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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

THE IMPACT OF SOCIOECONOMIC FACTORS ON FOOD INSECURITY AMONG SYRIAN REFUGEES IN FLORIDA

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

DIETETICS AND NUTRITION

by

Racha Sankar

2019

To: Dean Tomas Guilarte
R. Stempel College of Public Health and Social Work

This dissertation, written by Racha Sankar, and entitled The Impact of Socioeconomic Factors on Food Insecurity Among Syrian Refugees in Florida having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved

_____
Adriana Campa

_____
Catherine Coccia

_____
Florence George

_____
Fatma Huffman, Major Professor

Date of Defense: November, 4, 2019

The dissertation of Racha Sankar is approved.

_____
Dean Tomás Guilarte
R. Stempel College of Public Health and Social Work

_____
Andrés G. Gil
Vice President for Research and Economic Development and Dean of the University Graduate School

Florida International University, 2019

DEDICATION

This work is dedicated to the Syrian families who now live in the State of Florida.

Special gratitude extends to Syrian households in Tampa, Orlando, West Palm Beach and Miami.

To my dear Syrian families who participated in this project:

My project might have triggered sorrow, pain and tears. I owe you love, kindness, and warmth you shared with me. I am thankful for the welcoming environments you created for me. Your generosity made me humble & grateful. I truly value every moment I spent with you. I will forever be appreciative and grateful to each and everyone of you

I also dedicate this dissertation to my loving parents, Rafat Kabbani & Amir Sankar.

To the dearest to my heart,

Whether it is the way you comforted me when I was down

Whether it is the love you surrounded me with when I needed

It could be the prayers you kept me in

It might be the motivational whispers you nourished me with

You always encouraged me to walk this path

You always promised me it's going to happen

and

I will always be thankful for being the spiritual & beloved committee in my life

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ABSTRACT OF THE DISSERTATION

THE IMPACTS OF SOCIOECONOMIC FACTORS ON FOOD INSECURITY AMONG SYRIAN REFUGEES IN FLORIDA

by

Racha Sankar

Florida International University, 2019

Miami, Florida

Professor Fatma Huffman, Major Professor

Syrian refugees settled in the United States may experience food insecurity due to different socioeconomic factors that may include nutrition knowledge, language proficiency, women's education, and perceived stress. The structure and the type of households may also contribute to food insecurity in this population.

The objective of this study was to measure food security among Syrian refugees residing in Florida. It also aimed to determine the socioeconomic factors that may attribute to food insecurity at household level.

A comprehensive 228-item questionnaire was administered to N=80 households (n=43 in rural areas, n=37 in urban areas). Families with and without children were interviewed (88.7% families with children, 11.3% families without children). Interviewees included 78.5% women and 21.5% men with different levels of education.

The food security scale showed that refugees in rural and urban areas were moderately food insecure without hunger (4.9±2.4, 4.5±2.8 respectively).

Households with children in rural areas were 79.3% less likely to be food secure compared with counterparts in urban areas. The odds of being food secure were greater in

urban cities than in rural areas, when controlling the number of employed individuals in the corresponding regression model.

Perceived stress had an inverse relationship with food security in rural areas, when it had a positive relationship in urban areas. There was a marginal significant ($p=0.07$) correlation between food security score and perceived stress score among all of households.

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CHAPTER I: Introduction

Statement of Problem

United States (US) is the largest resettlement country worldwide (Vahabi, Damba, Rocha, and Montoya, 2011). Between 2013 and 2015, the refugee admission rate reached 70.000 refugees annually (Bruno, 2017). In 2016, this rate increased to 85,000 refugees, including 10,000 Syrian refugees, in response to the escalating refugee crisis (Zong and Batalova, 2017). Recently, the data obtained from the arrival report of Refugee Processing Center showed that 21,353 Syrian refugees have resettled in the United States since the beginning of the war in June 2011 (RPC, 2019).

Refugees are placed within 190 refugee-appropriate communities all over the United States; the placement process is managed by nine organized resettlement agencies (Fandl, 2017). More than 54% of Syrian refugees were placed in California, Michigan, Texas, Arizona, Pennsylvania, Illinois, and Florida (Kallich, Roldan, and Mathema, 2016).

There are multiple federal programs developed to benefit refugees placed in the United States such as Refugee Cash Assistance, Supplemental Security Income for refugees older than 65 years, Refugee Medical Assistance and a transitional benefit of 8 months of federal health care besides access to all of the public benefits such as eligibility to work and to apply for a social security card (Chalmers and Fox, 2016; Fandl, 2017). Refugees in the United States are expected to be self-sufficient within 8 months from arrival; however, there is no ultimate strategy to provide the resources to achieve and to

improve self-sufficiency among recently arrived refugees (Chalmers and Fox, 2016; Morrison, Haldeman, Sudha, Gruber, and Bailey, 2007).

Newly arrived immigrants experience challenges in accessing such resources due to unfamiliarity with new living systems and inability to navigate host communities (CBO, 2004). Host communities are responsible for managing refugees' access to different resources after the course of resettlement is set (Chalmers and Fox, 2016).

For instance, an interdisciplinary team at the medical school of Pennsylvania State University partnered with community-based charitable organizations and volunteered to communicate the resources to 70 newly resettled Syrian refugees in central Pennsylvania (Bouhman, Boothe and George, 2017). In Philadelphia, different communities expanded the access to health services for Syrian refugees through developing community-based programs such as Philadelphia Refugee Health Collaborative program that served as clinical liaisons between refugees and healthcare providers (Chalmers and Fox, 2016). Other communities continuously experienced challenges in overcoming the limits in providing Syrian refugees with their needs; the common practice was to collaborate with local assistance organizations (Chalmers and Fox, 2016).

Not surprisingly, providing cultural broker services to facilitate access to quality-life-promoting resources was suggested among Syrian refugees (Chalmers and Fox, 2016). The differences in culture, education, and language serve as environmental and personal barriers for Syrian refugees to live a normal life in United States (Chalmers and Fox, 2016). Such barriers were correlated with food insecurity in different populations of refugees resettled in the United States (Nunnery and Dharod, 2017).

Limited access to culturally acceptable food and difficulty in navigating the food-related environment were other barriers commonly experienced by 281 newly arrived refugees in United States (Hadley, Patil, and Nahayo, 2010). Due to unfamiliarity with The US food system and limited nutrition knowledge, under-nutrition was a health concern among 16 newly resettled refugees in United States (Rondinelli, Morris, Rodwell, and Moser, 2011). In addition, gender roles, types of households, employment status and poor social networks were barriers in achieving consistent access to quality services, which increased the likelihood of food insecurity among refugees in the United States (Nunnery and Dharod, 2017).

These challenges may have considerably negative impact, leading to a stressful life accompanied by food insecurity among refugees in the United States. A cross sectional self-report survey revealed a strong interaction between food insecurity and stress; the highest level of stress was evident among 16.5% severely food insecure and 6.4% moderately food insecure groups (Martin, Maddock, Chena, Gilman, and Colman, 2016). Moreover, Post Traumatic Stress Disorder (PTSD) is a commonly experienced psychiatric disorder among refugees, as a result of war conflicts and traumatic events (Fazel, Jeremy, and Danesh, 2005).

Despite insufficient information about the barriers Syrian refugees may face in this country, community-based programs that facilitate the communication between Syrian refugees and local organizations have been developed. The development of such programs suggests that there are relevant challenges that Syrian refugees experience, which counteract the consistent access to federal and public services (Chalmers and Fox, 2016; Bouhman et al, 2017).

The impact of English literacy on food insecurity among Syrian refugees living in the United States has not been fully investigated; nonetheless, the proficiency in English of Syrian refugees who arrived in this country between June 2011 and April 2019 (RPC, 2019) was very low (0.03%). Besides English literacy, the type of household may be another contributor to food insecurity. In the United States, food insecurity was prevalent in 19% of households with children, whereas it was prevalent in 14% among all households (Coleman, Rabbitt, Mathew, Gregory, and Singh, 2015). In accordance with records of the United Nation High Commissioner for Refugees (UNHCR), 75% of > 880,000 Syrian refugees fleeing the war were women and children (Sleiman, 2014). In fact, cultural norms of unemployed Syrian women may also affect employment status of Syrian refugees in the United States. UNHCR encouraged the empowerment of Syrian refugee women through improving skills as a tool for improving living conditions in host countries (Pagonis, 2013).

The education profile of Syrian refugees arriving in the United States after the war indicated that most had a low level of education, with a high school diploma or lower education, and only 4.43% had university degrees and 0.13% graduate school degrees (RPC, 2019). As a consequence of gender role and culture norms, Syrian men tended to be more educated than Syrian women; before the war, literacy among men was 91.7%, and only 81% among women (CIA, 2015). Nonetheless, gender-role had a different impact on the level of nutrition knowledge; Syrian females had higher score than Syrian males (38.37 vs 37.29). The result of this study showed that Syrian students aged 18-34 years had poor nutrition knowledge (Labban, 2015).

Nowadays, displaced Syrians fall in the upper range of PTSD prevalence (30.6%) compared with the mean prevalence of PTSD among international refugees. Stress may be a predisposing and causal factor for food insecurity; it may also impact their mental health and normal functioning after resettlement in the United States (Kazour, Zahreddine, Maragel, and Almustafa et al, 2017).

This study was conducted to assess food security status and to determine different factors that might contribute to food insecurity among Syrian refugees in the United States. The factors to be considered in this study are: English proficiency, education, nutrition knowledge, level of education, structure of households, employment status and stress.

Significance of Study

Migration from Syria to the United States is a challenging experience due to the substantial differences in the structures and cultures of these two countries. The United States is a highly developed country compared with Syria which is a developing country. In addition, other differences such as cultural norms, demographic characteristics, and language spoken are considerable. Unfamiliarity with the US system, combined with socioeconomic differences, may create a cluster of challenges for Syrian refugees. Such challenges may contribute to food insecurity resulting in low quality of life and low economical contribution. On the other hand, determining food security within the context of these challenging additional factors may provide with a better interpretation of their reality at the individual and community levels in order to implement more effective programs. Once factors are identified, appropriate interventions may be implemented to

lessen food insecurity prior or post arrival to the United States. Refugees may achieve self-sufficiency within the target time of 8 months, employment rate may increase, and income may rise reducing the dependency on different assistance programs. Acculturation and prosperity may be the long-term effect of these interventions. Currently, over 21,333 Syrian refugees live in the United States (RPC, 2019); in fact, the United States compared with other developed countries, has the highest annual admission rate of refugees (Zong and Batalova, 2016). Our study may help create strategies to improve the quality of life of Syrian refugees; such strategies may assist other refugees coming from developing countries to the United States or another developed country.

The evidence from the literature generates the following questions:

- What are the contributing factors to food insecurity among US population?
- What is the prevalence of food insecurity among different populations of refugees settled in the United States?
- What are the contributing factors to food insecurity among different populations of refugees settled in the United States?
- How does the resettlement process take place among Syrian refugees from homeland to the United States?
- What are the demographic characteristics of Syrian refugees who are registered in UNHCR?
- What are the challenges that Syrian refugees might face during displacement and prior to arrival to host countries and/or the United States?

- What is the education level, nutritional knowledge, employment status, and health status of Syrian refugees settled in different countries?

The objective of this study was to determine food security status and the levels of food insecurity among Syrian refugees in Florida. Level of education, English proficiency, and nutrition knowledge were assessed to indicate their effects on food insecurity in this population. The impact of the characteristics of households including number of employed individuals and number of children on food security were determined. Perceived stress was measured and its relationship with food insecurity was tested in Syrian refugees who participated in this study.

Innovation

To the best of our knowledge, this is the first study to determine food insecurity among Syrian refugees in the United States. Nutrition knowledge is associated with diet quality, and food insecurity might be the moderator of this association (Lombe et al., 2016). Assessing the nutrition knowledge among Syrian refugees in the United States in relation to food insecurity might be a new contribution to the literature. The influence of different demographical characteristics, including education, English proficiency, and employment status on food insecurity, is assessed for the first time in this population. The effect of the relationship of employment status and type of households with food insecurity is a new focus among Syrian refugees in the United States. The relationship between perceived stress and food insecurity is a new addition to the area of research in Syrian refugees living in the United States.

Specific Aims and Hypotheses

Specific Aim 1: To determine the effect of English proficiency, level of education, and nutrition knowledge on food insecurity among Syrian refugees living in Florida.
The effect of nutrition knowledge and English proficiency on food insecurity will be assessed.

Hypothesis 1a: Households that have at least one family member with fair or fluent English proficiency are more likely to be less food insecure.

Hypothesis 1b: Households with a woman with an education level of high school diploma or higher are more likely to be less food insecure.

Hypothesis 1c: Households with higher scores in nutrition knowledge with fair or/fluent English proficiency are less likely to be food insecure.

Specific Aim 2: To determine the effect of type of households on food insecurity among Syrian refugees living in Florida.

Hypothesis 2a: Households that have at least two employed family members are less likely to be food insecure.

Hypothesis 2b: Households with children are more likely to be food insecure compared to households without children

Specific Aim 3: To measure perceived stress and to determine its effect on food insecurity in Syrian refugees in Florida.

Hypothesis 3a: Households that report higher scores in perceived stress are more likely to be food insecure.

Hypothesis 3b: There will be a direct relationship between perceived stress and food insecurity.

Methodology

A model used in this study

The food security and socioeconomic factors model for Syrian refugees in Florida has been developed (Figure 1) as a result of merging three food insecurity models developed by three different organizations. The models used are the Interface between Food Insecurity and Violent Conflict by the Food and Agriculture Organization (FAO) of the UN (FAO, 2002), the Conceptual Framework of Food Security and Nutrition developed by Inwent Capacity Building International Germany on behalf of the Federal Ministry of Economic Cooperation and Development (Bokeloh, Gerster, and Weingartner, 2009) and The Conceptual Framework of The Nutritional Status at Household Level developed by Gross Rainer and Colleagues in 2000.

Justifications

Syrian conflict was initiated in 2011 and escalated until a humanitarian crisis was considerably developed in 2015 (Zong and Batalova, 2017). This crisis led to a mass migration of Syrians to neighboring countries and beyond. Neighboring countries have established camps to host Syrians fleeing in an attempt to offer a transitional place for them to stay. War-related violence has resulted in Syrians fleeing to camps with and without authorizations. A global humanitarian crisis emerged; 11 million Syrians fled, of which 4.9 million have registered as refugees with the United Nations (UN) (Yun et al, 2012).

With the cooperation of UN, the aim of host countries has eventually changed from providing a transitional place to a matter of regulating migration to assist Syrians become self-sufficient in different life aspects including education, employment, and healthcare access besides basic life needs of safety, food and drink (Yun et al, 2012; Zong and Batalova, 2017). The United States has admitted a total of 18,007 Syrian refugees who might be representing a new flow to United States, as reported by the Migration Policy Institute in 2017 (Zong and Batalova, 2017). The literature lacks studies among Syrian refugees in United States, but studies done among different refugees in United States have shown that food insecurity is prevalent among 85% of the refugees living in the US northeast region (Coleman, Nord, Andrews, and Carlson, 2012).

Syrian refugees resettled in United States mostly spent a transitional period in 1700 locations in Lebanon besides camps in Jordan, Iraq, and Turkey (Zong and Batalova, 2017). Housing shortage, lack of employment opportunities, complete dependence on food aid, and inadequate access to water, sanitation, electricity and waste management are challenges that might be experienced by Syrian refugees in camps and surrounding areas (Berti, 2015).

Refugees might arrive in the United States with a poor health condition already established before their arrival or during their processing, and as a result of an exposure to such stressful situations (UNHCR, 2013). Moreover, new challenges might arise in the United States leading to food insecurity, which is usually observed in refugees and

might exacerbate present health conditions (UNHCR, 2013). All these factors have increased the need to study food insecurity in Syrian refugees resettled in US. A model that identifies the milieu of causal factors that contribute to food insecurity must be developed in order to meet the objectives of the proposed research.

The proposed research has a main comprehensive concept that includes food insecurity and nutrition knowledge among Syrian refugees among other contributing factors. Food insecurity has different dimensions that include different causes in different circumstances (Bokeloh et al, 2009; Gross et al, 2000). The literature on Syrian refugees in different locations has shown that such a population might have been exposed to a variety of stressful predisposing conditions prior to arrival in the US. Our research, in accordance with the literature on refugees in United States, includes different compounding variables recognized as impacting food security status in Syrian refugees relocated in United States.

Prior to Resettlement

In the proposed synergistic model, conflict, war, and loss of life is included since 79% of Syrian refugees have experienced a death in their families due to the current conflict and war violence (Sirin and Sirin, 2015). Among some of the critical variables included in this model are loss of livelihood, loss of employment and income, and poor economic conditions. Since the beginning of the Syrian war in 2011, a significant increase in the unemployment rate has been observed, 14.9% compared to unemployment rate of 8.6% in 2010, according to the report of the central Bureau of

Statistics (CEIC. n.d.). In addition, among Syrian refugees, the mid 2016 report released by the United Nations Human Rights Council (UNHRC) showed that generous support has been provided to 5,603 individuals to find employment (Lyon, 2016).

A rapid fall into poverty, socially and culturally polarized societies, population displacement, and large-scale migration might be appropriate variables to be included in this model. The UN has warned of growing poverty among Syrian refugees despite the effort and support from different organizations to ameliorate the impact of the social and economic collapse among this population. In Jordan and Lebanon, 90% and 70% of Syrian refugees live below the poverty line respectively (Lyon, 2016). Cash assistance has been provided to 102,853 households, and food has been provided to 2,035,767 individuals by the UN with the support of charitable organizations (Lyon, 2016).

Lack of formal education might be a considerably predisposing variable, because 47% of Syrian refugees are school aged children and have a large gap in their education (Selcuk and Rogers, 2015; Zong and Batalova, 2017). In the Middle East and North Africa, 500,000 to 600,000 Syrian refugee children do not have access to formal education (UNHCR, 2013). Additionally, 78% of 1,245 Syrian refugees in Greece are students under the age of 35 year (Murray and Clayton, 2015).

After Resettlement in United States:

At the cultural and social levels, numerous studies have associated low acculturation, unfamiliarity with the new environment, and English literacy with food insecurity among refugees in US (Anderson et al, 2014; Covington, Agbemenu, and Matabmanadzo, 2018; Hadley et al, 2010; Peterman et al, 2013). A study has found

that 72% of refugees had low income levels of less than $500 per month (FAO, 2002). Food insecurity was prevalent among 31% of the refugees who had income of $ 2000 per month or less (Hadley et al, 2010).

Unfamiliarity with the US food system and inability to identify ingredients on food labels were common issues among 63% of refugees located in the Midwestern US (Hadley et al, 2010). In this particular study, 46% of refugees reported difficulties in recognizing food items in markets (Hadley et al, 2010). Different studies have concluded that refugees resettled in United States increase their consumption of sugar-sweetened beverages and eventually experience a change in their dietary habits (Barnes and Almasy, 2005; Patil et al, 2009; Rairdan and Higgs, 1992; Story and Harris, 1989). These changes might result in food insecurity and undesirable health outcomes (Wang et al, 2016).

Another study, in which the main objective was measuring the level of acculturation among Arab students in United States, found that participants' food system literacy and general food practices prior to and after moving to the United States were more important than acculturation in determining food choices (Brittin and Obeidat, 2011). Thus, food system literacy and general food practices need to be considered when determining levels of acculturation; therefore, data will be collected in these issues.

Governmental and federal assistance programs aim to assure that self-sufficiency is experienced by refugees within a short duration after arriving to United States (Coleman et al, 2012). In reality, socio-demographic characteristics, including level of education and language literacy, contribute to difficulties in utilizing services

among refugees living in United States (Mansha, Rene, Bhuttu, Rooshey, and Elizabeth et al, 2014).

Refugees resettled in United States become eligible for the Refugee Medical Assistance (RMA) program that provides access to health services for 8 months after arrival (US Department of Health and Human Services). Refugees who meet the eligibility criteria of Medicaid and Children's Health Insurance Program (CHIP) can be enrolled in these programs for several years. The Affordable Care Act (ACA) assists refugees in obtaining permanent healthcare services at an affordable rate (US Department of Health and Human Services).

Although RMA is a federal program, there might be a 4-5 week wait until refugees receive their RMA card (US Department of Health and Human Services). This gap in care might be a barrier to refugees with chronic conditions or disabilities (Coleman et al, 2016). Refugees resettled in the United States might have been exposed to different healthcare systems in their countries; inability to navigate the American healthcare system is another barrier, especially to refugees with poor language literacy (Coleman et al, 2016).

Two studies have proposed inadequate English proficiency as the main reason for unfamiliarity with the eligibility for health insurance, and consequently disadvantaged health outcomes might be experienced (Asgary and Segar, 2011; Reed and Barbosa, 2017). Additionally, a study has found that refugees are twice as likely to have pre-existing chronic conditions compared to other immigrants (Reed and Barbosa, 2017).

The cluster of challenges refugees might experience during and after resettlement contributes to migration-related stress, which might be correlated with negative health outcomes (Covington et al, 2018). Two different types of stress, physical stress and mental stress have been identified in a group of refugees resettled in the United States. The physical signs of stress include high blood pressure, loss of appetite, migraine, and dizziness, as well as cumulative stress that worsens an existing health condition. The signs of mental stress include emotional distress, loss of interest, depression, and excessive crying (Covington et al, 2018).

In the context of mental stress, the prevalence of Post-Traumatic Stress Disorder (PTSD) among adult Syrian refugees who resided in two camps were 36.3% and 61.9% respectively in 2013 (Carta, Moro, and Bass Judith, 2015). Surprisingly, the prevalence of PTSD was higher among children of Syrian refugees in the two camps was 41.3% and 76.4%. In a different camp settled by Syrian refugees, it was estimated that 53% of residents had anxiety disorders and 54% had depressive disorders (Carta et al,2015). Hence, Syrian refugees probably have existing PTSD prior to arriving in the United States; PTSD might be aggravated due to migration-related stress resulting in poor health status.

In conclusion, the FAO model might be fully adopted by our research excluding variables that might not be measured at the household level as they are not relevant for the circumstances in the United States. The excluded variables might include: disruption of food production, cut-off from market links and relief food, repressive political systems, degradation of natural resources, competition for resources, and decline in productivity.

We selected the variables relevant to our research and included the following variables: language spoken, employment, income, food support, household type, perception of healthy diet, eating habits before and after resettlement, and availability of preferred ingredients in markets.

Following the Food Security Model (FSM) questionnaire of the United States Department of Agriculture (USDA), we included in our modified model the following variables: prices of food, availability of food in households and equal distribution of meals among members of households (Bickel, Nord, Price, Hamilton, and Cook, 2000). Caring capacity, health services, and health status might be presented individually as in the model developed by Gross Rainer and colleagues (2000), different from other models that might contain these elements as factors influencing constructs.

Demonstration of the interactions between constructs and variables in the proposed model (Figure 1):

Identified constructs and variables that might have an impact on food insecurity after resettlement, might be categorized as recommended by Achieving Food Security and Nutrition booklet published by Inwent Capacity Building International Germany (Bokeloh et al, 2009).

Availability, Accessibility, and Utilization of food are physical elements, when stability is the temporal factor in the proposed model. Availability refers to the physical existence of food in the market place and in households at the household level, which is the area of the proposed study. It also includes food aid and domestic food stocks at

national level; however, these determinants will also be measured at household level in our target population of refugees.

Accessibility refers to an ensured state of having access to appropriate food for a nutritious diet among all of the individuals in a household. It recognizes different resources, including physical environment, social environment, cultural environment, and policy environment. At the household level, accessibility depends on capital, labor, knowledge, and prices.

Utilization refers to the ability to purchase, prepare, and consume a balanced meal that is distributed equitably among all members of the household. Utilization of food depends on knowledge and habits, if availability and accessibility are met sufficiently.

Stability is a temporal dimension in food security and refers to the time frame over which food security is sustainable. It has two categories: chronic food insecurity and transitory food insecurity. Two subcategories fall under transitory food insecurity, cyclical food insecurity and temporary food insecurity. Cyclical food insecurity happens regularly at certain periods of time. Temporary food insecurity results from shocks such as floods, droughts, war, etc.

In this model, food insecurity results from civil conflict and belongs to the category of temporary food insecurity despite staying sometimes over long periods of time. Hence, Syrian refugees in the United States might have temporary food insecurity.

Availability of Food access and Food support in the household might fall into the availability construct. Also in the same construct, a term of Existence of preferred

ingredients in market might be used to serve as determinant for the elements of availability of preferred ingredients in market and difficulty in recognizing food items in markets.

English proficiency will be used instead of the languages spoken and will be categorized under the accessibility construct, since this construct includes resources of the social environment. Employment status will be an alternate to labor along with the Level of income in the accessibility construct. Household type, as a combination of social and physical environments, might be categorized under the Accessibility construct as well.

Acculturation will be used in the accessibility construct, it will include the cultural environment, culturally-acceptable foods, unfamiliarity with a new environment, unfamiliarity with the American food system, inability to identify ingredients, and food system literacy.

Lastly, an element of Nutrition Knowledge might be added under the Utilization construct and will be comprised of perception of healthy diet, inability to identify ingredients on food labels, and ability to purchase and prepare a balanced meal. Similarly, an element of Dietary habit will replace eating habits and general food practice.

It is noteworthy to mention that Caring capacity has a direct effect on Health status. It is an underlying cause of malnutrition in which food insecurity is a major causal factor. It refers to the ability of caregivers to control all of the resources in order to meet the physical, mental, and social needs of children and other members in the households.

Stress, Knowledge, workload, and Numbers of members of the household are factors that influence the caring capacity. Moreover, Education level has a direct effect on this element, and inadequate education leads to inadequate care for women and children as per the United Nations Children's Fund (UNICEF) model for malnutrition released in 1991 (Jonsoon, 1992). Health service is an underlying cause of Nutritional status; access to health services might reduce chronic conditions and might improve overall health. Nutritional Knowledge of individuals has a direct influence on health service.

Sample Size

The study recruited a sample of 80 households from different cities in Florida. Cities were Miami, Orlando, Tampa, and West Palm Beach.

Statistical Analyses

Table 1 describes the dependent and independent variables tested in each chapter for each hypothesis and the statistical analyses used for each of the hypotheses.

Table 1: Statistical analyses of hypotheses

Hypotheses	Dependent Variable	Independent Variable	Statistical Analysis
Hypothesis 1a	Food security Categorical *Obtained from result of FSM-USDA	Households with fair/fluent English English proficiency in all of households Categorical variable *Obtained from questionnaires to self rate 4 parameters of English proficiency	-Fisher's exact test to determine differences in English proficiency in participants and to determine differences in food security in participants with different English proficiency in types of residence and cities -Logistic regression to determine effect of English proficiency on food security in

			types of residence and cities
Hypothesis 1b	Food security Categorical *Obtained from result of FSM-USDA	Education of women Women with high school diploma and higher Women without high school diploma Categorical variables *The two categories are obtained from demographic characteristics of women of households	-Chi square test and One way ANOVA test to determine difference in women's education in participants -Fisher's exact test to determine differences in food security in participants with different women's education levels in types of residence and cities -Logistic regressions to determine effect of women's education on food security in types of residence and cities
Hypothesis 1c	Food security *Obtained from result of FSM-USDA	Nutrition knowledge English proficiency Nutrition knowledge Continuous variable * Obtained from nutrition knowledge assessment questionnaire English proficiency Categorical * Obtained from a question to self-rate 4 parameters of English proficiency	-Chi square test to determine the difference in nutrition knowledge in participants. -Fisher's exact test to determine differences in food security in participants with different nutrition knowledge in different types of residence and cities -Logistic regressions to determine effect of nutrition knowledge on food security in different types of residence and cities -Interaction plot to demonstrate reaction between food security, nutrition knowledge and English proficiency
Hypothesis 2a	Food security *Obtained from the result of FSM-	Households with 2 employed family members Categorical variable *Obtained from demographic	-Fisher's exact test to determine differences in employment status in participants and to determine differences in food security in households with different employment status in different

	USDA	characteristics	types of residence and cities -Logistic regressions to determine effect of employment status on food security in different types of residences and cities
Hypothesis 2b	Food security *Obtained from the result of FSM-USDA	Households with children Households without children Categorical variables *Obtained from demographic characteristics	-Fisher's exact test to determine differences in households with and without children in participants, and to determine differences in food security in households with and without children in different types of residence and cities -Logistic regressions to determine effect of children in households on food security in different types of residence and cities
Hypothesis 3a	Food security Continuous and categorical variable *Obtained from the result of FSM-USDA	Perceived stress Continuous and categorical variable *Obtained from the result of PSS	-Two sample t test to determine the difference in PSS in participants in different types of residence -One way ANOVA to determine the difference in PSS in participants in different cities -Logistic regressions to determine effect of perceived stress on food security in different types of residence and cities
Hypothesis 3b	Food security Continuous variable *Obtained from the result of FSM-USDA	Perceived stress Continuous variable *Obtained from the result of PSS	Pearson correlation coefficient to determine the correlation between FSM-USDA score and PSS score

*Sources of variables,
FSM-USDA: Food Security Model-United States Department of Agriculture, PSS: Perceived Stress Scale

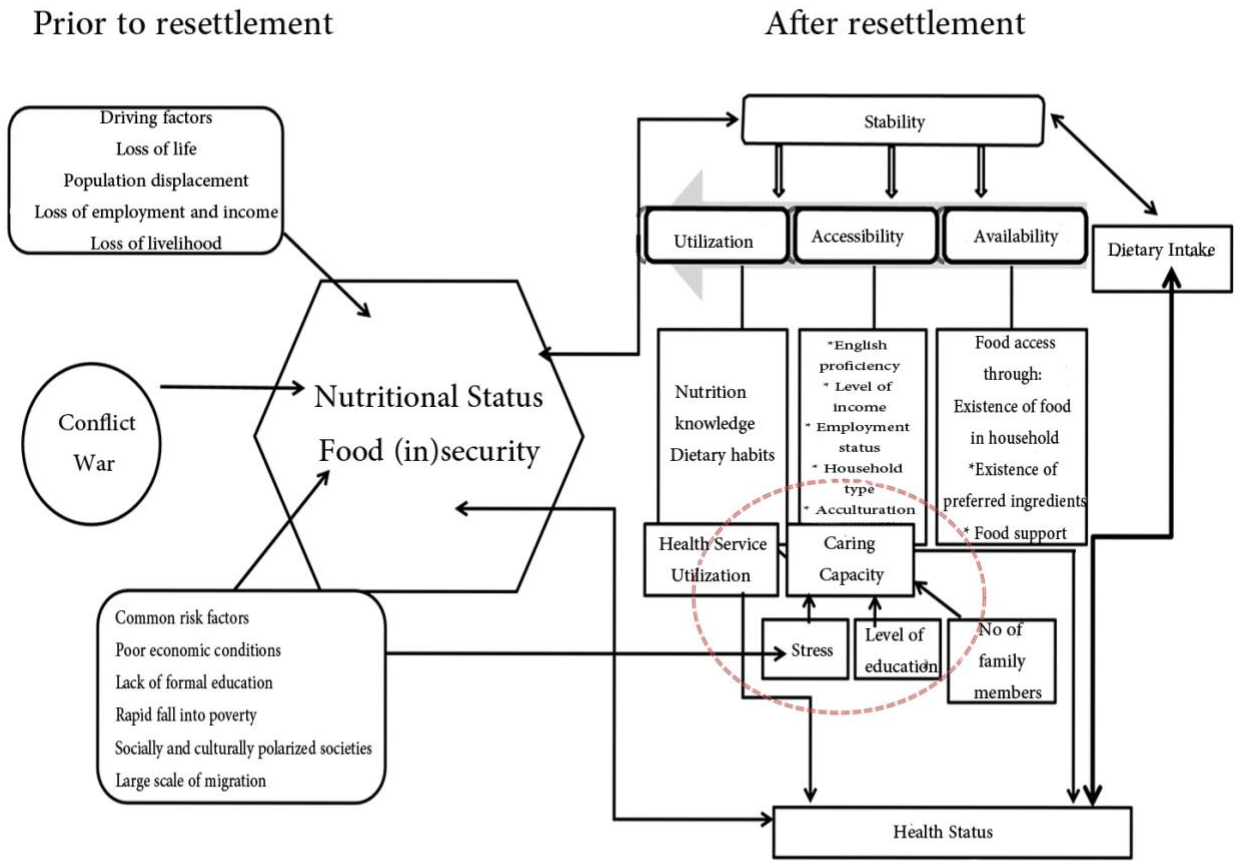

Figure 1: The model of food security and socioeconomic factors among Syrian refugees in Florida

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CHAPTER II: Literature review

Food insecurity in the United States:

Uncertain availability of nutritionally adequate and safe food for active life is defined as food insecurity. Millions of households in the United States are continuously affected by food insecurity; putting the individual health and public health in jeopardy (Holben, 2010). Food insecurity is a preventable public health problem; reported goals in Healthy People 2020 are eliminating very low food security, reducing hunger, and improving access to healthcare services among children in the United States. The dietary guidelines of 2015-2020 have made a connection between food insecurity and health outcomes (Holben, 2010).

The severity of food insecurity can be categorized into three levels: mild level at which there is a worry about future access to food, moderate level at which there is a worry about purchasing food of high nutritional values, and the severe level at which hunger and food shortage is expected. Households with children might more likely be at the severe level of food insecurity; records of USDA showed that one in six households with children were affected with food insecurity, and 16.5% of households with children were food insecure (Morrison, 2018). A study indicated that 19% of households with children were food insecure in the United States (Nunnery and Dharod, 2017). Parents tended to provide consistent food patterns to their children leaving themselves food insecure (Coleman, Rabbitt, Gregory, and Singh, 2015).

Families with a single parent might be more likely to be food insecure as well. In 2016, the prevalence of food insecurity was 31.6% among single mother households and

was 21.7% of single father households. On the other hand, the prevalence of food insecurity among households of multiple adults was 8% (Rabbitt, Coleman, and Gregory, 2017). The area of residence might contribute to food insecurity in the United States. In 2016, nonmetropolitan counties had the highest prevalence of food insecurity, 15%. The prevalence was 14.2 % in principal cities and was 9.5% in rural areas (Rabbitt et al, 2017).

The level of income might also be determinant for food insecurity in the United States. Households with an income below the federal poverty line constitute the majority of food insecure households. In 2016, USDA reported that 58.9% of food insecure households were families with low income (Rabbitt et al, 2017), and food insecurity was prevalent among 38.3% of households with low income (Morrison, 2018).

Underemployment, unemployment, and high housing costs were also associated with food insecurity (Holben, 2017). The national report of Feeding America network showed that 69% of the clients tended to tradeoff between food and utilities, 66% of tradeoffs were between food and medical bills, and 31% of tradeoffs were between food and education (Weinfield, Mills, Borger, and Gearing, 2014).

The likelihood of having chronic conditions increases the severity of food insecurity (Gregory and Coleman, 2017). The prevalence of predicted chronic diseases increased from 4.3% among high-food-secure households to 11.2% among low food-secure households (Gregory and Coleman, 2017). Sleep disorders, kidney diseases, diabetes, and human immunodeficiency virus infection were associated with food insecurity in the United States. Also, food insecure individuals had a high probability of having 10 chronic diseases: hypertension, hepatitis, stroke, cancer, diabetes, arthritis,

coronary heart disease, chronic obstructive pulmonary disease, and kidney disease (Gregory and Coleman, 2017).

Individuals living with food insecurity face more challenges managing their diseases (Gucciardi, Vahabi, Norris, Del Monte, and Farnum, 2014). Food insecure individuals tended to have poor glycemic and cholesterol control even when multiple confounders were controlled such as demographic and socioeconomic characteristics and clinical factors (Berkowitz, Baggett, Wexler, Huskey, and Wee, 2013). They tended to over-consume empty calories and nutrient-poor foods; an association between food insecurity and obesity was observed (Darmon and Drewnowski, 2015). Thus, food insecurity may lead to health-related challenges and may increase risk for developing chronic conditions (Wang, Min, Harris, and Khuri, 2016).

An examination of National Health And Nutrition Examination Survey (NHANES) data for 8,129 low-income individuals showed that food-insecure individuals received a lower score on a healthy eating index compared to food-secure individuals. Poor quality diet was associated with food insecurity and an increased risk of chronic diseases (Leung, Epel, Ritchie, Crawford, and Laraia, 2014).

Another NHANES data analysis for a sample of 2,171 individuals living in poverty showed that there was an association between nutrition knowledge and health risk, and this association might have been moderated by food insecurity. Nevertheless, nutrition knowledge was significantly associated with improved health outcomes only among food secure individuals (Lombe, Nebbitt, Sinha, and Reynolds, 2016).

When food security and nutrition knowledge were evaluated among families of limited resources in United States, primary caregivers of households were more likely to

overestimate their consumptions of different food groups except for grains. Also, 25% of this population needed an improvement in the consumption of calcium, folate, iron, vitamin A, vitamin C, and zinc. Although 81.3% of participants were able to identify high fat and high sugar foods, only 43.8% succeeded in identifying high fiber foods (Beretta, Koszewski, Bettes, and Benes, 2001).

Further research is needed to determine the impact of different environmental factors on food insecurity. A study suggested investigating the impact of local food prices, availability of transportation, social networks, and stress on food insecurity among individuals living in the United States (Larson and Story, 2011).

Food insecurity and refugees settled in the United States:

Food insecurity is usually observed among refugees based in the United States over a long period of time, which may cause negative health outcomes and health disparities (Nunnery and Dharod, 2017). In the US northeast region, 85% of the refugees experienced food insecurity compared to the national average, 14% (Coleman, Nord, Andrews, and Carlson, 2012). Again, a study found that 33% of refugees living in this country for more than 3 years were food insecure (Hadley, Zodhiates, and Sellen, 2007).

Four studies aimed to determine factors related to food insecurity among refugees in the United States, found that low income, low education level, and low acculturation were associated with food insecurity (Anderson, Hadzibegovic, Moseley, and Sellen, 2014; Dharod, Croom and Sady, 2013; Hadley, Patil, and Nahayo, 2010; Peterman, Wilde, Silka, and Bermudez, 2013). The studies indicated that a language barrier was a major contributor to food insecurity. Unfamiliarity with the newly adoptive environments had an influence on food insecurity; refugees who reported unfamiliarity with host

communities were 2.6 times more likely to be food insecure (Anderson et al, 2014;Dharod et al, 2013).

A correlation between food insecurity and level of income was observed; food insecurity was prevalent among 72% of refugees with low-income levels, less than $500 per month (Hadley et al, 2010). The prevalence of food insecurity was 31% among households whose income was more than $ 2000 per month (Hadley et al, 2010).

In contrast to the level of income, employment status was not associated with food insecurity among these refugees (Asgary and Segar, 2011). English literacy was significantly associated with food insecurity (Hadley et al, 2010); poor English language skill was a barrier to access healthcare services among African male refugees in New York city (Asgary and Segar, 2011). Interestingly, refugees who attended one year of education in United States were less likely to be food insecure (Hadley et al, 2010).

Independently of level of income, food-related environment might have an influence on food insecurity. Among refugees resettled in a city in the US Midwest, 46% reported difficulty in recognizing food items at grocery stores. Also 63% of the refugees demonstrated unfamiliarity with cooking methods of American foods (Hadley et al, 2010). Lack of knowledge about American food and ingredients present in packed food was common among 63% of refugees resulting in adopting a dietary pattern of low nutritional values (Hadley et al, 2010; Willis and Buck, 2007). There was excessive energy intake among 60% of Bosnian, Cuban, and Iranian refugees settled in the United States (Barnes and Almasy, 2005). Among Sudanese refugees, high protein and high starch foods contributed 75% of their total energy intake (Willis and Buck, 2007). Among a sample of refugee women resident in United States; 65% were more likely to

have a Body Mass Index (BMI) of more than 30, and food insecurity was associated with consumption of vegetables and fruits (Dharod et al, 2013). Food insecure refugees had a lower consumption of fruits and vegetables compared to food secure counterparts (Dharod et al, 2013). Interestingly, the likelihood of food insecurity was 70%-80% less when at least one serving of green leafy vegetables was consumed per day (Dharod et al, 2013).

The length of stay and age might contribute to dietary changes, which in turn lead to food insecurity in refugees resettled in United States. Studies agreed on the association between a shorter length of stay and food insecurity among refugees in the United States (Anderson et al, 2014; Dharod et al, 2013; Hadley et al, 2010; Peterman, 2013). Nevertheless, an increase in the length of stay in the United States was correlated with an increase in the consumption of added sugar, oils, seasoning, hot drinks, and vegetables (Patil, Hadley, and Nahayo, 2009). Another study found that there was an association between food insecurity and 80-82% reduction in fruit consumption among Somali refugees in the United States (Haldeman, Gruber, Ingram, 2011).

Numerous studies indicated that the refugees resettled in the United States experienced an increased consumption of sugar sweetened beverages and fast food (Barnes and Almasy, 2005; Patil et al, 2009; Rairdan and Higgs, 1992; Story &Harris, 1989; Story & Harris, 1988; Willis and Buck, 2007). When assessing the dietary intake among refugees of different age groups, adult refugees preferred their traditional diets and experienced difficulties in locating preferred foods, when teenagers preferred a combination of native and US foods (Wang et al, 2016). Refugees resettled in the United

States might experience a change in dietary intake leading to food insecurity and negative health outcomes (Wang et al, 2016).

An insight about Syrian refugees in camps before departure to the United States:

Syrians with disabilities and young children are more likely to be located in the United States (Zong and Batalova, 2017). Women and children accounted for 72% of the total Syrian refugees in the United States; children under the age range of 14 years and between the ages of 14-20 years constituted 47% and 12% of this population (Zong and Batalova, 2017). Children of Syrian refugees are at risk for mental health issues since 79% have experienced a death in their families, and 30% have been exposed to physical violence (Sirin and Sirin, 2015). Also, they fled the country during a key developmental period resulting in a large gap in their education (Sirin and Sirin, 2015). In 2013, it was estimated that 500,000-600,000 Syrian refugee children residing in the Middle East and North Africa had no access to formal education (UNHCR, 2013).

According to Centers for Disease and Control Prevention (CDC), Syrian refugees may suffer from different chronic conditions including hypertension, diabetes and cancer (CDC, 2016). A survey done among 1550 Syrian refugees in Jordan showed that every household had at least one member with an established chronic condition (Doocy, Lyles, Roberton and Akhuzaheya, 2015). There was an association between age and prevalence of chronic diseases in Syrian refugees in Jordan. The prevalence of hypertension, arthritis, diabetes, and cardiovascular disease was 10.7%, 7.1%, 6.1%, and 4.1% respectively among Syrian refugees surveyed in Jordan (Doocy et al, 2015).

While in Lebanon, of the 210 Syrian refugees surveyed, 22% reported high cholesterol and 15% reported chronic pain (Strong, Varady, Chanda, and Doocy et al,

2015). Digestive tract and neurological diseases were reported by 9% and 5% of Syrian refugees in Jordan and Lebanon respectively (Doocy et al, 2015; Strong et al, 2015). A study aimed to assess health status of Syrian refugee women in Lebanon found that 51.6% of women had dysmenorrhea and pelvic pain, 27.4% had anemia, 12.2% had hypertension, and 3.1% had diabetes (Masterson, Usta, Gupta, Ettinger, 2014).

Prevalence of anemia exceeded 40% among women and children of Syrian refugees in Zaatari camp, the largest Syrian refugee camp in Jordan that hosts 80,000 refugees (Bilukha, Jayasekaran, Burton, and Faender, 2014; Cultural Orientation Resource Center, 2014). The prevalence of anemia was 44.8% and 48.4% among women aged 15-49 years and children younger than 15 years old, respectively (Bilukha et al, 2014). A prevalence of anemia of over 40% among a particular population indicates significant public health concern, as per World Health Organization (WHO) (WHO, 2011). Moreover, the prevalence of malnutrition was 17% among Syrian refugee children in this camp (Bilukha et al, 2014).

Stress experienced prior to migration or post migration may be a causal factor for newly established chronic diseases among refugees. Medical intervention and monitoring are required to manage chronic diseases, if established prior to migration or as a consequence of migration (Ghammouh, AlSmadi, Tawalbeh, and Khoury, 2015). Syrian refugees might arrive with an initial health condition due to the previous exposure to stressful situations in their flight or stays in camps such as insufficient food supply, diseases, and malnutrition (Masterson et al, 2014). The Cultural Orientation Research Center stated that Syrian refugees living outside overcrowded camps have no access to clean water, health care, schools, and income-generating opportunities. It was estimated

that 500,000 Syrian refugees outside a camp in Turkey live in a challenging environment of poor facilities (Cultural Orientation Resource Center, 2014).

Syria became the second major source of refugees in 2013 on a global scale. Consequently, evaluating the prevalence of depression, Post Traumatic Stress Disorder (PTSD), somatic symptoms of anxiety disorder and physiological distress among Syrian refugees had become a research field of interest (Kazour, Zahreddine, Maragel, Almustafa, 2017). Different studies conducted among Syrian refugees in Lebanon and Turkey found that the prevalence of PTSD was 27.2% and 33.5% respectively (Alpak, Unal, Bulbul, Sagaltici et al, 2015; Kazour et al, 2017).

War-related traumatic injuries were commonly observed among Syrian refugees. One in 15 refugees in Jordan and one in 30 refugees in Lebanon suffered from war-related injuries (De Leeuw, 2014). War-related injuries might lead to depression, and it might affect the mental health status (Ghammouh et al, 2015; Kazour et al, 2017).

Severe emotional disorder was prevalent among 54% of 6,000 Syrian refugees residing in different countries including Lebanon, Turkey, and Jordan (Hijazi and Weissbecker, 2015). A cross sectional survey aimed at determining the depression tendency in Syrian refugees residing in Jordan, found that 30% of 765 participants suffered from depression. Among participants with depression, 35% had previous chronic conditions, and 40% had newly established chronic conditions (Ghammouh et al, 2015). The study stated that depression experienced by Syrian refugees might be a consequence of the exposure to traumatic events, food shortage, family loss, financial loss, and medication shortage (Ghammoh et al, 2015).

Syrian refugees from camps to the United States/Resettlement:

Refugees depart to the United States mostly from Syrian refugee camps in neighboring countries Jordan, Iraq, and Turkey. In addition, Syrian refugees have been placed in 1,700 locations all across Lebanon (Cultural Orientation Resource Center, 2014). The majority of Syrian refugees in the US speak Arabic as their native language, 96%, with 3% speaking Kurdish (Zong and Batalova, 2017).

Upon arrival to the United States, placement of refugees takes place with consideration of their health, age, family composition, and language. Also, cost of living, education, availability of housing and jobs, and health services are considerable factors in deciding the State of placement (Zong and Batalova, 2017). States of Texas, Michigan, and California resettled 30% of the total Syrian refugees located in the US.

As recommended by CDC, newly arrived refugees undergo multiple health assessment tests that include blood and urine screening including for anemia and sexually transmitted infections. Also adults over 35 years of age undergo lipid screening, cancer screenings, and other tests to detect chronic conditions (CDC, 2012). However, the longer-term healthcare services are limited (CDC, 2016), and refugees may not be aware of their eligibility to medical assistance programs upon arrival (Caulford and Vali, 2006). Because of inadequate English literacy and poor understanding of different governmental programs disadvantaged health outcomes may be experienced (Asgary and Segar, 2011; Reed and Barbosa, 2017). A study aimed to examine the health outcomes for refugees from diverse geographic areas found that refugees were 2 times more likely to have chronic conditions than non-refugee immigrants (Reed and Barbosa, 2017). Another study confirmed that refugees living in the United States had increased rates of chronic

diseases including obesity, diabetes, hypertension, and malnutrition (Yun, Herbrank, Graber, Sullivan, and Chen et al, 2012).

Moreover, refugees may be placed in states that have challenges with Medicaid expansion, the medical assistance program that refugees are eligible to apply for upon arrival. Agrawal and Venkatesh found that 40% of the refugees were located in states that had no Medicaid expansion. Thus, a delay in obtaining health insurance may be experienced leading to a challenge in managing chronic diseases, if those existed pre-settlement (Agrawal and Venkatesh, 2016).

Education and Syrian refugees:

Before the war, Syria was well known for having the strongest education program in the Middle East. Most Syrians attended primary school, and 72% of Syrians of secondary school age were enrolled before the war. The dropout rate from secondary school was common among girls (Cultural Orientation Resource Center, 2014). In 2013, the school attendance rate decreased to 6%, because many schools were destroyed or were used by armed groups or as shelters for displaced individuals. Lack of resources and teachers contributed to this decline as well (Cultural Orientation Resource Center, 2014). An initial survey by UNHCR among 1,245 Syrian refugees resettled in Greece revealed a profile of a highly skilled population (Murray, 2015). The result of this survey showed that 78% of refugees were students under the age of 35 years, 86% had an education level of secondary school and higher and 50% had a university degree (Murray, 2015).

English proficiency and Syrian refugees:

Following the Education First English Proficiency Index (EPI) to classify 80 countries based on the English proficiency of their populations, Syria fell in the lowest category of very low proficiency (EF, 2017). The Cambridge Center for Social Innovation estimated that 50% of Syrian refugees might have good English literacy; however, Syrian refugees should learn English in camps, and English training should be provided by responsible organizations (Aaron, 2015). Therefore, Syrians arriving to the United States might have little or no English proficiency.

The Center for American Progress indicated the ability of Syrian refugees to learn English based on the success of Syrian immigrants at learning English. Syrian immigrants living in United States for more than 10 years have the greatest rate of good English proficiency among overall immigrants, 57% versus 52%. It was estimated that 52% of Syrian immigrants living in the United States for more than a decade speak only English at homes (Kallick, Roldan, and Mathema, 2016).

Nutrition knowledge and Syrian refugees:

To our knowledge, there has not been a study conducted to determine the level of nutrition knowledge among Syrian refugees in United States. In order to evaluate the nutrition knowledge in Syria, a 110-item Parameter and Wardle nutrition knowledge questionnaire was distributed to 990 students from different universities all over Syria. Students with greater academic performance had a greater score, 40.16, among all participants (Labban, 2015). Also, students enrolled in health-related programs had a score of 41.23, whereas students enrolled in other programs had a score of 36.86. The study concluded that Syrian students had low nutrition knowledge with a total score of

37.14, compared to the total scores of 98.9 and 60.1 perceived by Parameter and Wardle in dietetics students and computer science students respectively (Labban, 2015).

In fact, immigrants to United States might have had originally healthier dietary patterns compared to their adopted pattern after resettlement. In United States, they might tend to increase the consumption of calorie-dense foods; they might become acculturated to poor eating habits due to their poor nutrition knowledge. The improvement of diet quality has been associated with the availability of nutrition knowledge, budgeting skill, and food resources in households of limited resources in US (Rondinelli, Morris, Rodwell, and Moser et al, 2011).

Gender role, employment status and Syrian refugees:

The socioeconomic status, the family, and area of residency determine the gender role among Syrians. The majority of Syrians believe that women are in need of men's protection. The majority of women are housewives; men are responsible for financial support. Syrian women with high socioeconomic status tend to work; women with lower educational levels tend to stay home as housewives, and women with low-income status may do low-wage jobs to support the family (Syrian Cultural Practices, 2016). This may increase the unemployment rate among Syrian refugees since the majority arriving in the United States are women and children (Zong and Batalova, 2017).

After surveying Syrian refugees arriving in Greece, the occupations have varied from high level profession to low skill workers, 16% studying, 9% merchants, 9% carpenters, 9% electricians, 7% plumbers, 7% engineers, 5% medical doctors, and 4% pharmacists (Murray, 2015). Also, most Syrian refugees in Jordan work in lower-skill jobs such as agriculture and hospitality. Most of the Syrian refugee women in Jordan

belong originally to a rural area called Daraa, where the notion of employed women is culturally unacceptable (Hunt, Samman, and Mansour, 2017). Despite 17% of Syrian refugee women in Jordan having previous work experience in Syria, only 3% have applied for or have held a work permit in Jordan. Lack of awareness, the high cost of a work permit fee, and cultural norms have become obstacles for not seeking work permits among this population (Hunt et al, 2017).

In an attempt to investigate the gender role amongst Syrian refugees, UNHRC surveyed 135 Syrian refugee women, for whom war-related circumstances such as the loss of spouse forced them to take full responsibility for their families (UNHCR, 2014). An expression of the feeling of insecurity was demonstrated by 60% of the women surveyed. Also, 30% of 135 surveyed Syrian refugee women reported fear of leaving home (UNHCR, 2014). As reported by UNHCR in 2014, there were 145,000 Syrian refugee women who took the sole responsibilities for their families after loss of their spouse in the war (UNHCR, 2014).

In Jordan, the United Nations International Children Emergency Fund (UNICEF) Next Generation program has a goal of assisting Jordan to provide work opportunities to 1,300 Syrian refugee women. The program aims to empower vulnerable Syrian refugee women through education and to provide them with protection services and critical healthcare packages (UNICEF, 2017; UNHCR, 2014).

Health belief and Syrian refugees:

Syrians appreciate the philosophy of western medical schools; they tend to follow physicians' instructions (Cultural Orientation Resource Center, 2014). This might increase the adherence to medication and treatment. The preference to be consulted by

the same gender health profession is a norm (Syrian Cultural Practice, 2016). Sexual-related concerns including diseases are private issues that should be discussed with care (Cultural Orientation Resource Center, 2014; Syrian Cultural Practice, 2016). A UNHCR report showed that Syrian refugee women were not prepared to discuss sexual and gender based violence (Sleiman, 2014). Because of a religion related concern, a preference for a female gynecologist is common amongst most of the Syrian women. This might cause a delay in physician appointments.

Previously used models to study food insecurity:

Model 1: The Interface between food insecurity and violent conflict developed by the Food and Agriculture Organization (FAO) of the UN, (FAO, 2002):

Food insecurity has a complex nature that might be extended to include violent crisis and conflict as casual factors. A relationship between food insecurity and violent conflict might be observed when developing a food insecurity framework in a war situation. Victims of war including refugees, war widows, war orphans, female-headed households, migrant workers and their families are classified as vulnerable groups by the Food Insecurity and Vulnerability Information and Mapping System (FIVIMS) of FAO (FAO, 2000; FAO, 2002).

Food insecurity might be affected by different variables and conditions prior to and post resettlement. Prior to resettlement, it might be a result of multiple predisposing conditions that include war, conflict, and war-related deterioration of resources: (poor economic status, lack of formal education, rapid fall in poverty, socially and culturally polarized societies, and large scale migration) (FAO, 2002). Other predisposing

conditions might be loss of life, population displacement, loss of employment and income as well as loss of livelihood (FAO, 2002).

The participants of the proposed research would be victims of violent crisis and would have become refugees in United States. Therefore, the interface between food insecurity and war conflict in the FAO model (Figure 1) might be applied into the proposed research. In addition, the demonstrated interaction between predisposing conditions and food insecurity in the FAO model might be adopted as well (FAO, 2002). Model 2: The Conceptual Framework of Food Security developed by Inwent Capacity Building International, Germany (Bokeloh et al, 2009):

The conceptual framework of food security was developed by Inwent Capacity Building International Germany on behalf of the Federal Ministry of Economic Cooperation and Development (Figure 2). This model became part of a comprehensive framework suggested to guide the work of professionals in different environments including political, social, cultural, and economical (Bokeloh et al, 2009).

It was developed in response to the failure in meeting one of the First Millennium Development Goals, which was to halve world hunger by 2015. Tremendous programs were developed to combat hunger as part of the First Millennium Development Goals; food and nutrition insecurity was the main focus of these programs. Authors stated that conflicts and crises were reasons for hunger and malnutrition; however, structural deficits within countries was a reason for 90% of hunger worldwide (Bokeloh et al, 2009).

Model 3: The conceptual framework of the nutritional status at household level developed by Gross Rainer and colleagues (Gross, Schoenebreger, pfeifer, and Preuss, 2000):

This model was developed by Gross Rainer and colleagues in 2000 following the United Nations Children's Fund (UNICEF) model of 1900s. It aimed to demonstrate a simplified notion of the link between nutritional status and ecological systems at household level (Gross et al, 2000). Poor health status might be a result of poor healthcare access and poor dietary intake. Identifying an exact reason for food insecurity might be necessary in order to develop an accurate and measurable intervention, if needed (Gross et al, 2000).

Health service utilization and caring capacity might influence health status; on the other hand, the number of family members, level of education, and stress might have an influence on caring capacity. Stress might be a factor prior to and after resettlement; it might act as predisposing factor and as compounding variable respectively.

The interaction between different variables demonstrated in this model (Figure 3) might be adopted in order to determine the main contributors to food insecurity among Syrian refugees in Florida. Therefore, food insecurity may be the result of different predisposing factors and different causal factors in different circumstances (FAO, 2002). Syrian refugees resettled in United States may be at risk of food insecurity; it may be experienced due to an interaction between a cluster of predisposing factors prior to resettlement with multiple challenges after resettlement.

Predisposing factors include war, loss of life, displacement, war-related stress, migration-related stress, and traumatic events (Berti, 2015). Challenges may include, but not be limited, to poor acculturation skills, language barriers, level of education, nutrition knowledge, type of household, number of family members of households, and employment status (Coleman et al, 2016; Hadley et al, 2010; Rondinelli et al, 2011). Development of a food insecurity model that addresses different contributors and demonstrates the interactions of these contributors will be used to meet the objective of the proposed research, and to assess the nutrition knowledge of the target population and its relationship to other variables.

Figure 1: FAO model: The interface between food insecurity and violent conflict

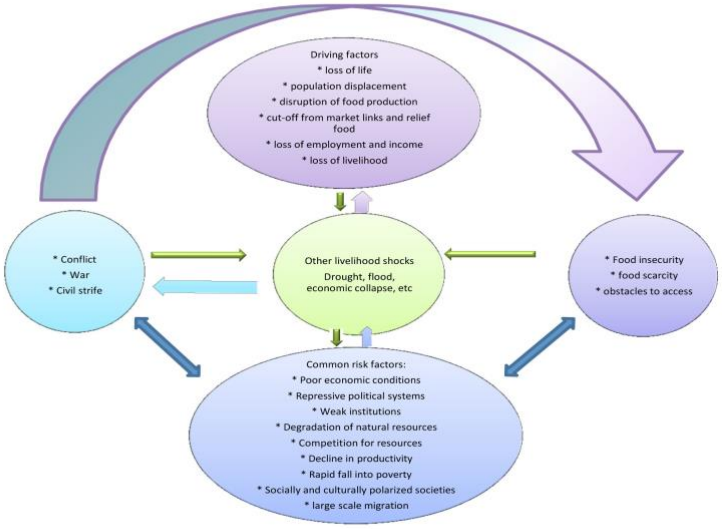


Figure 2: The Conceptual Framework of Food Security

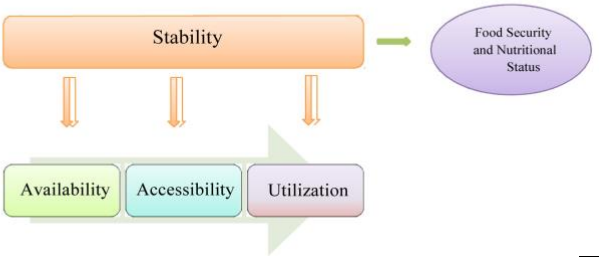
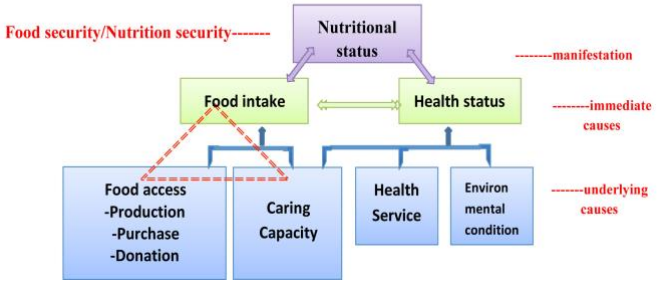


Figure 3: The conceptual framework of the nutritional status at household level



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Chapter III: The Effect of Nutrition Knowledge, English Proficiency, and Women's Education on Food Insecurity Among Syrian Refugees in Florida

Title: The effect of nutrition knowledge, English proficiency, and women's education on food insecurity among Syrian refugees in Florida.

Abstract

Objective: To measure food security and determine whether food insecurity might be associated with nutrition knowledge, English proficiency and education of Syrian women from the participating households.

Design: Semi-structured interview questionnaires were administered to 80 households of Syrian refugees residing in Florida. Included cities were Miami, West Palm Beach, Orlando and Tampa.

Settings and subjects: Syrian refugees who have resettled in Florida since 2011 were interviewed in one-on-one 45-minute sessions.

Main outcomes: Food security, levels of food insecurity, nutrition knowledge, English proficiency, women's education

Results The mean of food security score was 4.7± 2.6 among participating households. There were significant ($p=0.02$) differences between levels of food insecurity in rural and urban areas. We found a significant ($p=0.008$) relation between levels of food insecurity and nutrition knowledge, when households were grouped into "poor" nutrition knowledge and "fair-good" nutrition knowledge. Our two logistic regression models comparing Syrian refugees in rural and urban areas, showed that households in rural areas had 79.9% less odds to be food secure than those in urban areas, odd ratio= 0.201, 95%

CI: 0.053-0.758, p= 0.01. When English proficiency and education were included in the models of food insecurity, they were not significant. Our interaction plot suggested that households with a nutrition knowledge score of >45, tended to have greater English adequacy and were significantly more food secure.

Conclusion: Most of households, 80%, were food insecure; levels of food insecurity were greater in rural areas than in urban areas. Syrian refugees living in rural Tampa were more food insecure compared with other cities in Florida. Most Syrian refugees had fair nutrition knowledge, but it was significantly different among cities as well as in rural and urban areas. English proficiency, nutrition knowledge, and education of women may be less important than location on food security in this population. Our interaction plot, however, demonstrated the potential effects of these variables on food security.

Introduction

Syrian refugees are vulnerable families who have been forced to flee their homeland because of an ongoing war and war-related violence. (USA for UNHCR, 2018). As of April 2019, the records of the United Nations High Commissioner for Refugees (UNHCR) showed that the total number of registered Syrian refugees was 5,648,002. The United States (US), as the largest resettlement country worldwide (Vahabi, Damba, Rocha, and Montoya, 2011), 2011) has hosted 21,353 Syrian refugees since June 2011, as per the report of the Refugee Processing Center (RPC) overviewed in April 2019.

The United States has multiple governmental programs with the objective of encouraging newly resettled refugees to experience self-reliance in a short period of time. The government expects that self-sufficiency is achieved within 8 months from arrival to

the United States. The Cash and Medical Assistance programs, which are administrated by the Department of State Office of Refugee Resettlement, reimburses states with 100% of services provided to refugees during the first 8 months of arrival (US Department of Health and Human Service, 2018).

Even though newly arrived refugees are supported with basic life needs during their initial stay in United States, studies have showed that such a population is at risk of food insecurity (Hadley, Patil, and Nahayo, 2010; Nunnery and Dharod, 2017). Food insecurity may be experienced due to socioeconomic parameters that may become barriers to access quality of life-promoting resources among refugees in this developed country (Hadley et al, 2010) or because food assistance becomes inadequate after the first 8 months.

Language and education may contribute to difficulties in navigating the US system and US food-related environment (Hadley et al, 2010). Limited nutrition knowledge may be a non-economic challenge that becomes a barrier to access to culturally appropriate food and health services (Cottrell, 2006). Refugees who reported difficulties in navigating the food environment were more likely to have high food insecurity in United States (Coleman JA, Nord M, Andrews M, and Carlson S, 2012; Hadley et al, 2010).

The demographic characteristics of Syrian refugees on arrival in the United States indicated that only 0.03% of this population spoke English. Less than 1% of Syrian refugees achieved a graduate level of education, 4.62% earned some university credits or university degree, 1.92% finished technical school, and 10.15% completed high school (RPC, 2019). This statistical breakdown by RPC leads to an expectation of a low

education profile and poor English literacy in Syrian refugees upon arrival to the United States.

We hypothesized that food insecurity was going to be detected among Syrian refugees in Florida. English proficiency and level of education were proposed as predictors to food insecurity in this population. Although the literature did not provide information on nutrition knowledge in Syrian refugees, nutrition knowledge was proposed as a predictor to food insecurity as well. The primary objectives were to measure food insecurity in 80 Syrian refugee households residing in Florida, and to determine whether English proficiency, education of women, and nutrition knowledge would be socioeconomic predictors to food insecurity among Syrian refugees.

Methods

Research model

The food security and socioeconomic factors model for Syrian refugees in Florida was developed (Figure 1) as a result of merging three food insecurity models developed by three different organizations. The models used are the Interface between Food Insecurity and Violent Conflict by the Food and Agriculture Organization (FAO) of the UN (FAO, 2002), the Conceptual Framework of Food Security and Nutrition developed by Inwent Capacity Building International Germany on behalf of the Federal Ministry of Economic Cooperation and Development (Bokeloh et al, 2009) and The Conceptual Framework of The Nutritional Status at Household Level developed by Gross Rainer and Colleagues in 2000.

This particular research had a main concept that included food insecurity and nutrition knowledge among Syrian refugees. In reality, socio-demographic characteristics, including level of education and language literacy, contributed to difficulties in utilizing services among refugees living in the United States (Mansha, Rene, Bhuttu, and Rooshey et al, 2014). The effect of English proficiency and education of women on food insecurity were also examined in our research.

The core of our model consisted of four main constructs: Utilization, Accessibility, Availability, and Stability (Bokeloh et al, 2009). Utilization refers to the ability to purchase, prepare, and consume a balanced meal and depends on knowledge and habits. Thus, we included the variable of Nutrition Knowledge under the Utilization construct. The variable of English proficiency was utilized and categorized under the Accessibility construct, since this construct included resources of the social environment. Inadequate education led to inadequate care for women and children as per the United Nations Children's Fund (UNICEF) model for malnutrition released in 1991 (Jonsson, 1992). Therefore, we utilized Women's education as a contributing factor that might have an effect on Accessibility and Utilization in our model. Stability is a temporal dimension in food security and refers to the timeframe over which food security is sustainable. Stability occurs when consistency in availability, accessibility and utilization is experienced. In conclusion, we examined the effect of Nutrition

knowledge, English proficiency, and women's education on food insecurity (Figure 2).

In addition, other variables were considered during the course of data collection in order to measure food security and levels of food insecurity. Following the Food Security Core Model (FSM) by the United States Department of Agriculture (USDA), we included: Prices of food, Food access and Availability of food in households and equal distribution of meals among members of households (Bickel, Nord, Price, Hamilton, and Cook, 2000). These elements were included under the Availability construct. We also included Household Type in this research, which was listed under the Accessibility construct as a combination of the social and physical environment. Our objective with this inclusion was to determine the differences of food insecurity in different areas and cities of residence on food insecurity.

Design

Two semi-structured interview questionnaires that aimed to measure food security and to assess nutrition knowledge were compiled and administered to Syrian refugees living in Miami, West Palm Beach, Orlando and Tampa. The interviewer spoke Arabic, which was the native language of interviewees. The approval of Florida International University Institution Review Board (FIU-IRB) was obtained, and English and Arabic versions of informed consents were developed and approved by FIU-IRB.

Initially, Syrian refugees were recruited with the assistance of the leaders of Syrian immigrant community in Miami. Word of mouth was adopted eventually as another strategy to recruit our participants in West Palm Beach, Orlando, and Tampa.

Tampa residents were mainly located in rural areas, while those in Miami, West Palm Beach and Orlando were mainly urban dwellers.

The purpose of the research was communicated to the community leaders and participants. The participants were Syrian refugees of 80 households who met the inclusion criteria and agreed to be interviewed. The inclusion criteria were households of displaced Syrians in Florida who were originally registered by the United Nations (UN) as refugees and resettled in the United States after the beginning of Syrian war in 2011.

Displaced Syrians who arrived in Florida after 2011 but were not registered by the UN were excluded. Syrian immigrants with different visa documentations besides asylum seekers with Syrian nationality residing in Florida were excluded as well.

Semi-structured interview questionnaires

Food security, Food security status, nutrition knowledge, English proficiency, and women's education in participating households were collected. Multiple questionnaires were compiled into a comprehensive questionnaire with the objective of measuring food insecurity and nutrition knowledge. As part of the demographic characteristics, information about English proficiency and women's education was collected. Gender, city of residence in Syria, location of transitional period, month and year of arrival to the United States, type of households, number of children and employment status were collected (Appendix 3). In one-on-one sessions, the comprehensive questionnaire was completed in an average of 45 minutes per session. It is worth to nothing that such questionnaires triggered further explanations from interviewees; comments and information obtained were documented for future qualitative analysis. We also obtained

data on other variables that were involved in our model to be examined and analyzed based on conclusions drawn from a comprehensive literature review.

Food security

The FSM-USDA model was adopted; it included 15 questions with an additional 3 subsequent questions providing a comprehensive understanding about food intake and food supply of households during the past 12 months (Bickel et al, 2000) (Appendix 4). The questions covered the behavioral and psychological responses to circumstances of food shortage or insufficient financial resources.

The construct of questions directed interviewees to answer either affirmatively or negatively. The three options of answers were always true, often true, or never true besides the option of a refusal to answer. In addition, subsequent questions aimed to detect frequencies of events, if responses were affirmative. For instance, an affirmative response to an adult having to cut or skip meals due to insufficient food was followed by a question about the frequency of occurrence, two months or less or three months and more during the past 12 months. To capture clearly the outcomes of questions and responses of participants, we presented the results on Appendix 1.

Following the scaling system of the FSM-USDA model, every affirmative response of either always true or sometimes true was given 1 point. A total score of 10 points was given to households without children, and a total score of 16 was given to households with children. Food insecurity was classified into 3 levels of severity; a greater number of affirmative responses indicated greater severity of food insecurity. In all of the households, a score of ≤ 2 was classified as food secure. In households with children; a score of ≥ 3 to ≤ 7 was classified food insecure without hunger, a score of ≥ 8 to

≤12 was classified moderate food insecure with hunger, and a score of >12 was classified as severe food insecure with hunger. In households without children; a score of ≥3 to ≤5 was classified food insecure without hunger, a score of ≥6 to ≤8 was classified moderate food insecure with hunger, and a score of >8 was classified as severe food insecure with hunger.

Nutrition knowledge

The questionnaire was adopted from a study that aimed to measure nutrition knowledge, dietary behavior, and nutrient intakes of Hispanic adolescent females by Parga, 1999 (Appendix 5). The original questionnaire included 30 items to assess different aspects of nutrition knowledge including healthy eating habits, vitamins and minerals, dietary intake in relation to chronic diseases, and the individual's perception toward body image and weight change status.

This questionnaire was modified to simplify questions about the nutrition concepts that were assessed. Vitamins were identified with their simple alphabetical names instead of generic names, vitamin C replaced ascorbic acid, vitamin B1 replaced thiamin, and vitamin B2 replaced riboflavin.

Questions regarding body image and weight changes tended to be subjective in nature; they were excluded from the nutrition knowledge assessment. Responses to such questions were obtained, because they might allow the use of weight change as a confounding variable in the context of acculturation and health status in future research.

The questionnaire was translated and back-translated, English to Arabic and Arabic to English, by two bilingual Syrian immigrants to ensure the accuracy of translation. In order to validate the cultural appropriateness, a pilot study was conducted

through voluntarily participation of six Syrian immigrants who arrived to the United States after 2011. The result of the pilot study showed that newly arrived Syrians might be unfamiliar with Thousand Island dressing although they might consume alternative products. The general term of creamy salad dressing was used amongst the choices given to assess knowledge of high-fat food.

Seven questions on healthy diet content, sources of macronutrients, adolescence nutrition, and alcohol intake were utilized to assess healthy eating practice.
Questions to assess knowledge on vitamins and minerals included 10 questions about toxicity of vitamin supplements, function of antioxidants, and the best sources of the following nutrients: calcium, iron, vitamin D, vitamin B12, and folic acid.
Knowledge on dietary intake in relation to chronic diseases was assessed with a total of 8 questions: 2 questions on fiber intake and the function of fiber, 2 questions on fat intake and obesity, and 4 questions on different types of fat and prevention of heart disease.
A score of 4 points was assigned to a question with a correct answer, and a score of zero was given to incorrect answers or refusal to answer. A total of 100 points was the maximum possible score. A score in the average between 0 - ≤25 was considered poor nutrition knowledge, a score of 26 - ≤50 was considered fair nutrition knowledge, a score of 51 - ≤75 was considered good nutrition knowledge, and a score of (>75) was considered high nutrition knowledge.

English proficiency

In the demographic section of the compiled questionnaire, a self-rating for the four components of English proficiency was requested. Components of writing, reading, speaking and comprehension were rated as poor, fair, good, and fluent. Afterwards, a rate

of fair or greater in two components was classified as adequate English. English proficiency was measured as adequate English and inadequate English according to the result of the self-rating by the participants.

Women's education

In the demographic section of the compiled questionnaire, the academic level of women in households was questioned. Level of education was classified into three categories: (1) incomplete high school, (2) completed high school or (3) greater than high school. The first category, incomplete high school included women who reached high school level but did not earn the diploma, those who finished intermediate school and women who finished primary school. The second category included women who completed high school and earned a high school diploma, and the third category included those who reached some university level and/or women who earned a university degree.

Statistical analysis

SAS studio University Edition was used for all statistical analyses. Descriptive statistics, one-way frequency and table analysis were used to identify Syrian refugees in regards to demographic characteristics and variables of interest. Fisher's exact test and Chi Square tests were utilized to determine the association between food security, levels of food insecurity and predictors of interest in urban and rural areas as well as in cities of residence. Similarly, the associations between food security status and our predictors were determined applying Fisher's exact test and Chi Square test. The predictors were nutrition knowledge, English proficiency, and women's education. Binary logistic regression and an interaction plot were conducted to examine effects of predictors on food security status in rural and urban areas and in cities of residence.

Results

Tables 1 and 2 demonstrate selected demographic characteristics of our participants including gender, nutrition knowledge, English proficiency, and women's education. Appendix 1 presents the result of the 16-item FSM-USDA questionnaire among all of the households. Tables 4, 5 and 6 present the levels of food insecurity and food security status in these households in different residences and cities.

Food security

Of the 80 households, 20% were food secure while 80% of households experienced food insecurity at different levels, the mean of FSM-USDA score was 4.7± 2.6. Households of Syrian refugees in rural areas (n=43) were moderately food insecure with hunger (5.00 ± 2.4), and Syrian refugees in urban areas (n=37) were food insecure without hunger (4.50 ± 2.8). Fisher's exact test showed significant differences between the levels of food insecurity in rural and urban areas, p=0.02, (Table 5). When households were categorized into food secure and food insecure in the two different settings, there were also significant differences between food security status amongst households in rural and urban areas, p=0.009, (Table 7). Similarly, Fisher's exact test showed there were significant differences in the levels of food insecurity in the 4 cities, p=0.04, (Table 6). This test also showed significant differences in food security status amongst households in the four cities, p=0.02, (Table 7). Figure 4 shows the distribution of food security among the cities, and it shows that Tampa had the highest number of food insecure households.

Nutrition Knowledge

Among the total households, 10 (12.5%) had poor nutrition knowledge, 46 (57.5%) had fair nutrition knowledge, and 24 (30%) scored good nutrition knowledge. The mean nutrition knowledge score (42.0± 13.6) indicated that Syrian refugees had fair nutrition knowledge. The Chi square test showed a significant difference in nutrition knowledge in urban and rural areas, p=0.04, (Table 2). It also showed a significant difference in nutrition knowledge in the participating households in the four cities, p=0.02, (Table 3).

Fisher's exact test showed that there were no significant differences in food security status among households with different nutrition knowledge p=0.6, (Table 7). It showed marginal differences, however, between the levels of food insecurity in households with different nutrition knowledge, p=0.08, (Table 8) (Figures 6 and 7). When households were grouped into "poor" nutrition knowledge and "fair-good" nutrition knowledge; there was a significant relation between the levels of food insecurity and nutrition knowledge, p=0.008, but there were not significant differences in food security status, p=0.4, (Table 9) (Figure 8). Additionally, households were classified by hunger status, Fisher's exact test did not show significant association between hunger status and nutrition knowledge, (p=1.0), (Table 9).

English Proficiency

One-way frequency showed that 60 (75%) of households had inadequate English and 20 (25%) had adequate English. In rural areas, the frequency of inadequate English was 35, which accounted for 81.4% of households in these areas. English proficiency was significantly different in households of rural areas, student *t* test, (p=0.003). Only 8

households, 18.6%, had adequate English in rural areas. Again, the frequency of households with inadequate English was higher than the frequency of adequate English in urban areas, 25 (67.57%) versus 12 (32.43%), student *t* test, (p=0.0002). Fisher's exact test showed that there were no significant differences in English proficiency in rural and urban areas, (p=0.2), (Table 2).

When one-way frequency for English proficiency was categorized based on city of residence, the frequency of adequate English was 8 (44.4%) in Miami, 3 (30%) in West Palm Beach, 1 (11.1%) in Orlando, and 8 (18.6%) in Tampa. Fisher's exact test did not show that there were significant differences in English proficiency in different cities, (Table 3). Households were grouped into households with adequate English (n= 20) and households with inadequate English (n=60); Fisher's exact test did not show significant differences in food security status among households with different English adequacy, (Table 7). Similarly, there were no significant differences in the levels of food insecurity in households with different English adequacy, (Table 8).

Women's education

Twenty three point seven percent of Syrian refugee women had an education level of high school diploma or higher, when 76.3% did not complete their high school education. When categorized by types of residence, the percentage of women who completed high school was higher in urban areas compared with rural areas, 35.14% versus13.95%. The Chi square test showed that there were significant differences in the levels of women's education in rural and urban areas, (p=0.03), (Table 2). Based on city of residence, the percentage of households with women who completed high school were 44.4%, 20.0%, 33.3% and 13.95% in Miami, West Palm Beach, Orlando and Tampa

respectively. The differences of women's education in different cities were marginally significant based on one-way non-parametric ANOVA, (p=0.07), (Table 3). Nevertheless, Fisher's exact test did not show significant differences either in food security status or in the levels of food insecurity when households were categorized by two levels of women's education, p=1.0, p=0.3 respectively (Tables 7 and 8). Afterward, households were categorized into 3 classes of women's education: (women with incomplete high school, women who completed high school diploma, and those with some university/university degree). Households with women's education of some university/university degree constituted n=8 (10.0%) of our sample, households with women's education of completed high school constituted n=11 (13.75%), and households with women's education of incomplete high school constituted n=61 (76.25%). Fisher's exact test did not result in significant differences in food security status among households categorized by 3 classes of women's education, (Table 7). It did not show either that there were significant differences in the levels of food insecurity, (Table 8).

In regards to hunger status, all of the households with women's education of some university/university degree were of households without hunger, either food secure or moderately food insecure without hunger, n= 8(10.0%), Figure 5. Nevertheless, Table 10 showed that Fisher's exact test did not result in significant differences in hunger status when households were classified by two levels and three levels of women's education.

Women's education and English Proficiency

It is noteworthy to mention that the percentage of women with adequate English was higher among women in the group of completed high school than in the group of women with incomplete high school 63.16% versus 13.11%. Among women with

completed high school, there were n=12 (63.16%) with adequate English and n=7 (36.84%) with inadequate English. In contrast, the frequency of inadequate English was greater than the frequency of adequate English in women with incomplete high school, n=53 (86.89%) versus n=8 (13.11%). Fisher's exact test showed that there were significant differences between the two groups, $p \leq 0.0001$. This led to examining the association of food security with women's education and with English proficiency.

When English adequacy was controlled, one-way frequency showed that the total number of households with adequate English was n=20. There were no significant differences in food security status in the two groups of households, (Table 11). There were no significant differences in the levels of food insecurity in these groups either, (Table 12). Similarly, there were no significant differences in hunger status in households with different levels of women's education when English adequacy was controlled, (Table 13).

Regression models

The results of multivariate logistic regression models showed that type of residence had an inverse significant effect on food security, which remained significant after controlling for English proficiency, nutrition knowledge, and women's education, (Table 14). These results revealed that Syrian refugees in rural areas had 79.9 % more chance of being food insecure compared with urban areas, odd ratio= 0.201, 95% CI: 0.053-0.758, p= 0.01, (Table 14).

Nevertheless, all four cities showed significant effect on food security status in households of Syrian refugees; Tampa refugees had significantly higher food insecurity compared with West Palm Beach and other cities, (Odd ratio: 0.103, 95% CI: 0.020-

0.514, p=0.006), therefore, Tampa had 89.7% greater chance of having food insecure households compared to other cities (Table 15-Model 1). After adjusting for covariates, Tampa was the only city with high probability of food insecurity among refugees when compared with West Palm Beach, Tampa refugees were 7.4 times more likely to be food insecure, and refugees living in Tampa had 90.4% higher risk of being food insecure than in other Florida cities (odd ratio=0.096, 95% CI: 0.017-0.530, p=0.007, (Table 15-Model 2).

Lastly, an interaction plot that included a nutrition knowledge score, English adequacy and food security suggested that food security would be more likely to occur when households had a higher score in nutrition knowledge and greater English proficiency (Figure 2). Moreover, when we grouped fair and good nutrition knowledge and compared to poor, the interaction plots with these variables confirmed that households with greater nutrition knowledge and greater English proficiency are more likely to experience food security in urban areas (Figure 3).

Discussion

Since the beginning of the war in Syria, the overall number of Syrian refugees who were initially assigned to the State of Florida was 1154, as per the Department of State RPC (RPC, 2019). The Inter Press Service organization represented the Syrian refugee families in Southern Florida as an underserved refugee community that included 90 individuals (Delaney, 2019). Possibly, Syrian refugee families might have moved throughout Florida cities and to other states upon arrival. Our research included 80 households that comprised 360 Syrian refugees residing in Florida.

Food insecurity is usually observed among refugees based in the United States over a long period of time, which may cause poor health outcomes and health disparities (Nunnery and Dharod, 2017). In 2011, a study found that 85% of the refugees living in the US northeast region experienced food insecurity compared to the national average of 14% (Coleman, Nord, Andrews, and Carlson, 2012). Our findings showed that food insecurity was frequent (80%) among Syrian refugees residing in Florida. Environmental factors, including types of residence such as rural or urban, may affect food security status at the household level. These findings are congruent with those in the general population as food insecurity is more prevalent in US rural areas compared with US urban areas (Mabli, 2014).

The US Economic Research report released in 2017 showed that the prevalence of food insecurity was 15.4% in rural areas when it was 14.1% in urban areas. The report suggested that geographic location is an important environmental factor that affects food insecurity. Based on these reports from the literature, we included this factor in our evaluation when developing an intervention to promote quality access to nutritious food (Coleman, Rabbitt, and Gregory et al, 2017). In our research, 90.7% of households in the rural areas were food insecure compared with 67.6% of food insecure households in urban areas. Statistically, there were significant differences in food security and levels of food insecurity among households in different areas and cities.

The average score of nutrition knowledge indicated that most participants had fair nutrition knowledge; however, we were only able to detect a marginal positive association between levels of food insecurity and nutrition knowledge among all of the households. There were no significant differences in food security status in households

with different scores of nutrition knowledge. Yet, nutrition knowledge was significantly different in households in different cities and types of residence, (Table 2 and 3). Our interaction plot also demonstrated that there was a positive relationship between the nutrition knowledge score and food security status in all households (Figure 2).

Despite that, to the best of our knowledge, no research has been conducted to examine the effect of nutrition knowledge in combating food insecurity among Syrian refugees in the United States. The literature confirms that nutrition knowledge and nutrition education are barriers to food security among refugees. The Office of Refugee Resettlement of the US Department of Health and Human Services also incorporated nutrition education into the components of the Newly Arrived Refugees program to increase the knowledge about USDA dietary guidelines (Cottrell, 2006). In 2013, the Institute of Medicine suggested that nutrition-related support might reduce food insecurity if tailored to the geographical location and circumstances of individuals (Caswell and Yaktine, 2013).

Based on findings in the literature (Institute of Medicine, 2013; Cottrell, 2006) in addition to our own findings, we decided to classify households into two groups: Group 1, poor nutrition knowledge and Group 2, fair to good nutrition knowledge to statistically reassess the relationship between nutrition knowledge and food insecurity. The reclassification revealed the significant relationship between nutrition knowledge and the levels of food security; nevertheless, food security status was not significantly different in the two groups (Table 9). Figures 7 and 8 indicate that nutrition knowledge had a relationship with households of food security and households with moderate food insecurity without hunger. We did not find a relationship between “fair-good” nutrition

knowledge with households experiencing hunger at moderate and severe food insecurity levels. Our results suggest that nutrition knowledge may not have a main effect on food insecurity, although nutritional knowledge may possibly reduce the severity of food insecurity and promote food security.

Subsequently, we classified our households by hunger status and two levels of nutrition knowledge, poor level and fair to good level. Different levels of nutrition knowledge were not significantly associated with hunger status in the study population. The two groups had the same ratio of households without hunger to households with hunger, 4:1. The percentage of hunger status in the two groups was the same, 20%.

However, out of all of the participating households, 70% of the households without hunger had fair-good nutrition knowledge, and only 10% of these households had poor nutrition knowledge. Moreover, all of the participating households that were at the level of severe food insecurity with hunger had poor nutrition knowledge. In contrast, households with fair to good nutrition knowledge, n= 56 (70.0%), were rated as food secure or food insecure without hunger, Figure 9, which demonstrates the impact of nutritional knowledge on better food security.

Therefore, nutrition knowledge has an effect on levels of food insecurity, and poor nutrition knowledge is a risk factor for food insecurity in our population. Greater nutrition knowledge increases the likelihood of food security and food insecurity without hunger. Nutrition knowledge reduces likelihood of hunger status in Syrian refugee households. A larger sample size would have supported our finding by improving the statistical power.

Other studies have utilized different tools to measure nutrition knowledge when investigating food insecurity, therefore, our findings may be difficult to compare with others that have consistent results; however, a large study funded by the National Cancer Institute that involved 1874 households, proposed nutrition education as an intervention against food insecurity in low-income families (Mello J. Gans Kim, Risica P. Kirtania U. Strolla L, and Fournier L, 2010). Researchers concluded that lack of nutrition knowledge is one of the reasons for higher frequency of unhealthy behaviors in food insecure households. In this particular study, food insecurity was examined in relation to dietary habits using the Food Habits Questionnaire (FHQ). Despite some discrepancies with our tool and FHQ, the two measurement tools aimed to assess the same nutrition-related concepts. For instance, our tool included a question about the recommended servings of fruits and vegetables per day, when the FHQ tool was to assess servings of fruit and vegetables usually consumed per day the past year. This assessment tool likely reflected the nutrition knowledge of participants, food security was measured using FSM-USDA, and participants were of low-income and at risk for food insecurity in the United States. Therefore, their findings strongly support our conclusions that increasing nutrition knowledge is a food security-promoting strategy and a hunger-preventive strategy in the Syrian refugee community.

The majority of our respondents did not have adequate English proficiency, 75%. This percentage increased in rural areas to 81.4%, whereas it was less in urban areas, 67.6%. Statistically, we failed to prove our hypothesis of households with fair or fluent English proficiency were less likely to food insecure. This was in contrast to a study that

associated English difficulty with higher food insecurity among 281 refugees resettled in the United States, independently of level of income (Hadley et al, 2010).

In fact, only 0.03% of Syrian refugees admitted to the United States spoke English (RPC, 2019). An access to English learning classes is a service offered by refugee resettlement agencies and is reimbursed by the Department of State as a division of the Cash and Medical Assistance program (FL DOH, 2018, US). Our small sample size might have statistically reflected reality. When English proficiency was included in the interaction plot with the nutrition knowledge score and food security status, the result decently showed that greater English adequacy with a greater nutrition knowledge score promoted higher food security status. A study supported our interaction-plot-based conclusion and concluded that nutrition knowledge deficit and English proficiency were barriers in a group of 40 refugees that included Iraqi refugees resettled to the United States (Sastre and Haldeman, 2015). In fact, Iraq and Syria are neighboring countries in the region of Middle East; Iraqi and Syrian individuals may share a variety of similar norms in terms of demographics, food related culture and native language. Hence, our hypothesis of associating a higher score in nutrition knowledge and fair or/fluent English proficiency with increased likelihood of food secure households was accepted.

In our research, the distribution of different levels of women's education among participating households counteracted finding a statistical significant power. The overall number of households with women in the group that had completed high school was n= 19 (23.75%), and the overall number of households with women in the group that had not completed high school was n= 61 (76.25%). Table 7 led us to conclude that the ratio of the households with women with incomplete high school education to the households

with women with complete high school education was 3:1. This ratio remained constant when these groups of households were categorized by food security status. In other words, there were 3 households with women of incomplete high school education for every household with a woman with complete high school education when categorized by either food security or food insecurity statuses. Therefore, the assumption that women's education might predict food insecurity was not proven statistically. The hypothesis that households with women who had an education level of high school diploma or higher are more likely to be less food insecure was not fully accepted either.

This was in contrast to studies that showed a positive relationship between education and food insecurity. A significant relationship was evident between food insecurity and the level of education of 1847 respondents of which women accounted for 85% of total respondents (Mello et al, 2010). In this study, greater education level was observed amongst food secure households compared with food insecure households. The percentages of different education levels in secure households were: 34% with incomplete high school education, 31% with complete high school education and 35% with some university education or a university degree. In our study, the percentages of education levels of women in food secure households were: 75% of women with incomplete high school education, 18.75% of women with complete high school education and 6.25% of women with some university education or a university degree.

Although we observed that greater women's education was in food secure and food insecure households with no hunger, our statistical analysis challenged us to prove the definitive association. The majority of food secure households and moderate food insecure households without hunger were correlated with women's education levels of

incomplete high school (Table 8). However, households with women's education of some university/university degree did not experience hunger status compared with households of women's education of incomplete and complete high school education (Figure 8). Hunger was experienced by 18.75% among all of the participating households. Households with women's education of incomplete high school level composed 86.6% of all of households with hunger. Households with women's education of complete high school level comprised 13.3% of all of the households with hunger. This result redirected us to conclude that households with women with incomplete high school education were more likely to experience hunger compared with households with women who had completed high school education and/or some university/university degree. And households with women's education of complete high school were more likely to experience hunger compared with households with women's education of some university/university degree. Thus, the hypothesis of households with women with an education level of high school diploma or higher are more likely to be less food insecure was not fully accepted. Nonetheless, households with women with an education level of some university/university degree may be less likely to experience hunger. And households with women of incomplete high school education may be more likely to experience hunger at moderate and severe levels of food insecurity.

In the study developed by Mello and colleagues in 2010, the distribution of different levels of education was nearly equated in the households that participated resulting in significant statistical power. However, our sample size limited the opportunity to have better distribution of different education levels. Additionally, the report of RPC indicated that the vast majority of Syrian refugees admitted to the United

States had incomplete high school education (RPC, 2019). Approximately, half of Syrian refugees, 56%, completed primary and intermediate school. But only 10% completed the secondary school or high school education. Hence, 66% of Syrian refugees had an education of high school or lower level. When Syrian refugees were classified by gender, 47.9% were women (RPC, 2019). Thus, the percentage of Syrian refugee women with incomplete high school education admitted to the United States during the course of our research would be approximately 72.5%. Obtaining a better distribution of education levels among Syrian refugee women in United States may not be realistic. Thus, a larger sample size may not necessarily support our hypothesis or conclusion in the meantime.

Despite the fact that we lacked significant power to detect the association between women's education and food security, the observation that adequate English proficiency was among women with complete high school education than women with incomplete high school education (63.16% versus 13.11%) guided us to classify households into two groups of adequate English and inadequate English to further explore the association between women's education and food security. Significant association was not obtained either, but it was observed that households with adequate English and women of complete high school education did not experience hunger. In the group of inadequate English, hunger was not experienced in households with women's education of complete high school education and higher. Such observation supports our previous suggestion that households with women of incomplete high school may be more likely to experience hunger compared with households with women's education of completed high school and higher. A larger sample size may be able to detect significant association.

Translation of finding into our utilized model:

Food access, equal distribution of meals, and food price constituted the Availability construct in our model. Based on the result of multiple items of the FSM-USDA questionnaire, we affirmed that the construct of Availability was not consistent and its sustainability was less likely to happen. This inconsistency led to a negative impact on the Stability construct, which had direct relationship with our main outcome, Food Security Status.

The Stability construct had a direct interchangeable interaction with the construct of Accessibility, which was English proficiency in this particular research. By applying our finding, we concluded that the effect of Accessibility on Stability was not observed statistically, but the interaction was evident in our interaction plot. Moreover, the direct interaction between women's education and Accessibility was observed. Women with completed high school education were more likely to have adequate English.

Another variable we listed under Accessibility was the type of households at social and physical level. Our finding supported the interaction between Accessibility and Stability since food security was significantly different in different cities and different residences.

Lastly, the impact of the Utilization construct on Stability and the interaction between Utilization and Accessibility were confirmed. The association between English proficiency and nutrition knowledge was statistically significant. The interaction plot showed a clear explanation of the positive relation between the nutrition knowledge score and food security when English proficiency increased. This translation allows us to suggest that our model is likely applicable among Syrian refugees living in United States if future research is of interest.

Conclusion

Most households (80%) of Syrian refugees that participated in this research were food insecure. Levels of food insecurity were greater in rural areas compared with urban areas, however, the difference was that in the rural areas we observed more food insecurity with hunger compared with food insecurity without hunger in the urban areas. Most Syrian refugees had fair nutrition knowledge, but it was significantly different among cities as well as in rural and urban areas. Refugees in Tampa had lower food security; living in rural Tampa lowered the likelihood of having food security among Syrian refugees compared with other cities in Florida. English proficiency, nutrition knowledge, and education of women may be less important than location on being food secure in this population. Despite not finding statistical differences for those variables on food security, the results from the interaction plots suggest a route for future research with a larger sample size on the situation of Syrian refugees, and what are the points of intervention to ameliorate their challenging situation. A larger sample size would allow clearer understanding of the relation of our variables with food insecurity, and suggest remedial action.

Table 1. Description of the participants of the study

Characteristic	n (%)
Gender of respondents	
Female	63 (78.7)
Male	17 (21.3)
Type of households	
Households with children	71 (88.7)
Households without children	9 (11.3)
Nutrition Knowledge	
Respondent scored poor	10 (12.5)
Respondent scored fair	46 (57.5)
Respondent scored good	24 (30.0)
English Proficiency	
Respondent rated ≥ fair in reading	16 (20.0)
Respondent rated ≥ fair in writing	16 (20.3)
Respondent rated ≥ fair in speaking	13 (16.3)
Respondent rated ≥ fair in comprehension	19 (23.8)
English Proficiency/Adequacy	
Respondent with adequate English	20 (25.0)
Respondent with inadequate English	60 (75.0)
Women's education	
Women with incomplete high school	61 (76.3)
Women with complete high school level	11 (13.7)
Women with some university/university degree	8 (10.0)

Table 2. Description of the participants by types of residence

Characteristics	Rural areas n (%)	Urban areas n (%)	*P value*
Number of respondents (n)	43	37	
Nutrition Knowledge			0.04*
Respondent scored poor	3 (7.0)	7 (19.0)	
Respondent scored fair	30 (70.0)	16 (43.2)	
Respondent scored good	10 (23.0)	14 (37.8)	
English Proficiency/Adequacy			0.2**
Respondent with adequate English	8 (18.6)	12 (32.4)	
Respondent with inadequate English	35 (81.4)	25 (67.6)	
Women's education			0.03*
Incomplete high school	37 (86.0)	24 (64.9)	
Complete high school and greater	6 (14.0)	13 (35.1)	

*Chi-square test
** Fisher's exact test
Statistically significant, p=<0.05

Table 3. Description of the participants by city of residence

Characteristics	Miami n(%)	West Palm Beach n(%)	Orlando n(%)	Tampa n(%)	*P value*
Number of respondents (n)	18	10	9	43	
Nutrition Knowledge					0.02*
Respondent scored poor	4 (22.2)	3 (30.0)	0	3 (7.0)	
Respondent scored fair	5 (27.8)	4 (40.0)	7 (77.7)	30 (70.0)	
Respondent scored good	9 (50.0)	3 (30.0)	2 (22.3)	10 (23.0)	
English Proficiency					0.1**
Respondent with adequate English	8 (44.5)	3 (30.0)	1 (11.1)	8 (18.6)	
Respondent with inadequate English	10 (55.5)	7 (70.0)	8 (88.9)	35 (81.4)	
Women's education					0.07***
Incomplete high school	10 (55.6)	8 (80.0)	6 (66.7)	37 (86.0)	
Complete high school and greater	8 (44.4)	2 (20.0)	3 (33.3)	6 (14.0)	

* Chi square test
** Fisher's exact test
***One-way ANOVA test
Statistically significant, p=<0.05

Table 4. Levels of food insecurity of all of households

Level of food insecurity	Overall n(%)
All of the households	
Food security	16 (20.0)
Food insecurity without hunger	49 (61.3)
Moderate food insecurity with hunger	13 (16.3)
Severe food insecurity with hunger	2 (2.6)
Households with children	
Food security	14 (19.7)
Food insecurity without hunger	44 (62.0)
Moderate food insecurity with hunger	13 (18.3)
Severe food insecurity with hunger	0
Households without children	
Food security	2 (22.2)
Food insecurity without hunger	5 (55.6)
Moderate food insecurity with hunger	0
Severe food insecurity with hunger	2 (22.2)

Table 5. Levels of food insecurity by types of residence

Levels of food insecurity	Rural areas n (%)	Urban areas n (%)	*P value*
Food security	4 (9.3)	12 (32.4)	0.02**
Food insecurity without hunger	31 (72.1)	18 (48.6)	
Moderate food insecurity with hunger	8 (18.6)	5 (13.5)	
Severe food insecurity with hunger	0	2 (5.5)	

** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 6. Levels of food insecurity of households by city of residence

Levels of food insecurity	Miami n(%)	West Palm Beach n(%)	Orlando n(%)	Tampa n(%)	*P value*
Food security	5 (27.8)	5 (50.0)	2 (22.2)	4 (9.3)	0.04**
Food insecurity without hunger	9 (50.0)	3 (30.0)	6 (66.7)	31(72.1)	
Moderate food insecurity with hunger	3 (16.7)	1 (10.0)	1 (11.1)	8 (18.6)	
Severe food insecurity with hunger	1 (5.5)	1 (10.0)	0	0	

** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 7. Food security status in relation to variables of interest

Variables	Food secure households n(%)	Food insecure households n(%)	*P value*
Number of households	16 (100)	64 (100)	
Nutrition knowledge			0.6**
Poor	3 (18.75)	7 (10.9)	
Fair	8 (50.0)	38 (59.4)	
Good	5 (31.25)	19 (29.7)	
English Proficiency/Adequacy			1.0**
Inadequate	12 (75.0)	48 (75.0)	
Adequate	4 (25.0)	16 (25.0)	
Two levels of women's education			1.0**
Incomplete high school	12 (75.0)	49 (76.6)	
Complete high school	4 (25.0)	15 (23.4)	
Three levels of women's education			0.8**
Incomplete high school	12 (75.0)	49 (76.6)	
Complete high school	3 (18.7)	8 (12.5)	
Some University/University degree	1 (6.3)	7 (10.9)	
Types of residence			0.009*
Rural areas	4 (25.0)	39 (60.9)	
Urban areas	12 (75.0)	25 (39.1)	
City of residence			0.02*
Miami	5 (31.25)	13 (20.4)	
West Palm Beach	5 (31.25)	5 (7.8)	
Orlando	2 (12.5)	7 (10.9)	
Tampa	4 (25.0)	39 (60.9)	

* Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 8. Levels of food insecurity in relation to variables of interest

Variables	Food security n(%)	Food insecurity without hunger n(%)	Moderate food insecurity with hunger n(%)	Severe food insecurity with hunger n(%)	*P value*
Number of households	16 (100.0)	49(100.0)	13(100.0)	2 (100.0)	
Nutrition knowledge					0.08**
Poor	3 (18.75)	5 (10.2)	0	2 (100.0)	
Fair	8 (50.0)	29 (59.2)	9 (69.2)	0	
Good	5 (31.25)	15 (30.6)	4 (30.8)	0	
English Proficiency/Adequacy					0.7**
Inadequate	12 (75.0)	36 (73.5)	11 (84.6)	1 (50.0)	
Adequate	4 (25.0)	13 (26.5)	2 (15.4)	1 (50.0)	
Two levels of women's education					0.3**
Incomplete high school	12 (75.0)	36 (73.5)	12 (92.3)	1 (50.0)	
Complete high school	4 (25.0)	13 (26.5)	1 (7.7)	1 (50.0)	
Three levels of women's education					0.4**
Incomplete high school	12 (75.0)	36 (73.5)	12 (92.3)	1 (50.0)	
Complete high school	3 (18.75)	6 (12.2)	1 (7.7)	1 (50.0)	
Some University/University degree	1 (6.25)	7 (14.3)	0	0	
Types of residence					0.02**
Rural areas	4 (25.0)	31 (63.3)	8 (61.5)	0	
Urban areas	12 (75.0)	18 (36.7)	5 (38.5)	2 (100.0)	
City of residence					0.04**
Miami	5 (31.25)	9 (18.4)	3 (23.1)	1 (50.0)	
West Palm Beach	5 (31.25)	3 (6.1)	1 (7.7)	1 (50.0)	
Orlando	2 (12.5)	6 (12.2)	1 (7.7)	0	
Tampa	4 (25.0)	31 (63.3)	8 (61.5)	0	

* Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 9. Food security and levels of food insecurity, and hunger statuses in households with poor and fair-good nutrition knowledge

Food security/Levels of food insecurity	Poor nutrition knowledge n(%)	Fair-good nutrition knowledge n(%)	*P value*
Level of food insecurity			
Food security	3 (30.0)	13 (18.6)	0.008**
Food insecurity without hunger	5 (50.0)	44 (62.8)	
Moderate food insecurity with hunger	0	13 (18.6)	
Severe food insecurity with hunger	2 (20.0)	0	
Food security status			
Food secure	3 (30.0)	13 (18.6)	0.4**
Food insecure	7 (70.0)	57 (81.4)	
Hunger status			
No hunger	8 (80.0)	57 (81.4)	1.0**
With hunger	2 (20.0)	13 (18.6)	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 10. Hunger status in households with different levels of women's educations

Variables	Households without hunger n(%)	Households with hunger n(%)	*P value*
Number of households	65 (100.0)	15 (100.0)	
Three level of women's education			0.4**
Incomplete high school	48 (73.8)	13 (86.6)	
Complete high school	9 (13.8)	2 (13.4)	
Some university/University Degree	8 (12.4)	0	
Two level of women's education			0.3**
Incomplete high school	48 (73.8)	13 (86.6)	
Complete high school and higher	17 (16.2)	2 (13.4)	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 11. Food security status in households with different levels of women's educations along with controlling English proficiency

Variables	Food secure households n(%)	Food insecure households n(%)	*P value*
Number of households with adequate English	4 (100.0)	16 (100.0)	
Three levels of women's education			0.8**
Incomplete high school	1 (25.0)	7 (43.75)	
Complete high school	2 (50.0)	5 (31.25)	
Some university/University degree	1 (25.0)	4 (25.0)	
Two levels of women's education			0.6**
Incomplete high school	1 (25.0)	7 (43.75)	
Complete high school and higher	3 (75.0)	9 (56.25)	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table12. Levels of food insecurity in households with two and three levels of women's education along with controlling English adequacy

Variables	Food secure households n(%)	Food insecurity without hunger n(%)	Moderate food insecurity with hunger n(%)	Severe food insecurity with hunger n(%)	*P value*
Number of households with adequate English	4 (100.0)	13 (100.0)	2 (100.0)	1(100.0)	
Three levels of women's education					0.8**
Incomplete high school	1 (25.0)	6 (46.1)	1 (50.0)	0	
Complete high school	2 (50.0)	3 (23.1)	1 (50.0)	1(100.0)	
Some university/ University degree	1 (25.0)	4 (30.8)	0	0	
Two levels of women's education					0.9**
Incomplete high school	1 (25.0)	6 (46.1)	1 (50.0)	0	
Complete high school and higher	3 (75.0)	7 (53.9)	1 (50.0)	1(100.0)	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 13. Hunger status in households with two levels of women's educations along with controlling English proficiency

Variables	Households without hunger n(%)	Households with hunger n(%)	*P value*
Number of households with adequate English	17 (100.0)	3 (100.0)	
Two levels of women's education			1.0**
Incomplete high school	7 (41.2)	1 (33.4)	
Complete high school	10 (58.8)	2 (66.6)	

** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 14. Multivariate logistic regression demonstrating the effect of selected variables on food security status in participating households by types of residence

	Model 1				Model 2			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-0.7		0.35	0.03	-0.8		1.01	0.4
Types of residence								
Rural areas	-1.5	0.214	0.63	0.01	-1.6	0.201	0.67	0.01
Urban areas	0	-	-		0	-	-	
Nutrition Knowledge								
Good					-0.26	0.77	0.93	0.8
Fair					-0.18	0.83	0.86	0.8
Poor					0	-	-	-
English Proficiency								
Inadequate					0.11	1.118	0.83	0.9
Adequate					0	-	-	
Women's Education								
Incomplete high school					0.26	1.302	0.79	0.7
Completed high school					0	-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P<0.05

Table 15. Multivariate logistic regression demonstrating the effect of selected variables on food security status in participating households by city of residence

	Model 1				Model 2			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	1.2		0.63	1	-0.29		1.18	0.8
City of Residence								
Miami	-0.9	0.385	0.8	0.3	-0.9	0.413	0.85	0.3
Orlando	-1.3	0.286	1.02	0.2	-1.3	0.267	1.09	0.2
Tampa	-2.3	0.103	0.82	0.006	-2.3	0.096	0.87	0.007
West Palm Beach	0	-	-		0	-	-	
Nutrition Knowledge								
Good					-0.04	0.965	0.97	1.0
Fair					0.05	1.059	0.94	1.0
Poor					0	-	-	
English Proficiency								
Inadequate					0.27	1.307	0.85	0.8
Adequate					0	-	-	
Women's Education								
Incomplete high school					0.09	1.105	0.01	0.9
Completed high school					0	-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P=<0.05

Figure 1. The model of food security and socioeconomic factors of nutrition knowledge, English proficiency, and women's education among Syrian refugees in Florida

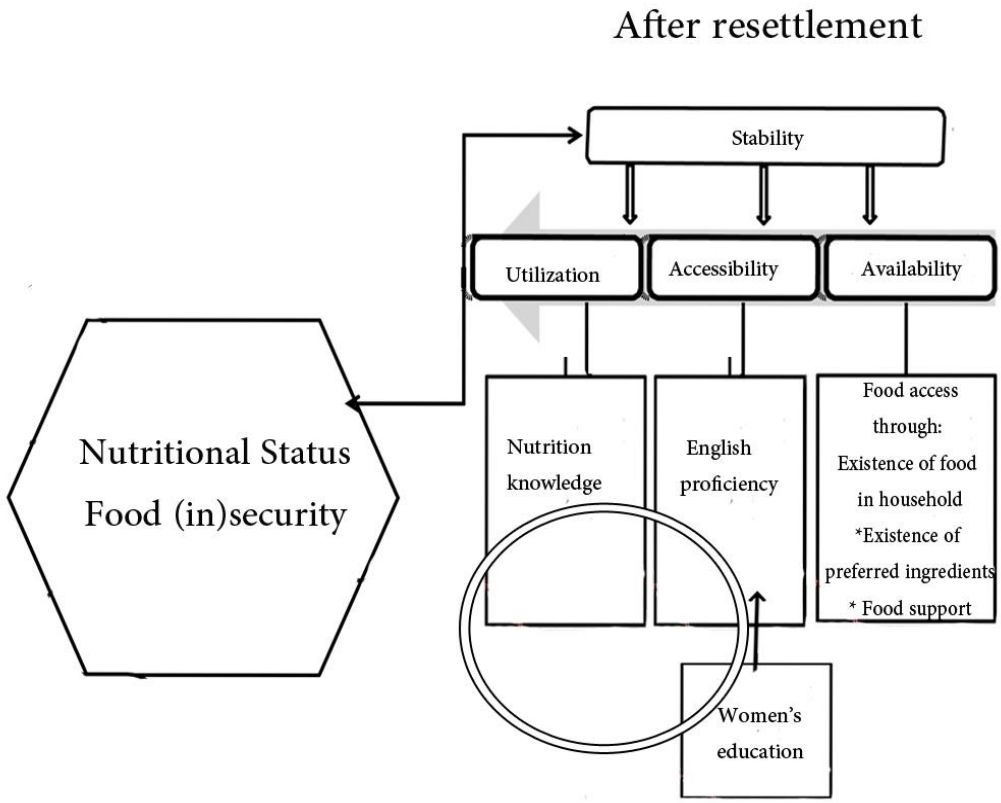


Figure 2. Interaction between food security, nutrition knowledge and English proficiency among all of the households

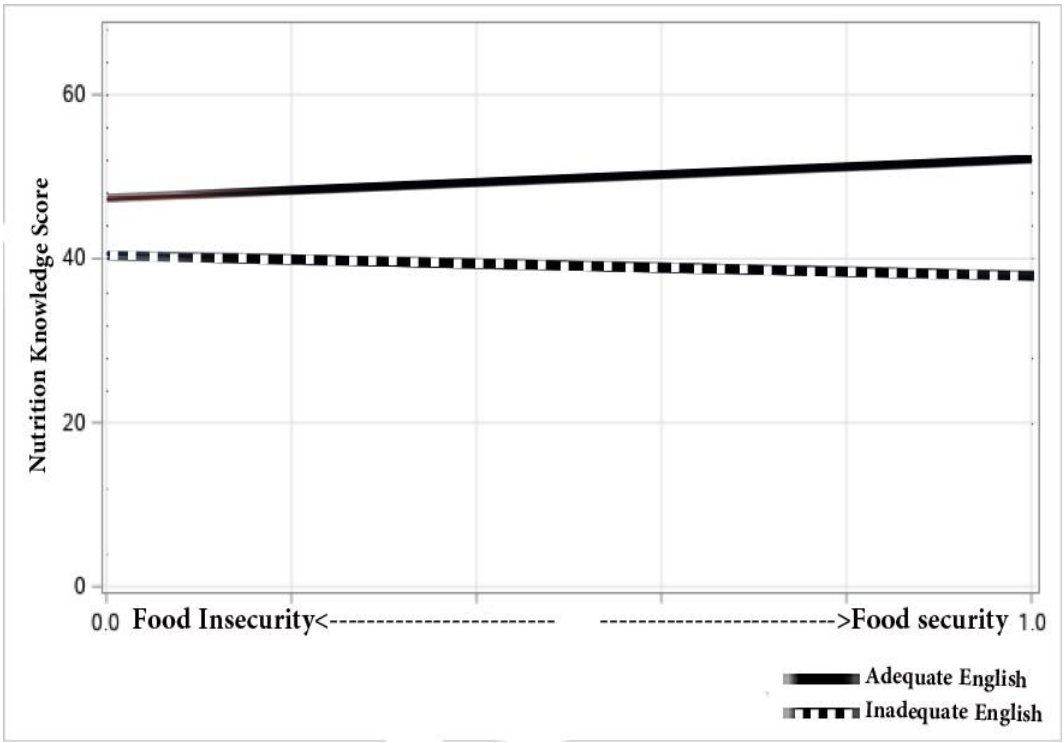


Figure 3. The interaction between food security, nutrition knowledge and English proficiency in households residing in urban areas

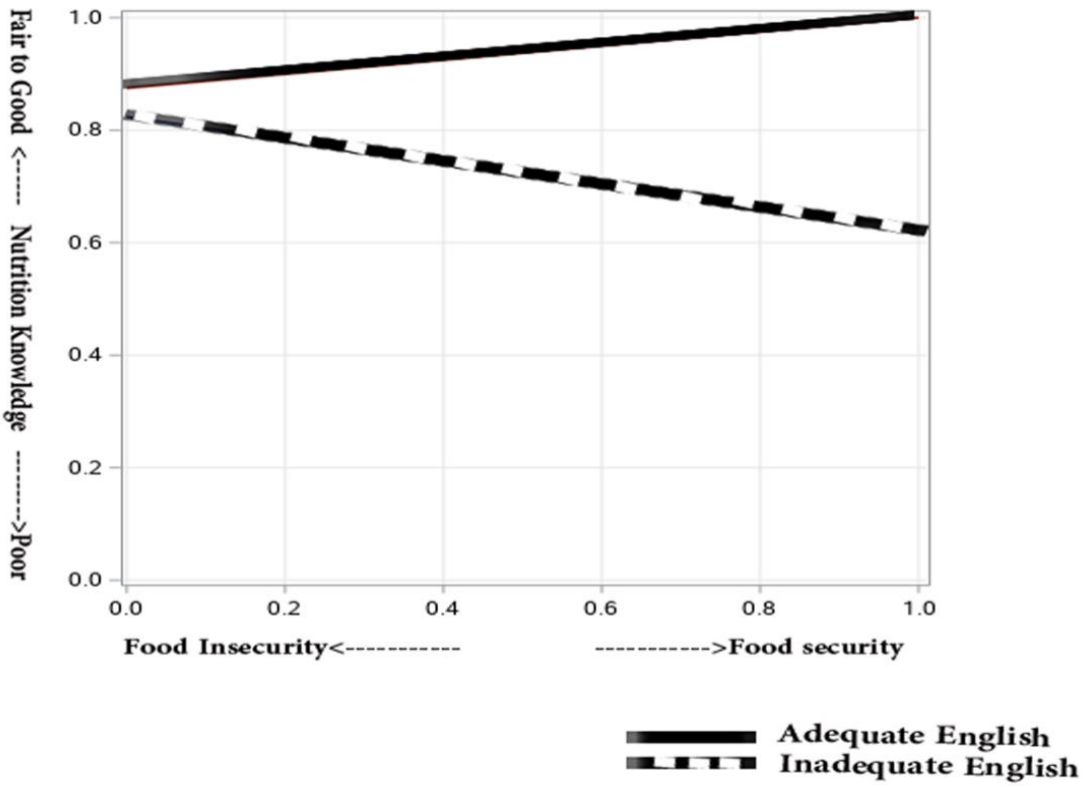


Figure 4. The distribution of food security and food insecurity among households by city of residence

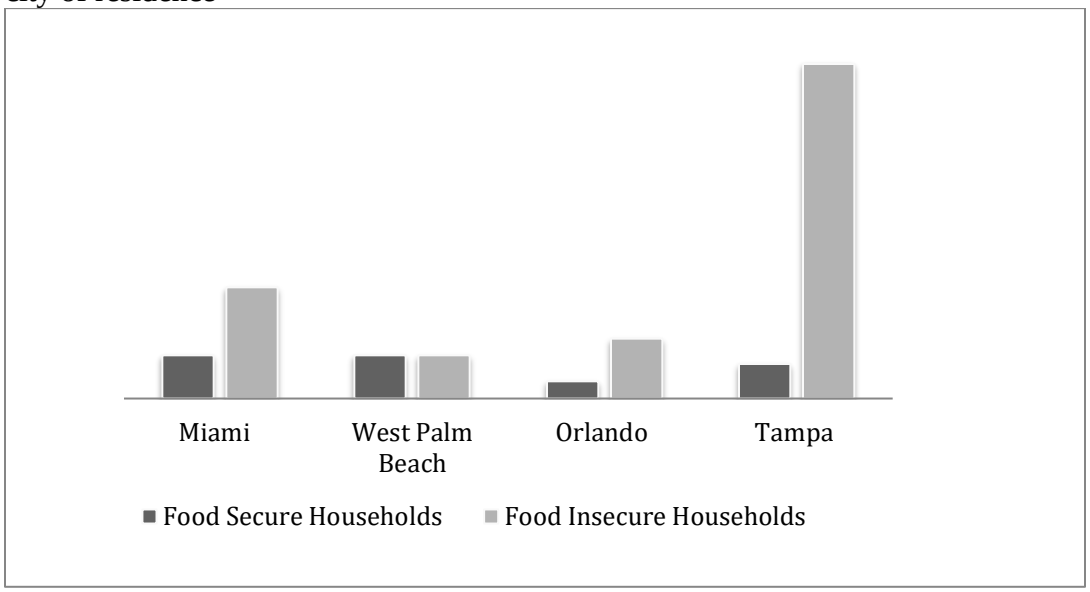


Figure 5. The association between women's education, levels of food insecurity, and hunger status among all of the households

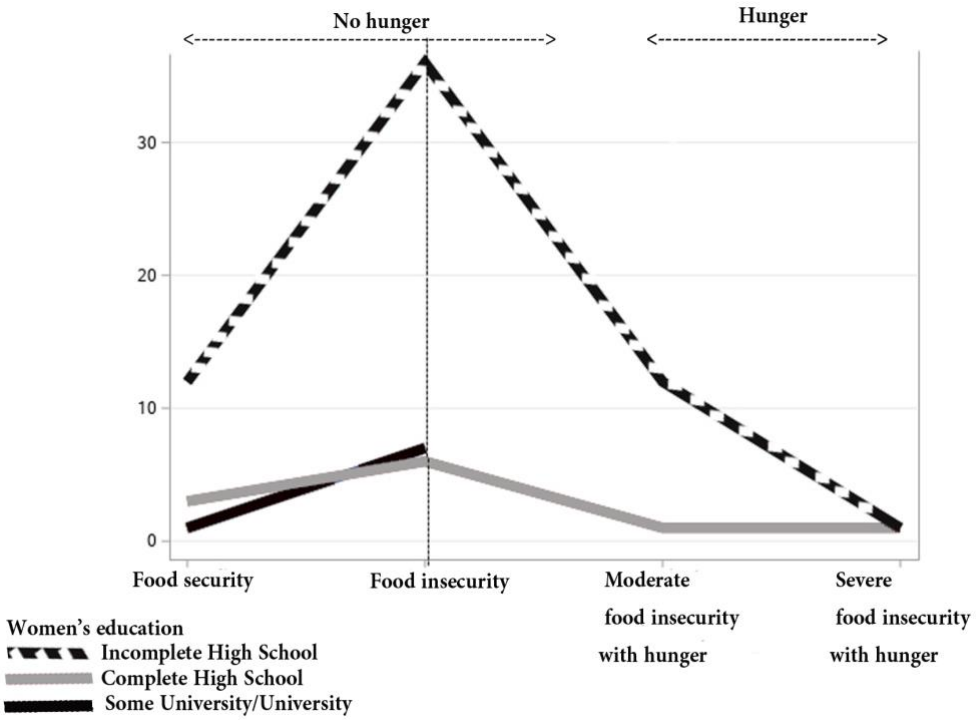


Figure 6. Food security and nutrition knowledge in all of the households

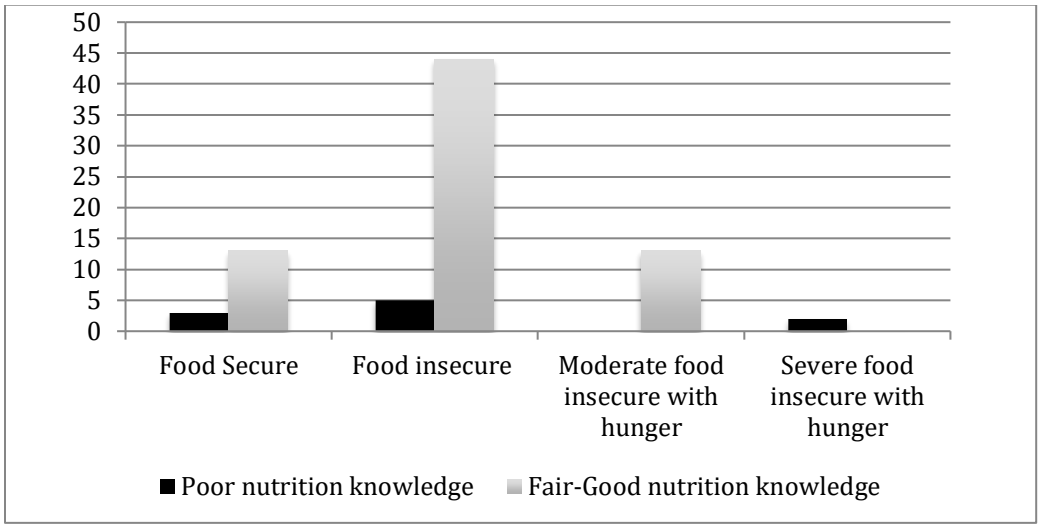


Figure 7. Three levels of nutrition knowledge and food security in all of the households

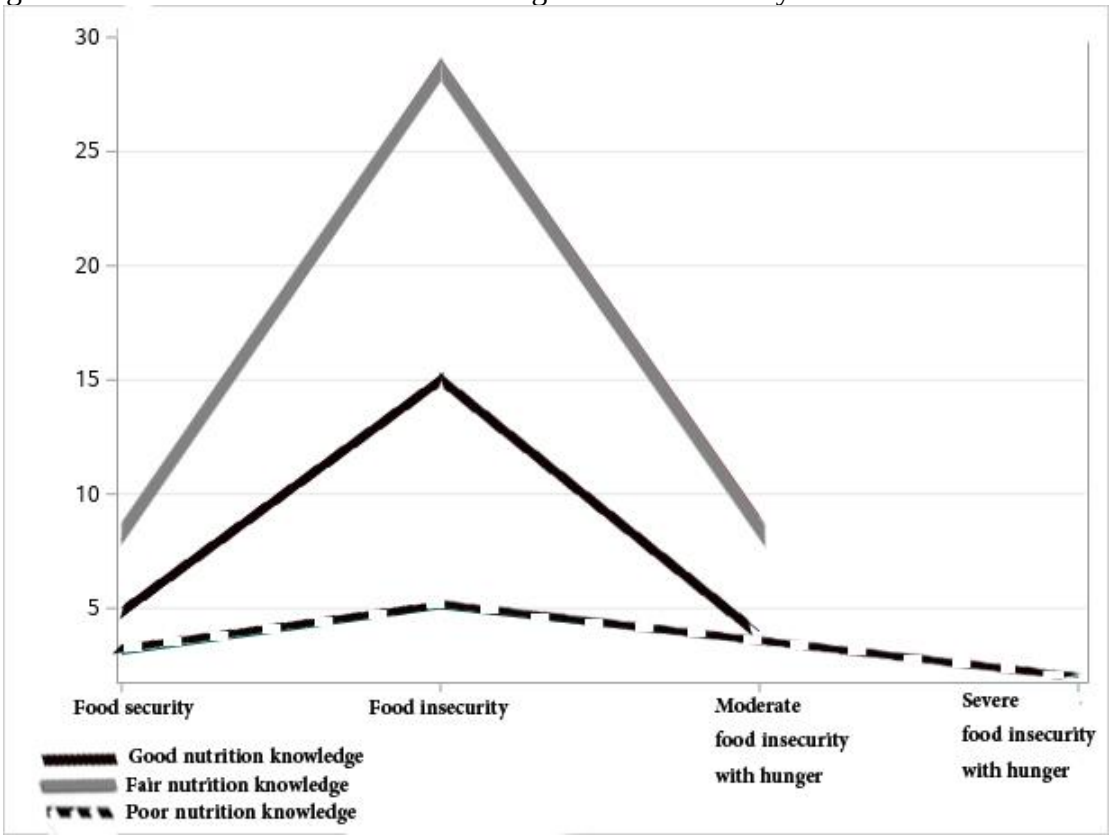
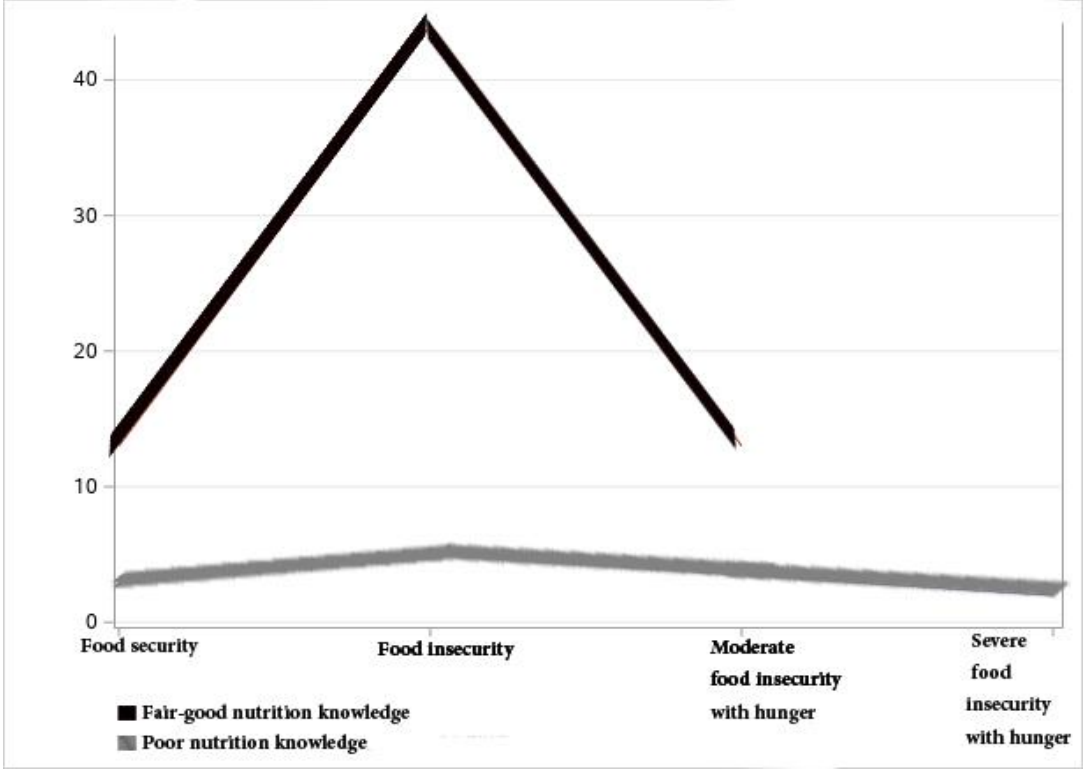


Figure 8. Two levels of nutrition knowledge and food security in all of the households



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Chapter IV: The Effect of Household Structure on Food Security Among Syrian Refugees Living in Florida.

Title: The impact of employment status and children in households on food security among Syrian refugees residing in Florida

Abstract

Objective: To measure food security and the levels of food insecurity among Syrian refugee households. It also aimed to determine the association between food security status and types of households including number of employed members of the households and children in households.

Design: Semi-structured interview questionnaires were administered to 80 households of Syrian refugees residing in Florida. Included cities were Miami, West Palm Beach, Orlando and Tampa.

Settings and subjects: Syrian refugees who have resettled in Florida since 2011 were interviewed in one-on-one 45-minute sessions.

Main outcomes: Food security, levels of food insecurity, number of employed individuals in households, structure of households with and without children.

Results: The mean of food security score was 4.7± 2.6 among participated households. There were significant differences (p=0.02) between the levels of food insecurity in rural and urban areas. We found a significant relationship (p=0.04) between food security and number of employed individuals in households in the rural areas. The logistic regression model comparing food security status in rural and urban areas, showed that households in rural areas had 80.2 % less odds of being food secure than those in urban areas with the adjustment of the variable of number of employed individuals, (odd ratio= 0.198, 95%

CI: 0.055-0.712, p= 0.01). Another logistic regression model showed that Miami was 4 times and West Palm Beach was 11.8 times more likely to be food secure than Tampa when number of employees was adjusted. Among all of the households, there were significant differences (p=0.01) in the levels of food insecurity between households with and without children. When types of residence was introduced into the corresponding model, households of rural areas were 79.3% less likely to be food secure than households of urban areas, (odd ratio: 0.207, CI: 0.06-0.70,p=0.01). Another logistic regression showed that West Palm Beach had significant positive effect (p=0.005) on food security. Households in this city had 9.95 greater odds to be food secure than households in Tampa. The effect in Miami was marginally positive (p=0.07) in this model. Households in Miami might have had 3.8 greater probabilities to be food secure than households in Tampa, when the variable of households with and without children was adjusted.

Conclusion: Food insecurity was frequent among n=64 (80.0%) of Syrian refugee households residing in Florida. Households with more than one employed individuals were more likely to experience food security than households with only one member employed. Number of employees in households may have a greater impact on food security in urban areas than in rural areas. Food insecurity was more frequent in households with children than in households without children. Adults in food insecure households with children might have experienced greater levels of food insecurity compared to their food insecure children.

Introduction

Food insecure households are composed of individuals lacking sustainable access to sufficient food to maintain a healthy lifestyle (Change Y, Chatterjee S, and Kim J, 2014). Understanding the characteristics of households that may be associated with food security may help mitigate food insecurity. Income of households is one of the critical determinants of food insecurity and hunger in the United States (US) (Rose, 1999). Among US households with children, more than 1 in 5 households lack maintainable access to nutritious food (Denney J, Kimbro R, and Sharp G, 2018).

Employment status has a direct impact on resources of households, which in turn affects food accessibility (Bartfeld, 2005). The US Bureau of Labor Statistics showed that an increase in unemployment rate by 1% was associated with an increase by 0.5 percentage point in the prevalence of food insecurity between 2001 and 2012 (Nord M, Coleman JA. And Gregory C, 2014). At a household level, the result of these statistics showed that households headed by individuals holding a part time job or with no labor hours were 12-15% more likely to be food insecure than households headed by full time employees. The likelihood of food insecurity was 1.39% less in households with two employed individuals compared with households of one employed individual or households with no labor hours (Nord et al, 2014).

The employment status plays a key role in the economic security of households. Subsequently, the economic security contributes to the differences in the level of food insecurity among US households with children (Bartfeld and Men, 2017). A report by the United States Department of Agriculture (USDA) in 2000 showed that the prevalence of food insecurity was higher in households with children compared to the national average

of food insecurity in the United States (Andrews et al, 2000). This trend remained constant over long period of time; the prevalence of food insecurity was 19% in households with children, when it was 14% in all of the households in 2015 (Coleman JA, Rabbitt P, Gregory C, and Singh A, 2015).

This work focused on the attributes of the structure of households including number of employed individuals and number of children on food security. The population of interest was Syrian refugees who resided in Florida after 2011. Several studies agreed that refugees living in the United States were at an elevated risk of food insecurity (Nunnery and Dharod, 2017; Bokeloh G, Gerster M, and Weingartner L, 2009; Hadley C, Zodhiates A, and Sellen DW, 2007). Literature showed that there was an association between number of employed individuals in households and food security in the United States (Bartfeld, 2005;Nord et al, 2014). Households with children had a higher prevalence of food insecurity compared with the national average of food insecurity (Coleman et al, 2015).

Literature lacked sufficient evidence about food insecurity among Syria refugees in the United States. Food insecurity in Syrian refugees was measured. The association between the number of employed individuals in households and food insecurity was examined. The differences in the levels of food insecurity between households with and without children were also tested.

Methods

Research model

A comprehensive model that included food security and different socioeconomic factors was developed. Our main research was divided into multiple parts; our comprehensive model served as guidance for each part of our research. In each part, we utilized our variables of interest; thus, the model of this particular paper included employment status, type of households and food access as our confounders for food security, (Figure 1).

The structure of the model (Figure 1)

Title:	The impact of employment status and children in households on food security among Syrian refugees in Florida
Construct	Definition
Utilization:	The ability to purchase, prepare, and consume a balanced meal
Accessibility:	The resources of the social and physical environment
Availability:	The availability of resources
Stability:	The timeframe over which food security is sustainable
Confounders	
Number of employees in households Households with children	Characteristics of households including employment status of family members and presences of children in households were listed under the Accessibility construct. Accessibility is a combination of the social and physical environment.
Availability	Since our food security measurement tool was the Food Security Model developed by USDA, we included: prices of food, food access and availability of food in household and equal distribution of meals among members of household in this model.

Design

Two semi-structured interview questionnaire that aimed to measure food insecurity and to collect demographic characteristics of participants including structure of households, number of employees, and number of children were administered to Syrian refugees living in Miami, West Palm Beach, Orlando and Tampa. The interviews were conducted in Arabic, the native language of participants. The approval of Florida International University Institution Review Board (FIU-IRB) was obtained, and English and Arabic versions of informed consents were developed and approved by FIU-IRB.

Initially, Syrian refugees were recruited with the assistance of the leaders of Syrian immigrant community in Miami. Word of mouth was adopted eventually as another strategy to recruit our participants in Tampa, West Palm Beach and Orlando. Tampa residents were mainly located in rural areas, while Miami, West Palm Beach and Orlando were mainly urban dwellers.

The purpose of the research was communicated to the community leaders and participants. The participants were Syrian refugees of 80 households who met the inclusion criteria and agreed to be interviewed. The inclusion criteria were households of displaced Syrians in Florida who were originally registered by United Nations (UN) as refugees and resettled in the United States after the beginning of Syrian war in 2011.

Displaced Syrians who arrived to Florida after 2011 but were not registered by the UN were excluded. Syrian immigrants with different visa documentations besides asylum seekers with Syrian nationality residing in Florida were excluded as well.

Semi-structured interview questionnaires

Food security, levels of food insecurity, employment status of members of households, number of children were our measurable outcomes. Multiple questionnaires were compiled into a comprehensive questionnaire with the objective of measuring food insecurity and nutrition knowledge. As part of the demographic characteristics information on gender, type of households, number of children and employment status were collected (Appendix 3). In one-on-one sessions, the comprehensive questionnaire was completed with an average of 45 minutes per session. It is worth nothing that such questionnaires triggered further explanations from interviewees; comments and information obtained were documented for future qualitative analysis. We also obtained data on other variables that were involved in our model to be examined and analyzed based on conclusions drawn from comprehensive literature review.

Food security

The Food Security Module (FSM) by USDA was adopted to measure food security (Bickel et al, 2000) (Appendix 4). Appendix 2 presented the FSM-USDA model, the levels of food insecurity, assessment questions, and the scoring system. Child-related questions were omitted for households without children. A total score of 10 points was given to such households, and a total score of 16 was given to households with children. Food insecurity was classified into 3 levels of severity; greater number of affirmative responses indicated greater severity of food insecurity.

Employment status and structure of households

A series of questions were asked to obtain information about number of family members earning income from employment, status of employment, main income earner,

second main income earner, and other financial resources. The demographic section included questions about children, number of children, gender and age.

Statistical analysis

SAS studio University Edition was used for all statistical analyses. Descriptive statistics, one-way frequency was used to identify Syrian refugees in regards to demographic characteristics and variables of interest. Chi square test was utilized to determine the differences in employment status in different types of residence. Fisher's exact test and logistic regression were used to examine the association between food security and characteristics of households in terms of employment status. These statistic tests were run to determine the association between the levels of food insecurity and food security status with households with and without children.

Results

Food security

Table 1 demonstrated selected demographic characteristics of our participants including gender of respondents, and employment status in households. Of the 80 households, 20% were food secure while 80% of households experienced food insecurity at different levels, mean of food security score was 4.7± 2.6, (Table 2). Figure 2 and figure 3 presented the levels of food insecurity and food security status in rural and urban areas. According to FSM-USDA score; households of Syrian refugees in rural areas (n=43) were moderately food insecure with hunger (5.00 ± 2.4), and households of Syrian refugees in urban areas (n=37) were food insecure without hunger (4.50 ± 2.8). Fisher's exact test showed that there were significant differences between the levels of food

insecurity in rural and urban areas, (p=0.02), (Table 3). It also showed significant differences in the levels of food insecurity in different cities, (p=0.04), (Table 4).

Employment status

The difference in employment status was marginally significant in urban and rural areas, (p=0.09), (Table 3). Data collected lacked any food secure household with two employed individuals in urban areas including Miami, West Palm Beach, and Orlando. Nevertheless, food insecurity was frequent in n=25 (64.1%) of all of households in urban areas. Of these households, there were n=21 (84.0%) households with one employed individual and n=4(16.0%) households with two employed individuals.

In rural areas, Tampa, food insecure households with one employed individual accounted for 72% of all of Syrian refugee households. Food insecure households with two employed individuals accounted for 18.6%. The percentage of food security in households with one employee was 2.4%, whereas it was 7.0% in households with two employees in Tampa. Fisher's exact test showed that there was a significant relation between food security status and number of employed individuals in households in Tampa, (p=0.04), (Table 5). Table 5 presented the frequency of food secure and food insecure households with different numbers of employed individuals in urban areas, Miami, West Palm Beach and Orlando.

The results of our logistic regression model showed that households with one employed individual did not have significant effect on food insecurity compared to households with two employed individuals (Model 1-Table 6). When types of residence was added to the model (Model 2-Table 6), the model showed that households in rural

areas had 80.2 % less probability of being food secure than those in urban areas, (odd ratio= 0.198, 95% CI: 0.055-0.712, p= 0.01), (Table 6).

Another logistic regression model, Table 7, in which we adjusted number of employed individuals, showed that Miami city had a marginal significant effect on food security, (p=0.06). The odds of being food secure were 4 times more in Miami than in Tampa. The effect of West Palm Beach was significant (p=0.004); the odds of being food secure for households in West Palm Beach were 11.8 times greater than for the households in Tampa.

Households with and without children

The frequency of food security was n=14 (19.7%) among households with children, and two levels of food insecurity were observed among these households. The level of food insecurity without hunger was frequent in n=44 (62.0%), and the level of moderate food insecurity with hunger was frequent among n=13 (18.3%) of households with children.

Of households without children, the frequency of food security was n=2 (22.2%), when the frequency of food insecurity without hunger and severe food insecurity with hunger were n=5 (55.6%) and n=2 (22.2%) respectively. Thus, households with children did not experience severe levels of food insecurity, when households without children did not experience moderate levels of food insecurity with hunger. The result of Fisher's exact test showed that there were significant differences in the levels of food insecurity between households with children and households without children in the entire population, (p=0.01), (Table 8).

When testing such an association by types of residence, the result showed that there were also significant differences in the levels of food insecurity between households with children and households without children in urban areas, (p=0.004), (Table 8). Fisher's exact test was carried out again to determine the cities in which differences in the levels of food insecurity between households with and without children would be detected. The result showed that such differences were marginal in Miami, (p=0.07), and there were no significant differences in West Palm Beach,(p=0.2), (Table 8). Orlando and Tampa were excluded in this comparison; Orlando city did not have households without children, and Tampa city did not have severely food insecure households with and without children.

The FSM-USDA revealed that 83.1% of Syrian refugee children consumed low cost food, and 70.4% were not constantly fed balanced meals the past 12 months. Of the total households, 23.9% reduced portions of meals to children, and 7% of children had to skip meals sometimes throughout the past year. Although our findings showed that some households were food insecure at the hunger level, none of the households reported an event of hungry children without sufficient resources to buy food or that a child spent a whole day without food intake, (Appendix 1).

Our logistic regression did not show an effect of households with/without children on food security (Model 1-Table 9). When the variable of types of residence was incorporated into the model (Model 2-Table 9); there was a significant negative effect in rural areas, (p=0.01). Households of rural areas were 79.3% less likely to be food secure compared with households in urban areas, when controlling households with and without children, (odd ratio: 0.207, CI: 0.06-0.70,p=0.01).

Additionally, another logistic regression whose variables were cities of residence (Model 3-Table 10), controlling households with and without children showed that West Palm Beach had a significant positive effect on food security, (p=0.005). The odds of being food secure were 9.9 times greater for households in West Palm Beach compared with households in Tampa city. The effect in Miami city was marginally positive, (p=0.07). The odds of being food secure could have been 3.8 times greater in Miami compared with households in Tampa.

Discussion

Food insecurity is usually experienced by refugees residing in the United States. In the US northeast region, food insecurity was frequent among 85% of refugees (Coleman, Nord, Andrews, and Carlson, 2012). Similarly, we found that food insecurity was frequent among 64(80%) of Syrian refugees residing in Florida. Among these food insecure households, 39(60.9%) were of households in rural areas, and 25(39.1%) were of households in urban areas. According to a US Economic Research report, US rural areas are prone to food insecurity compared with urban areas (Mabli, 2014). This report showed that the prevalence of food insecurity was 15.4% and 14.1% in rural areas and urban areas respectively (Mabli, 2014).

Besides the types of residence, characteristics of households had different effects on the food security status and the levels of food insecurity in our population. In Tampa, as the rural areas in our research, food insecurity was more frequent in the households with one employed individual than in the households with two employed individuals, 72.0% versus 18.6%. In addition, the levels of food insecurity were significantly different in this area.

Our logistic regression model (Table 6) revealed that Tampa had fewer probabilities to be food secure than urban areas, when number of employed individuals was adjusted. Another logistic regression model (Table 7) showed that adjustment of number of employed individuals had marginally significant effect on food security in Miami. The likelihood to be food secure could have been 300% greater in Miami than in Tampa. The probability of food security was 11.8 times greater in West Palm Beach compared with Tampa.

Therefore, our hypothesis of "households that have at least two employed family members are less likely to be food insecure" was proven. Additionally, the number of employed individuals per households may have greater impact on food security in urban areas than in rural areas in our population. Food security was associated with number of employed individuals in households in Tampa. When number of employed individuals in households was adjusted, households in Miami and West Palm Beach had greater change of being food secure compared with households in Tampa.

In fact, our rationale corresponded with the international concept of food security; food insecurity is associated with purchase power and food affordability in urban areas, and it is associated with availability of food in rural areas (Garvelink, 2013). The cost of living might have been an additional barrier to food security among Syrian refugees in urban areas resulting in marginal food budgets, which would have been expanded by additional employed individuals in households. The full time employment was associated with a reduction in the affirmative responses of food security scale by 1.3 points (Loopstra and Tarasuk, 2013).

A study found that the employment status in households affected the stability of households' income, and the greater the change in income was associated with greater change in the severity of food insecurity (Loopstra and Tarasuk, 2013). Another study conducted in the United States found that the cost of livings of households was significantly higher in urban areas than in rural areas. Households in rural areas tended to spend greater percentage of income on food compared with households in urban areas, 19.08% versus 15.56% (Cafer A. and Kaiser M., 2016). Among US households, food secure households spent 23% more on food than food insecure households (Oliveira, 2019).

The structure of the households was another confounder affecting the construct of Accessibility in our model, (Figure 1). Households with and without children were utilized to determine the impact of such structures of households on food security among Syrian refugee in Florida. The majority of our population n= 71(88.75%) were of households with children; 75% of Syrian refugees registered by the UN were women and children (Sleiman, 2014).

We found significant differences in the levels of food insecurity in households with and without children. Food insecurity was more frequent in Syrian refugee households with children than counterpart households without children, n= 57 (80.3%) versus n=7 (77.8%). Food insecurity was prevalent among 11.8% of all of US households and 15.7% of US households with children, as per the USDA 2018 annual report (Oliveira, 2019).

We hypothesized that households with children are more likely to be food insecure compared to households without children. Since we were able to detect

significant differences in the levels of food insecurity among households with and without children, we further investigated our hypothesis. Our regression model in Table 9 showed that households in rural areas were 79.3% less likely to be food secure than households in urban areas, when the variable of households with and without children was adjusted.

We carried out another logistic regression (Table 10) that also confirmed that households in urban cities were more likely to be food secure compared with households in rural areas, when the same variable was adjusted. West Palm Beach was 9.9 times more likely to be food secure than Tampa. A marginal significant effect on food security was detected in Miami, and the odds of being food secure could have been 3.8 times greater in Miami than in Tampa. Our small sample size might have been a reason for the marginal effect in Miami. The inability to run the statistical test for Orlando was due to a lack of households without children in this city.

When analyzing the items in the FSM-USDA (Appendix 1), there was no household with children who did not eat an entire day, but 5.0% of households had an affirmative response to having an adult spending an entire day without eating due to lack of financial resources to purchase food. Hunger, as an acute feeling, was never experienced by children in the participating households, but it was experienced by 3.8% of adults in households participating in this research.

The proportion of households with children who skipped meals was 7.0%, but the percentage of households with adults who skipped meals was 20.0%. Thus, meals were not equally distributed among members of Syrian refugee households, and their children were given preference to be fed. A study found that the number of food insecure

households with children was greater than the number of food insecure children among the same population. Adults of such households reduced their intake to cope with food shortages and limited financial resources (Fram et al, 2011).

The price of food was a concern in 77.5% of all of Syrian refugee households and 70.4% of Syrian refugee households with children, since these households were unable to obtain balanced meals consistently. This concern was also indicated by 83.1% of households that had to purchase low cost foods for children as a coping strategy.

Therefore, Syrian households with children were more likely to be food insecure than Syrian refugee households without children. The likelihood of being food insecure households with children was greater in rural areas than urban areas. Adults of households with children faced difficulties feeding children a nutritionally adequate diet; adults tended to sacrifice to mitigate hunger among children.

Translation of our findings into the developed model

Initially, our developed model suggested that employment status, as a confounder, would be an indicator for food security. Our result confirmed that employment status under the Accessibility construct had a direct effect on Stability construct resulting in changes in food security status between households with different numbers of employed individuals.

The variable of households with children was our second confounder that we listed under the Accessibility construct. Our findings confirmed that children in households had an effect on the Accessibility construct leading to a change in the Stability construct. A new link between the constructs of Accessibility and Availability

was also detected in this research. Households with children would have an effect on the Availability construct among adults.

Conclusion

Food insecurity was frequent among majority of Syrian refugee households residing in Florida. Although households of Syrian refugees in urban and rural areas scored moderately food insecure when applying the FSM-USDA, households in rural areas had greater food insecurity score than expected, which reached hunger levels of "always" or "sometimes" on the Likert scale in the past 12 months.

The number of employed individuals in households and households with and without children were two determinants for food security among our population. Households with more than one employee were more likely to experience food security than households with one employed individual. In rural areas, Syrian refugees with households of two employed individuals might have experienced food insecurity due to lack of physical availability of food. The high cost of living in urban areas might have created an indirect challenge to achieve food security; such a challenge could have been combated by an additional financial resource, an income of an employed family member.

Households with children tended to be more food insecure than households without children. Households with children in rural areas were at higher risk for food insecurity than households with children in urban areas. The levels of food insecurity might have varied among members of households with children; adults might have experienced greater food insecurity than children.

Regarding our food security model, we concluded that households with children might be considered a confounding variable affecting the construct of Accessibility of

food among all of family members. It is also a potential confounder that might affect the construct of Availability among adults. Further research might be needed to determine whether members of food insecure households with children experience different levels of food insecurity among Syrian refugees.

Table 1. Description of the participants of the study

Characteristic	n(%)
Gender of respondents	
Female	63 (78.7)
Male	17 (21.3)
Type of households	
Households with children	71 (88.7)
Households without children	9 (11.3)
Employment status in households	
Households with one employed individual	65 (81.3)
Households with two employed individuals	15 (18.7)

Table 2. Levels of food insecurity among all of households and households with and without children

Level of food insecurity	Overall n(%)
All of the households	
Food security	16 (20.0)
Food insecurity without hunger	49 (61.3)
Moderate food insecurity with hunger	13 (16.3)
Severe food insecurity with hunger	2 (2.6)
Households with children	
Food security	14 (19.7)
Food insecurity without hunger	44 (62.0)
Moderate food insecurity with hunger	13 (18.3)
Severe food insecurity with hunger	0
Households without children	
Food security	2 (22.2)
Food insecurity without hunger	5 (55.6)
Moderate food insecurity with hunger	0
Severe food insecurity with hunger	2 (22.2)

Table 3. Levels of food insecurity and employment status by types of residence

Characteristic	Rural areas n(%)	Urban areas n(%)	*P value*
Number of respondents	43	37	
Level of food insecurity			
Food security	4 (9.3)	12 (32.4)	0.02**
Food insecurity without hunger	31 (72.1)	18 (48.6)	
Moderate food insecurity with hunger	8 (18.6)	5 (13.5)	
Severe food insecurity with hunger	0	2 (5.5)	
Employment status			0.09*
Households with one employed individual	32 (74.4)	33 (89.2)	
Households with two employed individuals	11 (25.6)	4 (10.8)	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
Column based percentages within specific category

Table 4. Levels of food insecurity by city of residence

Level of food insecurity	Miami	West Palm Beach	Orlando	Tampa	*P value*
	n(%)	n(%)	n(%)	n(%)	
Number of respondents	18 (100.0)	10 (100.0)	9 (100.0)	43 (100.0)	
Food security	5 (27.8)	5 (50.0)	2 (22.2)	4 (9.3)	0.04**
Food insecurity without hunger	9 (50.0)	3 (30.0)	6 (66.7)	31 (72.1)	
Moderate food insecurity with hunger	3 (16.7)	1 (10.0)	1 (11.1)	8 (18.6)	
Severe food insecurity with hunger	1 (5.5)	1 (10.0)	0	0	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
Column based percentages within specific category

Table 5. Food security and employment status of households by types of residence and city of residence

Variables	Food secure households n(%)	Food insecure households n(%)	*P value*
Rural areas (Tampa)			0.04**
Households with one employed individual	1 (25.0)	31 (79.5)	
Households with two employed individuals	3 (75.0)	8 (20.5)	
Urban areas			0.3**
Households with one employed individual	12 (100.0)	21 (84.0)	
Households with two employed individuals	0	4 (16.0)	
Miami			0.5**
Households with one employed individual	5 (100.0)	10 (76.9)	
Households with two employed individuals	0	3 (23.1)	
Orlando			1.0**
Households with one employed individual	2 (100.0)	6 (85.7)	
Households with two employed individuals	0	1 (14.3)	
West Palm Beach			
Households with one employed individual	5 (100.0)	5 (100.0)	
Households with two employed individuals	0	0	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 6. Logistic regression model demonstrating the effect of employment status of households on food security status in rural and urban areas

	Model 1				Model 2			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.4		0.64	0.03	-0.4		0.8	0.6
Type of households								
Households with one employed individual	0	1	0.7	1.0		0.65	0.8	0.6
Households with two employed individuals	-	-	-			-	-	
Types of residence								
Rural areas					-1.6	0.198	0.7	0.01
Urban areas						-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P<0.05

Table 7. Logistic regression model demonstrating the effect of employment status of households on food security status in city of residence

	Model 1				Model 3			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.4		0.64	0.03	-1.8		0.7	0.01
Type of households								
Households with one employed individual	0	1	0.7	1.0	-0.6	0.54	0.8	0.4
Households with two employed individuals	-	-	-			-	-	
City of residence								
Miami					1.4	4.0	0.8	0.06
Orlando					1.1	3.11	1.0	0.24
West Palm Beach					2.5	11.8	0.9	0.004
Tampa						-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P<0.05

Table 8. Levels of food insecurity in households with and without children by types of residence and city of residence

Variables	Food security n(%)	Food insecurity without hunger n(%)	Moderate food insecurity with hunger n(%)	Severe food insecurity with hunger n(%)	*P value*
All of households n=80					0.01**
Households without children	2 (12.5)	5 (10.2)	0	2 (100.0)	
Households with children	14 (87.5)	44 (89.8)	13 (100.0)	0	
Rural areas					
Households without children	1 (25.0)	5 (16.1)	0	0	
Households with children	3 (75.0)	26 (83.9)	8 (100.0)	0	
Urban areas					0.004**
Households without children	1 (8.3)	0	0	2 (100.0)	
Households with children	11 (91.7)	18 (100.0)	5 (100.0)	0	
Miami					0.07**
Households without children	1 (20.0)	0	0	1 (100.0)	
Households with children	4 (80.0)	9 (100.0)	3 (100.0)	0	
West Palm Beach					0.2**
Households without children	0	0	0	1 (100.0)	
Households with children	5 (50.0)	3 (100.0)	1 (100.0)	0	

*Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 9. Logistic regression model demonstrating the effect of children in households on food security status in rural and urban areas

	Model 1				Model 2			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.4		0.3	<0.0001	-0.8		0.4	0.03
Household status								
Households Without children	0.15	1.2	0.8	0.9	0.4	1.5	0.9	0.6
Households with children	-	-	-		-	-	-	
Types of residence								
Rural areas					-1.6	0.207	0.6	0.01
Urban areas					-	-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P<0.05

Table 10. Logistic regression model demonstrating the effect of children in households on food security status in city of residence

	Model 1				Model 3			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.3		0.3	<0.0001	-2.3		0.55	<0.0001
Household status								
Households Without children	-0.6	0.54	1.1	0.6	0.4	1.4	0.9	0.7
Households with children	-	-	-		-	-	-	
City of residence								
Miami					1.3	3.8	0.7	0.07
West Palm Beach					2.3	9.9	0.8	0.005
Orlando					1.1	2.9	1.0	0.3
Tampa					-	-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P<0.05

Figure1. The impact of employment status and children in households on food security among Syrian refugees in Florida

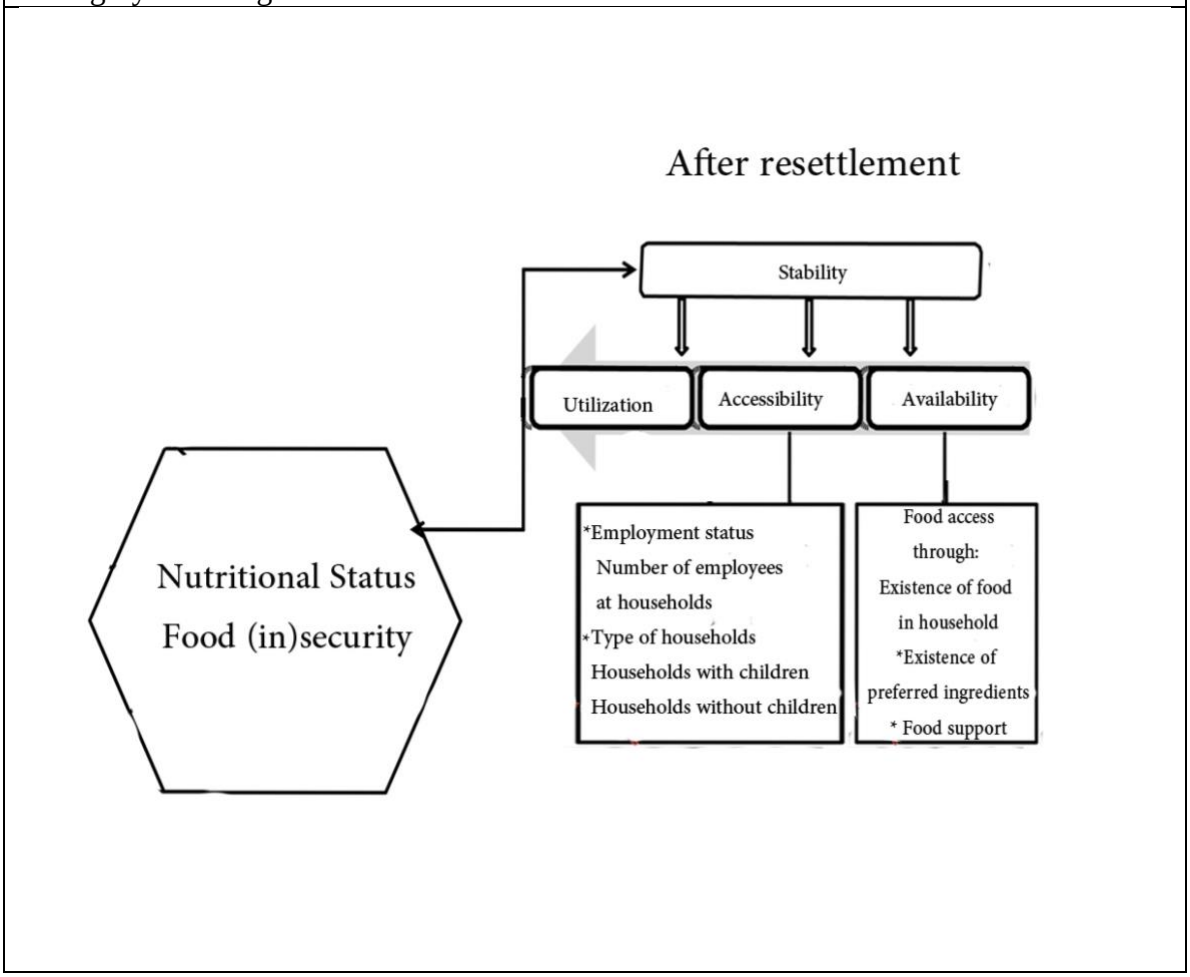


Figure 2: Levels of food insecurity in urban and rural areas

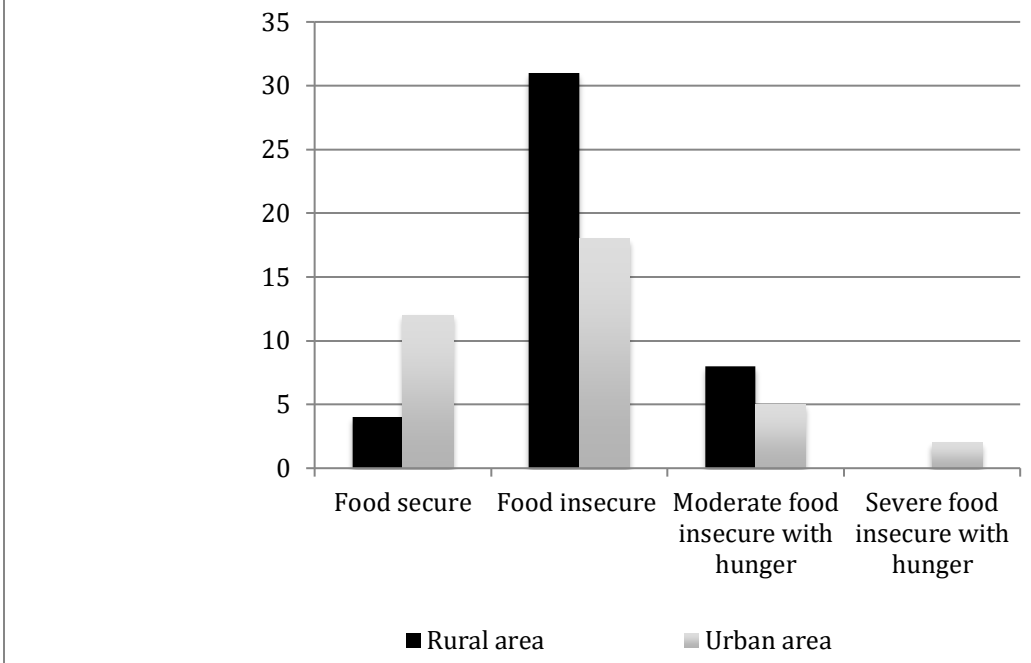
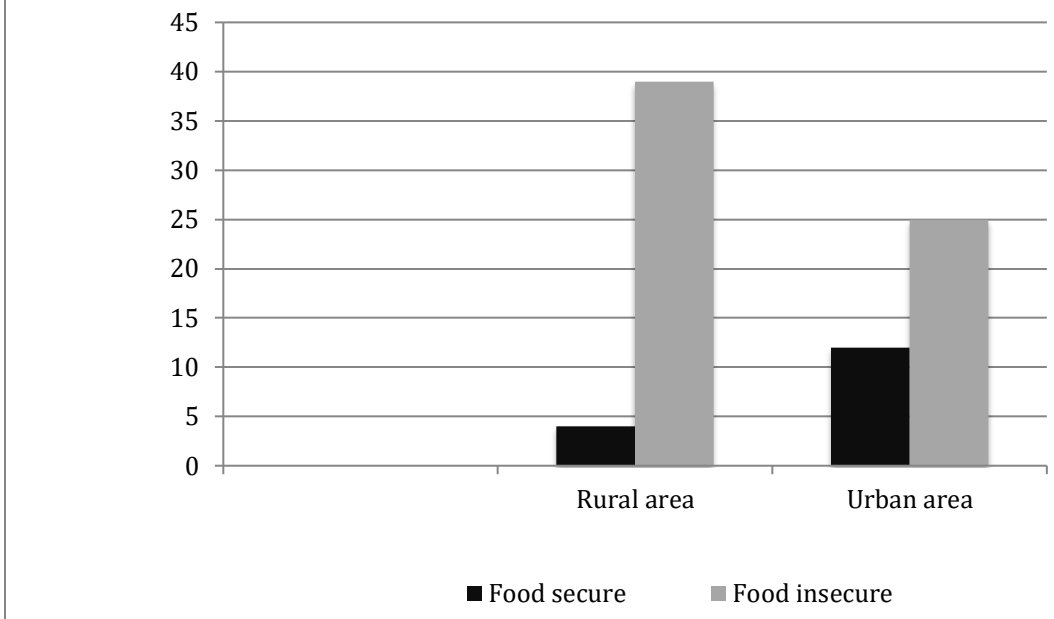


Figure 3. Food security status in rural and urban areas



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Chapter V: The Perceived Stress and Its Effect on Food Insecurity Among Syrian Refugees Living in Florida

Title: The impact of perceived stress on food insecurity among Syrian refugees living in Florida

Abstract

Objective: Three objectives were to measure food security, determine the levels of food insecurity among Syrian refugees in Florida, and determine whether perceived stress attributes to food security among our population.

Design: In a context of semi interview, two questionnaires of a Food Security Model and a Perceived Stress Scale were administered to 80 households of Syrian refugees residing in Florida. Included cities were Miami, West Palm Beach, Orlando and Tampa.

Results: Food security was frequent among 20% of households; different levels of food insecurity were experienced by 80% of households. Food insecurity without hunger was frequent in 61%, whereas moderate and severe levels of food insecurity with hunger were experienced by 16.3% and 2.6% of households respectively. The mean of perceived stress score was 21 ± 9.1 indicating that average Syrian refugees had a moderate level of perceived stress. There were significant differences in perceived stress in different types of residence and cities. In rural areas, there was an inverse relation between food security and perceived stress. Miami and West Palm Beach had greater probabilities to be food secure than Tampa, rural areas, when controlling perceived stress score in our regression model. The food security score was marginally correlated with perceived stress score, $p=0.07$.

Conclusion: Food insecurity was experienced by among majority of Syrian refugees (80%) in Florida. Refugees in urban areas experienced higher levels of the perceived stress than counterparts in rural areas. Food insecurity was inversely associated with perceived stress in rural areas, when food security was positively associated with perceived stress in urban areas. Refugees in rural areas appeared to have a high level of faithfulness, which might have reduced their perceived stress on a daily basis. When the perceived stress was controlled, the likelihood of food security was greater in Miami and West Palm Beach compared to Tampa. Perceived stress and food security scores were marginally correlated to each other. However, low power might have been contributing to our findings especially in Orlando and increased sample size would be advisable.

Introduction

The war in Syria has been aggressively ongoing since 2011 leading to a continuous increase in Syrian individuals with refugee status registered with United Nations High Commissioner for Refugees (UNHCR). It has become a humanitarian crisis globally; countries neighboring Syria and different countries around the world have become the host residence of Syrian refugees. In the United States (US), 21,353 Syrian refugees have resettled since the beginning of the war in June 2011 (RPC, 2019). Between 2015 and 2018, the Syrian refugee population resettled in Florida amounted to 1103 (RPC, 2019).

Wars and conflicts were suggested to be driving factors to food insecurity among displaced population (FAO, 2002). Displaced populations commonly experience Post Traumatic Stress Disorder (PTSD) as a result of traumatic events (Fazel, Jeremy, and

Danesh, 2005). In 2017, the prevalence of PTSD was 30.6% among Syrian refugees in Lebanon (Kazour, Zahreddine, Maragel, and Almustafa et al, 2017).

Syrian refugees were exposed to different traumatic events; war-related injuries were documented to be experienced by Syrians of different groups of age and genders (Sirin and Sirin, 2015; De Leeuw, 2014). In Jordan and Lebanon, 6.6% and 3.3% of Syrian refugees had war-related injuries respectively (De Leeuw, 2014). Among Syrian refugee children 79% and 30% experienced death events in their families and physical violence respectively raising their risk for disadvantaged mental health (Sirin and Sirin, 2015).

Kazour, Zahreddine, Maragel and Almustafa (2017) found that lifetime PTSD was frequent among 35.4% of 452 Syrian refugees in Lebanon. They concluded that stress experienced by such a population prior to resettlement might lead to malfunction and food insecurity after their arrival in the United States (Kazour et al, 2017).

Although there is no national prevalence of food insecurity among immigrants residing in the United States, multiple studies agreed that refugees in the United States had higher risk of food insecurity compared with the US population (Nunnery and Dharod, 2017; Bokeloh et al, 2009; Hadley et al, 2007). A US study of 97 refugees from different countries; found that food insecurity was experienced by 70% of the entire group, with estimates ranged from 39% to 81% among different subgroups categorized by country of origin (Nunnery and Dharod, 2017).

Thus, it was an interest to measure food security among newly arrived Syrian refugees in Florida. Investigating whether stress might be associated with food security was another objective of this research. Perceived stress and food security were our main

outcomes; we proposed that such measurements would be positively correlated among Syrian refugees residing in Florida.

Methods

Research Model

A comprehensive model that included food security and different socioeconomic factors was developed. Our main research was divided into multiple parts; our comprehensive model served as guidance for each part of our research. In each part, we utilized our variables of interest; thus, the model of this particular paper included perceived stress and food access as our confounders for food security, (Figure 1).

Study design and population

Two semi-structured interview questionnaire that aimed to measure food security and perceived stress were administered to Syrian refugees living in Miami, West Palm Beach, Orlando and Tampa. Demographic characteristics including gender, city of origin in Syria, year of departure from Syria, location of transitioning from Syria to the United States, year of arrival to the United States were collected as well. The interviews were conducted in Arabic, the native language of participants. The approval of Florida International University Institution Review Board (FIU-IRB) was obtained, and English and Arabic versions of informed consents were developed and approved by FIU-IRB.

Initially, Syrian refugees were recruited with the assistance of the leaders of Syrian immigrant community in Miami. A word of mouth method was adopted eventually as another strategy to recruit our participants in Tampa, West Palm Beach and Orlando. Tampa residents were mainly located in rural areas, while Miami, West Palm Beach and Orlando were mainly urban dwellers.

The purpose of the research was communicated to the community leaders and participants. The participants were Syrian refugees of 80 households who met the inclusion criteria and agreed to be interviewed. The inclusion criteria were households of displaced Syrians in Florida who were originally registered by the United Nations (UN) as refugees and resettled in the United States after the beginning of Syrian war in 2011.

Displaced Syrians who arrived in Florida after 2011 but were not registered by the UN were excluded. Syrian immigrants with different visa documentations besides asylum seekers with Syrian nationality residing in Florida were excluded as well.

Semi-structured interview questionnaires

Food security, levels of food insecurity, perceived stress score, and gender were our measurable outcomes. Two questionnaires were compiled into a comprehensive questionnaire with the objective of measuring food security and perceived stress. As part of the demographic characteristics information on gender was collected. In one-on-one sessions, the comprehensive questionnaire was completed with an average of 45 minutes per session. It is worth nothing that such questionnaires triggered further explanations from interviewees; comments and information obtained were documented for future qualitative analysis. We also obtained data on other variables that were involved in our model to be examined and analyzed based on conclusions drawn from a comprehensive literature review.

Food security

The Food Security Module (FSM) by USDA was adopted to measure food security (Bickel et al, 2000) (Appendix 4). Appendix 2 presented the FSM-USDA, the levels of food insecurity, assessment questions, and the scoring system. Child-related

questions were omitted for households without children. A total score of 10 points was given to such households, and a total score of 16 was given to households with children. Food insecurity was classified into 3 levels of severity; greater number of affirmative responses indicated greater severity of food insecurity.

Perceived Stress Scale

The Perceived Stress Scale (PSS) was developed by Cohen S. (1994) to measure the perception of individuals to stressful situations (Appendix 6). It is a 10-item tool to determine the level of experienced stress during the past month. Questions target the feelings experienced toward specific events and assess the abilities to handle such events. There are five responses of "Never", "Almost never", "Sometimes", "Fairly often" and "Very Often". The highest score that possibly can be obtained is 40 and indicates a high level of perceived stress. Average scores of PSS varied by different categories including gender, age, and race. When categorizing PSS by race, PSS suggests that minority groups have an average score of 14.1. Thus, such a score was used as the low level of perceived stress among our population, since our participants were a minority of Syrian refugees in the United States. Subsequently, a score of ≤ 19 was considered a low level of perceived stress, a score of ≥ 20 to ≤ 29 was considered a moderate level of perceived stress, and a score of ≥ 30 was considered a high level of perceived stress. Table 1 presents questions of the Perceived Stress Scale along with the responses of our participants.

Statistical analysis

One-way frequency was used to determine the frequency of perceived stress among participants in different types of residence and cities. Two-sample *t* test was carried out to determine the differences in the levels of perceived stress between gender

and types of residence. One-way ANOVA was utilized to determine the differences in the perceived stress in the four cities of residence. Logistic regression models were carried out to determine the effect of PSS on food security in different types of residence and cities. The Pearson coefficient was utilized to determine the correlation between the FSM-USDA score and PSS score.

Results

Food security

Of the 80 households, 20% were food secure when 80% of households were food insecure. In rural areas, households of Syrian refugees accounted for n=43 (53.75%) of our population. From these n=4 (9.3%) households were food secure and n=39 (90.7%) were food insecure households. In urban areas, there were n=12 (32.4%) food secure households and n=25 (67.6%) food insecure households. There were also significant differences (p=0.009) in food security status amongst households in rural and urban areas, (Table 2).

The frequencies of food secure households by city were n=5 (27.7%), n=5 (50.0%), n=2 (22.3%), n=4 (9.3%) in Miami, West Palm Beach, Orlando and Tampa respectively. The frequencies of food insecure households by city were n=13 (72.2%), n=5 (50.0%), n=7 (77.7%), n=39 (90.6%) in Miami, West Palm Beach, Orlando, and Tampa respectively. The Chi square test showed that there were significant differences (p=0.02) in food security status in the 4 cities, (Table 2).

Perceived stress

The mean PSS score was 21 ± 9.1 indicating that average Syrian refugees had a moderate level of perceived stress. The level of perceived stress was higher among

females interviewed than males, the mean PSS score was 21.6 ±8.5 among female whereas it was 18.5 ±10.9 among men. Females experienced moderate levels of perceived stress, and men experienced low levels of perceived stress. A two-sample t test was carried out to determine the significance of such differences; there were no significant differences (p=0.2) in the levels of the perceived stress between the two genders statistically, (Table 3).

Descriptive data analysis showed that in the 43 households of Syrian refugees residing in rural areas, and the mean of PSS score was 17.8±9.2. There were 37 households in urban areas, and they had a mean of PSS score of 24.6±7.6. The two-sample *t* test was carried out to determine if there were significant differences in the perceived stress in the two settings. The statistical test revealed that there were significant differences in the levels of the perceived stress among Syrian refugees in rural and urban areas at a significance level of α=0.05,*t* value= -3.55, P $\leq$0.001, (Table 3).

When the PSS score was analyzed based on city of residence; the test resulted with an *F* test value of 4.33 and *P*-value of 0.007. Thus, the means of the perceived stress were not equal for four different cities, and at least one mean would be different than others. There was strong evidence that the perceived stress might not be equal in four cities at a significance level of α =0.05, (Table 3). The Pearson coefficient correlation was utilized to determine if the scores of FSM-USDA and PSS were correlated. The result showed that the scores were marginally correlated to each other, (r=0.2, p=0.07), (Table 4).

The logistic regression model (Table 5-Model 1) showed that the perceived stress score did not have significant effect (p=0.6) on food security. When types of residence

were added to the model (Table5-Model 2), the perceived stress became marginally significant (p=0.08) with an inverse effect on food security. When controlling perceived stress, there was significant negative effect (p=0.005) in rural areas. Households of rural areas had 87.9% less odds to be food secure than households in urban areas, (odds=0.121, CI 0.027-0.533, p=0.005).

In another logistic regression model (Table 6-Model 3), we included different cities of residence and adjusted for the perceived stress. There was marginally negative effect of perceived stress on food security. By adjusting the perceived stress, Miami and West Palm Beach had a significant effect on food security, (p=0.03 and p=0.007) respectively. This model showed with that the households in Miami were 6.5% times more likely to be food secure than households in Tampa, odds=6.5, CI: 1.24-34.5. Whereas households of West Palm Beach were 22.3% times more likely to be food secure than households of Tampa, odds=22.3, CI: 3.2-154.1. The city of Orlando did not show any significant difference, (p=0.1).

Discussion

Syria became the second major source of refugees in 2013 at a global scale (UNHCR,2013); consequently, measuring food security and perceived stress among Syrian refugees in Florida was the interest of this research. Food insecurity was predominant among our population. There were n=64 (80.0%) food insecure households and n=16 (20.0%) food secure households. A systematic review of 10 studies conducted among migrants in the United States, found that the frequency of food insecurity ranged from 50% to 65% on average (Kiehne and Mendoza, 2015). One particular study showed findings resembling ours; frequency of food insecurity was as high as 85% among

refugees in the northeast region of the United States (Coleman, Nord, Andrews, and Carlson, 2012).

The geographical location and types of residence such as rural or urban, affected food security among Syrian refugees. It corresponded with US national findings in the area of food security (Mabli, 2014). In 2017, the prevalence of food insecurity was 15.4% in US rural areas when it was 14.1% in US urban areas (Oliveira V.2019). Our statistical analysis confirmed that there were significant differences in food security among households in different areas and cities. The frequency of food insecurity was significantly greater ($p=0.009$) in rural areas than in urban areas, 90.7% versus 67.6%.

In addition to the post-resettlement effects of the traumatic events that Syrian refugees have been exposed to (Kazour, Zahreddine, Maragel, and Almustafa et al, 2017), refugees in the United States experience traumatic migration challenges that result in long-term consequences on their mental health after resettlement (Ostrander et al, 2017). Assessing perceived stress among Syrian refugees led to the conclusion that Syrian refugees experienced moderate levels of perceived stress on a daily basis, $M=21.6 \pm 8.5$.

Among our respondents, women experienced higher level of perceived stress than men with no significant differences statistically. Likewise, a study done among adults living in the United States found that women reported higher levels of perceived stress than men with very small differences. There were no significant differences in the items of social stressors between women and men (Gentry et al, 2007).

Different studies suggested that financial situations and work-related events were the stressors among men. However, family and children were the stressors among

women (Matud, 2004; McDonugh and Walters, 2001). Such findings would be applicable in our population. Based on our observations and as a common Syrian norm, Syrian refugee men were more likely to be the heads of the households, whereas the majority of Syrian women were housewives responsible for the family and the children.

When examining the perceived stress between rural and urban areas, our findings indicated that Syrian refugees experienced higher levels of perceived stress in urban areas than in rural areas with significant differences ($P \leq 0.001$) between dwellers. However, food insecurity was more frequent in rural areas than in urban areas. The majority of the households (90.3%) were food insecure in rural areas, but 67.6% of the households were food insecure in urban areas. Furthermore, our regression model showed that rural areas had an inverse relation with food security when perceived stress was adjusted. We concluded from that model that the households of rural areas were 87.9% less likely to be food secure than the households in urban areas.

This led us to examine the differences in the responses to the subscales of PSS between the two types of residence. Compared to the households in rural areas, the households in urban areas scored higher with significant differences in the items of : (Frequency of feeling confident about the ability to handle personal problems, Frequency of feeling that things were going your way, and Frequency of feeling that you were on top of things), (Table 7).

There were significant differences with higher scores in urban areas in the following items: “The frequency of feeling nervous and stressed” and “ The frequency of being angered because of things that were outside of your control”, such results indicated that the households in rural areas experienced less stress and anger when lacking control

over specific situations happening. This conclusion was also confirmed when we did not find significant differences between the types of residence in the items of "Being upset because something that happened unexpectedly" and "Having felt that you were unable to control the important things in your life".

During our semi-structured interviews, we observed that the families in rural areas from a religion culture, strong believers in fate, and with noticeable levels of faith. The frequent comment on items of having or lacking controls over life events was always: "We do not control, it is the willing of the God". The inverse relationship between perceived stress and food insecurity in rural areas might have been driven by the high level of faithfulness among Syrian refugees in this residence.

A study suggested that practicing spiritual experience on a daily basis was a positive coping strategy against perceived stress. Participants, who reported higher levels of spiritual practice on specific days, experienced less negative-effect perceived stress on these days (Whitenhead and Bergeman, 2012). Another study aimed to determine the association between spiritual values in a work environment and mental wellbeing, concluded that spirituality was positively correlated with mental wellbeing as well as with a low occupational stress (Arnetz et al, 2013). This also could be an additional reason for the low score of PSS among men in our population.

Subsequently, our second regression model (Table 6-Model 3) showed that perceived stress was positively associated with the urban cities of Miami and West Palm Beach. Food security was also significantly associated with perceived stress in Miami and West Palm Beach. Compared to the households in Tampa, the households in Miami

and West Palm Beach were 6.5 and 22.3 times more likely to be food secure when perceived stress was adjusted.

A meta analysis review that included 20 studies found that living in urban cities was a causal factor for disadvantaged mental health. Researchers concluded that mood disorders and anxiety disorders were 39% and 21% higher in urban areas than in rural areas respectively (Peen et al, 2010). In addition, Syrian refugees had a tendency to depression and anxiety disorder prior to arrival to the United States. In Jordan, 30% of 765 of Syrian refugees were diagnosed with depression (Ghammouh et al, 2015).

A report released by the International Medical Corps showed that 54% of 6000 Syrian refugees suffered from severe emotional disorders in Lebanon, Turkey, and Jordan (Hijazi and Weissbecker, 2015). Syrian refugees residing in urban areas might have been at greater risk of disadvantaged psychological health, which was indicated as a higher score of PSS.

In the context of the FSM-USDA score and PSS score, the literature supported our finding of the marginally significant correlation between the two measurements, taking into account that a larger sample size would have revealed a stronger correlation. A cross sectional survey involving 2870 mothers found that depressive symptoms and anxiety disorders were frequent among 31.1% of marginally food secure women and 36.7% of food insecure women. Their statistical analysis showed that the odds of having mental health issues were more than twice in food insecure women compared with food secure women (Whitaker et al, 2006).

Moreover, food insecurity was linked to violence besides depressive symptoms in the United States. A study done among women with violence experience, found that 59%

of women reported very low food security and depressive symptoms. The study suggested that exposure to violence could be a causal factor to food insecurity as it might have affected the ability to seek jobs resulting in an inability to afford food (Chilton et al, 2014).

War-related violence was the main reason for fleeing Syria; the religion and believes prevented Syrian refugee women from discussing sexual and gender based violence (Sleiman, 2014). The vast majority of Syrian refugees (79%) had experienced death events in their families as a result of war-violence (Sirin and Sirin, 2015). The Syrian refugee population in Florida might have been exposed to war-related violence, which increased their risk for food insecurity.

Conclusion

Most households (80%) of Syrian refugees that participated in this research were food insecure. Food insecurity was greatly predominant in the households in the rural areas. While the perceived stress was higher in the households in the urban areas. The substantial culture of religion and spirituality might have reduced the level of perceived stress among Syrian refugees in rural areas. Living in urban areas and being exposed to war-related stressful events might have been reasons for high-perceived stress in Syrian refugees in urban areas. Perceived stress is an indicator for food security with respect to the changeable effects by different types of residence in our population.

Translation of our finding into our suggested model:

The result of FSM-USDA questionnaire affirmed that the construct of Availability was not consistent and its sustainability was less likely to happen (Appendix 1). This inconsistency led to negative impact on the Stability construct, which had direct

relationship with our main outcome, Food security. The Stability construct had a direct interchangeable interaction with the construct of Accessibility, which was directly affected by the variable of perceived stress.

Accessibility is defined as the environmental factors including physical and cultural factors. Although we were able to validate that perceived stress had an impact on Accessibility and Utilization constructs, confounders of Types of residence and Spirituality would be considered as main variables under Accessibility construct to include in future research.

Types of residence had an impact on food security and affected its association with perceived stress. There were significant differences in food security status in rural and urban areas. Perceived stress had an inverse effect on food security in rural areas, but it had a positive effect on food security in urban areas. Spirituality would be an additional contributing factor with a direct effect on perceived stress.

This translation allowed us to suggest that our model was likely applicable among Syrian refugees living in the United States; nevertheless, the addition of a spirituality variable would be strongly suggested.

Table 1. Percentages of responses to each item of PSS within the last month:

Question	Never n(%)	Almost never n(%)	Sometimes n(%)	Fairly often n(%)	Very often n(%)
Being upset because something that happened unexpectedly	21(26.25)	1(1.25)	32(40.0)	14(17.5)	12(15.0)
Having felt that you were unable to control the important things in your life	27(33.75)	1(1.25)	33(41.25)	7(8.75)	12(15.0)
Frequency of feeling nervous and stressed	12(15.0)	0	33(41.25)	9(11.25)	26(32.50)
Frequency of feeling confident about the ability to handle personal problems	27(33.75)	4(5.00)	26(32.5)	2(2.5)	21(26.25)
Frequency of feeling that things were going your way	11(13.75)	1(1.25)	32(40.0)	7(8.75)	29(36.25)
Frequency of finding that you could not cope with the things that you had to do	18(22.50)	2(2.50)	43(53.75)	2(2.50)	15(18.75)
Frequency of being able to control irritations in your life	27(33.75)	5(6.25)	31(38.75)	1(1.25)	16(20.0)
Frequency of feeling that you were on top of things?	17(21.25)	4(5.0)	19(23.75)	4(5.0)	36(45.0)
Frequency of being angered because of things that were outside of your control	23(28.75)	2(2.50)	37(46.25)	3(3.75)	15(18.75)
Frequency of feeling inability to overcome difficulties	14(17.5)	1(1.25)	22(27.50)	7(8.75)	36(45.0)

Table 2. Food security status by types of residence and city of residence

Variables	Food secure households n(%)	Food insecure households n(%)	P value
Number of households	16 (100)	64 (100)	
Types of residence			0.009*
Rural areas	4 (25.0)	39 (60.9)	
Urban areas	12 (75.0)	25 (39.1)	
City of residence			0.02*
Miami	5 (31.25)	13 (20.4)	
West Palm Beach	5 (31.25)	5 (7.8)	
Orlando	2 (12.5)	7 (10.9)	
Tampa	4 (25.0)	39 (60.9)	

* Chi square test
** Fisher's exact test
Statistically significant, p=<0.05
+ Column based percentages within specific category

Table 3. PSS in selected characteristics of Syrian refugee households

Variables	n(%)	Mean ±SD	*P value*
Gender			0.2*
Female	63(78.8)	21.6 ±8.5	
Male	17(21.2)	18.5 ±10.9	
Types of residence			<0.001*
Rural areas	43(53.8)	17.8±9.2	
Urban areas	37(46.2)	24.6±7.6	
City of Residence			0.007**
Tampa	43 (53.8)	17.8± 9.2	
Miami	18(22.5)	23.7± 9.1	
West Palm Beach	10(12.5)	26.3± 6.0	
Orlando	9(11.2)	24.6± 6.1	

* Two-sample *t* test
** One-way ANOVA
Statistically significant, P=<0.05

Table 4. Pearson correlation coefficient between FSM-USDA score and PSS score:

			Food security score
Pearson's rho	Perceived stress score	Correlation coefficient	0.2
		Sig. (2 tailed)	0.07
		N	80

Correlation is significant at the 0.05 level (2-tailed)
Correlation is marginally significant at the 0.05 level (2-tailed)

Table 5. Logistic regression demonstrating the effect of perceived stress on food security in rural and urban areas

	Model 1				Model 2			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.03		0.67	0.13	0.9		0.99	0.37
PSS	-0.02	0.98		0.6	-0.067	0.935	0.39	0.08
Types of residence								
Rural areas					-2.1	0.121	0.76	0.005
Urban areas					-	-	-	

(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, P=<0.05

Table 6. Logistic regression demonstrating the effect of perceived stress in households on food security status in cities of residence

	Model 1				Model 3			
	β	B	SE	*P value*	β	B	SE	*P value*
Covariate								
Constant	-1.03		0.67	0.13	-1.11		0.75	0.13
PSS score	-0.02	0.98		0.6	-0.07	0.927	0.04	0.06
City of residence								
Miami					1.88	6.53	0.85	0.03
West Palm Beach					3.1	22.3	0.99	0.007
Orlando					1.67	5.34	1.05	0.1
Tampa					-	-	-	-

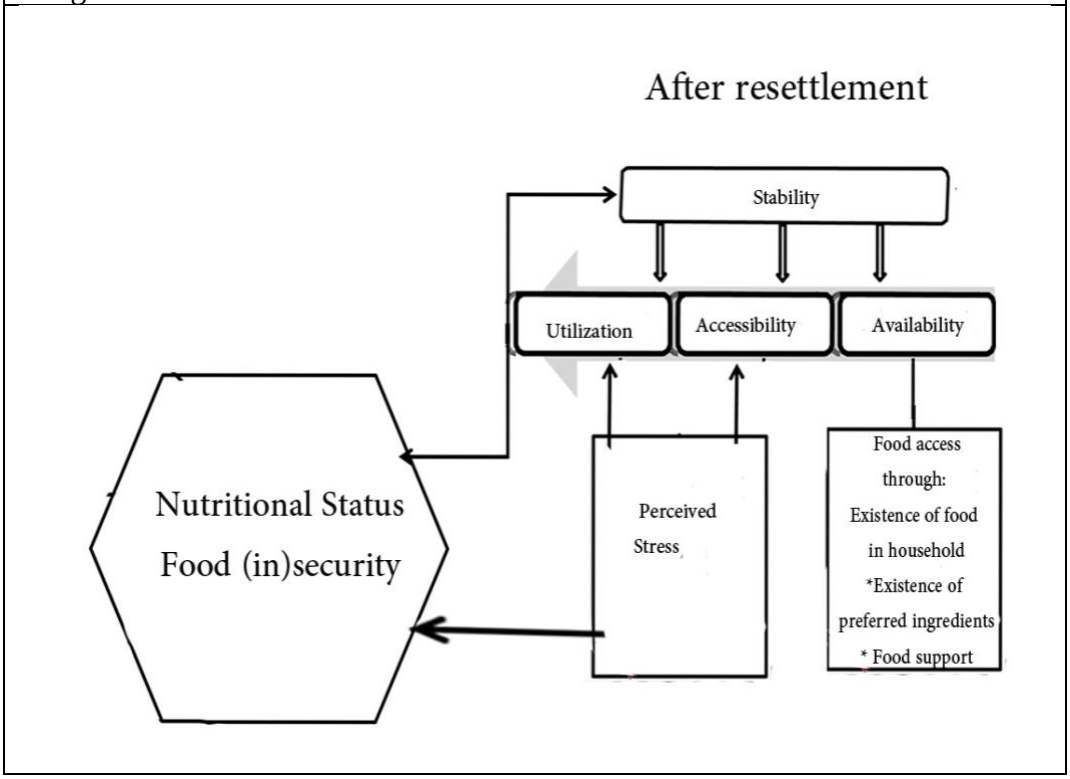
(-) Reference group
β: Estimate
B: Odd ratio
SE: Standard Error
Statistically significant, *P=<0.05*

Table 7. The results of PSS by types of residence

Question	Rural areas Mean ± SD	Urban areas Mean ± SD	*P value*
Being upset because something that happened unexpectedly	1.7 ± 1.3	2.2±1.4	0.1*
Having felt that you were unable to control the important things in your life	1.5 ± 1.2	1.9± 1.6	0.1*
Frequency of feeling nervous and stressed	2.1± 1.3	2.9±1.3	0.004*
Frequency of feeling confident about the ability to handle personal problems	1.3 ±1.5	2.4±1.5	0.003*
Frequency of feeling that things were going your way	2.2±1.5	2.9±1.1	0.02*
Frequency of finding that you could not cope with the things that you had to do	1.8±8.3	2.1±1.3	0.3*
Frequency of being able to control irritations in your life	1.5±1.5	1.9±1.4	0.2*
Frequency of feeling that you were on top of things?	1.9±1.6	3.1±1.3	0.0004*
Frequency of being angered because of things that were outside of your control	1.4±1.4	2.3±1.2	0.006*
Frequency of feeling inability to overcome difficulties	2.4±1.6	2.9±1.4	0.2*

* Two-sample *t* test
Statistically significant, P=<0.05

Figure 1: The impact of perceived stress on food security among Syrian refugees in Florida



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CHAPTER VI: Summary of Conclusion

Most households (80%) of Syrian refugees that participated in this research were food insecure. The levels of food insecurity were greater in rural areas compared with urban areas; however, the difference was that in the rural areas we observed more food insecurity with hunger compared with food insecurity without hunger in the urban areas.

The number of employed individuals in households and households with and without children were two determinants for food security among our population. Households with more than one member employed were more likely to experience food security than households with one employed individual. The high cost of living in urban areas might have created an indirect challenge to achieve food security; such a challenge could have been combated by an additional financial resources, an income of an employed family member.

Households with children tended to be more food insecure than households without children. Households with children in rural areas were at higher risk for food insecurity than households with children in urban areas. The levels of food insecurity might have varied among members of households with children; adults might have experienced greater food insecurity than children.

Food insecurity was inversely associated with perceived stress in rural areas, when it was positively associated with perceived stress in urban areas. Refugees in rural areas appeared to have a high level of faith, which might have reduced their perceived stress on a daily basis.

English proficiency, nutrition knowledge, and women's education may be less important than types of residence, structures of households, employment status, and perceived stress on being food secure in this population. Our findings suggest a route for future research with a larger sample size on the status of Syrian refugees, and where are the points of intervention to ameliorate their challenging lives. Future research should also address the status of this population, their lives, and acculturation at periodic intervals in the United States.

CHAPTER VII: Strengths and Limitations

The strength of this research was the ability to create a clear insight about the experiences of Syrian refugees in the State of Florida. The outcomes of our measures raised the awareness of the socioeconomic challenges that Syrian refugees may face in the United States. Such results may direct us to develop appropriate interventions among Syrian refugees in future research and interventions.

The demographic characteristics of the researcher facilitated the recruitment process and accelerated the phase of data collection. The researcher was born in Syria and was fluent in Arabic. She was familiar with Syrian culture and different norms of different Syrian cities. Thus, a trustful rapport was established with the participants, which reduced the bias associated with self-reporting and provided the opportunity to collect additional qualitative data.

The food security model developed for this study was substantially comprehensive, and it was adjustable in accordance to variables of interest. These properties will allow us to use this model as a guiding tool when investigating additional variables that may affect food security among Syrian refugees prior to and post resettlement in the United States.

The main limitation of this research was the sample size that prevented us from detecting significant associations statistically with regards to the education levels of women and English proficiency. Classification of our participants by city of residence further magnified the limitation created by our small sample size. The fact that majority of Syrian refugees who were admitted to the United States were of an education level of

incomplete high school led us to encounter multiple challenges in examining our related hypotheses.

English proficiency was self-rated by our participants; the result of self-rating was further classified into respondents with English adequate or English inadequate. Utilizing a much accurate English proficiency assessment tool with the cooperation of a language professional may be considered to minimize our bias in future research. In regards to the nutrition knowledge questionnaire, respondents tended to be comfortable answering true or false questions compared with multiple-choice questions. Reformatting the questionnaire may take place for future follow up research.

Based on power analysis, the number of families we were able to recruit was sufficient. However, we wished to tease out some of more important variables in the study that we encountered such as families in rural versus urban areas. This created a challenge to establish power in some of our analyses. Future research should take these differences into account when establishing power regarding these variables.

Our small sample size of 10 households in West Palm Beach challenged the statistical analysis; because food secure households with one employed individual equaled food insecure households with two employed individuals, and there was no household with two employed individuals at all in this city. Another difficulty was faced with the Orlando population; all of the Syrian refugee residents belonged to households with children. Determining the difference of the levels of food insecurity between households with and without children was incomplete in Orlando. The small sample size in Orlando was a reason again for not finding significant results when examining the association between perceived stress and food security by city of residence.

CHAPTER VIII: Future Research

Further research may be needed to determine whether women living in Syria experience different levels of perceived stress compared with housewife Syrian women in the United States. Among Syrian refugees, investigating the association between spirituality and perceived stress is strongly suggested for future research. Such an investigation requires the addition of spirituality as a confounder to food security as well as perceived stress when developing the model to the study.

In addition, studying refugees from other countries as comparison groups may help researchers to develop models to implement interventions when and where needed. A study of teenage children and their adjustment to school system would be of value as they have been moved with no choice of their own. Systematic evaluation of immigrants' status to design and implement appropriate interventions is needed and would provide subsequent studies.

Appendices

Appendix 1.

Percentage of affirmative responses to each item of FSM-USDA within the last 12 months

Concerns for food availability	Percentage of affirmative response (Always true/Sometimes true)
Worried food would run out	51.3%
Food bought did not last	80.0%
Could not afford to eat balanced meals	77.5%
Few kinds of low-cost food for children	83.1%
Could not feed children a balanced meal	70.4%
Children were not eating enough	15.5%
Adults cut or skipped meals	20.0%
Respondent ate less than felt they should have	25.0%
Respondent was hungry, no resources to buy food	3.8%
Respondent lost weight loss due to lack of food	2.5%
An adult spent a whole day without food intake	5.0%
Reduced portions of meals to children	23.9%
Children did skip a meal	7.0%
Children were hungry, no resources to buy food	0
A child spent a whole day without eating	0

Appendix 2.

FSM-USDA measurement tool by Bickel G et al, 2000

Levels of food insecurity	Assessment Questions	System of scale (Number of affirmative response)
Food secure	• None • Worried food would run out • Food bought did not last	0-2
Food insecure without hunger	• Adults not eating balanced meals • Child fed low-cost foods • Adult cut size or skipped meals • Adult eating less than felt they should	3-7
Moderate food insecure with hunger	• Adult cut size or skipped meals in 3 or more months in the past 12 months • Child not eating enough • Adult hungry but did not eat • Respondent lost weight • Cut size of child's meals	8-12
Severe food insecure with hunger	• Adult did not eat for whole day • Child hungry • Adult did not eat for whole day in 3 or more months in the past 12 months • Child skipped meal • Child skipped meal in 3 or more months in past 12 months • Child did not eat for whole day	13-18

Appendix 3.

Questionnaire of demographic characteristics including structure of households, employment status, education level, and English proficiency

Demographic characteristics

1. Gender
Female Male Other DK,R

2. Type of households
- Couple family with children
- Couple family without children
- Couple family with children and additional people
- Couple family without children but with additional people
- Female single parent with children/no additional people
- Female single parent without children/with additional people
- Female single parent with children /with additional people
- Male single parent with children/no additional people
- Male single parent without children/with additional people
- Male single parent with children /with additional people
- Single with additional people
- Single without additional people

3. Number of children_____

4. Gender of children_____

5. Number of children in household in age group of >5 years _____

6. Number of children in household in age group of 17years _____

7. Number of children in household in age group of >17years _____

8. Total number of people living in a household _____

10. Number of adult household members in age group of 18-40 years _____

11. Number of adult household members in age group of 41-60 years _____

12. Number of adult household members in age group >61years _____

13. Number of family member with disability. Specify: Adult _____and children_____

14. Are all individuals at home eating from the same table, not necessarily at the same time?

Yes No Not sure Refuse to answer

Employment status

14. How many individuals are there in the household earning an income through employment?_____

15. Who is the main income earner in the family?

- Mother
- Father
- Child Male
- Child Female
- Children
- Other

16. How would you describe the current employment status of the main income earner?

- Full time
- Part time
- Unemployed/looking for work
- Student
- Retired
- Other

17. How would you describe the current employment status of the other income earner?

- Full time
- Part time
- Unemployed/looking for work
- Student
- Retired
- Other

18. How would you describe the current employment status of the other income earner?

- Full time
- Part time
- Unemployed/looking for work
- Student
- Retired Other

19. How many members of your family have a job and have income?

_____

20. What is your occupation and occupation of major income earner?
_____

21. From which of the following sources did you receive any income in the past 12 months?

Your Wages and salaries
Income from self-employment
Money from aid organization
Dividend and interest (saving, brought some cash, tradeoff jewelry)
Worker's compensation
Retirement pensions
Abroad/foreign remittance
Alimony, other (rental income, scholarship, FAFSA)
Other
Refuse to answer

Education Level

22. Education of the Women

< grade 9
High school diploma
Some university
University degree
Other certification
Refuse to answer

23. Education of income earner

< grade 9
High school diploma
Some university
University degree
Other certification
Refuse to answer

English Proficiency

24. Spoken Languages

Arabic English Turkish French Other

25. Spoken languages at home:

Arabic English Turkish French Other

26. Literacy: Speaking English

None Poor Fair Fluent

27. Literacy: English Comprehension
None Poor Fair Fluent

28. Literacy: English Reading
None Poor Fair Fluent

29. Literacy: English Writing
None Poor Fair Fluent

Appendix 4

FSM-USDA Questionnaire by Bickel G et al, 2000

1. Worried food would run out
    Often true
    Sometimes true
    Never true
    DK/refuse to answer

2. Food bought just didn't last
    Often true
    Sometimes true
    Never
    DK/refuse to answer

3. Couldn't afford to eat balanced meals
    Often true
    Sometimes true
    Never
    DK/refuse to answer

4. Few kinds of low-cost food for children
    Often true
    Sometimes true
    Never
    Dk/refuse to answer

5. Couldn't feed children a balanced meal
    Often true
    Sometimes true
    Never
    DK/refuse to answer

6. Children were not eating enough (Your child/children is/are not eating enough because you and the other members of your household just could not afford enough food.)
    Often true
    Sometimes true
    Never
    DK/refuse to answer

7. The past 12 months, Adult(s) cut or skipped meals due to lack of sufficient food (Adult(s) cut or skipped meals/ Adult(s) cut or skipped meals, 3+ months)

    Almost every month 3 month plus

Two months or less
DK/refuse to answer

8. Did you (personally) ever eat less than you felt you should because there wasn't enough money to buy food?

Yes No DK/refuse to answer

9. Were you (personally) ever hungry but did not eat because you could not afford enough food?

Yes No DK/refuse to answer

10. Did you (personally) lose weight because you did not have enough money for food?

Yes No DK/refuse to answer

11. Did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?

Yes happened in more than 3 months
No happened in less than 3 months
DK/Refuse to answer

12. Did you or the other members of your household ever cut the size of your child's meals so that they ate less than usual because there was not enough money for food?

Yes happened in more than 3 months
No happened in less than 3 months
DK/Refuse to answer

13. Did any of the children ever skip meals because there wasn't enough money for food?

Yes happened in more than 3 months
No happened in less than 3 months
DK/Refuse to answer

14. Was your child ever hungry but you just could not afford more food?

Yes happened in more than 3 months
No happened in less than 3 months
DK/Refuse to answer

15. Did your child ever not eat for a whole day because there was not enough money for food?

Yes happened in more than 3 months
No happened in less than 3 months
DK/Refuse to answer

Appendix 5

Nutrition knowledge questionnaire by Parga, 1999

1. Healthy Diet Content
    - Bread and cereals
    - Fats and oils
    - Fruits and vegetables
    - Poultry, meat, and fish

2. Source of Calcium
    - Bread
    - Cheese
    - Chicken
    - Citrus fruit

3. Percentage of total fat intake
    - 10
    - 30
    - 45
    - 50

4. The best example of protein
    - Fish
    - Pasta
    - Potatoes
    - Rice and beans

5. Vitamins and minerals are
    - Supplements
    - Calories
    - Extra energy
    - Micronutrients

6. High CHO food
    - Fish
    - Steak
    - Rice and black beans
    - Salad dressing (Ranch)

7. RDAs are only recommendations for nutrient requirements
    - For most of healthy people
    - Only are for sick people
    - Tell you amount of vitamin and minerals you need to achieve
    - Tell you how to eat when on a diet

8. The highest in calories
    1 gram of fat
    1 gram of protein
    1 gram of alcohol
    1 gram of CHO

9. Best source of Iron
    Citrus fruit
    Turkey
    Scrambled egg
    Yogurt

10. The highest in fat 3 ounce of beef
    3 ounce of chicken
    3 ounce of cheddar cheese
    3 ounce of creamy salad dressing

11. Prevent heart disease PUFA
    Saturated fat
    Sodium/salt
    Unsaturated fat

12. Fiber is needed to provide energy
    Fiber is not necessary in the diet
    Help lower cholesterol in the body
    Help the body regulate temperature

13. Best source of fiber bran muffin with margarine
    Spaghetti and meat sauce
    Chicken and yellow rice
    Rice and black beans

14. Source of vitamin D
    Liver
    Mangoes
    Oranges
    Cereal (corn flakes)

15. Which of the following is a mineral
    Iron
    Thiamin
    Riboflavin
    Vitamin C

16. Adolescents need
    More calories, vitamins and minerals than adults
    Less calories, vitamins and minerals than adults
    Only more vitamins than adults
    Adolescents' needs are the same as adults

17. Source of vitamin B12
    Black beans
    Meat
    Pears
    Spinach

18. Folic acid is
    A vitamin necessary to prevent defects in the fetus during pregnancy
    A mineral people need during adulthood
    A food additive that helps keep food fresh
    A waste product of metabolism

19. An antioxidant
    is a substance needed by the body to kill germs
    a chemical used to make food fat free
    a chemical needed by people over age 50
    a substance needed by the body to prevent damage to cells

20. Servings of fruits and veggies a day
    At least 1 serving of each
    2 to 3 servings of each
    3 servings of fruits and 1 serving of vegetable
    4 to 5 servings of fruits and 2 servings of vegetables

21. A calorie is a fatty substance found in food which causes weight gain (True False)

22. Margarine contains fewer calories than butter (True False)

23. High intakes of certain vitamins can be very harmful (True False)

24. Alcohol contains no calories because it is not a food (True False)

25. The fat in foods what makes you fat (True False)

Appendix 6

Perceived Stress Scale by Cohen S, 1994

1. In the last month, how often have you been upset because of something that happened unexpectedly?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

2. In the last month, how often have you felt that you were unable to control the important things in your life?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

3. In the last month, how often have you felt nervous and "stressed"?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

5. In the last month, how often have you felt that things were going your way?

Never
Almost Never
Sometimes
Fairly Often
Very Often

DK/R

6. In the last month, how often have you found that you could not cope with all the things that you had to do?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

7. In the last month, how often have you been able to control irritations in your life?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

8. In the last month, how often have you felt that you are on the top of things?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

9. In the last month, how often have you been angered because of things that were outside of your control?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

10. In the last month, how often have you felt difficulties were pulling up so high that you could not overcome them?

Never
Almost Never
Sometimes
Fairly Often
Very Often
DK/R

Appendix 7

Food Environment

1. What are some challenges/barriers/that you face regarding to gain access to food for your family?
Challenges:
Barriers:

2. Do you have any difficulty in?
- Transportation to grocery
- Deciding what food to shop for
- What food to prepare and what food to eat?
- No difficulties
- Refuse to answer

3. What influences your decisions (culturally acceptable foods)? For example: halal food, television, friends, school mates, co-workers):

_____

4. How does this differ from when you lived in Syria?

_____

Prompts: in terms of purchase, food item, distribution, price, taste, convenience, transportation.

5. Are you receiving any supports?
- Social support: friends and relatives in US
- Food support: food aid program
- Not sure
- Refuse to answer

6. What grocery stores do you buy foods from?
- American stores
- Arab stores
- Both
- It depends on food ingredients
- Refuse to answer

7. Are you able to find substitutes for ingredients not available in grocery stores you shop at?

Yes No Sometimes Not sure/Refuse to answer

Appendix 8

General food practice

1. Do you follow any specific diet for a health concern or religion issue? Specify

Yes……. No Not sure

2. Do you take any dietary supplement? Specify

Yes…… No Not sure

3. Has the number of main meals consumed per day changed since moving to the US? Specify

Yes…… No Not sure

4. Has the portion of your main meals changed since moving to the US? Specify

Yes…… No Not sure

5. Has the time of having your meals changed since moving to the US?

Yes No Not sure

6. Have grocery shopping habit changed since moving to the US? Specify

Yes No Not sure

7. What was the meal that you were more likely to skip before moving to the US?

Yes No Not sure

8. What is the meal that you are more likely to skip since moving to the US?

Yes No Not sure

9. Do you think that your consumption of soft drink has increased since moving to the US?

Yes No Not sure

10. Can you mention a food related habit that you no longer practice since moving to the US?

Yes No Not sure

11. Can you mention a food related habit that you have acquired since moving to the US?

Yes No Not sure

Appendix 9

Health Status

1. Have you ever been told by a doctor or health professional that you had any of these conditions? Specify
Yes NO Specify if yes ----------

2. Have you done the medical screening upon arrival to the US?

Yes No Not sure

3. Have you been informed if the screening showed that you have had a medical condition?

Yes…… No Not sure

4. Have you been diagnosed with a medical condition after your arrival to the US?

Yes……. No Not sure

5. Do you take medication for it?

Yes…… No Not sure

6. Do you know of any dietary guidelines to manage your chronic condition?

Yes No Not sure

7. Do you follow any dietary regime to manage it?

Yes No Not sure

8. How do you rate your disease self-management skill?

Good Fair Poor

9. Do you have medical insurance?

Yes No Not sure

If so, is it governmental assistance insurance or private insurance?

Governmental Private

10. Are you aware of your eligibility for Medicaid medical insurance?

Yes No Not sure

11. Do you have any issue in regard to your physician visit, obtaining medication, etc?

Yes NO Specify if yes ----------

12. Most of people that are my age are
Happy with their weight and body shape
Unhappy with their weight and body shape

Do not talk about their weight or body shape

13. I feel I am
    Overweight
    Underweight
    Normal weight for my height

14. In the past year, I have dieted or changed the way I eat to lose weight
    I never diet to lose weight
    1-5 times
    6-10 times
    More than 10 times
    I am always dieting

15. Best dieting method for you
    Skipping meals
    Cutting out bad foods like sweets and foods high in fat
    Vomiting or using laxative
    Exercising
    Not eating at all for a day or more
    Joining a weight loss program
    Using diet pills (prescribed or nonprescribed)
    Atkin diet or another type of diet from book, magazine, etc
    I have not tried any of the above methods

16. Ideally, I would like my weight to be
    One to five pounds less
    Six more pounds less
    One to five pounds heavier
    Six or more pounds heavier
    The same, I am satisfied with my current weight

Appendix 10

Acculturation questionnaire

	Type of food	Frequency of weekly consumption in Syria (Pre-resettlement)	Frequency of weekly consumption in USA (Post-resettlement)	Comment
1	Arabic pita bread			
2	Orange fruit			
3	Apricot			
4	Watermelon			
5	Baby zucchini			
6	Green beans			
7	Plain yogurt			
8	Ayran drink			
9	Labneh			
10	Braids cheese Shelal			
11	Syrian salad			
12	Use of pomegranate molasses			
13	Middle Eastern Appetizers for breakfast (Hawader)			
14	Middle Eastern meals (Rice and vegetable side)			
15	Kebbah			
16	Cereal bars			
17	Mango			
18	Avocado			
19	Strawberries, cherries, blackberries			
20	Sweet potatoes			
21	Corn			
22	Flavored yogurt			
23	USA style cheese e.g.slices			
24	Creamy salad dressings			
25	Fast food			
26	Cereal and milk for breakfast			
27	Microwavable food			
28	Soft drink			
29	Chips and dips			
30	Drive thru and food delivery			

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