taller, there is no statistically significant difference in weight or BMI compared to females. Males who spent more than 25 years in Burma had lower BMIs compared to males who spent less than 25 years in Burma. Adults who have lived in the U.S. for less than 5 years are generally taller than adults who lived in the U.S. for more than 5 years. 43% of adults are considered overweight.

Most meals that were consumed were considered Burmese meals and were consumed at home. 80% of all meals consumed were rice-based dishes. When snacks and liquid calories were consumed, the majority were consumed at home or from home supplies. While consumption of American food was low, the majority of adults had favorable opinions on American food.

10-15% of adults reported fasting to lose weight indicating recent weight gain. Low rates of American food consumption may indicate weight gain due to reduced activity levels. Lifestyle changes experienced by Burmese adults post-migration, including diet and activity, may be associated with weight and other health-related changes.

4. Recommendations

- Education programs should discuss what the adults are eating versus what they feed their children.

- Adults should reduce rice consumption a bit, avoid junk food and liquid calories, and increase exercise.

- Tampa Bay Garden should encourage planting of foods that are part of the traditional Burmese diet.
    - Tampa Bay Garden should develop more sources of high quality protein, ex. eggs, fish.
- Adults should be provided with information on healthy US foods as another model for how to eat in America.

Introduction

This research, "Dietary Issues for Burmese Refugee Adults," is part of a larger, long-term community-focused project. We have been working with the Burmese refugee community in Tampa for 4 years, focusing on their health and nutrition needs. The Burmese community includes people from a number of different ethnic backgrounds including Karen, Kaya, Shan, and Chin. Each group speaks a different language, and most adults do not speak English. Fleeing the violence that has plagued Burma in past decades, they left their villages and farms for Thailand. Some lived in one of many refugee camps in northern Thailand for as long as 15 years before being resettled in the U.S. in the past 1-7 years (Figure 1).

Figure 1: Map of Refugee Resettlement Camps along the Burma-Thailand Border (EthnoMed 2016)

Background

The transition to life in the US and Tampa has been a difficult one, especially for the adults (Cultural Resource Center 2007). With respect to diets, there is continual exposure to new foods, particularly American junk food and sources of liquid calories. In the absence of any cultural or health-related information, new foods tend to be judged on the basis of taste alone, and current research indicates that the dietary transition from refugee camp to the U.S. poses an important threat to Burmese refugee health. A research project by Perkins (2016) comparing food consumption in a Thai refugee camp with that of post-migration to the U.S. found post-migration dietary adjustment to be a major concern. In the Thai camp, refugees received monthly food rations averaging below 1,640 kcals/person/day, supplementing their ration with small gardens and raising their own pigs and chickens (Perkins 2016). Though access to calories greatly improved upon migration to the U.S., this calorie escalation occurs in the form of sugary and processed foods (Perkins 2016). Specifically, Perkin's study found diets to largely include "an increased intake of sugary drinks and soda into the diet, an increased consumption of chips and processed snacks as well as an increased consumption of meat" (Perkins 2016: 7). Furthermore, caseworkers, resettlement agencies, and school-age children were found to be the major drivers of these changes (Perkins 2016). Children were exposed to these foods in school and requested them at home, and resettlement agencies and case workers introduced refugee families to these foods when stocking newly arrived refugee homes, as well as via picnics and other social events (Perkins 2016). Perkins (2016) argues for a focus on nutrition education and community gardens as a means to combat the potential negative long-term health effects of increased consumption of sugary drinks and processed foods.

Behrman et al. (2016) studied of women and infants in an Ohio Karen refugee community and also found liquid calorie consumption to be a major concern. This analysis revealed that not only did the majority of participants drink soda (73%), but most drank one or more per week (84.6%), and most also stated "they drank other sweetened drinks at least once a week" (78%) (Behrman et al. 2016). Despite liquid calorie consumption being a clear issue in this population, the study did not find a correlation between high consumption and "age, or time in refugee camps or the US" (Behrman et al. 2016). Behrman et al. also found that gathered and

grown foods were an important part of food consumption for participants. They argue for "collaboration with growing urban garden and local foods movements", as well as collaboration between "local, state, and federal personnel… [as an] effective way to support transition to best-fitting parts of the local foodscape" (Behrman et al. 2016: Slide 17).

While initial studies (Baer et al. 2011, Baer 2014, Baer et al. 2015) have observed consumption of many high-calorie, low-nutrient new foods in this population, there are no systematic data in the literature regarding what Burmese refugee adults eat on weekdays, nor have there been any formal assessments of their nutritional status. However, informal observations indicate that much of the population is stunted, probably as a result of dietary shortages in the refugee camps (Baer 2014). Their extremely short stature means that a few excess pounds will quickly result in being overweight, as well as being exposed to all of the health concerns that accompany that condition. As such, this study provides valuable information about nutritional status and dietary patterns that will not only fill a gap in the scholarly literature, but also be of value to service providers for these refugees in Tampa and in other parts of the U.S.

Community Partner:

This research project was conducted in collaboration with the Tampa Bay Gardens Refugee Agricultural Partnership Program of the St. Mary's Ethiopian Orthodox Church. Funded by the U.S. Office of Refugee Resettlement (ORR), the church has implemented a "Tampa Garden" to provide gardening opportunities to newly arrived refugees, primarily Burmese. The goals of the Tampa Garden were to promote greater food and financial security among the refugees, and to accelerate self-sufficiency and integration into the larger community. The Advisory Board of the Tampa Bay Garden and the Garden Program Director worked with us to design this and other projects conducted with the Burmese.

Previous Findings:

This project was completed in four parts. Part 1 was a health needs assessment of local Burmese refugees that was funded by Lutheran Services Florida (LSF). It was completed as a

class project for ANG 6469: Ethnicity & Health Care in spring 2011 (Baer et al 2011). Data collection consisted of 14 interviews, home visits with 23 families, and a women's focus group. Results indicated that there is a dietary transition/acculturation occurring in the community, especially among the children. Women reported that children eat "American" foods outside of their households, interviewers observed children eating candy bars and drinking sugary drinks, and there was a high frequency of dental issues—especially among children. Of those who said that they had problems with their teeth, 54% had been in the U.S. two years or longer, and 30% had been in the U.S. less than eight months.

Part 2 of the project was funded by the University of South Florida's (USF) Office of Community Engagement and Partnerships (OCEP). It included evaluations of weekend food consumption, diets of people with chronic health problems, and plants in The Tampa Bay Gardens-Refugee Agricultural Partnership (Baer 2014). It was conducted as a class project for the course Anthropology of Food (ANT 4465) in spring 2014. Food recalls of Saturday consumption were collected from one adult and one child of each of the 13 families then involved in the garden. Interviews regarding plants in the garden and their uses were conducted at the Refugee Gardens, and additional health interviews were conducted with individuals diagnosed with chronic health problems. Two focus groups were also conducted, one with men and one with women. Research findings included: a) the Burmese do not want to be too fat or too thin, b) many are short and thin, probably related to experiences in the refugee camps, c) parents recognize that American food makes their children gain weight, so they encourage its consumption--to a point, and d) men are concerned about children's consumption of soda and candy and worry about potential disease, such as diabetes.

Part 3 of the project was also funded by the USF's OCEP and assessed weekday food consumption and nutritional status of school-aged children. It was completed as a class project for Methods in Cultural Research (ANT 4495) in fall 2014 (Baer et al. 2015). The heights, weights, and ages of all children in the Burmese community were recorded and 3-day dietary recalls were collected (N=24). Three focus groups were also conducted, one with older boys, one with younger boys, and one with girls. It was found that much of the junk food and liquid calorie consumption came from home food supplies. Specifically, a mean of 2.9 portions (range 1--8.8

portions) of liquid calories were consumed by each child per day, and half of the liquid calories were consumed at home (most often soda or "juice"). Liquid calories consumed at school included flavored milk and apple juice. It was also found that a mean of 1 portion (range 0-6 portions) of junk food snacks was consumed by each child per day. The anthropometric measurements revealed that the sample as a whole has a fairly average weight when compared to U.S. children, but because this population is very short, the population is overweight (but not obese). This suggests that in the short time the children have been in the U.S., they have developed lifestyles (diets and patterns of exercise) that are leading them to gain weight.

Part 4 of this project, funded by USF OCEP, focused on the weekday food consumption, as well as weights and heights, of the adults. The specific objectives were:

1. To determine the extent of growth stunting and overweight/obesity among adult Burmese refugees.
2. To collect information about the content and structure of daily food consumption among adult Burmese refugees.
3. To determine the extent to which unhealthy aspects of contemporary American diets are being adopted by the adult Burmese refugees.
4. To understand the ethnographic context of these dietary changes.

Methods

Study Population

An initial census was conducted of all Burmese adults living in north Tampa. The families cluster in two low-income apartment complexes near the University of South Florida (USF). Adults were interviewed at community gatherings (Tampa Bay Burmese Council meetings, after church services, etc.) and in their homes, using bi-lingual interpreters. Basic demographic information for each adult (age, gender, occupation, time in the U.S.) was collected. Data collection was done by students as part of a service learning class, Anthropology of Food, (ANT 4465) fall 2015.

Objective 1. Anthropometry: Growth Stunting/Overweight/Obesity

Data Collection: All adults were weighed and measured. These data were collected at community gatherings and/or at participants' homes using bi-lingual interpreters.

Data Analysis: The height and weights were plotted on standard nutritional assessment graphs. Patterns of growth stunting and obesity were determined by analyzing relationships between age, weight, and height.

Objective 2. Food Recalls: Overall Daily Diets

Data Collection: All adults were interviewed twice, and what they ate on two different days was recorded. The interviews were conducted at community gatherings and/or at the participants' homes using bi-lingual interpreters.

Data Analysis: Data were coded as: Burmese meals, American meals, healthy snacks, junk food snacks, or liquid calories. Each food category was averaged over the two days of consumption recorded.

Objective 3. Dietary Acculturation

Data Collection: The data from Objective 2 were used.

Data Analysis: The categories of food consumed were analyzed. Comparisons were made between food categories based on gender, time in the U.S., and age.

Objective 4: Ethnographic Context

Data Collection: Short ethnographic interviews were conducted to determine how the food consumption data may relate to the post-migration experience (e.g. ideas about American food, exposure to American dietary trends, etc.), as well as how the anthropometric data may be related to the types of food eaten in the refugee camps. Interviews were semi-structured, consisted of open-ended questions, and were conducted in conjunction with one of two sessions of food recall collection.

Data Analysis: The data were coded and analyzed for themes.

Results

Census

A total of 16 families were interviewed, and 40 individuals participated (21 males and 19 females) (Table 1). These adults have a mean age of 37 years old. This population includes seven different ethnic groups (Karen=26; Kareeni=2; Chin=3; Raki=2; Mon=3; Shan=2; Rakeim=2) that speak eight different languages (English=19; Karen=25; Burmese=26; Thai=3; Chin=3; Rakheim=2; Chinese=1; Malaysian=1). Twenty-five of the participants (62.5%) speak more than one language. Of the 40 participants, 26 reported the ability to read more than one language, and a total of six different languages are represented within the study group (English=19; Karen=22; Burmese=22; Thai=2; Chin=3; Rakheim=2). Additionally, participants reported being able to write in a total of six different languages (English=20; Karen=23; Burmese=22; Thai=2; Chin=3; Rakheim=1). Three participants stated that they are not able to read or write. Sixteen participants (40%) reported their English proficiency as "good/very good," whereas the remainder felt their English was "poor/very poor." On average, the participants in this study have been in the United States for 5 years (Table 2), and in Tampa for 5 years. A mean of 17 years were spent in Burma, and 10 in Thailand (Table 2).

Table 1: Country of Origin and Ethnicity, by Gender (N=40)

		Gender		
		Female # (%)	**Male # (%)**	**Total # (%)**
Place of Birth	Burma	15 (48)	16 (52)	31 (78)
	Thailand	4 (44)	5 (56)	9 (22)
Ethnicity	Karen	13 (50)	13 (50)	26 (65)
	Kareeni	1 (50)	1 (50)	2 (5)
	Chin	1 (33)	2 (67)	3 (8)
	Raki	1 (50)	1 (50)	2 (5)
	Mon	1 (33)	2 (67)	3 (8)
	Shan	1 (50)	1 (50)	2 (5)
	Rakeim	1 (50)	1 (50)	2 (5)

Table 2: Age and Years Spent in Each Country

		Female	**Male**
	Mean (range)	**Mean (range)**	**Mean (range)**
Age	40 (21-78)	46 (24-58)	37 (21-78)
Years in Burma	17 (0-60)	16 (0-41)	18 (0-60)
Years in Thailand	10 (0-23)	11 (0-23)	9 (0-21)
Years in the U.S.	5 (0-11)	5 (0-11)	5 (0-10)

Participant Observation

Students conducted detailed observations during visits to the field sites; these were documented via ethnographic field notes and analyzed for themes. The Burmese refugees participating in the project predominantly resided in rented apartments, with only one family living in an individually owned home. Most participants live in apartments in low-income neighborhoods of Tampa, where safety is a concern and litter and debris are ubiquitous. The participants living in the individually-owned home reside in a safer neighborhood compared to those in the apartments. Most homes are decorated quite simply, with family photos and academic and work achievements prominently featured on interior walls. These are symbolic of

the importance of the family unit and the value placed on achievement outside the home. Participants wore either American clothing or traditional Burmese dress.

Ethnographic Context

Through the use of short ethnographic interviews we were able to collect baseline information on post-migration experiences (e.g. ideas about American food, exposure to American dietary trends, etc.), which were useful for understanding the food consumption data. We also collected information on types of foods eaten in the refugee camps, which helped us determine how the anthropometric data were related to the food in the camps.

The Dietary Transition

Two interview questions provided information on how the anthropometric data may relate to the types of food eaten in the refugee camps.

- When you lived in the refugee camp in Thailand, what kinds of food did you eat that were new?
- What kinds of foods did you eat that were the same as what you ate in Burma?

Participants lived in both Thailand and Malaysia, but the majority of participants (n=30) lived in refugee camps in Thailand. Eighteen participants (%) indicated that they had not been exposed to new foods and 13 (%) stated that they had been exposed to some type of new food. Other participants (n=9, %) either did not provide a response because they were too young when they left Burma to know how different the food was. New foods mentioned included: yellow beans, fish paste, canned tomato, fish, "different vegetables," "no good rice," pears, starfruit, specific Thai and Malaysian dishes, "Chinese food," specific Chinese dishes, hamburger, KFC, and curries.

When asked to identify specific kinds of food eaten in the camps that were the same as in Burma, 15 (%) participants stated that all of the food was the same, 15 (%) listed specific foods that were different, and 10 (%) did not provide a response. These two questions indicate that the food consumed in Burma and in the refugee camps was fairly similar, so the amount of time spent in refugee camps compared to Burma might not have affected their BMI or stature.

The Post-migration Experience

Questions regarding the post-migration experience can be understood in terms of ideas about American foods, exposure to American dietary habits, and types of physical activity post-migration.

When asked what they thought of American food when arriving to the U.S., 40% of participants indicated that they did not like it, 53% liked it/liked some foods but not others, and 8% either had no opinion, or hadn't tried it. Of those who liked it, specific foods mentioned included hamburgers, fries, meat, beef, eggs, turkey, Philly steak, pizza donuts, spaghetti, KFC fried chicken, and fish. Those who did not like American food stated that it smelled bad/weird, was salty, and/or was too sweet, and one participant stated that they did not like cheese or butter. These results indicate that about half of participants liked American food upon first arrival.

Approximately 38% of participants indicated they had not changed their opinions of American food while living here, 8% stated they still did not like American food, and 30% stated they originally liked it and continue to like it. Of those participants that indicated change in opinion (n=19), 100% changed from not liking to liking American food, indicating that they now liked a few American foods or like it even more than they originally did.

Exposure to American dietary habits was determined via the following questions:

- Have you ever gone to an American friend's house to eat? Why?
- Do other people give you food for your family? Who? What kinds of things?

When asked whether they had ever gone to an American friend's house to eat, 36 participants (90%) indicated that they had not, one of whom stated that they did not have any American friends. A total of 18 respondents (45%) stated that people gave them food for their family, 5 (13%) of whom specifically indicated that some or all the food given came from Burmese friends, and 7 (18%) of whom indicated that some or all of the food came from the church. This suggests that the social circle of the participants is fairly small. Programs to integrate/introduce the Burmese refugees to the larger local community could potentially increase their knowledge of American foods.

Participants indicated that their activities outside of work included physical activity (including walking and playing soccer), entertainment (including watching TV, cruising the internet, and going on Facebook, family time, and household activities (including growing houseplants and small scale gardening).

Anthropometric Data

Height and weight percentiles were calculated using the Centers for Disease Control and Prevention (CDC) scales, which provide anthropometric reference data that are specific to adults and children in the US. These percentiles were used because the data are context-specific to a particular place (the US) and time (2007-2010), compared to the World Health Organization (WHO) which uses international data to assess optimal growth. One individual was removed from anthropometric analysis because she was eight months pregnant at the time of the study, which would have confounded her weight and BMI estimates. Therefore, the total sample size for the adult Burmese refugees was 39 individuals. Frequency distributions for heights of adult Burmese refugees are shown in Figure 2, and frequency distributions for weights of adult Burmese refugees are shown in Figure 3.

It is important to note that the heights of the Burmese refugees are positively skewed (Figure 2), which indicates that they are an extremely stunted (short) population. The heights for all but one individual are considered to be in the 15^{th} percentile or less. In contrast, the frequency distribution for weights is bimodal. The majority of individuals fall between the 15^{th} and 75^{th} percentiles for weight (n=24, 60%), although a large portion (n=13, 33%) of individuals have weights in the less than 5^{th} percentile. Together, these indicate that, as a whole, the Burmese refugee adults are a stunted population with weights comparable to average Americans. Their short stature, however, puts them at increased risk for becoming overweight.

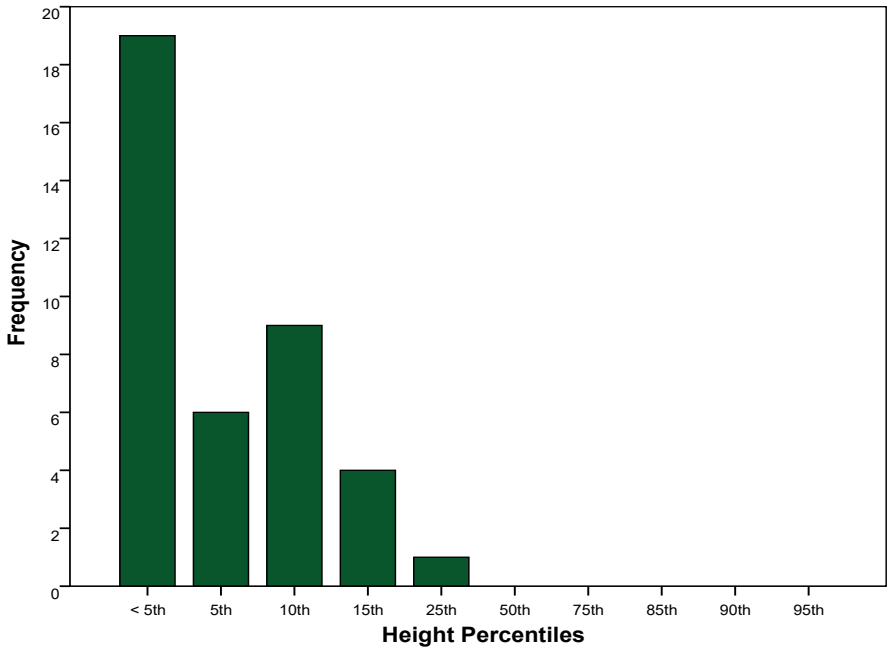

Figure 2: Frequency distribution for height of adult Burmese refugees (N=39), by percentiles.

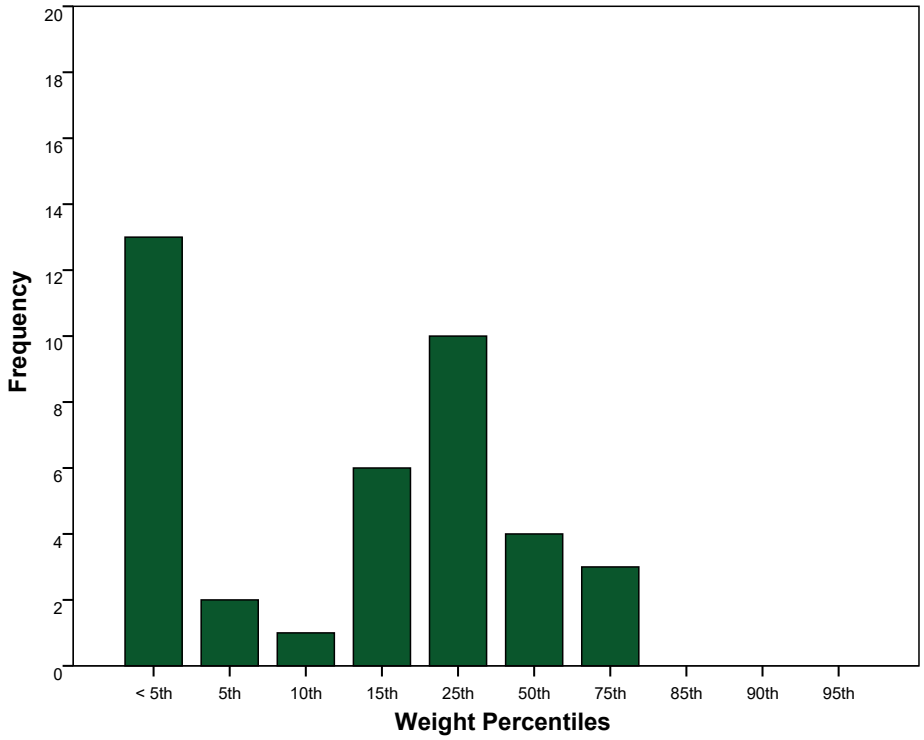

Figure 3: Frequency distribution for weight of adult Burmese refugees (N=39), by percentiles.

There is a statistically significant difference in height between adult Burmese males and females (t= 4.69, df= 37, p< .001). In this sample males are, on average, about 3.5 inches taller than the females (63.6 inches and 60 inches, respectfully). Although there is a significant difference in height, there is no significant difference in body weight between males and females (t= .778, df= 37, p= .441), nor is there a significant difference in body mass index (BMI) between males and females (t= -1.59, df= 37, p= .120). This indicates that the females weigh the same as the males, despite the fact that they are significantly shorter in stature.

Table 3 shows the adult Burmese BMI calculations using CDC standard categories for BMI. Approximately 43% (n=17) of the Burmese adults are classified as overweight (n=12) or obese (n=5). These figures are disconcerting in light of the fact that only 38% of adults living in the greater Tampa area are considered overweight, compared to the 43% of overweight adults in the Burmese refugee population (http://www.governing.com/gov-data/obesity-rates-by-state-metro-area-data.html). The adult obesity rate for the greater Tampa area is currently at 26%, however, which is more than double the rate of obesity among adult Burmese refugees (13%).

Table 3: BMI Classification of Adult Burmese Refugees Using CDC Standards.

Classification	BMI	# of Refugees with BMI	% of Sample
Underweight	< 18.5	1	3
Normal Weight	18.5-24.9	21	54
Overweight	25.0-29.9	12	31
Obese	≥ 30	5	13
Total:		**39**	

Part of this analysis focused on the length of time spent in Burma and if it affected height and/or BMI. If children growing up in Burma during the wars were not getting enough nutritious food to eat, then it is possible that their growth was stunted, which in turn can lead to increased BMI as an adult. Because bones stop growing when an individual is in his early to mid-twenties (White et al., 2012), 25 years was assumed to be a cutoff point assessing for catch-up growth after moving away from Burma. If an individual spent less than 25 years in Burma, it is possible

that they were able to have a healthier diet after moving away and their long bone growth was able to resume. Individuals who spent fewer than 25 years in Burma were grouped together and individuals with 25 or more years spent in Burma were grouped together. We found no significant difference in height between males who spent more than 25 years in Burma and less than 25 years in Burma (p= .619), nor was there any significant difference in height between females who spent more than 25 years and less than 25 years in Burma (p= .612). The amount of time spent in Burma did affect BMI, as there is a statistically significant difference in the BMI of males who spent less than 25 years in Burma and those who spent more than 25 years (t= 2.4, df= 14, p= .03). Males who spent less time in Burma (<25 years) had a mean BMI of 26.13, compared to a mean BMI of 22.5 for those who spent more time in Burma (≥25 years). In contrast to the males, the length of time spent in Burma did not affect the BMI of the females (p= .767). It has been documented (DiLalla and Clancy Dollinger 2013: 77) that BMI tends to increase with age. In order to see if this was the case for the Burmese refugees, a one-way analysis of variance (ANOVA) was used to determine if the mean BMI values are significantly different for different age cohorts of the adult Burmese refugees. The age cohorts examined were 18-29 years, 30-49 years, and 50+ years. Results of the ANOVA show that there is no significant difference in BMI across the three different age cohorts (p= .128) (Table 4). Therefore, when variables such as time spent in Burma and time spent in the US are examined, any significant differences that are found in BMI are not due to age factors.

Table 4: ANOVA Results Comparing BMI Across Age Cohorts

	df	Mean Square	*F*	*p*
Between	2	32.83	2.177	.128
Within	36	15.08		

The relationship between length of time spent in the US and the BMI for males and females was also examined. The purpose of this was to assess if individuals who were in the US for a longer period of time had a significantly higher BMI due to the exposure to junk food and liquid calories, compared to those who had just moved to the U.S. Results show that there is no significant difference in the BMI of males who have been in the U.S. for less than five years and those who have been in the U.S. five or more years (p= .618). There is no significant difference in females either (p= .50). Interestingly, however, there is a significant difference in the BMI of males who have been in the U.S. less than one year, compared to those who have been in the U.S. for a year or more (t= -2.26, df= 19, p= .036). Males who have been in the U.S. for less than a year have a lower BMI (μ=21) compared to those who have been in the U.S. for more than a year (μ=25). This suggests that when the Burmese refugees first come to the U.S. they have a BMI in the normal range, but after entering the US their BMI begins to increase.

Another objective of this study was to understand how length of time spent in the U.S. affects the height of Burmese adults. We explored whether individuals who were in the U.S. for a longer period of time were significantly taller than those in the U.S. for a shorter period of time, due to the change in diet experienced after coming to the U.S. Because long bone growth ceases in the mid-twenties, a significant impact on height would only occur if the Burmese refugees came to the US while still in their teens or early twenties. As a result, time spent in the US was used as a substitute for age of arrival in the US. Those individuals in the US for longer may likely have arrived in the US at a young age when bone growth had not completed; thus, time spent in the US may have impacted height. For this analysis, individuals who spent less than five (5) years in the US were grouped together and individuals who spent five or more years in the US were grouped together. There is a statistically significant difference (t= 3.84, df= 19, p= .001) in the heights between males with less than five years in the US and those with five or more years in the US. Those with less than five years in the US are taller in stature (μ=65.31 inches) compared to those with five or more years in the US who are shorter (μ= 61.83 inches). There is also a significant difference in the heights of females with less than five years in the US and five or more years in the US (t=2.66, df= 16, p= .017). Females who had been in the US for fewer than 5 years were taller (μ= 61.11) than those with five or more years in the US (μ=58.9).

Because there are data available for school-aged children of the adult Burmese refugees (ref), part of this analysis examined the family units to look for any trends in the data. Unfortunately, because the school-aged children are not finished growing, genetic versus environmental effects on growth could not be examined. However, BMI is available for both the children and the parents, so the known family units could be compared for BMI. There were data available for a total of ten different family units, with a total number of 36 individuals available for this analysis (n= 36). ANOVA was used to determine if there were significant differences in mean BMI values among each family unit. Results of the ANOVA show that there is no significant difference in BMI across the ten different family units (p= .998).

Food Recalls

American vs. Burmese Meals

Burmese meals were consumed at either home or work, and those consumed at work were brought from home (Figure 4). Most Burmese meals were consumed at home (88%), and rice meals had the overall highest consumption across home and work; 80% of all servings consumed were rice meals (Table 5). American meals were consumed at home, work, and "other," (fast food restaurant meals) with the majority of meals consumed either at home or work (Figure 4). Most American meals were consumed at work (78%), and chicken meals had the overall highest consumption across home and work; 26% of all servings consumed were chicken meals (Table 6). No American meals consumed at work were brought from home (Figure 4).

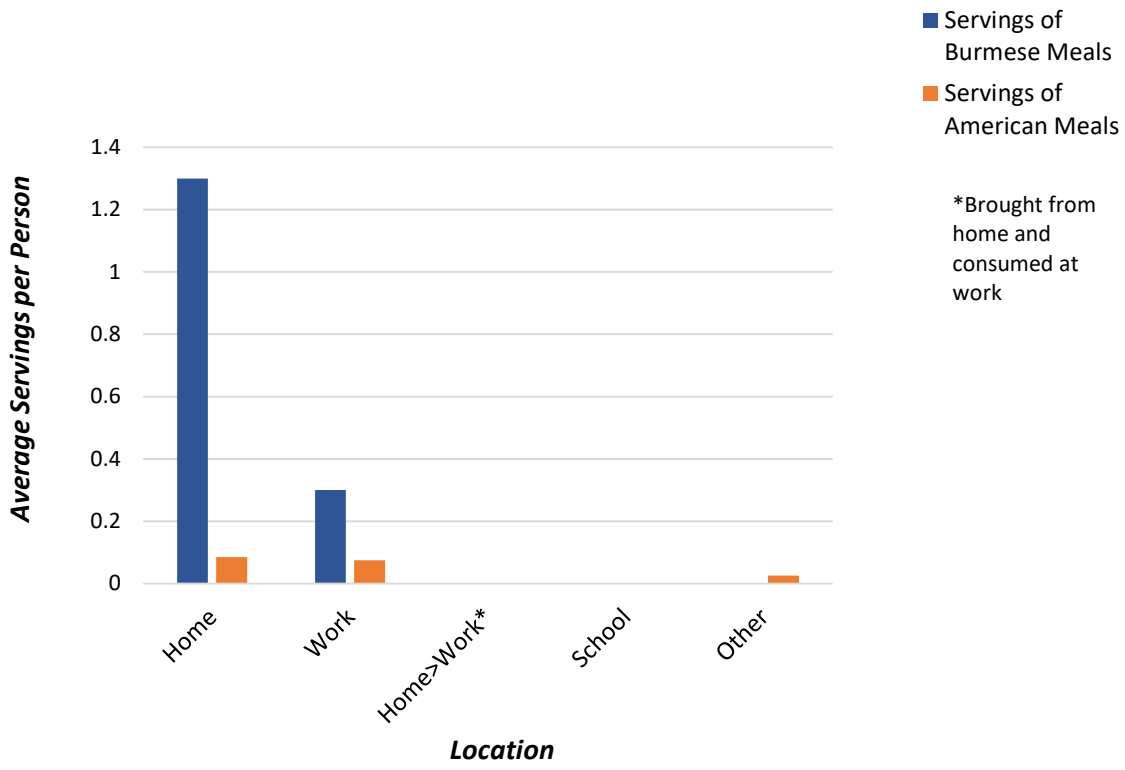

Figure 4: Location of Burmese meal and American meal consumption for adult Burmese refugees

Table 5: Burmese Meal Consumption, Total Servings Consumed at Home

	HOME		WORK	
	Total Servings	Proportion of Total Meal Consumption[1]	Total Servings	Proportion of Total Meal Consumption[1]
Rice meal (includes: rice, vegetables; rice, chiles; rice, chicken; rice, curry; rice, soup; rice, fish paste; rice, potato; rice, broccoli; rice, eggs; rice, noodles; rice, tomato; rice, onion; rice, fis; rice, cabbage; rice, chili paste; rice, fruit; rice, salmon; rice, fried egg; rice, beef; rice, clam; rice, beans; rice, bamboo; rice, ginger; rice, cucumber; rice, shrimp; rice, eggplant; rice, pumpkin leaves; rice, rosella soup; rice green beans; rice, garlic; rice, soy sauce; rice, salt; rice, pumpkin; rice, mushroom; rice, long beans; rice, avocado; rice, okra; rice green tea salad; rice, cauliflower; rice, salad; rice, pork*)	309	80%	36	9%
Soup meal (includes: fish soup; noodle soup; chiles soup; fish paste soup; chicken soup; broccoli soup)	11	3%	2	*
Chicken meal (includes: chicken breast; chicken, egg soup; chicken, chiles; chicken, fish paste; chicken, noodles; chicken, cabbage; coconut chicken)	10	3%	-	-
Sour leaf soup	6	2%	-	-
Noodles Meal	2	*	3	*
Pho	2	*	-	-
Pork	2	*	-	-
Mushroom	1	*	-	-
Fruit	1	*	-	-
Vegetable roll	-	-	3	*
TOTAL	**344**	**88%**	**44**	**9%**

[1] Rounded to the nearest whole number

[2] "rice, pork" was only consumed at work

*Proportion is <1% of total meal consumption

Table 6: American Meal Consumption, Total Servings Consumed at Home vs. Work

	HOME		WORK	
	Total Servings	**Proportion of Total Meal Consumption**[1]	**Total Servings**	**Proportion of Total Meal Consumption**[1]
Chicken meal(includes: chicken wings with ranch dressing; fried chicken with wing sauce)	-	-	6	26%
Bread	3	13%	1	4%
Pizza	-		3	13%
French Fries with Ketchup	-	-	2	9%
Philly Cheesesteak	-	-	2	9%
Sandwich with Mayo	-	-	2	9%
Onion rings	-	-	1	4%
Cheeseburger	-	-	1	4%
Cereal	1	4%	-	-
Hotdogs with mustard	1	4%	-	-
TOTAL	**5**	**21%**	**18**	**78%**

[1]Rounded to the nearest whole number

Table 7: Healthy Snack Consumption, Total Servings Consumed at Home vs. Work[1]

	HOME		WORK	
	Total Servings	**Proportion of Total Healthy Snack Consumption**	**Total Servings**	**Proportion of Total Healthy Snack Consumption**
Fruit (includes: apple; banana; strawberries; orange; green grapes; mango; fruit, general)	15	50%	6	20%
Peanuts	2	7%	-	-
Noodle soup, chiles, fish	2	7%	-	-
Lime juice	-	-	4	13%
Bread	-	-	1	3%
TOTAL	**19**	**63%**	**11**	**37%**

[1]All values rounded to the nearest whole number

Healthy vs. Junk Snacks

Results of the dietary recalls show that 16 out of 43 (37%) Burmese adults ate healthy snacks in the two days studied. There was an overall average of 0.3 servings per person per day.Most junk snacks were consumed at work and brought from home food supplies (3 average servings per person per day). The next highest consumption occurred at home (2 average servings per person).

Table 12: Junk Snack Consumption, Total Servings Consumed at Home vs. Work

	Home		Work	
	Total Servings	**Proportion of Total Junk Snack Consumption**	**Total Servings**	**Proportion of Total Junk Snack Consumption**
Ramen Noodles	2	25%	1	12%
Potato Chips	1	12%	—	—
French Fries	–	—	1.5	19%
Candy (includes: candy, general; Hershey's Kisses)	0.3	4%	1.3	16%
Cookies	1	12%	—	—
TOTAL	**4**	**53%**	**4**	**47%**

Liquid Calories

It was found that most liquid calorie consumption occurred at home (63%, Table 13). Liquid calories were also consumed at work from a non-home food supply (approximately 0.2 average servings per person; Table 13).

Table 13: Liquid Calorie Consumption, Total Servings Consumed at Home vs. Work[1]

	Home		Work		Other	
	Total Servings	Propotion of Total Liquid Calorie Consumption	Total Servings	Proportion of Total Liquid Calorie Consumption	Total Servings	Proportion of Total Liquid Calorie Consumption
Coffee	28	22%	7	5%	–	–
Soda	17	13%	10	8%	5	4%
Juice	11	9%	9	7%	5	4%
Milk	8	6%	–	–	–	–
Tea	4	3%	–	–	–	–
Milo with Creamer	4	3%	–	–	–	–
Beer	3	2%	–	–	7	5%
Monster	2	2%	2	2%	–	–
Gatorade	1	1%	–	–	–	–
Strawberry yogurt drink	1	1%	–	–	–	–
Fountain drink fruit punch	–	–	–	–	2	2%
TOTAL	79	62%	28	22%	19	15%

Of those who consumed liquid calories, over 51% consumed less than one serving on average, and over 22% consumed more than two on average (Table 14).

Table 14: Mean Servings of Liquid Calories by #(%) of Participants in Range[1]

Mean Servings	Participants # (%)
.25 - .5	10 (32%)
.51 - 1	6 (19%)
1.1 - 1.5	4 (13%)
1.51 - 2	4 (13%)
2.1 - 2.5	4 (13%)
2.51 - 3	0 (0%)
3.1+	3 (10%)

[1]Liquid calorie consumption among participants who consumed liquid calories (n=31)

Conclusions

Project findings indicate stunting among this population, as all individuals except one are in the 15th percentile or lower. This is probably due to insufficient food in Burma and/or Thailand (versus the traditional Burmese diet). Weight among this population is more normally distributed, peaking around the 50th percentile. These height and weight distributions suggest that individuals put on weight once they had already stopped growing taller. In other words, it is likely that they were stunted in both height and weight during time in Burma/Thailand but have gained weight upon migration to the U.S. The wars and civil unrest they faced in Burma, as well as the limited availability of nutritious food in the refugee camps, is likely to blame for the pre-migration stunting.

Additionally, approximately 10-15% of the participants reported "fasting" to lose weight, another indicator of relatively recent weight gain. Although the data collected suggest a link between US migration and weight gain, it is not conclusive as to the exact causes behind

distributions. Because the overall consumption of American foods is somewhat low among this population, the weight gain may relate to reduced activity. The Burmese refugee adults have undergone lifestyle changes since moving to the US, so it is likely that their weight and other health-related changes have resulted from a combination of changes in both diet and exercise.

Limitations

While we studied the entire population, a serious limitation of this project was its small size. Though time in the US was shown to have a relationship with some of the anthropometric data, the small sample size limits the significance of these findings. Other research has suggested that there is an overestimation of the relationship between time in the US and dietary acculturation (Behrman et al. 2016), and that even self-perceived acculturation cannot be simply reduced to time in the US and/or language spoken (Rodriguez-Soto et al. 2016). For this reason, we recommend that this project be replicated to determine if there is indeed a statistically significant relationship between anthropometric data, such as BMI and stature, and time in the US (with its presumption of dietary acculturation). Other limitations include that: 1) there was no baseline data on Burmese refugees to compare our anthropometric data to, 2) there was no comparative data to see how this population compares to those in other places post-refugee status or to other US populations, and 3) there was no longitudinal data to see how individual dietary patterns fluctuate over time.

Recommendations

- 1. Education programs should discuss what the adults are eating versus what they feed their children.
- 2. Adults should reduce rice consumption a bit, avoid junk food and liquid calories, and increase exercise.
- 3. Tampa Bay Garden should encourage planting of foods that are part of the traditional Burmese diet.

    - Tampa Bay Garden should develop more sources of high quality protein, ex. eggs, fish.
- 4. Adults should be provided with information on healthy US foods as another model for how to eat in America.

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