

PREGNANCY AND COVID-19 IN ONTARIO

Surveillance Update for March 2020 to March 2022

Over the course of the COVID-19 pandemic, BORN Ontario has been monitoring cases in pregnant individuals as part of our registry focus to facilitate and improve care. We have contributed Ontario data to a national project and learned that pregnant individuals have higher rates of hospitalization and intensive care unit (ICU) admission compared to non-pregnant individuals within the same age range. This is consistent with the experience of other countries. We have also learned that the babies of those pregnant with SARS-CoV-2 virus are more often born preterm compared to the general population of pregnant individuals ([See publication](#))¹. In this report we present a summary of Ontario data for the past 2 years.

BORN's COVID-19 data comes from Case Report Forms (CRF) from participating hospitals and midwifery practice groups across Ontario and includes those individuals who had a positive PCR or Rapid Antigen Test (RAT). We also receive information from Public Health Ontario's Case and Contact Management (CCM) system for all biological females aged 15-45 who have had a positive PCR test during pregnancy. These two data sources are then linked to the BORN Information System (BIS) which provides more in-depth information about the pregnancy and birth.

We present this report to support care providers, hospitals, midwifery practice groups, families and policy makers in learning how COVID-19 in pregnancy has affected the pregnant population. Aggregate data and findings have been shared with other researchers (e.g. CANCOVID-Preg), the Ontario Ministry of Health, and care provider groups so that pregnant individuals and care providers can have up-to-date information for decision-making. Within BORN we have also looked at the [impact of the first wave of the pandemic on system wide outcomes](#)² and also have a group working specifically on the [impacts of vaccination in the pregnant population](#)³.

Important Considerations

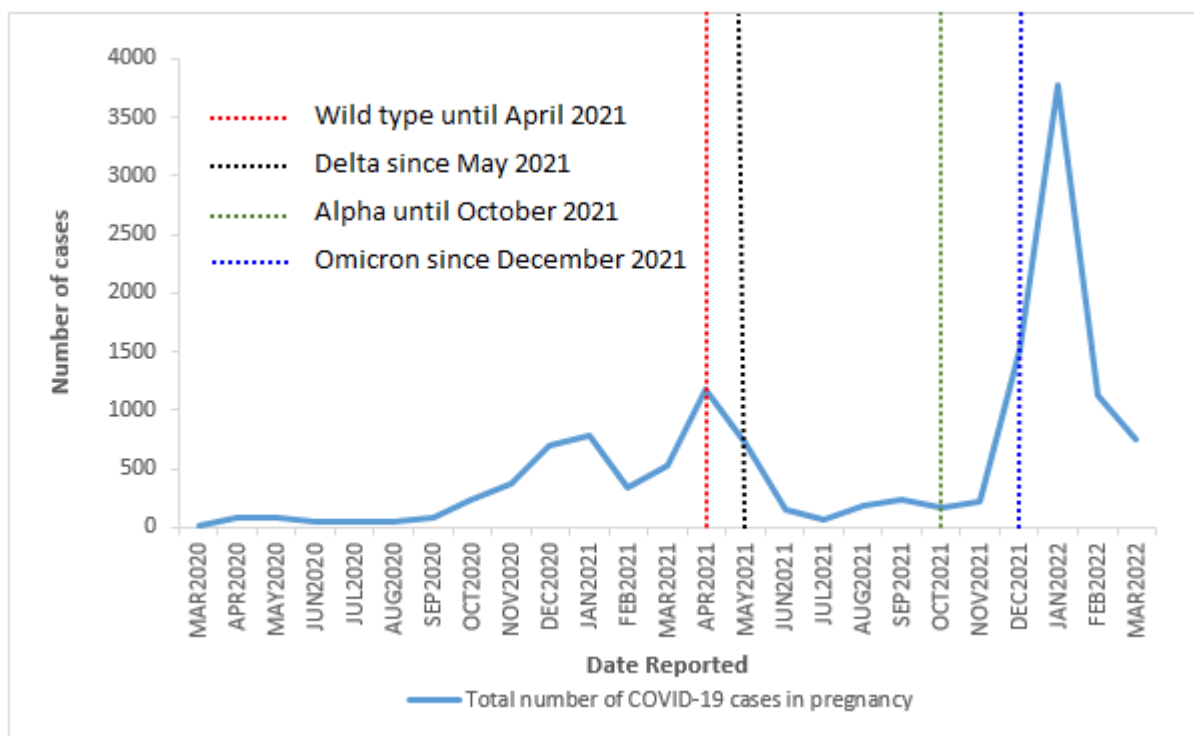
- This report only includes outcomes for confirmed cases (i.e. positive test for SARS-CoV-2 primarily on PCR, and as of January 2022 also through RAT) during pregnancy that have given birth, and that were ascertained through a CRF and/or CCM record between March 2020 and March 2022. Testing in Ontario (especially through PCR) has decreased in 2022. Only CRFs include cases ascertained through RAT, so the total number of cases is likely underestimated.
- If a CRF and CCM record was received for the same individual, it counted as a single case. The two data sources complement each other to provide more thorough information for the case.
- This report is not a complete ascertainment of cases since March 1st, 2020. This report underestimates the number of cases as some submissions are delayed and therefore not included here. Moreover, pregnant individuals were not eligible for PCR testing during a two-week period in December 2021, so any cases during that time are not included.

1. McClymont E, Albert AY, Alton GD, et al. Association of SARS-CoV-2 Infection During Pregnancy With Maternal and Perinatal Outcomes. *JAMA*. 2022;327(20):1983-1991. doi:10.1001/jama.2022.5906
2. Roberts NF, Sprague AE, Taljaard M, et al. Maternal-Newborn Health System Changes and Outcomes in Ontario, Canada, During Wave 1 of the COVID-19 Pandemic-A Retrospective Study. *J Obstet Gynaecol Can*. 2022;44(6):664-674. doi:10.1016/j.jogc.2021.12.006
3. Fell DB, Dhinsa T, Alton GD, et al. Association of COVID-19 Vaccination in Pregnancy With Adverse Peripartum Outcomes. *JAMA*. 2022;327(15):1478-1487. doi:10.1001/jama.2022.4255

COVID-19 in pregnancy: Overall trends

From March 1, 2020 – March 31, 2022 there have been 13,511 pregnant individuals in Ontario who have tested positive for SARS-CoV-2 during pregnancy. As shown in figure 1a and figure 1b, the outbreak waves seen in the general population mirror those seen in pregnant individuals for both overall and severe COVID cases. SARS-CoV-2 wild type was present between March 2020 and April 2021. The Delta variant was identified in May 2021. The Alpha variant was present until October 2021. The Omicron variant was identified in December 2021. There may have been an overlap of variants at different time periods (figure 1a and figure 1b). The majority of cases have been diagnosed during the first and second trimesters of pregnancy (table 1).

Figure 1a - Number of pregnancies affected by COVID-19 in Ontario



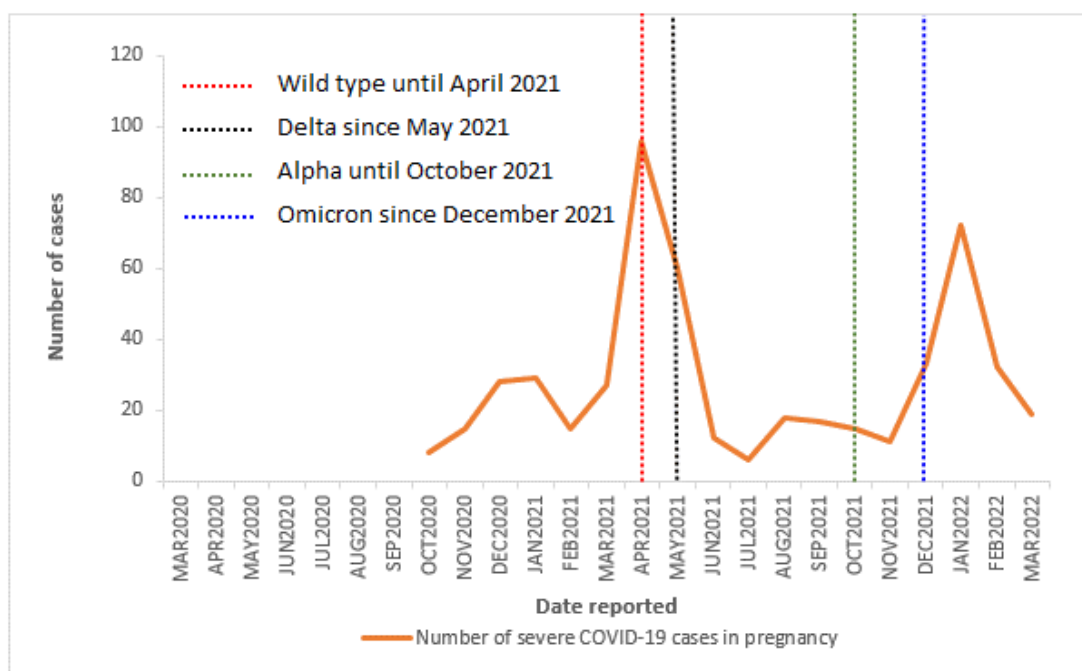
Note: Time periods for variants of concern in Ontario were retrieved from Science Table COVID-19 Advisory for Ontario: [Ontario Dashboard](#) ⁴

** There were 104 additional COVID-19 cases in pregnancy but the date of infection was not reported. These cases have been excluded from the line graph

Accessibility link: For the long description of Figure 1a, see page 7

4. Science Table COVID-19 Advisory for Ontario: Ontario Dashboard available at <https://covid19-sciencetable.ca/ontario-dashboard/?msclkid=96c174f8d07611ecbd1a002f317661d6> Accessed May 30, 2022

Figure 1b - Number of severe* COVID-19 cases in pregnancy in Ontario



Note: Time periods for variants of concern in Ontario were retrieved from Science Table COVID-19 Advisory for Ontario: [Ontario Dashboard](https://covid19-sciencetable.ca/ontario-dashboard/) ⁴

* Severe COVID-19 cases include anyone with any of the following: hospitalization, ICU admission, death, pneumonia, sepsis, respiratory failure, acute respiratory distress syndrome, heart failure, septic shock, coagulopathy, disseminated intravascular coagulopathy, renal failure, liver dysfunction, or ventilatory support

** There were 12 additional severe cases in pregnancy but the date of infection was not reported. These cases have been excluded from the line graph

Accessibility link: For the long description of Figure 2, see page 8

Table 1 - Gestational age at time of confirmed COVID-19 - March 1, 2020 to March 31, 2022

Gestational age at diagnosis	Frequency (n=13,511) ¹	Percent
Less than 14 weeks	3202	23.7
14-27 weeks	4701	34.8
28-37 weeks	3863	28.6
38-42 weeks	1537	11.4
Missing	208	1.5

¹ Total number of individuals with COVID-19 during pregnancy

4. Science Table COVID-19 Advisory for Ontario: Ontario Dashboard available at <https://covid19-sciencetable.ca/ontario-dashboard/?msckid=96c174f8d07611ecbd1a002f317661d6> Accessed May 30, 2022

COVID-19 in pregnancy: Disease severity

From March 1, 2020 to March 31, 2022, 96% of pregnant individuals with COVID-19 experienced mild to moderate disease and 4% experienced severe disease (table 2). A larger proportion of pregnant individuals with severe COVID-19 had co-morbidities compared to those with mild to moderate disease, as well as the general pregnant population during the same time period (table 2).

Of the 13,511 pregnancies with COVID-19, 505 (3.7%) pregnant individuals were hospitalized due to COVID-19 with the majority (421) having a general admission and 84 being admitted to the ICU. A total of <6 individuals died (table 3). These proportions are higher than those of the general female population in Ontario aged 20-39 who were hospitalized due to COVID-19 illness or complications (hospitalization = 0.1%)⁵. Overall, respiratory complications were the most prevalent SARS-CoV-2 complications with pneumonia being the most common (table 4). Length of hospital stay, in days, due to COVID-19 illness and/or complications varied considerably (mean= 5.7, median=2, std=12.4) (table 5). Three-quarters of hospitalized patients were admitted to hospital for 6 days or less (data not shown), and a small number of pregnant individuals were admitted to hospital for 30 days or more due to COVID-19. There was far less variability for pregnant individuals who were admitted to hospital for birth during the same time period; they were primarily admitted to hospital for just over one day (mean=1.4, median=1.3, std=0.7).

Table 2 - Frequency of maternal comorbidities according to COVID-19 severity - March 1, 2020 to March 31, 2022

	General Pregnant Population	Mild and Moderate COVID-19	Severe COVID-19	Total for COVID-19
Maternal Comorbidities	Frequency and percent (n=281,539)	Frequency and percent (n=12,966)	Frequency and percent (n=545)	Frequency and percent (n=13,511)
Diabetes	29,220 (10.4%)	979 (7.6%)	67(12.3%)	1046 (7.7%)
Hypertension	19,767 (7.0%)	582 (4.5%)	45(8.3%)	627 (4.6%)

* Includes pre-existing diabetes and hypertension, as well as diabetes and hypertension during pregnancy

** Less than 1% of individuals overall had pre-existing cardiovascular disease or asthma, thus stratification by COVID-19 disease severity was not possible due to small cell counts

Table 3 - Maternal outcomes for all pregnancies with COVID-19 - March 1, 2020 to March 31, 2022

	Frequency (n=13,511) ¹	Percent
No hospitalization	13,006	96.2
Hospitalization ²	505	3.7
General admission	421	3.1
ICU admission	84	0.6
Death	<6	---

¹ Total number of individuals with a COVID-19 during pregnancy

² Hospitalizations due to COVID-19

Table 4 - Maternal SARS-CoV-2 complications and use of ventilator support due to COVID-19 - March 1, 2020 to March 31, 2022

	Frequency (n= 13,511) ¹	Percent
Pneumonia	93	0.7
Sepsis	7	0.05
Respiratory failure	16	0.1
Acute respiratory distress syndrome	24	0.2
Liver dysfunction	6	0.04
Other complications²	19	0.1
Ventilatory support³	39	0.3
Severe COVID-19 during pregnancy⁴	545	4.0

¹Total number of pregnant individuals with COVID-19 during pregnancy, regardless of disease severity

² Some complications have been grouped together due to small cell counts. Other complications include heart failure, renal failure, septic shock, coagulopathy, and disseminated intravascular coagulopathy

³ Ventilatory support has been grouped together due to small cell counts. It includes extracorporeal membrane oxygenation (ECMO), non-invasive ventilation and invasive ventilation.

⁴ Includes anyone with any of the following: hospitalization, ICU admission, death, pneumonia, sepsis, respiratory failure, acute respiratory distress syndrome, heart failure, septic shock, coagulopathy, disseminated intravascular coagulopathy, renal failure, liver dysfunction, or ventilatory support. These are not mutually exclusive conditions.

Table 5 - Length of stay (LOS) in hospital due to COVID-19 versus average postpartum length of stay in days - March 1, 2020 to March 31, 2022*

	Mean	Median	Standard deviation	Minimum	Maximum
Average postpartum LOS for all pregnancies	1.4	1.3	0.7	< 1	5
COVID-19	6.2	2	13.2	< 1	181

* Includes vaginal and cesarean deliveries during the same time period

COVID-19 in pregnancy: Birth Outcomes

Of the 8912 infants born to an individual with a COVID-19 diagnosis during pregnancy where a birth has occurred as of March 31, 2022, 50 (0.6%) were stillbirths (table 6), and the majority were born vaginally (table 7). In comparison, the stillbirth rate for the 5-year period pre-pandemic in Ontario was 0.47%⁶. Of the livebirths, 9.1% were born premature (table 8). The typical preterm birth rate in Ontario is 7.7%, and varies by region from 5.6% - 12.1%⁷. Moreover, 7.1% of infants born to mothers with COVID-19 at during pregnancy had a birth weight of less than 2500 grams (table 9) and 1241 (14%) were admitted to the neonatal intensive care unit (NICU).

Due to limited SARS-CoV-2 testing performed on newborn infants at birth in Ontario, this outcome is not reported here. However, [a study conducted in Ontario](#)⁸ reported that vertical transmission (from pregnant individual to infant) is unlikely.

6. Stillbirths in Ontario 2021. Ottawa, Ontario, 2021. Available: <https://www.bornontario.ca/en/news/stillbirths-in-ontario-2021.aspx>

7. One in a Million. BORN Ontario Biennial Report 2016-2018. Ottawa, Ontario, 2018. Ontario COVID-19 Data Tool.

8. Fitzpatrick T, Wilton AS, Chung H, Guttman A. SARS-CoV-2 Infection Among Maternal-Infant Dyads in Ontario, Canada. *JAMA Netw Open*. 2021;4(8):e2120150. Published 2021 Aug 2. doi:10.1001/jamanetworkopen.2021.20150

Table 6 - Outcome of pregnancy for COVID-19 pregnancies - March 1, 2020 to March 31, 2022

	Frequency (n=8912) ¹	Percent
Live birth	8862	99.4
Stillbirth at ≥ 20 wks or ≥ 500 gms ²	50	0.6

Note: 4734 pregnancies are still ongoing or a birth record is not yet available

¹ Total number of infants delivered (including live births and stillbirths)

² Spontaneous stillbirth which may have occurred during the antepartum or intrapartum period

Table 7 - Mode of delivery for pregnancies with COVID-19 - March 1, 2020 to March 31, 2022

	Frequency (n=8912) ¹	Percent
Spontaneous vaginal	5282	59.3
Assisted vaginal	633	7.1
Induced or spontaneous labour cesarean section	1411	15.8
No labour - cesarean section	1575	17.7
Mode of delivery missing	11	0.1

¹ Total number of infants delivered (including live births and stillbirths)

Table 8 - Gestational age at birth for liveborn infants to pregnant individuals with COVID-19 - March 1, 2020 to March 31, 2022

	Frequency (n=8862)	Percent
< 28 weeks	54	0.6
28 - 31 weeks	65	0.7
32-33 weeks	102	1.2
34-36 weeks	581	6.6
≥ 37 weeks (term)	8060	90.9

Table 9 - Birth weight of liveborn infants to pregnant individuals with COVID-19 - March 1, 2020 to March 31, 2022

	Frequency (n=8862)	Percent
< 2500g	634	7.1
2500 - 3999g	7311	82.5
≥ 4000 g	732	8.3
Missing	185	2.1

COVID-19 in pregnancy: Vaccination in pregnancy

Vaccination became widely available for pregnant people in April 2021. Of the 368 pregnant individuals who were hospitalized for COVID-19 from April 1, 2021 – March 31, 2022, approximately 75% of hospitalizations and 93% of ICU admissions were in unvaccinated individuals (table 10).

Table 10 - Maternal outcomes by vaccination status at time of COVID-19 for pregnant individuals hospitalized between April 1, 2021 and March 31, 2022¹

	Unvaccinated	Partially vaccinated ²	Fully vaccinated	Boosted	Total
Hospitalization	275 (74.7%)	13 (3.5%)	65 (17.7%)	15 (4.1%)	368 ³
ICU admission⁴	57 (93.4%)	< 6	< 6	< 6	61
Death⁴	<6	0	0	0	<6

¹ Vaccination became widely available for pregnant individuals in Ontario in April, 2021. Total sample includes hospitalized pregnant individuals who had a COVID-19 between April 1, 2021 and March 31, 2022 only. Hospitalizations and deaths prior to this time period are not included in the table

² Individuals who received their first dose at least 14 days prior to the COVID-19 and who have not yet received their second dose in the past 14 days

³ Total includes both general admissions and ICU admissions

⁴ Cannot report exact number of ICU admissions or deaths in some subgroups due to small cell count

BORN would like to thank the hospital and midwifery practice groups for contributing to this important COVID-19 in pregnancy surveillance

Accessibility Links – Long descriptions

Figure 1a is a line graph with the y-axis representing the number of cases of COVID-19 in pregnancy and the x-axis representing the date of infection in months. Four vertical lines representing the different SARS-CoV-2 variant waves in Ontario cross the line graph at different months. SARS-CoV-2 wild type was present between March 2020 and April 2021. The Delta variant was identified in May 2021. The Alpha variant was present until October 2021. The Omicron variant was identified in December 2021. There may be an overlap of variants at different time periods.

Date reported	Total number of COVID-19 cases in pregnancy
March 2020	22
April 2020	75
May 2020	75
June 2020	40
July 2020	40
August 2020	40
September 2020	91
October 2020	229
November 2020	374
December 2020	690
January 2021	791

February 2021	334
March 2021	528
April 2021	1178
May 2021	709
June 2021	154
July 2021	68
August 2021	188
September 2021	230
October 2021	166
November 2021	212
December 2021	1510
January 2022	3772
February 2022	1120
March 2022	750

Figure 1b is a line graph with the y-axis representing the number of severe cases of COVID-19 in pregnancy and the x-axis representing the date of infection in months. Four vertical lines representing the different SARS-CoV-2 variant waves in Ontario cross the line graph at different months. SARS-CoV-2 wild type was present between March 2020 and April 2021. The Delta variant was identified in May 2021. The Alpha variant was present until October 2021. The Omicron variant was identified in December 2021. There may be an overlap of variants at different time periods. Note: Cannot report exact number of severe cases in some months due to small cell count.

Date reported	Total number of severe COVID-19 cases in pregnancy
March 2020	< 6
April 2020	< 6
May 2020	< 6
June 2020	< 6
July 2020	< 6
August 2020	< 6
September 2020	< 6
October 2020	8
November 2020	15
December 2020	28
January 2021	29
February 2021	15
March 2021	27
April 2021	96
May 2021	60
June 2021	12
July 2021	6
August 2021	18
September 2021	17
October 2021	15
November 2021	11
December 2021	33
January 2022	72
February 2022	32
March 2022	19