Original Research

An Overview of the Health Profile of Syrian Refugees Arriving in Kentucky from 2012-2017

Camila Calderon[1], Annie Rominger[2]*

Abstract

Background: The civil unrest in Syria has led to millions of displaced Syrians. The United States has relocated over 15,000 Syrian refugees, mostly arriving since 2015. Little is known about the health of Syrian refugees entering the United States.

Methods: Syrian refugees in Kentucky who had a medical screening and documented RHA from October 2012 to September 2017 were included in the study. The information is collected and stored in the Arriving Refugee Informatics Surveillance and Epidemiology (ARIVE) database. This study is a retrospective review of the ARIVE database to describe the general health of the Syrian refugees arriving to Kentucky which can be generalized to those arriving to other states.

Results: A total of 521 Syrian refugees had a complete RHA from October 2012 to September 2017. The top diagnosed conditions in Syrian refugee adults included dental conditions, elevated BMI, hematuria, vision changes and anemia. The top diagnosed conditions in Syrian refugee children included low BMI, dental conditions, hematuria, vision changes and anemia. Adult Syrian males had significantly higher cardiovascular risk factors compared to adult females.

Conclusions: Syrian refugees often have chronic conditions that require long term management, aggressive risk stratification and preventative health measures. Effective primary and preventative care is therefore essential to limit the long-term tertiary complications as they integrate into the local community

Background

Due to the civil unrest in Syria, an estimated 11 million Syrians have been displaced and 4.9 million have left their country seeking refuge since 2011 [1, 2]. By the end of 2016, 18,007 Syrian refugees had been resettled in the United States (US) [2]. Interestingly, from 2011 to 2015, the US had taken in less than 1,500 Syrian refugees [3]. Despite opposition from many US states to resettle Syrian refugees following the Paris attacks in 2015, Kentucky remained one of the 19 states to welcome Syrian refugees [2]. In 2016, Syrian refugees were the second largest origin group resettled in the US and Kentucky was the 6th highest state in Syrian refugees resettled per capita [4].

The State Department strives to provide resettlement services within the first 90 days of arrival in the US. These services include an initial health screening/assessment, specialty and mental health referrals, and the establishment of a primary care clinic (CDC) [5]. The goals of the Refugee Health Assessment (RHA) are to follow up previous diagnoses from oversees medical exams, identify individuals with communicable diseases of public health importance, and identify health conditions that could affect the resettlement process. The RHA also serves as an introduction to the US healthcare system and establishes a primary care location for the individual.

The Kentucky Office for Refugees and the University of Louisville Global Health Center makes RHA available to all Kentucky's newly arrived refugees and maintain the information in a secured database (Arriving Refugee Informatics Surveillance and Epidemiology (ARIVE) [6]. In Kentucky, refugees can receive an RHA at one of seven designated clinics throughout the state. Based on the Center for Disease Control (CDC) guidelines, RHAs, in addition to a review of overseas medical information, include a complete medical and socio-ethnographic history, a physical exam, and laboratory testing [6]. Little research exists regarding the health of US Syrian refugees.

The primary objective of this study is to identify the common health conditions that affect the incoming Syrian population in the state of Kentucky identified via completed RHA visits. The secondary objectives are to further classify the identified conditions by age (adult or pediatric) and gender so focused programs can be developed to improve the overall health of this population.

Methods

In 2012, the Kentucky Office of Refugees, in collaboration with

*Correspondence To:
Annie Rominger, MD MPH MSc
University of Louisville Department of Pediatrics
571 South Floyd Street, Suite 412, Louisville, KY 40202
Work Email: anna.rominger@louisville.edu

Table 1 Percentage of Syrian refugees in each BMI category subdivided by age and gender

Syrian Refugee Demographics	
Gender (n=521)	
Female	239 (45.9%)
Male	282 (54.1%)
Resettlement Agency (n=517)	
Catholic Charities	86 (16.6%)
KRM-Louisville	308 (59.6%)
KRM-Lexington	120 (23.2%)
IC-BG	3 (0.6%)
Age (n=521)	
≥ 18	237 (45.5%)
< 18	284 (54.5%)
Country of Departure (n=519)	
Jordan	387 (74.6%)
Turkey	89 (17.1%)
Egypt	26 (5%)
Lebanon	8 (1.5%)
Iraq	6 (1.2%)
Syria	3 (0.6%)
Language (n=521)	
Arabic	100%

the University of Louisville Global Health Center, created a secure database (ARIVE) which stores the information from the RHA of all newly arriving refugees in the state of Kentucky. This database is kept in the REDCap™ platform (Developed at Vanderbilt University Institute for Clinical and Translational Research; Nashville, TN) and maintained by the University of Louisville Global Health Center. Public health clinics throughout the state, which are overseen by the Kentucky Office of Refugees, perform all the RHAs and operate according to established screening protocols. The investigators received permission from the University of Louisville Institutional Review Board (IRB) to review charts from the ARIVE REDCap™ database for this study.

This is a retrospective, descriptive study including Syrian refugee patient charts from the REDCap™ database from October 2012 to September 2017. Based on the data elements suggested by the CDC and Office of Refugee Resettlement (ORR), a secondary data analysis of the Refugee Health database was conducted. Data collected from the seven clinical sites performing RHA were entered into the ARIVE database maintained in REDCap™. Basic demographic data for each patient chart, including age, gender, language, and country of departure, was used to describe the population. Health data, including medical diagnoses and subspecialist referrals, was reviewed. The documented screening data included vital signs, body mass index (BMI), complete blood count (CBC), complete metabolic panel (CMP), lipid panel, Human Immunodeficiency Virus (HIV) status, Hepatitis C, Syphilis, Hepatitis B exposure/ vaccination status, tuberculosis and stool studies for parasites. Behavioral risk factors included self-reported history of tobacco use and/ or exposure and the results of the mental health evaluation. Mental health evaluation was done using the Refugee Health Screener-15 (RHS-15), a tool developed by Pathways to Wellness to sensitively detect the range of emotional distress common across refugee groups [7]. The data was grouped into adult and pediatric (age <18) refugees for analysis. The adult population was further divided into male and female refugees. All data was

analyzed using SPSS version 24 to create a description of the health status of Kentucky Syrian refugees.

Results

A total of 521 Syrian refugees had a documented RHA from October 2012 to September 2017. There were 54.5% under 18 years of age, 45.9% that were female, and 74.6% who came through Jordan (**Table 1**). The Kentucky Refugee Ministries (KRM) resettled 82.2% and Catholic Charities (CC) resettled 16.6% of the included refugees. The top abnormal findings during the RHA in the adult Syrian refugees included dental conditions (80.8%), BMI >25 (69.4%), hematuria (33.3%), vision changes (25.9%) and anemia (22.9%) (**Table 2**). The top abnormal findings during the RHA in the pediatric Syrian refugees included BMI <19 (70.2%), dental conditions (60.6%), hematuria (34.3%), vision changes (28.1%) and anemia (19.2%) (**Table 3**). The most interesting difference between pediatric and adult population was the distribution of BMI. There were 69.4% of adults with a BMI >25 while 8% of children with the same BMI. In contrast, 70.2% of children were underweight (BMI <19), compared to only 0.9% of adults (**Figure 1**).

When the adult population was divided into males and females, additional variables including smoking, total cholesterol, high density lipoproteins (HDL), and systolic blood pressure (SBP) were evaluated (**Tables 4 & 5**). There were 43.4% of males who reported smoking regularly compared to only 14.3% of females. In addition, 49% of males had elevated total cholesterol (>200) and 96.4% had decreased HDL (<59) compared to 16.7% and 78.9% of females respectively (**Figures 2 & 3**). There were 58.3% of male Syrian refugees and 3.1% of female Syrian refugees with an elevated blood pressure (SBP >140). There were 42.6% of adult females with anemia and 48% were noted to have hematuria while only 3% of males had anemia and 18.8% had hematuria (**Tables 4 & 5**).
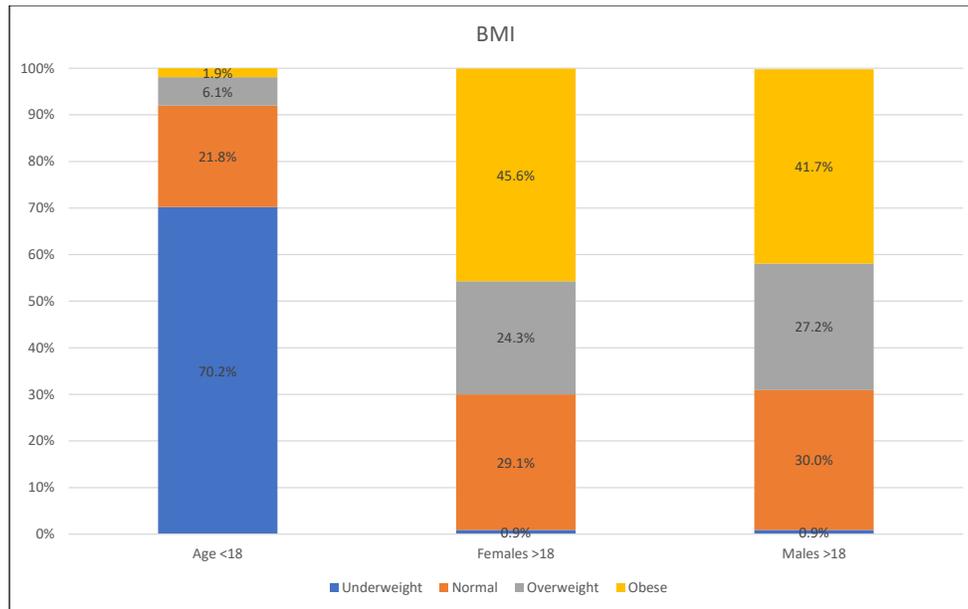
Figure 1 Percentage of Syrian refugees in each BMI category subdivided by age and gender

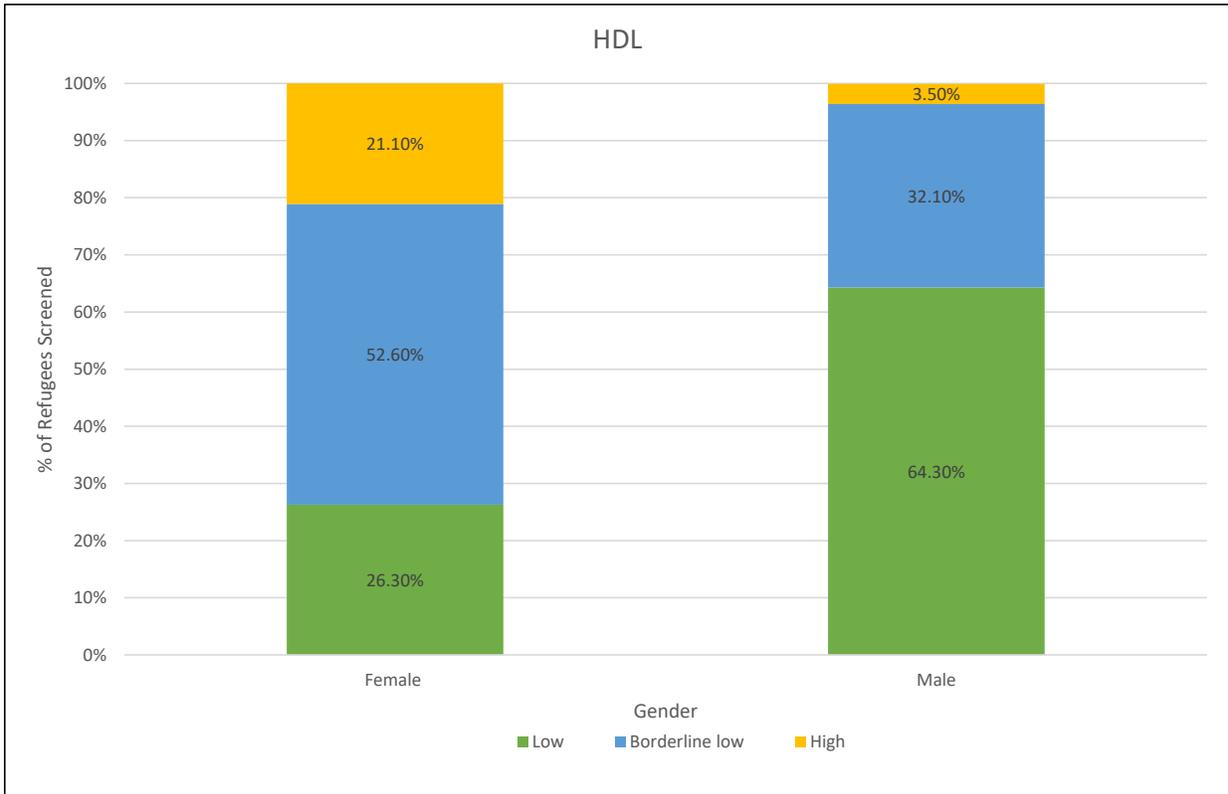**Table 2** Results of the screening and evaluation tests for all new adult Syrian refugees (age ≥18)

Evaluation (n=237)	N (%)
Vision (n=181)	
Abnormal	47 (25.9%)
Normal	134 (74%)
Dental (n=167)	
Abnormal	135 (80.8%)
Normal	32 (19.2%)
Urinalysis (n=201)	
Glucose	3 (1.5%)
Protein	22 (10.9%)
Blood	67 (33.3%)
TSPOT/QFT-Plus (n=183)	
Positive	25 (13.7%)
Negative	158 (86.3%)
Borderline	0
TST (n=0)	
CMP (n=127)	
Glucose > 120	6 (4.7%)
Glucose > 200	2 (1.6%)
Creatinine > 1	6 (4.7%)
BUN ≥ 20	2 (1.6%)
BMI (n=206)	
Underweight	2 (0.9%)
Normal	61 (29.6%)
Overweight	53 (25.7%)
Obese	90 (43.7%)
Lead (n=0)	
Hemoglobin (n=201)	
Anemia	46 (22.9%)
Normal	155 (77.1%)

Table 3 Results of the screening and evaluation tests for all new pediatric Syrian refugees (age <18)

Evaluation (n=284)	N (%)
Vision (n=178)	
Abnormal	50 (28.1%)
Normal	128 (71.9%)
Dental (n=241)	
Abnormal	146 (60.6%)
Normal	95 (39.4%)
Urinalysis (n=230)	
Glucose	0
Protein	40 (17.4%)
Blood	79 (34.3%)
TSPOT/QFT-Plus (n=204)	
Positive	7 (3.4%)
Negative	196 (96.1%)
Borderline	1 (0.4%)
TST (n=45)	
Reactive	9 (0.2 %)
Non-reactive	32 (71.1%)
Did not return	4 (8.9%)
CMP (n=19)	
Glucose > 120	1 (5.6%)
Glucose > 200	0
Creatinine > 1	0
BUN ≥ 20	0
BMI (n=262)	
Underweight	184 (70.2%)
Normal	57 (21.8%)
Overweight	16 (6.1%)
Obese	5 (1.9%)
Lead (n=240)	
Abnormal	3 (1.2%)
Normal	237 (98.8%)
Hemoglobin (n=261)	
Anemia	50 (19.2%)
Normal	211 (80.8%)
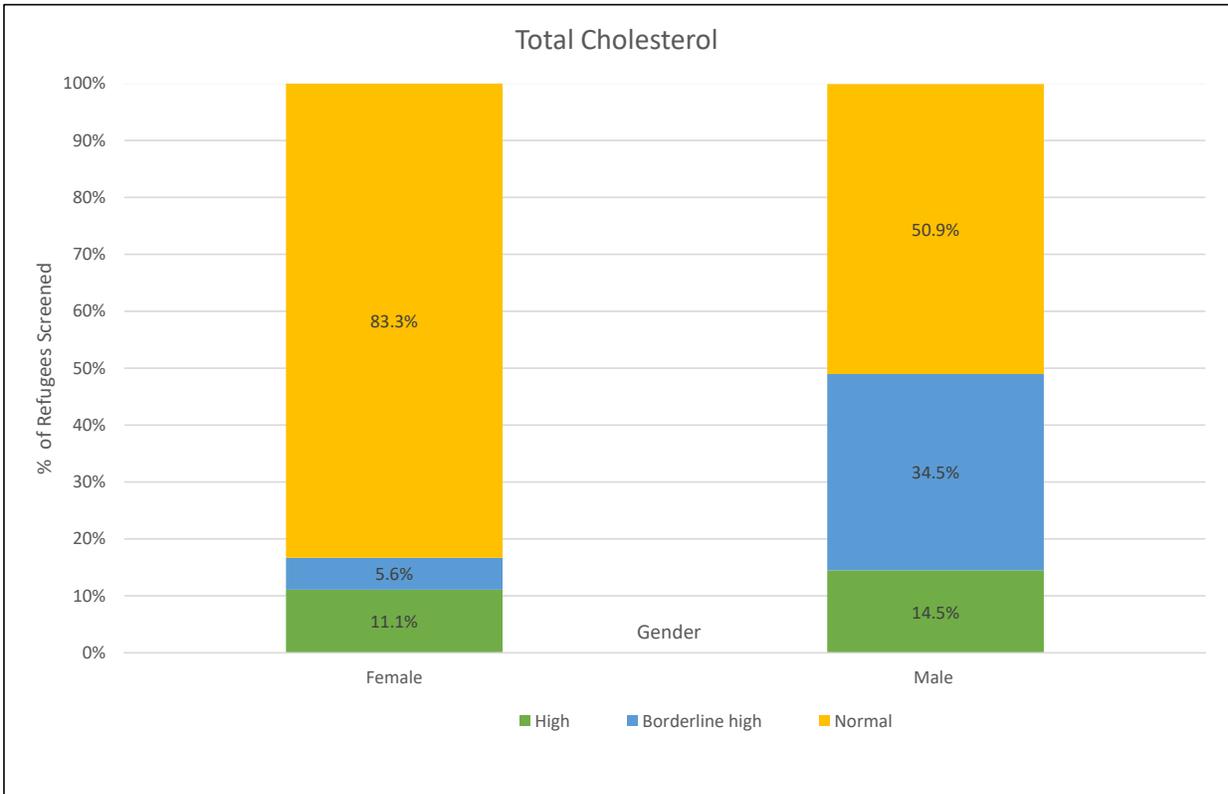
Figure 2 Total cholesterol of adult Syrian refugees subdivided by gender


Figure 3 HDL of adult Syrian refugees subdivided by gender

Table 4 Results of the screening and evaluation tests for all new adult male Syrian refugees

Evaluation	N (%)
Vision (n=91)	
Abnormal	19 (20.9%)
Normal	72 (79.1%)
Dental (n=86)	
Abnormal	72 (83.7%)
Normal	14 (16.2%)
Urinalysis (n=101)	
Glucose	2 (2%)
Protein	7 (6.9%)
Blood	19 (18.8%)
CMP (n=57)	
Glucose > 120	4 (7%)
Glucose > 200	2 (3.5%)
Creatinine > 1	6 (10.5%)
BUN ≥ 20	1 (1.8%)
BMI (n=103)	
Underweight	1 (0.9%)
Normal	31 (30%)
Overweight	28 (27.2%)
Obese	43 (41.7%)
Smoking (n=60)	
Yes	26 (43.3%)
No	34 (56.7%)
Hemoglobin (n=100)	
Anemia	3 (3%)
Normal	97 (97%)
Total Cholesterol (n=55)	
High	8 (14.5%)
Borderline high	19 (34.5%)
Normal	28 (50.9%)
HDL (n=56)	
Low	36 (64.3%)
Borderline low	18 (32.1%)
High	2 (3.5%)
Systolic Blood Pressure (n=60)	
≤ 120	20 (33.3%)
>120	5 (8.3%)
>140	35 (58.3%)

Table 5 Results of the screening and evaluation tests for all new adult female Syrian refugees

Evaluation	N (%)
Vision (n=90)	
Abnormal	28 (31.1%)
Normal	62 (68.9%)
Dental (n=81)	
Abnormal	63 (77.8%)
Normal	18 (22.2%)
Urinalysis (n=100)	
Glucose	1 (1%)
Protein	15 (15%)
Blood	48 (48%)
CMP (n=149)	
Glucose > 120	2 (1.3%)
Glucose > 200	0
Creatinine > 1	0
BUN ≥ 20	1 (0.6%)
BMI (n=103)	
Underweight	1 (0.9%)
Normal	30 (29.1%)
Overweight	25 (24.3%)
Obese	47 (45.6%)
Smoking (n=56)	
Yes	8 (14.3%)
No	48 (85.7%)
Hemoglobin (n=101)	
Anemia	43 (42.6%)
Normal	58 (57.4%)
Total Cholesterol (n=18)	
High	2 (11.1%)
Borderline high	1 (5.6%)
Normal	15 (83.3%)
HDL (n=19)	
Low	5 (26.3%)
Borderline low	10 (52.6%)
High	4 (21.1%)
Systolic Blood Pressure (n=64)	
≤ 120	52 (81.2%)
>120	10 (15.6%)
>140	2 (3.1%)
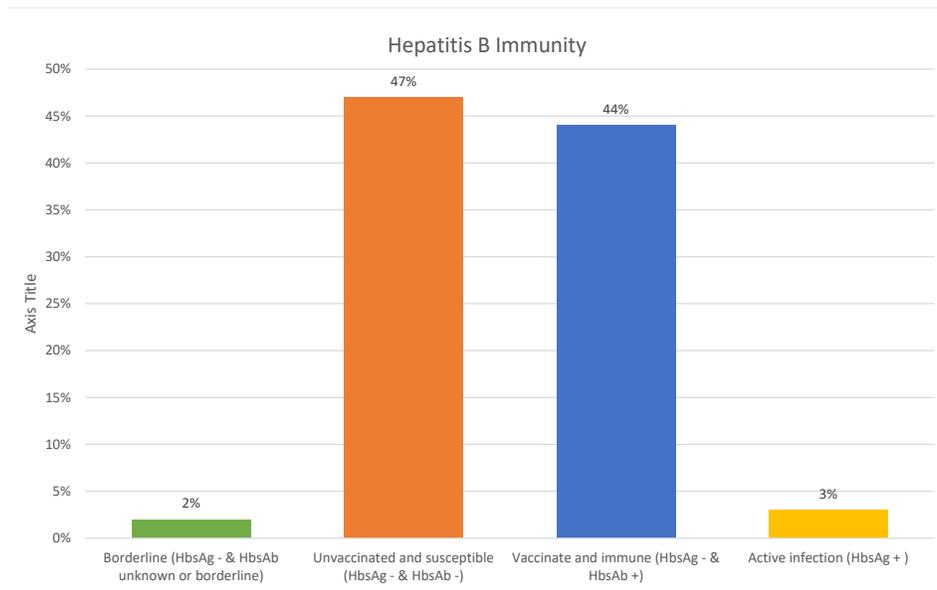
Figure 4 Percentage of Syrian refugees screened for Hepatitis B Immunity

When screened for reportable public health diseases, there were 3% of refugees with active Hepatitis B and many more who were unvaccinated and susceptible (**Figure 4**). The hepatitis B surface antigen (HbsAg) and the Hepatitis B surface antibody (HbsAb) were tested to determine infection, susceptibility and immunity. There were no screened refugees who tested positive for HIV, Hepatitis C or Syphilis. There were 8.7% of refugees who tested positive for Tuberculosis through blood assay (e.g., T-SPOT, QuantiFERON-TB Gold Plus [QFT-Plus]) test.

There were 33% of screened Syrian refugees who tested positive for parasites. The stool studies were positive for Blastocystis (47), Giardia (10), Dientamoeba (9), Endolimax nana (9), and Hymenolepis (1). The latter three are considered non-pathogenic parasites while the pathogenicity of blastocystis and giardia is still debatable and decisions to treat rely on symptoms and exposures. But more importantly, there were no patients with roundworms, Schistosomiasis, or Strongyloides. The relationship between anemia and parasites to determine if those with parasites are more likely to be anemic was not significant for refugees with all parasites, giardia or blastocystis.

Of the 244 pediatric patients asked, there were 53 (21.7%) who had experienced imprisonment, torture or violence. A RHS-15 score was only completed on 35 of the 244 patients. Fifteen were positive and only 4 accepted a mental health referral.

In adult males, 23 of the 103 who responded had experienced imprisonment, torture or violence. There were 55 who had a positive RHS-15 score; however only 10 accepted a mental health referral. There were 24 total patients with any response for "accept referral" so it is not clear if those without a response did not accept a referral or if there is incomplete documentation. In adult females, 5 of the 86 who responded had experienced imprisonment, torture, or violence. There were 51 who had a positive RHS-15 score. There were 30 refugees with a documented response for the mental health referral and only 15 of those accepted it.

Discussion

Abnormal dental exams were frequently documented for both adult (80.8%) and pediatric (60.6%) Syrian refugees arriving in Kentucky. According to the World Health Organization (WHO), oral disease is one of the most prevalent health problems in refugee populations [8]. While many studies show immigrant populations have higher incidences of dental disease compared to native populations, this has not been specifically documented for Syrian refugees in the United States [9,10]. A study by Riatto and colleagues focused on the oral health status of Syrian children in the refugee center in Melilla, Spain where the prevalence of caries in 6-12 year olds was 75% and 50% in permanent and deciduous dentition respectively [11]. Dashash and colleagues studied children in Damascus, Syria in 2012 prior to the increased turmoil and found a high proportion of 5-year-old Syrian children have dental caries [12]. Our study did not document the previous dental care of Syrian refugees arriving in Kentucky, therefore it cannot be said whether their access to dental care was feasible in their home country before the political and social turmoil but the results are consistent with the previous studies in Spain and Damascus. Medical providers should encourage all Syrian refugees, particularly children, to establish care with a dentist and have regular dental evaluations and preventative education.

Visual impairment is a public health burden and can impact one's quality of life and productiveness in society [13,14]. Abnormal eye exams were one of the most commonly encountered medical problem in both adult (25.9%) and pediatric (28.1%) Syrian refugees arriving in Kentucky. The RHA does not specify which components of the eye exam were abnormal making it difficult to understand the severity and complexity of eye health in Syrian refugees. However, these statistics are consistent with a systematic review of the optometric/ophthalmic needs of refugees which found poor eye health across all groups [15]. The resettlement process should not delay eye care and resettlement agencies along with refugee clinic physicians should conduct a full eye and vision exam to ensure proper follow up.

Cardiovascular disease is the leading cause of death in the US with men more commonly affected than women [16]. One of the goals of the WHO is to decrease the morbidity and mortality associated with cardiovascular disease. As the US implements different strategies to combat this problem, it is important to consider the health of the newly arriving refugee populations. Interestingly this study illustrates differences in cardiovascular risk factors (blood pressure, cholesterol, obesity and smoking) between adult Syrian refugee males and females.

When asked about smoking, almost 3 times the number of adult Syrian males responded "yes" compared to females. While this is consistent with the native population in the US where males (15.8%) are more likely to smoke than females (12.2%), smoking is more prevalent in newly arrived male Syrian refugees compared to the native population which increases their risk to other associated conditions [17]. Idris and colleagues report a positive relationship between smoking and the (Syrian) war in university students, with an increase in the mean number of daily cigarettes following the start of the war [18]. This is similar to findings in the American population showing that persons who experience significant psychological stress are more likely to smoke [17]. Knowing the increased stress levels of Syrian refugees, information and resources for smoking cessation should be communicated with this population during the initial health screening and at follow up evaluations.

The total cholesterol level (> 200 mg/dl) was higher in adult Syrian males (49%) compared to adult Syrian females. Concurrently, low HDL (< 59) was found more frequently in adult Syrian males compared to adult Syrian females. According to the Centers for Disease Control and Prevention (CDC), 12.4% of US adults had high total cholesterol and 18% of adults had low HDL in 2015-2016 [19]. In the US, like their Syrian counterparts, males more frequently have low HDL (28.5%) than females (8.9%); however Kentucky Syrian refugees have a higher overall and gender specific abnormalities in cholesterol levels. It is important that these patients all be screened and provided with appropriate education, prevention, and treatment to possibly augment the negative cardiovascular effects [19].

In a study of cardiovascular disease by Maziak and colleagues among adults in Syria, hypertension was detected in 40.6% of participants, specifically 47.7% of men and 34.9% of women [20]. This is higher than the percentage of people in the US with hypertension which is estimated to be 29%, but rising [16]. The proportion of Kentucky adult Syrian refugees with elevated systolic blood pressure was higher in males (58.3%) compared to females (3.1%). This is consistent with previous gender specific studies done on the US population [21].

According to the WHO, anemia affects 25% of the world's population and is found mostly in women and children [22,23]. Anemia was a commonly encountered diagnosis in the newly arrived Kentucky Syrian refugee population, with almost half of adult females and a fifth of children affected by this condition. Anemia is prevalent in Syrian children, which can be caused by a variety of factors, including malnutrition, iron deficiency, helminth infections, and blood loss [24]. There were no patients with roundworms, Schistosomiasis, or Strongyloides in this group and there was no relationship between anemia and those with intestinal parasites so this is unlikely the cause. The consequences of untreated iron deficiency anemia could be devastating in child development and growth [25] so iron studies are warranted and iron supplementation should be

initiated in newly arrived pediatric Syrian refugees.

Dysmenorrhea is a common cause of anemia in women and this should be considered in newly arrived Syrian females and appropriate evaluation and follow up by a gynecologist is warranted. Hematuria was found in about a third of Syrian refugee children. Similarly, almost half of adult females also had hematuria on screening urinalysis. Although this could be due to specimen collection from menstruating females, a kidney condition resulting in chronic blood loss needs to be excluded with repeated urinary studies.

The BMI range for adult and pediatric Syrian refugees was very different. There were 69.4% of adult Syrian refugees with a BMI above 25, which is considered overweight, compared to 70.2% of pediatric Syrian refugees with a BMI under 19, which is considered underweight. According to the Food and Agriculture Organization of the United Nations, 821 million people were undernourished in 2017; in western Asia, the prevalence of undernourishment was projected to be 11.3% [26]. The war has made food security a challenge for Syrian refugees where undernutrition, anemia and low breastfeeding rates were a known problem in Syria before the war [27]. Although undernutrition was reported in Syria pre-war, obesity was also been found to be prevalent and has been attributed to socioeconomic status, education level and location [28,27,29].

A review of primary surveys in Syria in 2012 found the prevalence of obesity in Syrians over 20 years old to be 38.2% and in Syrian women 45-65 years old a striking 81%; obesity analysis showed crossover from younger males to older females [28]. Now due to the war, more recent studies have found Syrian refugee females who have relocated to Turkey to have iron, B12, and folic acid deficiencies and those relocated in Jordan to have a high prevalence of anemia [30,31]. It can be assumed that the nutrition status of adult Syrian females has been compromised due to the war and although our study shows 69.9% of adult Syrian female refugees with a BMI above 25, their overall nutrition may still be deficient. Although food vouchers and cash assistance are available for registered refugees, lack of income and transportation barriers leads to limited access to healthy foods and poor food choices. This results in a high prevalence of anemia and poor nutrition in Syrian refugees, despite elevated BMI [30].

Although pediatric refugees are at risk for malnutrition due to displacement, studies in pediatric Syrian refugees have found that acute malnutrition is low despite the war [30,32,27]. However, the high number of underweight pediatric Syrian refugees in Kentucky is concerning for malnutrition and micronutrient deficiencies; further evaluation of vitamins and minerals by pediatricians is warranted and nutrition supplementation should be considered. Refugee children are at risk of rapid weight gain and increased BMI after resettlement in the US [33,34,35]. Pediatricians and resettlement agencies should provide nutrition education to patients and families to prevent obesity in refugee children. Education and guidance should be given regarding new foods they may have not had access to in their home countries or refugee camps, like fast food and foods high in sugar. Pediatricians are encouraged to trend BMI in pediatric Syrian refugees and regularly assess their vitamin and nutrient levels to assure proper growth and development.

The Syrian war has caused a threat to countries taking in Syrian

refugees due to the prevalence of infectious diseases [36]. There were no screened Syrian refugees who tested positive to HIV, Hepatitis C virus (HCV), or Syphilis, but 3% of Syrian refugees had active Hepatitis B virus (HBV) and many were unvaccinated. A study in Syrian refugee children in Turkey found many were unvaccinated against HBV and Hepatitis A virus [37]. It is important that they receive the proper hepatitis B vaccinations upon resettlement. There were 8.7% of Syrian refugees who tested positive for Tuberculosis (TB) through blood assay T-SPOT or QFT-Plus test. This may be due to previous TB infection or refugees who received the bacille Calmette-Guerin (BCG) TB vaccine.

The Syrian war has caused a cascade of unfortunate events affecting the mental health and psychosocial well-being of millions of Syrians who have been displaced, experienced violence and loss, and have had to live in refugee camps [38]. Syrian refugees in Kentucky have the added stress of resettlement in a new country. Syrians and Syrian refugees have a wide range of mental health problems including but not limited to post traumatic stress disorder (PTSD), anxiety, depression, exacerbation of pre-existing mental health disorders, and experiencing violence, and tremendous loss [39,38,40,41,42].

A RHS-15 was done in only 35 pediatric Syrian refugees, 97 adult Syrian males and 87 adult Syrian females. A low number of Syrian refugees accepted mental health referrals: 4 pediatric, 10 adult males, and 15 adult females. While the RHA included the RHS-15, it was not conducted on all patients and the prevalence of anxiety, depression and PTSD were not specially assessed. Improved screening is crucial to the identification of Syrian refugees with mental health disorders so that proper referrals can be made. Language and cultural differences could be barriers to obtaining the RHS-15. Mental health disease has a social stigma in the Syrian culture which could have prevented Syrian refugees from disclosing their symptoms during the RHS-15 and the RHA overall [38]. Although it is assumed that the Syrian refugees had access to an Arabic interpreter during the RHA, the cultural upbringing and country of origin of the Arabic interpreter is not known. This could have also been a deterrent for disclosure of mental health symptoms.

A study of Syrian refugees in Atlanta found only 20% of their participants saw a mental health professional [38]. Mental health referrals should be followed to ensure Syrian refugees are seeing mental health professionals and to ensure their adjustment in the US is going well. It is especially important for pediatricians to note that while refugee children have been found to be resilient despite the trauma they have undergone, they are also at risk for harassment, discrimination, bullying, and social isolation [43,44].

Limitations

This retrospective study relied on information gathered in the RHA. Language and cultural barriers, human error in electronic data input, and incomplete data entry are all limitations of this type of study.

Conclusions

Syrian refugees often have chronic conditions that require long term management, aggressive risk stratification and preventative health measures. Early identification of these

chronic diseases and effective primary and preventative care is therefore essential to limit the long-term tertiary complications as they integrate into the local community. Dental and visual preventative health should be promoted and resources provided to the refugees during their intake exams and through their primary care providers. Adults should have regular follow up to control and/or prevent further cardiovascular disease. Nutrition education should be strongly advocated in the Syrian community, particularly the effect of diet on overall health and the appropriate growth and development of their children.

Many Syrian refugees have mental health needs and they should all have a full mental health evaluation and appropriate intervention. Improved screening tools and follow up options could help facilitate mental health care. It is imperative that mental health referrals are followed to ensure appropriate adjustment of the Syrian refugees in their new environment. Pediatricians and teachers should closely monitor the Syrian refugee children for signs of adjustment problems, anxiety, post-traumatic stress disorder or other mental health conditions. In addition, they may also be at a higher risk of bullying and adjustment challenges in schools.

Resettling refugees is a community wide effort that requires patience, understanding and close follow up to ensure refugees' needs are met medically, socially and emotionally.

References

1. United Nations Office for the Coordination of Humanitarian Affairs. (2018). About OCHA Syria. Syrian Arab Republic. Retrieved from https://www.unocha.org/syria
2. Zong J, Batalova J. Syrian Refugees in the United States. migrationpolicy.org.
3. Harris G, Sanger DE, Herszenhorn DM. Obama increases number of Syrian refugees for US resettlement to 10,000. New York Times. 2015 Sep;10.
4. Radford J, Connor P. Just 10 states resettled more than half of recent refugees to US. Pew Research Center. 2016 Dec;6.
5. McNeely CA, Morland L. The Health of the Newest Americans: How US Public Health Systems Can Support Syrian Refugees. Am J Public Health. 2016 Jan;106(1):13–5. https://doi.org/10.2105/AJPH.2015.302975 PMID:26696285
6. Carrico RM, Goss L, Wiemken TL, Bosson RS, Peyrani P, Mattingly WA, et al. Infection prevention and control and

the refugee population: Experiences from the University of Louisville Global Health Center. Am J Infect Control. 2017 Jun;45(6):673–6. https://doi.org/10.1016/j.ajic.2017.02.032 PMID:28431845

7. Fellmeth G, Plugge E, Fazel M, Charunwattana P, Nosten F, Fitzpatrick R, et al. Validation of the Refugee Health Screener-15 for the assessment of perinatal depression among Karen and Burmese women on the Thai-Myanmar border. PLoS One. 2018 May;13(5):e0197403. https://doi.org/10.1371/journal.pone.0197403 PMID:29782542

8. WHO. Global Oral Health Data Bank; 2000.

9. Moreau AM, Hennous F, Dabbagh B, dos Santos BF. Oral Health Status of Refugee Children in Montreal. Journal of immigrant and minority health. 2019 Aug 1;21(4):693-8.

10. Riggs E, Gussy M, Gibbs L, van Gemert C, Waters E, Priest N, et al. Assessing the cultural competence of oral health research conducted with migrant children. Community Dent Oral Epidemiol. 2014 Feb;42(1):43–52. https://doi.org/10.1111/cdoe.12058 PMID:23869652

11. Riatto SG, Montero J, Pérez DR, Castaño-Séiquer A, Dib A. Oral Health Status of Syrian Children in the Refugee Center of Melilla, Spain. Int J Dent. 2018 Mar;2018:2637508. https://doi.org/10.1155/2018/2637508 PMID:29743889

12. Dashash M, Blinkhorn A. The dental health of 5 year-old children living in Damascus, Syria. Community Dent Health. 2012 Sep;29(3):209–13. PMID:23038936

13. Bourne RR, Flaxman SR, Braithwaite T, Cicinelli MV, Das A, Jonas JB, et al.; Vision Loss Expert Group. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. Lancet Glob Health. 2017 Sep;5(9):e888–97. https://doi.org/10.1016/S2214-109X(17)30293-0 PMID:28779882

14. Park SJ, Ahn S, Park KH. Burden of Visual Impairment and Chronic Diseases. JAMA Ophthalmol. 2016 Jul;134(7):778–84. https://doi.org/10.1001/jamaophthalmol.2016.1158 PMID:27196876

15. Bal S, Duckles A, Buttenheim A. Visual Health and Visual Healthcare Access in Refugees and Displaced Persons: A Systematic Review. J Immigr Minor Health. 2019 Feb;21(1):161–74. https://doi.org/10.1007/s10903-018-0766-x PMID:29860671

16. Merai R, Siegel C, Rakotz M, Basch P, Wright J, Wong B, et al.; DHSc. CDC Grand Rounds: A Public Health Approach to Detect and Control Hypertension. MMWR Morb Mortal Wkly Rep. 2016 Nov;65(45):1261–4. https://doi.org/10.15585/mmwr.mm6545a3 PMID:27855138

17. Wang TW, Asman K, Gentzke AS, et al. Tobacco Product Use Among Adults — United States, 2017. MMWR Morb Mortal Wkly Rep 2018;67:1225–1232. DOI: http://dx.doi.org/10.15585/mmwr.mm6744a2

18. Idris A, Al Saadi T, Turk T, Alkhatib M, Zakaria M, Sawaf B, Edris B. Smoking behaviour and patterns among university students during the Syrian crisis. EMHJ-Eastern Mediterranean Health Journal. 2018;24(02):154-60.

19. Carroll MD, Fryar CD, Nguyen DT. Total and High-density Lipoprotein Cholesterol in Adults: united States, 2015-2016. NCHS Data Brief. 2017 Oct;(290):1–8. PMID:29155686

20. Maziak W, Rastam S, Mzayek F, Ward KD, Eissenberg T, Keil U. Cardiovascular health among adults in Syria: a model from developing countries. Ann Epidemiol. 2007 Sep;17(9):713–20. https://doi.org/10.1016/j.annepidem.2007.03.016 PMID:17553700

21. Reckelhoff JF. Gender differences in the regulation of blood pressure. Hypertension. 2001 May;37(5):1199–208. https://doi.org/10.1161/01.HYP.37.5.1199 PMID:11358929

22. McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993-2005. Public Health Nutr. 2009 Apr;12(4):444–54. https://doi.org/10.1017/S1368980008002401 PMID:18498676

23. Jablonka A, Wetzke M, Sogkas G, Dopfer C, Schmidt RE, Behrens GM, et al. Prevalence and Types of Anemia in a Large Refugee Cohort in Western Europe in 2015. J Immigr Minor Health. 2018 Dec;20(6):1332–8. https://doi.org/10.1007/s10903-018-0725-6 PMID:29582203

24. Albaroudi IN, Khodder M, Al Saadi T, Turk T, Youssef LA. Prevalence, diagnosis, and management of iron deficiency and iron deficiency anemia among Syrian children in a major outpatient center in Damascus, Syria. Avicenna J Med. 2018 Jul-Sep;8(3):92–103. https://doi.org/10.4103/ajm.AJM_169_17 PMID:30090748

25. Walter T, De Andraca I, Chadud P, Perales CG. Iron deficiency anemia: adverse effects on infant psychomotor development. Pediatrics. 1989 Jul;84(1):7–17. PMID:2472596

26. FAO I, UNICEF. WFP and WHO 'The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition'in The State of the World (Report, 2018). 2018.

27. Meiqari L, Hoetjes M, Baxter L, Lenglet A. Impact of war on child health in northern Syria: the experience of Médecins Sans Frontières. Eur J Pediatr. 2018 Mar;177(3):371–80. https://doi.org/10.1007/s00431-017-3057-y PMID:29255951

28. Barakat H, Barakat H, Baaj MK. CVD and obesity in transitional Syria: a perspective from the Middle East. Vasc Health Risk Manag. 2012;8:145–50. https://doi.org/10.2147/VHRM.S28691 PMID:22454558

29. Nasreddine L, Mehio-Sibai A, Mrayati M, Adra N, Hwalla N. Adolescent obesity in Syria: prevalence and associated factors. Child Care Health Dev. 2010 May;36(3):404–13. https://doi.org/10.1111/j.1365-2214.2009.01042.x PMID:19961497

30. Bilukha OO, Jayasekaran D, Burton A, Faender G, King'ori J, Amiri M, et al.; Division of Global Health Protection, Center for Global Health, CDC; Centers for Disease Control and Prevention (CDC). Nutritional status of women and child refugees from Syria-Jordan, April-May 2014. MMWR Morb Mortal Wkly Rep. 2014 Jul;63(29):638–9. PMID:25055188

31. Şimşek Z, Yentur Doni N, Gül Hilali N, Yildirimkaya G. A community-based survey on Syrian refugee women's health and its predictors in Şanliurfa, Turkey. Women Health. 2018 Jul;58(6):617–31. https://doi.org/10.1080/03630242.2017.1321609 PMID:28430082

32. Bucak IH, Almis H, Benli S, Turgut M. An overview of the health status of Syrian refugee children in a tertiary hospital in Turkey. Avicenna J Med. 2017 Jul-Sep;7(3):110–4. https://doi.org/10.4103/ajm.AJM_17_17 PMID:28791243

33. Careyva B, LaNoue M, Bangura M, de la Paz A, Gee A, Patel N, et al. The effect of living in the United States on body mass index in refugee patients. J Health Care Poor Underserved. 2015 May;26(2):421–30. https://doi.org/10.1353/hpu.2015.0046 PMID:25913340

34. Dawson-Hahn E, Pak-Gorstein S, Matheson J, Zhou C, Yun K, Scott K, et al. Growth Trajectories of Refugee and

Nonrefugee Children in the United States. Pediatrics. 2016 Dec;138(6):e20160953. https://doi.org/10.1542/peds.2016-0953 PMID:27940678

35. Olson BG, Kurland Y, Rosenbaum PF, Hobart TR. Rapid Weight Gain in Pediatric Refugees after US Immigration. J Immigr Minor Health. 2017 Apr;19(2):263–6. https://doi.org/10.1007/s10903-016-0461-8 PMID:27393334

36. Nimer NA. A Review on Emerging and Reemerging of Infectious Diseases in Jordan: The Aftermath of the Syrian Crises. Can J Infect Dis Med Microbiol. 2018 May;2018:8679174. https://doi.org/10.1155/2018/8679174 PMID:29977415

37. Köse Ş, Ödemiş I, Çelik D, Gireniz Tatar B, Akbulut I, Çiftdoğan DY. Hepatitis A, B, C and HIV seroprevalence among Syrian refugee children admitted to outpatient clinics. Infez Med. 2017 Dec;25(4):339–43. PMID:29286012

38. Hassan G, Ventevogel P, Jefee-Bahloul H, Barkil-Oteo A, Kirmayer LJ. Mental health and psychosocial wellbeing of Syrians affected by armed conflict. Epidemiol Psychiatr Sci. 2016 Apr;25(2):129–41. https://doi.org/10.1017/S2045796016000044 PMID:26829998

39. Alpak G, Unal A, Bulbul F, Sagaltici E, Bez Y, Altindag A, et al. Post-traumatic stress disorder among Syrian refugees in Turkey: a cross-sectional study. Int J Psychiatry Clin Pract. 2015 Mar;19(1):45–50. https://doi.org/10.3109/13651501.2014.961930 PMID:25195765

40. Javanbakht A, Amirsadri A, Abu Suhaiban H, Alsaud MI, Alobaidi Z, Rawi Z, et al. Prevalence of Possible Mental Disorders in Syrian Refugees Resettling in the United States Screened at Primary Care. J Immigr Minor Health. 2018; https://doi.org/10.1007/s10903-018-0797-3 PMID:30066059

41. M'zah S, Lopes Cardozo B, Evans DP. Mental Health Status and Service Assessment for Adult Syrian Refugees Resettled in Metropolitan Atlanta: A Cross-Sectional Survey. J Immigr Minor Health. 2018 Aug. https://doi.org/10.1007/s10903-018-0806-6 PMID:30109534

42. Perkins JD, Ajeeb M, Fadel L, Saleh G. Mental health in Syrian children with a focus on post-traumatic stress: a cross-sectional study from Syrian schools. Soc Psychiatry Psychiatr Epidemiol. 2018 Nov;53(11):1231–9. https://doi.org/10.1007/s00127-018-1573-3 PMID:30083987

43. Betancourt TS, Meyers-Ohki SE, Charrow AP, Tol WA. Interventions for children affected by war: an ecological perspective on psychosocial support and mental health care. Harv Rev Psychiatry. 2013 Mar-Apr;21(2):70–91. https://doi.org/10.1097/HRP.0b013e318283bf8f PMID:23656831

44. Yaylaci FT. Trauma and resilient functioning among Syrian refugee children. Dev Psychopathol. 2018 Dec;30(5):1923–36. https://doi.org/10.1017/S0954579418001293 PMID:30295224