

Influenza and Pneumococcal Vaccination Uptake among Canadian Adults: Insights from the CLSA

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CLSA Webinar - June 7, 2023



Today's Seminar

1



Nicole E. Basta
Associate Professor
School of Population and Global Health
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Importance of
Adult Vaccination
and Insight from
the CLSA

2



Katie Gravagna
PhD student
Gillings School of Global Public Health
University of North Carolina at Chapel Hill

CLSA
Flu Vaccine
Uptake
Study

3



Giorgia Sulis
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University of Ottawa

CLSA
Pneumococcal
Vaccine Uptake
Study

Conflicts of Interest (COI) Declaration: None to Report



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Influenza and Pneumonia: A Significant Cause of Death among Older Adults

Rank of Influenza/Pneumonia among the Leading Causes of Death in Canada

65-74 yrs old	Rank
2015	8 th
2016	8 th
2017	8 th
2018	8 th
2019	8 th
2020	9 th

75-84 yrs old	Rank
2015	7 th
2016	8 th
2017	8 th
2018	7 th
2019	8 th
2020	10 th

≥ 85 yrs old	Rank
2015	5 th
2016	7 th
2017	6 th
2018	4 th
2019	7 th
2020	8 th

Source: Statistics Canada <https://www150.statcan.gc.ca>

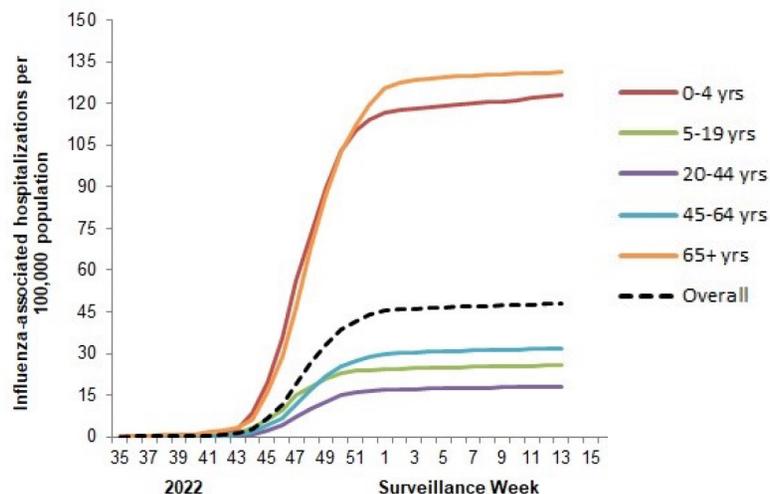


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Healthy Aging: Prevention of Infectious Diseases to Prevent Morbidity

Canadian adults ages 65+ had the highest cumulative rates of influenza-associated hospitalization: 132/100,000



Source: FluWatch



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Adults **65+** are at increased risk of flu-related complications

Heart Attack risk is increased by **3 to 5x** in the first 2 weeks of infection

Stroke risk is increased by **2 to 3x** in the first 2 weeks of infection

Source: National Foundation for Infectious Diseases

Who is at Risk of Severe Influenza and Pneumococcal?



Older Adults 65+

Adults age 65 years and older are at greater risk of flu-related complications, in part because of weakened immune systems

People with Certain Chronic Health Conditions



Heart disease:

Heart disease patients are 6 times more likely to have a heart attack within 7 days of influenza infection



Lung disease (including asthma and/or COPD):

Flu can increase inflammation in the lungs and airways, which can trigger asthma attacks and make COPD symptoms worse



Diabetes:

Diabetes can interfere with the body's ability to fight flu, and flu infection can interfere with management of blood sugar levels



Obesity:

Individuals with a body mass index (BMI) of 40+ have a higher rate of serious flu-related complications, including hospitalization



Compromised immune system:

People who have weakened immune systems, including current and former cancer patients and those living with HIV/AIDS, are at higher risk of developing serious flu-related complications, including hospitalization and death

Source: National Foundation for Infectious Diseases

See the National Advisory Committee on Immunization (NACI) for a complete list of chronic health conditions that increase risk



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Vaccination: A Cornerstone of Prevention that Supports Healthy Aging

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Influenza Vaccination

- Designed to protect against multiple flu strains
- Reduces the risk of infection, illness, severe illness, hospitalization & death
- Annual vaccination required

Pneumococcal Vaccination

- Two vaccines were available PNEU-P-23 and PNEU-C-13 at the time of our study
- Both protect against multiple pneumococcal bacterial serotypes
- Reduces the risk of invasive pneumococcal disease, hospitalization, and death caused by these strains

Evidence has demonstrated that both influenza and pneumococcal vaccination are safe, and they are the most effective way to prevent severe outcomes from these diseases.



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Current Vaccination Recommendations: Canada

Influenza Vaccination

NACI particularly recommends that everyone at high risk of severe outcomes be vaccinated annually at the start of the flu season, including:

- adults aged 65 years and older AND
- all adults with chronic medical conditions

Pneumococcal Vaccination

At the time of our study (2015-2018)*, NACI recommended that:

- adults aged 65 years and older receive one dose of PNEU-P-23 AND
- all adults with certain chronic medical conditions receive one dose of both PNEU-P-23 and PNEU-C-13

**In 2023, NACI updated recommendations now that two additional vaccines PNEU-C-15 and PNEU-C-20 approved.*

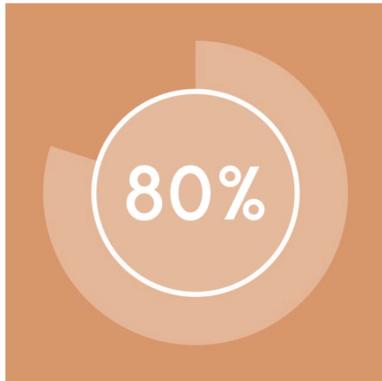
Source: <https://www.canada.ca/en/public-health/services/immunization/national-advisory-committee-on-immunization-naci/public-health-level-recommendations-use-pneumococcal-vaccines-adults-including-use-15-valent-20-valent-conjugate-vaccines/summary-february-2023.html>



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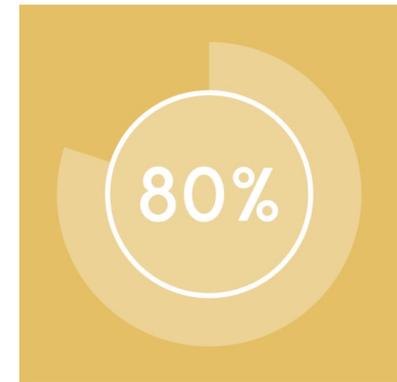
National Immunization Strategy Goals



Flu vaccine uptake:
≥65 years old



Flu vaccine uptake: 18-64
years old with chronic
medical conditions



Pneumo vaccine uptake:
≥65 years old



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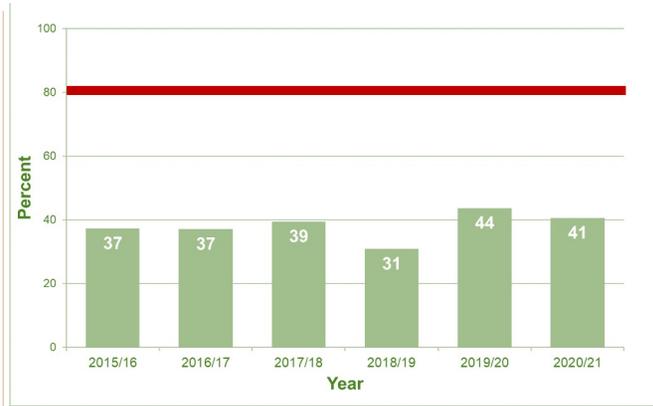
Source: <https://www.canada.ca/en/public-health/services/immunization-vaccine-priorities/national-immunization-strategy/vaccination-coverage-goals-vaccine-preventable-diseases-reduction-targets-2025.html#1.0>

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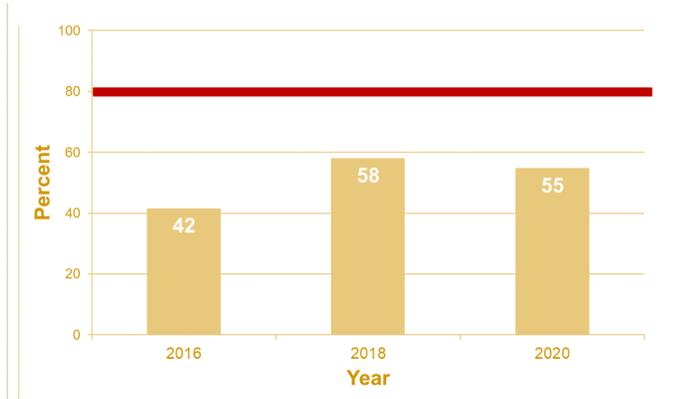
Effort to Improve Vaccination Rates Urgently Needed



Flu vaccine uptake:
≥65 years old



Flu vaccine uptake: 18-64
years old with chronic
medical conditions



Pneumo vaccine uptake:
≥65 years old

The CLSA Is a Unique Resource for Characterizing Vaccine Uptake

- CLSA can provide a comprehensive assessment of patterns of vaccine uptake for influenza and pneumococcal vaccines
- Data from FU1 (2015-2018) can be used as a baseline to monitor progress towards these national immunization strategy goals
- Can identify those least likely to be vaccinated among a large cohort where numerous potential risk factors for non-vaccination have been systematically evaluated and develop strategies to support vaccination uptake among these individuals



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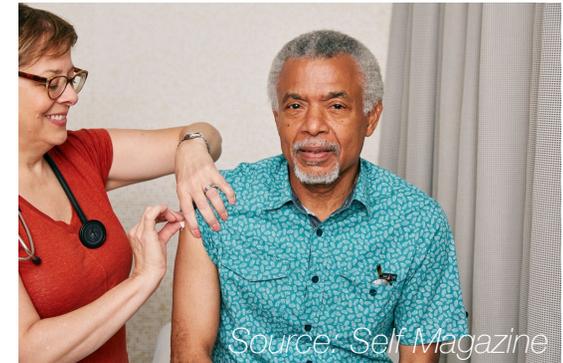
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Our CLSA Vaccine Study Aims

- Characterize flu vaccine uptake & factors associated with non-vaccination:
 - Adults aged 65 and older
 - Adults aged 46-64 with at least one CMC
 - Caregivers (all ages) and care recipients (65 years and older)
- Characterize pneumo vaccine uptake & factors associated with non-vaccination:
 - Adults aged 65 and older
 - Adults aged 47-64 with at least one CMC
- Assess missed opportunities for pneumococcal vaccination



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Influenza Vaccine Uptake Among Canadian Adults

Katie Gravagna, MSc

CLSA Webinar | June 7, 2023

Estimate the prevalence of influenza non-vaccination and associated factors between 2015-2018 in:

Those at high risk of severe outcomes

- 1. Adults aged 65 years and older**
- 2. Adults aged 46-64 years with at least one Chronic Medical Condition (CMC)**

Caregivers and care recipients

- 1. Caregivers aged 45 years and older**
- 2. Care recipients aged 65 years and older**

- **Cross-sectional** secondary analysis of FUP1 data
- Only variables within **both** the Comprehensive and Tracking cohorts included
- Cohorts combined for analyses
- Inclusion criteria: valid response to **outcome variable** (self-reported influenza vaccination)
- Sensitivity analysis to see if responses changed by flu season period
- Variables chosen *a priori*
- Use of nested multivariable logistic **regression models**

Influenza Vaccine Uptake Among High-Risk Canadian Adults

Participants

- **51.8%** of FUP1 participants

Prevalence of influenza non-vaccination

- **29.5%** (95% CI: 28.9%, 30.1%)
- High in current daily **smokers**, those with higher self-rated **health status**, **Quebec** residents

Factors associated with influenza non-vaccination

- Those **aged 64-74** compared to those aged 85-94 (**aOR: 2.12**, 95% CI: 1.82, 2.45)
- Those who **identified as non-white** compared to those who identified as white (**aOR: 1.44**, 95% CI: 1.22, 1.71)
- Lower odds: had **visited a family doctor** (**aOR: 0.48**, 95% CI: 0.42, 0.54) or **specialist** (**aOR: 0.79**, 95% CI: 0.74, 0.85) in past 12 months

Participants

- **25.1%** of FUP1 participants

Prevalence of influenza non-vaccination

- **50.4%** (95% CI: 49.4%, 51.3%)
- **Did not differ** by CMC type
- Prevalence was high as **age** decreased, for current daily **smokers**, and for **Quebec** residents

Factors associated with influenza non-vaccination

- Highest odds for **Quebec residents** (aOR: **2.21**, 95% CI: 1.95, 2.51)
- Residence in **rural areas** (aOR: **1.30**, 95% CI: 1.15, 1.46)
- Reported **1 CMC** (aOR: **1.23**, 95% CI: 1.05, 1.43)
- Lower odds: had **visited a family doctor** (aOR: **0.53**, 95% CI: 0.45, 0.62) or **specialist** (aOR: **0.78**, 95% CI: 0.72, 0.85) in past 12 months

- High-risk groups remained **well below** the 2003 target of 80% coverage
- Variation in non-vaccination prevalence by **province**
 - Impact of universal vaccination recommendations, policies, barriers
- Importance of **healthcare encounters**
 - Influence of practitioner recommendations
- Expanding **risk messaging**
 - Younger adults with CMC
- **Future studies**
 - Impact of frailty on vaccination status

Influenza Vaccine Uptake Among Caregivers and Care Recipients

Participants

- **53.0%** of FUP1 participants

Prevalence of influenza non-vaccination

- **41.4%** (95% CI: 40.8%, 42.0%)
- Decreased with **age**
- High in residents of **Quebec** and those with **2+ household members**

Factors associated with influenza non-vaccination

- Those who **identified as non-white** (aOR: **1.42**, 95% CI: 1.22, 1.65)
- Current **daily smokers** (aOR: **1.44**, 95% CI: **1.25**, **1.65**)
- Lower odds: had **visited a family doctor** (aOR: **0.53**, 95% CI: 0.47, 0.59) or **specialist** (aOR: **0.81**, 95% CI: 0.76, 0.86) in past 12 months

Participants

- **12.5%** of FUP1 participants

Prevalence of influenza non-vaccination

- **24.8%** (95% CI: 23.7%, 26.0%)
- **Did not vary** by CMC type or self-rated health
- **Decreased** as household income increased

Factors associated with influenza non-vaccination

- **Younger age** (65-74 years compared to older ages)
- Those who **identified as non-white** (aOR: **2.04**, 95% CI: 1.39, 2.99)
- Current **daily smokers** (aOR: **1.46**, 95% CI: **1.06, 1.99**)
- Lower odds: had **visited a family doctor** (aOR: **0.61**, 95% CI: 0.41, 0.90) or **specialist** (aOR: **0.71**, 95% CI: 0.59, 0.86) in past 12 months

- Influenza vaccination remained low among **caregivers** at risk of transmission
- **Educate** caregivers
 - **Direct and indirect benefits** to themselves and their care recipients
- Importance of **provider contact**
 - Targeting influenza vaccination recommendations to those without healthcare encounters
- Modifiable risk factors: **provider contact** and **smoking status**

- Influenza **non-vaccination** prevalence remains high
- Identify opportunities for **education**
 - Younger adults
 - Those with CMC
 - Caregivers
 - Undervaccinated groups
 - Individuals **without healthcare visits**

- **Generalizability**
 - Community-dwelling adults
 - Higher education and socioeconomic status
 - Excluded some groups
- **Self-reported variables**
 - Outcome variable
- **Missing information**
 - Reasons for non-vaccination
 - Professional caregiver status
 - Vaccination trends over time

- **Large sample size**
 - Increased precision
- **Province-level estimates**
 - Explore potential barriers
- **Wide range of covariates**
 - Associations across many domains
 - Expand on prior studies

Contacts

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Study Team

- **Katie Gravagna** University of North Carolina at Chapel Hill
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- **Dr. Sarah A. Buchan** University of Toronto
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Acknowledgements

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Pneumococcal vaccination uptake among Canadian adults

Giorgia Sulis, MD PhD

Assistant Professor

School of Epidemiology and Public Health | University of Ottawa

Check out our study!

PLOS ONE

RESEARCH ARTICLE

Pneumococcal vaccination uptake and missed opportunities for vaccination among Canadian adults: A cross-sectional analysis of the Canadian Longitudinal Study on Aging (CLSA)

Giorgia Sulis^{1*}, Valérie Rodrigue¹, Christina Wolfson^{1,2,3}, Jacqueline M. McMillan^{4,5}, Susan A. Kirkland^{6,7}, Melissa K. Andrew⁷, Nicole E. Basta¹

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Take a picture to download the full paper

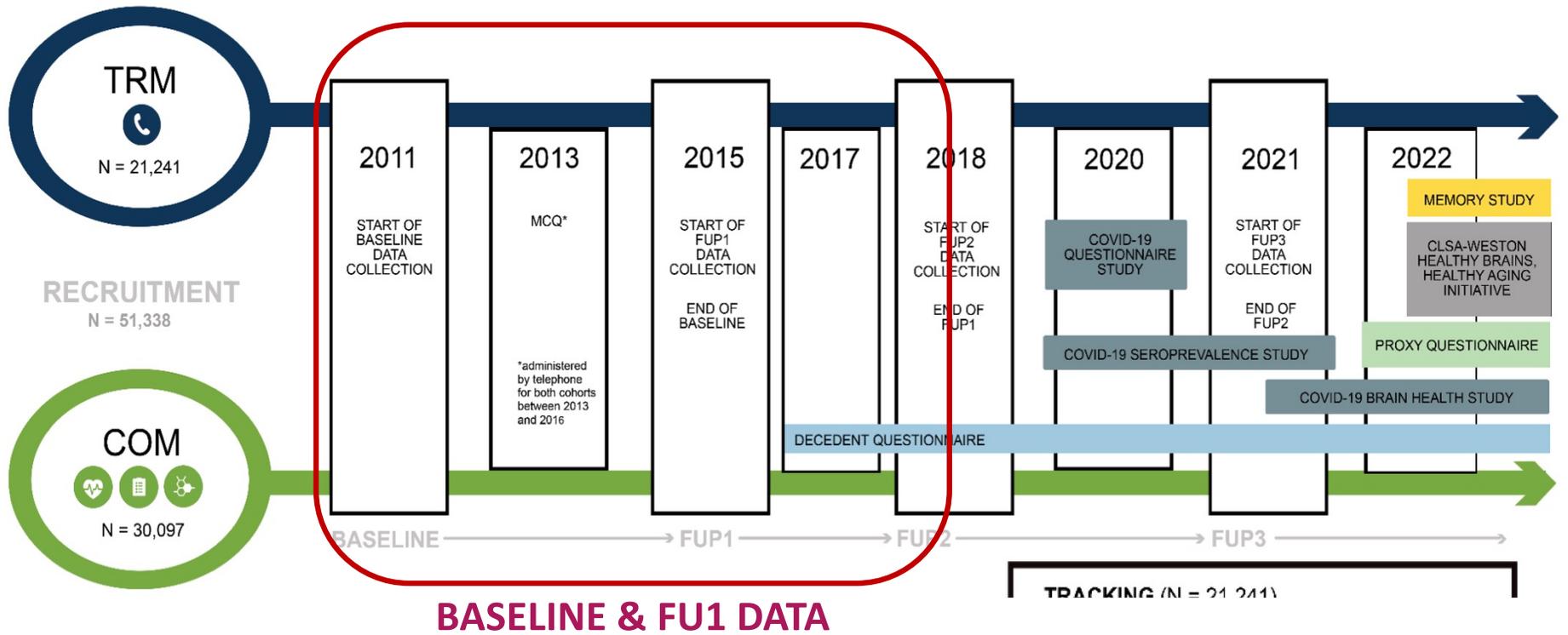


OPEN ACCESS

Study objectives

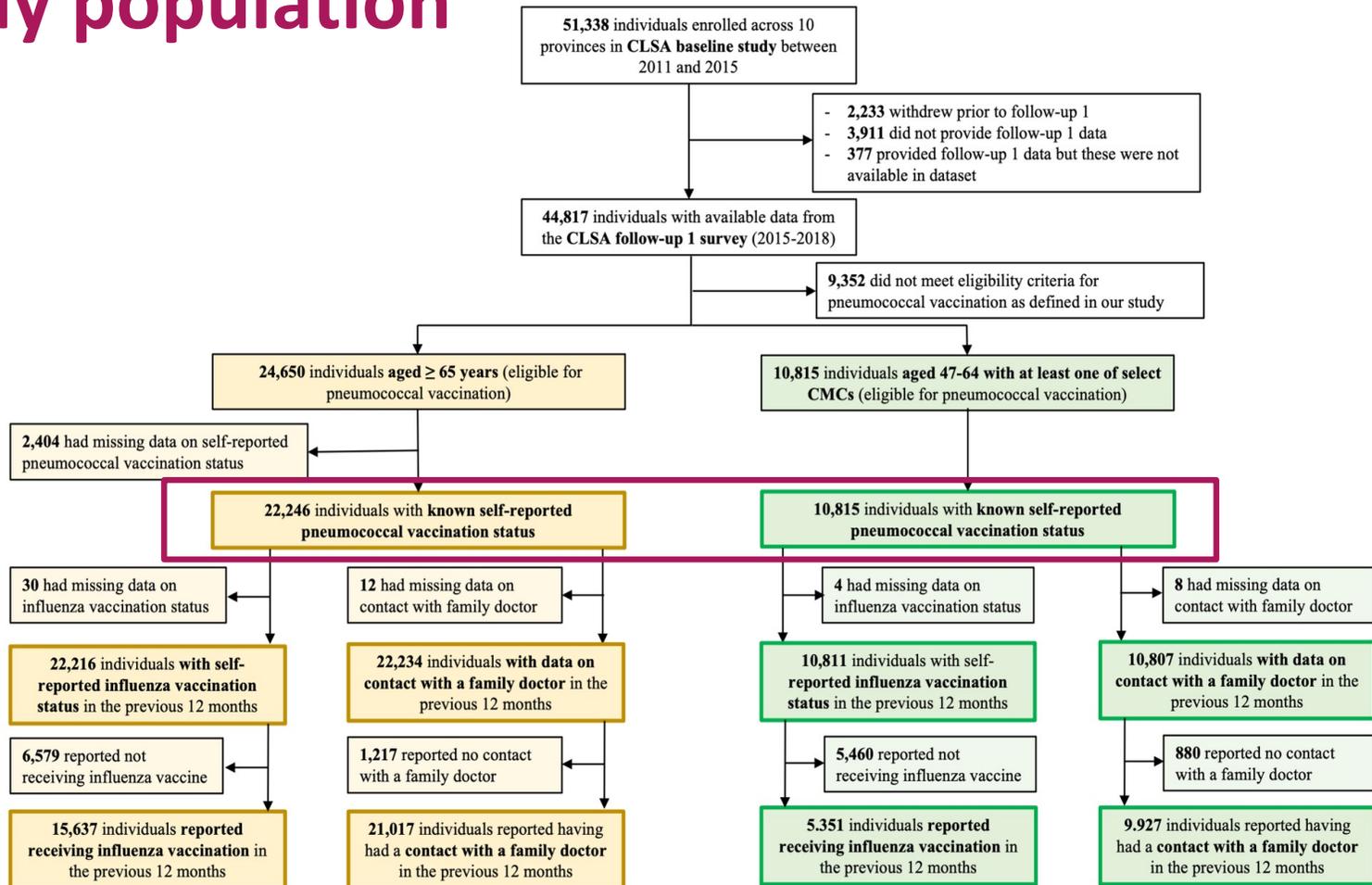
- (1) Estimate self-reported pneumococcal vaccine **uptake and differences in uptake** among Canadian adults eligible to be vaccinated
 - adults aged ≥ 65
 - adults aged <65 with at least one underlying medical condition
- (2) Identify **factors associated** with pneumococcal non-vaccination
- (3) Assess the frequency and determinants of **missed opportunities** for vaccination

Data source

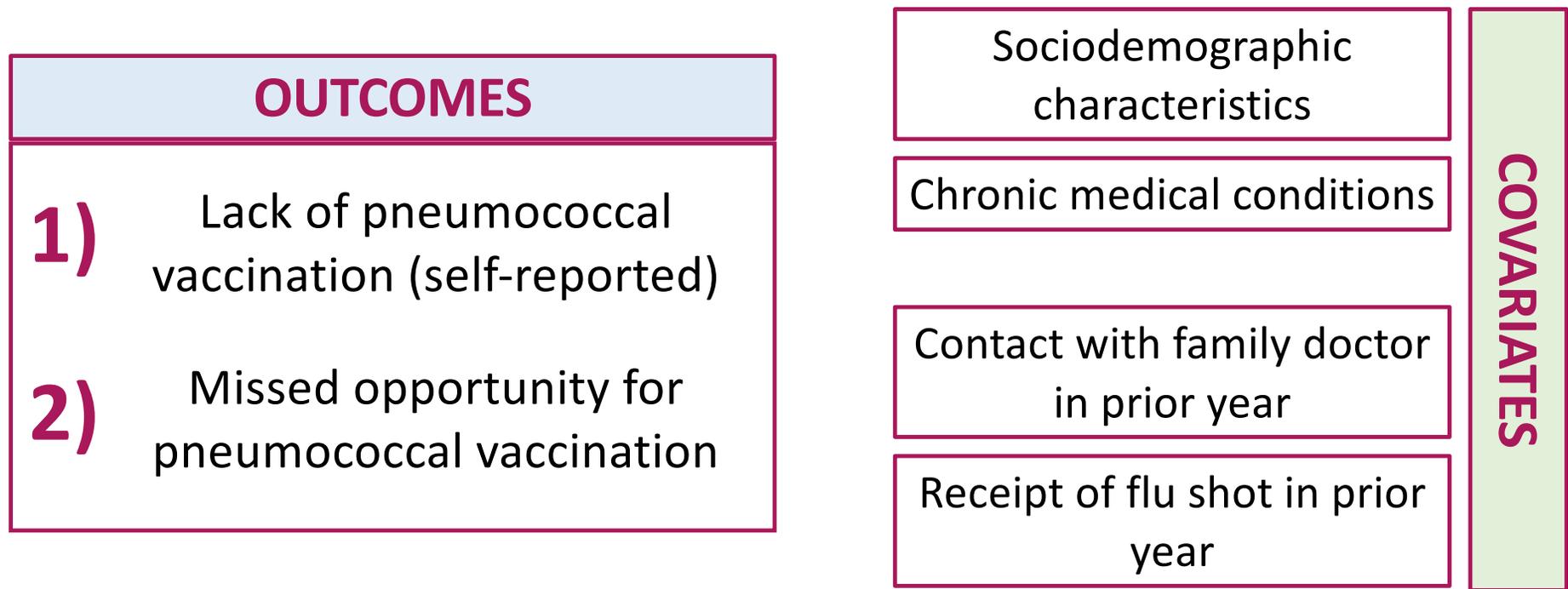


<https://www.clsa-elcv.ca>

Our study population



Variables in brief



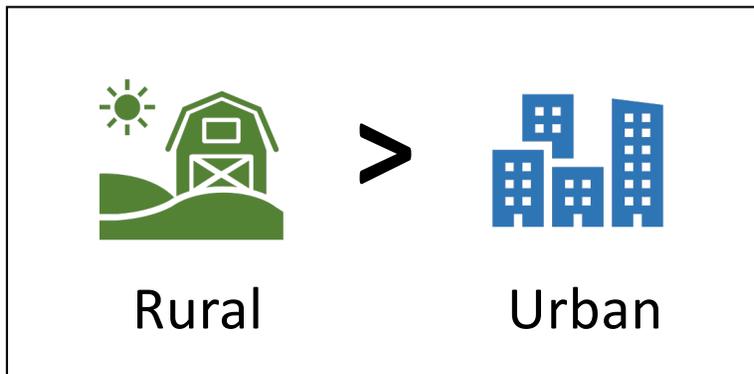
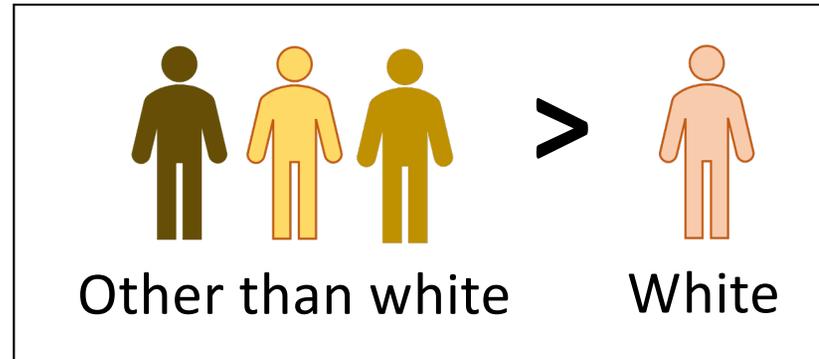
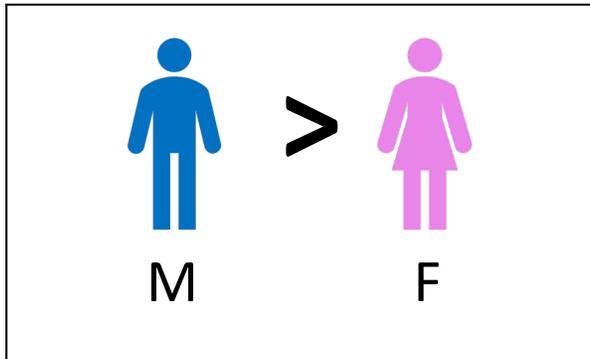
Analysis

- Separate analyses for
 - 1) adults aged 65+
 - 2) adults aged 47-64 with chronic conditions
- Descriptive analysis of (self-reported) pneumococcal vaccine uptake across subgroups defined by covariates of interest
- Multivariable logistic regression for associations between lack of pneumococcal vaccination and a range of covariates
- Evaluation of missed opportunities for vaccination (more soon)

Pneumococcal vaccine uptake among adults aged 65+

54.2% reported having received a
pneumococcal vaccine

Who is more likely to be non-vaccinated among adults aged 65+?



NB, NL, NS, PEI > ON

Pneumococcal vaccine uptake in adults aged 65+ increases with...

- age
- income
- residence in MB, SK, QC...
- having at least 1 chronic condition
- receipt of influenza vaccine in past 12 months
- contact with family doctor in past 12 months

Pneumococcal vaccine uptake among adults aged 47-64 with one or more chronic conditions

18.7% reported having received a
pneumococcal vaccine

Who is more likely to be non-vaccinated among adults aged 47-64?

People with higher income



Those residing in NL



Pneumococcal vaccine uptake in adults aged 47-64 increases with...

- age
- receipt of influenza vaccine in past 12 months
- contact with family doctor in past 12 months

Lots of **missed opportunities** for vaccination



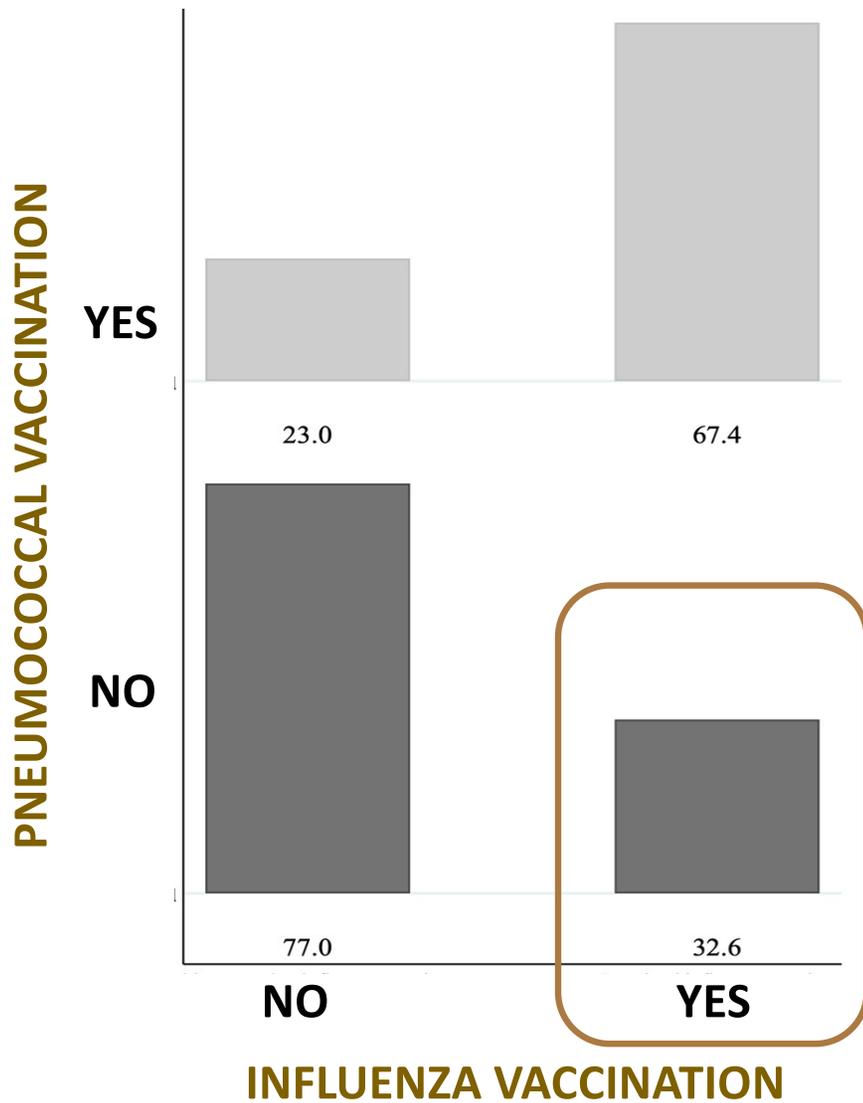
”Any contact with health services by an individual (child or person of any age) who is eligible for vaccination (e.g. unvaccinated or partially vaccinated and free of contraindications to vaccination), which **does not result** in the person receiving one or more of the vaccine doses for which he or she is eligible.” (*WHO definition*)

Lots of **missed opportunities** for vaccination

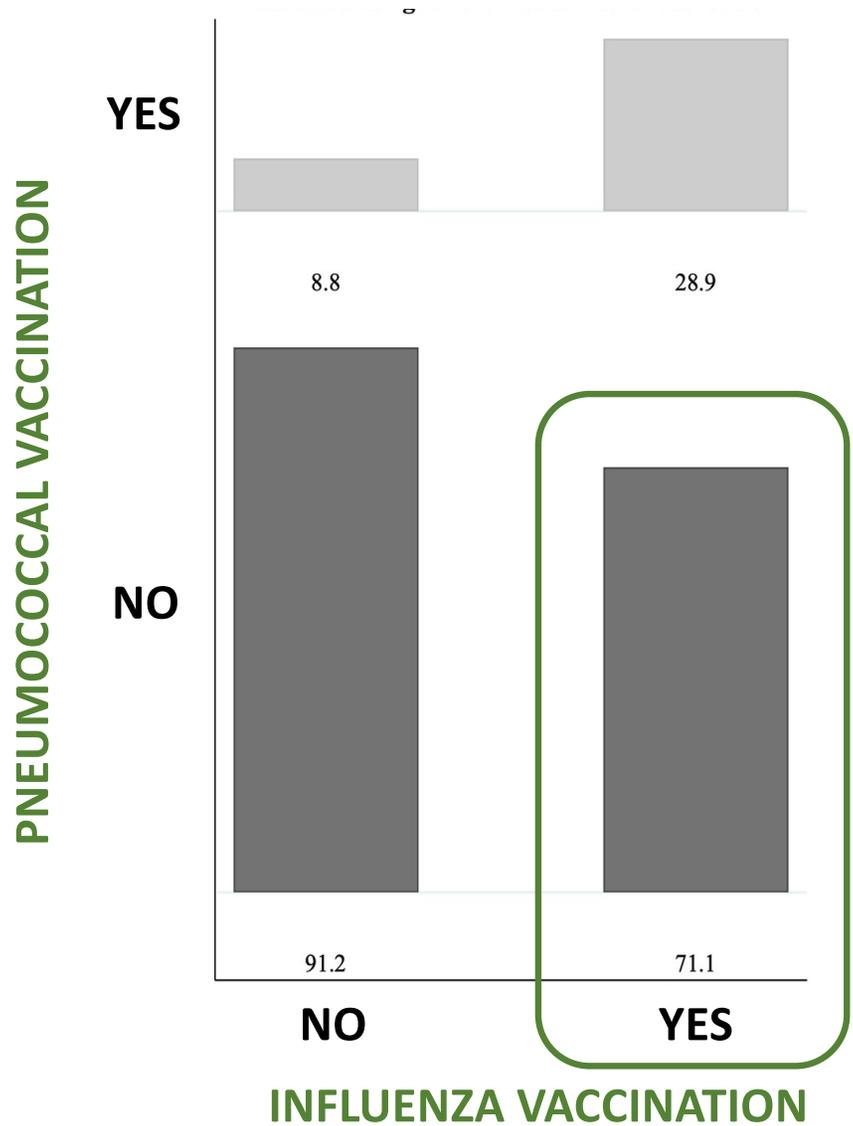
2 TYPES OF MISSED OPPORTUNITY CONSIDERED:

- Receipt of influenza vaccine
- Contact with family doctors

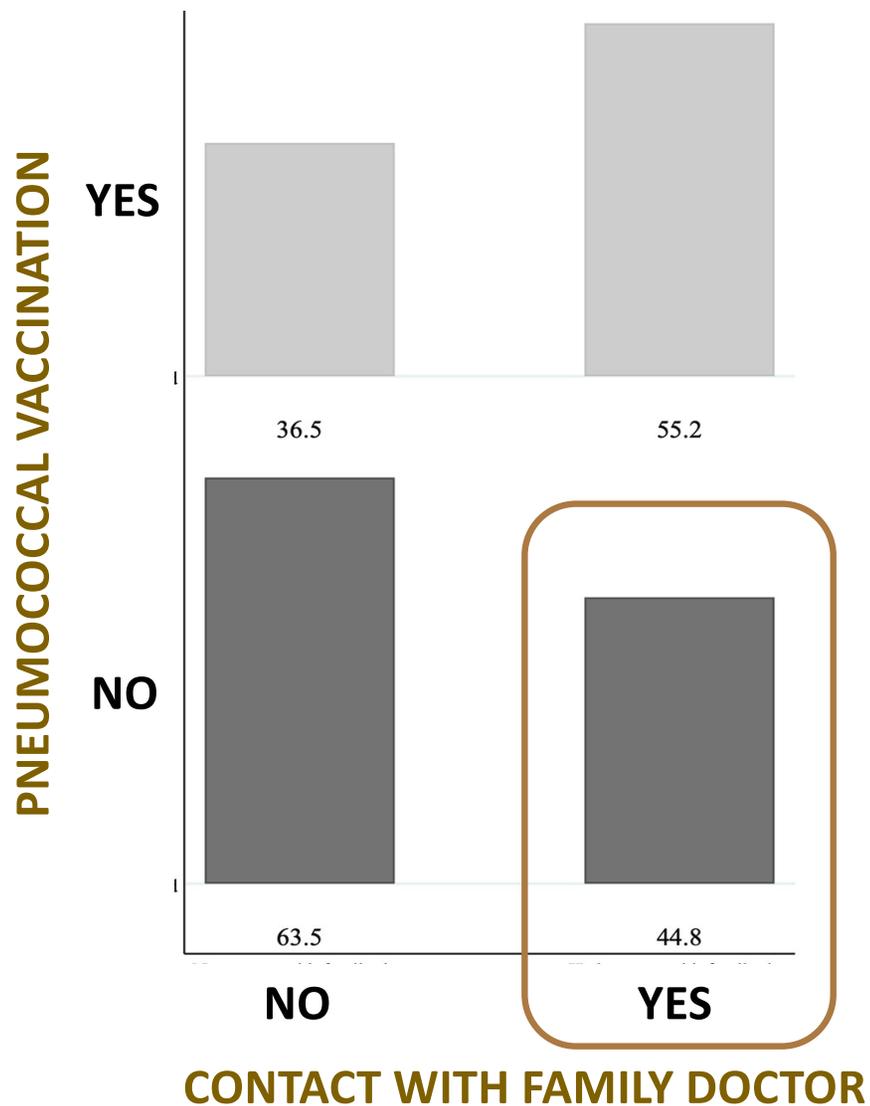
Males (vs. females) and **residents of Atlantic provinces** (vs. ON) more likely to miss an opportunity for pneumococcal vaccination



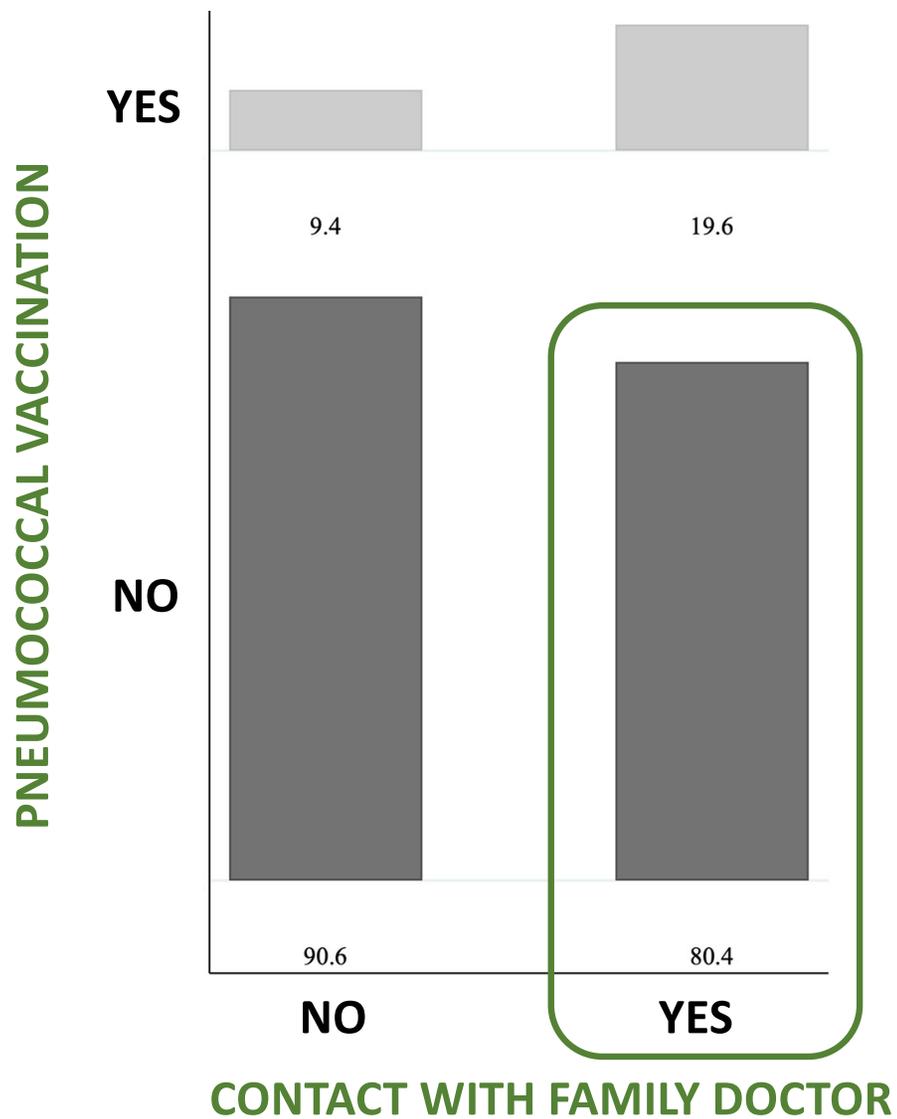
Missed opportunity in >32% of adults aged 65+ who received an influenza vaccine in the previous 12 months



Missed opportunity in >70% of adults aged 47-64 with chronic conditions who received an influenza vaccine in the previous 12 months



Missed opportunity in ~45% of adults aged 65+ who had contact with a family doctor in the previous 12 months



Missed opportunity in >80% of adults aged 47-64 with chronic conditions who had contact with a family doctor in the previous 12 months

Strengths

- Largest cohort of adults in Canada
- Participants from 10 provinces
- Provides excellent estimate of vaccine uptake among various subgroups

Limitations

- Data collected pre-pandemic
- Cross-sectional data → no time trends
- Self-reported vaccination status
- No data on reasons for getting or not getting vaccinated

Main take-aways

- Pneumococcal vaccine **uptake** remains below expectations among at-risk adults in Canada
- **Awareness** about pneumococcal vaccines likely low among high-risk groups
- Substantial heterogeneity in pneumococcal vaccine uptake among Canadian provinces → differences in vaccination **programs**
- Efforts needed to reduce **missed opportunities** for vaccination

Study team

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CLSA Datasets:

- CLSA Baseline Data Version 3.7 (tracking cohort) and 6.0 (comprehensive cohort)
- CLSA follow up 1 Data Version 2.2 (tracking cohort) and 3.0 (comprehensive cohort)

Funding sources:

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Summary: Patterns of Vaccine Uptake

- The CLSA has provided **significant insight** into detailed patterns of vaccine uptake among Canadian adults from 2015-2018 (Follow-up 1)
- The **comprehensiveness** of the CLSA data allowed us to go beyond routine national vaccination coverage surveys and investigate multiple factors simultaneously to better understand who is missing out on flu and pneumo vaccine uptake among Canadian adults



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Summary: Caregivers/recipients and Missed Opportunities

- We took the opportunity to focus on two understudied groups who would benefit significantly from flu vaccination: caregivers & care recipients
- We also assessed missed opportunities for pneumo vaccination
- Both of these aspects of our analyses plus the descriptive results provided greater insight into who may benefit most from interventions to improve uptake



Next Steps

- Continue to learn from the CLSA by assessing Influenza, pneumococcal, and shingles uptake using Follow-up 2 (FU2) data
- Compare changes over time and refine hypotheses about factors associated with non-vaccination
- Use the evidence from our CLSA analyses to design and then evaluate the impact of targeted interventions intended to improve uptake among those with low vaccination rates who may benefit most
- Build on the evidence from our CLSA analyses to better understand reasons for low vaccine uptake and to identify barriers to vaccination in future studies



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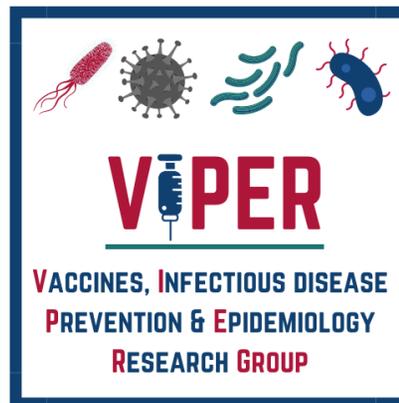
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Thank you!

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Everyone who has made the CLSA a success including PIs, Study Coordinators, Study Staff, Data Curators, Analysts, and Support Staff.

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**The VIPER Group aims to advance our understanding of infectious disease epidemiology, to prevent and control the spread of disease, and to promote health and well-being worldwide.
PI: Nicole Basta, PhD MPhil**



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