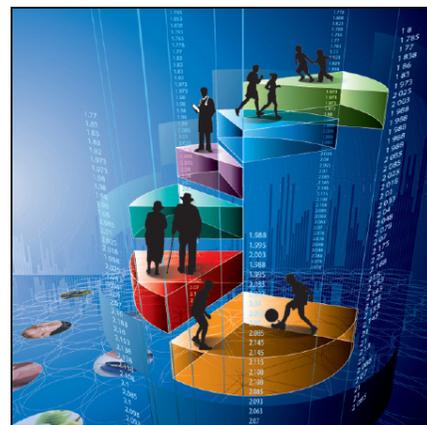


Health Reports

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by Heather Gilmour

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ABSTRACT

Background

Immunization against vaccine-preventable diseases such as shingles and pneumococcal disease is especially pertinent among older Canadians. However, vaccine uptake remains low.

Data and methods

Data from *the Canadian Health Survey on Seniors (CHSS) – 2019/2020* were used to examine receipt of shingles and pneumococcal vaccines among Canadians aged 65 and older living in the community. Multivariable logistic regression was used to identify individual predisposing, enabling and needs-related factors associated with receipt of each type of vaccination. Reasons reported for not getting vaccinated were also examined.

Results

Based on the 2019/2020 CHSS, an estimated 36.3% of Canadians aged 65 and older (2.3 million people) had received the shingles vaccine, while 51.1% (3.1 million) had received the pneumococcal vaccine. Being a woman, having higher socioeconomic status, having had the flu shot and having a regular health care provider were associated with increased odds of vaccination. Being an immigrant, living outside large population centres, and belonging to South Asian or Chinese population groups were associated with lower odds of vaccination.

Over one-third of unvaccinated people did not think the shingles vaccine (39.7%) or the pneumococcal vaccine (36.6%) was necessary. Other frequently reported reasons for non-vaccination were not having heard of the vaccine or the doctor not mentioning it; for the shingles vaccine, 12% cited cost as a reason.

Interpretation

Understanding factors associated with uptake of vaccines and reasons for not obtaining them among older Canadians will help to inform policy and programs aimed at preventing the burden of these diseases.

Keywords

Vaccinations, compliance, coverage, herpes zoster, pneumonia, Canada, cross-sectional survey, immunization

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What is already known on this subject?

- Because immunity declines with age, older adults are at higher risk of contracting certain diseases and experiencing more severe outcomes and medical complications. Thus, vaccination across the life course against vaccine-preventable diseases is an important element of healthy aging.
- Shingles and pneumococcal vaccine uptake remains low among older Canadians, and below stated coverage goals for pneumococcal vaccination.

What does this study add?

- An estimated 36.3% of older Canadians had been vaccinated against shingles and 51.1% against pneumococcal disease.
- Several characteristics were independently associated with a higher likelihood of vaccination against both shingles and pneumococcal disease—being a woman, having higher socioeconomic status, having a regular health care professional, and having had the seasonal flu shot.
- Immigrants, those living outside large population centres, and members of South Asian and Chinese population groups were less likely to have been vaccinated against either disease.
- Over one-third of unvaccinated individuals reported that they did not think the shingles (39.7%) or the pneumococcal (36.6%) vaccine was necessary. Other frequently reported reasons for not getting either vaccine were not knowing about it or the doctor not mentioning it. Additionally, cost was a factor for 12% of those unvaccinated against shingles.

Vaccination can play an important role in the overall health and well-being of older adults. Immune response declines with age, making older adults more vulnerable to contracting certain diseases and to experiencing more severe outcomes and medical complications.^{1,2} Thus, immunization against vaccine-preventable diseases (VPD) such as pneumococcal disease and herpes zoster (HZ), or shingles, is especially pertinent for older Canadians.

HZ infection occurs when the varicella zoster virus, which causes chickenpox, is reactivated, resulting in neuropathic pain caused by inflammation of nerves, skin rash, and blisters. Anyone who has had chickenpox can get shingles. It occurs most frequently in older adults, particularly those older than 50 years of age and immunocompromised people. Risk of hospitalization and complications from shingles such as post-herpetic neuralgia, which results in prolonged and sometimes debilitating pain, also increases with age.^{3,4}

Streptococcus pneumoniae bacteria are a common cause of pneumonia and can also result in invasive pneumococcal disease (IPD), such as when the bacteria enter the bloodstream (sepsis). These problems are more likely to occur in older adults and can cause serious illness and death. There are many pneumococcal serotypes, some of which can be prevented with vaccines. Additionally, antimicrobial resistance to some pneumococci complicates treatment and makes it important to prevent disease with vaccines.⁵

In Canada, the National Advisory Committee on Immunization (NACI) recommends the shingles vaccine for those older than 50 years without contraindications and the pneumococcal vaccine (also known as the pneumonia vaccine) for all adults

aged 65 years and older.^{3,6} While there are no national vaccination coverage goals for the shingles vaccine, the goals for the pneumococcal vaccine include achieving 80% coverage among adults 65 years of age and older by 2025.⁷

However, coverage for both vaccines remains low. Based on data from 2020/2021, 27% of individuals older than 50 years of age reported having received their shingles vaccine.⁸ The percentage of Canadians aged 65 and older who had received at least one dose of the pneumococcal vaccine remained stable at 38% to 42% between 2006 and 2012,⁹ after which it increased to 58% in 2019 and 55% in 2020/2021.⁸ Beyond knowing how many people have been vaccinated, understanding which factors are associated with pneumococcal and shingles vaccination among older Canadians is an important step toward developing strategies to increase vaccine uptake, reduce disease burden, and reach vaccine coverage goals.

Factors associated with seasonal flu¹⁰⁻¹² and COVID-19 vaccine uptake^{13,14} have been relatively well studied among older Canadians. For example, prior influenza vaccination increased the likelihood of seasonal flu or COVID-19 vaccination, while being non-White or in lower education or lower income groups was associated with a lower likelihood of receiving either vaccine.^{10,13} However, less is known about shingles¹⁵ and pneumococcal vaccination¹⁶ in this age group. Since there are no national vaccine registries (which would include only limited sociodemographic information), population health surveys are essential data sources for this purpose. The 2016 and 2018 adult National Immunization Coverage (aNICS) survey and the subsequent 2020/2021 Seasonal Influenza Vaccination Coverage Survey (includes shingles and pneumococcal vaccines every second year) collected self-reported data on

receipt of the vaccines, allowing for reporting of overall vaccine coverage rates. However, the sample size of those surveys does not permit an in-depth analysis of factors associated with vaccine uptake and disaggregation by population groups of interest. The Canadian Health Survey on Seniors (CHSS)–2019/2020 enables this level of analysis since it includes questions on both shingles and pneumococcal vaccines, has a large sample size, and includes a wide array of covariates.

Using data from the CHSS, this study examined the prevalence and factors associated with shingles and pneumococcal vaccination among individuals aged 65 and older living in the community. Andersen's behavioral model is a widely used framework for examining determinants of health care service use.¹⁷ Following this framework, multivariable logistic regression was used to identify individual predisposing, enabling, and needs-related factors associated with receipt of each type of vaccination. Reasons reported for not getting vaccinated were also examined.

Data and methods

Canadian Health Survey on Seniors (CHSS) – 2019/2020

The CHSS is a cross-sectional supplement to the Canadian Community Health Survey (CCHS), which collected detailed information on health status, health care services, social provisions, and social determinants of health for respondents residing in 1 of the 10 provinces. Individuals living on reserves and in other Indigenous communities in the provinces, full-time members of the Canadian Forces, the institutionalized population, and individuals living in certain remote regions were excluded from the CHSS.

Data were collected from January 2019 to December 2020, with a pause from mid-March until September 2020 because of the COVID-19 pandemic. A total of 41,635 people aged 65 years and older were interviewed using a combination of personal interviews and telephone interviews. The response rate for the CHSS was 40.1%, of which 90.8% agreed to link their responses to the CCHS. Detailed documentation for the CHSS is available at <https://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getSurvey&SDDS=5267>.

Analytical sample

The analytical sample for this study included 41,624 respondents aged 65 years and older for whom gender was reported (18,127 men and 23,497 women), representing 6.4 million people living in the community in the 10 provinces. Individuals who did not respond (don't know or refusal) to the questions on receipt of the shingles vaccine (699, or 1.7%) and the pneumococcal vaccine (1,885, or 4.5%) were excluded from the analysis for each vaccine. Additionally, proxy respondents (those who were unable to respond on their own behalf because of physical or mental conditions) contributed to prevalence estimates but were excluded from the multivariable models (2,048 for the pneumococcal sample and 2,165 for the shingles

sample). Missing responses for each of the remaining covariates were low (less than 1%), with the exception of sexual orientation (1.7%), for which a missing category was included in the logistic regression to maximize sample size, but odds ratios were not shown. Final adjusted logistic regression models were based on a sample of 37,188 for shingles vaccination and 36,193 for pneumococcal vaccination.

Analytical techniques

Weighted frequencies and cross-tabulations were calculated to examine, by selected characteristics, the proportion of community-living Canadians aged 65 and older who had received the shingles or pneumococcal vaccines. The reasons why vaccines had not been received were also examined. The descriptive estimates were based on available case analysis (unequal number of cases across variables).

Separate multivariable logistic regression models for shingles and pneumococcal vaccines were used to determine the independent association between selected characteristics and having received the vaccine versus not having received the vaccine. The logistic regression estimates were derived based on complete case analysis (equal number of cases across covariates). While moderate correlation exists between some of the variables in the model, variance inflation factors (≤ 2.9) and tolerance estimates (≥ 0.2) demonstrated that multicollinearity was not a problem.

Sampling weights were used to account for the survey design and non-response. Bootstrap weights were applied using SAS-callable SUDAAN 11.0 to account for the underestimation of standard errors caused by the complex survey design.¹⁸ The significance level was set at $p < 0.05$.

Definitions

Vaccination

Respondents were asked, "As an adult, have you ever had the pneumococcal vaccine, which protects against pneumonia?" and "As an adult, have you ever had the shingles vaccine, also known as herpes zoster vaccine?" Responses were coded as yes or no for each vaccine.

Correlates of shingles and pneumococcal vaccination status

Andersen's Behavioral Model of Health Service Use¹⁷ was designed to predict service use and was applied here to the receipt of shingles and pneumococcal vaccinations. Correlates of vaccination status were placed in three categories. Predisposing characteristics are related to the tendency to use health care services. Enabling resources refers to the availability of services and personnel and the knowledge and ability to access them. Needs-related factors, such as health status, influence the need for services.

Table 1
Prevalence of shingles and pneumococcal vaccination as an adult, by selected characteristics, household population aged 65 and older, Canada, excluding the territories, 2019/2020

Characteristic	Shingles vaccine				Pneumococcal vaccine			
	Number (000s)	%	95% confidence interval		Number (000s)	%	95% confidence interval	
			from	to			from	to
Total	2279.4	36.3	35.4	37.2	3112.9	51.1	50.2	52.1
Predisposing characteristics								
Gender								
Men [†]	1045.2	35.8	34.4	37.2	1342.6	48.0	46.6	49.5
Women	1234.0	36.7	35.4	38.0	1769.8	53.8 [*]	52.5	55.0
Age group								
65 to 74 years [†]	1442.1	38.4	37.2	39.7	1673.3	46.0	44.7	47.3
75 to 84 years	636.4	34.1 [*]	32.5	35.8	1059.6	58.5 [*]	56.8	60.2
85 years and older	200.8	30.2 [*]	27.5	33.1	380.0	59.4 [*]	56.4	62.3
Marital status								
Married or common law [†]	1613.1	40.2	38.9	41.4	2013.3	52.0	50.8	53.3
Widowed	353.1	30.4 [*]	28.6	32.3	624.0	54.8 [*]	52.7	56.9
Separated or divorced	198.7	29.3 [*]	27.0	31.7	295.7	44.7 [*]	41.9	47.5
Single, never married	113.0	26.7 [*]	23.7	29.9	177.5	42.8 [*]	39.3	46.5
Sexual orientation								
Heterosexual [†]	2084.0	36.6	35.6	37.5	2810.2	50.9	49.9	51.8
Gay or lesbian	20.4 [‡]	48.9 [*]	38.2	59.8	24.0 [‡]	58.3	48.0	68.0
Bisexual, pansexual, or other	11.3	40.0 [‡]	25.9	55.9	15.2 [‡]	53.9	39.8	67.4
Population group								
Indigenous	32.8	28.3 [*]	23.8	33.3	54.0	48.1	42.9	53.2
South Asian	43.8 [‡]	27.3 [‡]	19.8	36.5	54.8	34.4 [*]	26.5	43.2
Chinese	54.5	30.2	23.3	38.0	60.3	36.1 [*]	29.6	43.0
Black	20.7 [‡]	21.0 [‡]	13.5	31.0	34.4 [‡]	36.9 [*]	26.9	48.2
Other racialized	77.0	31.4	24.8	38.9	93.9	41.7 [*]	34.0	49.9
Non-Indigenous, non-racialized [†]	2031.0	37.4	36.4	38.3	2791.4	52.8	51.9	53.7
Immigrant status								
Immigrant	561.1	33.5 [*]	31.1	35.9	698.0	43.2 [*]	40.8	45.7
Canadian born [†]	1713.8	37.3	36.3	38.2	2409.8	53.9	53.0	54.9
Population centre								
Rural (fewer than 1,000)	420.6	32.1 [*]	30.4	33.9	604.2	47.8 [*]	46.2	49.3
Small centre (1,000 to 29,999)	302.7	34.0 [*]	32.0	36.0	441.7	50.8	48.9	52.7
Medium centre (30,000 to 99,999)	221.6	34.8 [*]	32.5	37.1	344.6	55.6 [*]	53.3	57.8
Large centre (100,000 or greater) [†]	1334.5	38.7	37.2	40.3	1722.3	51.6	50.1	53.2
Seasonal flu shot								
Less than one year ago	1754.3	48.1 [*]	46.9	49.3	2405.9	68.0 [*]	66.8	69.1
One to less than two years ago	71.4	28.9 [*]	24.7	33.6	116.8	49.8 [*]	44.7	54.9
Two or more years ago	129.7	20.3 [*]	18.1	22.7	189.6	31.0 [*]	28.5	33.5
Never [†]	181.4	13.9	12.4	15.5	168.1	13.1	11.7	14.6
Enabling resources								
Household education								
Less than secondary school graduation [†]	172.1	22.1	20.3	24.1	373.0	48.8	46.5	51.1
Secondary school graduation	338.4	31.7 [*]	29.5	33.9	509.0	48.9	46.7	51.2
Postsecondary education	1695.5	40.6 [*]	39.4	41.8	2114.1	52.4 [*]	51.2	53.6
Household income								
Lowest [†]	251.2	20.3	18.5	22.1	554.0	45.7	43.5	47.9
Low-middle	381.5	30.5 [*]	28.4	32.6	638.2	52.1 [*]	50.0	54.2
Middle	471.2	37.8 [*]	35.7	39.8	625.3	51.8 [*]	49.5	54.0
High-middle	540.1	42.5 [*]	40.4	44.7	657.4	53.5 [*]	51.2	55.7
Highest	635.3	50.0 [*]	47.7	52.3	637.9	52.5 [*]	50.4	54.7
Regular health care provider								
Yes	2219.4	37.7 [*]	36.7	38.7	3000.5	52.5 [*]	51.5	53.5
No [†]	58.3	15.3	12.9	18.0	110.7	29.7	26.6	33.0
Province of residence								
Newfoundland and Labrador	22.2	20.3 [*]	18.5	22.2	33.5	31.5 [*]	29.4	33.8
Prince Edward Island	9.7	32.5 [*]	29.7	35.5	12.0	41.9 [*]	39.4	44.5
Nova Scotia	57.5	29.7 [*]	27.6	31.9	94.2	50.1	47.6	52.6
New Brunswick	37.4	23.9 [*]	22.0	26.0	61.5	40.4 [*]	38.1	42.8
Quebec	337.6	21.6 [*]	20.1	23.2	779.5	51.3	49.5	53.1
Ontario [†]	1207.7	50.4	48.4	52.4	1183.5	51.4	49.4	53.3
Manitoba	63.4	31.6 [*]	29.5	33.7	111.2	57.2 [*]	55.0	59.4
Saskatchewan	50.2	29.3 [*]	27.2	31.4	87.9	52.4	50.0	54.8
Alberta	198.4	35.4 [*]	33.4	37.5	289.7	52.9	50.8	54.9
British Columbia	295.3	32.8 [*]	30.6	34.9	460.0	52.1	49.9	54.4
Survey timing								
Pre-COVID-19 restrictions [†]	1315.2	33.9	32.8	35.1	1872.6	50.1	48.9	51.2
During COVID-19 pandemic	964.2	40.1 [*]	38.4	41.7	1240.3	52.8 [*]	51.2	54.4
Needs-related factors								
Multimorbidity								
None or one chronic condition [†]	1400.4	37.2	35.9	38.4	2108.2	57.7	56.5	58.9
Two or more chronic conditions	866.5	35.1 [*]	33.7	36.6	988.0	41.3 [*]	39.8	42.8
Self-perceived health								
Excellent or very good [†]	1207.9	39.5	38.2	40.8	1450.0	49.0	47.7	50.3
Good, fair, or poor	1070.0	33.4 [*]	32.0	34.7	1658.5	53.2 [*]	51.8	54.5

[†] reference category
^{*} significantly different from reference category (p < 0.05)
[‡] use with caution

Note: Based on available case analysis (unequal sample size across the predictors).
Source: 2019/2020 Canadian Health Survey on Seniors.

Predisposing characteristics

Among the three categories of gender available in the CHSS (male, female, and gender diverse), the first two categories were used in the analysis and the third category was excluded because of the small number of respondents (fewer than 10).

Age was grouped into three categories (in years)—65 to 74, 75 to 84, and 85 and older—for descriptive analysis and used as a continuous variable in multivariable models. Marital status was classified as married or common-law; widowed; separated or divorced; and single, never married.

Respondents were asked, “What is your sexual orientation?” Responses included heterosexual, gay or lesbian, and bisexual or pansexual. Responses to the sexual orientation question of not elsewhere classified, don’t know, refusal, and not stated were grouped together.

Respondents were asked whether they were First Nations (includes Status and Non-Status Indians), Métis, or Inuk (Inuit), and, if not, whether they belonged to one or more racial or cultural groups. Based on these questions and available sample size, six population groups were created: Indigenous; South Asian; Chinese; Black; other racialized; and non-Indigenous, non-racialized.

Immigrant status was categorized as immigrant (landed immigrant or non-permanent resident) or Canadian-born individual. Based on the Statistics Canada classification of population centres,¹⁹ four categories were used: rural area (fewer than 1,000 people), small population centre (1,000 to 29,999), medium population centre (30,000 to 99,999), and large urban centre (100,000 or more).

Respondents who indicated that they had ever received a seasonal flu shot were asked when they had last done so: less than one year ago, one year to less than two years ago, and two years ago or more.

Enabling resources

Highest level of household education was categorized as less than high school graduation, high school graduation (no postsecondary education), and postsecondary education. Income was represented as the adjusted ratio of household income to the low-income cut-off corresponding to household and community size and divided into quintiles: lowest, low-middle, middle, high-middle, and highest.

Having a regular health care provider was determined with the question, “Do you have a regular health care provider? By this, we mean one health professional that you regularly see or talk to when you need care or advice for your health.”

The timing of the survey was based on the survey collection period and was coded as before COVID-19 restrictions (January to December 2019, and January to March 2020) and during the COVID-19 pandemic (September to December 2020).

Needs-related factors

Multimorbidity was defined as having two or more chronic conditions that had been diagnosed by a health professional and that had lasted or were expected to last at least six months. Conditions included asthma, chronic obstructive pulmonary disease, sleep apnea, fibromyalgia, arthritis, osteoporosis, diabetes, heart disease, stroke, cancer, Alzheimer’s disease, chronic fatigue syndrome, and high blood pressure. Self-perceived health was categorized as excellent or very good, versus good, fair or poor.

Reasons for not getting vaccinated

Respondents who indicated they had not received the shingles or pneumococcal vaccine were asked about the reasons they had not had the vaccine (respondents could give more than one reason in a mark-all-that-apply question with set responses).

Results

Characteristics of the study population

The majority of the study population (59.2%) were 65 to 74 years old; about two-thirds (63.6%) were married or living common-law; more than one in four were immigrants (27.3%); more than two-thirds (69.1%) had a postsecondary education; 60.6% were living with multimorbidity; and more than half (55.2%) lived in large population centres. The majority were interviewed before COVID-19 pandemic restrictions (61.9%) and the rest (38.1%) during the pandemic.

Vaccine uptake

Based on the 2019/2020 CHSS, an estimated 36.3% of Canadians aged 65 and older (2.3 million people) had received the shingles vaccine, while 51.1% (3.1 million) had received the pneumococcal vaccine (Table 1).

In multivariable analysis, women had greater odds of having both the shingles (1.1) and pneumococcal (1.3) vaccines (Table 2). Those who were not married or common-law were less likely to have received either vaccine, but the association persisted only for those who were single or widowed for the shingles vaccine in the multivariable model.

Gay or lesbian individuals had greater odds than their heterosexual counterparts of having received the shingles vaccine, but there was no significant association between sexual orientation and pneumococcal vaccination.

Individuals belonging to South Asian and Chinese population groups were less likely than non-Indigenous, non-racialized Canadians to have been immunized with either vaccine, after controlling for other factors. Immigrants were less likely than their Canadian-born counterparts to have received either vaccine and had lower odds (0.7) of having either vaccine when other factors were taken into account.

Table 2
Adjusted odds ratios relating shingles and pneumococcal vaccination to predisposing, enabling and needs-related characteristics, household population aged 65 and older, Canada, 2019/2020

Characteristic	Shingles vaccine			Pneumococcal vaccine		
	AOR	95% confidence interval		AOR	95% confidence interval	
		from	to		from	to
Predisposing characteristics						
Gender						
Men [†]	1.0	...	...	1.0	...	...
Women	1.1 *	1.0	1.3	1.3 *	1.2	1.5
Age in years (continuous)	0.99 *	0.98	1.00	1.03 *	1.02	1.04
Marital status						
Married or common law [†]	1.0	...	...	1.0	...	...
Widowed	0.9 *	0.8	1.0	1.0	0.9	1.1
Separated or divorced	1.0	0.8	1.1	1.0	0.9	1.2
Single, never married	0.8 *	0.6	0.9	0.9	0.7	1.0
Sexual orientation						
Heterosexual [†]	1.0	...	...	1.0	...	...
Gay or lesbian	1.6 *	1.0	2.5	1.2	0.8	2.0
Bisexual, pansexual, or other	1.5	0.8	2.9	1.1	0.6	2.1
Population group						
Indigenous	0.8	0.6	1.0	0.9	0.7	1.2
South Asian	0.5 *	0.3	0.8	0.6 *	0.3	0.9
Chinese	0.6 *	0.4	0.9	0.6 *	0.4	0.8
Black	0.5	0.2	1.1	0.6	0.3	1.2
Other racialized	0.7	0.5	1.2	0.8	0.5	1.2
Non-Indigenous, non-racialized [†]	1.0	...	...	1.0	...	...
Immigrant status						
Immigrant	0.7 *	0.6	0.8	0.7 *	0.6	0.8
Canadian born [†]	1.0	...	...	1.0	...	...
Population centre						
Rural (fewer than 1,000)	0.7 *	0.6	0.8	0.9	0.8	1.0
Small centre (1,000 to 29,999)	0.8 *	0.7	0.9	0.9 *	0.8	1.0
Medium centre (30,000 to 99,999)	0.8 *	0.7	0.9	1.0	0.9	1.2
Large centre (100,000 or greater) [†]	1.0	...	...	1.0	...	...
Seasonal flu shot						
Less than one year ago	5.2 *	4.4	6.1	13.5 *	11.6	15.7
One to less than two years ago	2.4 *	1.8	3.2	6.0 *	4.7	7.7
Two or more years ago	1.5 *	1.2	1.8	2.7 *	2.3	3.3
Never [†]	1.0	...	...	1.0	...	...
Enabling resources						
Household education						
Less than secondary school graduation [†]	1.0	...	...	1.0	...	...
Secondary school graduation	1.2 *	1.0	1.4	1.1	1.0	1.3
Postsecondary education	1.4 *	1.2	1.6	1.3 *	1.1	1.5
Household income						
Lowest [†]	1.0	...	...	1.0	...	...
Low-middle	1.5 *	1.3	1.8	1.1	1.0	1.3
Middle	2.0 *	1.7	2.4	1.1	1.0	1.3
High-middle	2.2 *	1.9	2.7	1.2 *	1.1	1.5
Highest	2.9 *	2.4	3.5	1.2 *	1.0	1.4
Regular health care provider						
Yes	2.1 *	1.6	2.6	1.6 *	1.3	1.9
No [†]	1.0	...	...	1.0	...	...
Province of residence						
Newfoundland and Labrador	0.2 *	0.2	0.3	0.4 *	0.3	0.4
Prince Edward Island	0.4 *	0.4	0.5	0.6 *	0.5	0.7
Nova Scotia	0.3 *	0.3	0.4	0.7 *	0.6	0.9
New Brunswick	0.3 *	0.3	0.3	0.6 *	0.5	0.7
Quebec	0.3 *	0.3	0.3	1.6 *	1.4	1.8
Ontario [†]	1.0	1.0	1.0	1.0	1.0	1.0
Manitoba	0.4 *	0.4	0.5	1.4 *	1.2	1.7
Saskatchewan	0.3 *	0.3	0.4	1.1	0.9	1.2
Alberta	0.4 *	0.4	0.5	1.1	1.0	1.3
British Columbia	0.4 *	0.4	0.5	1.1	1.0	1.3
Survey timing						
Pre-COVID-19 restrictions [†]	1.0	...	...	1.0	...	...
During COVID-19 pandemic	1.2 *	1.1	1.4	1.0	0.9	1.1
Needs-related factors						
Multimorbidity						
None or one chronic condition [†]	1.0	...	...	1.0	...	...
Two or more chronic conditions	1.0	0.9	1.1	0.6 *	0.6	0.7
Self-perceived health						
Excellent or very good [†]	1.0	...	...	1.0	...	...
Good, fair, or poor	0.8 *	0.7	0.9	1.0	0.9	1.1

... not applicable

[†] reference category

* significantly different from reference category (p < 0.05)

Note: AOR = adjusted odds ratio.

Source: 2019/2020 Canadian Health Survey on Seniors.

Residents of rural and small population centres had significantly lower odds of immunization with either vaccine.

Having received a seasonal influenza shot compared with never having done so was strongly associated with immunization with both the shingles and pneumococcal vaccines, both bivariately and in multivariable analysis.

Higher levels of household education and income were associated with a greater likelihood of immunization, in particular for the shingles vaccine. Individuals in higher-income households had higher odds of having received the shingles vaccine compared with the lowest-income households in multivariable analysis, with a strong gradient evident (1.5 times for low-middle-income households to 2.9 times for the highest-income households).

Having a regular health care provider significantly increased the odds of shingles and pneumococcal vaccination, while respondents who participated in the survey during the pandemic, compared with before COVID-19 restrictions, had higher odds of having received the shingles vaccine but not the pneumococcal vaccine.

Provincial variations were evident for both vaccines. Ontario had the highest prevalence of shingles vaccination among older Canadians (50.4%), and, in multivariable analysis, residents of all provinces had lower odds of shingles vaccination compared with Ontario. For pneumococcal vaccination, residents of all the Atlantic provinces had lower odds of vaccination than did Ontario residents, while residents of Quebec and Manitoba had higher odds.

Those with multimorbidity had lower odds of having received the pneumococcal vaccine, while those with good, fair, or poor self-perceived health had lower odds of having received the shingles vaccine compared with those reporting excellent or very good health.

Reasons for not being vaccinated

Among those who had not been vaccinated, over one-third reported that they did not think it was necessary for the shingles (39.7%) and pneumococcal (36.6%) vaccines (Table 3). Other frequently reported reasons for not having had the shingles vaccine were that the doctor did not mention it (19.7%), or that they had never heard of it (11.0%). That the doctor did not mention it (25.2%) and that they had never heard of it (27.7%) were significantly more likely to be given as reasons for not getting the pneumococcal vaccine than for not getting the shingles vaccine. Notably, cost was cited as a reason for not getting the shingles vaccine by 12% of older adults, while 0.9% gave this reason for not getting the pneumococcal vaccine. Not having gotten around to it and being unsure of the benefits of the vaccine were also cited as reasons for non-vaccination with the shingles vaccine (8.3% and 4.2%, respectively) or the pneumococcal vaccine (5.9% and 4.3%, respectively).

Discussion

Because age is a significant risk factor for both shingles²⁰ and pneumonia,²¹ the aging of the population may increase the number of cases of each disease, emphasizing the importance of disease prevention through vaccination. According to the 2019/2020 CHSS, an estimated 36.3% of older Canadians had received the shingles vaccine and 51.1% had received the pneumococcal vaccine. The higher proportion reporting having had the pneumococcal vaccine may be in part because it is publicly funded for the 65-and-older age group across Canada, while in most jurisdictions, the shingles vaccine is not.⁶ Further supporting the possibility of economic reasons for this difference, 12.0% of unvaccinated older Canadians reported cost as a reason for not being immunized against shingles, compared with only 0.9% for pneumococcal disease.

The existence of a vaccination coverage goal for the pneumococcal vaccine (80% by 2025) for this age group could potentially increase awareness of the vaccine. However, about one-quarter of older Canadians reported that they had never heard of the pneumococcal vaccine (27.7%) or that their doctor had not recommended it (25.2%) despite public funding and the coverage goal for this age group. More than one-third felt that the shingles vaccine (39.7%) and pneumococcal vaccine (36.6%) were unnecessary, highlighting the opportunity to increase education about these vaccines.

Factors associated with vaccination can identify groups for which vaccine uptake is good and others that could benefit from targeted promotion of vaccines. In this study, several predisposing, enabling, and needs-related factors were associated with vaccine uptake among older adults. Notably, having had a seasonal flu shot and having a regular health care provider remained strongly associated with increased odds of either vaccine in multivariable analysis. A gradient with the recency of the seasonal flu shot was evident. For example, compared with those who had never had a flu shot, the odds of being vaccinated against pneumococcal disease were 13.5 times higher for those who had had a flu shot in the past year, 6.0 times higher for those who did so one to less than two years ago, and 2.7 times higher for those who did so two years ago or more. This association between the flu shot and other vaccines is consistent with previous studies for vaccinations against shingles,²² pneumococcal disease,¹⁶ H1N1²³ and COVID-19.^{13,24} It is possible that the association could be a proxy for a positive attitude toward vaccinations in general among those who had received a seasonal influenza vaccination and would also indicate individuals for whom a shingles or pneumococcal vaccination is likely to be safe.

Having a regular doctor could influence a person's decision to receive either of the vaccines if it has been recommended or offered opportunistically during a consultation for another reason. While this survey did not indicate whether the respondent had visited a doctor in the past year, other Canadian data show that over 40% of older Canadians who did so had experienced a missed opportunity for vaccination against

Table 3
Reasons for not getting shingles or pneumococcal vaccination, household population aged 65 and older who were not vaccinated, Canada, excluding territories, 2019/2020

Reasons	Shingles vaccine				Pneumococcal vaccine			
	Number '000s	%	95% confidence interval		Number '000s	%	95% confidence interval	
			from	to			from	to
Felt it was unnecessary	1535.4	39.7	38.6	40.8	1046.6	36.6	35.3	38.0
Doctor did not mention	761.6	19.7	18.7	20.8	720.0	25.2	23.9	26.5
Never heard of it	424.9	11.0	10.2	11.8	793.0	27.7	26.4	29.1
Not gotten around to it	343.0	8.9	8.3	9.5	169.8	5.9	5.3	6.7
Unsure of benefits	177.9	4.6	4.2	5.1	122.5	4.3	3.8	4.8
Fear of contents	63.3	1.6	1.3	2.0	54.0	1.9	1.6	2.3
Fear or discomfort	40.7	1.1	0.8	1.3	33.5	1.2	0.9	1.5
Bad reaction to a previous vaccine	32.8	0.8	0.7	1.0	38.9	1.4	1.1	1.7
Cost	463.3	12.0	11.3	12.7	27.1	0.9	0.7	1.2
Other	486.9	12.6	11.8	13.4	201.8	7.1	6.3	7.9

Note: Because respondents could report more than one reason, the sum of the percentages exceeds 100%.

Source: 2019/2020 Canadian Health Survey on Seniors.

pneumococcal disease.¹⁶ In this study, those with a regular health care provider had more than twice the odds of pneumococcal vaccination and 1.6 times the odds of shingles vaccination. Many Canadians do not have a regular doctor, but, in some provinces, the shingles and pneumococcal vaccines are offered at pharmacies, expanding avenues for access to vaccines.

Older residents of Ontario had the highest prevalence of the shingles vaccine (50.4%) compared with other provinces, likely related to the fact that the shingles vaccine has been publicly funded in that province for those aged 65 to 70 years since 2016.²⁵ Prince Edward Island²⁶ has publicly funded the shingles vaccine for those 65 and older starting in 2022. Quebec²⁷ has done so for those aged 80 and older starting in 2023. These changes occurred after data collection for the CHSS.

Despite being publicly funded for all Canadians aged 65 and older, the pneumococcal vaccine saw provincial variations in uptake, both bivariate and in multivariable analysis that took into account predisposing, enabling and needs factors. Residents of all the Atlantic provinces had lower odds of having received the pneumococcal vaccine than did residents of Ontario, and residents of Quebec and Manitoba had higher odds. While the results for the shingles vaccine in Ontario suggest that publicly funded programs can have a positive impact on vaccine uptake, the provincial variations in pneumococcal vaccine uptake suggest there are additional factors at play. For example, geographical variations in vaccine promotion and education programs over time could not be accounted for in this study.

Consistent with studies in other countries,^{28,29} socioeconomic status, as measured by education and income, was also associated with increased odds of vaccination. This is also similar to findings for influenza and COVID-19 vaccinations.^{10,13} In this study, for shingles vaccination, a strong gradient was evident with income; for pneumococcal vaccination, the association was less consistent. This is not unexpected, given that the cost of pneumococcal vaccination is

covered across the country for this age group, but the cost of the shingles vaccination is not.

Women were more likely than men to have had shingles or pneumococcal vaccinations. Other Canadian results showed no gender difference in shingles vaccine uptake⁸ but are not directly comparable since results were reported for the 50-years-and-older age group versus the 65-years-and-older age group examined in this study. The greater likelihood of pneumococcal vaccination among women is consistent with other Canadian studies^{8,10} and may be linked to greater health care seeking behaviours overall among women.^{5,30}

The association between some covariates and vaccination was not always consistent for both vaccines. In this study, age operated in different directions for the two vaccines—the odds of immunization with the shingles vaccine were lower with increasing age, while the odds of immunization with the pneumococcal vaccine rose with increasing age. This is consistent with another Canadian study of pneumococcal vaccination,¹⁶ but it is the opposite of what was found for the shingles vaccine and age in the United States.²⁸ Since individuals may have received the shingles vaccine as early as age 50, it is possible that recall bias is stronger for the shingles vaccine with increasing age. Further investigation into the association between age and shingles vaccination is warranted in future studies.

Gay or lesbian individuals were more likely than heterosexual people to have received the shingles vaccine. There is limited research on uptake of vaccines among older non-heterosexual adults. Some mixed evidence from U.S. studies exists—one found no difference across sexual orientation groups of older adults for either shingles or pneumococcal vaccination³¹ another found that gay men had a higher likelihood of shingles vaccination³² and a third, albeit based on a small convenience sample in one region, found higher rates of shingles vaccination among LGBT older adults.³³ The limitations of a small sample size of non-heterosexual individuals can hinder analysis of vaccination uptake, but this analysis is nonetheless important given the health disparities in this population group.³⁴

Additionally, belonging to South Asian or Chinese population groups (compared with non-Indigenous, non-racialized Canadians), being an immigrant (versus Canadian-born individuals), living in smaller population centres, and having poorer health were associated with lower odds of vaccination.

The COVID-19 pandemic could have limited individuals' access to vaccinations or influenced their awareness of and attitudes toward vaccinations in general. In this study, those surveyed during the pandemic had greater odds of having had a shingles vaccination. This result is difficult to interpret because it is not known when the respondent received the vaccine—it may have occurred many years before the pandemic.

Strengths and limitations

Among the strengths of this study are the use of a representative Canadian data source with a large sample of older Canadians and the inclusion of a wide range of covariates in the analysis.

Nonetheless, this study has some limitations. The CHSS 2019/2020 excludes information on older Canadians living in institutional settings such as long-term care and nursing homes—5.8% of the population aged 65 and older.³⁵ Thus, immunization status and factors associated with having received either the shingles or the pneumococcal vaccine are not known in this population. Data collection for the 2020 CHSS was interrupted by the COVID-19 pandemic, and the inability to conduct in-person interviews during the pandemic resulted in lower response rates. Survey weights were used in the analyses to minimize any potential bias that could arise because of low response rates. However, the increase in non-response rates could affect estimates (e.g., increase in the total variance) produced using the survey data.³⁶ Despite the sizable sample, further disaggregation of population groups that may differ in their access to and willingness to receive shingles and pneumococcal vaccines was not possible (e.g., more detailed breakdowns of population groups; non-binary or transgender individuals; separate estimates for First Nations people, Métis, and Inuit). Data are self-reported, and some people may not recall vaccinations they received many years ago. Proxy respondents (5.5% of the overall CHSS sample) were excluded from the multivariable analysis. While this has the potential to

introduce bias, so too would the inclusion of survey records completed on behalf of infirm individuals.³⁷ An analysis of characteristics of the CHSS data indicated that proxy respondents, compared with self-reporting respondents, were more likely to be men, older, and immigrants, as well as to have a regular health care provider and to be in worse health, and they were less likely to be non-Indigenous, non-racialized. Similarly, those who did not respond to the shingles vaccine or pneumococcal vaccine questions (1.7% and 4.5%, respectively) could introduce bias. Non-respondents were more likely to be older, to be immigrants, and to live in large population centres and were less likely to be heterosexual or non-Indigenous, non-racialized. Additionally, non-respondents to the pneumococcal vaccine question were less likely to have had a recent flu shot, and non-respondents to the shingles vaccine question were less likely to report excellent or very good self-perceived health.

Conclusion

Despite being an integral part of healthy aging and the prevention of disease and side effects, shingles and pneumococcal vaccine uptake remains low. Just over one-third of older Canadians had been vaccinated against shingles, and just over half had been vaccinated against pneumococcal disease.

In an aging population, the number of people affected by shingles, pneumococcal disease, and their complications will likely increase. Identifying factors associated with uptake of vaccines and reasons for not obtaining them among older Canadians will help to inform policy and programs aimed at preventing the burden of these diseases. Higher odds of vaccination among those with a regular health care provider, and the number of unvaccinated respondents who identified that their doctor did not recommend the vaccine as a reason for not being vaccinated, emphasize the importance that contact with the health care profession could have in vaccine uptake. Improving awareness of the availability and benefits of both vaccines may also improve uptake, as well as targeting vaccine promotion programs to groups that had lower odds of vaccination—men, those living outside large population areas or in certain provinces, members of certain population groups, and those with lower socioeconomic status.

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