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Development Of An Arab Food Frequency Questionnaire And Examination Of Changes In Dietary Patterns In Arab Immigrant Women To The United States

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DEVELOPMENT OF AN ARAB FOOD FREQUENCY QUESTIONNAIRE AND EXAMINATION OF CHANGES IN DIETARY PATTERNS IN ARAB IMMIGRANT WOMEN TO THE UNITED STATES

by

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DEDICATION

I would like to begin by thanking my family, albeit I understand any amount of gratitude shown to them is woefully inadequate. My father's unconditional support is largely the reason that this Doctor of Philosophy degree was completed in the United States. No words are sufficient to describe my late mother's contribution to my life before she passed away. I owe every bit of my existence to her. This dissertation is dedicated to her memory. Also, my sisters and brothers have provided great support for me in achieving this goal. I have been fortunate on this journey to receive tremendous love from the rest of my extended family in Saudi Arabia. Their support and encouragement has been instrumental in my overcoming several hurdles in life.

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CHAPTER 1 – INTRODUCTION

People of Arab heritage reside in the 22 Arab countries (e.g., United Arab Emirates, Qatar, Bahrain, Saudi Arabia (SA), Kuwait, Oman, Libya, Algeria, Iraq, Lebanon, Syria, Palestine, Jordan, Morocco, Tunis, Egypt, Yemen) (Brittingham and De la Cruz, 2005). Saudi Arabia, Iraq, and Yemen prepare similar meals due to their close proximity and cultural similarities which make them an appropriate sample for studies. Arab women play very important roles in food choice and its preparation for their families as opposed to men. Also, house hold income could be another factor that plays a significant role for family's grocery list.

In the last three decades, populations in some Arab countries (e.g., SA and Iraq) have seen their lifestyles changed due to the increase of income from oil revenue (Musaiger, 1987 and 1993). As a result, the residents have become less active, and their diets have changed to include more fat, rice, wheat flour, and sugar than prior to oil discovery (Musaiger, 1993; Alawdi and Amine, 1989). For example, in the years of 2001-2007, the population of SA exceeded the recommended dietary energy intake, increased from 2100 kcal/capita/day to 3078 kcal/capita/day (Adam et al., 2014).

The consumption of meat, animal fat, offal, milk, egg, sugar and sweetener shows an increase from 1961-to 2007; on the other hand, fruits and vegetables were less consumed by the Saudi population during the same time (Adam et al., 2014). The consumption of animal protein showed its highest increase in the last five decades as meat supply was increased from 26 g/capita/day up to 139 g/capita/day (Adam et al., 2014). The consumption of rice is very high in the Saudi population according to the food balance sheet at Food and Agriculture Organization (FAO) Statistical (FAOSTAT) database for

the year of 2011 (FAOSTAT, 2014a). Rice was consumed at 37.3 kg/year per capita (FAOSTAT, 2014a) compared to 7.5 kg/year per capita in the U.S. (FAOSTAT, 2014b). Saudi population serves rice with meat two times a day for lunch and dinner as a mixed cooked dish called *Kapsah*. It is a favorite dish in SA that is usually cooked with chicken or with red meats (e.g., beef, camel meat, mutton) and onion, vegetable oil or ghee, carrot, tomato (juice and paste), spices, and salt (Adam et al., 2014).

Another study describes 14 most popular Saudi dishes and evaluates these dishes based on the amount of animal protein included (Sawaya et al., 1986). For example, the study shows that *Shakshuka* (omelet) contains a very high amount of fat due to the content of eggs and provides 75% energy from fat (Sawaya et al., 1986).

Also, the content of salt is very high in the dishes consumed by Arab populations (Musaiger, 2006). Adding to this issue is the habit of using table salt, pickles, and a lot of spices in Arab food that could lead to increased energy intake and hypertension (Musaiger, 2002).

Additional health problems facing Arab countries are the overconsumption of sugar on a daily basis among both genders resulting in weight gain, obesity, and dental health issues (Marshall et al., 2007). Also, larger portions and servings of meals and snacks beyond the daily recommended amount not only increases risks for obesity but also for type 2 diabetes and other chronic diseases (Yusuf et al., 2005).

Arab people are not only facing health problems (e.g., hypertension, diabetes, heart disease, obesity) in their home countries, but are also facing additional challenges when they migrate to new countries. These challenges included communication issues (learning another language), financial hardships, and/or the fear of losing their culture and

identities that may affect their food intake, which later reflects in their health status. Vallianatos and Raine (2008) report that food is the most important connection between Arab immigrants and their country of origin. This study was conducted in Canada to depict how the lives of Arab immigrant women were affected by their food consumption and dietary choices (Vallianatos and Raine, 2008).

While Arab immigrants in Canada are facing many socioeconomic challenges, they still want to maintain their cultural practices and ethnicity (Meintel, 1996). Some female Arab immigrants, specifically Muslim ones, make decisions on food preparation and cooking for religious reasons (Halal meat only), and shopping for groceries is very time consuming because they have to read the ingredients to make sure there are no pork products contained (Vallianatos and Raine, 2008). Another issue facing new Arab female immigrants is the language barrier. For example, one female participant in Vallianatos's and Raine's (2008) study mentioned that she thought her first meal in Canada was canned beef, but she later found out the can actually contained dog food. Also, having few or no Arab grocery stores around the community makes it difficult to purchase Arab food than before, and the price of Arab food products is higher than the price in their home country (Vallianatos and Raine, 2008).

Social life is another challenge for female Arab immigrants. For example, Muslim Arab women care for their children and what they eat (Halal meat only). One of Vallianatos's and Raine's (2008) participants expressed that she does not trust sending her children to non-Muslim birthday parties because her children might not know what is served to them, and therefore consume non-Halal meat (Vallianatos and Raine, 2008). While Arab immigrants are considered as an ethnic minority in Canada, they are also an

ethnic minority in the US.

The United State Census Bureau American Community Survey (2006-2010) shows approximately one and half million Arab people live in the U.S. representing .5% of the total population (Asi and Beaulieu, 2013). Specifically, the Arab immigrant population in the U.S. is estimated to be around 1,017,000 of more than 303 million U.S. population (Asi and Beaulieu, 2013). Around 201,000 Iraqi, 89,000 Saudi, and 41,000 Yemeni immigrants relocated to the U.S. (Zong, and Jeanne, 2015). In the year of 2005, the government of SA opened an international education door that allows Saudi students to study in different countries around the world (Saudi Arabian Cultural Bureau, 2014). More than 9,000 students (males and females) were sent to study in the U.S. (Saudi Arabian Cultural Bureau, 2014). The number of Saudi students in the U.S. has increased every year since the program began. In 2012, the number of Saudi students in the U.S. was 44,566, a 30% increase over 2011 (Judicial Watch, 2013). The state of Michigan has over 500,000 Arab Immigrants that include 12,000 Yemenis (Arab American Institute, 2011) and 120,000 Iraqis (Karoub, 2017).

Arab immigrants comprise 30% of residents in Dearborn, Michigan which is the largest ethnic group by percentage in the U.S. (Brittingham and De la Cruz, 2005). As stated earlier Arab immigrant women are facing challenges regarding their food intake in Canada; however, the challenges (food intake) facing Arab immigrants in the U.S. are less studied, especially among female immigrants who are the gateway to food consumption and food choices in an Arab family. In this study, the food intake patterns of immigrant women from SA, Iraq, and Yemen was the focus.

Food intake patterns of other ethnic or minority groups in the U.S. have been

investigated. When immigrants settled in the U.S., their food intake pattern (as well as lifestyle) gradually changed as more Western style of foods are consumed while traditional native food intakes are gradually reduced. Acculturation is a term used to describe the process of changing behaviors, such as attitudes, values, and or identities of group of people or individuals (e.g, refugees and immigrants) who lived in a new country other than the one they were born in (Cabassa, 2003). With increased length of residency in the host country not only have people's behaviors changed, but also their dietary pattern changed, which could affect their health status (Yang et al., 2007). A systematic review and meta-analyses was reported by Delavari et al., in 2013. In this review, six EBSCO host databases were used to evaluate the length of residency in the U.S. and BMI for immigrant males and females from eight different counties. Over 1135 publications were identified, only nine studied were selected based on the inclusion criteria. Six studies showed positive correlation between the length of residency and body weight gain among males and females. The other three studies indicated that the length of residency was negatively correlated with body weight among women (Delavari et al., 2013).

Another study recruited Korean Americans who resided in the U.S. in 2007 to study the relationship between chronic diseases and dietary changes due to acculturation (Yang et al., 2007). A cross-sectional survey was administrated to 637 Korean immigrants to the U.S. (males *n=263* and females *n= 234*), ages were between 30 to 87 years old. Participants self-reported their chronic diseases, such as hypertension, digestive diseases, diabetes, and arthritis. The length of residency in the U.S. was positively correlated with thyroid disease in females and respiratory disease in males.

Also, the length of residency was negatively correlated with digestive disease in both genders. This study reported that the consumption of steam rice and/or rice with mix traditional dishes was negatively correlated with the length of residency in the U.S. among Korean immigrants. Changing of chronic diseases pattern between Korean immigrants to the U.S. was associated with changing of their diet pattern due to acculturation (Yang et al., 2007).

Given the fact that more immigrants/refugees from Arab countries are resettling in the U.S. and acculturation has been reported in immigrants from other countries, it is urgent to investigate if such acculturation exists in Arab immigrants, and if it does, how the acculturation process affects the eating behavior, lifestyle and health conditions.

In order to evaluate long-term dietary intake patterns for any population (e.g., Arab population), 24-hour food recall or records would be the best way to collect the food intake data (Ortega et al., 2015). However, it is time-consuming and requires literacy, it is not suitable to collect food intake data from a large population. A food frequency questionnaire (FFQ) is the best method to be used in epidemiological research, not only to collect food intake data from different populations, but also to collect data longitudinally over a period of time from the same sample in order to identify changes in intake patterns (Willett, 1998). At the present time, there are several well-validated FFQs available such as Block Food Questionnaire and Fred Hutchinson Cancer Research Center (GNA Booklet). Block Food Frequency Questionnaire is the most validated questionnaire (Boucher et al., 2006). It has been validated for many countries, languages and different age groups. However, Block FFQ has not been validated for Arab population and an Arab Food Frequency Questionnaire (AFFQ) has not been established before. **Our**

research objectives are 1: to establish a food intake database using 24-hr dietary records from Arab immigrant women who have been in the U.S. for less than 5 years, 5 to 10 years and greater than 10 years, as well as women still living in SA; 2: to establish an Arab Food Frequency Questionnaire (AFFQ) for future nutrition-related studies with Arab populations. These research objectives addressed the following aims; **Aim 1: to test the hypothesis that as the length of residence in the U.S. increased, the amount of native food consumption decreased as a function of acculturation, and also to determine the demographic variables that contributed to the changes in food intake patterns; Aim 2: to test the hypothesis that food intake patterns of female immigrants in the U.S. who were from SA, Iraq, and Yemen, or Saudi females still living in SA would be different from that of the general population of the three countries in 2013.**

CHAPTER 2 – HYPOTHESES TO BE TESTED

We hypothesized that there were differences in food intake patterns among Arab immigrant women in the U.S. as compared to those who resided in the Middle East region. Furthermore, for those who immigrated to the U.S., changes in dietary pattern were associated with the length of residence in the U.S.

The null (H_0) hypotheses of this study were: there were no differences in food intake patterns among Arab immigrant women in the U.S. as compared to those who resided in the Middle East region; and there were no changes in dietary pattern among Arab immigrant women who immigrated for more than ten years vs those who immigrated to the U.S. for less than five years. The alternative hypotheses (H_1) were: there were differences in food intake patterns among Arab immigrant women in the U.S. as compared to those who resided in the Middle East region; H_1: there were changes in dietary pattern among Arab immigrant women who immigrated for more than ten years as compared to those who immigrated to the U.S. for less than five years.

CHAPTER 3 – METHODS

The objective of this study was to collect two cross-sectional 24-hr dietary recall data from Arab immigrant women in order to develop an Arab food frequency questionnaire (AFFQ) to be used in the future to collect dietary pattern data of Arab immigrants. The outcome of this research is a valuable tool for future research on nutrition acculturation of Arab immigrants reside in the U.S.

Objective 1. to establish a food intake database using 24-hr dietary records from Arab immigrant women who have been in the U.S. for less than 5 years, 5 to 10 years and greater than 10 years, as well as women still living in SA

A face-to-face interview, along with questionnaires including 24-hr dietary recalls, was conducted utilizing a convenience sample during the Spring Summer semester of 2015. The sample included Arab females only because they are responsible for household food choices, purchasing and preparation. Since no previous study on food intake patterns has been conducted on this population, no power analysis can be used as a guidance to perform sample size calculation. Therefore, it was an educated-guess that 125 participants residing in metropolitan Detroit, Michigan, U.S. who were originally from Iraq, Yemen, and SA were recruited for this study. The breakdown of the participants according to the length of residence in the U.S. who immigrated for less than five years (*n=63*) were as following: 18 from SA, 21 from Iraq, and 24 from Yemen; who immigrated for five to ten years (*n=16*): 7 from SA, 6 from Iraq, and 3 from Yemen; and who immigrated for more than ten years (*n=46*); 23 from Iraq, and 23 from Yemen. Furthermore, 50 Saudi females who live in SA were also recruited. The reason we recruited participants who live in SA but not in Iraq or Yemen was that the political status

in both countries (Iraq and Yemen) could make the food intake patterns not stable/valid to be studied. We also had the collaboration agreement between Wayne State University (WSU) and King Abdul Aziz University (KAU) to conduct research with the approval from both universities. Due to the limited number of Saudi females residing in metro Detroit, there were no Saudi women with more than ten years in the U.S. recruited. The inclusion criteria were: at least 18 years of age, originally from Iraq, Yemen or SA, consuming meals at home most of the time and involved in family meal planning and preparation. The exclusion criteria were: Arab individuals from other countries in the region, male members of the household, already had one member of the household participating in this study, pregnant or lactating at the time of recruitment, and consuming most of the meals away from home. The study protocol was approved by the Institutional Review Boards of WSU, Detroit, Michigan, U.S. and KAU, Jeddah, Western Region, SA.

Recruitment

Arab immigrant women in the Detroit metropolitan areas (e.g., Dearborn, Dearborn Heights, and Sterling Heights) were recruited to participate in the research and received gift cards for their participation. Recruitment flyers were distributed at WSU campus, area mosques, churches, health clinics, Arab stores, and gas stations in the Arab community. The recruitment flyers provided a brief description about this study and contact information if individuals were interested in getting more information. The interested individuals were then contacted the study researcher to get detailed study information. If this individual fulfilled the recruiting criteria and was still interested in participating, an initial interview was scheduled, followed by a second interview. The two interviews were arranged so that one was during weekday and one on the weekend. Interview time and

location were scheduled according to the convenience of the interviewer and the participants. At the end of each data collection (interview), a $25 gift card was provided to the participant. Another announcement was taken place in Jeddah, Saudi Arabia to recruit Saudi females (*n=50*). Flyers were given to Saudi females in Jeddah at KAU.

Around 140 individuals in the U.S. showed interests in participating in this study. After initial interview, the first 125 qualified individuals were invited to participate. In Saudi Arabia, more than 50 individuals showed interests and the first 50 qualified and willing individuals were invited to participate in this study.   Excluded participants (without affecting the original number) were: five females who were pregnant, and fewer than ten females who were younger than 18 years, or who were born in the U.S. Females from Arab countries other than Yemen, Iraq, Saudi Arabia were also excluded from this study.

Questionnaire

The interview was done by using multiple pass methods (Willett & Lenart, 2013). First passage started with a general questionnaire related to demographic information (Section A Q1-Q15), health status and physical activities (Section B Q1-Q18), and food preparation and dietary behavior (Section C Q1-Q8), followed by first day of 24-hr dietary recall. All questionnaires were translated from English to Arabic and retranslated back from Arabic to English to assure the accuracy of the English-Arabic translation. The questionnaires were available in both English and Arabic languages, and the participants decided which version would be used in the interview (Appendix A and B). The demographic (Section A) questionnaire included questions regarding age, gender, race, religion, primary language, length of residence in the U.S., education level, occupation, employment status, marital status, and place of birth. The health status and physical

activities (Section B) questionnaires included questions such as health insurance status, smoking status, and self-reported weight and height (Appendix A). The last part of the questionnaire was related to the food preparation and dietary behavior (Section C) that included the following questions "How many meals do you usually eat per day?"; "How much do you spend on grocery per week?"; "Is there another person other than you prepare food in this household?" (Appendix A).

24-hour Dietary Recall

The participants were asked to describe what they ate during the previous 24-hr (day 1), from the first food consumed in the morning until the last food before going to bed. Using 24-hr dietary recalls data collection sheet (see Appendix A), which provided space to record the list of foods consumed, each participant recalled the food items they consumed the day before, serving size, preparation methods, types, and restaurant/ brand names for all meals and snacks. The interviewer helped the participant to remember all food consumed by asking helpful questions. One example of these questions was: "When you were watching TV did you eat anything?" The interviewer also provided some helpful food pictures to the participants if they cannot remember the name of the food they ate outside their home (at a restaurant).

In addition, a food atlas book "A photographic atlas of food portion sizes" (Nelson et al., 1997) was used to help describe the actual size of a food portion consumed. All mixed food (traditional dishes) were reported by documenting the ingredients in the recipes. At the end of the first interview, each participant was instructed on how to prepare the second 24-hr recall, and was provided with recording sheets to record food intake for the next interview. All the dietary recall interviews followed the multiple passage

method (Johnson et al 1996) to ensure accuracy- first passage: collect general information, physical activities, and food items consumed in the previous day, second passage: discussion of food brands, portion size consumed, and recipes used (mixed food items); and third passage: collecting information about time and activity engaged when each food item was consumed (Willett and Lenart, 2013).

Objective 2. to establish an Arab Food Frequency Questionnaire (AFFQ) for future nutrition-related studies with Arab populations

Development of the AFFQ

Food items consumed by all the participants were tallied. All the food items were classified into ten categories as listed below. Based on the commonly consumed food items from each group of women in each category, an AFFQ was established. This AFFQ covered both traditional Arab food items, and the western food items commonly consumed by the Arab immigrant women. Similar type of foods (e.g., cooked rice with different flavors) consumed by a few women was merged as a single food item (Bharathi et al., 2008). If a food was consumed by five percent of the participants, it was considered in the final list (Shahar et al., 2003) of the AFFQ. The commonly consumed food items were categorized into ten food groups as the following (Based on FFQ and General Nutrition Assessment (GNA) booklet of Fred Hutchinson Cancer Research Center (FFQ booklet, 2017)).

1-Cereals, breads, snacks;

2- Meat, fish, eggs;

3- Spaghetti, mixed dishes, soups;

4- Milk and dairy products;

5- Vegetables and grains;

6- Pickles;

7- Fruits;

8- Sweets;

9- Beverages and alcohol; and

10- Native foods (Appendix C).

The AFFQ was designed in a medium serving size for each single food item and the size of the medium serving was described in the AFFQ. The participants had an option to select their food serving size among small (S), medium (M), and large (L). A small serving was about half of the medium serving size, and large was about twice the size of a medium serving. They also had to choose one out of nine options to answer how often they consumed each food item. These nine options were: never or less than one time per month, one time per month, two to three times per month, one time per week, two times per week, three to four times per week, five to six times per week, one time per day, and two times or more per day (appendix C).

A total of 104 items were included in the AFFQ, and they were available in both English and Arabic languages (Appendix C and D). Each participant was instructed to choose the frequency that represented her frequency of consumption of that food item the most. This AFFQ was a closed-end questionnaire, so there was not much burden to the participant in answering this questionnaire (Appendix C and D).

Establish the reliability and validity of this AFFQ

After the AFFQ was established, it was field tested on selected immigrant women from the same groups to establish the validity and reliability and to validate its usefulness

in studying nutrition acculturation in Arab immigrants. Fifty participants with 24-h dietary recall data at time 1 (T1) were recruited for the AFFQ validity and reliability study. Participants were between 21 to 62 years of age. They were ten each from Iraq and Yemen who immigrated for less than five years and ten each who immigrated to the U.S. for more than ten years; and ten Saudi females who live in the U.S. for less than five years. A face-to-face interview was arranged by a phone call prior to the interview, with each participant individually at their homes. It took about 30 minutes to complete the AFFQ for each participant.

24-h dietary recall Time 2

The same 50 participants who answered the AFFQ were also requested to report another 24-h recall at Time 2 (T2) for two days (one week day and one weekend day). Two interviews for each participant were arranged for about 30 minutes to an hour each to gather the details of all foods consumed in the previous day. One interview was based on a week day, and the other one was based on a weekend day. The procedure for second 24-h recall was the same as the first one (appendix B). All food items were reported with details of serving sizes, preparing methods, specific type of food (e.g., fat free if it was dairy, with skin or without if it was poultry, or wheat, white, or rye if it was bread), and restaurants/brand names (appendix B). At the end of the second interview each participant received a visa gift card for $25.00 for their time and participation.

After the dietary records were tabulated and categorized, intraclass correlation coefficients for food intakes obtained from the dietary recalls T1 and T2, and T2 and AFFQ were calculated to estimate the reliability and validity respectively (Willet, 1998). In order to calculate the validity of AFFQ, the food consumption frequency in AFFQ was converted

to frequency per day of each item base on a medium serving size since 90% of participants choose a medium serving size. When the choice in AFFQ was in a range, such as two to three times per week, the average of the range (2.5) was used in order to calculate reliability and validity. In this case, the consumption of this food item would be 2.5 divided by seven (a week) to get .36 servings/day.

Specific Aim 1: to test the hypothesis that as the length of residence in the U.S. increased, the amount of native food consumption decreased as a function of acculturation, and also to determine the demographic variables that contributed to the changes in food intake patterns

Determine the changes in dietary patterns

By comparing the commonly consumed food items among each group of women (Iraqi, Yemeni who immigrated to the U.S. for less than five years, five to ten years, and more than ten years; Saudi immigrated to the U.S. for less than five years, five to ten years, and still residing in SA), the changes in dietary patterns, (e.g., eating more sweets, grains, fruits, and vegetables) were determined.

Specific Aim 2: to test the hypothesis that food intake patterns of female immigrants in the U.S. who were from SA, Iraq, and Yemen, or Saudi females still living in SA would be different from that of the general population of the three countries in 2013

The latest Food Balance Data Sheet collected in 2013 for general population from SA, Iraq, and Yemen, by Food and Agriculture Organization of the United Nations (FAO) were obtained from its website. We compared our result from T1 (frequency base on a medium serving size) for all female participants from these three countries with the

general population from the same countries. In order to do so, the FAO data were converted from kg/capita/year to cup/capita/day before comparison.

Statistical Analysis

Analysis of variance (ANOVA) was used to compare mean frequency of intake of food items among Arab immigrant women in SA, and in the U.S. with different length of residency in the U.S. The alpha-level was set at .05. Post-hoc t-tests were performed if a significant result was obtained in order to identify the groups that contributed to the difference. For women from the same country, Student t-tests or one way ANOVA with post-hoc comparisons were performed to compare the effects of length of residence on food intake patterns.

Multiple linear regression models (MLR) were used to assess interactive effects of the demographic variables including age, residency in the U.S., education level, employment status, marital status, and number of dependent children on intakes of each food group at T1 to determine the contributing variables to the between-group variability. One sample t-tests were used to test the differences in food intake patterns among immigrant women in the U.S., women who reside in SA, and the general population of their country of origin. Data was analyzed with SPSS Software version 24 (IBM Corp, Armond, NY).

CHAPTER 4 – RESULTS

Objective 1. to establish a food intake database using 24-hr dietary records from Arab immigrant women who have been in the U.S. for less than 5 years, 5 to 10 years and greater than 10 years, as well as women still living in SA (Table 1)

Description of the population:

Description of the entire sample, including Arab female immigrants from Iraq, Yemen, and SA, and Saudi females residing in SA was presented in Table 1. All participants were aged from 18-65 years old. Those participants in the U.S. were categorized into immigrated to the U.S. for less than five years, between five to ten years, and more than ten years. Most of the participants were homemakers or students and most of them were married. Less than 25% participants had one to two dependent children, and about 20% had three to four dependent children. Most were Muslims, and described themselves as White.

Most of the applicants reported their health as excellent or very good on health scales. About half of the participants were in healthy or overweight BMI range. About half of the participants had some college or higher education. Sixteen participants reported to have no former education, 12 of these participants were from Yemen (age between 25-65 years old) and four participants from Iraq (age between 44-62 years old). Ten participants chose English as the first language (age between 19-31 years old), they were from Iraq (*n=9*) and Yemen (*n=1*).

24-h dietary recall Time 1

It took between thirty minutes to an hour to complete each dietary recall with several attempting procedures for each individual participant to minimize misreporting information in the 24-h dietary recall.

Food intake pattern was different from weekday and weekend day among female immigrants to the U.S. from the three countries. For example, Yemeni females prepared and consumed more traditional food that contained red meat (lamb or beef) vs chicken when all family got together on the weekend. On the other hand, Iraqi and Saudi females reported different food intakes behaviors other than preparing food for the family on weekend; sometimes they ordered food from Mediterranean restaurants or they went out to eat outside the house with their families.

Objective 2. to establish an Arab Food Frequency Questionnaire (AFFQ) for future nutrition-related studies with Arab populations

Frequency and the percentage of all food items consumed by the participants in T1 was tabulated and calculated to develop the AFFQ. Of the long list of all food items consumed, only those consumed by more than five percent of the participants were considered to be included in the AFFQ. Of the grain group, rice was consumed by 83%, followed by 66% for white bread and 45% for whole grain bread. The top three food items in the dairy group were hard cheese (46%), whole milk (33%), and cream cheese and whole fat yogurt (25%). Oranges, apples and bananas were the most commonly consumed fruits by Arab females (47%, 45%, and 43% respectively). Among the vegetables, 80% was consumed as fresh salad and 37% as cooked or steamed vegetables, and cooked or steamed beans followed by 34%.

Twenty-eight percent of the participants consumed ground red meat (beef or lamb) and 22% consumed non-ground lamb. Among the poultry group, 57% of the participants consumed eggs. Chicken breast was consumed by 43%, and chicken thigh by 31% of the participants. Seafood group showed only 15% of the participants consumed fish as well as canned tuna. Sweets group was consumed by the U.S. Arab females as cakes (25%), cookies (22%), and chocolate (21%). Mix nuts was consumed by 27% of the participants. For other snacks, results showed that 23% was for chips, and 21% for fries. Over the beverages group, hot tea (69%), coffee (47%), and cola-type (36%) were the top beverages consumed by the participants. The four top food items consumed in the traditional food group were foul (18%), hot sauce (sahawiq) (13%), aseed (11%), and kabsa (11%). Over the mix dishes group (non-traditional), spaghetti (23%) and pizza (15%) were consumed most by female immigrants.

Specific Aim 1: to test the hypothesis that as the length of residence in the U.S. increased, the amount of native food consumption decreased as a function of acculturation, and also to determine the demographic variables that contributed to the changes in food intake patterns

 (Table 2 and Table 3)

Multiple linear regression models was performed to determine which variables were associated with food choices. Three models were addressed to include the following variables; age and residency in the U.S. (Model 1); age, residency in the U.S., employment status, and education level (Model 2); age, residency in the U.S., employment status, education level, marital status, and number of dependent children (Model 3).

Grains Time1 (T1) and fruits T1 were positively predicted by residency in models one, two, and three. Also, fruits were positively predicted by dependent children in model three. Dairy T1 and poultry T1 were not predicted by any variables in all three models. Vegetables T1 were positively predicted by age and residency in models one, two, and three. They were also predicted negatively by education level in model two and model three. Red meat T1 was positively predicted by age for model one but failed to be significant in models two and three. Education level was a positive predictive variable for seafood T1 in model two and model three. Sweets T1 was negatively predicted by age in model one and positively by education level for model two and model three. Beverages T1 was predicted negatively by residency in all three models. Age was a positive and residency was a negative predictive variable for traditional food T1 in models 1, 2, and 3. Also, traditional food T1 was negatively predicted by education level in model two and model three.

Comparisons of food intake between female immigrants in the U.S. (less than 5 years, five to ten years, and more than 10 years) and females who live in SA (Table 4)

Results showed significant differences in consuming the following food groups grains (p=.03), dairy (0.5), fruits (p<.001), vegetables (p<.001), poultry (p=.001), and beverages (p=.05) between female immigrants to the U.S. and females living in SA.

Effects of length of stay in the U.S. (Table 5)

Student t-test result showed that female immigrants moved to the U.S. for less than five years consumed beverages more than those who have immigrated to the U.S.

for more than ten years (p=.04). They also consumed traditional food more than Arab females who have immigrated to the U.S. for greater ten years (p=.05).

Our results showed number of years in residence in the U.S. was correlated negatively with consuming traditional food (r=-.22, and p=.04).

Comparison of food intake among Saudi female immigrants for less than five years, five to ten years, and from SA (Table 6)

Table 6 showed acculturations among Saudi residence in the U.S. and food intakes pattern compared to the food intake in SA. Saudi females who immigrated for five to ten years in the U.S. consumed significantly more grains than Saudis residing in SA (p=.01). However, the sample size for participants in the 5-10 years group was small. Fruits were consumed significantly more by U.S. Saudi who immigrated to the U.S. for less than five years compared to the females lived in SA (p=.01).

Comparison of food intake among Iraqi female immigrants with less than five years, five to ten years, and more than ten years in the U.S. (Table 7)

Iraqi residents in the U.S. who immigrated for five to ten years consumed significantly less red meat than who immigrated for less than five years (p=.01).

Comparison of food intake among Yemeni female immigrants for less than five years, five to ten years, and more than ten years in the U.S. (Table 8)

Yemeni female immigrants to the U.S. showed a stable food intake pattern over the years in the U.S. No significant difference among the three groups in any food group was identified.

Comparisons of food intake among U.S. Saudis, Saudis in SA, and immigrants from other countries in the U.S. (Table 9)

ANOVA and post-hoc results showed that five food groups (grains, fruits, vegetables, poultry, and sweets) were consumed statistically different among U.S. Saudi, Saudi in SA, and other female immigrants to the U.S. Saudi females live in the U.S. ate more grains and fruits than Saudi females in SA (p=.05, and p=.03 respectively). Also, other female immigrants to the U.S. consumed more fruits than U.S. Saudi (p=.02) and Saudi in KSA (p<.001). Other immigrants in the U.S. ate more vegetables than Saudi in the U.S. and Saudi in SA (p<.001). Poultry was consumed more by other immigrant women in the U.S. compared to Saudi in SA, and the difference was significant (p=.01). Saudi living in the U.S. showed higher consumption of sweets compared to other immigrants to the U.S. (p=.02).

Comparisons of food intake between female immigrants in the U.S. for more than ten years and females live in SA (Table 10)

Student t-test result showed a significant difference in consumption of grains (p=.02), fruits (p<.001) and vegetables (p-.02) for T1 between female immigrants to the U.S. for more than ten years and participants live in SA (p=.02). As the length of residency in the U.S. increased the consumption of poultry was also increased compared to the Arab females who live in SA (p=.02). The length of residency in the U.S. decreased the consumption of beverages, such as, tea, coffee, latte, coke, and other soda compared to the Arab females who live in SA (p=.04).

Saudi females who lived in SA consumed sweets more than female immigrants to the U.S. more than ten years (p=.05). In addition, Arab female immigrants in the U.S. for more than ten years consumed traditional food significantly less than native females who lived in SA (p=.03).

Comparison of food intakes between females from Saudi Arabia, Iraq, and Yemen (Table 11)

Amongst the U.S. participants from three countries Saudi Arabia, Iraq, and Yemen, Saudi females consumed less fruits (p<.001), less vegetables (p<.001), as compared to Iraqi and Yemeni females, and they also consumed less poultry (p=.03) than Yemeni females. Yemeni females consumed less red meat than Iraqi females and the difference was statistically significant (p=.03). Female immigrants from SA consumed significantly more seafood and sweets as compared to female immigrants from Yemen (p=.04 and p=.01) respectively. Iraqi females ate more miscellaneous food than females from Yemen (p=.05). Miscellaneous food includes snacks (e.g., mix nuts, popcorns, fries, chips, and baked potato), pickles, olives, and sauces (e.g., ranch dressing, hot sauce, ketchup, mustard). There was no significant difference among all female immigrants from the three original birthplace countries in term of eating traditional foods.

Comparisons of food intake among female immigrants from three countries for less than five years (Table 12)

Yemeni females consumed more vegetables (p=.01) and traditional food (p=.03) but less sweets (p=.02) than Saudi. Iraqi females consumed red meat significantly more than the other two groups (p's =.01).

Comparisons of food intake between female immigrants in the U.S. for five to ten years from the three countries (Table 13)

Saudi females consumed seafood more than Yemeni female immigrants and the difference was statistically significant (p=.05). There was no other difference in food

intake among participants from the three countries. It should be noted that the sample size for the three groups were relatively small especially for the Yemeni group.

Comparisons of food intake between female immigrants in the US. for more than ten years from Iraq and Yemen (Table 14)

Since no Saudi participants had more than 10 years in the U.S., only Iraqi and Yemeni participants were compared. Iraqi females consumed more fruits (p=.01) and red meat (p=.05) but less traditional food (p=.03) as compared to Yemeni females.

AFFQ

An interview was arranged with the participants individually to answer the AFFQ that included 101 questions classified into eleven food groups: ten groups were American foods or foods common to both Mid-Eastern region and the U.S., and the eleventh was the traditional foods (Appendix C).

Of the 101 questions, there were three questions asking more frequent consumption of some food items than the rest of the AFFQ. The three questions were "How often did you eat foods that were cooked in fat (pan-fried, sautéed, or deep fried)? Count all fat such as margarine, butter, oil or lard"; "How often did you eat a serving of vegetables? Do not count potatoes, salad or beans"; and "How often did you eat a serving of fruit? Do not count juices". Participants had to select one of nine options that were designed as the following choices: never or less than one time per week, one to two times per week, three to four times per week, five to six times per week, one time per day, two times per day, three times per day, four times per day, and five times or more per day (Appendix C).

Reliability (Table 15)

Intraclass Correlation Coefficient (ICC) was used to test the consistency of food consumption between T1 and T2 24-h food recalls. Six food groups (grains, vegetables, beverages, red meat, seafoods, and sweets) showed significant correlations between food recalls T1 and T2.

Validity (Table 16)

Another correlation was used to test validity between T2 and AFFQ. The purpose of this correlation was to validate that the AFFQ did measure what it was intended to. Grains (p=.01), fruits (p=.04), vegetables (p=.04), and beverages (p<.001) showed significant correlation among T2 and AFFQ.

The traditional food group was separated into four groups: group one (the traditional foods mostly consumed by Saudi immigrants); group two (the traditional foods mostly consumed by Iraqi participant); group three (the mostly consumed by Yemeni immigrants); and group four (the foods were consumed by all participants). Group one included kabsa, mulukhya, samusa, Mandi, and tameeze); group two contained samoon, lebneh, shish kafta (kabab), and dolma; group three included foul, hot sauce (sahawig), aseed, shakshouka, tea with milk (Adeni tea), and hulba; and group four contained biryani, hummus, chicken shawarma, white beans with meat, baby okra with meat, baklava, ma'amoul, falafel, fatush, tahini sauce, managish, and za'atar. Traditional food group three (Yemeni, p=.01) were significantly correlated between T2 and AFFQ.

Specific Aim 2: to test the hypothesis that food intake patterns of female immigrants in the U.S. who were from SA, Iraq, and Yemen, or Saudi females still living in SA would be different from that of the general population of the three

countries in 2013 (Table 17)

Results showed Saudi females in the U.S. and females in SA consumed significantly more grains (p<.001), dairy (p=.01 and p<.001 respectively), red meat (p=.03 and p<.001 respectively), seafood (p=.03 and p=.01 respectively), sweets (p=.02 and p<.001 respectively, and miscellaneous (p=.002) compared to the general population in SA in the year of 2013. Also, U.S. Saudi females ate significantly more fruits (p=.01) than females in SA or general population in SA. Saudi female participants in SA consumed scientifically less vegetables than U.S. Saudi females or general population (p=.04).

Comparisons of food intakes between Iraqi females in the U.S. and general population in Iraq in 2013 (Table 18)

Iraqi females in the U.S. consumed more grains, dairy, fruits red meat, poultry, seafoods, sweets, and miscellaneous compared to general population in Iraq (p<.001). Vegetables were consumed more by U.S.

Comparisons of food intakes between Yemeni females in the U.S. and general population in Yemen in 2013 (Table 19)

Yemeni females in the U.S. consumed more grains, dairy, fruits, vegetables, red meat, poultry, seafoods, sweets and miscellaneous than general population in Yemen (p<.001).

CHAPTER 5 – DISCUSSION

Objective 1. to establish a food intake database using 24-hr dietary records from Arab immigrant women who have been in the U.S. for less than 5 years, 5 to 10 years and greater than 10 years, as well as women still living in SA

This study was the first to establish an AFFQ on Arab immigrant women. Twenty-four hr dietary records were collected with multiple passage procedures to minimize food misrepresenting and memory issues (Tseng et al., 2015). Some females from Yemen were not able to write, read, or recognize food brands compared to other educated females from Iraq, Yemen, and Saudi Arabia. Those with no former education had requested their children's help to report their food intakes. Sometimes it was necessary to ask their children a specific question, such as food brand names. That might explain why Yemeni females were more likely to stick to their traditional food and less likely to adapt to American food compared to the other females on our study. Generally, in the Yemeni family the man is the one responsible for making money for the family, and also men buy the groceries that the women request; therefore, Yemeni females were less exposed to the host country and more likely resistant to dietary changes associated with acculturation. Also, females who chose English version of the food record form were more likely to have English as their first language (9 from Iraq, 1 from Yemen), who grew up in the U.S. and most likely to have accustomed to the U.S. society/culture and have diet changes as results of acculturation.

Objective 2. to establish an Arab Food Frequency Questionnaire (AFFQ) for future nutrition-related studies with Arab populations

AFFQ

In this study, we defined the process of development FFQ for Arab population in the U.S. by following the Fred Hutchinson Cancer Research Center General Nutrition Assessment FFQ. We used 75 questions out of 130 from e GNA booklet (FFQ booklet, 2017). These questions were categorized into nine sections 1. Cereals, breads, snacks; 2. Meat, fish, eggs; 3. Spaghetti, mixed dishes, soup; 4. Milk and dairy products; 5. Vegetables and grains; 6. Pickles; 7. Fruits; 8. Sweets; and 9. Beverages and alcohol. We also added 29 questions for the traditional foods section that we considered from our 24-h food recall T1.

They were three questions added to AFFQ from GNA FFQ which were "How often did you eat foods that were cooked in fat?"; "How often did you eat a serving of vegetables?" and "How often did you eat a serving of fruit?" (FFQ booklet, 2017). We were interested in these questions since some of our participants reported in the early survey that they cooked different foods for their young dependent children from those for the rest of the family, such as chicken nuggets and French fries. Multiple linear models results of T1 showed that fruits were predicted by the number of dependent children. However; we did not include answers to these three questions when we calculated the validity. When we studied the validity, we had to match the question in AFFQ with the food groups in T2. These three questions did not have data matching them in the 24-h food dietary recall, and we already have questions about fruits group and vegetables group in AFFQ that matching the 24-h food dietary recall. Furthermore, there was no data in the 24-h food recall that match the first question about cooking food in fat. Hence, we felt it is necessary to have these three questions included in the AFFQ even though we cannot get this information from 24-h food recall.

We collected the second 24-hr dietary recall for the purpose of determining the reliability of the recalls and to validate the AFFQ. The timing between the two recalls was important as stated by Willet (1998). When the time lag between the two recalls is too short, the memory may play a role in the second recall. If the lag is long, seasonal variations in food choices and availability may affect the consumption. The time lag between T1 and T2 in our study was between August (2015) and February (2016) due to analyzing T1 dietary recall to create AFFQ and unforeseeable administration delays. The food items most likely affected by seasonal variation are fruits and vegetables. Therefore, we summed up all fruits and vegetables as total consumptions rather than using each individual item to overcome the seasonal variabilities.

In order to study the validity, we ran a correlation between T2 and AFFQ. Since the AFFQ frequency options were different from 24-h food recall: once per month, two to three time per months, once per week, two time per weeks, three to four times per weeks, five to six times per weeks, one per day, and two times or more per day, we had to change our AFFQ data to make it once per day to match T2 data. For example, if once per week or once per month was selected, we divided the answer by seven or thirty respectively.

We also had to adjust the food items in AFFQ and T2 to make them match each other. We arranged the food item under each group in T2 and AFFQ to the following lists. Grains group included cold and cooked cereals, muffins, white and whole grain bread, cereal bars, crackers, spaghetti, bread stick, pizza, and steamed rice. Pizza is considered as a grain no matter what kind of topping (chees, peperoni, chicken, and vegetable) added to it. Those toppings were counted in the other groups (i.e., cheese in dairy, peperoni in red meat, and chicken in poultry). Fruits and fruit juices included citrus, apples and pears,

bananas, cocktail fruits, watermelon and melons, strawberries and berries, peaches, mangos, dried fruit, apricots, orange juice, and other fruit juices (100%). Vegetable group contained salad and fresh vegetables, cooked or steamed vegetables, cooked beans, fries and mashed/or baked potatoes, lentils or lentil soup, and vegetable soups. The items selected in beverages and alcohol group were tea, coffee, latte, coke and soda, beer, liquor, and wine. We had a very good correlation between T2 and AFFQ for the following food groups; grains, fruits, vegetables, beverages, traditional three (Yemeni food), and traditional four (shared food) just missed the significant correlation between food recall T2 and AFFQ (p=.06). Nonetheless, we were under powered for the following groups: red meat, poultry, and seafood as the correlations between AFFQ and T2 records were approaching to be significant. Future studies to further validate this AFFQ with larger sample size is warranted.

There were two versions of this AFFQ were produced, one in English and one in Arabic. The English version has been translated into Arabic and the Arabic version has been back translated into English. After translations, both versions have same food items listed, indicating that the translation was correct and both version would give us accurate information we were seeking. Hence both versions can be used in future nutrition acculturation studies in the Arab population.

Specific Aim 1: to test the hypothesis that as the length of residence in the U.S. increased, the amount of native food consumption decreased as a function of acculturation, and also to determine the demographic variables that contributed to the changes in food intake patterns

We observed in our study that female immigrants with equal or more than ten years

in the U.S. adapted to the American diet and consumed significantly less traditional food compared to the female immigrants in the U.S. for five years or less. Batis and his colleagues (2011) studied the effect of food acculturation among females who live in Mexico, or Mexican American females who immigrated to the U.S. (MAMX), and Mexican American females born in the U.S. (MAUS) (Batis et al., 2011). This study revealed that MAMX females who have been in the U.S. for equal or more than ten years adapted to the American diet in the same way as MAUS females (Batis et al., 2011). Our multiple linear regression models indicated similar findings, that traditional food was negatively predicted by the length of residency in the U.S. and positively predicted by age. Both groups consumed more desserts, salty snacks, pizza, French fries, high fiber bread, fish, low fat meat, and low fat milk compared to Mexican females who live in Mexico (Batis et al., 2011). Batis et al's study showed the intake of sweets was positively correlated with residency. Our results showed sweets were negatively predicted by age. Younger immigrant females are more likely to consume more energy and fat due to the high content of energy and fat in most of the sweets. If Arab immigrants behave like the Mexicans in the U.S., they are more likely to develop obesity and other chronic diseases when the length of residence increases in these young immigrants. Those who live in Mexico consumed significantly more corn tortilla, low fiber bread, high fat milk, and Mexican fast food compared to MAMX and MAUS (Batis et al., 2011). Adult MAMX women consumed fruits and vegetables more than adult females MAUS, and the study did not explain why (Batis et al., 2011). However, our results showed that fruits and vegetables were positively predicted by length of residency in the U.S., and vegetables were positively predicted by age. Also, MAMX ate vegetables and fruits more than

Mexicans who live in Mexico (Batis et al., 2011). This study mentioned that usually Mexican diet does not include vegetables and fruits in the diets. Another study was conducted by Remero-Gwynn and his colleagues (1993) and they reported that new Mexican immigrants in California consumed high fruits and vegetables after immigrating to the U.S. These data could be explained by the fact that, vegetables were used only as ingredients of mix dishes, such as pasta, rice, and meat in the Mexican food (Remero-Gwynn et al., 1993), hence the amount consumed was low in Mexico, similar to what Batis et al. (2011) have reported.

These findings are similar to what we observed in the current study in that the new Saudi immigrants consumed more fruits than the Saudi females in SA as well as Iraq and Yemen. Due to its hot and dry climate, SA is not a country with abundance of fruits and vegetables, hence residents in SA are not accustomed to consume large quantity of fruits and vegetable. On the other hand, the U.S. produces a variety of fruits and vegetables. All fresh, frozen and canned fruits and vegetables are readily available and inexpensive. Vegetables (sometimes fruits) as in salad are commonly consumed in the U.S. diet and thus increased vegetable intake for people in the U.S. Acculturation to more fruit and vegetable intakes is a positive change for individuals from Middle Eastern countries.

Our study showed that education levels negatively predicted the consumption of traditional foods. More educated immigrants were more likely to acculturate to the host countries and less likely to keep the traditional food consumption. Similar results have been reported with immigrants from other countries, such as Chinese Americans with higher education level consumed more grains, fruits, vegetables and less traditional foods (Lv and Cason, 2004). Also, education level was negatively associated with traditional

food intake patterns among U.S. Korean immigrant males, and positively correlated among U.S. Korean immigrant females (Yang et al., 2005).

Among Korean residence in the U.S., acculturation showed as changing in their dietary pattern by eating less steamed rice after they immigrated to the U.S. This study showed negative correlation between digestive disease and length of residency in the U.S (Yang et al., 2007). Thus, acculturation not only influences dietary pattern, but also affects the health conditions associated with dietary pattern. Our study also showed a negative correlation between consumption of traditional food and length of residency in the U.S. among Arab immigrant females. It should be noted that this study is a cross-sectional study. In order to delineate the acculturation process, a large scale longitudinal study to investigate the immigrants' food intake pattern is warranted.

Specific Aim 2: to test the hypothesis that food intake patterns of female immigrants in the U.S. who were from SA, Iraq, and Yemen, or Saudi females still living in SA would be different from that of the general population of the three countries in 2013

Tables 17, 18, and 19 showed comparisons between food consumption of our participants (females) at T1 with food consumed by the general populations (males and females) from Saudi Arabia, Iraq, and Yemen for the year 2013 as reported by FAO (FAO, 2017). We changed the FAO data from kg/capita/year to cup/capita/day to make it consistent with our data.

We observed that Saudi females in the U.S. and females in SA consumed significantly more grains, dairy, red meat, poultry, seafood, sweets, and miscellaneous compared to the general population in SA for the year of 2013 (Table 17). Given the fact

that those participants living in SA were associated with a university, they were probably more educated and were in a higher socioeconomic status than the general population where FAO data were collected from, hence it is not unexpected that they consumed more of the higher energy and protein foods, presumably higher cost foods, than the general population in SA. Saudi females in the U.S. consumed significantly more fruits compared to general population or females in SA. This may reflect an abundance of fresh fruits in the U.S. as compared to SA. Nonetheless, females living in SA who participated in our study consumed less vegetables than general population in SA (Table 17). Since FAO data were mean intakes from both males and females, the significantly lower intake of vegetables in SA females may indicate that SA males have a significantly higher vegetable intake than females in general population and the reason for this difference is not yet clear. On the other hand, the small sample size in our study may have skewed the results.

Table 18 showed that with the exception of vegetables, U.S. Iraqi females consumed significantly higher grains, dairy, fruits, red meat, poultry, seafood, sweets, and miscellaneous than general population in Iraq for the year of 2013. Given the higher intake of these food items, it is speculated that U.S. Iraqi females may also have higher energy intake. A study in progress is designed to analyze the energy intake of these participants in order to demonstrate that this is the case. If this proved to be true, then it lends support to the previous findings that immigrants/refugees gained more weight after arriving at the host countries, especially when the host country is a highly developed country like the U.S. (Jen et al., 2015 and Jamil et al., 2014).

For Yemeni females in the U.S., they consumed more food after immigrating to U.S. (Table 19) compared to the general population in Yemen for the year of 2013 (FAO, 2017). Thus, even though Yemeni females were more likely to adhere to their traditional foods, the amount of food consumed was still significantly higher than that of the Yemeni general population residing in Yemen. The abundance and inexpensiveness of foods in the U.S. may have contributed to these higher intakes, not only for Yemenis, but also for participants from other two countries. High intakes of grains (Liu et al., 2003), red meats (Wang and Beydoun, 2009), sweets and sugar-sweetened beverages have been reported to increase energy intake, resulting in increased body weight (Bray et al., 2004), hypercholesterolemia, cardiovascular diseases (Micha et al., 2010). and certain types of cancer (Schwartz et al., 2004). The long-term health condition of these immigrants needs to be investigated. The younger generation of Middle-Eastern immigrants need to pay more attention to dietary changes as a result of acculturation, and managing intake of Western-style foods, particularly red meats and sweets, should be a public health concern.

CHAPTER 6 – STRENGHT AND LIMITATION

General food intake pattern (2 24-hr dietary recalls) of Middle Eastern female immigrants were collected – providing a brief glimpse of what these females were consuming in the U.S. We developed an AFFQ based on these intake recalls, the first one ever developed. This AFFQ would be useful in future studies to evaluate Arab immigrants' dietary acculturation and health. The food list in the AFFQ could be a useful reference for Arab grocery store owners who could use the results of AFFQ to stock their store shelves and improve their traditional food offerings depending on the origin of the immigrants in their neighborhood. However, our AFFQ had a few limitations. When we collected 24-hour food intake records, we did not report water as part of beverages. Future improvement of the AFFQ should list water as a separate entry. Even though significant predictors were identified in this study, the amount of variability that can be explained by these variables are relatively small. Other demographic or socioeconomic status variables may contribute to the changes in food intake pattern and warrant further investigation. Our AFFQ did not have an open-ended question to report an additional traditional food item/items consumed during normal days or certain holidays, such as Ramadan, Eid Al-fitr EID, Eid Al-Hajj, Thanksgiving, Christmas, and Easter among Muslims and Christian Arab immigrants. Also, we chose females in our research because Arab female in general is the one responsible for preparing food to the family. However, some of our participants reported that their husbands purchased and cooked for the family sometimes. Some Saudi males in the U.S. helped their wives with cooking if she was busy with school or after giving birth. Those U.S. Saudi came to U.S. for school and experience new life away from their families, thus males have to share some of the house

work when there is no family member around to help. Another limitation is that the sample

size was relatively small. This AFFQ needs to be validated further with more participants

and with both genders.

CHAPTER 7 – CONCLUSION

Our study is the first one to stablish an AFFQ for Arab female immigrants in the U.S. This AFFQ is validated only in a small group, so more studies would be required in this area with larger sample size. For future research, we recommend including Arab males as part of study participants and longitudinal studies are also warranted. Our AFFQ is a useful epidemiological tool for future research to study Arab immigrants' heath status and acculturation.

Table 1: Description of the sample (*n=175*)

Characteristic	n	(%)	Characteristic	n	(%)
Age			**Race**		
18-33 years old	101	57.7	White	95	54.9
34-49 years old	57	32.6	Asian	23	13.1
50-69 years old	17	9.7	Black	2	1.1
			Two or more races	3	1.7
			None of these	41	23.4
			Missing data	10	5.7
Residency			**Religion**		
≤ 5 years	63	36.0	Muslim	164	93.7
5-10 years	16	8.6	Christian	11	6.3
≥ 10 years	46	26.9			
Live in the KSA	50	28.6			
Occupation			**Health Status**		
Homemakers	85	48.6	Excellent	60	34.3
Students	42	24.0	Very good	57	32.6
Teachers	13	7.4	Good	41	23.4
Medical Assistants	3.0	1.7	Fair	12	6.9
Other	26	14.9	Poor	5.0	2.9
Missing data	6.0	3.4			
Marital status			**BMI (kg/m^2)**		
Married	114	65.1	≤ 18.5 underweight	13	7.4
Single	45	25.7	18.5-24.9 healthy	78	44.6
Divorces	10	5.7	25.0-29.9 overweight	52	29.7
Widowed	6.0	3.4	30.0-34.9 obese class I	22	12.6
			35.0-39.9 obese class II	9	5.1
			> 40.0 obese class III	1	.60
Dependent children			**Education level**		
0	91	49.2	No former education	16	9.1
1-2	42	24.0	Primary school graduate	16	9.1
3-4	34	19.9	Middle school graduate	22	12.6
5-6	13	7.4	High school graduate	37	21.1
			Some college	24	13.7
			College graduate	37	21.1
			Graduate/professional Degree	23	13.1

Table 2: Multiple linear regression models summarizing the predictive variables of food choices among Arab female immigrants to the U.S.

Food group	Model 1			Model 2			Model 3		
	B	SE	ß	B	SE	ß	B	SE	ß
Grains T1									
Age	-.01	.01	-.08	-.01	.01	-.06	-.01	.01	-.07
Residency	.13	.05	.18**	.14	.06	.09**	.14	.06	.19**
Employment status				-.02	.04	-.03	-.02	.04	-.04
Education level				.02	.04	.05	.02	.04	.05
Marital status							.01	.10	.01
Dependent children							.02	.05	.03
Dairy T1									
Age	-.01	.01	-.06	-.00	.01	-.03	-.00	.01	-.02
Residency	-.04	.05	-.07	-.03	.05	-.05	-.03	.05	-.04
Employment status				-.05	.04	-.12	-.05	.04	-.10
Education level				.02	.04	.05	.01	.04	.04
Marital status							.02	.05	-.02
Dependent children							-.05	.05	-.09
Fruits T1									
Age	.02	.01	.13	.01	.01	.09	.01	.01	.00
Residency	.45	.1	.32***	.42	.10	.30***	.40	.10	.29***
Employment status				.07	.08	.07	.04	.08	.05
Education level				-.09	.07	-.11	-.07	.07	-.08
Marital status							-.07	.19	-.03
Dependent children							.22	.05	.19*
Vegetables T1									
Age	.02	.01	.22***	.01	.01	.17*	.01	.01	.17*
Residency	.10	.05	.15*	.11	.05	.15**	.09	.05	.14*
Employment status				-.04	.04	-.08	-.04	.04	-.09
Education level				-.08	.04	-.21**	-.08	.04	-.19*
Marital status							-.03	.09	-.03
Dependent children							.05	.05	.09

(T1= time 1, T2= time 2)

* p<.05

** p< .01

***p<.001

Table 2: Multiple linear regression models summarizing the predictive variables of food choices among Arab female immigrants to the U.S. (Continued)

Food group	Model 1			Model 2			Model 3		
	B	SE	ß	B	SE	ß	B	SE	ß
Red meat T1									
Age	.01	.00	.17*	.01	.00	.13	.01	.00	.16
Residency	-.05	.03	-.11	-.05	.03	-.12	-.06	.03	-.13
Employment status				.00	.03	.01	.00	.03	.00
Education level				-.02	.02	-.09	-.02	.02	-.07
Marital status							-.01	.06	-.11
Dependent children							.04	.03	.11
Poultry T1									
Age	-.00	.01	-.02	-.01	.01	-.07	-.00	.01	-.05
Residency	.09	.05	.14	.08	.05	.12	.08	.05	.12
Employment status				.03	.04	.07	.04	.04	.08
Education level				-.04	.04	-.10	-.05	.04	-.11
Marital status							-.01	.11	-.01
Dependent children							-.04	.05	-.06
Seafood T1									
Age	.00	.00	-.00	.00	.00	.08	.00	.00	.03
Residency	-.03	.02	-.09	-.03	.02	-.08	-.03	.02	-.11
Employment status				.01	.02	.06	.01	.02	.03
Education level				.05	.02	.27**	.06	.02	.29**
Marital status							.03	.04	.06
Dependent children							.04	.02	.14
Sweet T1									
Age	-.01	.01	-.15*	.00	.01	-.06	.00	.01	-.07
Residency	-.03	.05	-.04	-.02	.04	-.03	-.02	.04	-.04
Employment status				.03	.03	.08	.03	.04	.06
Education level				.12	.03	.31***	.12	.03	.33***
Marital status							-.05	.08	-.06
Dependent children							.08	.04	.15

(T1= time 1, T2= time 2)

* p<.05

** p< .01

***p<.001

Table 2: Multiple linear regression models summarizing the predictive variables of food choices among Arab female immigrants to the U.S. (Continued)

Food group	Model 1			Model 2			Model 3		
	B	SE	ß	B	SE	ß	B	SE	ß
Miscellaneous T1									
Age	-.01	.01	-.08	.00	.01	-.02	.00	.01	.04
Residency	.05	.04	.11	.06	.04	.11	.07	.04	.13
Employment status				-.01	.03	-.03	.00	.00	-.01
Education level				.05	.03	.14	.05	.03	.14
Marital status							-.11	.08	-.11
Dependent children							-.05	.04	-.11
Beverages T1									
Age	.01	.01	.12	.01	.01	.14	.01	.01	.08
Residency	-.14	.06	-.19*	-.14	.06	-.19**	-.15	.06	-.21**
Employment status				.01	.04	.01	.00	.04	-.01
Education level				.03	.04	.07	.03	.04	.07
Marital status							.14	.10	.12
Dependent children							.03	.05	.05
Traditional food T1									
Age	.04	.01	.28***	.03	.01	.22**	.03	.01	.21**
Residency	-.21	.09	-.16*	-.22	.09	-.17*	-.22	.09	-.18**
Employment status				-.07	.07	-.08	-.07	.07	-.08
Education level				-.18	.07	-.23**	-.18	.07	-.22**
Marital status							-.04	.17	-.02
Dependent children							.06	.09	.05

(T1= time 1, T2= time 2)

* $p < .05$

** $p < .01$

***$p < .001$

Table 3: Positive and negative predictive variables of food choices among Arab female immigrants to the U.S.

Food group	Model 1	Model 2	Model 3
Grains T			
Residency	+	+	+
Fruits T1			
Residency	+	+	+
Dependent children			+
Vegetables T1			
Age	+	+	+
Residency	+	+	+
Education level		-	-
Red meat T1			
Age	+		
Seafood T1			
Education level		+	+
Sweet T1			
Age	-		
Education level		+	+
Beverages T1			
Residency	-	-	-
Traditional food T1			
Age	+	+	+
Residency	-	-	-
Education level		-	-

Table 4: Comparison of the food intake (frequency)[a] at Time 1 between all females immigrated to the U.S. (<5 years, 5-10 years, and >10 years) and females living in SA (mean±SD)

Dependent variable	U.S. immigrants (*n=125*)	Saudi in SA (*n=50*)
Grains T1	2.4±.86	2.1±.67[*]
Dairy T1	1.2±.79	1.4±.70[*]
Fruits T1	2.3±1.6	.77±1.1[***]
Vegetables T1	1.4±.71	.97±.80[***]
Red meat T1	.43±.52	.50±.48
Poultry T1	1.1±.84	.71±.53[**]
Seafood T1	.18±.31	.27±.45
Sweet T1	.61±.73	.75±.57
Miscellaneous T1	.68±.64	.60±.63
Beverages T1	1.5±.83	1.8±.90[*]
Native food T1	1.8±1.5	2.1±1.4

a=Frequency base on the medium serving size
* Significant difference between the two groups at p<.05
** Significant difference between the two groups at p<.01
*** Significant difference between the two groups at p< .001
Student t-tests were performed

Table 5: Comparison of the food intake (frequency)[a] at Time 1 between participants immigrated to the U.S. for <5 years and >10 years (mean±SD)

Dependent variable	<5 years (n=63)	>10 years (n=46)
Grains T1	2.3±.90	2.5±.80
Dairy T1	1.2±.80	1.2±.70
Fruits T1	2.3±1.1	2.4±1.4
Vegetables T1	1.5±.70	1.4±.80
Red meat T1	.50±.60	.40±.40
Poultry T1	1.1±.90	1.0±.70
Seafood T1	.20±.40	.20±.30
Sweet T1	.60±.60	.60±.60
Miscellaneous T1	.60±.60	.80±.70
Beverages T1	1.7±.80	1.4±.90*
Traditional food T1	2.0±1.4	1.5±1.6*

a=Frequency base on the medium serving size
*Significant difference between the two groups at $p < .05$
Student t-tests were performed

Table 6: Comparison of food intake (frequency)[a] at Time 1 among Saudi female immigrants to the U.S. (<5 years and 5-10 years) and females living in SA (mean±SD)

Dependent variable	SA 0 years (*n=50*)	U.S. Saudi <5 years (*n=18*)	U.S. Saudi 5-10 years (*n=7*)	Total (*n=75*)
Grains T1	2.1±.70[b]	2.4±.70[bc]	3.0±1.1[c]	2.3±.78
Dairy T1	1.4±.65	1.4±.83	1.6±1.0	1.4±.73
Fruits T1	.77±1.1[b]	1.8±1.4[c]	1.4±1.5[bc]	1.1±1.3
Vegetables T1	1.0±.80	1.1±.77	1.4±.48	1.0±.77
Red meat T1	.50±.48	.39±.47	.50±.58	.47±.49
Poultry T1	.71±.53	.75±.79	1.3±.95	.77±.65
Seafood T1	.27±.45	.31±.55	.36±.24	.29±.46
Sweets T1	.75±.57	.83±.66	1.2±1.9	.81±.80
Miscellaneous T1	.60±.63	.80±.71	.64±.56	.65±.64
BeveragesT1	1.8±.91	1.9±.90	1.1±.75	1.7±.89
Traditional food T1	2.1±1.4	1.3±1.0	1.8±1.5	1.8±1.3

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at $p<.05$
One way ANOVA and Post-Hoc tests were performed

Table 7: Comparison of food intake (frequency)[a] at Time 1 among Iraqi female immigrants to the U.S. (<5 years, 5-10 years, and >10 years) (mean±SD)

Dependent variable	U.S. Iraqi <5 years (*n=21*)	U.S. Iraqi 5-10 years (*n=6*)	U.S. Iraqi >10 years (*n=23*)	Total (*n=50*)
Grains T1	2.1±.87	2.4±.97	2.6±.83	2.4±.87
Dairy T1	.90±.82	1.6±.66	1.2±.69	1.1±.76
Fruits T1	2.3±1.3	3.3±3.3	3.0±1.5	2.7±1.7
Vegetables T1	1.6±.65	1.4±.58	1.4±.77	1.5±.69
Red meat T1	.81±.71[b]	.00±.00[c]	.48±.51[bc]	.56±.62
Poultry T1	.93±.55	1.4±.74	1.1±.72	1.1±.66
Seafood T1	.12±.22	.25±.27	.21±.29	1.7±.26
Sweets T1	.50±.59	1.2±.93	.59±.63	.62±.67
Miscellaneous T1	.74±.58	.92±.74	.85±.75	.81±.61
BeveragesT1	1.6±.71	1.58±.58	1.4±.84	1.5±.75
Traditional food T1	2.1±1.7	2.5±1.3	1.1±1.2	1.7±1.5

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at $p<.05$
One way ANOVA and Post-Hoc tests were performed

Table 8: Comparison of food intake (frequency)[a] at Time 1 among Yemeni female immigrants to the U.S. (<5 years, 5-10 years, and >10 years) (mean±SD)

Dependent variable	U.S. Yemeni <5 years (*n=24*)	U.S Yemeni 5-10 years (*n=3*)	U.S. Yemeni >10 years (*n=23*)	Total (*n=50*)
Grains T1	2.3±.94	2.0±1.3	2.4±.75	2.3±.86
Dairy T1	1.3±.78	1.2±1.3	1.2±.76	1.2±.78
Fruits T1	2.6±1.5	2.2±2.5	1.9±1.1	2.2±1.4
Vegetables T1	1.7±.55	2.0±.87	1.4±.81	1.6±.70
Red meat T1	.27±.47	.50±.50	.30±.25	0.3±.38
Poultry T1	1.4±1.2	.83±.58	.91±.67	1.1±.98
Seafood T1	.15±.23	.00±.00	.13±.22	.13±.22
Sweets T1	.38±.41	.00±.00	.55±.46	.44±.44
Miscellaneous T1	.44±.47	.17±.29	.63±.68	.51±.58
BeveragesT1	1.6±.89	1.5±.50	1.4±.94	1.5±.89
Traditional food T1	2.4±1.2	2.5±2.0	1.9±1.8	2.2±1.6

a=Frequency base on the medium serving size
One way ANOVA tests were performed

Table 9: Comparison of food intake (frequency)[a] at Time 1 among Saudi in the U.S., Saudi in SA, and other (Iraqi and Yemini) in the U.S. (mean±SD)

Dependent variable	U.S. Saudi (*n=25*)	SA (*n=50*)	U.S. other (*n=100*)	Total (*n=175*)
Grains T1	2.6±.90[b]	2.1±.70[c]	2.4±.90[bc]	2.3±.80
Dairy T1	1.4±.90	1.4±.70	1.2±.80	1.3±.80
Fruits T1	1.6±1.4[b]	.80±1.4[c]	2.5±1.6[d]	1.9±1.6
Vegetables T1	1.2±.70[bc]	1.0±.80[c]	1.5±.70[d]	1.3±.80
Red meat T1	.40±.50	.50±.50	.40±.50	.50±.50
Poultry T1	.90±.90[bc]	.70±.50[b]	1.1±.80[c]	1.0±.80
Seafood T1	.30±.50	.30±.50	.20±.20	.20±.40
Sweet T1	.90±1.3[b]	.80±.60[bc]	.50±.60[c]	.70±.70
Miscellaneous T1	.80±.70	.60±.60	.70±.60	.70±.60
Beverages T1	1.7±.90	1.8±.90	1.5±.80	1.6±.90
Traditional food T1	1.4±1.2	2.1±1.4	1.9±1.6	1.9±1.5

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at p<.05, p< .01, or p<.001
One way ANOVA and Post-Hoc tests were performed

Table 10: Comparison of food intake (frequency)[a] at Time 1 between females in SA and Immigrated females to the U.S (>10 years) (mean±SD)

Dependent variable	SA (*n=50*)	>10 years (*n=46*)
Grains T1	2.1±.69	2.5±.84[*]
Dairy T1	1.4±.65	1.2±.72
Fruits T1	.80±1.09	2.4±1.4[***]
Vegetables T1	1.0±.80	1.4±.78[*]
Red meat T1	.50±.50	.39±.40
Poultry T1	.71±.53	1.0±.68[*]
Seafood T1	.30±.50	.16±.26
Sweet T1	.80±.60	.56±.55[*]
Miscellaneous T1	.60±.63	.80±.71
Beverages T1	1.8±.90	1.4±.90[*]
Traditional food T1	2.1±1.4	1.5±1.6[*]

a=Frequency base on the medium serving size
* Significant difference between the two groups at p<.05
*** Significant difference between the two groups at p< .001
Student t-tests were performed

Table 11: Comparison of food intake (frequency)[a] at Time 1 among females from Saudi Arabia, Iraq, and Yemen (mean±SD)

Dependent variable	Saudi Arabia (*n=75*)	Iraq (*n=50*)	Yemen (*n=50*)	Total (*n=175*)
Grains T1	2.3±.80	2.4±.90	2.3±.90	2.3±.80
Dairy T1	1.4±.70	1.1±.70	1.2±.80	1.3±.80
Fruits T1	1.1±1.3[b]	2.7±.20[c]	2.2±1.4[c]	1.9±1.6
Vegetables T1	1.0±.80[b]	1.6±.70[c]	1.6±.70[c]	1.3±.80
Red meat T1	.50±.50[bc]	.60±.60[b]	.30±.40[c]	.50±.50
Poultry T1	.80±.70[b]	1.1±.71[bc]	1.1±1.0[c]	1.0±.80
Seafood T1	.30±.50[b]	.20±.30[bc]	.10±.20[c]	.20±.40
Sweets T1	.80±.80[b]	.60±.70[bc]	.40±.40[c]	.70±.70
Miscellaneous T1	.70±.60[bc]	.80±.70[b]	.50±.60[c]	.70±.60
BeveragesT1	1.7±.90	1.5±.80	1.5±.90	1.6±.90
Traditional food T1	1.8±1.3	1.7±1.5	2.2±1.6	1.9±1.5

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at p<.05, p< .01, or p<.001
One way ANOVA and Post-Hoc tests were performed

Table 12: Comparison of food intake (frequency)[a] at Time 1 among female immigrants to the U.S. (<5 years) from Saudi Arabia, Iraq, and Yemen (mean±SD)

Dependent variable	Saudi <5 years (*n=18*)	Iraqi <5 years (*n=21*)	Yemeni <5 years (*n=24*)	Total (*n=63*)
Grains T1	2.4±.70	2.2±.87	2.3±.90	2.3±.80
Dairy T1	1.4±.80	.90±.80	1.3±.80	1.2±.80
Fruits T1	1.8±1.4	2.3±1.3	2.6±1.5	2.3±1.4
Vegetables T1	1.1±.80[b]	1.5±.70[bc]	1.7±.50[c]	1.5±.70
Red meat T1	.40±.50[b]	.80±.70[c]	.30±.50[b]	.50±.60
Poultry T1	.80±.80	.90±.60	1.4±1.2	1.0±.90
Seafood T1	.30±.50	.10±.20	.10±.20	.20±.40
Sweets T1	.80±.70[b]	.50±.60[bc]	.40±.40[c]	.50±.60
Miscellaneous T1	.80±.70	.70±.60	.40±.50	.60±.60
BeveragesT1	1.9±.90	1.6±.70	1.6±.90	1.7±.80
Traditional food T1	1.3±1.0[b]	2.1±1.7[bc]	2.4±1.2[c]	2.0±1.4

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at p<.05 or p< .01
One way ANOVA and Post-Hoc tests were performed

Table 13: Comparison of food intake (frequency)[a] at Time 1 among female immigrants to the U.S. (5-10 years) from Saudi Arabia, Iraq, and Yemen (mean±SD)

Dependent variable	Saudi 5-10 years (*n=7*)	Iraqi 5-10 years (*n=6*)	Yemeni 5-10 years (*n=3*)	Total (*n=16*)
Grains T1	2.8±1.0	2.4±1.0	2.0±1.3	2.5±1.0
Dairy T1	1.5±1.1	1.6±.70	1.2±1.3	1.5±.90
Fruits T1	1.3±1.6	3.3±3.3	2.2±2.5	2.3±2.6
Vegetables T1	1.5±.30	1.4±.60	2.0±.90	1.6±.60
Red meat T1	.50±.60	.00±.00	.50±.50	.30±.50
Poultry T1	1.3±1.0	1.4±.70	.80±.60	1.3±.80
Seafood T1	.40±.20[b]	.30±.30[bc]	.00±.00[c]	.30±.30
Sweets T1	1.4±2.0	1.2±.90	.00±.00	1.0±1.4
Miscellaneous T1	.50±.40	.90±.70	.20±.30	.60±.60
BeveragesT1	1.2±.80	1.6±.60	1.5±.50	1.4±.70
Traditional food T1	2.0±1.5	2.5±1.3	2.5±2.0	2.3±1.4

a=Frequency base on the medium serving size
Numbers with different superscripts in the same row were significantly different from each other at p<.05
One way ANOVA and Post-Hoc were performed

Table 14: Comparison of food intake (frequency)[a] at Time 1 between female immigrants to the U.S. (>10 years from Iraq and Yemen) (mean±SD)

Dependent variable	Iraqi >10 years (*n=23*)	Yemeni >10 years (*n=23*)
Grains T1	2.6±.80	2.3±.70
Dairy T1	1.2±.70	1.2±.80
Fruits T1	3.0±1.5	1.8±1.1[**]
Vegetables T1	1.4±.80	1.4±.80
Red meat T1	.50±.50	.30±.20[*]
Poultry T1	1.1±.70	.90±.70
Seafood T1	.20±.30	.10±.20
Sweet T1	.60±.60	.60±.50
Miscellaneous T1	.80±.70	.60±.70
Beverages T1	1.4±.80	1.4±.90
Traditional food T1	1.1±1.2	1.9±1.8[*]

a=Frequency base on the medium serving size
* Significant difference between the two groups at p<.05
** Significant difference between the two groups at p< .01
Student t-tests were performed

Table 15: Intraclass correlations between food groups at T1 and T2

Dependent variable	r	*P* value
Grains	.36	.01
Dairy	.22	.06
Fruits	.19	.09
Vegetables	1.0	<.001
Red meat	1.0	<.001
Poultry	.12	.21
Seafood	1.0	<.001
Sweet	.32	.01
Miscellaneous	.13	.18
Beverages	.40	.002
Traditional food	.17	.12

Table 16: Intraclass correlations between food groups at T2 and AFFQ

Dependent variable	r	*P* value
Grains	.32	.01
Dairy	.13	.10
Fruits and juices	.25	.04
Vegetables	.24	.05
Red meat and poultry	.21	.07
Seafood	.21	.08
Sweet	-.03	.59
Snacks, pickles, and miscellaneous	.11	.23
Beverages and alcohol	.46	<.001
Traditional food 1 (Saudi)	.25	.23
Traditional food 2 (Iraqi)	-.07	.62
Traditional food 3 (Yemeni)	.51	.01
Traditional food 4 (shared)	.22	.06

Table 17: Comparison of food intake (frequency)[a] per day for each food groups between U.S. Saudi females and general population in SA, or Saudi females in SA, and general population in SA in 2013[b]

Dependent variable	U.S. Saudi (*n=25*)	SA (*n=50*)	FAO 2013
Grains	2.6***	2.1***	1.5
Dairy	1.4**	1.4***	1.0
Fruits	1.6**	.80	.90
Vegetables	1.2	1.0*	1.2
Red meat	.40*	.50***	.20
Poultry	.90	.70	.60
Seafood	.30*	.30*	.10
Sweets	.90*	.80***	.40
Miscellaneous	.80**	.60**	.30

a=Frequency base on the medium serving size
b: http://www.fao.org/faostat/en/#data/FBS
*Significant difference between U.S. Saudi or SA and FAO 2013 at p<.05
**Significant difference between U.S. Saudi or SA and FAO 2013 at p< .01
***Significant difference between U.S. Saudi or SA and FAO 2013 at p< .001
One sample t-tests were performed

Table 18: Comparison of food intake (frequency)[a] per day for each food groups between U.S. Iraqi females and general population in Iraq in 2013[b]

Dependent variable	U.S. Iraqi (*n=50*)	FAO 2013
Grains	2.4**	2.0
Dairy	1.1***	.30
Fruits	2.7***	.50
Vegetables	1.6	1.30
Red meat	.60***	.06
Poultry	1.1***	.30
Seafood	.20***	.04
Sweets	.60***	.20
Miscellaneous	.80***	.20

a=Frequency base on the medium serving size
b: http://www.fao.org/faostat/en/#data/FBS
**Significant difference between U.S. Iraqi and FAO 2013 at p< .01
***Significant difference between U.S. Iraqi and FAO 2013 at p< .001
One sample t-tests were performed

Table 19: Comparison of food intake (frequency)[a] per day for each food groups between U.S. Yemeni females and general population in Yemen in 2013[b]

Dependent variable	U.S. Yemeni (*n=50*)	FAO 2013
Grains	2.3***	1.5
Dairy	1.2***	.50
Fruits	2.2***	.60
Vegetables	1.6***	.40
Red meat	.30***	.10
Poultry	1.1***	.50
Seafood	.10**	.04
Sweets	.40*	.30
Miscellaneous	.50***	.10

a=Frequency base on the medium serving size
b: http://www.fao.org/faostat/en/#data/FBS
*Significant difference between U.S. Yemeni and FAO 2013 at * p<.05
**Significant difference between U.S. Yemeni and FAO 2013 at ** p< .01
***Significant difference between U.S. Yemeni and FAO 2013 at *** p< .001
One sample t-tests were performed

APPENDIX A – COPY OF THE ENGLISH VERSION OF THE SURVEY

QUESTIONNAIRE

WAYNE STATE UNIVERSITY

College of Liberal Arts and Sciences
Department of Nutrition & Food Science
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(313) 577-2500/ Fax (313) 577-8616

Development of an Arab Food Frequency Questionnaire and Examination of Changes in Dietary Patterns in Arab Immigrant Women.

Principal Investigator (PI): Samiah Naji Alqahtani, PhD Candidate.
Department of Nutrition and food Science, Wayne State University

Funding Source: Nutrition and Food Science Department

Purpose:
You are being asked to be in a research study of development of a food frequency questionnaire in order to examine the changes in dietary patterns in Arab immigrant women. You are selected by a random sampling procedure. You are eligible because you are Arabic immigrant/or non-immigrant woman age 18 or above and live in the Detroit metropolitan area, Michigan (MI), United States (US) /or in Jeddah, Saudi Arabia. This study is being conducted at Dearborn, Dearborn Heights, and Sterling Heights, MI, US. In addition, part of this study will take place (be conducted) at Jeddah, Saudi Arabia.

Study Procedures:
If you take part in the study, you will be asked to complete a survey that collects three 24hr-dietary records about what you eat and how much. The interview will take up to 2 hr each on 2 separate days (1week day and 1 day over the weekend). The interview is anonymous. You do not need to provide your name.

Benefits:
There will be no direct benefit to you. However, significant knowledge from this study will benefit the Arab immigrant women in the U.S. now or in the future.

Risks:
There will be no known risks to participate in this study.

Costs:

There will be no costs to you for participating in this research.

Compensation:
You will be given $25 gift card after completing the second interviews for taking part in this study.

Confidentiality:
All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code number. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Human Investigation Committee (HIC) at WSU, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

Voluntary Participation/Withdrawal:
Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study. You are free to only answer questions that you want to answer. You are free to withdraw from participating in this study at any time. Your decision will not change any present or future relationship with WSU or its affiliates, or other services you are entitled to receive.

Questions:
If you have any questions about this study now or in the future, you may contact Samiah Naji Alqahtani or her research team at (313) 577-2500. If you have any question or concern about your rights as a research participant, the Chair of the Human Investigation Committee can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call 313-577-1628 to ask questions or voice concerns or complaints.

Participation: To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

Interview starting time_____ Interview ending time_____
Neighborhood/City_____ Country_____

Please provide your accurate answers. Thank you for your support and cooperation.

SECTION A: DEMOGRAPHICS

I am going to ask you some information about yourself.

A.1. How old are you?
_____Years old

A.2. What is your gender?
1-Female   2-Male

A.3. What is your primary language?
1-Arabic   2-English   3-Other please specify _____

A.4. Birthplace:
1-Saudi Arabia   2-Iraq   3-Yemen   4-U.S.   5-Other, please specify_____

A.5. How long have you been in the U.S. (if you U.S. participants only)
1-Less than 3 months   2-Less than 4 year   3-Less than 5 years
4-For 10-15 years   5-More than 15 years

A.6. What is the highest level of education you have completed?
1-No former education   2-Primary school graduate   3-Middle school graduate
4-High school graduate   5-Some college   6-College graduate
7-Graduate or professional degree

A.7. What is your occupation?_____

A.8. Current employment status
1-Employed full-time working in my original profession
2-Employed part-time working in my original profession
3-Employed below my level of expertise
4-Self-employed
5-Unemployed (Please specified: I. Full time students; II. Retired; III. Homemaker; IV. Laid off; V. Other)

A.9. Marital status:
1-Single or never married   2-Married   3-Widowed   4-Divorced   5-Separated

A10. Do you currently live alone?
1-Yes (skip to question A.12)   2-No

A11. Not include yourself, how many other people live in the household?
_____

A12. Are you a parent?
1-Yes (number of children _)   2-No (skip to question A.14)

A.13. How many children <18 years old in this house hold?_____

A14. What is your race? (Note: we know that your ethnicity is Arabic, but in which racial group do you consider yourself to be?)
1-White   2-Black   3-Asian   4-Two or more races   5-None of these

A.15. What is your religion?

1-Islam   2-Christian 3-Jewish 4-Other _____

SECTION B: HEALTH STATUS & PHYSICAL ACTIVITIES

The next few questions ask you about your health and your physical activity
   level.

B.1. Do you have health insurance?
1-Yes   2-No

B.2. How would you rate your general health today?
 1-Excellent   2-Very good   3-Good   4-Fair   5-Poor

B.3. How much do weight? _____kg. or _____lbs.

 B.4. How tall are you? _____cm or _____ft_____inches

B.5. Do you smoke?
1-Yes   2-No

B.6. Do you drink alcohol?
 1-Yes   2-No (skip to question B.8)

B.7. How often you usually drink alcohol?
 1-(0 – 1 day/week)   2-(2 – 3 days/week)   3-(4 – 5 days/week)   4-
Occasionally   5-Almost daily

B.8. How many times per week do you exercise extremely hard? (e.g., jump rope)
 0 1 2 3 4 5 6 7 more than 7 (if 0 please skip to B.10)

 B.9. How much time do you spend when you exercise hard?

1-_____Hours   2-_____Minutes   3-Don't know

B.10. How many times per week do you exercise moderately? (e.g., doing daily chores)
0 1 2 3 4 5 6 7 more than 7 (if 0 please skip to B.12)

B.11. How much time do you spend when you do moderate exercise?
1-_____Hours   2-_____Minutes   3-Don't know

B.12. How many times per week do you walk for at least 30 minutes?
0 1 2 3 4 5 6 7 more than 7 (if 0 please skip to B.14)

B.13. When I walk, I usually spend
1-_____Hours   2-_____Minutes   3-Don't know

B.14. How much times do you usually spend on sitting (exclude the weekend)?
1-_____Hours   2-_____Minutes   3-Don't know

B.15. How do you usually get to work/school/mall?
1-Take a bus   2-Taxi   3-Get a ride from someone else
4-Ride a bike   5-Drive a car   6-Walk

B.16. Please answer yes or no if you have been diagnosed with any of the following medical conditions.

1-High blood pressure	1-Yes	2-No	
2-Heart disease	1-Yes	2-No	
3-High cholesterol	1-Yes	2-No	
4-Obstructive sleep apnea	1-Yes	2-No	
5-Asthma	1-Yes	2-No	
6-Allergies (not asthma)	1-Yes	2-No	
7-Diabetes	1-Yes	2-No	
8-Arthritis or rheumatism	1-Yes	2-No	
9-Any disease of the muscles or tendons	1-Yes	2-No	
10-Any skin problem	1-Yes	2-No	
11-Ear, nose, and throat disorders	1-Yes	2-No	
12-Cancer (if any type), if yes,	1-Yes	2-No	specify:_____
13-Renal problem	1-Yes	2-No	
14-Traumatic brain injury	1-Yes	2-No	
15-Dental problems	1-Yes	2-No	
16-Other	1-Yes	2-No	specify:_____

B.17. Please answer yes or no if you take any of the following nutritional supplements, if yes please name the brand and doses.

			Brand name	Doses
1- Multivitamins	1-Yes	2-No	_____	_____
2-Vitamin D	1-Yes	2-No	_____	_____
3-Folic acid	1-Yes	2-No	_____	_____
4-Omega 3	1-Yes	2-No	_____	_____
5- Fish oil	1-Yes	2-No	_____	_____
6-Iron	1-Yes	2-No	_____	_____
7-Calcium	1-Yes	2-No	_____	_____
8-Biotin	1-Yes	2-No	_____	_____
9-Supplements to lose weight	1-Yes	2-No	_____	_____
10-Supplement to gain weight/muscles	1-Yes	2-No	_____	_____
11-Supplements to increase energy	1-Yes	2-No	_____	_____
12-Other, please specify:_____	1-Yes	2-No	_____	_____

B.18. Please answer yes or no if you take any of the following medicines, if yes please name the brand and doses.

			Brand name	Doses
1-To lower blood sugar	1-Yes	2-No	_____	_____
2-To lower cholesterol level	1-Yes	2-No	_____	_____
3-To lower blood pressure	1-Yes	2-No	_____	_____
4-To treat kidney disorder	1-Yes	2-No	_____	_____
5-For heart vascular disease	1-Yes	2-No	_____	_____
6-For stomach pain	1-Yes	2-No	_____	_____
7-To treat depression	1-Yes	2-No	_____	_____
8-To reduce anxiety	1-Yes	2-No	_____	_____
9-For headache	1-Yes	2-No	_____	_____
10-For asthma	1-Yes	2-No	_____	_____
11-For allergy	1-Yes	2-No	_____	_____
12-Other, please specify:_____	1-Yes	2-No	_____	_____

SECTION C: FOOD PREPAREING AND DIETARY BEHAVIOR

I am going to ask you some questions about how you usually get your food, and your daily routine regarding to your daily food intake.

C.1. How many meals do you usually eat per day?
1-(1-2)   2-(2-3)   3-More than 3 meals   4-Don't know

C.2. How many times per week do you eat potato chips, candies, doughnut, etc.

1-(1-2)   2-(2-3)   3-More than 3 times   4-Don't know

C.3. How much do you spend on grocery per week? (USD)

(if the person live in Saudi Arabia please Skip to question C4)

1-Less than $10   5-$56 - $75

2-$10 - $15   6-$76 - $95

3-$16 - $35   7-$96 and above

4-$36 - $55

C4. How much do you spend on grocery per week? (SAR)

1-Less than 10   5-56-75

2-10-15   6-76-95

3-16-35   7-96 and above

4-36-55

C.5. Please list the food that you used to eat at your home country before you immigrate to the U.S. and you could not eat them after immigration.

1-……………   6-……………

2-……………   7-……………

3.……………   8.……………

4.……………..   9.……………

5.…………….   10.…………...

C.6. How many times per a week did you use to eat these food (in the QC.5)?

1-(0-1)   2-(1-2)   3-(2-3)   4-More than 3 times

C.7. Is there any difference between your food that you eat and the food of other people who live in this household?

1-Yes, please specify_____   2-No   3-I do not know

C.8. Is there another person than you prepare food for this household?

1-Yes, please specify_____   2-No

24-HOUR DIETARY RECALL

ID # _____
Date _____

DAY OF THE WEEK M T W R F S U	SERVING SIZE	PREPARATION METHOD	SPECIFIC TYPE (IF KNOWN)	RESTAURANT/BRAND NAME
List approximate times of meals	cups, Tbs, tsp, oz, fl oz, "item"	Baked, fried, boiled, steamed	Wheat, rye, fat-free, w/ or w/o skin	General Mills, Kelloggs, McDonalds, Pizza Hut, Nabisco, etc.
BREAKFAST				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
MORNING SNACK				
1				
2				
3				
4				
5				
6				
LUNCH				
1				
2				
3				
4				
5				
6				
7				
8				
9				

10				
11				
12				
13				
14				
AFTERNOON SNACK				
1				
2				
3				
4				
5				
6				
DINNER				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
EVENING SNACK				
1				
2				
3				
4				
5				
6				
7				

APPENDIX B – COPY OF THE ARABIC VERSION OF THE SURVEY QUESTIONNAIRE

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Development of an Arab Food Frequency Questionnaire and Examination of Changes in Dietary Patterns in Arab Immigrant Women

تطوير استمارة غذائية وفحص التغييرات في الأنماط الغذائية لدى نساء العرب المهاجرات

الباحث الرئيسي: سامية ناجي القحطاني.

طالبة مرشحة لدرجة الدكتوراه في قسم التغذية وعلوم الأطعمة بجامعة وين ستيت.

مصدر التمويل: قسم التغذيه وعلوم الأطعمه.

الهدف:

تم دعوتك للمشاركة في هذا البحث الذي يهدف الى تطوير استمارة غذائية وفحص التغييرات في الأنماط الغذائية لدى نساء العرب (النساء العربيات في بلاد المهجر) المهاجرات. تم اختيارك للمشاركة بطريقة عشوائية. انتي مؤهلة للمشاركة في هذه الدراسة لانك امرأه عربية مهاجره أو غير مهاجره في عمر 18 سنه او اكثر ولانك تعيشين في مدينة ديتررويت او احدى المناطق التابعه لها في ولاية ميشيغن في الولايات المتحدة الامريكية او لأنك تعيشين في مدينة جده في المملكة العربية السعودية. ستنفذ هذه الدراسة في المدن التالية: ديربون , ديربورن هايتس , وسترلينق هايتس بولاية ميشغن بامريكا. اضافة لذلك سينفذ جزء من هذه الدراسة بمدينة جدة في المملكة العربية السعودية.

إجراءات الدراسة:

إذا قررت المشاركة في هذه الدراسة سيطلب منك ان تكملي (تجيبي على) بعض الاسئلة المتعلقة بتسجيل تقررين غذائيين حول نوع وكم الغذاء المأكول خلال الاربع وعشرين ساعة الماضية. ستستغرق المقابلة حوالي ساعه واحده في كل مره لمدة يومين (يوم في وسط الأسبوع ويوم في عطلة نهاية الاسبوع). وسوف تكون هذه المقابله مجهولة حيث لن تحتاجي ان تصرحي باسمك.

الفوائد:

مشاركتك في هذه الدراسة لن تقدم لك فائدة مباشرة ولكن المعلومات القيمة التي يتم الحصول عليها من هذه الدراسة سوف تفيد النساء العربيات المهاجرات في الولايات المتحدة الأمريكية حاليا أو في المستقبل.

المخاطر:

مشاركتك في هذه الدراسة لا يسبب اي مخاطر معروفة.

التكاليف:

لا يوجد تكاليف مادية للمشاركة في هذه الدراسة.

التعويضات:

سيتم إهداء بطاقه ماليه 25$ دولاراً في نهاية المقابلة تقديرا للمشاركة في هذه الدراسة.

الخصوصية:

جميع المعلومات التي يتم جمعها والتي ستشاركين بها خلال هذه الدراسة سيتم حفظها بشكل سري الى حد يسمح به القانون. سوف يتم التعرف عليكي في تقارير هذه الدراسة عن طريق رمز رقمي. اي معلومات تتعلق بهويتك لن يتم التصريح بها دون الحصول على موافقة خطية منك بإستثناء الراعي الرسمي لهذه الدراسة ولجنة تحقيق الانسان في جامعة وين ستيت أو وكالات حكومية ذات صلة برقابة تنظيمية مناسبة كمنظمة الغذاء والدواء الأمريكية ومكتب حماية البحوث البشرية ومكتب الحقوق العامة اللذين من المحتمل ان يطلعوا على هذه التقارير.

نشر نتائج هذا البحث أو مناقشتها في احد المؤتمرات سوف لن يتضمن اي معلومات تنوه عن هويتك.

المشاركة تطوعية/الإنسحاب:

مشاركتك في هذه الدراسة تعتبر تطوعية ولك الحق ان تنسحب من هذه الدراسة. واذا رغبتي في المشاركة في هذه الدراسة تستطيعي لاحقا تغيير رأيك والانسحاب من هذه الدراسة. لك الحرية ان تجيبي على الأسئلة التي ترغبي بالاجابة عليها. لك الحرية في الإنسحاب من هذه الدراسة في أي وقت. قرارك لن يؤثر على علاقتك بجامعة وين ستيت حاليا أو في المستقبل اوالمؤسسات التابعه لها او اي خدمات اخرى يحق لك الحصول عليها.

إستفسار:

إذا كان لديك أي سؤال حول هذه الدراسة سواء حاليا أو في المستقبل يمكنك الاتصال بالباحث الرئيسي سامية ناجي القحطاني أو احد أعضاء فريق البحث على الرقم التالي 2500-577 (313). إذا كان لديك أي سؤال حول حقوقك كمشاركه في هذه الدراسة فيمكنك الاتصال برئيس قسم لجنة الحقوق الانسانية على الرقم التالي 1628-577 (313). إذا كنتي غير قادرة على الاتصال بالمسؤولين أو انك تريدين التحدث مع شخص آخر غير المسؤولين على الدراسة يمكنك الإتصال بالرقم التالي 1628-577 (313) للاستفسار أو تقديم تعليق اوشكوى.

المشاركة:

الموافقة التطوعية للمشاركة في هذه الدراسة تشترط توقيعك على الخط أدناه. اذا اخترتي المشاركة في هذه الدراسة تستطيعي الانسحاب في اي وقت. توقيعك على هذا النموذج ليس دليلا على التخلي عن حقوقك القانونية ولكن يدل على انك قرأتي النموذج او تم قرأئته لك بمايتضمن المنافع والمخاطر من هذه الدراسة وانه تم الاجابة على جميع اسئلتك.سوف يتم تزويدك بنسخة من هذا النموذج.

وقت بداية الحوار_____وقت نهاية الحوار_____

الحي/المدينة_____الدولة_____

الرجاء تقديم الإجابة المناسبة. شاكرين لك دعمك ومشاركتك.

قسم أ: المعلومات الشخصية

سوف اقوم بطرح بعض الاسئلة المتعلقة بمعلوماتك الشخصية.

أ.1. كم عمرك؟
_____سنة

أ.2. ماهو جنسك؟
☐ امرأه
☐ رجل
☐ متحول جنسيا

أ.3. ماهي لغتك الأساسية؟
☐ عربي
☐ انجليزي
☐ اخرى _____

أ.4. مكان الولاده
المملكه العربية السعودية
العراق
اليمن
الولايات المتحده الامريكيه
أخرى، الرجاء التحديد_____

أ.5. منذ متى وانت في الولايات المتحدة الأمريكية؟ (للمشاركات من أمريكا فقط)
☐ اقل من 6 اشهر
☐ اقل من سنه
☐ اقل من سنتين
☐ اكثر من سنتين (الرجاء التحديد_____سنوات)

أ.6. ماهي أعلى درجة تعليم حصلتي عليها؟
☐ لم اذهب للمدرسة
☐ خريجة مدرسة ابتدائي
☐ خريجة مدرسة اعدادية (متوسطة)
☐ خريجة ثانوية
☐ بعض سنوات في الجامعة
☐ خريجة جامعة
☐ خريجة دراسات عليا

أ.7. هل انتي حاليا طالبة؟

☐ نعم

☐ لا

أ.8. هل تعملي حاليا؟

☐ نعم

☐ لا (انتقل للسؤال أ.10)

أ.9. ماهي وظيفتك؟ ـــــــــــــــــــــــــ

أ.10. الوضع المهني الحالي

☐ اعمل بدوام كامل في مجال تعليمي

☐ اعمل بدوام جزئي في مجال تعليمي

☐ اعمل باقل من مستوى تعليمي

☐ اعمل لحسابي الخاص

☐ غير موظف (الرجاء التحديد: 1. طالبة منتظمة، 2. متقاعده، 3. ربة منزل، 4. عاطلة، اخرى)

أ.11. الحالة الإجتماعية

☐ عازبه او لم يسبق لي الزواج

☐ متزوجه

☐ أرملة

☐ مطلقة

☐ منفصلة

أ.12. هل تعيشي حاليا لوحدك؟

☐ نعم (انتقل الى سؤال أ.14)

☐ لا

أ.13. باستثنائك كم شخص يعيش معك بالمنزل؟ ـــــــــــ

أ.14. هل أنتي والده؟

☐ نعم

☐ لا (انتقل الى سؤال أ.15)

أ.15. كم عدد أطفالك؟ ـــــــــــ

أ.16. كم عدد الاطفال تحت سن 18 واللذين يعيشون في هذا المنزل؟ ـــــــــــ

أ.17. ماهو عرقك؟ (ملاحظه: نحن نعلم ان اصلك عربي ولكن نرغب معرفه ماهو العرق الذي تنتمين اليه؟)

☐ ابيض

☐ اسود

☐ آسيوي

☐ عرقين او اكثر

☐ لا شيء مما ذكر

أ.18. ماهي ديانتك؟
☐ مسلمة
☐ مسيحية
☐ يهودية
☐ اخرى _____

قسم ب: الحالة الصحية والنشاط الجسدي

الاسئلة التالية سوف تكون عن حالتك الصحية وعن مستوى نشاطك الجسدي

ب.1. هل لديك تأمين صحي؟
☐ نعم
☐ لا (انتقل الى السؤال ب.3 اذا الشخص يعيش في السعودية، وانتقل الى السؤال ب.4 اذا الشخص عربي مهاجر)

ب.2. ماهو نوع التأمين الصحي الذي تملكه؟
☐ خاص من جهة العمل
☐ ميدي كيد
☐ ميدي كير
☐ تامين صحي للاجئين
☐ تامين صحي خاص للافراد
☐ كان لدي تامين صحي ولكن انتهى

ب.3. أين تذهب في العادة للكشف عن صحتك؟
☐ المستشفيات العامة (مجانا)
☐ مراكز الرعاية الصحية الأولية (مجانا)
☐ اخرى _____

ب.4. كيف تقيم حالتك الصحية اليوم؟
☐ ممتازه
☐ جيده جدا
☐ جيده
☐ مقبوله
☐ سيئة

ب.5. كم وزنك؟_____كجم. أو_____رطل

ب.6. كم طولك؟_____سم. أو_____قدم_____بوصة

ب.7. هل انتي مدخنة؟
☐ نعم
☐ لا (انتقل للسؤال ب.10)

ب.8. تدخين السجاير خلال 30 يوماً الماضية:
☐ حاليا ادخن
☐ مدخن سابق

☐ لم يسبق لي التدخين

ب.9. تدخين الشيشة خلال 30 يوماً الماضية:
☐حاليا ادخن
☐ مدخن سابق
☐ لم يسبق لي التدخين

ب.10. هل تشرب الكحول؟
☐ نعم
☐ لا (انتقل للسؤال ب.12)

ب.11. كم مره بالعاده تشرب الحكول؟
☐ 0-1 يوم/ الاسبوع
☐ 2-3 يوم/ الاسبوع
☐ 4-5 يوم/ الاسبوع
☐ كل يوم في الغالب

ب.12. كم مره في الاسبوع تتمرن بشكل عنيف؟ (على سبيل المثال: قفز الحبل)
0   2   3   4   5   6   7 (اذا كان الجواب 0 انتقل الى سؤال ب.14)

ب.13. كم مدة الوقت الذي تقضيه عندما تتمرن بشكل عنيف؟
☐_____ساعه
☐_____دقيقه
☐ لا أعلم

ب.14. كم مره في الاسبوع تتمرن بشكل متوسط؟ (على سبيل المثال: القيام بالأعمال المنزلية)
0   2   3   4   5   6   7 (اذا كان الجواب 0 انتقل الى سؤال ب.16)

ب.15. كم مدة الوقت الذي تقضيه عندما تتمرن بشكل متوسط؟
☐_____ساعه
☐_____دقيقه
☐ لا أعلم

ب.16. كم مره في الاسبوع تمشي على الأقل لمدة 30 دقيقة؟
0   2   3   4   5   6   7 (اذا كان الجواب 0 انتقل الى سؤال ب.18)

ب.17. عندما امشي في العاده اقضي من الزمن
☐_____ساعه
☐_____دقيقه
☐ لا أعلم

ب.18. كم المده التي تستغرقها في الجلوس ؟ (بإستثناء عطلة نهاية الأسبوع)
☐_____ساعه
☐_____دقيقه
☐ لا أعلم

ب.19. كيف تذهب في العاده إلى المدرسة أو العمل أو السوق؟

☐ ركوب الدراجه
☐ ركوب السيارة
☐ المشي
☐ آخذ الباص
☐ سيارة اجره (تاكسي)
☐ شخص ما يوصلني

ب.20. الرجاء رسم دائره حول الإجابة الصحيحة أمام كل عباره لتوضيح اذا ما كان لديك اي من المشاكل الصحية التالية:

	لا	نعم
إرتفاع ضغط الدم	لا	نعم
امراض القلب	لا	نعم
إرتفاع مستوى الكوليسترول	لا	نعم
توقف التنفس اثناء النوم	لا	نعم
ربو	لا	نعم
حساسية (ليس ربو)	لا	نعم
سكري	لا	نعم
إلتهاب المفاصل أو الروماتيزم	لا	نعم
أي مرض في العضلات أو الأوتار	لا	نعم
أي مشاكل في الجلد	لا	نعم
إضطرابات في الأنف و الأذن و الحنجره	لا	نعم
سرطان (أي نوع)، إذا كان الجواب نعم الرجاء التحديد_____	لا	نعم
امراض المسالك البولية	لا	نعم
إصابات في الدماغ	لا	نعم
مشاكل في الأسنان	لا	نعم
غير ذلك الرجاء التجديد_____	لا	نعم

ب.21. الرجاء رسم دائره حول الإجابة الصحيحة أمام كل عباره لتوضيح اذا ما كنت تستخدمين أيا من المكملات الغذائية التالية:

	الجرعة	الاسم التجاري		لا	نعم
فيتامينات متعدده	_____	_____		لا	نعم
فيتامين د	_____	_____		لا	نعم
حمض الفوليك	_____	_____		لا	نعم
اوميجا 3	_____	_____		لا	نعم
زيت السمك	_____	_____		لا	نعم
حديد	_____	_____		لا	نعم
كالسيوم	_____	_____		لا	نعم
بايوتين	_____	_____		لا	نعم
مكملات لفقدان الوزن	_____	_____		لا	نعم
مكملات لزيادة الوزن	_____	_____		لا	نعم
مكملات لزيادة الطاقة	_____	_____		لا	نعم
أخرى، الرجاء التحديد_____	_____	_____		لا	نعم

ب.22. . الرجاء رسم دائره حول الإجابة الصحيحة أمام كل عباره لتوضيح اذا ما كنت تستخدمين أياً من الأدوية التالية:

	الجرعة		الاسم التجاري			
لعلاج ارتفاع السكر في الدم	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج ارتفاع الكوليسترول	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج ارتفاع ضغط الدم	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج مشاكل الكلى	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج امراض القلب	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج آلآم المعده	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج الإكتئاب	ـــــــــــ		ـــــــــــ	لا	نعم	
لعلاج القلق	ـــــــــــ		ـــــــــــ	لا	نعم	
للصداع	ـــــــــــ		ـــــــــــ	لا	نعم	
للربو	ـــــــــــ		ـــــــــــ	لا	نعم	
للحساسية	ـــــــــــ		ـــــــــــ	لا	نعم	
أخرى، الرجاء التحديد_____	ـــــــــــ		ـــــــــــ	لا	نعم	

قسم ج: تحضير الطعام والسلوك الغذائي

سوف أسالك الآن بعض الأسئلة حول كيفية الحصول على طعامك عادة، وعاداتك اليومية بالنسبة لتناول الطعام

ج.1. كم عدد الوجبات التي تتناولينها كل يوم؟
☐ 1-2
☐ 2-3
☐ اكثر من 3 وجبات
☐ لا أعلم

ج.2. كم مرة في الأسبوع تتناولين الاطعمه التاليه (بطاطس سييش، حلويات، دونت، الخ)؟
☐1-2
☐2-3
☐ اكثر من 3 وجبات
☐ لا أعلم

ج.3. حددي المبلغ الذي تصرفينه على شراء المواد الغذائية اسبوعيا؟ (بالدولار)
(إذا كان الشخص يعيش في السعودية الرجاء الانتقال الى سؤال ج.4)

☐ < $10
☐ $10-$15
☐ $16-$35
☐ $36-$55
☐ $56-$75
☐ $76-$95
☐$96≤

ج.4. حددي المبلغ اللذي تصرفينه على شراء المواد الغذائية إسبوعيا؟ (بالريال السعودي)

☐ > 10
☐ 10-15
☐ 16-35
☐ 36-55
☐ 56-75
☐ 76-95
☐≤96

ج.5. الرجاء تحديد اسماء الأطباق التي كنت تأكلينها في دولتك قبل الهجره الى الولايات المتحدة الأمريكية ولم تستطيعي أكلها بعدها الهجره
(اذا كان الشخص يعيش في السعوديه الرجاء الانتقال الي التقرير الغذائي ل 24س)
6-.................   1-.................
7-.................   2-.................
8-.................   3-.................
9-.................   4-.................
10-.................   5-.................

ج.6. كم عدد المرات في الأسبوع كنت معتادا على أكل هذه الأطعمه؟

☐ 0-1
☐ 1-2
☐ 2-3
أكثر من 3 مرات

ج.7. هل هناك فرق بين غذائك وغذاء الاشخاص الاخرون في هذا المنزل؟
☐ نعم، الرجاء التوضيح_____
☐لا
☐لا اعرف

ج.8. هل يوجد شخص آخر غيرك يقوم بتحضير الطعام بالمنزل؟
☐نعم، الرجاء التوضيح_____
☐لا

تقرير غذائي ل 24 س الماضية

الرمز #_____
التاريخ_____

المطعم/ الاسم التجاري	نوع محدد اذا عرف	طريقة التحضير	حجم الحصه	يوم من أيام الاسبوع س, ح, ث, ل, ع, خ, ج
المطاحن العامه، كلوقز، ماكدونالدز، بيتزاهت، نابيسكو، الخ	قمح، راي، خالي من الدسم، مع او بدون الجلد	مخبوز، مقلي، مسلوق، على البخار	كوب، ملعقة طعام، ملعقة شاي، اوقيه\اجم\ملليلتر	أسرد الأوقات التقريبيه للطعام المتناول
				الأفطار
				1
				2
				3
				4
				5
				6
				7
				8
				9
				10
				11
				12
				وجبة خفيفة في الصباح
				1
				2
				3
				4
				5
				6
				الغداء
				1
				2
				3
				4
				5
				6
				7

				8
				9
				10
				11
				12
				13
				14
				وجبة خفيفة بعد الظهر
				1
				2
				3
				4
				5
				6
				العشاء
				1
				2
				3
				4
				5
				6
				7
				8
				9
				10
				11
				12
				13
				14
				وجبة خفيفة في المساء
				1
				2
				3
				4
				5
				6
				7

APPENDIX C – COPY OF THE ENGLISH VERSION OF THE ARAB FOOD FREQUENCY QUESTIONNAIRE

WAYNE STATE UNIVERSITY

College of Liberal Arts and Sciences
Department of Nutrition & Food Science
5045 Cass Avenue/3009 Science Hall
Detroit, Michigan, US 48202
(313) 577-2500/ Fax (313) 577-8616

Arab Food Frequency Questionnaire

Principle Investigator
Dr. Kai-Lin Catherine Jen, Professor

PhD Candidate
Samiah Naji Alqahtani

Answer by filling in the correct oval.
● Yes   ○ No

TODAY'S DATE							
MO		DAY		YEAR			
⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①	①
	②	②	②	②	②	②	②
	③	③	③	③	③	③	③
	④	④	④	④	④	④	④
	⑤	⑤	⑤	⑤	⑤	⑤	⑤
	⑥	⑥	⑥	⑥	⑥	⑥	⑥
	⑦	⑦	⑦	⑦	⑦	⑦	⑦
	⑧	⑧	⑧	⑧	⑧	⑧	⑧
	⑨	⑨	⑨	⑨	⑨	⑨	⑨

IDENTIFICATION NUMBER								
⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①	①	①
②	②	②	②	②	②	②	②	②
③	③	③	③	③	③	③	③	③
④	④	④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨

**CEREALS,
BREADS,
SNACKS**

	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Cold cereals	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
Cooked cereals and oatmeals	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
Milk on cereals	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ cup	◯	◯	◯
Muffins, scones, croissants and biscuits	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium	◯	◯	◯
White breads, including bagels, rolls and English muffins	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 slices or 1mdium	◯	◯	◯
Whole grain bread and rolls	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 slices or 1mdium	◯	◯	◯
Cereal bars and canola bars	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 bar	◯	◯	◯
Potatoes or corn chips	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 handfuls or 1 sm. bag	◯	◯	◯
Popcorn	◯	◯	◯	◯	◯	◯	◯	◯	◯	4 handfuls	◯	◯	◯
Crakers	◯	◯	◯	◯	◯	◯	◯	◯	◯	6 medium	◯	◯	◯
Peanut butter, peanuts and other nuts and seeds	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 Tbsp. (spreads) or ¼ cup (nuts)	◯	◯	◯
Honey, corn syrup, Jam and sugar (including in coffee, tea, and cereal)	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 Tbsp.	◯	◯	◯
Bread stick/ Rusk	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 pieces or 1 medium	◯	◯	◯

**MEAT,
FISH, EGGS**

HOW OFTEN DID YOU EAT THESE FOOD? → AMOUNT?

	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Eggs	○	○	○	○	○	○	○	○	○	2 eggs	○	○	○
Breast chicken	○	○	○	○	○	○	○	○	○	1 large or 2 sm. pieces	○	○	○
Chicken thigh	○	○	○	○	○	○	○	○	○	1 large or 2 sm. pieces	○	○	○
Ground beef (hamburger or meatloaf)	○	○	○	○	○	○	○	○	○	1 medium patty or 3 oz	○	○	○
Hot dogs	○	○	○	○	○	○	○	○	○	1 hot dog or 2 oz	○	○	○
Canned tuna	○	○	○	○	○	○	○	○	○	½ can tuna	○	○	○
Fish (white fish)	○	○	○	○	○	○	○	○	○	4 oz	○	○	○
Shrimp	○	○	○	○	○	○	○	○	○	3 oz or ½ cup	○	○	○
Steak or beef	○	○	○	○	○	○	○	○	○	4 oz	○	○	○
Lamb	○	○	○	○	○	○	○	○	○	4 oz	○	○	○

**SPAGHETTI,
MIXED DISHES,
SOUPS**

HOW OFTEN DID YOU EAT THESE FOOD? → AMOUNT?

	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Spaghetti, lasagna, or pasta w/tomato or tomato meat sauce or w/cheese, or cream sauce	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Pizza	○	○	○	○	○	○	○	○	○	2 slices	○	○	○
Lentil and lentil soup	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Noodle soup inculding Ramen noodle or chicken noodle	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Lean clear soups (including chicken, lamb, or beef)	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Veggie soup	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Other soups	○	○	○	○	○	○	○	○	○	1 cup	○	○	○

MILK AND DAIRY PRODUCTS

	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Milk (whole, 2%, 1%, or skim)	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
Hard cheese (whole, 2%, or skim)	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 slice or ¼ cup shredded	◯	◯	◯
Whole cream cheese or cottage cheese	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 Tbsp.	◯	◯	◯
Yogurt (whole, 2%, 1%, or skim)	◯	◯	◯	◯	◯	◯	◯	◯	◯	6 oz	◯	◯	◯
Buttermilk	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
Cream	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 Tbsp.	◯	◯	◯
Milk , cream or creamer add to tea or coffee	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 Tbsp.	◯	◯	◯

VEGETABLES and GRAINS

	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Salad and fresh vegetables	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
Steamed or cooked mixed vegetables	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ cup	◯	◯	◯
Beans steamed and cooked	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ cup	◯	◯	◯
Steamed rice	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 cup	◯	◯	◯
French fried potatoes	◯	◯	◯	◯	◯	◯	◯	◯	◯	¾ cup	◯	◯	◯
Potatoes, mashed, baked and steamed	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium or ¾ cup	◯	◯	◯

Pickles

	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Pickles	◯	◯	◯	◯	◯	◯	◯	◯	◯	¼ cup	◯	◯	◯
Olives	◯	◯	◯	◯	◯	◯	◯	◯	◯	¼ cup	◯	◯	◯

FRUITS

	HOW OFTEN DID YOU EAT THESE FOOD?									→ Medium serving size	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day		S	M	L
Oranges, grapefruits, clementines, and lemons	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium	◯	◯	◯
Apples and pears	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium or ½ cup	◯	◯	◯
Bananas	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium	◯	◯	◯
Watermelon, cantaloupe, and melon	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium slice or ¼ melon	◯	◯	◯
Strawberries, blackberries, blueberries, and cranberries	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ cup	◯	◯	◯
Peaches, nectarines, and plums	◯	◯	◯	◯	◯	◯	◯	◯	◯	1 medium or ½ cup	◯	◯	◯
Mangos	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ mango	◯	◯	◯
Grapes, pineapple, cherries, and other fruit cocktail	◯	◯	◯	◯	◯	◯	◯	◯	◯	½ cup	◯	◯	◯
Dried fruits dates, prunes, and raisins	◯	◯	◯	◯	◯	◯	◯	◯	◯	¼ cup	◯	◯	◯
Apricots (fresh, canned or dried)	◯	◯	◯	◯	◯	◯	◯	◯	◯	2 medium or 4 halves	◯	◯	◯

SWEETS

HOW OFTEN DID YOU EAT THESE FOOD? → AMOUNT?

	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Ice cream	○	○	○	○	○	○	○	○	○	1 scoop	○	○	○
Cookies	○	○	○	○	○	○	○	○	○	2 medium	○	○	○
Cakes	○	○	○	○	○	○	○	○	○	1 piece	○	○	○
Chocolate milk or dark bars and toffee	○	○	○	○	○	○	○	○	○	1 regular bar or 2 pieces	○	○	○

PLEASE ANSWER THESE THREE IMPORTANT QUESTIONS!

	NEVER or <1 per week	1-2 per week	3-4 per week	5-6 per week	1 per day	2 per day	3 per day	4 per day	5+ per day
				Note that the frequency headings are different.					
How often did you eat foods that were cooked in fat (pan-fried, sautéed, or deep fried)? *Count all fat such as margarine, butter, oil or lard.*	○	○	○	○	○	○	○	○	○
How often did you eat a serving of vegetables? *Do not count potatoes, salad or beans.*	○	○	○	○	○	○	○	○	○
How often did you eat a serving of fruit? *Do not count juices.*	○	○	○	○	○	○	○	○	○

BEVERAES and ALCOHOL	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT ?		
	NEVER or <1 per moth	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Tea (black, green, mint, herbs)	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Tea with milk/ Adeni tea	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Coffee not decaffeinated	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Latte/mocha/ cappuccino	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Coca cola, Pepsi	○	○	○	○	○	○	○	○	○	12 oz or 1 can	○	○	○
Orange juice and grapefruit juice	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Other 100% fruit juice such as apple, grapes, and cranberry	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Other carbonated beverage	○	○	○	○	○	○	○	○	○	12 oz or 1 can	○	○	○
Low calorie carbonated drinks	○	○	○	○	○	○	○	○	○	12 oz or 1 can	○	○	○
Beer non alcoholic	○	○	○	○	○	○	○	○	○	12 oz or 1 can	○	○	○
Beer (all types)	○	○	○	○	○	○	○	○	○	12 oz or 1 can	○	○	○
Liquor and mixed drinks	○	○	○	○	○	○	○	○	○	1 shot (1 ½oz) or 1 mixed drink	○	○	○
Wine red or white	○	○	○	○	○	○	○	○	○	1 medium glass (6 oz)	○	○	○

NATIVE FOODS

	HOW OFTEN DID YOU EAT THESE FOOD?									→	AMOUNT?		
	NEVER or <1 per month	1 per month	2-3 per month	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium serving size	S	M	L
Foul, foul with eggs, foul tuna	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Hot sauce (sahawiq)	○	○	○	○	○	○	○	○	○	2 Tbsp.	○	○	○
Aseed	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Kabsa (rice with meat or chicken)	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Grape leaves/ stuffed capagge	○	○	○	○	○	○	○	○	○	3 medium	○	○	○
White beans w/wo meat	○	○	○	○	○	○	○	○	○	I cup	○	○	○
Hummus	○	○	○	○	○	○	○	○	○	½ cup	○	○	○
Samoon	○	○	○	○	○	○	○	○	○	1 medium	○	○	○
Lebneh	○	○	○	○	○	○	○	○	○	2 Tbsp.	○	○	○
Ma'amoul	○	○	○	○	○	○	○	○	○	2 medium	○	○	○
Mulukhiyah with chicken	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Shish Kafta skewer	○	○	○	○	○	○	○	○	○	3 oz	○	○	○
Manakish (za'atar, cheese, meat)	○	○	○	○	○	○	○	○	○	1 medium	○	○	○
Shakshouka	○	○	○	○	○	○	○	○	○	½ cup	○	○	○
Za'atar	○	○	○	○	○	○	○	○	○	2 Tbsp.	○	○	○
Baklava	○	○	○	○	○	○	○	○	○	2 medium	○	○	○
Kibbeh (fried, or w/tomato, or w/yogurt)	○	○	○	○	○	○	○	○	○	3 medium or 3 oz	○	○	○
Khameer yemeni	○	○	○	○	○	○	○	○	○	1 medium	○	○	○
Tubule	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Chicken Shawarma	○	○	○	○	○	○	○	○	○	3 oz	○	○	○
Biryani w/vegetables or w/meat or chicken	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Falafel pieces or wrap	○	○	○	○	○	○	○	○	○	3 medium	○	○	○
Samosas (meat or veggie)	○	○	○	○	○	○	○	○	○	3 medium	○	○	○
Tahini sauce	○	○	○	○	○	○	○	○	○	2 Tbsp.	○	○	○
Hulba sauce	○	○	○	○	○	○	○	○	○	2 Tbsp.	○	○	○
Mandi	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Fattoush	○	○	○	○	○	○	○	○	○	1 cup	○	○	○
Tameez Arabic bread	○	○	○	○	○	○	○	○	○	¼ of large slice	○	○	○
Okra stew with meat	○	○	○	○	○	○	○	○	○	1 cup	○	○	○

APPENDIX D – COPY OF THE ARABIC VERSION OF THE ARAB FOOD FREQUENCY QUESTIONNAIRE

WAYNE STATE UNIVERSITY

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استماره لتعدد استهلاك الاكل العربي

الباحث الرئيسي
الأشتاذه الدكتوره كاي لين كاثرين جين

طالبه مرشحه لدرجه الدكتوراه
ساميه ناجي القحطاني

هذا النموذج يسالك عن استهلاككي للاغذيه خلال الشهر الماضي
الرجاء استخدام قلم الرصاص

اجيبي بطمس الدائره المناسبه

نعم ●   ○ لا

رقم الاستبيان								
⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①	①	①
②	②	②	②	②	②	②	②	②
③	③	③	③	③	③	③	③	③
④	④	④	④	④	④	④	④	④
⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨	⑨

تاريخ اليوم							
الشهر		اليوم		السنه			
⓪	⓪	⓪	⓪	⓪	⓪	⓪	⓪
①	①	①	①	①	①	①	①
		②	②	②	②	②	②
		③	③	③	③	③	③
		④	④	④	④	④	④
		⑤	⑤	⑤	⑤	⑤	⑤
		⑥	⑥	⑥	⑥	⑥	⑥
		⑦	⑦	⑦	⑦	⑦	⑦
		⑧	⑧	⑧	⑧	⑧	⑧
		⑨	⑨	⑨	⑨	⑨	⑨

كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر	
			الكمية				**كم مره تتناول هذه الاطعمه؟**						الحبوب والخبز والوجبات الخفيفة
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	حبوب الافطار البارده
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	الحبوب المطهيه أو الشوفان
○	○	○	نصف كوب	○	○	○	○	○	○	○	○	○	حبوب بالحليب
○	○	○	حبه متوسطه	○	○	○	○	○	○	○	○	○	مافن أو سكونز أو بيسكيت
○	○	○	شريحتين أو 1 متوسطه	○	○	○	○	○	○	○	○	○	الخبز الأبيض بما يشمل البيقل والرول والمافن الانجيلزي
○	○	○	شريحتين أو 1 متوسطه	○	○	○	○	○	○	○	○	○	الخبز الأسمر والرول الاسمر
○	○	○	1 اصباع	○	○	○	○	○	○	○	○	○	اصابع الحبوب او الكانولا
○	○	○	2 كف يد مليانه او 1 كيس صغير	○		○	○	○	○	○	○	○	شيبس بطاطس او شيبس ذره
○	○	○	4 كف يد مليانه	○	○	○	○	○	○	○	○	○	فشار
○	○	○	6 وسط	○	○	○	○	○	○	○	○	○	بسكويت مالح
○	○	○	2 ملاعق طعام او نصف كوب مكسرات	○	○	○	○	○	○	○	○	○	زبده الفول السوداني أو الفول السوداني أو المكسرات والحبوب الأخري
	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○	العسل او شراب الذره او المربي او السكر المضاف للقهوه والشاي وحبوب الافطار
○	○	○	قطعتين او 1 متوسطه	○	○	○	○	○	○	○	○	○	اصابع الخبز أو الشابوره

اللحوم والأسماك والبيض

	الكمية			←									كم مره تتناول هذه الاطعمه؟
كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو1< في الشهر	
○	○	○	بيضتين	○	○	○	○	○	○	○	○	○	البيض
○	○	○	1 صدر كبير او 2 قطع صغيره	○	○	○	○	○	○	○	○	○	صدر الدجاج
○	○	○	1 فخذ كبير او 2 قطع صغيره	○	○	○	○	○	○	○	○	○	فخذ الدجاج
○	○	○	1 شريحه برجر متوسطه أو 3 اونصص	○	○	○	○	○	○	○	○	○	اللحم المفروم (همبرجر او رغيف اللحم)
○	○	○	1 حبه نقانق او 2 اونصص	○	○	○	○	○	○	○	○	○	نقانق
○	○	○	نصف علبه تونا	○	○	○	○	○	○	○	○	○	تونه معلبه
○	○	○	4 اونصص	○	○	○	○	○	○	○	○	○	سمك (السمك الابيض)
○	○	○	3 أونصص او نصف كوب	○		○	○	○		○	○	○	الروبيان او الجمبري
○	○	○	4 أونصص	○	○	○	○	○		○	○	○	ستيك او لخم بقري
○	○	○	4 اونصص	○	○	○	○	○	○	○	○	○	لحم الخروف

المعكرونه والاطباق المشكله والشربه

الكمية ← كم مره تتناول هذه الاطعمه؟

	كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر
اسباقيتي او لزانيا او مكرونه بصلصه الطماطم واللحم او بصلصه الطماطم فقط مع الجبنه او صلصه الكريمه	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
بيتزا	○	○	○	شريحتين	○	○	○	○	○	○	○	○	○
عدس أو شربه العدس	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
شربه بالمكرونه وتشمل الاندومي وشربه الدجاج بالمكرونه	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
مرق دجاج او مرق الغنم او مرق البقر	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
شربه خضار	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
شربات اخرى	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○

الحليب ومشتقاته

الكمية ← كم مره تتناول هذه الاطعمه؟

	كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر
حليب (كامل الدسم او 2% او 1% او خالي الدسم)	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
الأجبان الجامده (كامله الدسم او 2% او خاليه الدسم)	○	○	○	1 شريحه او ربع كوب	○	○	○	○	○	○	○	○	○
الأجبان قابله للدهن او اجبان الماعز	○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○
الزبادي (كامل الدسم او 2% او 1% او خالي الدسم)	○	○	○	6 اونصص	○	○	○	○	○	○	○	○	○
اللبن الرائب	○	○	○	1 كوب	○	○	○	○	○	○	○	○	○
القشطه	○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○
الحليب او المبيض المضاف للقهوه او الشاي	○	○	○	1 ملعقه طعام	○	○	○	○	○	○	○	○	○

الخضار والحبوب

	أبدا أو>1 في الشهر	1 في الشهر	2-3 في الشهر	1 في الأسبوع	2 في الأسبوع	3-4 في الأسبوع	5-6 في الأسبوع	1 في اليوم	2+ في اليوم	حجم الحصه المتوسطه	صغيره	وسط	كبيره
				كم مره تتناول هذه الاطعمه؟						←		الكمية	
السلطات والخضروات الطازجه	○	○	○	○	○	○	○	○	○	1 كوب	○	○	○
الخضار المشكله المطبوخه او المسلوقه	○	○	○	○	○	○	○	○	○	نصف كوب	○	○	○
الفاصوليا المسلوقه او مطبوخه	○	○	○	○	○	○	○	○	○	نصف كوب	○	○	○
الأرز المسلوق	○	○	○	○	○	○	○	○	○	ا كوب	○	○	○
اصابع البطاطس المقليه	○	○	○	○	○	○	○	○	○	ربع كوب	○	○	○
البطاطس المهروسه او المطبوخه في الفرن او المسلوقه	○	○	○	○	○	○	○	○	○	1 حبه متوسطه او ربع كوب	○	○	○

المخلات

	أبدا أو>1 في الشهر	1 في الشهر	2-3 في الشهر	1 في الأسبوع	2 في الأسبوع	3-4 في الأسبوع	5-6 في الأسبوع	1 في اليوم	2+ في اليوم	حجم الحصه المتوسطه	صغيره	وسط	كبيره
				كم مره تتناول هذه الاطعمه؟						←		الكمية	
المخل	○	○	○	○	○	○	○	○	○	ربع كوب	○	○	○
الزيتون	○	○	○	○	○	○	○	○	○	ربع كوب	○	○	○

الفواكه

كم مره تتناول هذه الاطعمه؟

الكمية			←										
كبيره	وسط	صغيره	حجم الحصه المتوسطة	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر	
○	○	○	1 حبه متوسطه	○	○	○	○	○	○	○	○	○	البرتقال او الجريب فروت او اليوسف او الليمون
○	○	○	1 حبه متوسطه او ربع كوب	○	○	○	○	○	○	○	○	○	التفاح والكمثرى
○	○	○	1 حبه متوسطه	○	○	○	○	○	○	○	○	○	الموز
○	○	○	1 شريحه متوسطه ربع وحده	○	○	○	○	○	○	○	○	○	البطيخ والخربز والشمام
○	○	○	نصف كوب	○	○	○	○	○	○	○	○	○	الفراوله والتوت الاسود والتوت الازرق والتوت البري
○	○	○	1 حبه متوسطه او نصف كوب	○	○	○	○	○	○	○	○	○	الخوخ والبرقوق
○	○	○	نصف مانجو	○	○	○	○	○	○	○	○	○	المنجا
○	○	○	نصف كوب	○	○	○	○	○	○	○	○	○	العنب والاناناس والكرز
○	○	○	ربع كوب	○	○	○	○	○	○	○	○	○	الفواكه المجففه كالخوخ والزبيب
○	○	○	2 حبات وسط او 4 انصاف	○	○	○	○	○	○	○	○	○	المشمش سواء طازج او معلب او مجفف

الحلويات

كم مره تتناول هذه الاطعمه؟

الكمية			←										
كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر	
○	○	○	1 ملعقه	○	○	○	○	○	○	○	○	○	ايسكريم
○	○	○	2 حبات متوسطه	○	○	○	○	○	○	○	○	○	البسكويت
○	○	○	قطعه واحده	○	○	○	○	○	○	○	○	○	الكيك
○	○	○	1 شريط كامل او 2 قطع	○	○	○	○	○	○	○	○	○	شوكولاته بالحليب او شوكولاته غامقه او حلاوه توفي

5+ في اليوم	4 في اليوم	3 في اليوم	2 في اليوم	1 في اليوم	5-6 في الاسبوع	3-4 في الاسبوع	1-2 في الاسبوع	أبدا أو>1 في الاسبوع	الرجاء اجيبي على هذه الأسنله المهمه
									ملاحظه عدد المرات في هذا الجدول مختلف
○	○	○	○	○	○	○	○	○	كم عدد المرات التي تاكلين فيها هذه الاطعمه المطبوخه في الدهون كالمقليه في الصاج او السوتيه او المقليه عميقا؟
○	○	○	○	○	○	○	○	○	كم عدد المرات التي تاكلين فيها الخضروات؟ لا تحسبي البطاطس او السلطه او الفاصوليا.
○	○	○	○	○	○	○	○	○	كم عدد المرات التي تاكلين فيها الفواكه لا تحسبي العصيرات.

المشروبات والكحول

الكمية				←				كم مره تتناول هذه الاطعمه؟				
كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو>1 في الشهر	
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	الشاي (اسود او اخضر او نعناع او شاي الاعشاب)
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	شاي مع الحليب او شاي عدني
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	قهوه
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	لاتيه او موكا او كابتشينو
○	○	○	12 اونصص او 1 علبه	○	○	○	○	○	○	○	○	○	كوكا كولا او بيبسي
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	عصير برتقال او عصير جريب فروت
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	عصيرات طبيعيه 100% مثل التفاح والعنب والتوت البري
○	○	○	12 اونصص او 1 علبه	○	○	○	○	○	○	○	○	○	المشروبات الغازيه الأخرى
○	○	○	12 اونصص او 1 علبه	○	○	○	○	○	○	○	○	○	المشروبات الغازيه القليله السعرات
○	○	○	12 اونصص او 1 علبه	○		○	○	○	○	○	○	○	البيره الخاليه من الكحول
○	○	○	12 اونصص او 1 علبه	○	○	○	○	○	○	○	○	○	البيره بجميع انواعها
○	○	○	كاس صغير او ونصف اونصص او 1 شراب مختلط	○	○	○	○	○	○	○	○	○	الكحول والمشروبات المشكله
○	○	○	1 كوب مختلط	○	○	○	○	○	○	○	○	○	الخمر الاحمر والخمر الابيض

| الاكل العربي | | | | | | | | | | | | |

كبيره	وسط	صغيره	حجم الحصه المتوسطه	2+ في اليوم	1 في اليوم	5-6 في الأسبوع	3-4 في الأسبوع	2 في الأسبوع	1 في الأسبوع	2-3 في الشهر	1 في الشهر	أبدا أو<1 في الشهر	
○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○	فول او فول بالبيض او فول بالتونا
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	شطه حاره (سحاوق)
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	عصيد
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	كبسه (ارز باللحم او الدجاج)
○	○	○	3 قطعه متوسطه	○	○	○	○	○	○	○	○	○	ورق عنب أومحشي ملفوف
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	فاصوليا بيضاء باللحم او بدون لحم
○	○	○	ربع كوب	○	○	○	○	○	○	○	○	○	حمص
○	○	○	1 قطعه متوسطه	○	○	○	○	○	○	○	○	○	صمون
○	○	○	2 ملعقه طعام	○	○	○	○	○	○	○	○	○	لبنه
○	○	○	2 قطع متوسطه	○	○	○	○	○	○	○	○	○	معمول
○	○	○	1 كوب	○		○	○	○	○	○	○	○	ملوخيه بالدجاج
○	○	○	3 اونصص	○	○	○	○	○	○	○	○	○	سيخ شيش كفته او كباب عراقي
○	○	○	1 قطعه متوسطه	○	○	○	○	○	○	○	○	○	مناقيش زعتر او جبنه او لحم
○	○	○	نصف كوب	○	○	○	○	○	○	○	○	○	شكشوكه
○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○	زعتر
○	○	○	2 قطع متوسطه	○	○	○	○	○	○	○	○	○	بقلاوه
○	○	○	3 قطع او 3 اونصص	○	○	○	○	○	○	○	○	○	كبه مقليه او بالطماطم او باللبن
○	○	○	1 قطعه متوسطه	○	○	○	○	○	○	○	○	○	خمبير يمني
○	○	○	كوب 1	○	○	○	○	○	○	○	○	○	تبوله
○	○	○	3 اونصص	○	○	○	○	○	○	○	○	○	شاورما دجاج
○	○	○	كوب 1	○	○	○	○	○	○	○	○	○	برياني بالخضار او باللحم او بالدجاج
○	○	○	3 قطع متوسطه	○	○	○	○	○	○	○	○	○	فلافل حبات او ساندوتش
○	○	○	3 قطع متوسطه	○	○	○	○	○	○	○	○	○	سمبوسه لحم او خضار
○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○	صلصه طحينه
○	○	○	2 ملاعق طعام	○	○	○	○	○	○	○	○	○	صلصه حلبه
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	مندي
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	فتوش
○	○	○	ربع الشريحه الكبيره	○	○	○	○	○	○	○	○	○	تميز (خبز سعودي)\
○	○	○	1 كوب	○	○	○	○	○	○	○	○	○	باميا باللحم

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ABSTRACT

DEVELOPMENT OF AN ARAB FOOD FREQUENCY QUESTIONNAIRE AND EXAMINATION OF CHANGES IN DIETARY PATTERNS IN ARAB IMMIGRANT WOMEN TO THE UNITED STATES

by

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December 2017

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Major: Nutrition and Food Science

Degree: Doctor of Philosophy

INTRODUCTION: Immigrants to the U.S. face challenges and changes regarding to their food intake patterns that may be associated with their health status. However, less is known about the intake patterns among Arab immigrants.

OBJECTIVES 1: To establish a food intake database using 24-hr dietary records from Arab females who immigrated to the U.S. for less than 5 years, 5 to 10 years and greater than 10 years, as well as women still living in SA; **2:** To establish an Arab Food Frequency Questionnaire (AFFQ) for future nutrition-related studies with Arab populations.

AIMS 1: To test the hypothesis that as the length of residence in the U.S. increased, the amount of native food consumption decreased as a function of acculturation, and also to determine the demographic variables that contributed to the changes in food intake patterns; **2:** To test the hypothesis that food intake patterns of female immigrants in the U.S. who were from SA, Iraq, and Yemen, or

Saudi females still living in SA would be different from that of the general population of the three countries in 2013.

METHODS: Participants in the U.S. from Iraq, Yemen, and SA (*n=125*) who immigrated for less than 5 years, 5 to 10 years, and greater than 10 years, and in SA (*n=50*) were interviewed to collect 24-hr food dietary records. Based on the commonly consumed food items, an AFFQ was established. Another 2 days dietary records and AFFQ data were collected from 50 participants of the original sample to test the reliability and the validity of AFFQ.

RESULTS: There were significant differences in dietary intake patterns between women in the U.S. and women in SA, and between women in the U.S. for more than 10 years and for less than 5 years. The longer they resided in the U.S., the more likely they accepted the western food and culture compared to women living in SA.

CONCLUSION: Studies with larger sample size is needed to further validate the AFFQ use and to further refine this AFFQ. Nevertheless, this AFFQ demonstrated its validity and may be used for future longitudinal nutrition acculturation studies.

AUTOBIOGRAPHICAL STATEMENT

Samiah Alqahtani is a PhD in the Nutrition and Food Science Department at Wayne State University, Detroit, Michigan. Samiah, a Saudi citizen who has earned her B.S., M.S., and another M.S. degrees in Nutrition and Food Science. Samiah was awarded a trainee position with the Broadening Experiences in Scientific Training (BEST) program at Wayne State University that provides PhD students with work experience outside of academia. Upon receiving this award, Samiah was selected to train through the volunteer/externship with the United States Department of Agriculture (USDA), Food Safety Inspection Service (FSIS). She received an honor publication with USDA/FSIS on the first page of the Beacon newsletter and as a photo of the month (July, 2015). She is also HACCP certified, which helped fuel her interest in a food inspection career. She has four publications: 1. as a second author for an e.Book chapter entitled *Approach to Developing a Sustainability Office at the University Level* (2017) 2. as a second author for a peer review article entitled *Native/Aboriginal Students use Natural Health Products for Health Maintenance More so than Other University Students*, (2015) ; 3. as a first author for a book chapter entitled *Antidiabetic and Anticancer Potential of Native Medicinal Plants from Saudi Arabia*, (2014); and 4. as a second author for a peer review article entitled *Aboriginal and non-Aboriginal students learn about natural health products from different information sources*, (2013). Samiah's academic background in public health and professional certification complement her personal desire to work as a junior researcher in a public heath filed.