CANADIAN SURVEILLANCE OF COVID-19 IN PREGNANCY: EPIDEMIOLOGY, MATERNAL AND INFANT OUTCOMES

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Maternal and Infant Outcomes (March 1st, 2020 to December 31st, 2022) from 9 Canadian Provinces and Territories

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(See Appendix 1 for List of Collaborators)

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*The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

SUMMARY

1. Rates of hospitalization and ICU admission have declined since December 31st, 2021.
2. Risk of adverse outcomes was significantly higher for unvaccinated pregnant women/persons compared to vaccinated pregnant women/persons during both Delta and Omicron periods of the pandemic.
3. Risk of hospitalization was significantly higher for unvaccinated pregnant women/persons in the Delta period compared to the Omicron period of the pandemic.

1.0 BACKGROUND

The Canadian Surveillance of COVID-19 in Pregnancy project (CANCOVID-Preg) has been central to understanding the evolving epidemiology of COVID-19 in pregnancy in Canada. Previously published CANCOVID-Preg data have confirmed international findings that pregnant women/persons were at increased risk of severe illness from SARS-CoV-2, including the need for maternal hospitalization and admission to an intensive care unit (ICU).[1-18] We are now monitoring disease severity in both vaccinated (i.e. at least one dose prior to COVID-19 diagnosis) and unvaccinated (i.e., no doses prior to COVID-19 diagnosis) pregnant women/persons over time with variant emergence. By identifying pregnant women/persons who are most at risk for adverse maternal and infant outcomes, CANCOVID-Preg data can be used to inform public health and the clinical management of this population. This report highlights interim findings from nine provinces and territories [British Columbia (BC), Ontario (ON), Manitoba (MB), Quebec (QC), New Brunswick (NB), Nova Scotia (NS), Prince Edward Island (PE), Newfoundland & Labrador (NL), and Yukon Territory (YT)], participating in the CANCOVID-Preg Project.

2.0 METHODS

On behalf of public health officials, with support from the Public Health Agency of Canada, the COVID-19 Immunity Task Force, the Canadian Institutes for Health Research, and the BC Women's Health Foundation, this national, prospective, surveillance project was initiated to monitor pregnancy outcomes throughout the pandemic. This initiative is supported by central coordination at the University of British Columbia, through the Reproductive Infectious Diseases Program, based at the Women's Health Research Institute in Vancouver, BC.

Data on laboratory-confirmed, SARS-CoV-2 PCR positive cases during pregnancy were obtained through public health agencies and/or provincial databases in each participating province until December 2021, when PCR testing in Canada declined. From January 2022 to December 2022, pregnant women/persons with either a positive PCR or rapid antigen test (RAT) were reported to CANCOVID-Preg by physicians and midwives across the country and included in the dataset. Data were abstracted and entered directly into a Research Electronic Data Capture (REDCap) database, which utilizes a robust data confidentiality and security protocol. Data abstraction is complete, and the dataset was closed May 24th, 2024. In ON, data were entered at the point of care into a data collection tool and securely transferred to the BORN Information System (where it was linked with the corresponding pregnancy or birth record). Public health laboratory notifications were also submitted to BORN Ontario for linkage to the BORN Information System.

In this report we present data from British Columbia (BC), Manitoba (MB), New Brunswick (NB), Nova Scotia (NS), Prince Edward Island (PEI), Newfoundland & Labrador (NL), Quebec (QC), Yukon Territory (YT), and Ontario (ON) for cases with a documented SARS-CoV-2 diagnosis date (Figure 1). Data from Alberta is pending. High-level summary data were amalgamated for this report (manuscript in preparation). Available data for this report are from 29,347 cases detected between March 1st, 2020 and December 31st, 2022. Variant time period analyses were based on the following estimates of variant dominance in Canada for pre-Delta: 2020-03-01 to 2021-04-04, Delta: 2021-04-05 to 2021-12-20, and Omicron: 2021-12-21 to 2022-12-31.[19]

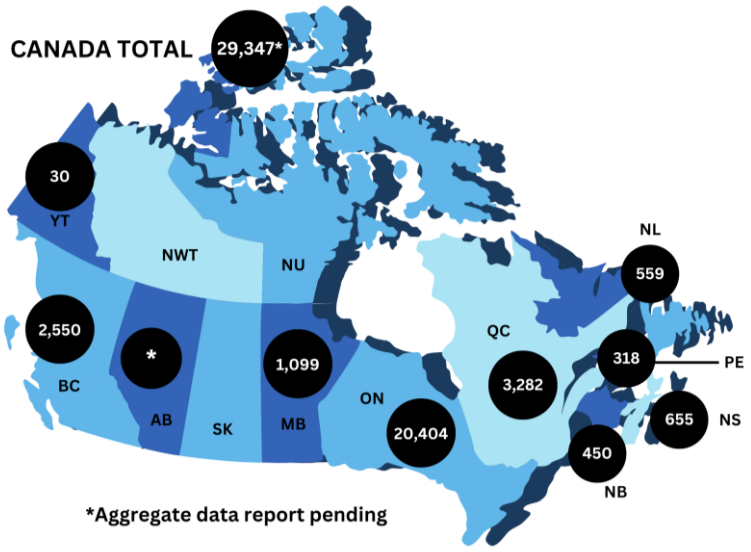

Figure 1. Case counts by province, with a documented SARS-CoV-2 diagnosis date.

3.0 RESULTS

3.1 Demographic and Clinical Summaries

The majority of pregnancies with a positive SARS-CoV-2 diagnosis had a maternal age less than 35 (80%), a BMI less than 30 (76%), and a gestational age at diagnosis of 37 weeks or less (87%). Approximately 2% of cases had pre-existing asthma, 0.6% of cases had pre-existing hypertension, and 0.5% of cases had pre-existing type 1 or 2 diabetes.

Table 1. Demographic and clinical summaries.

		N	Denominator
Age	< 30	9,770 (35.1%)	27,851
	30-35	12,584 (45.2%)	
	≥ 36	5,497 (19.7%)	
BMI	< 18.5	889 (4%)	23,231
	18.5 - 24	10,558 (45%)	
	25 - 29	6,311 (27%)	
	≥ 30	5,473 (24%)	
Gestational Age at Diagnosis (weeks)	≤ 14	6,292 (22.1%)	28,493
	15 – 27	9,794 (34.4%)	
	28 – 37	8,471 (29.7%)	
	≥ 38	3,936 (13.8%)	
Asthma	Yes	628 (2.1%)	29,347
Hypertension (chronic)	Yes	187 (0.6%)	29,347
Diabetes (type 1 or 2)	Yes	136 (0.5%)	29,347

3.2 Pregnancy Outcomes

In this sample, 8% of pregnant women/persons diagnosed with SARS-CoV-2 infection experienced a preterm birth, with the majority of preterm births (~72%) being late preterm (between 34 and 37 weeks). The majority were vaginal deliveries (67%), with a stillbirth rate of 0.6%.

Table 2. Pregnancy outcomes.

		N	Denominator
Mode of Delivery	Caesarean	8,990 (32.9%)	27,328
	Vaginal	18,338 (67.1%)	
Gestational Age at Delivery	Preterm (< 37 weeks)	2,304 (8.0%)	28,809
	Term (≥ 37 weeks)	25,246 (87.6%)	
Preterm Birth	Iatrogenic	1,080 (3.7%)	29,268
	Spontaneous	1,136 (3.9%)	
Birth Outcome	Live Birth	27,768 (98.9%)	28,072
	Stillbirth	170 (0.6%)	
	Loss (< 20 weeks or < 500g)	134 (0.5%)	

3.3 Infant Outcomes

The majority of infants exhibited a 5-minute Apgar score greater than 7 (96%) and were within the normal weight range of 2500g - 4000g (85%). NICU admission rates were approximately 11%.

Table 3. Infant outcomes.

		N	Denominator
Apgar 5	≤ 7	1035 (3.8%)	27,045
	> 7	26,010 (96.2%)	
Birth Weight (g)	< 2500	1,959 (7.3%)	26,810
	2500 - 4000	22,428 (84.7%)	
	> 4000	2,423 (9.0%)	
NICU admission	Yes	3,385 (11.4%)	29,781

3.4 Adverse Outcomes Over Time

The Omicron era saw a dramatic decline in hospitalizations and ICU admissions. Hospitalization rates fell from a peak of 7.7% during the Delta time period to 2.0% during Omicron, with ICU admission rates similarly falling from 2.2% during Delta to 0.1% during Omicron. There were similar rates of NICU admission during pre-Delta and Delta (12.3% and 12.8%, respectively) with a slight decline during Omicron (10.8%). Preterm birth rates declined across all time periods (9.4%, 8.7%, and 8.0%, respectively).

Table 4. Adverse outcomes across time periods.

	Pre-Delta	Delta	Omicron
Hospitalization rate	4.6%	7.7%	2.0%
ICU admission rate	1.2%	2.2%	0.1%
Preterm birth rate	9.4%	8.7%	8.0%
NICU admission rate	12.3%	12.8%	10.8%

3.5 Vaccination

When looking only at the Delta time period, the risks of hospitalization and ICU admission were both significantly higher among unvaccinated pregnant women/persons compared to their vaccinated counterparts. The relative risk (RR) of hospitalization was 4.47 (95% CI: 2.89-6.94) for those who were unvaccinated versus vaccinated, while the RR of ICU admission was 7.11 (95% CI: 2.61-19.35). This was also the case, in a less pronounced manner, for preterm birth (RR: 1.33, 95% CI: 1.03-1.73). There was no statistically significant difference between the two groups for NICU admissions.

When looking only at the Omicron time period, the relationship between being unvaccinated and increased risk of adverse outcomes (hospitalization, ICU admission, and preterm birth) remained true. Additionally, the risk of NICU admission was significantly higher among unvaccinated pregnant women/persons (RR: 1.34, 95% CI: 1.11-1.63).

When comparing Delta and Omicron time periods, the risk of hospitalization among unvaccinated pregnant women/persons was significantly higher in the Delta time period (RR: 2.37, 95% CI: 1.75-3.20). However, among vaccinated pregnant women/persons, the risk of hospitalization was not significantly higher in the Delta time period compared to Omicron.

3.6 Risk Factors for Hospitalization

Several factors were associated with hospitalization among pregnant women/persons. During the Delta time period, higher BMI, pre-existing asthma, and increasing gestational age at diagnosis increased the risk of hospitalization. Similarly, the same risk factors, as well as pre-existing hypertension, increased the risk of hospitalization during the Omicron time period. During the Omicron era, being aged 30-35 years was associated with the lowest risk of hospitalization compared to being aged <30 years or >35 years. Minority women were more likely to be hospitalized during both Delta and Omicron time periods.

4.0 DISCUSSION

The data presented in this report demonstrate findings that are consistent with prior reports, particularly the most recent report (#6). Rates of NICU admission (11.4%) and stillbirth (0.6%) are in keeping with pre-pandemic background rates (11.1% [20] and 0.8%,[21] respectively) in the general population. Updated numbers for preterm birth exhibit relatively average rates of 8-9%.

With data abstraction complete and many additional data from the Omicron era now incorporated, this report demonstrates a decline in ICU admission and hospitalization in pregnant women/persons since December 2021. These findings highlight the lessening severity of disease associated with the passage of time and suggest that both new variant emergence (i.e., Omicron) and vaccination are associated with reduced disease severity among pregnant women/persons and improved early infant outcomes. This highlights the ongoing value of vaccination in pregnancy to reduce the risk of severe disease in pregnancy and to provide passive protection to the newborn.

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