



# Examining Trends of Cigarette Smoking Amongst Syrian Refugees During Their First Two Years in Canada

Anna Oda<sup>1</sup> · Carolyn Beukeboom<sup>2</sup> · Jonathan Bridekirk<sup>3</sup> · Ahmed Bayoumi<sup>4</sup> · Michaela Hynie<sup>5</sup> · SyRIA.lth team

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## Abstract

This brief report explored trends of cigarette smoking among Syrian newcomers in the first two years of resettlement in Canada. 1794 adult Syrian refugees were surveyed about their physical and mental health, and smoking behaviours. Results were analyzed using descriptive statistics, Wilcoxon signed-rank tests, and logistic regressions. Almost 27% of the sample reported cigarette smoking (50% light smokers and 50% moderate/heavy smokers). Light smokers increased and moderate/heavy smokers decreased in the number of cigarettes smoked from year 1 to year 2. Moderate/heavy smokers were more likely to be male and reported higher post-traumatic stress scores, while light smokers reported higher depression scores. Only 14.3% of smokers recalled receiving advice from health care providers in Canada regarding their smoking habits. Healthcare providers should provide tailored advice to everyone who is an active smoker with a specific emphasis on those who have concurrent health issues.

**Keywords** Cigarette smoking · Health care providers · Refugees · Canada

## Introduction

Between 2015 and 2019, more than 44,000 Syrian refugees were resettled in Canada [1]. The use of tobacco is a serious problem in the Mediterranean Region with Syria being amongst the top ten countries with the highest prevalence of tobacco smoking in the world [2, 3]. Globally, tobacco smoking is the leading preventable cause of death and disability related to cardiovascular diseases, respiratory illnesses and numerous cancers [4]. Immigrants have contributed significantly to the Canadian smoking population [5]. Although Syrian refugees have come from a region with high rates of

smoking, there is minimal research examining tobacco use in this population in Canada. The goals of this brief report are:

- (1) To examine the trends of daily cigarette smoking in a sample of recently resettled Syrian refugees in Canada and determine change in smoking rates between year 1 and year 2 of resettlement.
- (2) To determine characteristics of non-smokers, light and moderate/heavy smokers and if there are any characteristics that differentiate between them.
- (3) To determine the characteristics of Syrian refugee smokers who recalled receiving advice from health care professionals related to smoking habits in year 2 of resettlement in Canada.

✉ Anna Oda  
annaoda@yorku.ca

<sup>1</sup> Centre for Refugee Studies, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

<sup>2</sup> School of Nursing Western University, 1151 Richmond Street, London, ON N6A 3K7, Canada

<sup>3</sup> Department of Psychology, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

<sup>4</sup> St. Michael's Hospital, 30 Bond Street, Toronto, ON M5B 1W8, Canada

<sup>5</sup> Department of Psychology, York University, 4700 Keele Street, Toronto, ON M3J 1P3, Canada

## Methods

Data were collected in the first two years of a longitudinal study on Syrian refugee integration in Canada (SyRIA.lth) [6]. The study was reviewed and approved by each institutions' ethics review committee. A total of 1915 adult Syrian refugees representing 854 households participated in year

1.<sup>1</sup> The attrition rate in year 2 was approximately 7%, with a total of 1805 participants. Each year, participants were interviewed and completed a survey containing approximately 240 questions, with priority given to standardized scales that had validated Arabic versions. Participants provided informed consent prior to each interview and were given a modest honorarium for participation. The measures used in this report are described below.

Sociodemographic variables included age, gender, official languages knowledge and education. Perceived health and mental health were measured on a scale from 1 to 5 (1 = Excellent; 5 = Poor) using a single item from the RAND 36 Health Survey and a single item mental health scale. Stress was measured on a scale of 0–40 using the 10-item Perceived Stress Scale (PSS-10), with total scores above 20 indicating higher levels of stress. Depression was measured on a scale of 0–27 using the 9-item Patient Health Questionnaire (PHQ-9), with clinical categories of no depression (0–4), mild (5–9), moderate (10–14), and moderately severe/severe (15–27). Finally, post-traumatic stress symptoms were measured on a scale of 0–4 using the 4-item Post-traumatic Stress Disorder measure (PTSD-4), with clinical scores of 3 or over indicating post-traumatic stress. Smoking behaviour questions were adapted from the Canadian Community Health Survey (CCHS) including: “do you smoke cigarettes?”, “how many times per day?”, and “have you received any recommendations from a health-care professional in Canada to change your behaviour around smoking?”.

We used Statistics Canada definitions of tobacco use as non-smoker: no cigarettes; light  $\leq 14$  cigarettes per day; and moderate/heavy  $\geq 15$  cigarettes per day [7].<sup>2</sup> Results were analyzed in SPSS version 24 using descriptive statistics, Wilcoxon signed-rank tests, and logistic regressions.

## Results

### Objective 1

Out of the 1805, 11 participants were excluded due to missing data regarding their smoking behaviour. Approximately 27% of the total sample reported cigarette smoking daily in year 1 and 2 (Table 1). Of those who smoked on a daily basis, approximately 50% were light smokers and 50% were moderate/heavy smokers in year 1 and 2.

<sup>1</sup> Only 74 (15%) out of 485 households who reported smoking had more than one smokers in their household.

<sup>2</sup> Due to small sample size we combined moderate and heavy smokers.

**Table 1** Smoking trends in year 1 and 2

	Year 1	Year 2
Smoking rates	<i>N</i> = 1794	<i>N</i> = 1794
Non-smoker	1309(73%)	1313(73.2%)
Daily smokers	485(27%)	481(26.8%)
Daily smoker categories	<i>n</i> = 485	<i>n</i> = 481
Light smoker	245(50.5%)	237(49.3%)
Moderate/heavy smoker	240(49.5%)	244(50.7%)
Average number of cigarettes smoked per day ( $\pm$ SD)	14.16( $\pm$ 9.37)	14.05 ( $\pm$ 8.53)

The maximum number of cigarettes smoked per day was 80 in year 1 and 60 in year 2. Numbers in italics represent the Standard Deviation (SD).

Between year 1 and 2, almost 4% ( $n = 70$ ) of the total non-smokers ( $n = 1309$ ) started smoking. We further investigated the direction and significance of change in the number of cigarettes smoked daily for light and moderate/heavy smokers using Wilcoxon signed-rank test.

Light smokers significantly increased in the daily number of cigarettes smoked overall from year 1 ( $Mdn = 7$ ,  $IQR = 5–10$ ) to year 2 ( $Mdn = 10$ ,  $IQR = 5–12$ ),  $Z = 5$ ,  $p < 0.001$ ,  $r = 0.32$ . Of the total 245 light smokers in year 1, 53 (21.6%) quit smoking, 50 (20.4%) decreased the number of cigarettes smoked daily, 97 (39.6%) increased the number of cigarettes smoked daily, and 45 (18.4%) reported the same number in year 1 and year 2. Although 41 (16.7%) of light smokers in year 1 became a moderate/heavy smoker in year 2 ( $\geq 15$  cigarettes/day), the majority remained within the “light smoker” range, demonstrating no clinical significance.

Moderate/heavy smokers significantly decreased in the number of cigarettes smoked overall from year 1 ( $Mdn = 20$ ,  $IQR = 20–20$ ) to year 2 ( $Mdn = 20$ ,  $IQR = 15–20$ ),  $Z = 4.05$ ,  $p < 0.001$ ,  $r = 0.26$ . Of the total 240 moderate/heavy smokers, 21 (8.8%) quit smoking, 87 (36.2%) decreased the number of cigarettes smoked daily, 39 (16.2%) increased the number of cigarettes smoked daily, and 93 (38.8%) reported the same number in year 1 and year 2.<sup>3</sup> Although 42 (17.5%) of moderate/heavy smokers in year 1 became a light smoker in year 2 ( $\leq 14$  cigarettes/day), the majority remained within the “moderate/heavy smoker” range, demonstrating no clinical significance.

<sup>3</sup> Although the numbers were small, we ran a logistic regression examining differences between those who started ( $n = 70$ ) or quit ( $n = 74$ ) smoking using the following predictor variables: Age, gender, number of months in Canada, employment, education level, speak/Understand English, attendance of language classes, physical health, mental health, stress, depression and PTSD. Logistic regression results showed no significant differences ( $p > 0.05$ ).

**Table 2** Socio-demographic characteristics of non-smokers, light and moderate/heavy smokers at Year 1:

	Non-smoker ( <i>n</i> = 1309)	Light smoker ( <i>n</i> = 245)	Moderate/heavy smoker ( <i>n</i> = 240)	Test Statistic	df	<i>p</i>	Effect size
Number of months in Canada (± SD)	13.4(± 5.43)	13.6 (± 5.38)	12.86(± 5.43)	<i>F</i> = 1.33	1792	0.264	<i>n</i> <sup>2</sup> = 0.001
Age (in years)	37.8 <sup>a</sup> (± 14)	39.98(± 13.7)	40.3 <sup>a</sup> (± 11.48)	<i>F</i> = 4.54	1789	0.011	<i>n</i> <sup>2</sup> = 0.005
Gender							
Male (%)	37.7 <sup>a</sup>	69.4 <sup>a</sup>	87.5 <sup>a</sup>	<i>X</i> <sup>2</sup> =	2	< 0.001	<i>V</i> = 0.375
Female (%)	62.3 <sup>a</sup>	30.6 <sup>a</sup>	12.1 <sup>a</sup>	251.35			
Education level							
High school and below (%)	68.4 <sup>a</sup>	74.74	81.3 <sup>a</sup>	<i>X</i> <sup>2</sup> = 18.01	2	< 0.001	<i>V</i> = 0.10
Above High school (%)	31.6 <sup>a</sup>	25.3	18.8 <sup>a</sup>				
Speak/Understand English (± SD)	3.83 <sup>ab</sup> (± 1.35)	3.61 <sup>a</sup> (± 1.30)	3.5 <sup>b</sup> (± 1.19)	<i>F</i> = 8.149	1789	< 0.001	<i>n</i> <sup>2</sup> = 0.009
Attendance of language classes (Yes %)	72.7	72.4	74.2	<i>X</i> <sup>2</sup> = 0.263	2	0.87	<i>V</i> = 0.012
Employed (Yes %)	21.2 <sup>a</sup>	31.3 <sup>a</sup>	25	<i>X</i> <sup>2</sup> = 12.59	2	0.002	<i>n</i> <sup>2</sup> = 0.084
Perceived physical health mean score (± SD)	2.75 <sup>a</sup> (± 1.17)	2.89 (± 1.21)	2.96 <sup>a</sup> (± 1.27)	<i>F</i> = 3.756	1794	0.02	<i>n</i> <sup>2</sup> = 0.004
Perceived mental health mean score (± SD)	2.74 (± 1.15)	2.88 (± 1.17)	2.86 (± 1.27)	<i>F</i> = 2.287	1792	0.10	<i>n</i> <sup>2</sup> = 0.003
Perceived Stress score (PSS-10) (± SD)	14.24 (± 7.1)	13.74 (± 6.98)	13.25 (± 7.75)	<i>F</i> = 2.065	1794	0.12	<i>n</i> <sup>2</sup> = 0.002
Depression score (PHQ-9) (± SD)	4.9 (± 4.66)	5.6 (± 5.25)	4.9 (± 5.1)	<i>F</i> = 2.271	1794	0.10	<i>n</i> <sup>2</sup> = 0.003
Post-traumatic Stress Disorder (PTSD-4) score (± SD)	1.26 (± 1.38)	1.3 (± 1.42)	1.42 (± 1.47)	<i>F</i> = 1.979	1787	0.22	<i>n</i> <sup>2</sup> = 0.002

Means and percentages with shared superscripts (*a* or *b*) differ by *p* < 0.05. For number of months in Canada, the min = 1 for all groups, and the max for non-smokers = 33, light-smokers = 35, and moderate/heavy smokers = 29. For age (in years), the min = 18 for all groups, and the max for non-smokers = 90, light smokers = 84, and moderate/heavy smokers = 71. Numbers in italics represent the Standard Deviation (SD).

## Objective 2

Overall there were no statistical differences between non-smokers, light and moderate/heavy smokers in terms of number of months in Canada, attendance of language classes, perceived mental health, perceived stress, depression and post-traumatic stress disorder symptoms (Table 2). For all three groups, clinical cutoff scores were not significant for stress (non-smoker 95% CI 13.85, 14.62; light smoker 95% CI 12.90, 14.66; moderate/heavy smoker 95% CI 12.27, 14.24) and post-traumatic stress disorder (non-smoker 95% CI 1.18, 1.33; light smoker 95% CI 1.13, 1.49; moderate/heavy smoker 95% CI 1.23, 1.61). However, clinical cutoff scores for depression fell under the mild depression category for all three groups (non-smoker 95% CI 4.66, 5.17; light smoker 95% CI 4.96, 6.28; moderate/heavy smoker 95% CI 4.25, 5.55) (Table 2).

Light and moderate/heavy smokers were more likely to be male and have poor ability in understanding and speaking English compared to non-smokers. Moderate/heavy smokers were more likely to have a high school education or less and report poorer physical health compared to

non-smokers. The proportion of light smokers who were working was higher compared to non-smokers (Table 2).

Furthermore, a logistic regression analysis comparing light and moderate/heavy smokers, excluding non-smokers, showed that, compared to light smokers, moderate/heavy smokers were more likely to be a male, unemployed, and report higher post-traumatic stress scores. However, light smokers were more likely to report higher depression scores (Table 3).

## Objective 3

A total of 14.3% of smokers recalled receiving advice related to smoking habits from healthcare providers. Logistic regression analysis showed that those who recalled receiving advice were more likely to be male, unemployed, and had lower perceived physical health status. There was also a marginal effect for number of months in Canada with those participants who had been in Canada longer being more likely to recall receiving advice (Table 4).

**Table 3** Factors predicting light and moderate/heavy smoking

Factor	$\beta$	SE $\beta$	Wald $\chi^2$	P	OR (95% CI)
Age (in years)	0.004	0.009	0.230	0.632	1.00 (0.98, 1.02)
Gender (1 = female; 0 = male)	- 1.455	0.275	28.044	0.000	0.23 (0.13, 0.40)
Number of months in Canada	- 0.015	0.019	0.625	0.429	0.98 (0.95, 1.02)
Employment	0.533	0.239	4.956	0.026	1.70 (1.06, 2.72)
Education level (1 = above high school; 0 = high school and below)	- 0.287	0.251	1.302	0.254	0.75 (0.45, 1.22)
Speak/Understand English	- 0.081	0.088	0.841	0.359	0.92 (0.77, 1.09)
Attendance of language classes	0.003	0.230	0.000	0.988	1.00 (0.63, 1.57)
Physical health	0.134	0.092	2.127	0.145	1.14 (0.95, 1.36)
Mental health	0.004	0.102	0.002	0.969	1.00 (0.82, 1.22)
Stress	0.022	0.020	1.211	0.271	1.02 (0.98, 1.06)
Depression	- 0.070	0.029	5.610	0.018	0.93 (0.88, 0.98)
PTSD	0.153	0.078	3.886	0.049	1.16 (1.00, 1.35)
Constant	0.663	0.848	0.611	0.435	1.94
$\chi^2$				<0.001	44.45
Df					12

$\beta$  unstandardized regression coefficients, SE standard error, OR odds ratio, CI confidence interval for odds ratio

**Table 4** Factors predicting receiving recommendations from a healthcare provider related to smoking:

Factor	$\beta$	SE $\beta$	Wald $\chi^2$	p	OR (95% CI)
Smoker category (light or moderate/ heavy)	0.221	0.173	1.639	0.200	1.24(0.88, 1.74)
Age (in years)	0.003	0.009	0.152	0.697	1.00 (0.98, 1.02)
Gender (1 = female; 0 = male)	- 1.570	0.296	28.058	0.000	0.20 (0.11, 0.37)
Number of months in Canada	0.037	0.019	3.745	0.053	1.03 (1.00, 1.07)
Employment	0.562	0.243	5.367	0.021	1.75 (1.09, 2.82)
Education level (1 = above high school; 0 = high school and below)	- 0.287	0.257	1.245	0.265	0.75 (0.45, 1.24)
Speak/Understand English	- 0.112	0.089	1.556	0.212	0.89 (0.75, 1.06)
Attendance of language classes	0.146	0.232	0.399	0.527	1.15 (0.73, 1.82)
Physical health	0.308	0.095	10.630	0.001	1.36 (1.13, 1.63)
Mental health	- 0.071	0.104	0.465	0.496	0.93 (0.75, 1.14)
Stress	- 0.005	0.020	0.075	0.785	0.99 (0.95, 1.03)
Depression	0.011	0.028	0.146	0.702	1.01 (0.95, 1.06)
PTSD	0.096	0.077	1.551	0.213	1.10 (0.94, 1.28)
Constant	- 1.011	0.907	1.244	0.265	0.364
$\chi^2$				<0.001	62.519
Df					13

$\beta$  unstandardized regression coefficients, SE standard error, OR odds ratio, CI confidence interval for odds ratio

## Discussion

This brief report examined trends of cigarette smoking among Syrian refugees during their first two years in Canada. Findings showed more than a quarter (27%) of the total sample reported cigarette smoking daily in years 1 and 2. These rates were substantially higher than the

general smoking rates in Canada in 2017 (10.8%) [8]. Results showed light smokers were smoking more cigarettes in year 2 compared to year 1, while moderate/heavy smokers were smoking fewer cigarettes in year 2 compared to year 1. Although the number of cigarettes smoked daily among light smokers increased and moderate/heavy smokers decreased over time, these differences were small and not clinically significant. Only 41 light smokers became

moderate/heavy smokers and 42 moderate/heavy smokers became light smokers.

New immigrants experience resettlement stress related to schooling, employment, and absence of social networks and smoking may be used and initiated as a coping strategy to help newcomers reduce their stresses [5]. Consistent with this, our sample showed that those who were moderate/heavy smokers seemed to be in difficult circumstances, as they had lower likelihood of employment and high post-traumatic stress scores.

Only 14% of smokers recalled receiving smoking-related recommendations from healthcare providers. The amount smoked did not predict whether respondents reported receiving advice around smoking. Rather, factors that predicted receiving recommendations included having lower perceived health status, identifying as a male, and being unemployed. Barriers to receiving health services is a reality—language and cultural barriers, difficulty navigating the healthcare system, financial burdens, transportation to appointments, differences of opinion with Western medicine can all contribute to people lacking access to health care [9]. These barriers could also hinder health promotion efforts, such as the importance of healthcare providers' advice around smoking for newcomers.

This study has several limitations. First, it is unclear what type of health care (i.e. walk-in clinics, emergency departments, primary health care provider) participants were accessing. The type of care may influence whether health care providers provide advice around smoking behaviours due to, for example, length of appointments or knowledge of the patient's history. The absence of this information makes it difficult to understand why advice around smoking was not being received by this sample. Second, all data were self-reported and participants might have underreported how many cigarettes they smoked. However, Canadian research has shown no significant difference between self-reported smoking rates and biomarkers, such as urinary cotinine concentration, suggesting underreporting may not be a frequent issue [10]. Third, sample sizes were small, especially once divided by the amount smoked, limiting the power of the analyses and the kinds of analyses possible. For example, although a substantial number with almost 22% of light smokers and 9% of moderate/heavy smokers quit smoking, the numbers were small, limiting the opportunity to explore possible lifestyle changes upon resettlement. Finally, we only looked at daily cigarette smoking rates. It is important to further explore non-daily cigarette smokers as they represent over 4% of cigarette smokers in Canada [8].

Despite these limitations, study findings demonstrated a high prevalence of smoking among a sample of Syrian refugees compared to the general Canadian population. Given the health burden of smoking, healthcare providers should focus on giving advice around smoking to those who have

concurrent health issues, such as post-traumatic stress and depression, and plan a holistic care approach to address these co-existing issues simultaneously. Given the impact of social conditions (e.g., employment) on smoking in this sample, healthcare providers should provide advice that is consistent with a health equity perspective, tailoring their advice to their diverse patients. These findings are relevant and timely to healthcare providers as the Canadian government continues to welcome large numbers of newcomers every year.

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## Compliance with Ethical Standards

**Conflict of interest** No competing interests. No conflict of interest.

**Ethical Approval** This study was reviewed and received ethics approval at each of the research sites affiliated with an academic institution. REB approval certificate numbers: (1) York University# e2016-369, (2) CAMH# 139/2016, (3) St. Michael's Hospital# 18-348, (4) McGill University# 389-0217, (5) University of Windsor# 16-241.

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