COVID-19 Cases with Severe Outcomes: December 12, 2021 to June 4, 2022

Introduction

This report includes the most current information available from CCM as of June 4, 2022. For the purpose of this descriptive analysis, severe outcomes are defined as COVID-19 cases who were hospitalized or in the ICU or died because of COVID-19.

This report characterizes COVID-19 cases who met the definition of a confirmed case and is limited to those where a severe outcome was identified, with a focus on wave 5 onwards. This report is not intended to quantify the level of risk for an individual to have a severe outcome, for instance based on age or vaccination status.

This report contains severe outcomes presented by outcome occurrence date. For example, hospitalizations are presented by hospital admission date (not date reported to public health or data entry date). Please note, this is different than many other PHO products that present data by case reported date. These products include (but are not limited to) PHO's Ontario COVID-19 Data Tool, COVID-19 in Long-Term Care Homes and Confirmed Cases of COVID-19 Following Vaccination in Ontario.

Severe outcomes are a lagging indicator, meaning that severe outcomes often occur after (e.g. days or weeks) cases are initially reported to public health. Severe outcomes trends are reflective of earlier trends in COVID-19 infections.

Highlights

Between December 12, 2021 and June 4, 2022:

- 18,297 cases of COVID-19 in Ontario had a severe outcome, defined as being hospitalized or in the ICU or having died because of COVID-19.

- 16,898 cases were admitted to hospital

- 2,146 cases were admitted to an intensive care unit (ICU)

- 3,446 cases died

**Note:** A case can be counted in more than one of these categories.

Trends from May 1, 2022 to May 28, 2022 (i.e. excluding the latest week to account for reporting delays) among COVID-19 cases with severe outcomes:

- Weekly hospitalizations decreased from 521 (week of May 1, 2022) to 245 (week of May 22, 2022).

- Weekly ICU admissions decreased from 59 (week of May 1, 2022) to 32 (week of May 22, 2022).

- Weekly deaths decreased from 124 (week of May 1, 2022) to 52 (week of May 22, 2022).

Hospitalizations

Hospitalization refers to cases that were ever hospitalized (or that had their hospital stay extended) because of COVID-19. It includes cases that have been discharged from hospital as well as cases that are currently hospitalized and does not reflect bed occupancy. Hospitalized cases include those admitted to intensive care unit (ICU), but not emergency room visits. Dates presented in the section below refer to hospital admission date.

Figure 1. Confirmed COVID-19 cases that were hospitalized, by hospital admission week: Ontario, December 12, 2021 to June 4, 2022
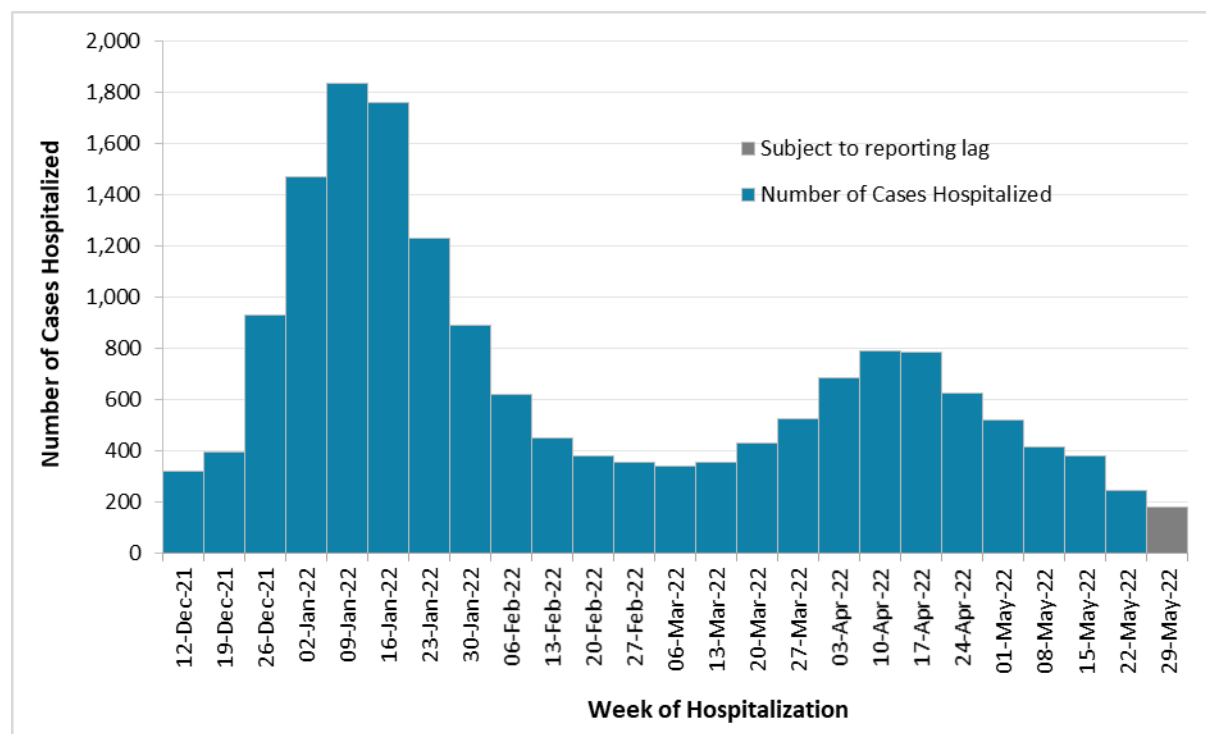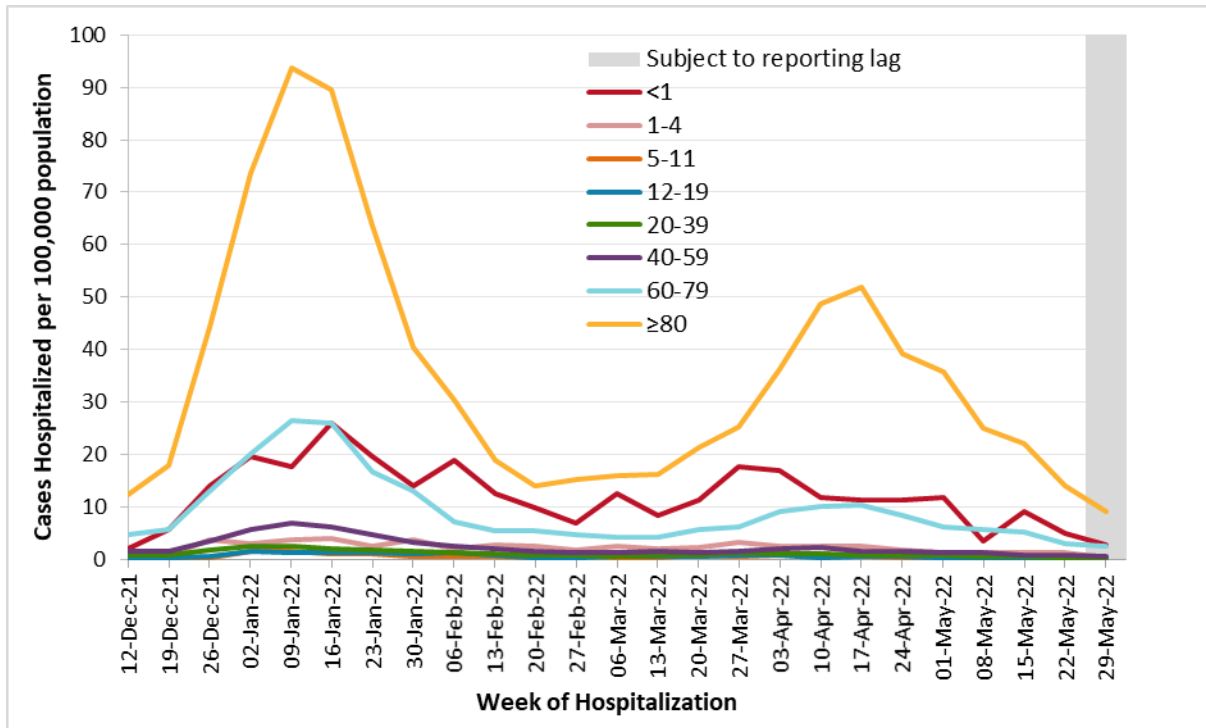

Data Source: CCM
Note: Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 1. Confirmed COVID-19 cases that were hospitalized, by sex and age group: Ontario, December 12, 2021 to June 4, 2022

Sex and age group	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Total Cases	245	1.7	177	1.2	16,898	114.7
Sex: Female	111	1.5	92	1.2	7,700	103.3
Sex: Male	134	1.8	85	1.2	9,166	125.9
Sex: Did not specify female or male	0	N/A	0	N/A	32	N/A
Ages: <1	7	4.9	4	2.8	428	300.5
Ages: 1 – 4	7	1.2	2	0.3	322	55.5
Ages: 5 – 11	2	0.2	2	0.2	164	15.2
Ages: 12 – 19	1	0.1	5	0.4	207	15.6
Ages: 20 – 39	12	0.3	11	0.3	1,097	26.4
Ages: 40 – 59	33	0.8	23	0.6	2,281	58.6
Ages: 60 – 79	91	3.1	71	2.4	6,663	229.8
Ages: 80 and over	92	14.0	59	9.0	5,736	874.6
Ages: Unknown	0	N/A	0	N/A	0	N/A

Data Source: CCM

Figure 2. Rates of confirmed COVID-19 cases that were hospitalized (per 100,000 population), by age group and hospital admission date: Ontario, December 12, 2021 to June 4, 2022

Data Source: CCM
Notes:

- Cases without an age reported are excluded from the figure.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 2 provides information on vaccination status to help characterize cases that were hospitalized because of COVID-19. Table 2 does not consider the size of the underlying populations or describe the risk of hospitalization based on vaccination status.

For population-based rates of hospitalization (including ICU admissions) and risk of hospitalization (including ICU admissions) by vaccination status, please see the latest version of the Confirmed Cases of COVID-19 Following Vaccination in Ontario

Table 2. Confirmed COVID-19 cases that were hospitalized by vaccination status: Ontario, December 12, 2021 to June 4, 2022

Age group	Series Initiation Count (%)	Series Completion Count (%)	Series Completion + 1 Booster Count (%)	Series Completion + 2 Booster Count (%)	Unvaccinated/Not protected Count (%)	Total Count (%)
Ages: 5 – 11	43(26.2%)	17(10.4%)	1(0.6%)	0(0.0%)	103(62.8%)	164(100.0%)
Ages: 12 – 19	10(4.8%)	112(54.1%)	19(9.2%)	1(0.5%)	65(31.4%)	207(100.0%)
Ages: 20 – 39	62(5.7%)	455(41.5%)	148(13.5%)	5(0.5%)	427(38.9%)	1,097(100.0%)
Ages: 40 – 59	92(4.0%)	852(37.4%)	442(19.4%)	22(1.0%)	872(38.2%)	2,280(100.0%)
Ages: 60 – 79	187(2.8%)	2,273(34.1%)	1,920(28.8%)	175(2.6%)	2,105(31.6%)	6,660(100.0%)
Ages: 80 and over	128(2.2%)	1,894(33.0%)	2,178(38.0%)	245(4.3%)	1,290(22.5%)	5,735(100.0%)
Total	**522(3.2%)**	**5,603(34.7%)**	**4,708(29.2%)**	**448(2.8%)**	**4,862(30.1%)**	**16,143(100.0%)**

Data Source: CCM/COVaxON
Notes:

- A large proportion of the population over 12 years old has completed the vaccine series or had booster doses. This table only presents the number of cases admitted to hospital, but the underlying population of each group is different. Interpretation of this table should keep this in mind.
- Not all cases have an age reported. Age groups are informed by vaccine product recommendations (i.e. no vaccine currently authorized or recommended in individuals <5 years of age) and vaccine program eligibility.
- Only cases that have received Health Canada authorized vaccines including, Pfizer-BioNTech Comirnaty, Moderna Spikevax, AstraZeneca Vaxzevria/COVISHIELD, and Janssen COVID-19 vaccines are included. Cases that received one or more doses of a non-Health Canada authorized vaccine are excluded.
- This table combines vaccine status data (COVaxON) and confirmed case data (CCM), which were extracted on different days (see Technical Notes). Vaccination status may be unknown for cases reported to CCM after COVaxON data was extracted and linked to CCM data; these cases are excluded from the table above.
- Vaccine category definitions are included in the Confirmed Cases of COVID-19 Following Vaccination in Ontario report.

Figure 3. Rates of confirmed COVID-19 cases that were hospitalized (per 100,000 population), by quintile of neighbourhood material deprivation and hospital admission week: Ontario, December 12, 2021 to June 4, 2022
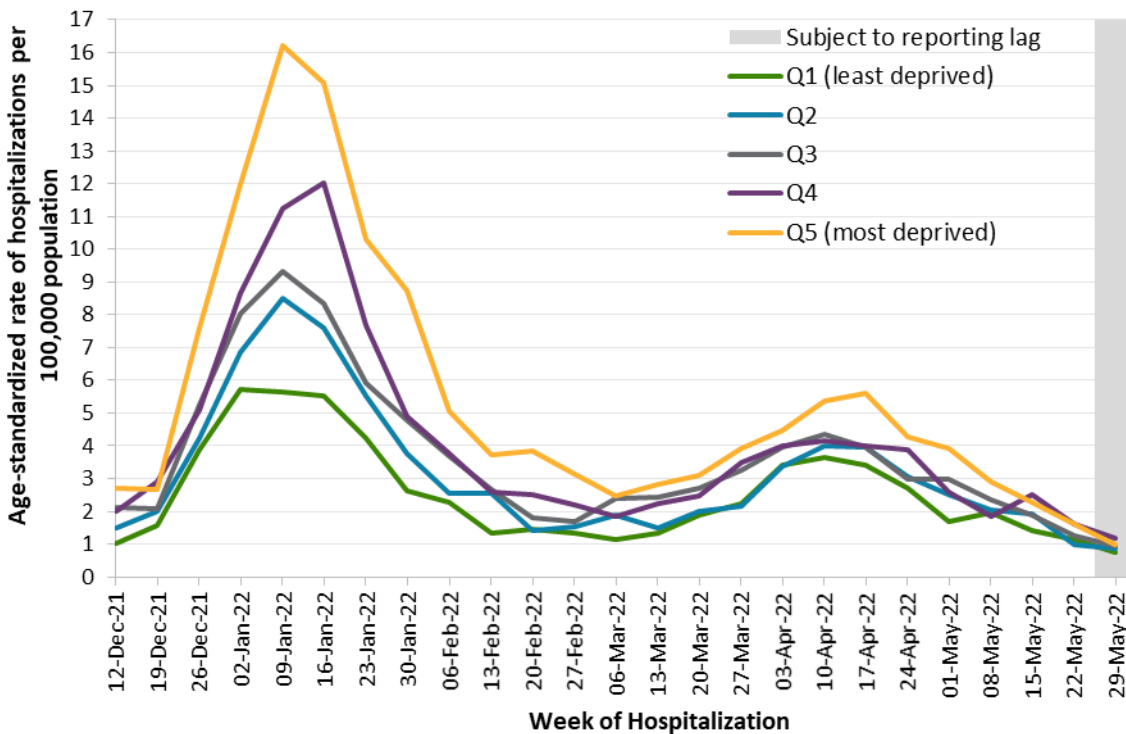
Data Source: CCM, ON-Marg 2016
Notes:

- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 3. Confirmed COVID-19 cases that were hospitalized, by quintile of material deprivation: Ontario, December 12, 2021 to June 4, 2022

Quintile	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Quintile 1 (least material deprivation)	42	1.2	29	0.8	2,366	63.5
Quintile 2	34	1.0	30	0.9	2,742	78.3
Quintile 3	42	1.3	32	0.9	2,975	91.2
Quintile 4	53	1.6	37	1.2	3,224	101.4
Quintile 5 (most material deprivation)	51	1.6	30	1.0	4,102	134.7

**Data Source:** CCM, ON-Marg 2016
Notes:

- Rates per 100,000 population are adjusted to the 2011 census population to account for any age differences between quintiles of marginalization.
- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.

Intensive Care Unit (ICU)

Intensive care unit (ICU) cases are a subset of the count of hospitalized cases. ICU admissions include all cases for which an ICU admission date was reported. It includes cases that have been treated or that are currently being treated in an ICU because of COVID-19. Dates presented in the section below refer to ICU admission date.

Figure 4. Confirmed COVID-19 cases that were admitted to ICU, by ICU admission date: Ontario, December 12, 2021 to June 4, 2022
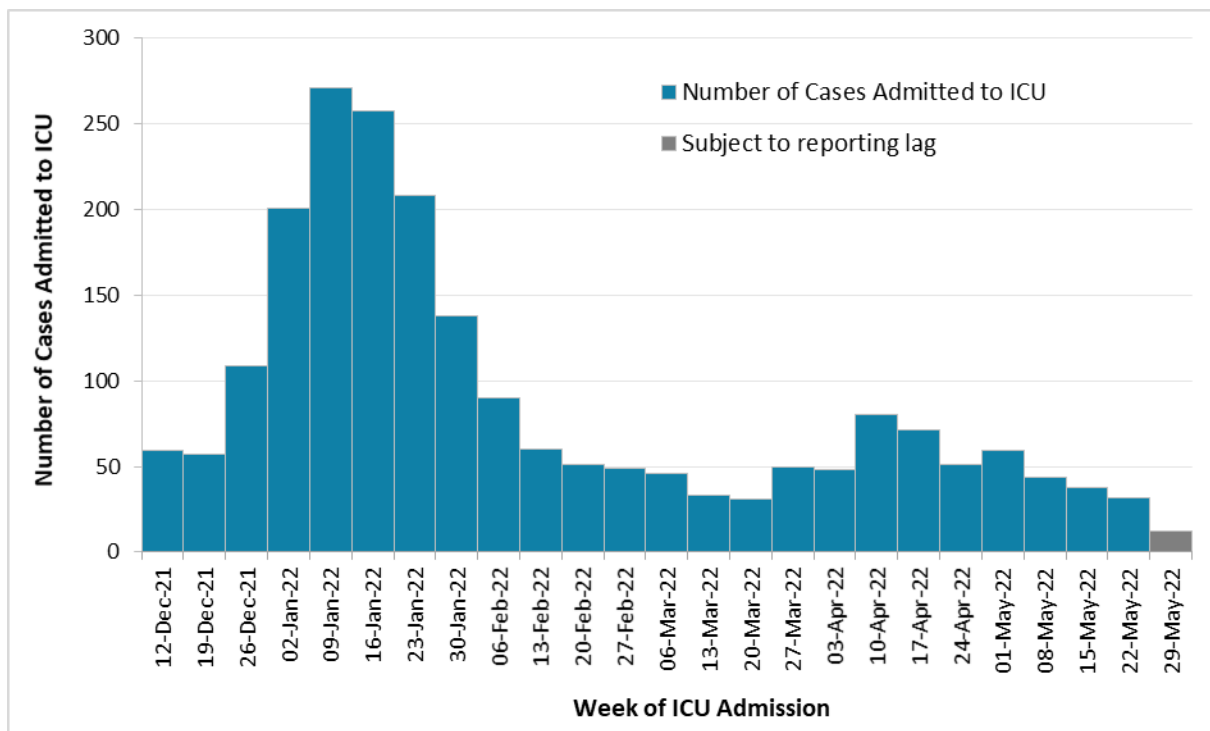
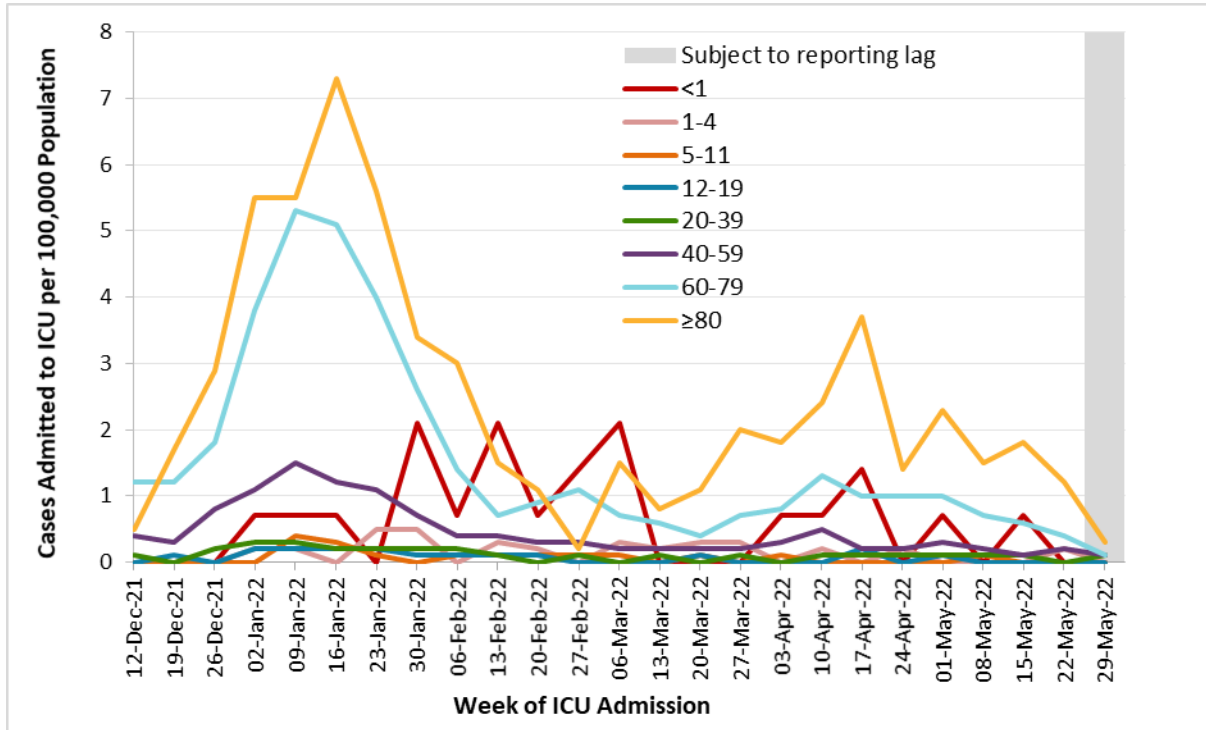**Data Source:** CCM
Notes:

- The vertical (y-axis) scale in this figure is smaller than in Figure 1 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 4. Confirmed COVID-19 cases that were admitted to ICU, by sex and age group: Ontario, December 12, 2021 to June 4, 2022

Sex and age group	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Total Cases	32	0.2	12	0.1	2,146	14.6
Sex: Female	11	0.1	6	0.1	846	11.3
Sex: Male	21	0.3	6	0.1	1,295	17.8
Sex: Did not specify female or male	0	N/A	0	N/A	5	N/A
Ages: <1	0	0.0	0	0.0	22	15.4
Ages: 1 – 4	1	0.2	0	0.0	21	3.6
Ages: 5 – 11	0	0.0	0	0.0	16	1.5
Ages: 12 – 19	0	0.0	0	0.0	19	1.4
Ages: 20 – 39	2	<0.1	3	0.1	120	2.9
Ages: 40 – 59	8	0.2	4	0.1	433	11.1
Ages: 60 – 79	13	0.4	3	0.1	1,122	38.7
Ages: 80 and over	8	1.2	2	0.3	393	59.9
Ages: Unknown	0	N/A	0	N/A	0	N/A

Data Source: CCM

Figure 5. Rates of confirmed COVID-19 cases that were admitted to ICU (per 100,000 population), by age group and ICU admission date: Ontario, December 12, 2021 to June 4, 2022

Data Source: CCM
Notes:

- Cases without an age reported are excluded from the figure.
- The vertical (y-axis) scale in this figure is smaller than in Figure 2 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).
- Small case counts in the <1 year age group can result in sharp fluctuations due the small size of the underlying population.

Table 5 provides information on vaccination status to help characterize cases that were admitted to ICU because of COVID-19. Table 5 does not consider the size of the underlying populations or describe the risk of being admitted to ICU based on vaccination status.

For population-based rates of hospitalization (including ICU admissions) and risk of hospitalization (including ICU admissions) by vaccination status, please see the latest version of the Confirmed Cases of COVID-19 Following Vaccination in Ontario report.

Table 5. Confirmed COVID-19 cases that were admitted to ICU, by vaccination status: Ontario, December 12, 2021 to June 4, 2022

Age group	Series Initiation Count (%)	Series Completion Count (%)	Series Completion + 1 Booster Count (%)	Series Completion + 2 Booster Count (%)	Unvaccinated /Not protected Count (%)	Total Count (%)
Ages: 5 – 11	2(12.5%)	1(6.3%)	0(0.0%)	0(0.0%)	13(81.3%)	16(100.0%)
Ages: 12 – 19	1(5.3%)	8(42.1%)	2(10.5%)	0(0.0%)	8(42.1%)	19(100.0%)
Ages: 20 – 39	9(7.5%)	32(26.7%)	18(15.0%)	1(0.8%)	60(50.0%)	120(100.0%)
Ages: 40 – 59	17(3.9%)	141(32.6%)	71(16.4%)	3(0.7%)	201(46.4%)	433(100.0%)
Ages: 60 – 79	22(2.0%)	352(31.4%)	232(20.7%)	23(2.0%)	493(43.9%)	1,122(100.0%)
Ages: 80 and over	12(3.1%)	135(34.4%)	125(31.8%)	8(2.0%)	113(28.8%)	393(100.0%)
Total	**63(3.0%)**	**669(31.8%)**	**448(21.3%)**	**35(1.7%)**	**888(42.2%)**	**2,103(100.0%)**

Data Source: CCM/COVaxON
Notes:

- A large proportion of the population over 12 years old has completed the vaccine series or had booster doses. This table only presents the number of cases admitted to hospital, but the underlying population of each group is different. Interpretation of this table should keep this in mind.
- Not all cases have an age reported. Age groups are informed by vaccine product recommendations (i.e. no vaccine currently authorized or recommended in individuals <5 years of age) and vaccine program eligibility.
- Only cases that have received Health Canada authorized vaccines including, Pfizer-BioNTech Comirnaty, Moderna Spikevax, AstraZeneca Vaxzevria/COVISHIELD, and Janssen COVID-19 vaccines are included. Cases that received one or more doses of a non-Health Canada authorized vaccine are excluded.
- This table combines vaccine status data (COVaxON) and confirmed case data (CCM), which were extracted on different days (see Technical Notes). Vaccination status may be unknown for cases reported to CCM after COVaxON data was extracted and linked to CCM data; these cases are excluded from the table above.
- Vaccine category definitions are included in the Confirmed Cases of COVID-19 Following Vaccination in Ontario report.

Figure 6. Rates of confirmed COVID-19 cases that were admitted to ICU (per 100,000 population), by quintile of neighbourhood material deprivation and ICU admission week: Ontario, December 12, 2021 to June 4, 2022
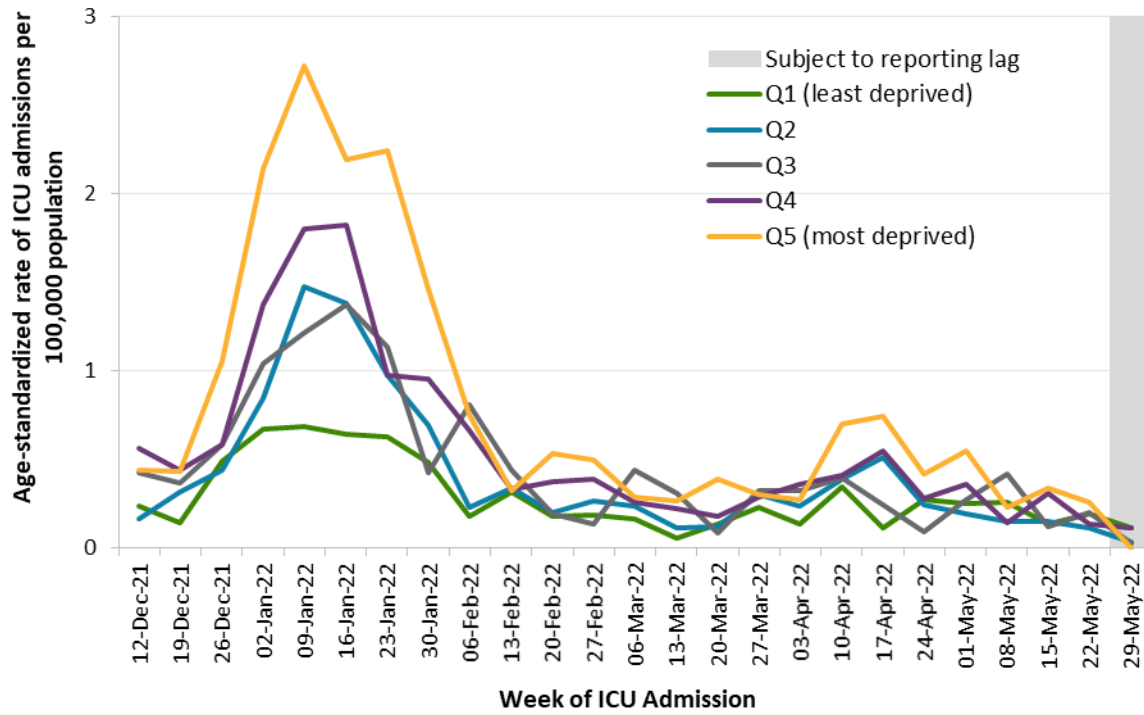
Data Source: CCM, ON-Marg 2016
Notes:

- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.
- The vertical (y-axis) scale in this figure is smaller than in Figure 2 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 6. Confirmed COVID-19 cases that were admitted to ICU, by quintile of material deprivation: Ontario, December 12, 2021 to June 4, 2022

Quintile	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Quintile 1 (least material deprivation)	7	0.2	4	0.1	267	7.2
Quintile 2	4	0.1	1	0	353	10.1
Quintile 3	6	0.2	1	0	369	11.4
Quintile 4	4	0.1	3	0.1	436	13.8
Quintile 5 (most material deprivation)	8	0.3	0	0	577	19.5

**Data Source:** CCM, ON-Marg 2016
Notes:

- Rates per 100,000 population are adjusted to the 2011 census population to account for any age differences between quintiles of marginalization.
- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.

Deaths

For surveillance purposes, a COVID-19 death is defined as a death resulting from a clinically compatible illness, unless there is a clear alternative cause of death that cannot be related to COVID-19 (e.g., trauma, medically assisted death). There should be no period of complete recovery from COVID-19 between illness and reported death. Death counts include records with a fatal outcome regardless of their hospital/ICU admission status and include deaths for which COVID-19 is the underlying cause of death, contributed but was not the underlying cause of death, and those with type of death unknown or missing.

Dates presented in the section below refer to date of death. Cases without a date of death recorded will not be presented in this section.

Figure 7. Confirmed COVID-19 deaths by cause and week of death: Ontario, December 12, 2021 to June 4, 2022
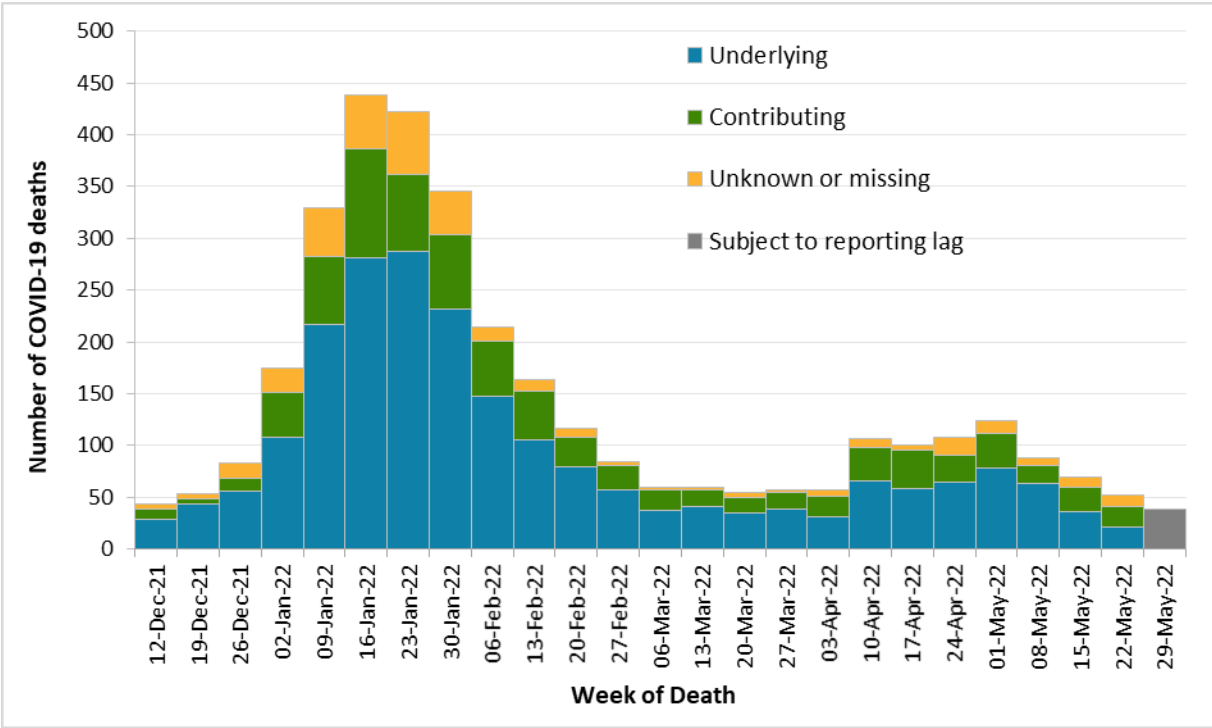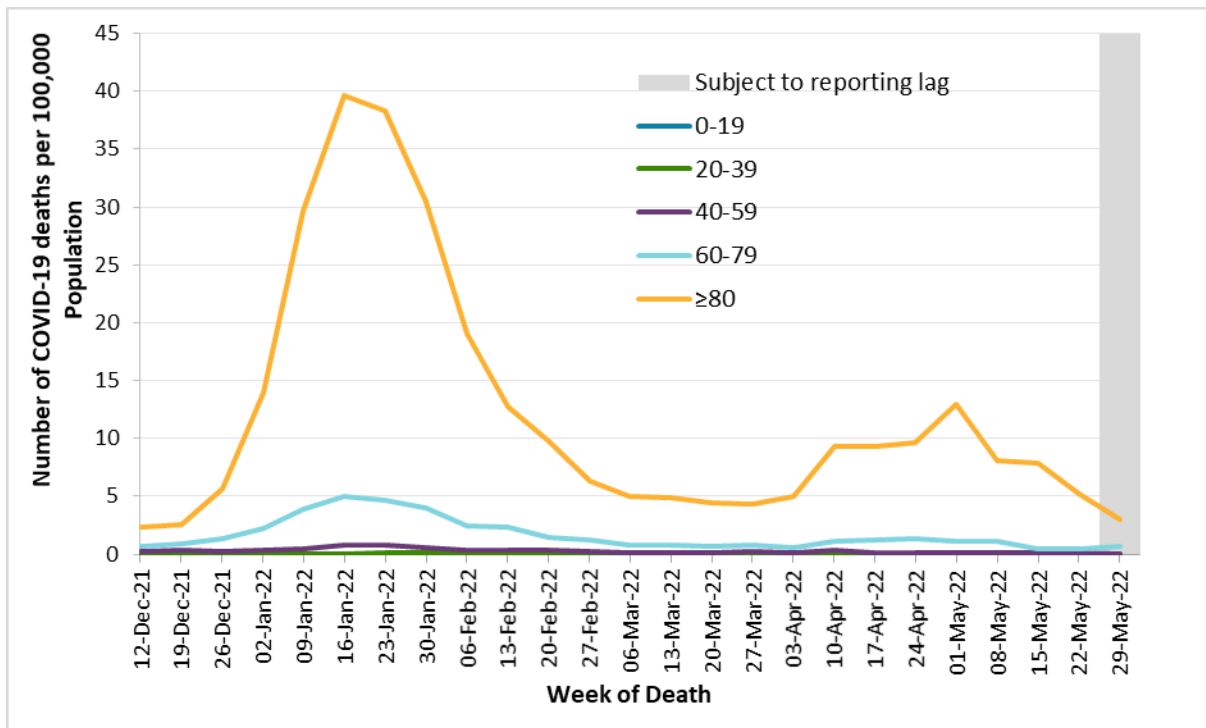

Data Source: CCM
Notes:

- The vertical (y-axis) scale in this figure is smaller than in Figure 1 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).
- The category 'Underlying' refers to COVID-19 is the underlying cause of death
- The category 'Contributing' refers to COVID-19 contributed but was not underlying cause
- The category 'Unknown or missing' includes cases where the cause of death was unable to be determined or was missing.

Table 7. Confirmed COVID-19 deaths, by sex and age group: Ontario, December 12, 2021 to June 4, 2022

Sex and age group	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Total Cases	52	0.4	39	0.3	3,446	23.4
Sex: Female	29	0.4	21	0.3	1,501	20.1
Sex: Male	22	0.3	18	0.2	1,935	26.6
Sex: Did not specify female or male	1	N/A	0	N/A	10	N/A
Ages: 0 – 19	0	0.0	0	0.0	10	0.3
Ages: 20 – 39	1	<0.1	0	0.0	38	0.9
Ages: 40 – 59	3	0.1	0	0.0	242	6.2
Ages: 60 – 79	14	0.5	19	0.7	1,192	41.1
Ages: 80 and over	34	5.2	20	3.0	1,964	299.5
Ages: Unknown	0	N/A	0	N/A	0	N/A

Data Source: CCM

Figure 8. Rates of confirmed COVID-19 deaths (per 100,000 population), by age group and week of death: Ontario, December 12, 2021 to June 4, 2022

Data Source: CCM
Notes:

- Cases without an age reported are excluded from the figure.
- The vertical (y-axis) scale in this figure is smaller than in Figure 2 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 8 provides information on vaccination status to help characterize confirmed COVID-19 cases that died. Table 8 does not consider the size of the underlying populations or describe the risk of death based on vaccination status.

For population-based rates of COVID-19 deaths and risk of death by vaccination status, please see the latest version of the Confirmed Cases of COVID-19 Following Vaccination in Ontario.

**Table 8. Confirmed COVID-19 deaths, by vaccination status: Ontario, December 12, 2021 to June 4, 2022**

Age group	Series Initiation Count (%)	Series Completion Count (%)	Series Completion + 1 Booster Count (%)	Series Completion + 2 Booster Count (%)	Unvaccinated/ Not protected Count (%)	Total Count (%)
Ages: 5 – 19	0(0.0%)	3(60.0%)	0(0.0%)	0(0.0%)	2(40.0%)	5(100.0%)
Ages: 20 – 39	6(15.8%)	9(23.7%)	4(10.5%)	0(0.0%)	19(50.0%)	38(100.0%)
Ages: 40 – 59	5(2.1%)	81(33.5%)	34(14.0%)	1(0.4%)	121(50.0%)	242(100.0%)
Ages: 60 – 79	30(2.5%)	373(31.3%)	285(23.9%)	39(3.3%)	465(39.0%)	1,192(100.0%)
Ages: 80 and over	46(2.3%)	548(27.9%)	737(37.5%)	117(6.0%)	516(26.3%)	1,964(100.0%)
Total	87(2.5%)	1,014(29.5%)	1,060(30.8%)	157(4.6%)	1,123(32.6%)	3,441(100.0%)

Data Source: CCM/COVaxON
Notes:

- A large proportion of the population over 12 years old has completed the vaccine series or had booster doses. This table only presents the number of cases admitted to hospital, but the underlying population of each group is different. Interpretation of this table should keep this in mind.
- Not all cases have an age reported. Age groups are informed by vaccine product recommendations (i.e. no vaccine currently authorized or recommended in individuals <5 years of age) and vaccine program eligibility.
- Only cases that have received Health Canada authorized vaccines including, Pfizer-BioNTech Comirnaty, Moderna Spikevax, AstraZeneca Vaxzevria/COVISHIELD, and Janssen COVID-19 vaccines are included. Cases that received one or more doses of a non-Health Canada authorized vaccine are excluded.
- This table combines vaccine status data (COVaxON) and confirmed case data (CCM), which were extracted on different days (see Technical Notes). Vaccination status may be unknown for cases reported to CCM after COVaxON data was extracted and linked to CCM data; these cases are excluded from the table above.
- Vaccine category definitions are included in the Confirmed Cases of COVID-19 Following Vaccination in Ontario.

Figure 9. Rates of confirmed COVID-19 deaths (per 100,000 population), by quintile of neighbourhood material deprivation and week of death: Ontario, December 12, 2021 to June 4, 2022
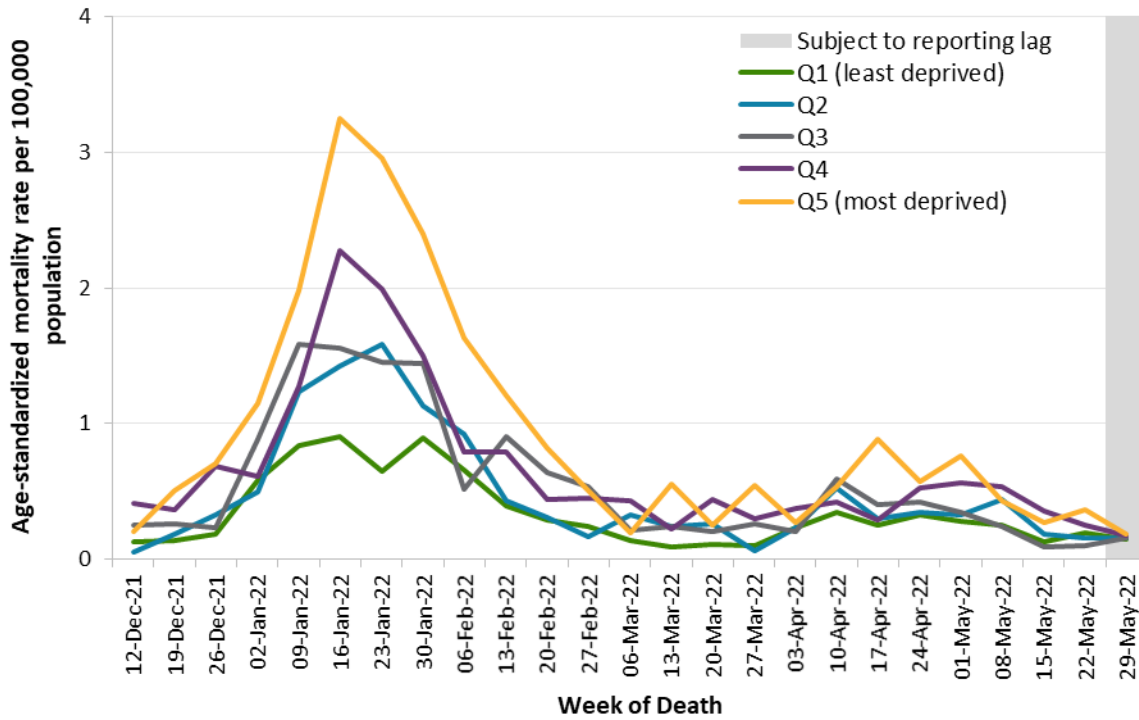
Data Source: CCM, ON-Marg 2016
Notes:

- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.
- The vertical (y-axis) scale in this figure is smaller than in Figure 2 for hospitalizations.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM).

Table 9. Confirmed COVID-19 deaths, by quintile of material deprivation: Ontario, December 12, 2021 to June 4, 2022

Quintile	May 22, 2022 to May 28, 2022 Cases	May 22, 2022 to May 28, 2022 Rate per 100,000 population	May 29, 2022 to June 4, 2022 Cases	May 29, 2022 to June 4, 2022 Rate per 100,000 population	Cumulative Dec 12, 2021 to June 4, 2022 Cases	Cumulative Dec 12, 2021 to June 4, 2022 Rate per 100,000 population
Quintile 1 (least material deprivation)	8	0.2	6	0.2	335	8.5
Quintile 2	6	0.2	6	0.2	440	11.8
Quintile 3	4	0.1	6	0.2	484	13.7
Quintile 4	10	0.3	6	0.2	578	16.5
Quintile 5 (most material deprivation)	12	0.4	6	0.2	748	23.1

Data Source: CCM, ON-Marg 2016
Notes:

- Rates per 100,000 population are adjusted to the 2011 census population to account for any age differences between quintiles of marginalization.
- Cases residing in institutional and congregate settings, including Long Term Care Homes, are excluded from the figure because institutional and congregate setting residents are excluded from ON-Marg. See Data Caveats and Methods: ON-Marg for more details.

Technical Notes

Data Sources

- The data for this report were based on information successfully extracted from the Public Health Case and Contact Management Solution (CCM) for all PHUs by PHO as of June 8, 2022 at 1 p.m. for cases reported from December 1, 2021 onwards.

- COVID-19 vaccination data were based on information successfully extracted from the Ontario Ministry of Health's COVaxON application as of June 6, 2022 at approximately 7:00 a.m.

- Statistics Canada Postal Code Conversion File Plus (PCCF+), version 7E.

- The health equity (material deprivation) analyses use data from the 2016 Ontario Marginalization Index (ON-Marg), and population counts from the Ontario Health Insurance Plan (OHIP) Registered Person Database (RPDB) Cohort FY 2019/20 (Extracted October 2020) (provided by Health Analytics and Insights Branch, Capacity Planning and Analytics Division, Ministry of Health):

  - Matheson FI; van Ingen T. 2016 Ontario marginalization index. Toronto, ON: Providence St. Joseph's and St. Michael's Healthcare; 2018. Joint publication with Public Health Ontario.

Data Caveats: Case Data

- COVaxON and CCM are dynamic reporting systems, which allow ongoing updates to data previously entered. As a result, data extracted from COVaxON and CCM represent a snapshot at the time of extraction and may differ from previous or subsequent reports.

- The data only represent cases reported to public health units and recorded in CCM. As a result, all counts will be subject to varying degrees of underreporting due to a variety of factors, such as disease awareness and medical care seeking behaviours, which may depend on severity of illness, clinical practice, changes in laboratory testing, and reporting behaviours.

- Changes in PCR testing eligibility went into effect on December 31, 2021, limiting access to PCR testing and resulting in a change in the population being tested. Details can be found in the Ministry of Health COVID-19 Integrated Testing & Case, Contact and Outbreak Management Interim Guidance: Omicron Surge.

- Only cases meeting the confirmed case classification as listed in the Ministry of Health Case Definition – Coronavirus Disease (COVID-19) are included in the report counts from CCM.

- Case classification information may be updated for individuals with a positive result issued from a point-of-care assays.

- Data on hospital admissions, ICU admissions and deaths are likely under-reported as these events may occur after the completion of public health follow up of cases. Cases that were admitted to hospital or died after follow-up was completed may not be captured in CCM.

- Hospitalization/ICU data may be incomplete or missing for records where information was not gathered, reported to public health units or entered within CCM.

- Hospitalization includes all cases hospitalized (or that had their hospital stay extended) because of COVID-19. It includes cases that have been discharged from hospital as well as cases that are currently hospitalized. Includes Intensive Care Unit (ICU) cases but not emergency room visits. Hospitalizations were identified by a reported hospital admission date or reported 'Yes' for hospitalization/ICU.

  - Hospital admission date refers to the first admission date recorded on the case record. Hospital service transfers (e.g., alternate level of care (ALC)) are not reflected in the hospital admission date.

  - If hospital admission date is missing, then ICU admission date is used (if applicable). When there is no ICU admission date to serve as a proxy, then reported date is used.

- Cases admitted to an ICU include all cases for which an ICU admission date was reported at the time of data extraction. It includes cases that have been treated or that are currently being treated in an ICU. Cases admitted to an ICU are a subset of cases hospitalized. However, ICU admission counts may include cases admitted to ICU that are not included in hospitalization counts if the initial hospital admission date for a case occurred prior December 12, 2021.

  - ICU admission date refers to the first admission date recorded on the case record (i.e., the first ICU admission date would be used if a case was readmitted).

  - If ICU admission date is missing, reported date is used as a proxy.

- For surveillance purposes, a COVID-19 death is defined as a death resulting from a clinically compatible illness unless there is a clear alternative cause of death that cannot be related to COVID-19 (e.g., trauma, medically assisted death). There should be no period of complete recovery from COVID-19 between illness and reported death.

- Deaths are determined by using the Outcome and Type of Death fields in CCM. COVID-19 deaths are counted where the Outcome value is 'Fatal' and the Type of Death value is not 'DOPHS was unrelated to cause of death'.

  - COVID-19 deaths are placed in time using the 'Date of Death' field in CCM. If the date of death is missing, the outcome date field is used as a proxy.

- COVID-19 cases from CCM for which the Classification and/or Disposition was reported as ENTERED IN ERROR, DOES NOT MEET DEFINITION, IGNORE, DUPLICATE or any variation on these values have been excluded. The provincial case count for COVID-19 may include some duplicate records, if these records were not identified and resolved.

- Long-term care home residents' includes cases that reported 'Yes' to the risk factor 'Resident of a long-term care home'; or 'Yes' to the risk factor 'Resident of nursing home or other chronic care facility' and reported to be part of an outbreak assigned as a long-term care home (via the Outbreak number or case comments field); or were reported to be part of an outbreak assigned as a long-term care home (via the outbreak number or case comments field) with an age over 70 years and did not report 'No' to the risk factors 'Resident of long-term care home' or 'Resident of nursing home or other chronic care facility'. 'Long-term care home residents' excludes cases that reported 'Yes' to any of the health care worker occupational risk factors.

Data Caveats: Variants of Concern

- Public Health Ontario conducts testing and genomic analyses for SARS-CoV-2 positive specimens using the criteria outlined in PHO's SARS-CoV-2 (COVID-19 Virus) Variant of Concern (VoC) Screening and Genomic Sequencing for Surveillance. Also see PHO's SARS-CoV-2 Whole Genome Sequencing in Ontario for more details.

- Lineage nomenclature is dynamic. PANGO lineage naming and assignment may change as more samples are sequenced and analyzed.

- Variant status may be updated based on scientific evidence. Variants designated as a VOC in Canada is available on the Public Health Agency of Canada's SARS-CoV-2 Variants webpage.

- The laboratory detection of a variant of concern is a multi-step process. Samples that test positive for SARS-CoV-2 and have a cycle threshold (Ct) value ≤30, may then undergo genomic analyses to identify the VOC lineage.

- If a VOC is identified through genomic analysis cases initially classified as a mutation may be updated and moved to the appropriate lineage (e.g. B.1.1.529, B.1.617.2)

Data Caveats: COVaxON

- Linking COVaxON and CCM data is dependent on availability of personal identifiers reported in both databases. For example, if a client was reported in both COVaxON and CCM, but personal identifiers (e.g. such as health card number, date of birth) were not available, then sufficient information would not have been available to identify the client and the client would not have been included in the linkage.

- Methods for processing COVaxON vaccine uptake data are described in the Technical Notes of the COVID-19 Vaccine Uptake Report.

- For definitions used to describe COVID-19 infection following vaccination, please refer to Confirmed Cases of COVID-19 Following Vaccination in Ontario.

- For additional information and technical notes related to COVID-19 infection following vaccination, please refer to Confirmed Cases of COVID-19 Following Vaccination in Ontario.

Data Caveats and Methods: ON-Marg

- ON-Marg is a data tool that combines a wide range of demographic indicators into multiple distinct dimensions of marginalization. It is an area-based index which assigns a measure of marginalization based on neighbourhood versus individual characteristics. As such, the broader demographic trends of an area may not reflect all residents of a neighbourhood owing to the inherent heterogeneity of demographic characteristics which can vary substantially especially across large rural geographies. For more information, please visit PHO's ON-Marg website.

- Neighbourhood material deprivation is defined using the material deprivation dimension of ON-Marg, which is closely connected to poverty. It refers to the inability of individuals and communities to access and attain basic material needs. The indicators included in this dimension measure income, quality of housing, educational attainment and family structure characteristics.

- "Neighbourhoods" are considered to be Statistic Canada dissemination areas (DA), the smallest geographic unit for which Canadian census data are available, with an average population of 400 to 700 residents. Cases were probabilistically matched to a DA based on their postal code using Statistics Canada's PCCF+ version 7E file, and subsequently one of five levels or quintiles of material deprivation so that each grouping contains 20% of Ontario neighbourhoods. The quintiles for the material deprivation dimensions are ordered from quintiles 1 to 5, with quintile 1 having the lowest level of marginalization (i.e., least deprived) and quintile 5 having the highest level of marginalization. (i.e., most deprived).

- The following were not included in analyses that summarize the impact of COVID-19 among Ontarians who may experience marginalization:

  - People who have tested positive for COVID-19 that reside in institutional and congregate settings are not included in the census data from which the marginalization indicators (e.g. material deprivation) are derived. Although these cases represent a large number of cases overall and deaths, their exclusion ensures appropriate comparisons since institutional and congregate setting residents are excluded from ON-Marg.

  - People who have tested positive for COVID-19 that reside in census dissemination areas where data has been suppressed, and cases that have missing or invalid postal codes could not be assigned to a quintile of marginalization.

  - Due to data suppression for some census indicators on First Nation reserves in Ontario, residents of reserves could not be included in ON-Marg and therefore people who have tested positive for COVID-19 and are living in these communities could not be assigned to a quintile of marginalization. While Indigenous individuals living off reserves are included in this analysis, indigeneity data is not currently collected or captured in dimensions of ON-Marg.

- Population counts used in rate denominators were provided by Ministry of Health. Individuals alive and eligible for the Ontario Health Insurance Plan (OHIP) Cohort FY 2019/20 (Extracted October 2020) using the OHIP RPDB were included.

  - Postal codes were assigned to individuals according to the most recent residential address available in the OHIP RPDB. The denominators do not include residents of Ontario who do not have a health card number. Population counts include individuals whose OHIP eligibility ended mid-year.

  - Individuals age less than 65 who have not had any health care system activity in the past seven years, and individuals age 65 and older who have not had any health care system activity in the past two years are assumed to be no longer residents of Ontario, and are excluded from the population counts (denominators).

- Quintile specific rates per 100,000 were age-standardized to the 2011 census population to account for any age differences between quintiles of marginalization.

Appendix A

Figure A1. Confirmed COVID-19 cases that were hospitalized, admitted to ICU or died because of COVID-19, by variant: Ontario, December 12, 2021 to June 4, 2022
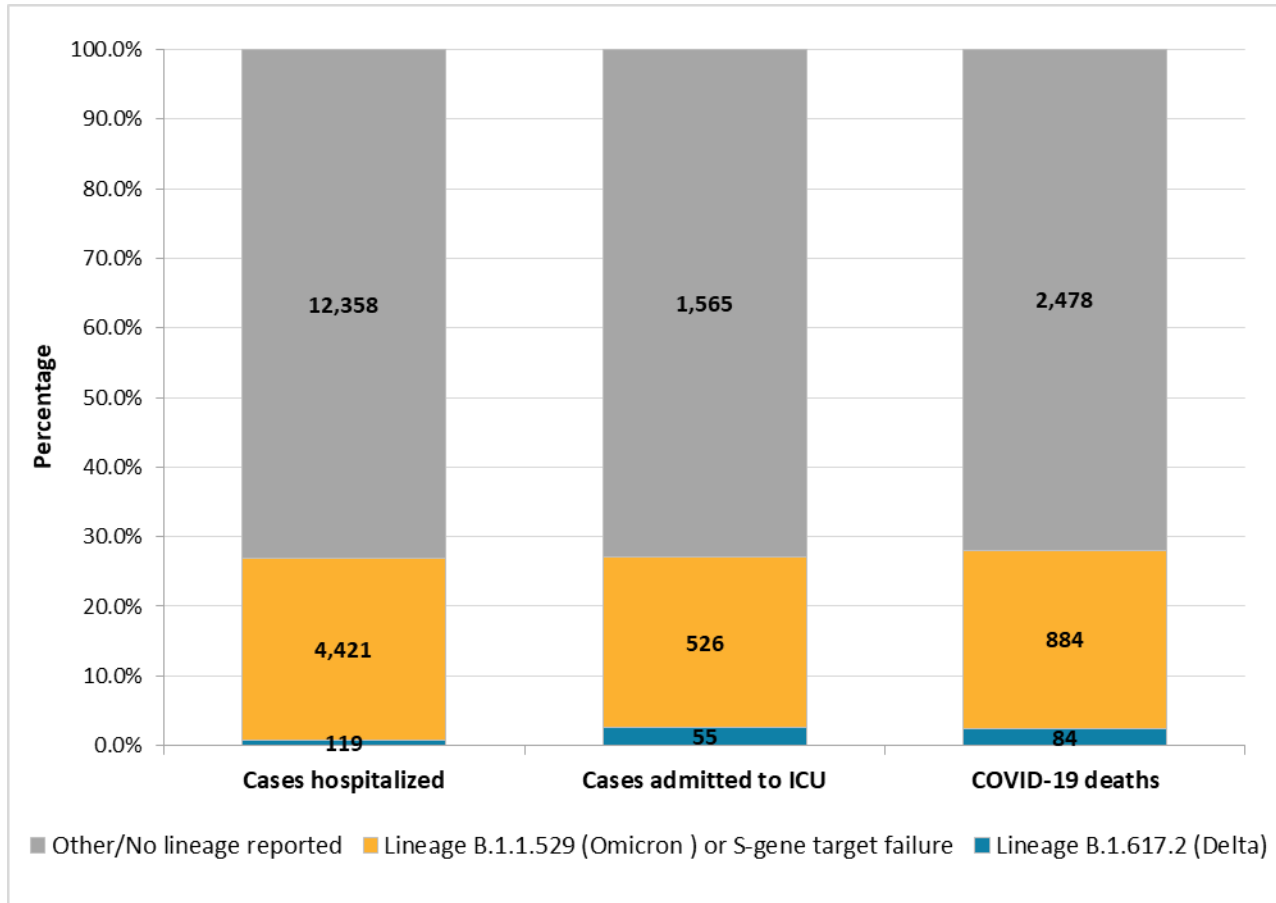
Source: CCM

Note: The number of cases that have samples screened for variants of concern or undergo genomic analysis decreased substantially during the time period presented. Therefore, variant information is not available for most cases. See SARS-CoV-2 Whole Genome Sequencing in Ontario for more details.

Figure A2. Number of confirmed COVID-19 cases with a severe outcome stratified based on their most severe outcome by case reported week: Ontario, December 12, 2021 to June 4, 2022
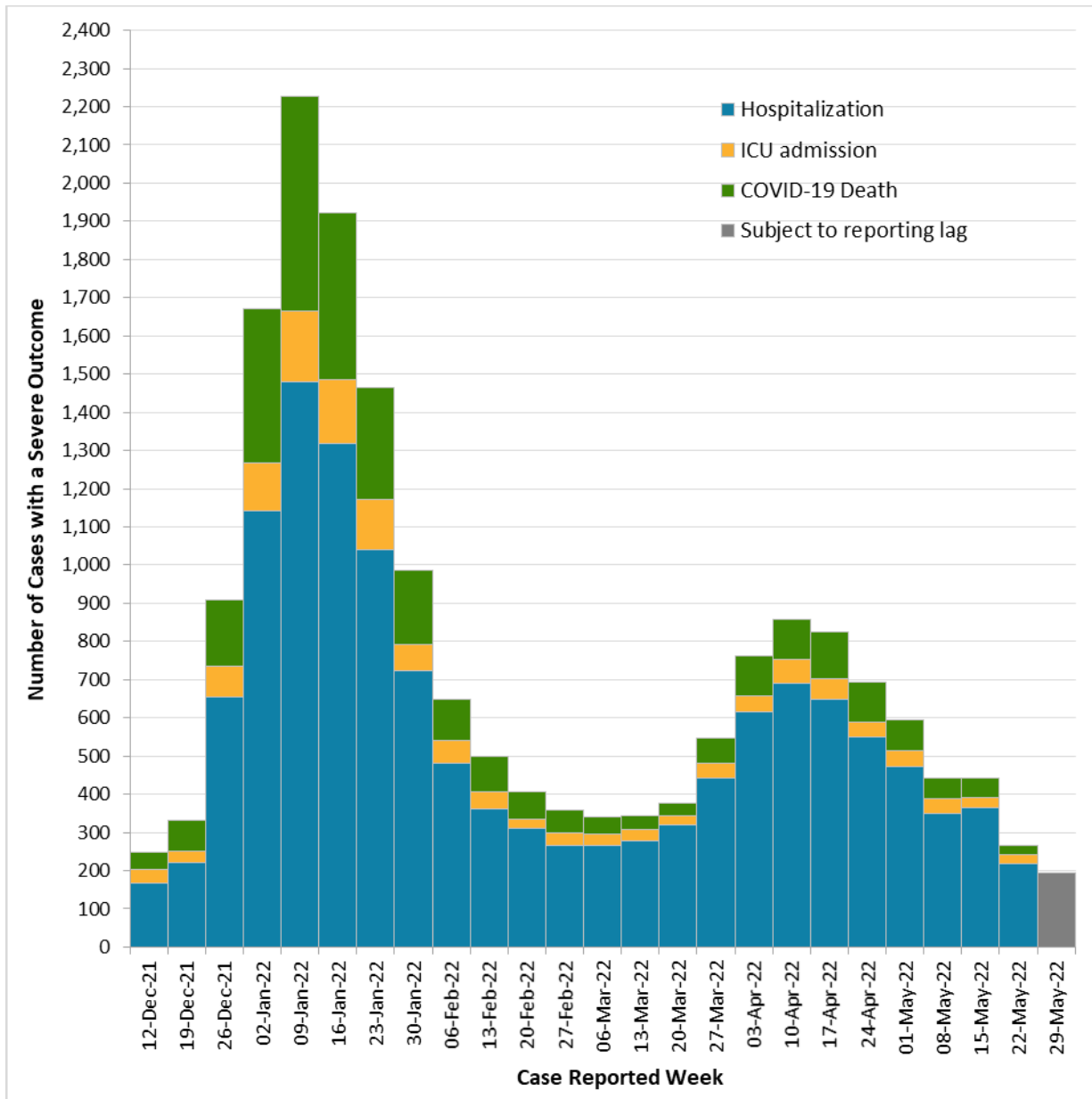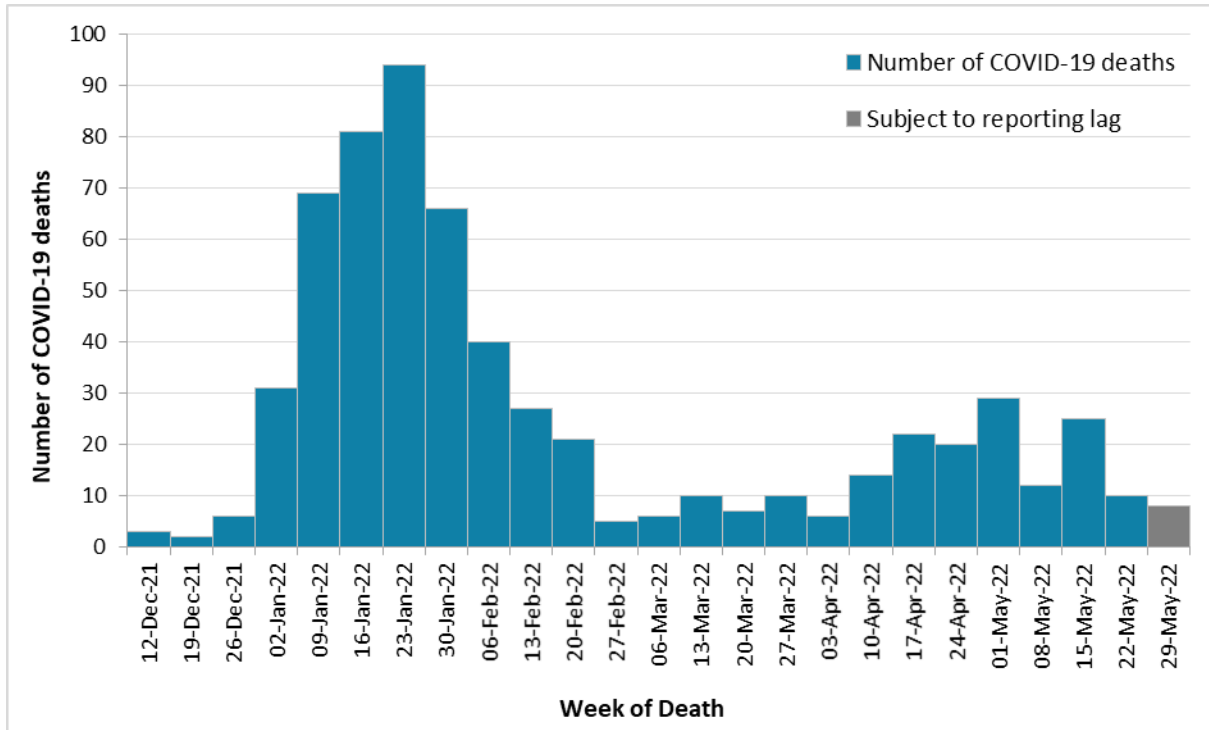

Data Source: CCM
Notes:

- Cases reported in the figure only include cases with a severe outcome defined as hospitalization, ICU admission or COVID-19 death. Cases were assigned to only one category, based on the most severe outcome, with COVID-19 death being the most severe and hospitalization being the least severe.
- Severe outcomes are placed in time based on the reported date of the case. Reported date is the date the case was reported to the public health unit. The outcome may have occurred at a later date than presented in this figure.
- Percentages are calculated out of the total number of cases for a given day with a severe outcome.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health units or entry into CCM). As well, severe outcomes are a lagging indicator, meaning that they often occur after (e.g. days or weeks) cases are initially reported to public health.

Figure A3. Confirmed LTCH Resident COVID-19 deaths, by week of death: Ontario, December 12, 2021 to June 4, 2022

Data Source: CCM
Notes:

- The vertical (y-axis) scale in this figure is smaller than in Figure 5 for all deaths.
- Recent outcome data should be interpreted with caution due to lags in reporting (to public health unit or by public health unit into CCM)

Citation

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