Understanding Current Immunization Funding, Decision-making, and Gaps in Vaccine Access and Coverage in Canada

Final Report

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This report identified gaps in funding and decision-making, access, and coverage for routine vaccines in Canada

### Funding and Decision-Making
- Routine vaccine procurement accounted for \(0.15-0.21\%\) ($302-426 million) of total public sector health spending between 2017-2021 ($171-241 billion)
- Stakeholders believe that routine vaccines are currently insufficiently funded and not prioritized
- Current immunization-related decision-making mechanisms are complex, involving multiple levels of government and other stakeholders
- Fundings required for functional immunization programs at the provincial/territorial-level are managed by different units and divisions

### Gaps in Vaccine Access
- A non-exhaustive number of vaccines were selected as case studies based on the existence of key quantifiable gaps in access
  - An estimated 14 million doses of RZV, Tdap vaccine, and Pneu-C-13 vaccine may be required to bridge current gaps in access for existing patients for the above 3 case study vaccines
  - To provide universal access to influenza vaccine across Canada, an additional 1.4 million doses are required annually
  - Additional investments may be required to ensure equitable access to existing and pipeline vaccines, such as RSV

### Gaps in Vaccine Coverage
- Current coverage for influenza, adult, and childhood vaccines are below the Vaccination Coverage Goals set out by the National Immunization Strategy
- Current access channels, such as pharmacies, are underutilized
- The lack of an automated and harmonized way to report uptake has resulted in challenges in estimating coverage rates
- Learnings and innovations from the COVID-19 pandemic response can be leveraged to bridge gaps in coverage

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent; RSV: Respiratory syncytial virus
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This project aimed to better understand current investments in immunization, gaps in vaccine access and gaps in vaccine coverage.

1. Estimate the current investments in public immunization programs. Understand the key decision-making and funding mechanisms for immunization programs.

2. Define the gaps in Canada related to public vaccine access. Estimate the incremental doses/cost of vaccines needed to bridge the gaps in access.

3. Identify issues and gaps in vaccine coverage, and summarize learnings from COVID-19 pandemic response.
IQVIA combined secondary and stakeholder research to develop a holistic understanding of the immunization landscape in Canada.

Secondary Research

- IQVIA leveraged internal datasets and open-source data from national, regional and local regulatory authorities, financial reports and other publicly available information to answer key research questions.

Stakeholder Research

- IQVIA leveraged stakeholder interview to fill in any gaps in knowledge from secondary research.
- Inputs from stakeholders are presented in aggregate or anonymous form to maintain stakeholder confidentiality.

Methodology

- Virtual 1:1 interviews
- Length of Interview: 45-60 minutes
- Stakeholders: 5
- Methodology: Public health, immunization, and policy experts with expertise at federal (1) and provincial (1 AB, 2 ON, 1 QC) levels
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Only 0.15% of total public sector health spending were on routine vaccine procurement ($333M) in 2020

Total Public Sector Health Spending, 2020
($226 Billion)
Including all health-related expenditures, such as hospital spendings, physicians, public drugs plans, public health, etc.

Public Health Spending ($16 Billion, 7% of public sector health spending)
Funds expenditures including food and drug safety, health inspection, health promotion, mental health, disease prevention (including immunization)

COVID-19 Response Fund ($31 Billion, 14% of public sector health spending)
Funds all expenditures for health related activities, including vaccine and programs in response to the COVID-19 pandemic

Vaccine Procurement
($333 Million, 0.15% of public sector health spending)
Public funding dedicated for routine vaccine procurement, and distribution to local government hubs

Sources:
1. National Health Expenditure Database, 2021, Canadian Institute for Health Information.
Routine vaccine procurement spending consistently accounted for a small fraction of total public sector health spending between 2017-2021

Public Sector Health Care Expenditure (National)¹

- Total public sector healthcare spending in Canada is estimated to hit a new high of $241 billion in 2021
- In 2020, total public sector health spending surged by ~20% as a result of COVID-19 pandemic response fund. Prior to pandemic, annual growth in total health care spending was around 4%.
- Routine vaccine procurement spending consistently accounted for only 0.15-0.21% of the total health spending between 2017-2021

Note:
* Actual expenditure for 2017-2020 and forecasted spending for 2021. Actual health expenditures for 2021 will be available in fall 2023

Public Health Spending includes expenditures for items such as food and drug safety, health inspections, health promotion activities, community mental health programs, public health nursing, measures to prevent the spread of communicable disease and occupational health to promote and enhance health and safety at the workplace.

COVID-19 Response Funding includes government-budgeted funding for health-related activities as a time-limited emergency response to the COVID-19 pandemic. Due to the uncertainties brought about by the pandemic, forecasts may experience larger variance than usual when they become actual figures.

Source: 1. National Health Expenditure Database, 2021, Canadian Institute for Health Information.
Routine vaccine procurement spending experienced incremental increases until 2019, COVID-19 pandemic disrupted this trend in 2020

Estimated National Vaccine Procurement Spending (Excluding COVID-19 Vaccines)\(^1\)

<table>
<thead>
<tr>
<th>Year</th>
<th>Procurement Spending ($ Million)</th>
<th>Dollar spent by contract average</th>
<th>Year-over-year growth in procurement spending</th>
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</thead>
<tbody>
<tr>
<td>2015</td>
<td>300.0</td>
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<tr>
<td>2016</td>
<td>335.0</td>
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<td>2017</td>
<td>322.8</td>
<td>6.6%</td>
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<tr>
<td>2018</td>
<td>363.7</td>
<td>12.7%</td>
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<tr>
<td>2019</td>
<td>398.6</td>
<td>9.6%</td>
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<tr>
<td>2020</td>
<td>333.7</td>
<td>-16.3%</td>
<td></td>
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<tr>
<td>2021</td>
<td>426.1</td>
<td>27.7%</td>
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</tbody>
</table>

Note:
- For contracts spanning multiple years, average value of total contract is used for calculation.
- Estimations may be within a -10%/+20% deviation from actual spend.
- Tender notices and contract history for known vaccine or referenceable solicitation number are used in estimation.
- Estimate does not include procurement from Centre d’acquisition gouvernementales (CAG) which procures vaccines for Quebec only.

Sources:

Abbreviations: CIC: Canadian Immunization Conference; PSPC: Public Services Procurement Canada.

• Vaccine procurement spending experienced consistent year-over-year increase between 2015-2019.
• Vaccine procurement appeared to have a dip in 2020, which was likely a result of the disruption caused by the COVID-19 pandemic.
Vaccine procurement remained relatively stable until 2019, when the COVID-19 pandemic led to a significant reduction in vaccine procurement in 2021-22.

**Estimated Doses of Vaccine Procured**

(Excluding Influenza and COVID-19 Vaccines)

- Excluding flu and COVID-19 vaccines, the total doses of routine vaccines procured has remained relatively stable between 2015-2019.
- There was a dip in procured doses in 2020, which was likely a result of the disruption caused by the COVID-19 pandemic.

**Notes:**
- Public Services and Procurement Canada (PSPC) data estimated are based on listed dose information on available tender notices.
- For contracts spanning multiple years, it is assumed that same dose of vaccines are purchased for each year.
- For tender notices that are missing dose information, contracts for the same vaccines for a different year are used.
- Tender notices and contract history for known vaccine or referenceable solicitation number are used in estimation.

**Sources:**
Vaccine procurement spending was a small fraction of total public sector health spending.

**Section Summary**

1. **Public Sector Health Spending**
   Public health spending accounted for 7% of total public sector health spending in 2020.

2. **Vaccine Procurement Spending**
   Vaccines procured through Public Services and Procurement Canada (PSPC), excluding COVID-19, accounted for **0.15-0.21% of total public sector health spending between 2017-2021**.

3. **Doses of vaccines procured**
   An estimated **7-11 million doses of vaccines**, excluding COVID-19 and influenza vaccines, were procured annually between 2015-2021.
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      » Vaccine funding mechanism
      » Expert opinions on vaccine funding and decision making
  • Gaps in vaccine access
  • Gaps in vaccine coverage
+ Summary of Findings and Gaps
Vaccine decision-making requires coordinated involvement of stakeholders at federal, provincial and municipal levels

- **Health Canada**
  - Authorizes vaccine use in Canada via Notice of Compliance

- **Public Health Agency of Canada (PHAC)**
  - Oversees vaccine surveillance and reporting across Canada
  - Funds initiatives that increase vaccine uptake

- **National Advisory Committee on Immunization (NACI)**
  - Recommends vaccine use in Canada
  - Evaluates vaccine safety, immunogenicity, and efficacy

- **Provincial/Territorial Ministry of Health**
  - Decides whether and for which populations vaccines should be funded under immunization programs for its province/territory
  - Funds the procurement, distribution, and administration of vaccines under immunization programs within its province/territory
  - Negotiates pricing and procures routine vaccines from suppliers for all participating provinces/territories

- **Public Works Procurement Services (PSPC)**
  - Funds the procurement, distribution, and administration of vaccines under immunization programs within its province/territory

- **Public Health Units**
  - Administer vaccines and coordinate immunization campaigns
Decision-making for public immunization programs is highly complex, involving multiple levels of government, organizations and advisory bodies.

- **National**
  - Health Canada (Biologic Radiopharmaceutical Drugs Directorate)
- **Provincial**
  - Public Health Agency of Canada (PHAC)
- **Local/Community**
  - Public Service & Procurement Canada (PSPC)
  - Vaccine suppliers
  - Vaccine Program
  - Vaccine Administration
  - Vaccine Decision-making Processes

- **Decision Makers**
  - Federal
  - Provincial/Territorial
  - Local/Community
  - Non-government
  - Advisory body

- **BRDD authorizes vaccine use in Canada**
- **Public Health Agency of Canada (PHAC)**
  - Scientific advisory body that recommends vaccine use
  - National Advisory Committee on Immunization (NACI)
  - Canadian Immunization Research Network (CIRN)
  - Research contributes to NACI decision-making
  - Canadian Immunization committee (CIC)
  - F/P/T committee that reviews & recommends vaccine programs

- **Vaccine Program**
  - Vaccine Supply Working Group (VSWG)
  - VSWG oversees vaccine procurement and negotiation process

- **Procurement & Distribution**
  - Vaccine Supply Working Group (VSWG)
  - PSPC negotiates vaccine contracts on behalf of P/T MOH

- **Centre d’acquisitions Gouvernementales (CAG)**
  - Quebec purchases some vaccines via provincial procurement services

- **P/T Ministry of Health (MOH)**
  - Decides on adding vaccines into P/T vaccine programs and which vaccines to procure
  - Works with MoH to perform review and localized recommendations for vaccine use within P/T (e.g., policies and programs)

- **Vaccines programs may also be delivered through other HCPs (i.e., Physicians, Pharmacists)**

- **PHUs decides on some local immunization programs and budget allocation**

- **Public Health Units (PHUs)**

- **Other Healthcare Professionals (HCPs)**
While the Federal government provides overall health care funding, funding for immunization programs is managed at the provincial/territorial level.

**FUNDING SOURCES**

- **Federal Government**
- **Provincial/Territorial (P/T) Government**

**FUNDING DESTINATIONS**

1. **PSPC pays vaccine suppliers for doses and shipment to government hubs**
2. **MOH pays for vaccines and shipment to P/T hub locations**
3. **MOH pays for vaccine distribution from hub to local public health units**
4. **PHUs supports administration & immunization campaigns through MoH funding**
5. **Vaccine Procurement through PSPC**
6. **Vaccine Distribution to P/T Hubs**
7. **Vaccine Distribution to Local Public Health Units**
8. **Vaccine Awareness and Administration**

**Sources of Funding**

- **Federal**
- **Provincial/Territorial**

**Public Health Agency of Canada (PHAC)**

**Public Health Units (PHUs)**

Immunization Partnership Funds from the Federal government support vaccine awareness & uptake
COVID-19 vaccine procurement was funded and managed at the Federal level by Public Health Agency of Canada

FUNDING SOURCES

Federal Government

Provincial/Territorial (P/T) Government

P/T Ministry of Health (MOH)

Public Health Agency of Canada (PHAC)

FUNDING DESTINATIONS

Vaccine Procurement through PSPC

Vaccine Distribution to P/T Hubs

Vaccine Distribution to Local Public Health Units

Vaccine Awareness and Administration

PSPC pays for doses and shipment to government hubs

PSPC pays COVID-19 Vaccine distribution through Response Fund

Public Health Units (PHUs)

PHUs supports administration & immunization campaigns through MoH funding

MOH pays for vaccine distribution from hub to local public health units

MOH pays for vaccines and shipment to P/T hub locations

PHAC coordinates COVID vaccine procurement

Federal government purchases vaccines for targeted populations and those not under P/T provision

Immunization Partnership Funds from the Federal government support vaccine awareness & uptake

Sources of Funding:
- Federal
- Provincial/Territorial
- COVID-19 vaccine procurement

PSPC: Public Services Procurement Canada

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Provincial fundings for immunization programs are fragmented and funding allocations are not always reported

**Vaccine Procurement Funding**  
(The only dedicated immunization funding)

The budget for vaccine procurement is managed by the immunization policy and program unit under health protection and surveillance policy and programs branch in the Ministry of Health.

**Communications Funding**

Ministry of Health’s communication division manages ministry media, digital communications, which also includes vaccine market research, surveillance, and reporting.

- While the Minister of Health owns all of the immunization budget, it’s unclear how fundings for each piece of functional immunization programs are allocated.
- Immunization fundings are also rarely reported, with only reported in 3 of the 13 provinces/territories (AB, SK, MB) reporting in financial statements/annual reports.

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“... let's say Public Health Ontario makes a recommendation that shingles should be funded. This goes up to somewhere in the Ministry of Health and somewhere in finance where a decision is made to whether or not to put money to it. That's the part that is really more opaque. I'm sure it's probably different for every province, but it's there that the final funding decision or lack thereof, is made at the provincial territorial level.”

- Public Health and Immunization Expert

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Political and financial considerations may also influence vaccine funding and decision-making at the provincial level.

Political factors may influence vaccine funding and programing decisions.

While the Minister of Health makes immunization funding decisions, these decisions may be susceptible to political and financial influences.

Ministry of Finance may have input on the budgetary impact of adding new vaccine programs and expanding existing ones.

Vaccine Funding and Programing Decisions
Stakeholders interviewed believe immunization programs receive insufficient funding, not regarded as a priority, and lack formalized, transparent process.

**Insufficient funding allocated to immunization**
- Budgets for vaccines are low, and not sufficient to allow highly effective and cost-effective vaccines to be funded.

  “… I think a big reason vaccines, especially some of the newer ones, aren’t covered, despite NACI recommendations around effectiveness and cost effectiveness, is that the budget impact is seen as relatively high. Because the budget envelope for vaccines is quite low.”
  - Public health and immunization expert

  “… you’re just leaving almost a whole therapeutic class at the doorstep. And I think that’s a problem that will only get worse because there’s just a lot of stuff coming down the pipelines in the vaccine world …”
  - Public health and immunization expert

**Vaccines are not regarded as a priority**
- Despite the high effectiveness and cost-effectiveness, vaccines do not receive the same attention as some other medications.
- Vaccines are not seen as a priority for funding.

  “… as new vaccines that are very effective and cost effective come to the table, they’re often not going to be funded. Whereas if there was a new cost-effective cancer drug that emerged, I think it will almost automatically get funded.”
  - Public health and immunization expert

  “… The decision to expand HPV vaccines to boys were always on the table for years, we always had them on the pipeline … we just never acted on it.”
  - Immunization policy expert

**A lack of a formalized, transparent funding process**
- Current system lacks a structured pathway for newly approved vaccines to be publicly funded.
- Funding decisions for vaccines are often made on an ad-hoc basis.

Sources:
1. CADTH, Financial Statement of Canadian Agency for Drugs and Technologies in Health Year ended March 31, 2022.
Immunization-related fundings are low, decision-making mechanisms are complex, and fundings for immunization at P/T level are fragmented

Section Summary

1. Vaccines are currently under funded
   - Interviewed stakeholders believe that immunization programs are underfunded due to insufficient funding allocation, lack of prioritization, and a lack of formal, transparent funding process.

2. Current immunization-related decision mechanisms are complex
   - Multiple levels of governments, with different advisory bodies, are involved in making immunization-related decisions.
   - Immunization-related decisions may be susceptible to political and budgetary influences.

3. Different pieces of the immunization budgets are owned by different divisions within the government
   - Different pieces of funding required for functional immunization programs are managed by different divisions & units within the provincial government, highlighting the complexity and fragmentation in immunization funding.
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      » Gaps in access for Selected Vaccines
      » Estimation of incremental doses and funding required to bridge the gap
      » Estimation on doses needed for pipeline vaccines, such as RSV
  • Gaps in vaccine coverage

+ Summary of Findings and Gaps
Several vaccines were selected as case studies based on out-of-pocket spending, existing gaps in access, and quantifiability of these gaps.

While there are multiple vaccines with gaps in access (i.e., current immunization programs do not cover all populations recommended by the Canadian Immunization Guide), a sample of 4 vaccines were selected as case studies based on the 3 criteria below:

- High out-of-pocket spending (IQVIA LRx)*
- Existence of major gaps in access
- Gaps in access among target populations are quantifiable**

Vaccines selected as case studies based on selection criteria***:
- Influenza vaccine
- Recombinant zoster vaccine (RZV)
- Tetanus, diphtheria, and pertussis vaccine (Tdap)
- Pneumococcal 13-valent conjugate vaccine (Pneu-C-13)

The list of vaccines selected as case studies is non-exhaustive. There are also access gaps for vaccines that are not included, such as Hepatitis B vaccines, human papillomavirus vaccines, and meningococcal vaccines. The gaps for these vaccines are difficult to quantify.

* Based on data from the IQVIA Longitudinal Prescription Data dataset (2017-2022)
** Quantifiable is defined as the target populations can be identified and quantified through sources in the literature or official Statistics and Census Data
*** Vaccine selected based on these 3 criteria is non-exhaustive
When compared to recommendations from the CIG, several gaps in access were identified for selected vaccines across all provinces and territories.

<table>
<thead>
<tr>
<th>Vaccine Type</th>
<th>Canadian Immunization Guide (CIG) Recommendation</th>
<th>AB</th>
<th>BC</th>
<th>MB</th>
<th>ON</th>
<th>QC</th>
<th>PE</th>
<th>NB</th>
<th>NL</th>
<th>NS</th>
<th>SK</th>
<th>YT</th>
<th>NT</th>
<th>NU</th>
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<tbody>
<tr>
<td>Influenza</td>
<td>• 6 months of age and older, 1 or 2 doses, Annually</td>
<td>A</td>
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<tr>
<td>Recombinant zoster vaccine (RZV)</td>
<td>• For adults ≥ 50 years of age; 2 doses</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td></td>
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<tr>
<td>Tetanus, diphtheria, and pertussis (Tdap)</td>
<td>Child: (Age, 2 year – 17 year)• DTaP-IPV/ Tdap-IPV: 1 dose at 4 – 6 year• Tdap: 1 dose (childhood booster) at 14-16 year</td>
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<td>Adult: (Age, 18 year and above)• Tdap: 1 adulthood dose and 1 dose every pregnancy• Td: 1 booster dose at every 10 years</td>
<td>G</td>
<td>H</td>
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<tr>
<td>Pneumococcal conjugate 13-valent (Pneu-C-13)</td>
<td>Healthy Child (Age 2 M- 17 Y) : 3-4 doses (at 2, 4, 12/15 m)• Child at risk of IPD: 4 doses (at 2, 4, 6, 12 m)• Adult (18Y+) at risk of IPD: 1 dose followed by Pneu-P-23</td>
<td>I</td>
<td>J</td>
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<thead>
<tr>
<th>Publicly funded for all individuals recommended by NACI</th>
<th>Publicly funded for selective individuals recommended by NACI</th>
<th>Publicly not funded</th>
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</table>

**Influenza**: A: Flu/QC: No universal coverage. Vaccine is not funded for individuals of age 24 m to 59 years except for some high-risk populations and pregnant women (2nd and 3rd trimester). Flu vaccine was universally funded for the 2022/23 season; Herpes Zoster: B: RZV/AB: Not covered except patient of age 18+ going to organ transplant; C: RZV/ON and YT: Only individual of age 65Y to 70 Y are covered in ON and only individual of age 65Y to 79 Y are covered in YT; D: RZV/PE: Only individual of age 60 Y and above are covered; Tdap: F: Tdap/QC: Td is covered at grade 9 instead of Tdap at 14-16 year; G: Tdap/BC: Adulthood dose is not publicly funded; H: Tdap/QC – Only 1 dose of Td at age 50 and Tdap for every pregnancy are covered; Pneu-C-13: I: Pneu-C-13/AB,NU,NT: Adult (18Y+) at risk of IPD are not covered; J: Pneu-C-13/QC: For children, Pneu-C-10 is covered at 2 and 4 month and Pneu-C-13 is covered at 12-month; K: Pneu-C-13/YT: Children and adult (18Y+) at risk of IPD are not covered.


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Gaps in Vaccine Access

Gaps indicate that there are various patient populations that do not have publicly-funded access to a vaccine that is recommended by the CIG

**Pneumococcal 13-valent conjugate vaccine (Pneu-C-13)**

- **Children** and adults at risk of invasive pneumococcal disease (IPD) are not offered an additional dose of Pneu-C-13 vaccine in Yukon.
- Alberta, Nunavut, and the Northwest Territories do not offer this vaccine for adults at risk of IPD.

**Influenza Vaccine**

Outside of some high-risk populations, influenza vaccine is not publicly-funded in Quebec for healthy individuals between 23 months and 59 years of age, as recommended by the CIG.

**Recombinant Zoster Vaccine (RZV)**

The CIG recommends RZV for all adults age ≥ 50. However, 9 out of 13 P/T offer no coverage for this vaccine.

- Alberta only offers RZV to adult organ transplant recipients. Ontario, Yukon, and PEI only offer RZV for specific age segments.

**Tetanus, diphtheria, and pertussis vaccine (Tdap)**

- One dose of Tdap vaccine for adults is not publicly funded in British Columbia or Quebec.
- Quebec provides 1 dose of Td rather than Tdap, as recommended by the CIG, for grade 9 students.


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The size of patient groups that have a gap in access and the count of doses required for these groups were estimated for the case study vaccines.

**Influenza (Annual Vaccine)**
- Provide universal coverage across Canada annually

**RZV**
- Provide 2 doses for adults ages ≥ 50

**Tdap**
- Provide 1 booster dose per adult lifetime and 1 booster dose to children ages 14-16 across Canada

**Pneu-C-13**
- Provide 1 extra dose for children & adults who are at risk of invasive pneumococcal disease

Population estimates from Statistics Canada\(^1\) were used to estimate the population size of recommended age groups.

- Age groups that are already eligible to receive the vaccine were excluded
- 24% of individuals were estimated as already eligible due to an underlying health condition, and were excluded\(^2\)

When available, current vaccination coverage estimates among patients with an access gap were used to exclude those who have already received the vaccine. If a suitable estimate was not available, it was assumed no patients with the access gap had received the vaccine. For estimates of doses required for newly eligible patients, existing coverage among these patients is not accounted for.

Vaccination coverage estimates for a publicly funded population were used to estimate vaccine uptake after implementation of a public program. When vaccine-specific estimates were not available, the vaccination coverage rate for a publicly-funded vaccine in a similar age group was used as an analogue to estimate uptake. For RZV, second dose compliance was factored into dose estimates.

Estimated number of doses required to address access gaps for existing individuals and newly eligible individuals for RZV, Tdap vaccine, and Pneu-C-13 vaccine, and for existing individuals annually for influenza vaccine (See Appendix for details)

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent.
Approximately 1.4 million additional doses of influenza vaccine may be required yearly in order to fulfill the access gap.

An estimated ~1.4 Million additional doses of influenza vaccine may be required each year to provide universal coverage across Canada based on estimated uptake.
An estimated incremental investment of ~$15.7 million may be required yearly to provide universal coverage across Canada against influenza.

This represents an estimated incremental investment of ~$15.7 Million based on retail vaccine prices*

(estimate accounts for the incremental investment for influenza vaccine only, and does not account for other vaccines with access gaps that were not included as case studies)

*Estimates are calculated using list prices from IQVIA DeltaPA.
Roughly 14 million doses in total of RZV, Tdap vaccine, and Pneu-C-13 vaccine may be needed for existing individuals to fulfill the access gap.

An estimated ~14 Million doses in total may be required over time for existing recommended patient groups to fulfill the access gap for these 3 case study vaccines based on estimated uptake.

- **RZV**: Provide 2 doses for adults ages ≥50
- **Pneu-C-13**: Provide 1 dose for adults who are at risk of invasive pneumococcal disease
- **Tdap**: Provide 1 booster dose per adult lifetime for adults

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent.

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An estimated investment of ~$1.4 billion in total may be required in order to procure the estimated doses of RZV, Tdap vaccine, and Pneu-C-13 vaccine.

This represents an estimated incremental investment of ~$1.4 Billion based on retail vaccine prices*.

(estimate accounts for the total incremental investment for RZV, Pneu-C-13 vaccine, and Tdap vaccine only, and does not account for other vaccines with access gaps that were not included as case studies)

*Estimates are calculated using list prices from IQVIA DeltaPA.

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent.
Each year, newly eligible patients require an estimated total of ~590,000 additional doses of RZV, Tdap vaccine, and Pneu-C-13 vaccine.

An estimated ~590,000 additional doses in total may be required over time to account for patients that are newly eligible each year to fulfill the access gap for these 3 case study vaccines based on estimated uptake.

- **RZV**: Provide 2 doses for adults ages ≥50
- **Pneu-C-13**: Provide 1 extra dose for children and adults who are at risk of invasive pneumococcal disease
- **Tdap**: Provide 1 booster dose per adult lifetime for adults and 1 booster dose for children ages 14-16 across Canada

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent
To procure the estimated doses needed for newly eligible patients each year, an incremental investment of roughly $63 million may be required. An estimated ~590,000 additional doses in total may be required over time to account for patients that are newly eligible each year to fulfill the access gap for these 3 case study vaccines based on estimated uptake. This represents an estimated incremental investment of ~$63.1 Million based on retail vaccine prices*.

*Estimates are calculated using list prices from IQVIA DeltaPA. Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent.
Excluding influenza virus, there are 119 candidates in the pipeline for infectious diseases. ~42% of these candidates are for diseases without existing vaccines¹

Vaccine Europe from 2022 also indicated 100 vaccine candidates from 15 member companies are in the pipeline. 46% of these candidates are for disease without existing vaccines²

Equitable access for promising and highly impactful pipeline candidates could require significant additional public funding

**Selected Pipeline Vaccine Candidates for Infectious Diseases without Existing Vaccine Programs¹**

- **Bacterial Infection (7)**
  - 3 (Anthrax, C. diff)
  - 1 (C. diff)

- **HIV Infection (8)**
  - 5

- **Viral Infection (9)**
  - 4 (RSV)
  - 3 (RSV, Norovirus, Herpes)
  - 2 (Norovirus, hMPV)

**Respiratory syncytial virus (RSV)**
- Older adults have been increasingly identified as being at high-risk for severe RSV infections³
- The costs attributable to lab-confirmed RSV cases have been estimated to $40,028 per case (CAD; 2020) over the year following an infection³

**Patient population potentially eligible for RSV vaccines (adults ≥50 years of age)⁴:**
15,028,683


Abbreviations: HIV: human immunodeficiency virus; hMPV: human metapneumovirus; RSV: Respiratory syncytial virus; S. Aureus: Staphylococcus aureus; B. Strep: Group B Streptococcus; C. diff: clostridioides difficile

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Additional fundings may be required to ensure equitable access for current and pipeline vaccines

Gaps in access were examined in detail for several case study vaccines including influenza vaccine, RZV, Tdap vaccine, and Pneu-C-13 vaccine

1. In order to provide universal access to influenza vaccine across Canada, an estimated ~1.4 million additional doses of influenza vaccine is required yearly, which translates to an incremental investment of $15.7 million

2. Fulfilling the gaps in access for RZV, Tdap vaccine, and Pneu-C-13 vaccine in existing patients is estimated to require roughly 14 million doses of vaccines over time which translates to an incremental investment of ~$1.4 billion based on retail vaccine prices

3. Each year, newly eligible individuals represent an estimated ~590,000 additional doses of RZV, Tdap vaccine, and Pneu-C-13 vaccine required over time to fulfill the gaps in access; based on retail prices, this represents an incremental investment of ~$63.1 million

Significant investments may be needed to ensure equitable access for pipeline vaccines

1. Excluding influenza, an estimated 119 vaccine candidates are in the pipeline for infectious disease, and nearly half are for diseases without vaccines

2. An estimated 15 million Canadians could be eligible for the upcoming RSV vaccines

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent; RSV: Respiratory syncytial virus
## Agenda

+ Executive Summary

+ Objectives and Methodology

+ Research Findings
  - Vaccine funding and decision making
  - Gaps in vaccine access
  - **Gaps in vaccine coverage**
    › Gaps in coverage for influenza, adult and childhood vaccines
    › Vaccine surveillance and learnings from COVID-19 pandemic response

+ Summary of Findings and Gaps
Achieving high coverage rates for influenza, adult, and childhood vaccines is a key component of the National Immunization Strategy.

### National Immunization Strategy Vaccination Coverage Goals by 2025

#### Influenza
- Achieve 80% vaccination coverage among **adults 65 years of age or older**
- Achieve 80% coverage among **high-risk adults aged 18-64 years**

#### Adults
- Achieve 80% vaccination coverage of a **pneumococcal vaccine** among **adults 65 years of age or older**

#### Infants and Children
- Achieve a high vaccination coverage goal of 95% for all **childhood vaccines** by two and seven years of age

Source: 1. Canada.ca. Vaccination Coverage Goals and Vaccine Preventable Disease Reduction Targets by 2025
National vaccination coverage rates for the seasonal influenza vaccine in seniors have consistently been lower than the national coverage goal of 80%.

**National Seasonal Influenza Vaccination Coverage Rate Estimates from the Canadian Community Health Survey (%)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Individuals (Age 12+)</th>
<th>Seniors (Age 65+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>32.6</td>
<td>32.6</td>
</tr>
<tr>
<td>2018</td>
<td>31.5</td>
<td>31.5</td>
</tr>
<tr>
<td>2019</td>
<td>33.6</td>
<td>33.6</td>
</tr>
<tr>
<td>2020</td>
<td>39.0</td>
<td>61.1</td>
</tr>
</tbody>
</table>

Note: 2017-2020 data excludes territories. Estimates for the territories were not available.

1,047,194 incremental doses of influenza vaccines needed to be administered to achieve the national coverage goal in 2020.

Only 55% of seniors reported having received a pneumococcal vaccine in 2020, a rate that remains below the national coverage goal of 80%.

Access channels for vaccines recommended for use in high-risk adult, such as Pneu-P-23 and Pneu-C-13, are underutilized across Canada

<table>
<thead>
<tr>
<th>Channel</th>
<th>Number of Provinces that Provide Vaccine Access via Different Channels¹</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PNEU-P-23</strong></td>
<td></td>
</tr>
<tr>
<td>Doctors’ offices</td>
<td>12</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>5</td>
</tr>
<tr>
<td>Public health sites</td>
<td>11</td>
</tr>
<tr>
<td>Home and community care</td>
<td>13</td>
</tr>
<tr>
<td>Long-term care</td>
<td>10</td>
</tr>
<tr>
<td>Congregate care settings</td>
<td>5</td>
</tr>
<tr>
<td><strong>PNEU-C-13</strong></td>
<td></td>
</tr>
<tr>
<td>Doctors’ offices</td>
<td>7</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>1</td>
</tr>
<tr>
<td>Public health sites</td>
<td>8</td>
</tr>
<tr>
<td>Home and community care</td>
<td>12</td>
</tr>
<tr>
<td>Long-term care</td>
<td>1</td>
</tr>
<tr>
<td>Congregate care settings</td>
<td>12</td>
</tr>
</tbody>
</table>


Abbreviations: CIG: Canadian Immunization Guide; Pneumococcal polysaccharide 23-valent (Pneu-P-23); Pneu-C-13: Pneumococcal conjugate 13-valent

- Access to CIG recommends vaccines such as **Pneu-P-23 vaccine** (for all adults ≥ 65 years) and **Pneu-C-13 vaccine** are **restricted to specific channels**, and these channels differ amongst the provinces & territories

- While there is evidence to suggest that enabling access to vaccination at pharmacies can have a positive impact on vaccine uptake²-⁴, **5 provinces** do not provide **Pneu-P-23 vaccination** at pharmacies, and **7 provinces** do not provide **Pneu-C-13 vaccination** at pharmacies
Coverage rates for childhood vaccines have not met the national vaccination coverage goal of 95%.

Canadian Childhood Vaccination Coverage Rate Estimates (%) in Children Aged 2 Years

- Childhood vaccination was below national coverage rate goal of 95% for all vaccines.
- Coverage rates for DTaP and Hib have remained far below the national coverage rate goal.
- Coverage rates for most childhood vaccines largely remained at the same level from 2017 to 2019.

Notes:
1. Based on combining reports of vaccination from parents and guardians, health care providers, and provincial registries (MB and PEI only).
2. Coverage indicates four doses for NT, NV, and three doses for the other provinces and territories.
3. Coverage indicates two doses for 2-year-olds in provinces and territories that, as of March 1, 2017, provided publicly funded rotavirus vaccines: NL, PEI, QC, ON, MB, SK, AB, BC, NT, YK.
4. Survey results for 2021 will be available in early 2023.

The COVID-19 pandemic has impacted school-based immunization programs in most provinces/territories in Canada

**British Columbia**

Coverage Rates in Grade 6 Students: HPV²

- When compared to 2019 rates, HPV coverage in grade 6 students in 2020 decreased dramatically in all health authorities and health service delivery areas in BC.²
- These decreases reflect the redirection of public health resources from routine immunization programs to the COVID-19 pandemic response during the latter part of the school year.²

**Ontario**

Coverage Rates in 12-Year-Olds¹

- As a result of the COVID-19 pandemic, there has been limited public health unit capacity to deliver school-based immunization programs, as well as to enter and assess immunization records.¹
- Many grade 7 students in the 2019-20 cohort initiated but did not complete their school-based immunization series.¹

Sources: 1. Public Health Ontario. Immunization Coverage Report for School-Based Programs in Ontario: 2019-20 and 2020-21 School Years. 2. BC Centre for Disease Control. Grade 6 Coverage Results.

Abbreviation: human papillomavirus (HPV)
Overall, barriers to vaccination and underutilized access channels may prevent Canada from meeting its vaccination coverage goals

Major Barriers and challenges to Vaccination in Canada

Influenza
- Several major barriers to influenza vaccination exist, including personal beliefs and reluctance, misconception, and lack of awareness.2
- The COVID-19 pandemic has also resulted in limited appointment availability2

Adults
- Barriers such as lack of awareness, vaccine fatigue and hesitancy, financial barriers, and barriers related to COVID-19 may be impeding vaccination2,3
- Several access channels for vaccines, particularly for high-risk populations, are underutilized in many provinces5

Infants & Children
- Vaccine hesitancy and negative perceptions of childhood vaccines are common barriers to vaccination4
- Disruptions to school-based programs due to COVID-19 have had a significant impact on vaccination coverage6

Gaps in Vaccine Coverage in Canada

Recent coverage rates in seniors and high-risk populations are below national vaccination coverage goals

Recent coverage rates for pneumococcal vaccination in seniors are below the national vaccination coverage goal

Recent coverage rates for childhood vaccines are below the national vaccination coverage goal


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The lack of an automated and harmonized way to capture vaccination data makes it difficult to monitor and report vaccination coverage rates.

**Lack of Interconnected Systems**
- Jurisdictions currently use various immunization information systems or other processes to track immunization data.
- The variability in system infrastructure between jurisdictions makes creating interconnected systems a challenge.

**Varied Surveillance Methodologies**
- The data sources and methodology used for immunization coverage assessment vary by province and territory (P/T).
- The time frame between immunization administration and data capture by the system varies considerably between and even within individual P/Ts.

**Challenge in Data Capture**
- Reporting by non-public health providers (e.g., physicians) can be poor due to a lack of incentive to do so in many jurisdictions.

"We don't have a harmonized language... that's critical to interoperability" - Public health and immunization expert

"We don't have a pan-Canadian immunization registry. We rely on a survey... I suspect most people they call don't even know what vaccine they got..." - Public health and immunization expert

"It's just another thing to do... [other information systems are] burning out doctors already" - Public health and immunization expert

Applying lessons learned from the COVID-19 pandemic response can help to bridge gaps in vaccine coverage.

**Successes: What Worked Well**

**Communication and Coordination**
- Improved sharing of information and resources across jurisdictions strengthened the response

**Electronic Platforms for Booking Appointments**
- Leveraging digital tools to provide patients with simple and easy to navigate means of finding and booking appointments for immunizations

"I can find a vaccination appointment in 5 minutes and I’m going to have a place and time… *It’s very efficient. It’s working very well.*"
- Public health and immunization expert

**Opportunities: What Can We Do Better**

**Innovative Channels**
- Heavy reliance on a single access channel can put immunization programs at risk if that channel is disrupted

**Prevent Future Outbreaks**
- Disruptions to routine childhood immunization mean that there is an urgent need to implement improved monitoring and catch-up vaccination strategies for vulnerable populations

"Our pharmacies… they’re really only allowed to give flu and COVID in Ontario, but I view those as a *more convenient access point.*"
- Public health and immunization expert
Stakeholders interviewed agreed that addressing barriers, adopting innovative channels, and improving surveillance could improve coverage.

Barriers to vaccination

- Barriers to vaccination, such as hesitancy and misinformation, exist that may be impeding uptake

"Now with our healthcare crisis and [lack of] access to family doctors, there's trouble with even getting vaccines and knowing where to get them. There are innovations in pharmacy delivery of vaccines… I think that's the way of the future"  
- Public health and immunization expert

Lessons from COVID-19

- Innovative channels improved ease of access to the COVID-19 vaccine
- Leveraging digital tools to provide convenient vaccination appointment booking and tracking

"The other thing about… barriers is education [on] misinformation, and government's and industry's responsibility to engage with vaccine hesitancy groups a bit differently"  
- Immunization policy expert

"We don't have a pan-Canadian immunization registry. We rely on a survey… I suspect most people they call don't even know what vaccine they got, they just [say] that their kids got vaccinated, so they can't answer affirmatively or not to these surveys"  
- Public health and immunization expert

Vaccination Coverage

Vaccine Surveillance

- Survey-based measures for estimating coverage may be biased & inaccurate
- A national immunization registry may be the optimal method to measure coverage rates
Improving access channels, coverage reporting and translating learning from COVID-19 response could be important in achieving coverage goals

**Section Summary**

1. **Barriers to vaccination and underutilization of access channels may lead to suboptimal vaccination coverage**
   - Current coverage for influenza, adult and childhood vaccines are below the National Coverage Goals as set out by the National Immunization Strategy
   - Beyond barriers such as hesitancy and misinformation, the underutilization of readily-available access channels, such as pharmacies, contributed to suboptimal vaccination coverage

2. **The lack of an automated and harmonized way to report uptake makes it difficult to monitor and report coverage rates**
   - Variability in information system infrastructure and surveillance methodologies makes monitoring and reporting of coverage rates challenging

3. **Translate lessons learned from the COVID-19 pandemic response to routine immunization program could be instrumental to outbreak prevention**
   - Successful adoption of innovative access channels and the adoption of digital tools to promote immunization are examples of successes that can be embraced across all immunization programs to protect Canadians from emerging disease threats
Agenda

+ Executive Summary
+ Objectives and Methodology
+ Research Findings
  • Vaccine funding and decision making
  • Gaps in vaccine access
  • Gaps in vaccine coverage
+ Summary of Findings and Gaps
Current decision-making process is highly complex, and fundings for immunization are limited and fragmented

Vaccine Funding and Decision-making

1. Vaccines are currently underfunded
   - Vaccines are considered low priority
   - A lack of formal and transparent decision-making and funding process for immunization programs

2. Current immunization-related decision-making mechanisms are complex
   - Immunization-related decision-making currently involve multiple levels of government and stakeholders

3. Immunization fundings are complex and fragmented
   - Fundings required for functional immunization programs, including vaccine procurement, distribution, communications and operation of public health units, are managed by different divisions and units
There are gaps to access for existing vaccines and challenges with access for pipeline candidates that require additional investments

1. There are gaps to access for existing vaccines, as demonstrated in case studies for influenza, RZV, Tdap, and Pneu-C-13

2. Pipeline vaccines may also face challenges to access

- An estimated 14 million doses of RZV, Tdap, and Pneu-C-13 vaccines may be required to address access gaps for existing recommended patient groups outlined in the case study.
- Additional doses may be required to bridge the gaps in vaccines not included in the case study.
- Additional investments may be required to ensure that pipeline vaccines are funded so that Canadians are protected.

Abbreviations: RZV: Recombinant Zoster Vaccine; Tdap: Tetanus, diphtheria, and pertussis; Pneu-C-13: Pneumococcal conjugate 13-valent
Improving access channels, coverage reporting, and adopt innovations from COVID-19 response could be important in achieving coverage goals

Gaps in Vaccine Coverage

1. Barriers to vaccination and underutilization of access channels may lead to suboptimal vaccination coverage

   - Current coverage for influenza, adult and childhood vaccines are below the National Coverage Goals as set out by the National Immunization Strategy
   - A large number of provinces/territories currently do not fund several vaccines administered at pharmacies

2. The lack of an automated and harmonized way to report uptake led to challenges in reporting coverage rates

   - Variability in information system infrastructure and surveillance methodologies makes monitoring and reporting of coverage rates challenging

3. Translate lessons learned from the COVID-19 pandemic response for routine vaccinations could be instrumental to outbreak prevention

   - Innovations and tools used during the COVID-19 pandemic response could be translated to improve routine vaccination programs
Appendix
Incremental dose estimate “Annual”: Doses required to provide universal coverage against influenza across Canada annually

**Influenza**

- **Total population aged 2-59 years in QC:**
  - Total population: \( N = 6,089,752 \)

**Sources:**

**Description:**
- Total current population of recommended Canadians excluding age groups for whom the vaccine is already publicly funded
- Assumptions: Population growth beyond this immediate cohort is not accounted for

- **Total population: \( N = 4,628,212 \)**

**Assumptions:**
- 24% of the total population is estimated as being currently eligible as a result of an underlying health condition and are excluded

- **Total population: \( N = 1,393,092 \)**

**Sources:**
1. PHAC. *Seasonal Influenza Vaccination Coverage in Canada, 2021–2022.*

**Description:**
- Estimated national coverage rates for influenza vaccination in adults aged 18-64 years were used to estimate uptake
- Assumptions: 30.1% of the population will receive the influenza vaccine

- **Total doses: \( N = 1,393,092 \)**
Incremental dose estimate “Existing”: Doses required to provide 2 doses of RZV for adults currently aged ≥ 50 years

RZV

Total population aged ≥50 years in AB, BC, MB, QC, NB, NS, SK, NT, and NU: N = 9,175,781

Source: Statistics Canada. Table 17-10-0005-01, Population estimates on July 1st, by age and sex.

Description: Total current population of recommended Canadians excluding groups for whom the vaccine is already publicly funded.

Assumptions: Patients in Ontario aged 71-72 years and patients in Yukon aged 80-81 years are not included as the RZV program was already in place while they were within the eligible age range. Patients in Alberta aged ≥18 years that are organ transplant recipients are eligible to receive the RZV under the current vaccine schedule but are not excluded as the small population size is unlikely to affect the estimate.

Total population: N = 10,540,424


Description: The uptake of RZV in currently ineligible patients was estimated by correlating an estimated national coverage rate (27.4%) and the proportion of prescriptions filled for RZV outside of Ontario and Prince Edward Island (provinces where the vaccine is partially publicly funded).

Assumptions: 23% of the population has already received the RZV.

Total population aged 50-64 & ≥73 years in ON, 50-59 in PE, and 50-64 & ≥82 years in YT: N = 4,513,081

Total doses: N = 10,102,490

Source: PHAC. Vaccine uptake in Canadian adults 2021.

Description: Given there is no reliable estimate of the coverage rate of RZV in a population of patients for which the vaccine is publicly funded, the coverage rate for the Pneu-P-23 vaccine in adults aged ≥65 years was used to estimate uptake. The Pneu-P-23 vaccine is publicly funded across Canada in seniors and, as such, the national coverage rate was assumed to reflect the uptake of a publicly-funded vaccine in a (mostly) elderly population.

Assumptions: 54.8% of the population will receive the RZV.


Description: Second dose compliance of RZV was taken into consideration. An estimate from a Canadian study that examined second dose compliance at 12 months was used.

Assumptions: 74.9% of patients receiving the RZV will receive the entire series (i.e., 2 doses); 25.1% of patients receiving the RZV will not complete the series and receive a single dose.
Incremental dose estimate “Existing”: Doses required to provide 1 Tdap dose per adult lifetime for adults currently aged ≥ 18 years

**Tdap**

- **Total population aged ≥18 years in BC and QC:**
  - N = 11,509,562
  
- **Total population:**
  - N = 11,509,562
  
- **Total population:**
  - N = 3,890,232
  
- **Total doses:**
  - N = 3,890,232

**Source:** Statistics Canada. [Table 17-10-0005-01. Population estimates on July 1st, by age and sex.](#)

**Description:** Total current population of recommended adult Canadians excluding groups for whom the vaccine is already publicly funded.

**Description:** There is no reliable estimate of the coverage rate of the Tdap vaccine in a population of patients for which the vaccine is not publicly funded. For the purpose of this estimate, it was assumed that no patients who do not have publicly funded access to the vaccine have received the vaccine.

**Assumptions:** 0% of the population has received the Tdap vaccine.

**Source:** PHAC. [Vaccine uptake in Canadian adults 2021.](#)

**Description:** The national coverage rate for pertussis vaccination in adults was used to estimate uptake.

**Assumptions:** 33.8% of the population will receive the Tdap vaccine.
Incremental dose estimate “Existing”: Doses required to provide 1 dose of Pneu-C-13 vaccine for adults currently aged ≥ 18 years who are at risk

### Pneu-C-13

**Total population aged ≥ 18 years in AB, YK, NT, and NU:**
\[ N = 3,649,495 \]

**Description:** Total current population of age groups of which recommended adult Canadians belong excluding groups for whom the vaccine is already publicly funded

**Source:** Statistics Canada. Table 17-10-0005-01. Population estimates on July 1st, by age and sex.

**Assumptions:**

**Total population:**
\[ N = 240,867 \]

**Description:** Only patients that have an immunocompromising condition are included.

**Assumptions:** 6.6% of the total adult population has an immunocompromising condition


**Total population:**
\[ N = 63,107 \]

**Description:** There is no reliable estimate of the coverage rate in a population of patients who are at high risk of IPD for which the vaccine is not publicly funded. For the purpose of this estimate, it was assumed that no patients who do not have publicly funded access to the vaccine have received the vaccine.

**Assumptions:** 0% of the population has received the Pneu-C-13 vaccine

**Source:** PHAC. Vaccine uptake in Canadian adults 2021.

**Total doses:**
\[ N = 63,107 \]
Incremental dose estimate “Newly Eligible”: Doses required to continue providing 2 doses of RZV for adults aged ≥ 50 years

**RZV**

**Total population aged 49 years in Canada:**
N = 471,490

**Sources:** 1. Statistics Canada. Table 17-10-0055-01. Population estimates on July 1st, by age and sex.
**Description:** Total current population of adults aged 49 years who will become eligible for the vaccine at 50 years of age
**Assumptions:** Population growth beyond this immediate cohort is not accounted for

**Total population:**
N = 471,490

**Description:** Patients are entering the recommended age range and are assumed to not have received the vaccine previously
**Assumptions:** 0% of the population has received the RZV

**Total population:**
N = 258,377

**Sources:** 1. PHAC. Vaccine uptake in Canadian adults 2021.
**Description:** Given there is no reliable estimate of the coverage rate of RZV in a population of patients for which the vaccine is publicly funded, the coverage rate for the Pneu-P-23 vaccine in adults aged ≥65 years was used to estimate uptake
**Assumptions:** 54.8% of the population will receive the RZV

**Total doses:**
N = 451,901

**Description:** Second dose compliance of RZV was taken into consideration. An estimate from a Canadian study that examined second dose compliance at 12 months was used
**Assumptions:** 74.9% of patients receiving the RZV will receive the entire series (i.e., 2 doses); 25.1% of patients receiving the RZV will not complete the series and receive a single dose
Incremental dose estimate “Newly Eligible”: Doses required to continue providing 1 Tdap dose per adult lifetime and 1 dose to children ages 14-16

**Tdap**

- **Total population aged 17 years in BC and QC:**
  \[N = 137,880\]

- **Total population aged 13 years in QC:**
  \[N = 95,434\]

**Sources:**

**Description:** Total current population of individuals aged 17 years who will become eligible for the vaccine at 18 years of age. Total current population of children aged 13 years in Quebec who will become eligible for a booster dose at 14 years of age.

**Assumptions:** Population growth beyond this immediate cohort is not accounted for.

---

**Total population:**
\[N = 233,314\]

**Description:** Patients are entering the recommended age range and are assumed to not have received the vaccine previously.

**Assumptions:** 0% of the population has received the Tdap vaccine.

---

**Total population:**
\[N = 137,552\]

**Sources:**
1. PHAC. *Vaccine uptake in Canadian adults 2021.*
2. PHAC. *Vaccination coverage in Canadian children: Results from the 2019 childhood National Immunization Coverage Survey (cNICS).*

**Description:** Estimated national coverage rates for pertussis vaccination in adults and adolescents were used to estimate uptake.

**Assumptions:** 33.8% of the adult population will receive the Tdap vaccine. 95.3% of the adolescent population will receive the Tdap vaccine.
Incremental dose estimate “Newly Eligible”: Doses required to continue providing 1 extra dose of Pneu-C-13 vaccine for at risk children & adults

**Pneu-C-13**

Total population aged 17 years in AB, YK, NT, and NU: 
N = 54,204

Total population aged <1 years in YK: 
N = 415

Total population: 
N = 3,583

Total population: 
N = 3,583

Total population: 
N = 943

Total doses: 
N = 943

**Sources:** 1. Statistics Canada. Table 17-10-0005-01 Population estimates on July 1st, by age and sex.

**Description:** Total current population of individuals aged 17 years who may become eligible for the vaccine at 18 years of age. Total current population of infants aged <1 year in Yukon

**Assumptions:** Population growth beyond this immediate cohort is not accounted for


**Description:** Only patients that have an immunocompromising condition are included.

**Assumptions:** 6.6% of the adult population has an immunocompromising condition. 1.4% of the infant population has an immunocompromising condition.

**Description:** Adult patients entering the recommended age range are assumed to not have received the vaccine previously. Infants are to receive their primary series

**Assumptions:** 0% of the population has received an extra dose of the Pneu-C-13 vaccine

**Sources:** 1. PHAC. Vaccine uptake in Canadian adults 2021.

**Description:** Given there is no reliable estimate of the coverage rate of the Pneu-C-13 vaccine in a population of patients who are at high risk of IPD for which the vaccine is publicly funded, the coverage rate for the Pneu-P-23 vaccine in adults aged 18-64 years with chronic medical conditions (26.2%) was assumed to reflect the anticipated uptake for adults. The anticipated uptake in infants was assumed to be 100%

**Assumptions:** 26.2% of the adult population will receive the Pneu-C-13 vaccine. 100% of the infant population will receive the Pneu-C-13 vaccine