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Determinants of non-vaccination against seasonal influenza

by Maxime Roy, Lindsey Sherrard, Ève Dubé and Nicolas L. Gilbert

Abstract

Background: In Canada, vaccine coverage for seasonal influenza remains below targets. Few studies have sought to determine the sociodemographic factors associated with non-vaccination using a Canada-wide survey. This study aims to identify the determinants of, and the reasons for, non-vaccination.

Data and methods: Data from the 2013/2014 Canadian Community Health Survey (CCHS) were used. Respondents were divided into three groups: adults aged 18 to 64 years with a chronic medical condition (CMC), adults in the same age group with no CMC, and adults aged 65 years and older. Logistic regressions were used to measure the association between sociodemographic factors and non-vaccination.

Results: Among adults aged 65 years and older, the proportion of non-vaccinated persons was 36.2%. This proportion was higher among adults aged 18 to 64 years with a CMC and those with no CMC (62.2% and 77.8%, respectively). Factors independently associated with non-vaccination in all groups included being young, having a lower level of education, and not having a family doctor. Among adults aged 65 years and older and 18 to 64 years with a CMC, excellent self-perceived health was also associated with non-vaccination. The belief that the vaccine is not necessary was the most common reason for non-vaccination.

Interpretation: Too few Canadians get the influenza vaccine. The main reasons for not getting vaccinated have more to do with personal decision than barriers to access. This illustrates the ongoing need to inform the public about the importance of the vaccine and the risks associated with influenza.

Keywords: adults, Canada, influenza, immunization, vaccination

Seasonal influenza is a contagious disease that affects millions of Canadians each year.¹ It is an important cause of morbidity and mortality.² It is estimated that influenza is responsible for an average of 12,200 hospitalizations and 3,500 deaths in Canada every year.^{3,4}

Despite its sometimes limited effectiveness, vaccination remains the best way to prevent influenza.⁵ The National Advisory Committee on Immunization (NACI) recommends that all individuals aged six months and older get the seasonal influenza vaccine every year, and especially people at high risk for influenza-related complications or hospitalization, such as people with a chronic medical condition (CMC) and people aged 65 years and older.⁶

All Canadian provinces and territories run annual influenza vaccination campaigns and various activities to promote vaccination. Moreover, influenza vaccines are free for people at risk of complications or hospitalization, and those who could transmit the virus to someone at risk. In some provinces and territories, influenza vaccines are also free for adults aged 18 to 64 years with no CMC.⁷ Yet in spite of these measures, vaccine coverage for these specific groups remains well below the national target of 80% for adults aged 18 to 64 years with a CMC, adults aged 65 years and older and health care professionals.^{6,8} This target was adopted by the federal government and approved by the provinces and territories in 2017.⁹ A number of studies have dealt with the relationship between a particular factor (e.g., ethnic origin or having a chronic condition) and influenza vaccination while controlling for several confounding factors.¹⁰⁻¹²

This study aims to identify the health and sociodemographic factors associated with non-vaccination among those most cited

in the literature as being potentially associated with vaccination or being of public health interest.^{8,10-14} Studying non-vaccination supports identifying groups where coverage is low, to better inform health promotion activities.¹² Understanding what contributes to the decision to remain non-vaccinated provides insight on attitudes and concerns, and allows for the exploration of possible solutions to guide vaccination promotion initiatives.¹⁵ The purpose of the study is therefore to identify the factors associated with non-vaccination and the reasons why Canadian adults did not get the influenza vaccine in 2013/2014.

Data and methods

Population of study

Data from the Canadian Community Health Survey (CCHS) were used. The CCHS is a cross-sectional study conducted nationwide by Statistics Canada every year and consists of computer-assisted interviews on a number of health-related topics.¹⁶ The survey uses a complex sample design to obtain a representative sample of the Canadian population. Béland (2002) described the CCHS methodology in detail.¹⁷ The following groups are excluded from the survey: persons living on First Nation Reserves and on Crown lands, full-time members of the Canadian Armed Forces, institutional residents (such as long-term care facilities and prisons), and residents of two Quebec health regions (Nunavik and Terres-Cries-de-la-Baie-James). These groups combined represent less than 3% of the target population.¹⁶

The analysis uses the most recent data available, which are from the 2013/2014 cycle of the CCHS. The response rate was 66.2%, and 94.7% of respondents gave Statistics Canada

their consent to share the data collected about them with partner organizations, including the Public Health Agency of Canada.¹⁶ Therefore, the analysis file comprises 111,790 respondents aged 18 years and older.

Variables

The dependent variable was self-reported influenza vaccination status within the past 12 months. This was determined by the responses to the following questions: “Have you ever had a seasonal flu shot?” and “When did you have your last seasonal flu shot?” Respondents who answered “Less than 1 year ago” were considered vaccinated.

The independent variables were age, sex, province of residence, level of education, total household income, country of birth, Aboriginal identity, mother tongue, place of residence, having or not having a family doctor, having or not having a CMC, and self-perceived health. These variables are most often cited in the literature as being associated with vaccination or being of public health interest.^{8,10-14}

The analyses were done on subpopulations considered at risk of complications, including adults aged 18 to 64 years with a CMC and adults aged 65 years and older. Adults aged 18 to 64 years with no CMC were also included, even though they are not considered at high risk of complications. Respondents who reported a diagnosis of one of the following conditions were categorized as having a CMC: asthma, chronic obstructive pulmonary disease (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer.⁶

Respondents were able to select multiple reasons for non-vaccination from a pre-established list. These reasons were divided into three major categories: reasons related to the decision to refuse vaccination, reasons related to barriers to access, and other reasons. “Cost,” “transportation problem” and “language problem” made up the subcategory “other barriers to access”. All responses not reflected in the survey questionnaire’s pre-established list made up the “other” category.

Statistical analyses

The associations between the various factors and non-vaccination were measured with unadjusted and adjusted odds ratios (ORs) estimated using simple and multiple logistic regressions. Factors with a *p* value of less than 0.1 in the simple logistic regression were included in the multiple models and were retained as long as their *p* remained below 0.1. Additionally, the province or territory with the lowest proportion of non-vaccinated persons was considered the reference category in the logistic regression. All proportions and ORs calculated using the final sample (therefore excluding the response rate) were weighted. Weighting took into account age, sex and health region of residence. The absolute numbers presented are unweighted. Variances, 95% confidence intervals (CIs), and coefficients of variation were estimated using the bootstrap method to account for the complex sample design.¹⁶ SAS Enterprise Guide 5.1 was used to perform the statistical analyses.

Results

A total of 111,790 adults aged 18 years and older responded to the 2013/2014 CCHS, among which 2.8% (n=3090) were excluded for non-response to at least one of the questions used to create the dependent variable. As such, 108,700 respondents were included in the analyses (Table 1). Of the three groups studied, the proportion of non-vaccinated persons was lowest among adults aged 65 years and older (n = 33,664), or 36.2% (95% CI: 35.2 to 37.1). In this group, the lowest proportion was observed among adults aged 65 years and older with a CMC, or 28.0% (95% CI: 26.8 to 29.2) (Table 2). Among adults aged 18 to 64 years with a CMC (n = 14,036) for whom vaccination was also recommended, the proportion of non-vaccinated persons was 62.2% (95% CI: 60.8 to 63.7) (Table 3). Lastly, the proportion of non-vaccinated persons was 77.8% (95% CI: 77.2 to 78.3) among adults aged 18 to 64 years with no CMC (n = 61,002) (Table 4).

Table 1
Characteristics of the study population, 2013/2014

	Number [†]	Weighted %	% of persons not vaccinated against seasonal influenza
Total	108,700	100.0	68.2
Age			
18 to 24 years	9,180	11.7	86.1
25 to 44 years	27,590	34.4	79.4
45 to 64 years	38,265	35.9	67.8
65 to 74 years	19,550	11.2	41.2
75 years and older	14,115	6.8	27.8
Sex			
Men	47,680	48.9	72.0
Women	61,025	51.1	64.6
Province or territory			
Newfoundland and Labrador	3,320	1.5	72.4
Prince Edward Island	1,675	0.4	65.4
Nova Scotia	4,515	2.7	52.1
New Brunswick	4,195	2.1	62.0
Quebec	20,870	23.5	74.8
Ontario	35,880	38.8	65.9
Manitoba	6,265	3.3	69.8
Saskatchewan	6,235	2.9	69.0
Alberta	10,270	11.2	68.3
British Columbia	12,825	13.2	66.7
Yukon	1,070	0.1	69.1
Northwest Territories	1,030	0.1	64.7
Nunavut	555	0.1	68.6
Education			
High school or less	40,970	32.6	66.9
Postsecondary below the bachelor’s level	44,040	40.4	71.0
University degree	21,950	25.3	65.7

Table 1
Characteristics of the study population, 2013/2014

	Number [†]	Weighted %	% of persons not vaccinated against seasonal influenza
Total household income			
\$0 to \$29,999	23,985	16.3	64.5
\$30,000 to \$59,999	31,500	26.3	66.2
\$60,000 to \$89,999	21,970	21.1	70.0
\$90,000 or more	31,245	36.2	70.4
Country of birth			
Other	16,200	25.3	67.8
Canada	90,125	71.6	68.4
Aboriginal identity			
None	100,280	93.3	68.1
First Nations	2,630	1.6	72.2
Métis	2,280	1.5	70.9
Inuk or Inuit	560	0.1	71.8
Mother tongue			
English	68,035	53.1	65.8
French	22,690	20.5	72.2
Other	15,820	23.6	70.4
Area of residence			
Urban	78,485	82.0	68.0
Rural	30,215	18.0	69.3
Has a family doctor			
No	13,995	15.6	86.7
Yes	94,625	84.3	64.8
Has a CMC			
No	80,475	79.5	73.0
Yes	28,230	20.5	49.9
Self-Perceived health			
Excellent	19,995	20.6	72.2
Very good	40,400	38.4	70.5
Good	33,070	29.6	67.4
Fair	11,270	8.5	57.1
Poor	3,820	2.8	51.3

[†] In accordance with Statistics Canada's confidentiality rules, unweighted numbers are rounded to the nearest multiple of 5.

CMC = chronic medical condition: includes asthma, chronic obstructive pulmonary diseases (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer.

Note: The sum of the percentages for each category may not add up to 100%, as some respondents did not provide valid responses for each question.

Source: 2013/2014 Canadian Community Health Survey (CCHS) – Shared folder.

Determinants of non-vaccination

In all the groups studied, being young, having a lower level of education (high school or less and postsecondary below the bachelor's level), and not having a family doctor were factors significantly and independently associated with non-vaccination. Also, the proportion of non-vaccinated persons varied significantly among the provinces and territories for all groups (Tables 2 to 4).

Among adults aged 65 years and older, factors independently associated with non-vaccination also included having a low household income (\$0 to \$29,999 compared to \$90,000 or more), being born outside Canada, having a mother tongue other than English (compared to

English), living in a rural area, not having a CMC, and perceiving one's health as excellent (compared to poor). The factor most strongly associated with non-vaccination in this group was not having a family doctor (OR 3.57; 95% CI: 3.01 to 4.24) (Table 2).

Among adults aged 18 to 64 years with a CMC, the factors independently associated with non-vaccination also included being a man, having a mother tongue other than English or French (compared to English), and perceiving one's health as excellent, very good or good (compared to poor) (Table 3).

Among adults aged 18 to 64 years with no CMC, being a man, having a household income of less than \$90,000

(compared to \$90,000 or more), and living in a rural area were also independently associated with non-vaccination (Table 4).

Reasons for non-vaccination

The reasons most commonly cited by respondents in each group studied were the following: "respondent didn't think it was necessary," "have not gotten around to it," and "bad reaction to previous shot." Each of these reasons was considered a personal decision to refuse vaccination. Of the reasons related to access, unavailability of the vaccine when required and not knowing where to get it were the two most common. Less than 5% of respondents mentioned reasons related to access (Table 5).

Discussion

Vaccine coverage among high-risk individuals was much lower than the national target of 80%. In other words, the proportion of non-vaccinated persons was greater than 20%.⁹ The proportions of non-vaccinated adults aged 18 to 64 years with a CMC (62.2%) and with no CMC (77.8%) were higher than the proportions posted in the United States for the same year (53.7% and 66.1%, respectively).¹⁸ In the United States, organizations that provide services to people with certain chronic illnesses, such as the Diabetes Quality Improvement Project, have in recent years been working proactively to increase the number of people who receive the influenza vaccine.¹⁹ Among adults aged 65 years and older, the proportion observed in the United States (35.0%) was quite similar to the one in Canada (36.2%).¹⁸ However, these proportions were higher than in the United Kingdom, where the proportion of non-vaccinated persons among adults aged 65 years and older for the same season varied from 23.1 % to 31.7%, depending on the country.²⁰

Determinants of non-vaccination

The results show that non-vaccination against influenza is associated with certain sociodemographic factors.

Table 2
Proportion and determinants of non-vaccination against seasonal influenza among Canadians 65 years and older, 2013/2014†

	%	95% confidence interval		Unadjusted odds ratio	95% confidence interval		p	Adjusted odds ratio‡	95% confidence interval		p
		from	to		from	to			from	to	
Total	36.2	35.2	37.1	...	...	...	...	...	...	...	...
Age											
65 to 74 years	41.2	40.1	42.4	1.82	1.69	1.96	<0.001	1.79	1.65	1.94	<0.001
75 years and older	27.8	26.5	29.1	1.00	...	...	...	1.00	...	...	...
Sex											
Men	36.7	35.4	38.0	1.04	0.97	1.12	0.268	...	...	...	...
Women	35.7	34.6	36.9	1.00	...	...	...	...	...	...	...
Province or territory											
Atlantic	34.3	32.5	36.2	1.17	1.05	1.30	0.005	1.20	1.08	1.35	0.001
Quebec	42.5	40.6	44.5	1.65	1.48	1.84	<0.001	1.51	1.29	1.77	<0.001
Ontario	31.0	29.4	32.6	1.00	...	...	...	1.00	...	...	...
Manitoba	38.6	35.2	42.1	1.40	1.20	1.65	<0.001	1.87	1.60	2.18	<0.001
Saskatchewan	45.3	42.1	48.5	1.85	1.59	2.14	<0.001	1.44	1.23	1.69	<0.001
Alberta	37.4	34.6	40.2	1.33	1.15	1.54	<0.001	1.38	1.18	1.61	<0.001
British Columbia	36.8	34.7	38.9	1.30	1.16	1.46	<0.001	1.30	1.16	1.46	<0.001
Territories	31.8	25.5	38.0	1.04	0.77	1.41	0.804	0.63	0.41	0.96	0.032
Level of education											
High school or less	36.8	35.5	38.2	1.15	1.03	1.29	0.014	1.26	1.11	1.43	<0.001
"Postsecondary below the bachelor's level"	36.6	35.1	38.1	1.14	1.02	1.28	0.019	1.19	1.06	1.35	0.004
University degree	33.6	31.4	35.7	1.00	...	...	...	1.00	...	...	...
Total household income											
\$0 to \$29,999	39.9	38.3	41.6	1.28	1.12	1.47	<0.001	1.37	1.17	1.60	<0.001
\$30,000 to \$59,999	34.9	33.6	36.2	1.03	0.90	1.18	0.635	1.08	0.93	1.25	0.295
\$60,000 to \$89,999	34.2	32.1	36.4	1.00	0.86	1.17	0.966	1.01	0.87	1.18	0.872
\$90,000 or more	34.2	31.5	36.9	1.00	...	...	...	1.00	...	...	...
Country of birth											
Other	37.8	35.6	40.0	1.11	1.00	1.23	0.043	1.15	1.01	1.31	0.029
Canada	35.4	34.5	36.3	1.00	...	...	...	1.00	...	...	...
Aboriginal identity											
None	36.0	35.1	37.0	1.00	...	...	...	...	...	...	...
First Nations	34.3	26.7	41.9	0.93	0.66	1.31	0.669	...	...	...	...
Métis	37.4	28.7	46.2	1.06	0.73	1.54	0.752	...	...	...	...
Inuit or Inuit	F	...	...	0.84	0.26	2.70	0.773	...	...	...	...
Mother tongue											
English	32.3	31.3	33.4	1.00	...	...	...	1.00	...	...	...
French	41.0	39.2	42.8	1.45	1.34	1.58	<0.001	1.16	1.01	1.34	0.038
Other	39.9	37.5	42.3	1.39	1.25	1.55	<0.001	1.37	1.20	1.56	<0.001
Area of residence											
Urban	34.8	33.7	35.8	1.00	...	...	...	1.00	...	...	...
Rural	41.5	40.0	43.0	1.33	1.24	1.43	<0.001	1.32	1.23	1.43	<0.001
Has a family doctor											
No	69.8	66.2	73.4	4.40	3.70	5.24	<0.001	3.57	3.01	4.24	<0.001
Yes	34.4	33.5	35.4	1.00	...	...	...	1.00	...	...	...
Has a CMC											
No	41.9	40.6	43.1	1.85	1.72	2.00	<0.001	1.64	1.50	1.78	<0.001
Yes	28.0	26.8	29.2	1.00	...	...	...	1.00	...	...	...
Self-Perceived health											
Excellent	45.2	42.8	47.6	1.93	1.57	2.37	<0.001	1.51	1.21	1.87	<0.001
Very good	36.8	35.4	38.2	1.36	1.12	1.65	0.002	1.13	0.92	1.38	0.236
Good	34.7	33.0	36.3	1.24	1.02	1.51	0.031	1.04	0.85	1.27	0.705
Fair	30.5	28.2	32.7	1.02	0.83	1.26	0.822	0.94	0.76	1.15	0.521
Poor	30.0	26.1	33.9	1.00	...	...	...	1.00	...	...	...

... not applicable

F too unreliable to be published

† n = 33,664

‡ adjusted for all variables whose odds ratios are presented in this column

CMC = chronic medical condition: includes asthma, chronic obstructive pulmonary diseases (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer.

Note: Proportions and odds ratios are weighted.

Source: 2013/2014 Canadian Community Health Survey (CCHS) – Shared folder.

Firstly, non-vaccination was more common among the youngest people across the three groups studied, similar to the results of other studies.^{8,13,21,22} Advanced age is one of the only factors consistently associated with vaccination in general, and vaccination against influenza in particular.^{14,21-23} The fact that the proportion of non-vaccinated persons is lowest among adults aged 65 years and older suggests that vaccination programs are reaching this at-risk group.²³ Perceived vulnerability could also be playing a role in the decision to get the influenza vaccine. Younger people may not feel that they are as much at risk as older people, and therefore fewer get vaccinated.²⁴

A person's sex was also associated with non-vaccination. Among adults aged 18 to 64 years with or without a CMC, fewer men than women were vaccinated; however, this difference was not observed in adults aged 65 years and older. These results are consistent with what is generally reported in the literature, by other studies that also compared men and women in the same age group.^{19,21-24} However, other studies conducted in France showed that more men got vaccinated, or that there was no difference between the sexes.^{25,26} The difference between men and women could be explained by the fact that women use preventive health services more than men, and as a result, they are more frequently in contact with health care professionals who may recommend that they get vaccinated.^{27,28}

Differences between provinces and territories were observed for the three groups studied. Not all provinces and territories offer free vaccination for adults aged 18 to 64 years without CMC, but these differences among the programs do not seem to completely account for the differences in vaccine coverage.²¹ Moreover, less than 1% of respondents cited the cost of the vaccine as a reason for not getting an influenza vaccine. It is also possible that vaccines not provided free of charge by the government are viewed as less important by a segment of the population, including some health care professionals.²⁹

There may be a correlation between level of education and household income. The results suggest that a level of education below a university degree is an explanatory variable for non-vaccination, similar to results observed in other studies.^{10,13} For example, an American study showed that the proportion of vaccinated persons was greater among those who had at least gone to college compared with those who had not. However, this result is not significant for all age groups.¹⁹ Another study conducted in the United States did not find any differences based on level of education for adults aged 18 to 64 years.²³ Education and income are two indicators of socioeconomic status (SES). It is possible that those with a lower SES may be generally less inclined to adopt preventive health practices such as vaccination, particularly because of a lower literacy level.^{30,31}

Living in a rural area was significantly associated with non-vaccination among adults aged 18 to 64 years with no CMC, and adults aged 65 years and older. The few studies conducted to examine this relationship, in France and in Canada, also showed that living in a rural area was associated with non-vaccination.^{10,25} This result therefore suggests that those living in a rural area may have difficulty accessing the vaccine. However, when we analyze the reasons for non-vaccination, we see that less than 5% of respondents in all groups cited problems accessing the influenza vaccine. Future studies should examine this factor to better determine its relationship with non-vaccination.

Being born outside Canada was a factor associated with non-vaccination only among adults aged 65 years and older. This was not seen in the other two groups. An American study showed that non-vaccination was more common among immigrants than non-immigrants if they had been living in their host country for less than 10 years. After 10 years, there were no longer any differences between the vaccination status of immigrants and non-immigrants.¹⁹ A Canadian study based on CCHS data that looked exclusively at ethnic differ-

ences revealed that in all ethnic groups, except those who identify as Black, more people received the influenza vaccine than white Canadians.¹² This relationship is not very clear however, and, although some studies show that mother tongue and beliefs may have played a greater role in explaining this relationship, the results are not consistent.¹² Mother tongue was associated with non-vaccination in adults aged 65 years and older, and to some extent among adults aged 18 to 64 years with a CMC. Aboriginal identity was not associated with non-vaccination in any group.

Lastly, having a CMC was associated with a greater probability of vaccination in all groups. Not having a family doctor increased non-vaccination in the three groups, whereas perceiving one's health as excellent was associated with non-vaccination among adults aged 18 to 64 years with a CMC and adults aged 65 years and older. These results were similar to those of other Canadian studies that examined these three factors.^{10,14} An American study revealed that a greater proportion of adults aged 18 to 64 years with a CMC who perceived their health as poor or fair were vaccinated than those who perceived their health as good, very good or excellent.¹³ Self-perceived health and actual health are related, and perceiving one's health to be poor could lead to more medical visits. Another American study showed that vaccine coverage increased with the number of medical visits.¹⁹ However, in this study, self-perceived health and the presence of a CMC were factors independently associated with non-vaccination. Moreover, having a health care professional recommend the vaccine (a factor not measured in this study) increases the prevalence of vaccination.^{13,19,27,32}

Reasons for non-vaccination

The Health Belief Model describes four dimensions that can guide the adoption of healthy behaviour: 1) perceived susceptibility of developing the disease, 2) perceived severity of the disease, 3) perceived benefits, and 4) perceived barriers to adopting the behaviour.³³ In

Table 3
Proportion and determinants of non-vaccination against seasonal influenza among Canadians aged 18 to 64 with a CMC, 2013/2014†

	%	95% confidence interval		Unadjusted odds ratio	95% confidence interval		p	Adjusted odds ratio‡	95% confidence interval		p
		from	to		from	to			from	to	
Total	62.2	60.8	63.7	...	...	...	...	...	...	...	...
Age											
18 to 24 years	81.4	77.8	84.9	3.65	2.88	4.61	<0.001	3.39	2.68	4.28	<0.001
25 to 44 years	72.1	69.7	74.6	2.16	1.87	2.50	<0.001	2.19	1.90	2.52	<0.001
45 to 64 years	54.5	52.6	56.4	1.00	...	...	...	1.00	...	...	...
Sex											
Men	64.2	62.0	66.3	1.18	1.05	1.33	0.007	1.21	1.07	1.36	0.002
Women	60.3	58.5	62.2	1.00	...	...	...	1.00	...	...	...
Province or territory											
Newfoundland and Labrador	63.3	57.2	69.3	2.37	1.72	3.28	<0.001	2.61	1.84	3.70	<0.001
Prince Edward Island	64.2	55.7	72.8	2.48	1.62	3.79	<0.001	2.86	1.87	4.37	<0.001
Nova Scotia	42.0	37.0	47.1	1.00	...	...	...	1.00	...	...	...
New Brunswick	54.2	48.2	60.1	1.63	1.19	2.23	0.003	1.80	1.30	2.49	<0.001
Quebec	68.6	65.7	71.5	3.01	2.36	3.84	<0.001	2.97	2.17	4.07	<0.001
Ontario	59.8	57.3	62.3	2.05	1.63	2.58	<0.001	2.13	1.68	2.68	<0.001
Manitoba	69.2	63.6	74.7	3.09	2.24	4.27	<0.001	2.94	2.13	4.07	<0.001
Saskatchewan	64.8	59.4	70.3	2.54	1.85	3.49	<0.001	2.56	1.85	3.52	<0.001
Alberta	63.8	59.3	68.2	2.42	1.82	3.23	<0.001	2.26	1.68	3.04	<0.001
British Columbia	60.0	55.6	64.4	2.07	1.57	2.72	<0.001	2.10	1.58	2.79	<0.001
Yukon	60.1	51.1	69.0	2.07	1.35	3.20	0.001	2.04	1.33	3.13	0.001
Northwest Territories	56.7	47.1	66.3	1.81	1.16	2.82	0.009	1.39	0.87	2.24	0.173
Nunavut	70.7	58.8	82.7	3.33	1.78	6.22	<0.001	1.71	0.90	3.27	0.103
Education											
High school or less	63.8	61.4	66.2	1.33	1.10	1.60	0.003	1.53	1.26	1.86	<0.001
"Postsecondary below the bachelor's level"	63.5	61.4	65.6	1.31	1.11	1.55	0.002	1.38	1.16	1.64	<0.001
University degree	57.0	53.4	60.7	1.00	...	...	...	1.00	...	...	...
Total household income											
\$0 to \$29,999	61.7	58.6	64.9	1.01	0.85	1.20	0.886	...	...	...	...
\$30,000 to \$59,999	64.0	61.3	66.6	1.12	0.95	1.31	0.181	...	...	...	...
\$60,000 to \$89,999	61.9	58.7	65.1	1.02	0.86	1.21	0.830	...	...	...	...
\$90,000 or more	61.4	58.8	64.0	1.00	...	...	...	...	...	...	...
Country of birth											
Other	61.2	57.4	65.1	0.95	0.80	1.13	0.537	...	...	...	...
Canada	62.5	60.9	64.0	1.00	...	...	...	...	...	...	...
Aboriginal identity											
None	62.2	60.7	63.8	1.00	...	...	...	...	...	...	...
First Nations	65.8	59.7	71.9	1.17	0.89	1.54	0.271	...	...	...	...
Métis	57.1	49.0	65.1	0.81	0.58	1.13	0.211	...	...	...	...
Inuk or Inuit	69.2	50.0	88.5	1.37	0.53	3.51	0.518	...	...	...	...
Mother tongue											
English	60.4	58.6	62.1	1.00	...	...	...	1.00	...	...	...
French	66.0	63.1	68.8	1.27	1.11	1.47	0.001	1.00	0.79	1.27	0.979
Other	63.6	59.5	67.7	1.15	0.95	1.39	0.156	1.30	1.07	1.58	0.010
Area of residence											
Urban	62.1	60.4	63.8	1.00	...	...	...	...	...	...	...
Rural	63.0	60.6	65.3	1.04	0.92	1.18	0.534	...	...	...	...
Has a family doctor											
No	80.4	77.1	83.7	2.74	2.21	3.40	<0.001	2.10	1.68	2.62	<0.001
Yes	59.9	58.4	61.5	1.00	...	...	...	1.00	...	...	...
Perceived health											
Excellent	63.6	58.6	68.6	1.70	1.27	2.29	<0.001	1.39	1.03	1.88	0.033
Very good	64.4	61.6	67.1	1.76	1.36	2.28	<0.001	1.47	1.13	1.91	0.004
Good	64.3	62.0	66.6	1.75	1.37	2.24	<0.001	1.55	1.19	2.01	0.001
Fair	59.5	55.9	63.1	1.43	1.07	1.91	0.016	1.34	1.00	1.80	0.053
Poor	50.7	45.1	56.3	1.00	...	...	...	1.00	...	...	...

... not applicable

† n = 14,036

‡ adjusted for all variables whose odds ratios are presented in this column

CMC = chronic medical condition: includes asthma, chronic obstructive pulmonary diseases (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer.

Note: Proportions (%) and odds ratios are weighted.

Source: 2013/2014 Canadian Community Health Survey (CCHS) – Shared folder.

Table 4
Proportion of unvaccinated persons and determinants of non-vaccination for seasonal influenza among Canadians aged 18 to 64 without a CMC, 2013/2014[†]

	%	95% confidence interval		Unadjusted odds ratio	95% confidence interval		p	Adjusted odds ratio [‡]	95% confidence interval		p
		from	to		from	to			from	to	
Total	77.8	77.2	78.3	...	...	...	...	...	...	...	...
Age											
18 to 24 years	86.7	85.7	87.8	2.58	2.33	2.86	<0.001	2.24	2.01	2.49	<0.001
25 to 44 years	80.2	79.4	81.1	1.60	1.49	1.73	<0.001	1.62	1.50	1.76	<0.001
45 to 64 years	71.7	70.7	72.7	1.00	...	...	...	1.00	...	...	...
Sex											
Men	81.8	81.0	82.5	1.59	1.49	1.71	<0.001	1.51	1.41	1.63	<0.001
Women	73.8	72.9	74.7	1.00	...	...	...	1.00	...	...	...
Province or territory											
Newfoundland and Labrador	82.0	79.7	84.3	2.63	2.18	3.17	<0.001	2.70	2.23	3.28	<0.001
Prince Edward Island	73.9	70.5	77.4	1.64	1.33	2.02	<0.001	1.58	1.27	1.97	<0.001
Nova Scotia	63.4	60.8	66.0	1.00	...	...	...	1.00	...	...	...
New Brunswick	72.3	69.9	74.7	1.51	1.27	1.78	<0.001	1.50	1.27	1.79	<0.001
Quebec	85.4	84.3	86.4	3.36	2.93	3.87	<0.001	3.21	2.78	3.71	<0.001
Ontario	76.0	75.0	77.1	1.83	1.62	2.07	<0.001	1.97	1.74	2.24	<0.001
Manitoba	78.2	75.8	80.7	2.08	1.73	2.49	<0.001	2.07	1.72	2.48	<0.001
Saskatchewan	75.9	73.8	77.9	1.82	1.56	2.12	<0.001	1.73	1.47	2.04	<0.001
Alberta	74.8	73.1	76.5	1.71	1.48	1.97	<0.001	1.68	1.44	1.95	<0.001
British Columbia	76.0	74.5	77.6	1.83	1.60	2.11	<0.001	1.87	1.62	2.16	<0.001
Yukon	76.0	72.5	79.6	1.83	1.48	2.27	<0.001	1.70	1.36	2.11	<0.001
Northwest Territories	68.7	64.4	73.0	1.27	1.01	1.59	0.040	0.88	0.68	1.12	0.291
Nunavut	72.4	68.0	76.8	1.52	1.18	1.94	0.001	0.74	0.55	0.99	0.042
Education											
High school or less	80.8	79.8	81.9	1.62	1.48	1.77	<0.001	1.51	1.37	1.68	<0.001
"Postsecondary below the bachelor's level"	79.4	78.6	80.2	1.48	1.36	1.61	<0.001	1.38	1.26	1.51	<0.001
University degree	72.2	70.9	73.5	1.00	...	...	...	1.00	...	...	...
Total household income											
\$0 to \$29,999	80.9	79.3	82.5	1.40	1.25	1.56	<0.001	1.14	1.01	1.28	0.034
\$30,000 to \$59,999	79.8	78.6	81.0	1.30	1.20	1.42	<0.001	1.14	1.04	1.25	0.005
\$60,000 to \$89,999	78.7	77.5	79.8	1.22	1.12	1.32	<0.001	1.12	1.02	1.22	0.013
\$90,000 or more	75.2	74.3	76.1	1.00	...	...	...	1.00	...	...	...
Country of birth											
Other	77.1	75.7	78.5	0.95	0.87	1.04	0.268	...	...	...	...
Canada	78.0	77.3	78.6	1.00	...	...	...	...	...	...	...
Aboriginal identity											
None	77.7	77.1	78.3	1.00	...	...	...	...	...	...	...
First Nations	79.0	75.7	82.2	1.08	0.89	1.31	0.432	...	...	...	...
Métis	79.9	76.5	83.3	1.14	0.91	1.42	0.245	...	...	...	...
Inuk or Inuit	76.6	71.7	81.4	0.94	0.71	1.24	0.654	...	...	...	...
Mother tongue											
English	75.4	74.7	76.2	1.00	...	...	...	...	...	...	...
French	83.4	82.4	84.5	1.64	1.51	1.78	<0.001	...	...	...	...
Other	78.1	76.7	79.5	1.16	1.06	1.27	0.001	...	...	...	...
Area of residence											
Urban	77.4	76.7	78.1	1.00	...	...	...	1.00	...	...	...
Rural	79.4	78.4	80.4	1.12	1.05	1.21	0.002	1.17	1.08	1.27	<0.001
Has a family doctor											
No	88.5	87.5	89.6	2.55	2.29	2.84	<0.001	2.01	1.80	2.25	<0.001
Yes	75.2	74.5	75.8	1.00	...	...	...	1.00	...	...	...
Perceived health											
Excellent	77.3	76.1	78.5	1.17	0.86	1.59	0.332	...	...	...	...
Very good	77.9	77.1	78.7	1.21	0.89	1.64	0.223	...	...	...	...
Good	78.6	77.5	79.7	1.26	0.93	1.72	0.141	...	...	...	...
Fair	75.3	72.5	78.2	1.05	0.75	1.46	0.788	...	...	...	...
Poor	74.5	68.7	80.2	1.00	...	...	...	...	...	...	...

... not applicable

[†] n = 61,002

[‡] adjusted for all variables whose odds ratios are presented in this column

CMC = chronic medical condition: Includes asthma, chronic obstructive pulmonary diseases (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer

Note: Proportions (%) and odds ratios are weighted.

Source: 2013/2014 Canadian Community Health Survey (CCHS) – Shared folder.

Table 5
Reasons reported by Canadian adults for not getting the flu shot, 2013/2014

Number of valid respondents	Specific groups								
	18 to 64 years with no CMC [‡]			18 to 64 years with a CMC [§]			65 years and older ^{††}		
	95% confidence interval			95% confidence interval			95% confidence interval		
Reasons for non-vaccination	%	from	to	%	from	to	%	from	to
Decision to refuse vaccination	96.5	96.2	96.8	95.3	94.5	96.1	96.3	95.8	96.8
Have not gotten around to it	15.7	15.1	16.3	17.3	15.9	18.8	10.6	9.7	11.5
Respondent did not think it was necessary	74.0	73.3	74.7	65.6	63.8	67.5	72.0	70.6	73.3
Doctor did not think it was necessary	1.3	1.1	1.5	2.8	2.1	3.6	2.4	2.0	2.9
Fear	4.3	4.0	4.6	5.3	4.3	6.3	4.6	4.0	5.3
Bad reaction to previous shot	6.3	5.9	6.7	9.6	8.5	10.7	12.4	11.4	13.3
Barriers to accessing services	3.5	3.2	3.8	4.2	3.4	5.0	3.0	2.5	3.5
Personal or family responsibilities	0.5	0.4	0.6	0.6 [‡]	0.3	0.9	0.3 [‡]	0.2	0.4
Not available at time required	0.9	0.8	1.0	1.3 [‡]	0.8	1.7	0.8	0.6	1.0
Not available at all in the area	0.3	0.2	0.3	0.3 [‡]	0.1	0.5	0.4 [‡]	0.2	0.5
Waiting time was too long	0.3 [‡]	0.2	0.4	0.4 [‡]	0.2	0.7	0.2 [‡]	0.1	0.3
Did not know where to go	1.1	0.9	1.3	1.0 [‡]	0.6	1.5	0.7 [‡]	0.4	0.9
Unable to leave house / health problem	0.1 [‡]	0.0	0.1	0.5 [‡]	0.2	0.8	0.3 [‡]	0.2	0.4
Other barriers to access [†]	0.5	0.4	0.7	0.4 [‡]	0.1	0.6	0.6 [‡]	0.3	1.0
Other	1.3	1.1	1.5	1.8 [‡]	1.3	2.3	2.0	1.6	2.4

[‡] Use with caution: Coefficient of variation between 15.0% and 35.0%

[†] Includes “cost,” “transportation problem” and “language problem”

[‡] 393 respondents (18 to 64 years with no CMC) did not provide a reason for non-vaccination

[§] 55 respondents (18 to 64 years with a CMC) did not provide a reason for non-vaccination

^{††} 90 respondents (≥65) did not provide a reason for non-vaccination

CMC = chronic medical condition: Includes asthma, chronic obstructive pulmonary diseases (emphysema or chronic bronchitis), diabetes, heart disease, effects of a stroke and cancer

Note: Because multiple responses were accepted, the sum of the subcategories is greater than the sum of the category. Rates are weighted.

Source: 2013/2014 Canadian Community Health Survey (CCHS) – Shared folder.

this study, the reasons for non-vaccination were related to different dimensions of this model. Among the three groups studied, the most common reason for not getting the influenza vaccine was that the respondent thought it was not necessary, which could correspond to low perceived susceptibility to, and severity of, influenza and to low perceived benefits of vaccination.²⁴ In a European study that also used this model, the vast majority of the reasons cited for non-vaccination were due to low perceived susceptibility.³⁴ In a Quebec study, the main reasons cited were associated with low perceived susceptibility to, and severity of, influenza.²² The second category of most commonly cited reasons relates to high perceived barriers that Santos et al. (2017) described as emotional or cognitive, namely fear and reactions to previous vaccines.³⁴ According to them, emotional and cognitive barriers are the dimension that best predicts the adoption of healthy behaviour.³⁴ In this study, “fear” (4% to 5%) and “reaction to pre-

vious shot” (6% to 12%) were among the four most commonly cited reasons, along with “vaccine not necessary” (66% to 74%) and “have not gotten around to it” (11% to 17%).

The results of this study are consistent with those of the National Flu Survey, conducted in the United States in 2011/2012. The most commonly cited reasons were related to low perceived susceptibility and high perceived emotional and cognitive barriers, particularly regarding side effects of the vaccine.¹⁵ Other Canadian studies based on CCHS data for previous years also gave the same most common reasons: the respondent did not think that the influenza vaccine was necessary or had not gotten around to getting it.^{8,14,35} The most commonly cited reasons were considered a decision to refuse vaccination and may be related to a lack of confidence in, or a negative attitude toward, the vaccine, particularly because of several misconceptions about the vaccine and its sometimes-limited effectiveness.^{5,24}

Strengths and limitations

The main strength of this study is the quality of the CCHS. First, using data from the 2013/2014 cycle makes it possible to have a large sample size. Second, probability sampling yields results that are representative of the Canadian population, except the few excluded groups. Specifically, 36% of CCHS respondents had a household income over \$90,000 and 25% had at least a university degree. These proportions are similar to those observed during the 2011 National Household Survey, where 37% of the Canadian population reported an income over \$80,000 and 26% had at least a university degree.^{36,37} Finally, the survey had a high participation rate (66.2%), which reduces non-response bias.

Nevertheless, this study contains certain shortcomings. Vaccine status is self-reported and may therefore be subject to recall bias. However, the validity of this information has been proven in the past.^{38,39} Moreover, the survey does not include institutionalized populations,

What is already known on this subject?

- Influenza is an important cause of morbidity and mortality among Canadians.
- Vaccine coverage for influenza in Canada is below targets.

What does this study add?

- The proportion of non-vaccinated persons is highest among adults aged 18 to 64 years with no chronic medical condition and lowest among adults aged 65 years and older.
- Factors independently associated with non-vaccination in all the groups studied included being young, having a lower level of education, and not having a family doctor.
- The belief that the vaccine was not necessary was the most common reason for non-vaccination.
- Public health authorities should continue to inform Canadians about the importance and safety of the influenza vaccine and the consequences of influenza-related complications.

such as seniors in long-term care facilities, which could result in overestimation of the proportion of non-vaccinated persons among adults aged 65 years and older. Other vulnerable populations, such as persons living on Aboriginal reserves, are also excluded from the survey. In addition, the CCHS did not include questions on certain chronic diseases that, according to NACI, may increase the risk of influenza-related complications or hospitalization. This may have influenced the proportion of non-vaccinated persons among adults aged 18 to 64 years with or without a CMC. Lastly, since the vaccine status of respondents is known for only a single season, it is impossible to distinguish respondents who sometimes get vaccinated from those who never get vaccinated.

Conclusion

Vaccine coverage for influenza in Canada remains below the 80% target for groups at risk of complications. This study identified several factors associated with non-vaccination against influenza, including a lower level of education and not having a family doctor,

two factors that increase social inequalities in health. A better understanding of the determinants of non-vaccination can guide promotion activities to better reach the most vulnerable populations. Future efforts should particularly target the population with a CMC and seek to educate it about the severity of influenza and the increased risk of complications on account of their condition, given that most non-vaccinated persons in this group perceived the vaccine as not necessary.

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