Editor's key points

- Hepatitis B and C virus infection among Syrian refugees was uncommon; prevalence rates were similar to those among Canada-born populations.
- High rates of tobacco use among Syrian men provide an opportunity for family physicians to intervene. Refugees might be amenable to adopting healthier lifestyles given access to smoking cessation therapy and restrictions on smoking in public places; however, more research is warranted to monitor the prevalence of tobacco use among integrating refugees.
- Glucose-6-phosphate dehydrogenase deficiency is a potentially serious cause of hemolytic anemia. Given the low (2.0%) prevalence among Syrian males, and the limitations of the screening test, family physicians might consider not empirically screening except before initiation of certain antimalarial or sulfa medications.
- Anemia was common among Syrian women of reproductive age (prevalence of 28.5%). Surprisingly, the prevalence of anemia among Syrian men (14.2%) was higher than among Canada-born men (estimated at 1% to 2%).

Prevalence of chronic conditions in Syrian refugees to Ottawa

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Abstract

Objective To study the prevalence of chronic conditions (ie, anemia, glucose-6-phosphate dehydrogenase [G6PD] deficiency, hepatitis B virus (HBV) and hepatitis C virus (HCV) infection, and tobacco use) in Syrian refugees.

Design Cross-sectional study. Four primary care health clinics received Syrian refugees from December 2015 to April 2016, and each followed a standard protocol for refugee health assessments.

Setting Ottawa, Ont.

Participants Arabic-speaking Syrian refugees were invited for early primary care health assessment. Most participants arrived in Ottawa from temporary refugee encampments in Lebanon and Jordan between December 2015 and April 2016.

Main outcome measures Following a protocol, family physicians and nurse practitioners systematically documented age, sex, education, hemoglobin level, G6PD status, HBV and HCV infection, and tobacco use.

Results The study included 669 of the 916 government-assisted refugees, which represents most of the 1087 Syrian refugees to Ottawa: 373 male and 296 female participants. Overall, 28.5% of women and adolescent girls had anemia, and 2.0% of men had G6PD deficiency. The seroprevalence of HBV and HCV infection in the overall population was 0.9% and 0.7%, respectively. Tobacco use was reported in 60.3% of men and 11.7% of women. Overall, alcohol use (3.7%) and other substance use (0.5%) were uncommon.

Conclusion Anemia was a common health problem in women of reproductive age, while the prevalence of chronic HBV and HCV infection was lower than the prevalence in the general Canadian population. Results showed substantial sex differences in tobacco use, with Syrian men using it at a rate much higher than Canadian men and Syrian women. The health assessment did not document chronic conditions affecting dental or mental health.

La fréquence des problèmes chroniques chez des réfugiés syriens à Ottawa

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Résumé

Objectif Étudier la prévalence de problèmes chroniques (p. ex. anémie, carence en glucose-6-phosphate déshydrogénase [G6PD], infection au virus de l'hépatite B (VHB) ou de l'hépatite C (VHC), et tabagisme) chez des réfugiés syriens.

Type d'étude Une étude transversale. Quatre cliniques de soins de santé primaires ont reçu des réfugiés syriens entre décembre 2015 et avril 2016, et chacune a suivi un protocole standard pour l'évaluation de la santé des réfugiés.

Contexte Ottawa (Ontario).

Participants Des réfugiés syriens arabophones ont été invités à un examen d'évaluation initiale en soins de santé primaires. La plupart des participants étaient arrivés à Ottawa en provenance de campements temporaires de réfugiés au Liban et en Jordanie, entre décembre 2015 et avril 2016.

Principaux paramètres à l'étude Conformément à un protocole, des médecins de famille et des infirmières praticiennes ont systématiquement documenté leur âge, leur sexe, leur scolarité, leur taux d'hémoglobine, leur taux de G6PD, la présence d'une infection au virus de l'hépatite B (VHB) ou de l'hépatite C (VHC), et leur utilisation du tabac.

Résultats L'étude portait sur 669 des 918 réfugiés pris en charge par le gouvernement, ce qui représente la majorité des 1087 réfugiés syriens à Ottawa : les participants comptaient 373 hommes et 296 femmes. Dans l'ensemble, 28,5 % des femmes et des adolescentes souffraient d'anémie, et 2,0 % des hommes avaient une carence en G6PD. La séroprévalence d'une infection au VHB et au VHC se situait respectivement à 0,9 et à 0,7 % dans l'ensemble de cette population. Le tabagisme a été signalé chez 60,3 % des hommes et 11,7 % des femmes. Dans l'ensemble, la consommation d'alcool (3,7 %) et d'autres substances (0,5 %) était peu fréquente.

Conclusion L'anémie était un problème de santé courant chez les femmes en âge de procréer, tandis que la prévalence des infections chroniques au VHB et au VHC était plus faible que celle de la population canadienne en général. Les résultats ont fait valoir une différence considérable entre les sexes sur le plan du tabagisme, les hommes syriens faisant usage du tabac à des taux bien plus élevés que les hommes canadiens et les femmes syriennes. Dans cette évaluation de la santé, les problèmes chroniques liés à la santé dentaire ou mentale n'étaient pas documentés.

Points de repère du rédacteur

- Les infections aux virus de l'hépatite B et C chez les réfugiés syriens n'étaient pas souvent présentes; leurs taux de prévalence étaient semblables à ceux des populations nées au Canada.
- Les taux élevés de tabagisme chez les hommes syriens ont donné aux médecins de famille une occasion d'intervenir. Les réfugiés peuvent être disposés à adopter des modes de vie plus sains, étant donné l'accès à des thérapies de cessation du tabagisme et les interdictions de fumer imposées dans les lieux publics; toutefois, une recherche plus poussée est nécessaire pour surveiller la prévalence du tabagisme chez les réfugiés en voie d'intégration.
- Une carence en glucose-6-phosphate déshydrogénase est une cause potentiellement sérieuse d'anémie hémolytique. Compte tenu de sa faible prévalence (2,0 %) chez les hommes syriens et des limites du test de dépistage, les médecins de famille pourraient envisager de ne pas effectuer de dépistage de façon empirique, sauf avant de prescrire certains médicaments contre le paludisme ou sulfamidés.
- L'anémie était fréquente chez les Syriennes en âge de procréer (prévalence de 28,5 %). Étonnamment, la prévalence de l'anémie chez les hommes syriens (14,2 %) était plus élevée que chez les hommes natifs du Canada (estimée entre 1 et 2 %).

The government of Canada selected and resettled 52 000 Syrian refugees[1] between December 2015 and February 2018, most coming from temporary encampments in Lebanon and Jordan.[2] Ottawa, Ont, was among the first cities to receive Syrian refugees, and the initial wave included mostly government-assisted refugees.[3] Refugee 613, a grass-roots settlement coalition,[4] was formed in the summer of 2015 just before Syrian newcomers began to arrive. This Ottawa coalition coordinated the resettlement process and included more than 30 health and settlement partner organizations.[5] The Refugee 613 coalition used practice guidelines for Syrian refugees[5] to develop protocols rapidly (Appendices 1 and 2,[6,7] available from **CFPlus***) and approached primary care clinics to conduct initial health assessments. Health assessment protocols were generated from the Canadian Collaboration for Immigrant and Refugee Health's Evidence-Based Preventive Care Checklist for New Immigrants and Refugees[6] for adults, from the Caring for Kids New to Canada's checklist[7] for children, and from Ottawa Public Health's input on publicly funded immunization and maternal and newborn programs Syrian refugees could access. The resettlement of Syrian refugees represented the largest refugee resettlement in Canada since the 1978 resettlement of Vietnamese refugees.[8]

The Syrian refugees were fleeing an 8-year war to escape persecution or death; many traveled from the conflict-affected northern provinces. Many Syrian families originally lived in temporary accommodations (plastic tent clusters created along the Syrian border of neighbouring countries near Al-Zaatari in Jordan, and Beqaa and Arsal in Lebanon). Although the international intent had been to resettle them rapidly in more favourable living conditions, most families had lived for 2 or more years in these camps before they were resettled in Canada.

In 2011 the Canadian Collaboration for Immigrant and Refugee Health published evidence-based guidelines to help primary care practitioners assess the health of newly arriving refugees.[9] In 2016, Pottie et al published additional guidance specific to Syrian refugees.[5] Data on chronic conditions prevalence were limited; however, health data on Syrian refugees migrating to Europe were emerging.[10] At that time evidence-based clinical preventive guidelines for glucose-6-phosphate dehydrogenase (G6PD) deficiency screening did not exist. There was evidence that the prevalence of this condition was greater than 3% in many regions of the Middle East[11]; however, no Syria-specific data for G6PD deficiency were available. Our study aimed to determine the prevalence of G6PD deficiency among government-assisted Syrian refugees arriving in Ottawa. In addition, we examined the prevalence of other chronic conditions, both communicable and noncommunicable.

*The 2015 Ottawa Syrian Refugee Templates for adults (**Appendix 1**) and for children (**Appendix 2**) are available from **www.cfp.ca**. Go to the full text of the article online and click on the **CFPlus** tab.

Methods

Setting

The regional health network (Champlain Local Health Integrated Network) and Refugee 613 designated 7 clinics in Ottawa to conduct health assessments. We sampled 4 of these primary care health clinics: 2 community health centres, 1 refugee and newcomer clinic, and 1 academic teaching clinic. We did not sample the other 3 clinics because we were unable to secure the resources required for quality monitoring and control. All clinics had interpreter services and family physicians; some had nurse practitioners and on-site phlebotomy services.

Study design

The Refugee 613 network, using existing guidelines,[5,9] created a health assessment protocol for the designated clinics. This study represents a cross-sectional sample of 5 months of protocol data on health assessments of Syrian refugees. Ethics approval was obtained from the Research Ethics Board at the Bruyère Research Institute in Ottawa.

Study participants

We included Syrian refugees of all ages from the 4 largest designated primary care centres. Participants arrived in Ottawa between December 2015 and April 2016 as the first wave of resettled government-assisted refugees. All Syrian refugees were offered health assessments in collaboration with the regional health network.

Primary outcome measures

Our primary outcome measures of interest were the prevalence of G6PD deficiency,[12] anemia, hepatitis B virus (HBV) surface antigen, and hepatitis C virus (HCV) antibodies.[13] Anemia was defined using the World Health Organization criterion of hemoglobin level less than 12.5 g/dL (125 g/L) in adults and less than 12 g/dL (120 g/L) in children aged 6 to 14 years.[9] We recorded sex for all participants to support analysis by sex.

Other outcome measures

We collected demographic information on age, sex, and level of education as a proxy measure of socioeconomic status. Secondary outcomes included behavioural risk factors (ie, tobacco, alcohol, and drug exposure in refugees older than 14 years).

Data collection

Each of the 7 primary health care assessment centres followed the Refugee 613 health assessment protocol (Appendices 1 and 2[6,7]*). Our data were collected from the 4 largest centres. Refugee health assessment

templates were constructed in each of the electronic health records to support care and data collection. The research team (D.L., R.W.) conducted chart reviews and identified data relevant to the study outcomes.

Analysis

We used descriptive statistics to analyze and present data on demographic characteristics and chronic conditions, and *t* tests, χ^2 tests, Fisher exact tests, and Kruskal-Wallis rank sum tests to analyze differences by sex.

Results

Ottawa received a total of 1087 Syrian refugees between December 2015 and April 2016, of whom 916 were government assisted. Nearly all (n=914) were assessed at 1 of the 7 designated primary care centres. We reviewed data from 669 of 914 charts. We were unable to collect and analyze data on 245 charts from the 3 smallest centres. Most (55.8%) participants were male and 44.2% were female; 321 of the 669 refugees assessed were 14 years and older. Education levels were distributed around "some high school"; participants in the 25th to 75th percentiles had graduated from either elementary school or high school.

Women were more likely to have anemia (28.5%) than men were (14.2%). We screened 528 Syrian refugees for G6PD deficiency and found an overall prevalence of 1.3%. Deficiency of G6PD was more prevalent in male participants (2.0%) than in female participants (0.4%). No 2 cases of G6PD deficiency occurred in the same family. One person with G6PD deficiency also had anemia.

We found an HBV infection prevalence of 0.9% among 582 persons screened; no cases occurred in the same family. We found an HCV infection prevalence of 0.7% among 612 screened; no cases occurred in the same family.

Behavioural risk factors (ie, tobacco, alcohol, and drug exposure) were assessed in refugees older than 14 years of age. Few refugees reported exposure to alcohol or drugs. Tobacco use was much more prevalent in male participants (60.3%) than in female participants (11.7%) (**Table 1**).

Discussion

Family physicians and other primary care practitioners support newly arriving refugees to adopt or maintain healthy lifestyles and preventive health care measures. Cultural beliefs, language, and socioeconomic status, combined with health literacy, are key to understanding and adhering to treatment for chronic conditions.[14] This cross-sectional study of Syrian refugees presents several findings concerning chronic conditions of public health importance.

We report a difference in overall rates of anemia between male and female participants. Iron-deficiency anemia is the most common nutritional disorder in the world and predominantly affects women of reproductive age and children. Other causes of anemia can coexist, depending on patients' diets, living conditions, and genetic predisposition (concomitant G6PD deficiency). We documented moderate levels of anemia in female participants, which can lead to poor pregnancy outcomes, impaired physical and cognitive development in children, and fatigue and reduced exercise tolerance among mothers.[9]

Glucose-6-phosphate dehydrogenase deficiency is an X-linked genetic condition in which affected men may experience hemolysis with oxidative stress from medications (primaquine, dapsone, and sulfa medications), acute illness, and foods, including fava beans.[15] The risk of hemolysis varies substantially based on the genetic variant and degree of enzyme deficiency. Evidence-informed screening practices are important because positive screening results for G6PD deficiency have cultural consequences. Fava beans are a culturally important staple of the Syrian diet, and the cultural concept known as *fava bean disease* may cause major distress to patients and their families.

The prevalence of HBV and HCV infection was low among our resettling Syrian refugees, comparable to the baseline prevalence among Canada-born populations. The benefits of screening for chronic HBV and HCV infection include enabling timely treatment to eradicate the viruses and prevent cirrhosis and hepatocellular carcinoma, and enabling timely HBV vaccination for household contacts. Given that the prevalence of HBV and HCV infection was similar to that of those born in Canada,[5] this suggests existing Canadian practices (including screening pregnant women and those with high-risk behaviour and exposures) should be followed with Syrian refugees.[16] This study did not address the prevalence of high-risk behaviour (eg, blood transfusion, sexual activity, intravenous drug use) or older cohorts of Syrian refugees.[17]

Tobacco use is a leading cause of preventable disease, disability, and death, and 80% of the estimated 6 million annual related deaths occur in low- and middle-income countries.[18] Some evidence on the prevalence of tobacco use in Syria has been recently published, but tobacco use is a well-observed social phenomenon attributed to cultural or religious restrictions on the use of recreational drugs or alcohol.[19-21] Using tobacco products has become a social norm in postwar Syrian society, where people remaining in Syria and fleeing refugees face war-related stressors.[22] Refugees are vulnerable, but the relationship between tobacco use and refugee status remains understudied. However, prevalence studies consistently indicate that rates of tobacco use are higher among male than among female participants.[19-21] Notably, rates of cigarette smoking and water pipe use in public places by women in Syria, Lebanon, and Jordan are increasing.[23] Our study showed that approximately

Table 1. Prevalence of chronic conditions, behavioural risk factors, and sociodemographic characteristics: *Bold values are statistically significant.*

	TOTAL SAMPLE		MEN		WOMEN		DIFFERENCE BETWEEN SEXES
VARIABLES	N	VALUE	N	VALUE	N	VALUE	
Characteristics							
• Age, y, mean (SD)	669	19.8 (15.8)	373	19.4 (16.1)	296	20.4 (15.4)	$t = 0.82$, $P = .42$
• Sex, % male	669	NA	373	55.8	296	44.2	**$z = 3$, $P < .003$**
• Education,* mean (IQR)	168	2.8 (2-4)	92	2.9 (2-3)	76	2.7 (2-4)	**$P < .001$**†
Primary outcomes, % (95% CI)							
• G6PD deficiency	528	1.3 (0.5-2.1)	297	2.0 (0.7-3.3)	231	0.4 (0.00-2.4)	$P = .14$‡
• Anemia	618	20.6 (17.4-24.0)	344	14.2 (10.7-18.4)	274	28.5 (23.2-34.2)	$\chi^2 = 18.0$, **$P < .001$**
• HBV surface antigen	582	0.9 (0.0-2.0)	324	1.5 (0.5-3.6)	258	0.0 (0.0-1.4)	$\chi^2 = 2.4$, $P = .12$
• HCV antibody	612	0.7 (0.0-1.4)	337	1.2 (0.3-3.0)	275	0.0 (0.0-0.1)	$\chi^2 = 1.7$, $P = .19$
Secondary outcomes, % (95% CI)							
• Tobacco use§	239	39.3 (33.1-45.8)	136	60.3 (51.6-68.6)	103	11.7 (6.2-19.5)	$\chi^2 = 56.1$, **$P < .001$**
• Alcohol use§	218	3.7 (1.6-7.0)	120	5.0 (1.9-10.6)	98	2.0 (0.2-7.2)	$P = .30$‡
• Drug or substance use§	203	0.5 (0.0-1.7)	113	0.8 (0.0-4.8)	90	0.0 (0.0-4.0)	NA

G6PD—glucose-6-phosphate dehydrogenase, HBV—hepatitis B virus, HCV—hepatitis C virus, IQR—interquartile range, NA—not applicable.
*Data from 279 charts (age ≥ 18 y). Highest education level for Syrian refugees ≥ 18 y was ranked on a 7-point scale: 1 = no formal education, 2 = some elementary school, 3 = graduated from elementary school, 4 = some high school, 5 = graduated from high school, 6 = some postsecondary education, 7 = graduated from postsecondary education.
†Kruskal-Wallis rank sum test.
‡Fisher exact test.
§Data from 321 charts (age ≥ 14 y).

60% of male participants were using tobacco. Syrian refugees may benefit from access to smoking cessation therapy and smoke-free environments maintained by tobacco control interventions; however, more research is warranted to monitor the prevalence of tobacco use among integrating refugees.

Strengths and limitations

This multisite cross-sectional study of chronic conditions, including G6PD deficiency, provides new evidence to guide the care of Syrian refugees. It provides initial insights into tobacco and alcohol use patterns that appear to be distinct from substance use patterns in Ottawa, and provides prevalence estimates for G6PD deficiency, and HBV and HCV infection. The validity of our research is supported by the similarities between demographic characteristics of the study population, demographic characteristics reported for all Syrian refugees resettled in Canada,[2,24] and demographic characteristics of Syrian refugees registered with United Nations High Commissioner for Refugees.[25]

Limitations of our study include potential selection bias relating to our sample of Syrian refugees; for example, we were able to sample only 4 of 7 clinics (669 of 916 participants) owing to technical search difficulties within electronic medical records in 3 clinics. We sampled only newly arriving, mostly government-assisted refugees. Subsequent research should study privately sponsored Syrian refugees and should encompass longitudinal sampling to better understand the consequences of chronic conditions. Our data collection templates relied on practitioners' and interpreters' understanding of behavioural risk factors. For example, some practitioners might not be aware of all forms of tobacco use (eg, shisha, water pipes) and might not have known to include those as a positive result, possibly under-reporting tobacco exposure. Further, some practitioners did not elicit behavioural risk factors as effectively as others did.

Conclusion

This cross-sectional study of chronic conditions in government-assisted Syrian refugees found several differences between the sexes that have clinical and public health implications. Tobacco use among male participants was very high; culturally appropriate programs and gender-specific programs could be warranted. Anemia, most likely from nutritional deficiency, was especially common among female participants and has relevance for primary care. The prevalence of G6PD deficiency was low in this study. The prevalence of HBV and HCV infection was low and in line with the Canadian prevalence.

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Contributors

All authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

Competing interests

None declared

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