TECHNICAL NOTES

COVID-19 Data Tool – Vaccine Uptake

Updated: September 2022

Background

Public Health Ontario (PHO) developed the COVID-19 Data Tool which contains data on laboratory confirmed cases, confirmed outbreaks of COVID-19 and COVID-19 vaccine uptake in Ontario.¹ This tool allows users to view summarized COVID-19 data through a series of visuals that show trends for the province as a whole or for specific sub-populations. Vaccine data are updated biweekly.

Health Canada has authorized several COVID-19 vaccines for use in Canada.² They are:

- Pfizer-BioNTech Comirnaty™ COVID-19 vaccine (referred to as Pfizer-BioNTech or Pfizer in the tool and technical notes)
- Moderna Spikevax™ COVID-19 vaccine (referred to as Moderna in the tool and technical notes)
- AstraZeneca Vaxzevria™/COVISHIELD COVID-19 vaccine (referred to as AstraZeneca or COVISHIELD in the tool and technical notes)
- Janssen (Johnson & Johnson) COVID-19 vaccine (referred to as Janssen in the tool and technical notes)
- Novavax Nuvaxovid™ COVID-19 vaccine (referred to as Novavax in the tool and technical notes)
- Medicago Covifenz™ COVID-19 vaccine (referred to as Medicago in the tool and technical notes)

The Ontario population data file used to calculate vaccine coverage estimates was updated on September 30, 2022.⁴ This will result in differences in coverage estimates compared to those reported previously.
Descriptive Measures

At Least 1 Dose
- Refers to individuals that have received at least one dose of any COVID-19 vaccine (Health Canada authorized or not).

At Least 1 Dose Coverage, Total Population
- The proportion of the total population of Ontario, or a given public health unit, that received at least one dose of any COVID-19 vaccine.

Completed Primary Series
- Refers to individuals that have received both doses of a two-dose Health Canada authorized COVID-19 vaccine series (i.e. dose two of two) including mixed series with Health Canada authorized vaccine products, one dose of a one-dose Health Canada authorized COVID-19 vaccine series (i.e. dose one of one), one dose of a non-Health Canada authorized vaccine and one dose of a Health Canada authorized vaccine (regardless of the order), two doses of non-Health Canada authorized vaccines and one dose of a Health Canada authorized vaccine (regardless of the order), or three doses of non-Health Canada authorized vaccines.

Completed Primary Series Coverage, Total Population
- The proportion of the total population of Ontario, or a given public health unit, that has completed their primary series.

Completed Primary Series and 1 Booster Dose
- Refers to individuals that have completed their primary series (as per the definition above) and have received a booster dose of a Health Canada authorized vaccine (note that a dose of a non-Health Canada authorized vaccine is not considered a booster dose).

Completed Primary Series and 1 Booster Dose Coverage, Total Population
- The proportion of the total population of Ontario, or a given public health unit, that has completed their primary series and received one booster dose.

Completed Primary Series and 1 Booster Dose Coverage, Vaccine-Eligible Population
- The proportion of the population eligible for a COVID-19 vaccine booster (i.e. aged 5 years or older) in Ontario, or a given public health unit, that has completed their primary series and received one booster dose.
Completed Primary Series and 2 Booster Doses
- Refers to individuals that have completed their primary series (as per the definition above) and have received two booster doses of a Health Canada authorized vaccine (note that doses of non-Health Canada authorized vaccines are not considered booster doses).

Completed Primary Series and 2 Booster Doses Coverage, Total Population
- The proportion of the total population of Ontario, or a given public health unit, that has completed their primary series and received two booster doses.

Completed Primary Series and 2 Booster Doses Coverage, Vaccine-Eligible Population
- The proportion of the population eligible for a second COVID-19 vaccine booster (i.e. aged 18 years or older) in Ontario, or a given public health unit, that has completed their primary series and received two booster doses.

Dose 1
- Refers to the first dose of a COVID-19 vaccine.

Dose 2
- Refers to the second dose of a COVID-19 vaccine.

Dose 3
- Refers to the third dose of a COVID-19 vaccine.

Dose 4
- Refers to the fourth dose of a COVID-19 vaccine.

Dose 5
- Refers to the fifth dose of a COVID-19 vaccine. Individuals with fifth doses are likely specific populations (e.g. immunocompromised individuals) eligible for an extended 3-dose primary series and a second booster (i.e. a fifth dose).

Doses Administered
- Refers to the number of doses of a COVID-19 vaccine administered, not the number of individuals vaccinated. Reflects doses administered within a public health unit, rather than an individual recipient’s public health unit of residence, and exclude doses administered out of province or from non-Ontario stock. Dose counts include doses administered for individuals later reported as deceased. As a result, counts reported for doses administered will not align with the number of individuals vaccinated.
Dose Administration Date

- The date the COVID-19 vaccine was given. For at least one dose, the dose 1 administration date is used. For completed primary series, the date the series was completed is used. For completed primary series and one booster dose, the date of the first booster dose is used. For completed primary series and two booster doses, the date of the second booster dose is used.

Total Population

- Refers to the total population of Ontario, or a given public health unit, and includes those not yet eligible for a COVID-19 vaccine.

Vaccination Setting

- Refers to the type of setting in which the dose was administered (e.g. congregate living, hospital, pharmacy).

Vaccine-Eligible Population

- Refers to the population in Ontario, or a given public health unit, whom are eligible for a booster dose (i.e. aged 5 years or older) or eligible for a second booster dose (i.e. aged 18 years or older).

Vaccine Product

- Refers to the brand name of the dose administered. Includes only COVID-19 vaccine products available in Ontario (i.e. Moderna, Pfizer-BioNTech, AstraZeneca/COVISHIELD, Janssen, Novavax, or Medicago).

Vaccine Series

- The number of vaccine doses within a schedule that has been approved by Health Canada as a primary series. COVID-19 vaccine products available in Ontario have a two-dose (i.e. Moderna, Pfizer-BioNTech, AstraZeneca/COVISHIELD, Novavax, or Medicago) or a one-dose (i.e. Janssen) schedule.
Tool Overview

Summary

- This section of the tool presents high level summary information about vaccine uptake in Ontario. There are eight metrics on the summary page:

  - Cumulative number of individuals in Ontario with at least 1 dose
  - Proportion of the total population of Ontario with at least 1 dose
  - Cumulative number of individuals in Ontario that have completed their primary series
  - Proportion of the total population of Ontario that has completed their primary series
  - Cumulative number of individuals in Ontario that have completed their primary series and 1 booster dose
  - Proportion of the total population of Ontario that has completed their primary series and 1 booster dose
  - Cumulative number of individuals in Ontario that have completed their primary series and 2 booster doses
  - Proportion of the total population of Ontario that has completed their primary series and 2 booster doses

Map Tab

- This tab displays the cumulative number of individuals who have received a COVID-19 vaccine, as well as vaccination coverage estimates in Ontario. Data can be viewed for Ontario or by public health unit, and by vaccination status (i.e. at least one dose, completed primary series, completed primary series and one booster dose or completed primary series and two booster doses). Coverage estimates are shown as a percentage of the total population of Ontario. For completed primary series and one booster dose and completed primary series and two booster doses, coverage estimates are also shown as a percentage of the vaccine-eligible population of Ontario.

- The orientation of vaccination counts and coverage estimates by geography is based on the individual's public health unit of residence at the time of vaccination, as reported in COVaxON. Provincial totals and coverage estimates include individuals who received their vaccination out of province or from non-Ontario stock (e.g. doses administered from federal stock to correctional facility inmates or military personal), as well as individuals whose public health unit of residence was not reported. Provincial totals and coverage estimates exclude individuals later reported as deceased.

- The denominator for coverage estimates is the total or vaccine-eligible population of Ontario or a given public health unit.
Vaccines Tab

- This tab displays trends in vaccine coverage estimates and dose administration counts over time. Data can be viewed for Ontario or by public health unit, as well as by daily or weekly period. Coverage estimates can also be viewed by vaccination status (i.e. at least one dose, completed primary series, completed primary series and one booster dose or completed primary series and two booster doses), age groups informed by vaccine product authorization and vaccine program eligibility in Ontario\textsuperscript{2,3}, and sex. Dose administration counts can be viewed by dose number, vaccine product and vaccination setting.

- Provincial totals and coverage estimates include individuals that received their vaccination out of province or from non-Ontario stock (e.g. doses administered from federal stock to correctional facility inmates or military personal), as well as individuals whose public health unit of residence was not reported. Provincial totals and coverage estimates exclude individuals later reported as deceased.

- Dose counts refer to doses administered in Ontario or in a given public health unit, not the number of individuals vaccinated. Dose counts reflect those administered within a given public health unit, rather than an individual recipient’s public health unit of residence, and exclude doses administered out of province and those from a non-Ontario stock. Dose counts include doses administered for individuals later reported as deceased.

- All coverage estimates and dose counts are shown using the dose administration date. The ‘At least 1 dose’ graph uses the dose 1 administration date. The ‘Completed primary series’ graph uses the date the series was completed. The ‘Completed primary series and 1 booster dose’ graph uses the date of the first booster dose. The ‘Completed primary series and 2 booster doses’ graph uses the date of the second booster dose.

- The time period for most graphs displayed can be modified. Vaccination data are reported in the Tool from December 14, 2020 (the date the COVID-19 vaccine program began in Ontario) and onward.

- The denominator for coverage estimates is the total population of Ontario or a given public health unit.
  
  - Coverage estimates shown as 100% may represent estimates of 100% or more. Coverage estimates may be over 100% due to limitations in the vaccination data (numerator) or Ontario population projections (denominator). For example, lags in death reporting.
  
  - The denominator for coverage estimates by age group and sex is the total population of Ontario or a given public health unit of the same age group and sex. However, due to population data limitations the denominator for coverage estimates for individuals under 5 years of age includes individuals 0 – 4 years, while the numerator only includes individuals 6 months – 4 years (individuals younger than 6 months are not eligible for vaccination). Thus, coverage estimates for this age group may be slightly underestimated.
Data Limitations
The following limitations apply to the data presented in the COVID-19 Data Tool Vaccine sections.

Data Sources
- COVID-19 vaccine data for this report are based on information extracted from the Ontario Ministry of Health’s COVaxON application at approximately **7:00 am on the Monday prior to posting**.
- COVaxON is a dynamic reporting system which allows ongoing updates to data previously entered. As a result, data extracted from COVaxON represent a snapshot at the time of extraction and may differ from previous or subsequent reports.
- Ontario population projection data were sourced from Statistics Canada.⁴

Data Caveats
- The data represent vaccination information reported and recorded in COVaxON. As a result, all counts may be subject to varying degrees of underreporting due to a variety of factors such as individual consent for data collection and delays in data entry.
- Data presented may differ from other sources for various reasons, including differing extract times and methodologies for processing COVaxON data.
- Data includes clients with a dose administration record recorded in COVaxON, which includes a small number of client records with a residential postal code outside of Ontario who may be eligible for vaccination on the basis of working in a high-risk setting (e.g. long-term care home) in Ontario.
- Data presented have been processed to produce individual level data as well as to remove duplicate records, non-valid records, and assign dose number.
- For missing dose administration dates and dose administration dates prior to December 14, 2020 (the date the COVID-19 vaccine program began in Ontario), the date the administration record was created is used as a proxy.
- Duplicate dose records (i.e. clients with multiple dose administration records with the same date) are identified and excluded using personal identifiers, such as health card number, name, date of birth, and postal code, where available, as well as dose administration date.
- Non-valid records include doses where the status is reported as ‘entered in error’, ‘invalid’, or other similar variations, as well as doses where the status is valid (e.g. ‘administered’) but that were identified as non-valid client records (e.g. client first and last name are reported as ‘test’, ‘do not use’, ‘error’, ‘ignore’, or other similar variations).
• Dose 1, dose 2, dose 3, dose 4, and dose 5 are assigned based on the dose administration dates reported.

• The first chronological dose administered is considered the first dose.

• To determine the second dose, the first subsequent dose administered on or after the product-specific recommended minimum interval of the first dose product, with a 4-day grace period, is used. Doses administered prior to the product-specific recommended minimum interval, with a 4-day grace period, are not considered valid. For example, if there are two subsequent doses that are 7 days and 21 days from a Moderna first dose, respectively, then the dose that was 21 days from the first dose is used as the second dose. Similarly, if there are two subsequent doses that are 10 days and 12 days from the first dose, respectively, then neither dose is used and the individual is not assigned a second dose. The recommended product-specific minimum intervals, with a 4-day grace period, as outlined by the National Advisory Committee on Immunization (NACI) are as follows (there is currently no maximum interval for second doses, i.e., no recommendation to restart a vaccine series regardless of the length of delay of the second dose):
  • Pfizer-BioNTech: 15 days (19 days with a 4-day grace period).\(^5\)
  • Moderna: 17 days (21 days with a 4-day grace period).\(^5\)
  • AstraZeneca/COVISHIELD: 24 days (28 days with a 4-day grace period).\(^5\)
  • Novavax: 17 days (21 days with a 4-day grace period).\(^5\)
  • Medicago: 17 days (21 days with a 4-day grace period).\(^5\)
  • Janssen, non-Health Canada authorized products, unspecified products, or missing products: 17 days (21 days with a 4-day grace period).\(^5\)

• To determine a date for the third dose, the first subsequent dose administered 28 days or more after the date of the second dose is used, regardless of the vaccine product of the second dose (i.e. the dose 3 minimum interval was not product-specific). If multiple doses 28 days or more after the second dose are reported, then the first chronological dose after the second dose is used.

• To determine a date for the fourth dose, the first subsequent dose administered 28 days or more after the date of the third dose is used, regardless of the vaccine product of the third dose (i.e. the dose 4 minimum interval was not product-specific). If multiple doses 28 days or more after the third dose are reported, then the first chronological dose after the third dose is used.

• To determine a date for the fifth dose, the first subsequent dose administered 28 days or more after the date of the fourth dose is used, regardless of the vaccine product of the fourth dose (i.e. the dose 5 minimum interval was not product-specific). If multiple doses 28 days or more after the fourth dose are reported, then the first chronological dose after the fourth dose is used.

• Postal code of residence was extracted from the client residential address. For clients where the public health unit of residence was not reported and the postal code of residence was available, the postal code of residence was used to assign clients to a public health unit of residence.
On December 16, 2021, the methodology for calculating age was updated to reflect an individual's current age. Age at the time of data extraction is calculated using the client date of birth and the date of data extraction. Ages reported as ≥120 years, <0 years, or where date of birth is missing are considered unknown. In Canada, the Pfizer-BioNTech and Moderna COVID-19 vaccines are authorized for use in individuals aged 6 months and older, and the AstraZeneca/COVISHIELD, Janssen, Novavax and Medicago COVID-19 vaccines are authorized for use in individuals aged 18 years and older. Based on expected vaccine product use as per NACI and product monographs, clients under 6 months of age that received the Pfizer-BioNTech or Moderna COVID-19 vaccines, and clients under 18 years of age that received the AstraZeneca/COVISHIELD, Janssen, Novavax or Medicago COVID-19 vaccines, are also considered to have unknown age.

- Individuals with unknown age are excluded from age group-specific vaccination counts and coverage estimates, as well as vaccine-eligible vaccination counts and coverage estimates.
- Individuals with unknown sex are excluded from sex-specific vaccination counts and coverage estimates.
- For certain populations (e.g. immunocompromised individuals) three doses are recommended to complete the primary series. Due to challenges in identifying these individuals in the COVaxON data, it was not possible to account for a three-dose primary series in the analysis and these individuals are classified as per the standard definitions.
- Dose numbers are maintained in reported counts. For example, if an individual received doses 1 and 2 out of province and a third dose in Ontario, the third dose is counted as a dose 3 administered in Ontario and the first two doses are not counted as they were administered out of province. Dose administration records with missing product information are excluded from product-specific dose counts.
- For doses administered by setting, the ‘mass immunization clinic’ category includes mass immunization, mobile, drive-through, and occupational clinics. The ‘other/not reported’ category includes dose administration records where a vaccination setting was not specified (reported as ‘other’) or was missing (not reported).
- Counts for the number of doses administered in Ontario exclude doses administered out of province and from non-Ontario stock (e.g. doses administered from federal stock to correctional facility inmates or military personal) and include doses administered for individuals later reported as deceased. However, as coverage estimates reflect the proportion of the population currently vaccinated, individuals that received a vaccination out of province or from non-Ontario stock are included and individuals later reported as deceased are excluded from coverage estimates. As a result, the counts reported for doses administered will not align with the number of individuals vaccinated.
References


Citation

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