

REPORT #7 (FINAL REPORT)

COVID-19 VACCINATION DURING PREGNANCY IN ONTARIO

December 14, 2020 to December 31, 2022

BACKGROUND:

Pregnant individuals are considered a high-risk population for COVID-19 complications, based on higher rates of COVID-19 hospitalization, intensive care unit (ICU) admission, and death compared with non-pregnant individuals. In late April 2021, pregnant people in Ontario were prioritized for COVID-19 vaccination as part of Phase 2 of the COVID-19 vaccine program implementation. The Better Outcomes Registry & Network (BORN) Ontario evaluated COVID-19 vaccination in pregnant individuals in Ontario. **This report presents data on vaccine coverage among individuals who were pregnant at any point between December 14, 2020 and December 31, 2022, and also presents summary information about pregnancy and birth outcomes, and COVID-19 vaccination during and after pregnancy.**

RESULTS:

FIGURE 1. Estimated percentage of pregnant people who had received at least one COVID-19 vaccine (before or during pregnancy), by calendar month

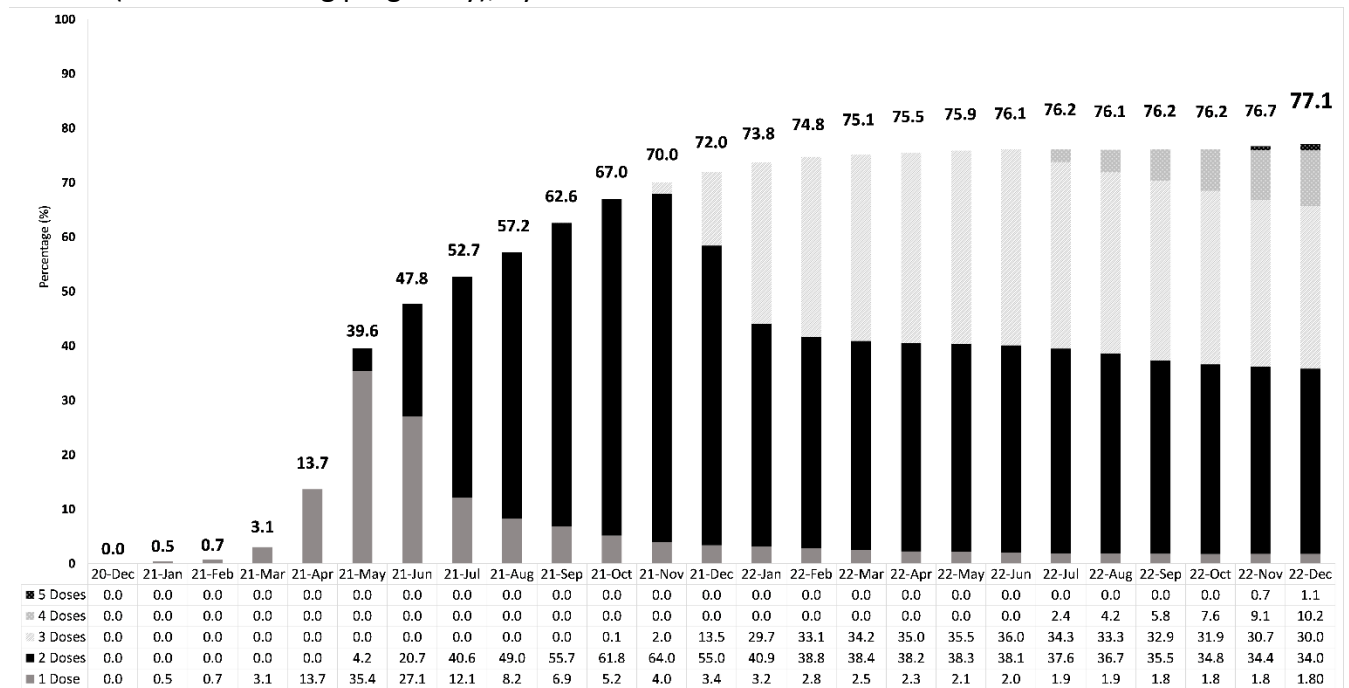


FIGURE 1 shows that among people who were pregnant in December 2022, 77.1% had received one or more doses before or during pregnancy:

- **75.3%** had received two or more doses of COVID-19 vaccine before or during pregnancy
- **41.3%** had received three or more doses of COVID-19 vaccine before or during pregnancy
- **11.3%** had received four or more doses of COVID-19 vaccine before or during pregnancy

FIGURE 2. COVID-19 vaccine coverage (at least 1 dose before or during pregnancy) in the pregnant population by maternal age in December 2022

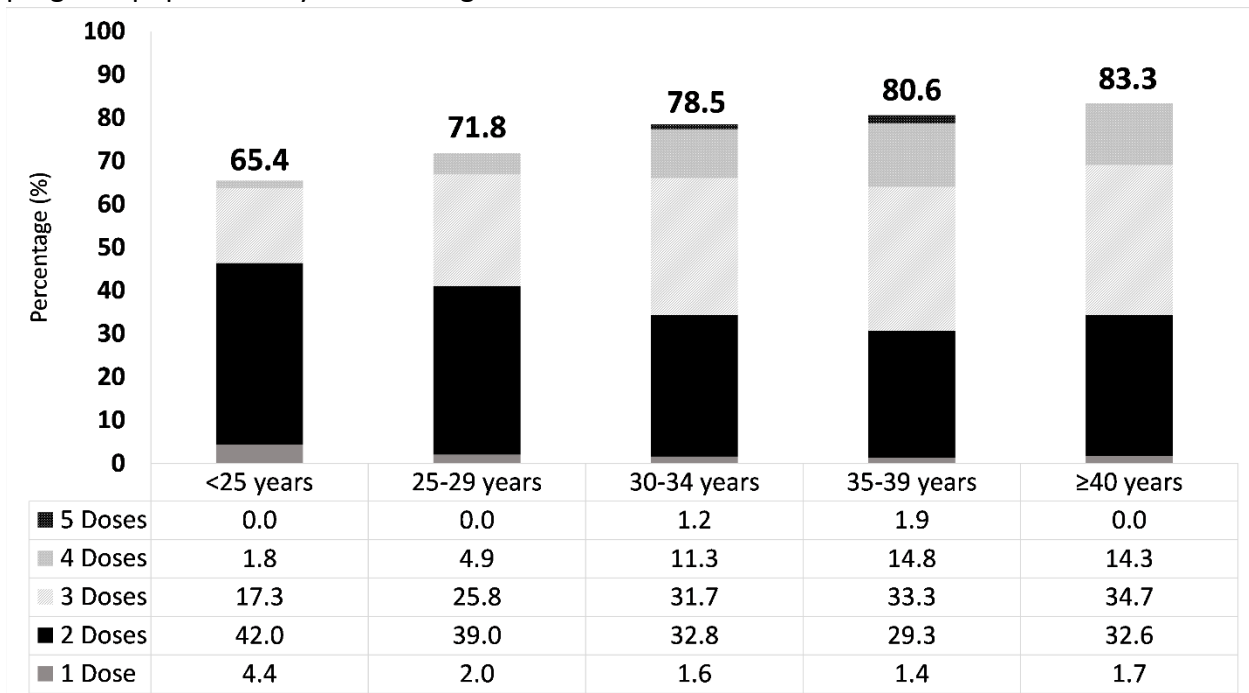


FIGURE 3. COVID-19 vaccine coverage (at least 1 dose before or during pregnancy) in the pregnant population by neighbourhood income quintile in December 2022

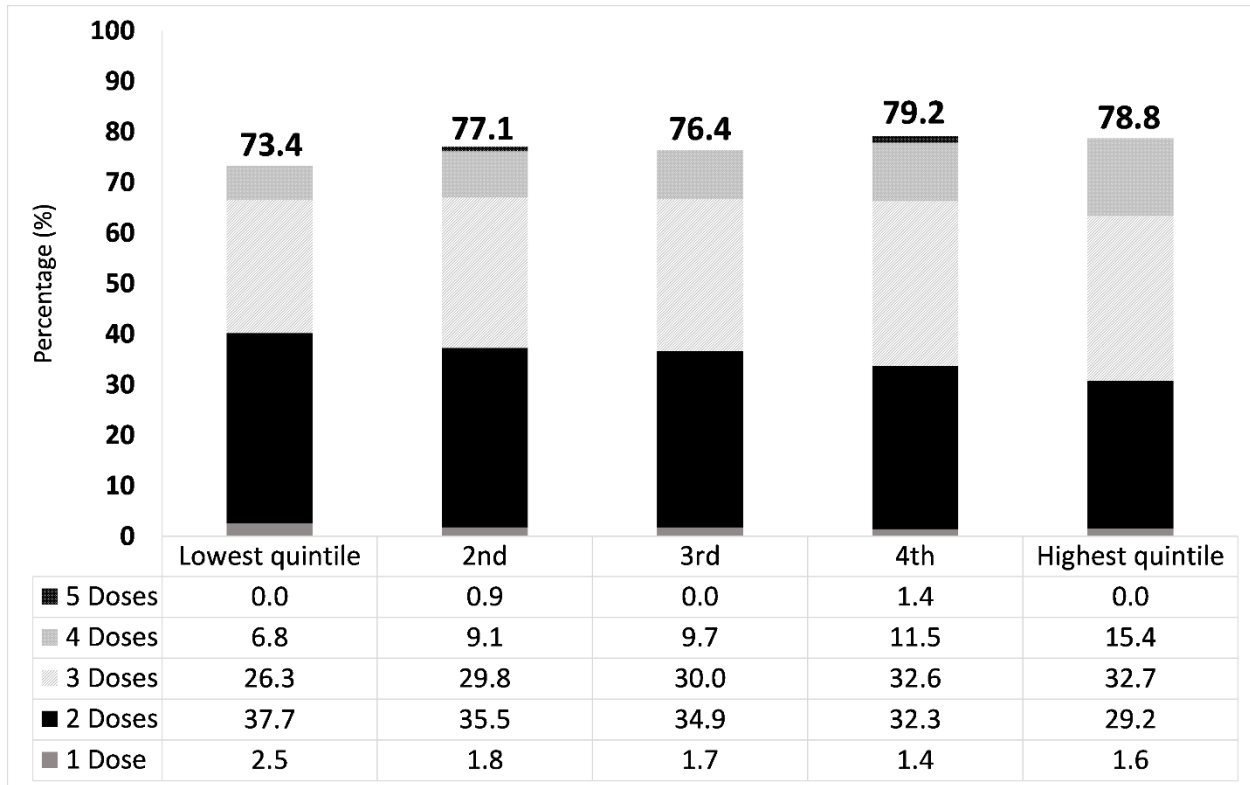
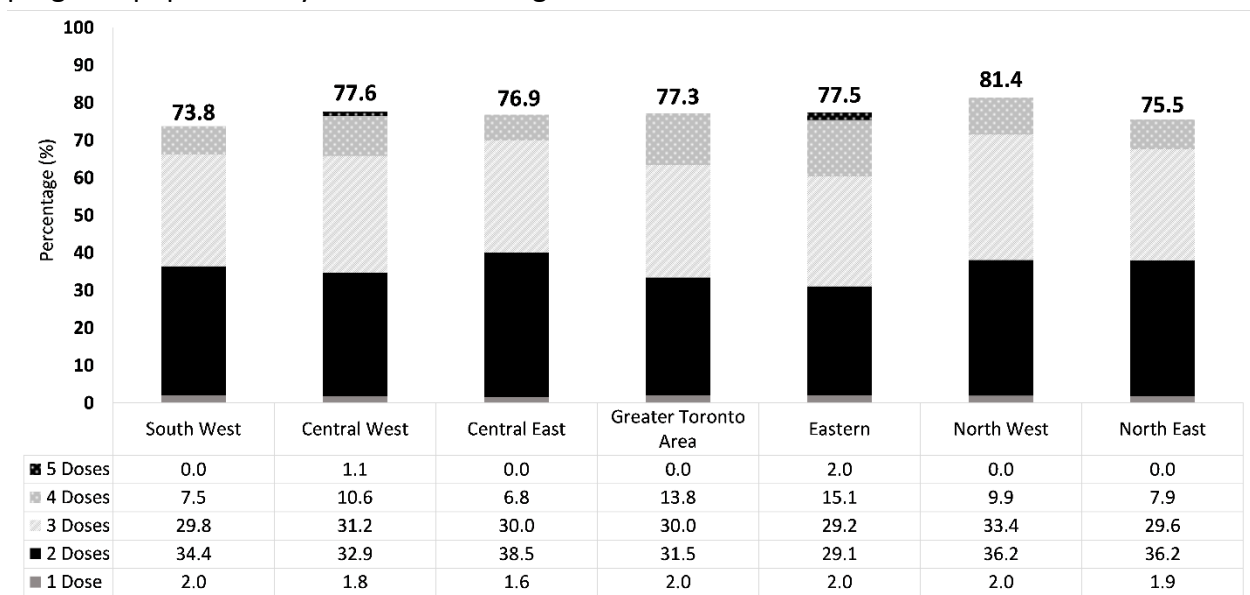


FIGURE 4. COVID-19 vaccine coverage (at least 1 dose before or during pregnancy) in the pregnant population by Public Health Region in December 2022



RESULTS:

FIGURE 2, 3, and 4 show that among people who were pregnant in December 2022:

- Vaccine coverage with 3 or more doses across age groups varied from **19.1%** to **50.0%**,
- Vaccine coverage with 3 or more doses across income quintiles varied from **33.1%** to **48.1%**,
- Vaccine coverage with 3 or more doses across Public Health Regions ranged from **36.8%** to **46.3%**

PREGNANCY AND BIRTH OUTCOMES

Data from the BORN Information System were used in four studies to investigate the association of COVID-19 vaccination in pregnancy with maternal and neonatal outcomes:

1. A study published in the *Journal of the American Medical Association*^a explored outcomes following **COVID-19 vaccination during pregnancy**, for over 97,500 pregnant individuals (23% of whom had received at least one dose of COVID-19 vaccine) who gave birth between December 14, 2020 to September 30, 2021, and their newborns. Vaccinated individuals had **no increased risk** of postpartum hemorrhage, chorioamnionitis, cesarean delivery, and their babies **did not have** higher rates of admission to neonatal intensive care unit and low newborn 5-minute Apgar score compared with those who were not vaccinated during pregnancy. See infographic at this [link^b](#).
2. A study published in the *British Medical Journal*^c explored the risk of preterm birth, small-for-gestational-age at birth, and stillbirth, following **COVID-19 vaccination during pregnancy**, for over 85,000 pregnant individuals (51% of whom had received at least one dose of COVID-19 vaccine) who gave birth from May 1 to December 31, 2021. Individuals who had been vaccinated **during pregnancy** had **no increased risk** of preterm birth before 37 weeks (overall or spontaneous preterm birth), very preterm birth (<32 weeks), small-for-gestational-age at birth (<10th percentile), or stillbirth (fetal death at ≥20 weeks) compared with those who were not vaccinated during pregnancy. See infographic at this [link^d](#).
3. A study assessed risk of adverse pregnancy, fetal, and neonatal outcomes following a third dose (first booster dose) of COVID-19 vaccine during pregnancy (vs. no third dose during pregnancy) among individuals who had completed their primary COVID-19 vaccine series before pregnancy. Among over 32,000 births between December 20, 2021 and August 31, 2022, more than 18,000 were born to individuals who received a

third vaccine dose during pregnancy. Individuals who had received a **third COVID-19 vaccine dose during pregnancy** had **no increased risk** of placental abruption, chorioamnionitis, postpartum hemorrhage, cesarean delivery, stillbirth, preterm birth (<37 weeks), NICU admission, 5-minute Apgar score <7, or small-for-gestational-age at birth. *The study is currently under review with a journal.*

4. A study assessed the risk of placenta-mediated outcomes after receiving one or more doses of COVID-19 vaccine during the **periconceptional/first trimester period** compared with no doses during this period. Among more than 75,000 births between April and December 2021, over 30,000 were born to individuals who had received ≥ 1 dose of COVID-19 vaccine during the periconceptional/first trimester period. Analyses of hypertensive disorders of pregnancy, placental abruption, preterm birth (<37 weeks), small-for-gestational-age at birth and stillbirth following COVID-19 vaccination during this early period are ongoing.

COVID-19 VACCINATION COVERAGE DURING AND AFTER PREGNANCY

Data from the BORN Information System were used in two studies to describe COVID-19 vaccination in the pregnant population:

1. A study published in *Vaccine*^e explored COVID-19 **vaccine coverage (≥ 1 dose before or during pregnancy)** and evaluated factors associated with **vaccine series initiation (receiving dose 1 during pregnancy)**. Among more than 200,000 individuals who were pregnant between December 14, 2020 and December 31, 2021, coverage with at least one dose increased to 71% by the end of the study period, which was lower than in the general female population of reproductive age in Ontario by the end of 2021. Factors associated with lower likelihood of COVID-19 vaccine series initiation during pregnancy included younger age, smoking and substance use during pregnancy, not having a first prenatal care visit in the first trimester, and living in a rural area or a neighbourhood with lower income and higher material deprivation. See infographic at this [link](#)^f.
2. A study explored COVID-19 **vaccine series initiation in recently pregnant people (≥ 1 dose after the date of delivery)** who gave birth between January 1 and December 31, 2021 and **were not yet vaccinated** at the time of giving birth. Among more than 87,000 individuals who were unvaccinated at the time of giving birth, 65% initiated COVID-19 vaccination by the end of June 2022, which was lower than vaccine coverage in the general female population of reproductive age in Ontario by June 2022. Factors associated with lower likelihood of COVID-19 vaccine series initiation after pregnancy included younger and older maternal age, smoking and substance use during pregnancy, rural residence, lower neighbourhood income, higher material deprivation and social

dependency, and exclusive breastfeeding at time of discharge from hospital/birth centre. *The study is currently under review with a journal.*

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The report is based on data extracted from the Ontario Ministry of Health's COVaxON and from the BORN Information System (BIS).

Disclaimer: the results of this report may differ from other reported estimates due to differences in data sources and data processing lag times.

CONCLUSION

Our results have shown that:

- Receipt of the **primary COVID-19 vaccine series** (dose 1 and 2) during pregnancy was **not associated** with any increased risk of **adverse pregnancy or birth outcomes**. The results did not differ according to the number of COVID-19 doses (dose 1 or 2) received during pregnancy, trimester when vaccination occurred, and type of mRNA vaccine product.
- Receipt of a **third dose** (first booster dose) of COVID-19 vaccine during pregnancy was **not associated** with any increased risk of **adverse maternal, fetal, and neonatal outcomes**.
- **COVID-19 vaccine coverage** with at least 1 dose **was lower among pregnant individuals** than in the general female population of reproductive age in Ontario. Similarly, among pregnant individuals who were not yet vaccinated at the time of giving birth, COVID-19 vaccination after pregnancy also remained lower than vaccine coverage in the general female population.

- There was a **subgroup of pregnant individuals** (e.g., those in younger age groups, those reporting smoking and substance use during pregnancy, and those living in a rural area or a neighbourhood with lower income and higher material deprivation) who were **less likely to get vaccinated against COVID-19** during pregnancy and even after giving birth.

- Previous studies found that COVID-19 illness during pregnancy is associated with an increased risk of hospital and intensive care unit admission, pregnancy complications, and adverse birth outcomes (e.g., preterm birth). It has also been shown that COVID-19 vaccination during pregnancy effectively reduces the risk of COVID-19 infection in pregnant individuals and their newborn infants. Our studies add to the growing body of evidence that COVID-19 vaccination during pregnancy is not associated with a higher risk of adverse maternal and birth outcomes. These findings can help inform public health strategies to increase COVID-19 vaccine acceptance and coverage in the pregnant population, especially among certain subgroups.

References:

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- d) <https://www.bornontario.ca/en/news/no-link-between-covid19-vaccination-in-pregnancy-and-higher-risk-of-preterm-birth-or-stillbirth.aspx>
- e) *Vaccine* 2023;S0264-410X(23)00114-7
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