UNIVERSITY OF SASKATCHEWAN
School of Public Health
USASK.CA/SPH

Factors Associated with Self-reported Asthma among the Canadian Population

Barada Mohanty[a,b]; Francis Abayateye[a]; Bonnie Janzen[a]; Punam Pahwa[a,b]

[a] Department of Community Health and Epidemiology, University of Saskatchewan, Saskatoon, Canada
[b] Canadian Centre for Health and Safety in Agriculture, University of Saskatchewan, Saskatoon, Canada

INTRODUCTION

- Asthma is one of the most common chronic conditions that adversely impacts children and adults' well-being and creates a burden for the health care system[1,2] .
- Approximately 8.1% of the Canadian population aged 12 and older have been diagnosed with asthma[3]. Worldwide, the prevalence of asthma has rapidly increased and doubled in the last decade[4].
- A Children have a high prevalence of asthma than adult groups and socioeconomic status plays a crucial role in increasing the prevalence of asthma.
- Prolonged alcohol consumption impacted lung and airway functioning, and heavy exposure could lead to a high risk of asthma complications. Similarly, asthma had a significant effect on the increase in the risk of people having lifetime and anxiety disorders
- **Objective**: to determine the prevalence and risk factors associated with asthma in the Canadian population aged above 12 years, based on the Canadian Community Health Survey (CCHS) 2017-18.

METHODS

Data Source:

- Data for the present study were obtained from a cross-sectional survey which is publicly available in the 2017-2018 Canadian Community Health Survey (CCHS)-Annual component[5].
- The data structure consists of persons aged 12 and over living in over 100 health regions of all ten provinces and three territories. Initially, it was determined to collect a sample of 130,000 respondents, out of which 120,000 were adults, and 10,000 were for the youth population. In this study, we have considered 113,290 respondents.
- Exclusion criteria were applied to the persons and other indigenous people residing on reserves; young individuals aged between 12-17 years living in foster homes; full-time members of the Canadian forces; the institutionalized population and the people living in the Quebec health regions of Nunavik and Terres-Cries-de-la- Baie-James .

METHODS

Study Variables:

- **The explanatory variables:**
  - Demographic factors (age, sex, marital status, ethnicity, immigration status and province of residence of respondent)
  - Socioeconomic factors (household income, household size and respondent education);
  - Health-related factors/comorbidities (body mass index, smoking habit, second-hand smoking, type of drinker in last 12 months, anxiety disorders).
- The outcome variable was the presence or absence of asthma, which was based on the question "Do you have asthma ?"

Statistical Analysis:

- The descriptive statistics, including all exposure factors, were computed in terms of weighted proportion for the entire data set, and asthma prevalence was estimated.
- Based on bivariable logistic regression variables with a p <0.20 or those with clinical importance having potential scientific background were further selected for the multivariable logistic regression.
- Exposure factors were analyzed by a weighted multivariable logistic regression approach accounting for (i) unequal probability of selection via sampling weights and (ii) design effects (stratification and clustering) via the Taylor Linearization technique[6] .
- All clinically important two-way interactions were assessed.
- The variables including main effects and interaction effects that were statistically significant with a p <0.05 were included in the final multivariable model.
- The strengths of associations were examined with the help of odds ratio (OR) and 95% confidence interval (95% CI).
- **Software used:** STATA version 17 (StataCorp, 2021).

RESULTS

- The overall estimated asthma prevalence was 8.05%.
- People living in prairies had more asthma prevalence (8.7%) followed by Atlantic region and Quebec region.
- White racial background individuals were more likely to have asthma than non-white (8.4% vs. 5.9%) and similar case was observed for Canadian born individuals than landed immigrant (9.2% vs. 4.8%).
- The proportion of participants with asthma was significantly higher (10.8%, p <0.001) among those with obesity problem. Participants with anxiety disorder were significantly more likely to report asthma (16.1%, p <0.001) than those with not.

Table 1: Percentage distribution of participants characteristics.

Variables	Weighted (%)	Missing (%)
Demographic		
Sex		0.0
Female	50.65	
Male	49.35	
Age group (years)		0.0
12-14	3.72	
15-29	21.19	
30-49	31.59	
50-69	30.87	
≥ 70	12.63	
Marital status		0.17
Married/ Common-law	58.05	
Widowed/Divorced/Separated	11.78	
Single	30.00	
Ethnicity		5.64
Non-white	22.70	
White	71.66	
Immigrant status		1.74
Non-immigrant (Canadian born)	72.37	
Landed immigrant/non-permanent	25.89	
Province of residence of the respondent		0.0
Ontario	39.12	
Quebec	22.94	
Prairies	17.81	
British Columbia	13.24	
Atlantic Region	6.59	
Territories	0.31	
Socioeconomic		
Household income ($)		0.06
< 20,000	6.53	
20,000-39,999	12.88	
40,000-59,999	14.22	
60,000-79,999	12.84	
≥ 80,000	53.47	
Household size		0.05
1 person	14.82	
2 persons	33.64	
3 persons	18.55	
4 persons	19.58	
≥ 5 persons	13.36	
Respondent education		1.70
Less than secondary school graduation	17.3	
Secondary school graduation, no post-sec education	22.69	
Post-secondary certificate diploma or university	58.31	
Health Factored		
Body Mass Index (BMI)		7.54
Neither overweight nor obese	44.01	
Overweight	30.73	
Obese-Class I, II, III	17.72	
Smoking status		0.37
Current Smoker	15.99	
Ex-smoker	24.22	
Non-smoker	59.42	
Second hand smoking		0.0
No	74.58	
Yes	25.42	
Alcohol use		0.45
Regular	59.31	
Occasionally	16.12	
Not at all in the last 12 months	24.12	
Anxiety		0.29
No	90.76	
Yes	8.95	

Table 2: Adjusted odds ratio with 95% confidence intervals (CI) for the association of asthma and other explanatory variables.

Variables	Adjusted	
	OR	95% CI
Demographic		
Sex		
Female	1	
Male	1.38	0.93-2.05
Age group (years)		
12-14	1	
15-29	1.52**	1.13-2.05
30-49	1.41*	1.03-1.94
50-69	1.50*	1.10-2.04
≥ 70	1.35	0.98-1.85
Marital status		
Married/ Common-law	1	
Widowed/Divorced/Separated	1.17**	1.05-1.31
Single	1.17**	1.05-1.30
Immigrant status		
Non-immigrant (Canadian born)	1	
Landed immigrant/non-permanent	0.54***	0.48-0.62
Province of residence of respondent		
Ontario	1	
Quebec	0.94	0.85-1.05
Prairies	1.04	0.94-1.16
British Columbia	0.95	0.84-1.07
Atlantic Region	0.86*	0.76-0.96
Territories	0.75*	0.60-0.94
Socioeconomic		
Household income ($)		
No income or < 20,000	1	
20,000-39,999	0.92	0.80-1.05
40,000-59,999	0.85*	0.73-0.98
60,000-79,999	0.82*	0.70-0.95
≥ 80,000	0.80**	0.70-0.91
Respondent education		
Less than secondary school graduation	1	
Secondary school graduation, no post-sec education	0.83**	0.73-0.93
Post-secondary certificate diploma or university	0.84**	0.75-0.94
Health Related		
Body Mass Index (BMI)		
Neither overweight nor obese	1	
Overweight	1.27***	1.12-1.45
Obese-Class I, II, III	1.79***	1.59-2.01
Smoking status		
Current smoker	1	
Ex-smoker	0.82**	0.71-0.95
Non-smoker	0.77***	0.67-0.88
Alcohol use		
Regular	1	
Occasionally	1.10	0.99-1.23
Not at all in the last 12 months	1.07	0.96-1.19
Anxiety		
No	1	
Yes	1.92***	1.73-2.13
Interaction Effects		
Sex x Age group (years)		
Male x 12-14	1	
Male x 15-29	0.62*	0.42-0.91
Male x 30-49	0.58**	0.39-0.86
Male x 50-69	0.48***	0.32-0.70
Male x ≥ 70	0.53**	0.35-0.81
Sex x BMI		
Male x Neither overweight nor obese	1	
Male x Overweight	0.71**	0.58-0.86
Male x Obese-Class I, II, III	0.64***	0.52-0.78
Sex x Smoking status		
Male x Current smoker	1	
Male x Ex-smoker	1.28*	1.02-1.60
Male x Non-smoker	1.35**	1.09-1.68

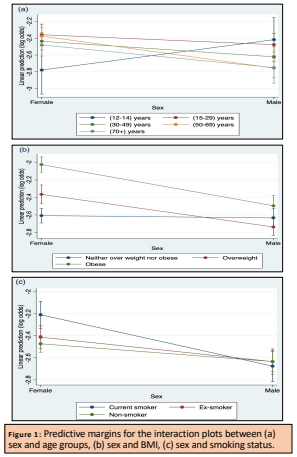

Figure 1: Predictive margins for the interaction plots between (a) sex and age groups, (b) sex and BMI, (c) sex and smoking status.

CONCLUSIONS

- Prevalence of asthma is higher among females than males in the Canadian population; however, the association strongly depends upon other factors such as age, BMI, and smoking status.
- Factors such as geographical location, immigration status, and household income influences the prevalence of asthma among the Canadian population.
- As it is hard to get the causal relationship in this study, a longitudinal analysis is recommended.

ACKNOWLEDGEMENTS

College of Medicine
HIGHER ICAR

REFERENCES

1. Asher, M. I., & Weiland, S. K. (1998). The International Study of Asthma and Allergies in Childhood (ISAAC). Clin Exp Allergy, 28 Suppl 5, 52-66; discussion 90-91
2. Lawson, J. A., Janssen, I., Bruner, M. W., Hussain, A., & Pickett, W. (2014). Asthma incidence and risk factors in a national longitudinal sample of adolescent Canadians: a prospective cohort study. BMC Pulm Med, 14, 51
3. Chu, L. M., & Pahwa, P. (2018). Prevalence and associated factors for self-reported asthma in a Canadian population: The Canadian Community Health Survey, 2014. J Asthma, 55(1), 24-34.
4. Teodata, E., & Kennedy, D. W. (2015). Asthma risk factors. International Forum of Allergy & Rhinology, 5(S1), S11-S14
5. Statistics Canada (2018). Canadian community health survey, Demmati, A., & Kao, J. N. K. (2004). Linearization variance estimators for survey data. Survey Methodology, 30(1), 17-24.