COVID-19 IMMUNITY TASK FORCE | GROUPE DE TRAVAIL SUR L'IMMUNITÉ FACE À LA COVID-19

CanCOVID

Seminar Series | Research Results & Implications

# The impact of COVID-19 disease & vaccination on pregnancy and newborns

Monday, December 20, 2021 | 11:30 a.m. EST

# Moderator

**Tali Bogler MD, CCFP, MScCH**

Staff Physician, Department of Family & Community Medicine, St. Michael's Hospital

Chair, Family Medicine Obstetrics, St. Michael's Hospital

Assistant Professor, University of Toronto

Co-Founder, Pandemic Pregnancy Guide

# Speakers

- **Catherine Hankins MD, PhD, FRCPC**, Co-Chair, COVID-19 Immunity Task Force
- **Deborah Money MD, FRCSC,** University of British Columbia, Women's Health Research Institute, BC Women's Hospital
- **Deshayne Fell PhD,** University of Ottawa, Children's Hospital of Eastern Ontario Research Institute
- **Deborah O'Connor PhD,** University of Toronto, The Hospital for Sick Children, Mount Sinai Hospital

**Joining for Q&A:**

- **Sharon Unger MD, FRCPC,** University of Toronto, Sinai Health, Rogers Hixon Ontario Human Milk Bank

# Catherine Hankins

MD, PhD, COVID-19 Immunity Task Force
Co-Chair

# COVID-19 Immunity Task Force mandate

Established by the Government of Canada in April 2020

**Mandate:**

Catalyze, support, fund, and harmonize knowledge on SARS-CoV-2 immunity for federal, provincial, and territorial decision-makers to inform their efforts to protect Canadians and minimize the impact of the COVID-19 pandemic.

# CITF: Priority areas of research

### SEROPREVALENCE STUDIES

Assess the extent of SARS-CoV-2 infection across Canada

### IMMUNE SCIENCE

Understand the nature of immunity arising from infection

### IMMUNE TESTING

Develop improved antibody testing methods

### VACCINE SURVEILLANCE

Help monitor the effectiveness and safety of vaccines

### BOOSTERS

Understand when and if different populations need booster shots

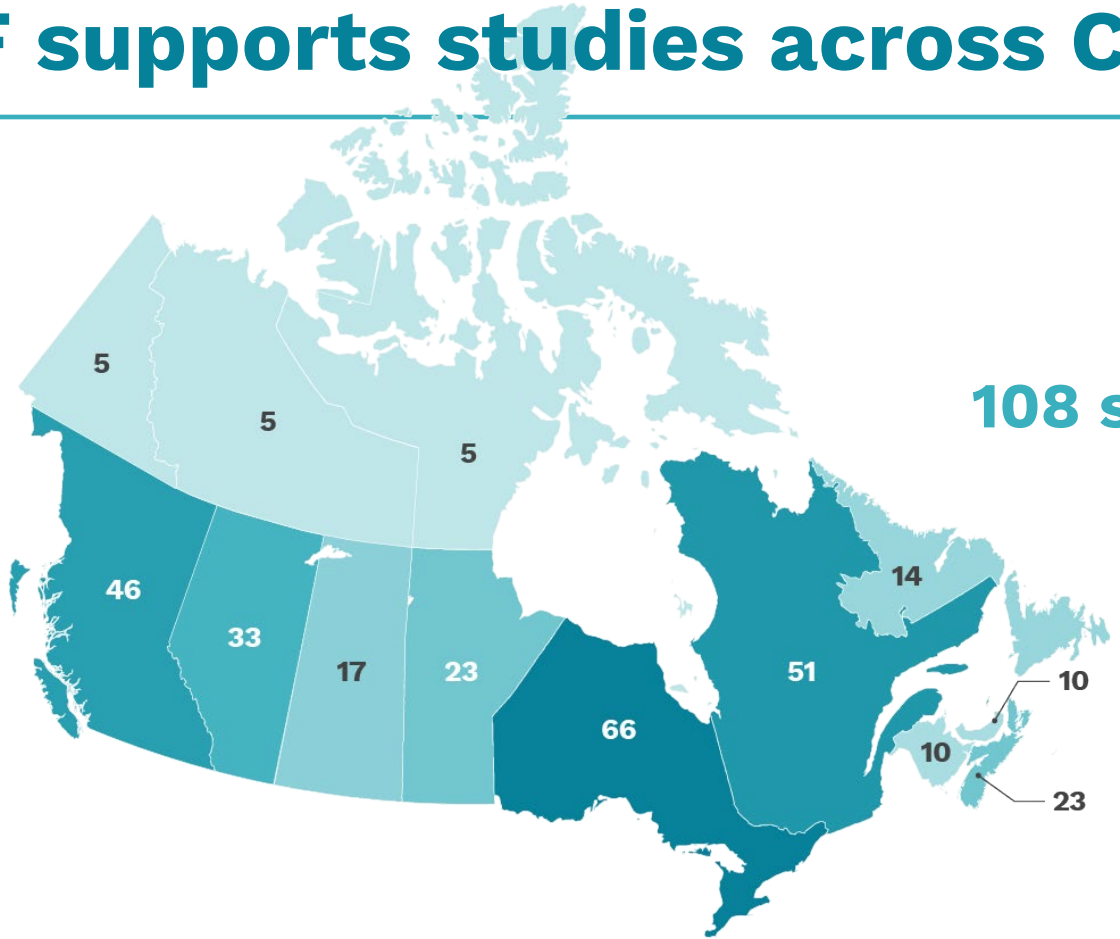
### PEDIATRIC VACCINATION

Research safety, effectiveness and immunogenicity of vaccines in children under 21

### IMMUNITY MODELLING

Model trends in overall immunity across Canada

# CITF supports studies across Canada




**108 studies**

# Focusing research on pregnancy, newborns & breastfeeding

- Two of the four studies that will be presented today were among the first studies to get support from CITF, recognizing the importance of COVID research in pregnant people, people planning to get pregnant, and those wanting to use human milk to feed their babies.

- Once vaccines emerged, we funded two more studies that are being presented today to look at the effects of vaccination on these groups.

# Research informing policy

- The results being presented today are preliminary, and most have not been peer reviewed.
- The CITF's mandate: support studies to inform public policy. Over the past months, results of CITF-supported studies have been informing public health officials and influencing recommendations, guidelines, and policy.
- Today you will hear about knowledge to translate into guidelines and actions.

# COVID-19 in Pregnancy:

Epidemiology, Maternal and Infant Outcomes (CANCOVID-Preg) and COVID-19 vaccines and pregnancy (COVERED)

All of Canada


**Deborah Money**

MD, FRCSC, Professor, Ob/Gyn, Medicine, SPPH

University of British Columbia
Clinician Scientist, WHRI


WOMEN'S HEALTH RESEARCH INSTITUTE AT BC WOMEN'S

# Disclaimer

I do not have any conflicts of interest to declare

# Synergistic projects to inform public health, clinical care and vaccination policies

**CANCOVID-Preg**

- National surveillance of SARS-CoV-2 infections in pregnancy – ongoing since March 2020

**COVERED**

- National survey of pregnant persons on COVID-19 vaccines in pregnancy and lactation

**Antenatal Serostudies**

- National retrospective serostudies to understand seroprevalence at different stages in the pandemic

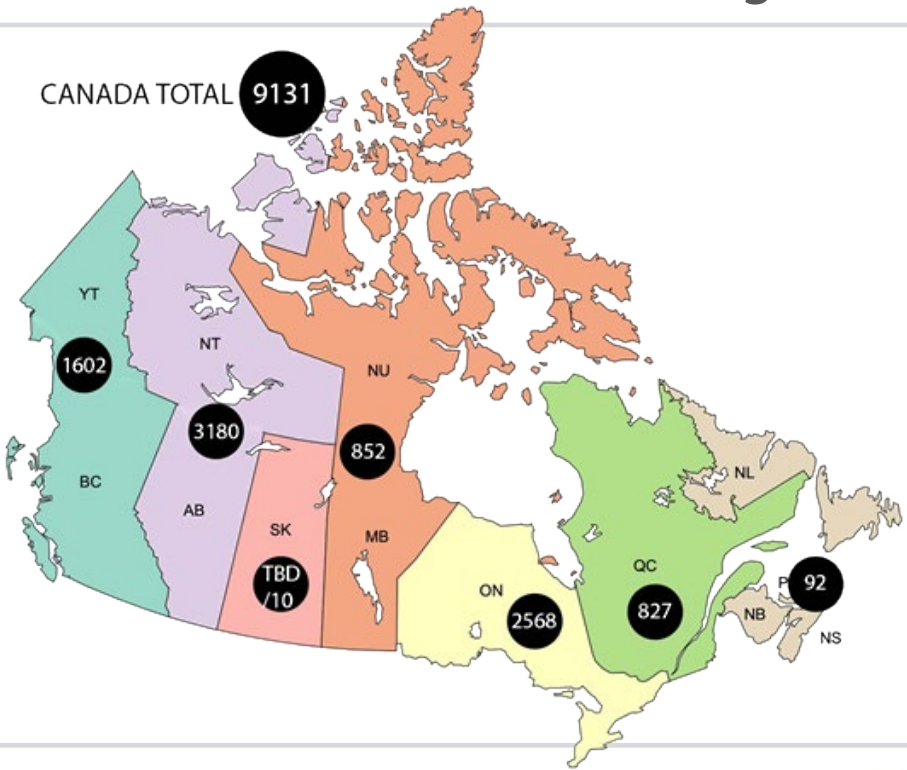
# CANCOVID-Preg - Objectives

**Aim:** To provide Canadian data on COVID-19 in pregnancy to support optimal care and public policy.

**Objectives**

1. To determine the **burden of COVID-19 in pregnancy** in Canada
2. To capture and report **maternal outcomes**, including degree of illness and requirement for hospitalization and/or ventilation
3. To determine **fetal and infant outcomes** including evidence of transmission of SARS-CoV-2 infection from mother to infant
4. To provide data to facilitate **planning and support** for COVID-19 affected pregnancies in the Canadian context
5. To contribute data to **international collaborations**, allowing for optimized international understanding of COVID-19 in pregnancy

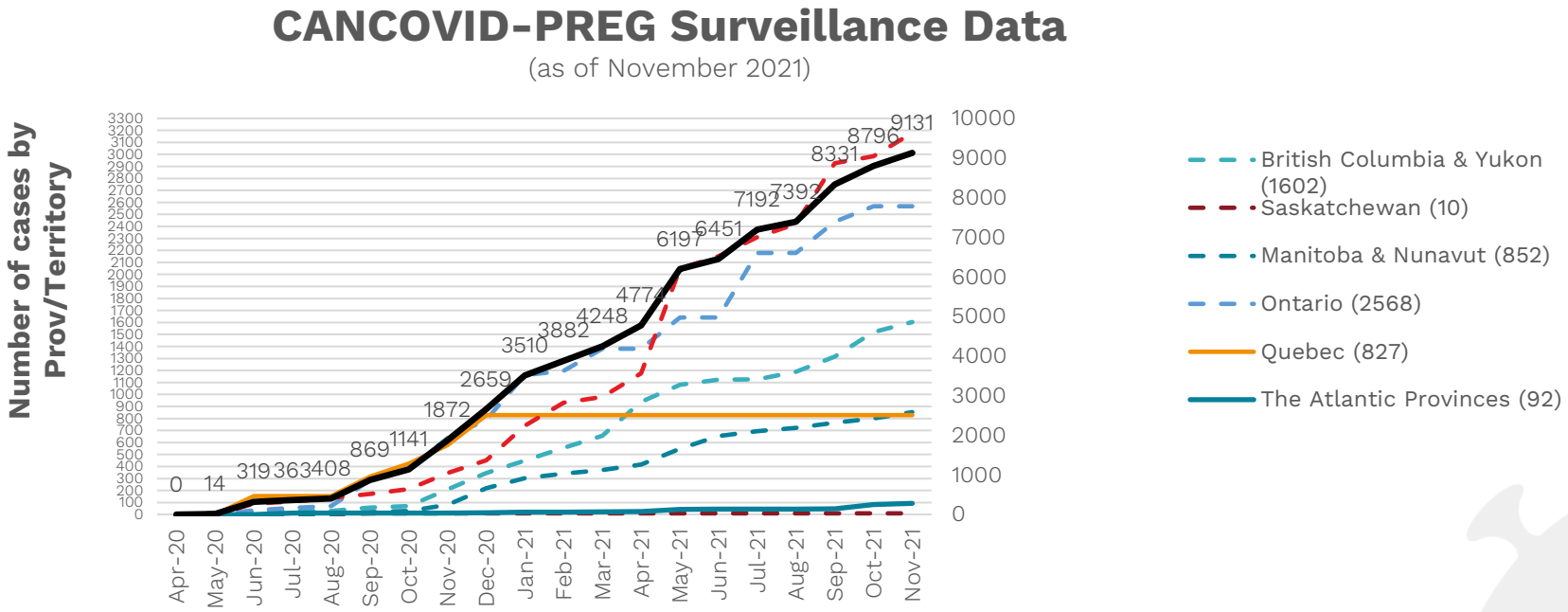
# Numbers of SARS-CoV-2 infections in pregnant people in Canada: January 2020 – November 2021



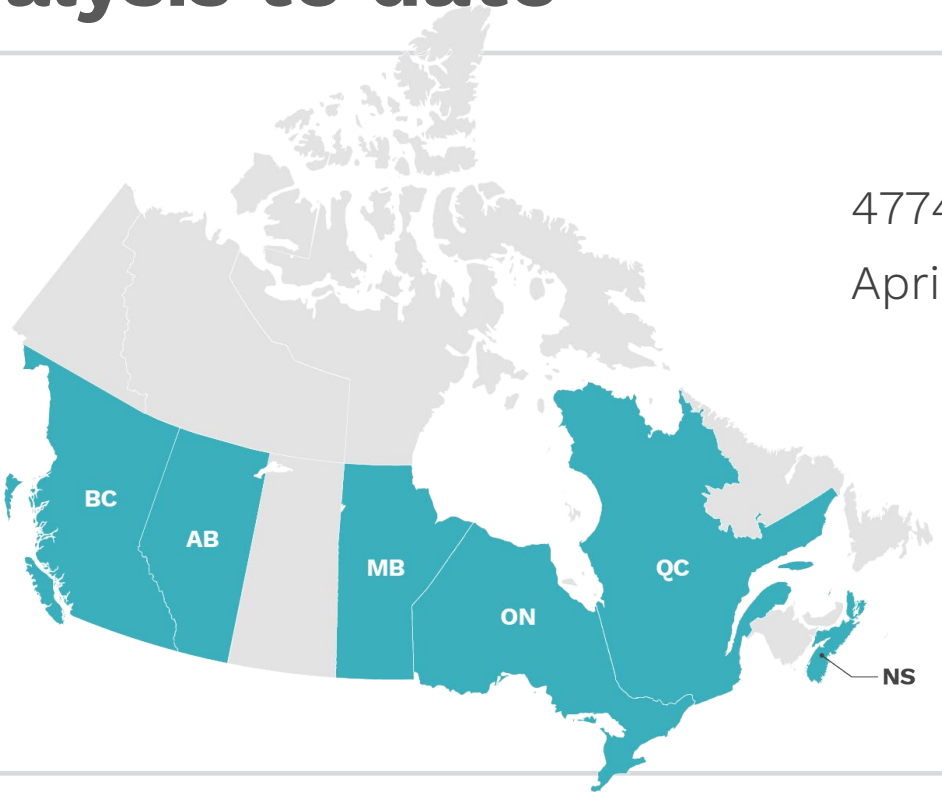

## Last updated

| | |
|---|---|
| BC + Yukon | Nov 26, 2021 |
| Alberta + NWT | Nov 3, 2021 |
| Saskatchewan | TBD/Nov 11, 2020 |
| Manitoba + Nunavut | Nov 22, 2021 |
| Ontario | Oct 31, 2021 |
| Quebec | Dec 14, 2020 |
| The Atlantic Provinces | Nov 19, 2021 |

# Number of pregnant people in Canada with COVID has increased steadily



# Analysis to date




4774 completed pregnancies up to April 30, 2021 from 6 provinces

Comparison data:

- PHAC CIHI-DAD data from March 2020-December 2020 used as pandemic comparison for pregnancy outcomes
- Stats Can/PHAC data on demographics and overall population outcomes for COVID-19

# Race representation in cases vs. Canadian population

Total # of people in CANCOVID-Preg sample (n=768 )

| | CANCOVID-Preg sample | All females aged 15-45 in Canada (StatCan) |
|---|---|---|
| **White** | 231 (30.0%) | 80.0% |
| **South Asian** | 183 (23.8%) | 3.4% |
| **Other** | 178 (23.2%) | 9.3% |
| **Black** | 127 (16.5%) | 2.2% |
| **East or SE Asian** | 49 (6.4%) | 4.8% |

# Pregnant people had a greater chance of severe outcomes from COVID

| | Pregnant positive SARS-CoV-2 cases in BC, AB, MB, ON, NS, and QC to April 30, 2021 (n=2,045) | Positive SARS-CoV-2 females aged 20-49 in Canada to April 30, 2021 (n=215,542) | Relative Risk | 95% CI |
|---|---|---|---|---|
| **Number and percent hospitalized** | 155 (7.6%) | 5632 (2.6%) | **2.9** | 2.5-3.4 |
| **Number and percent admitted to ICU** | 40 (2.0%) | 670 (0.3%) | **6.3** | 4.5-8.4 |

**100%** of hospitalized were unvaccinated or incompletely vaccinated

(Information from early analysis to end of September)

COVID-19 in Pregnancy: Epidemiology, Maternal and Infant Outcomes (CANCOVID-Preg) and COVID-19 vaccines and pregnancy (COVERED)

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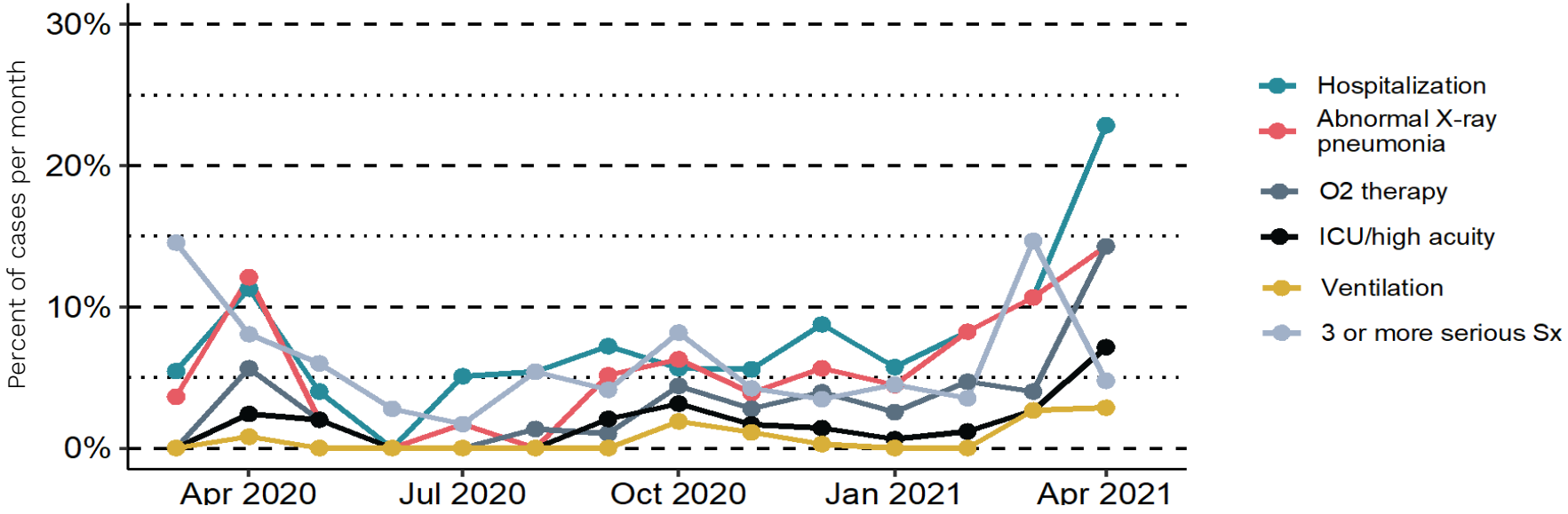
UBC

# CANCOVID-Preg Pregnancy Outcomes

**Adverse maternal outcomes: COVID-19 in pregnancy** (April 1, 2020 to April 30, 2021)



# CANCOVID-Preg Pregnancy Outcomes

| | **CANCOVID (pregnant people with COVID)** N (%) | **All non-COVID pregnancies in Canada*** N (%) | **Relative risk** (95% CI) | **p-value** |
|---|---|---|---|---|
| **Pregnancy-induced hypertension** (n=1 522, n=289 399) | 110 (7.2%) | 22 549 (7.8%) | 0.93 (0.8-1.1) | 0.44 |
| **Caesarian delivery** (n=2 616, n=289 399) | 874 (33.4%) | 93 467 (32.3%) | 1.03 (1.0-1.1) | 0.23 |
| **Preterm <37 weeks** (n=2 626, n=283 401) | 357 **(13.6%)** | 19 243 (6.8%) | **2.00 (1.8-2.2)** | < 0.0001 |
| **Late preterm** (34-36wks) | 252 (9.6%) | 14 643 (5.2%) | **1.86 (1.6-1.1)** | < 0.0001 |
| **Moderate preterm** (32-33wks) | 37 (1.4%) | 1 996 (0.7%) | **2.00 (1.4-2.7)** | < 0.0001 |
| **Very preterm** (28-31wks) | 27 (1.0%) | 1 535 (0.5%) | **1.90 (1.2-2.7)** | 0.0012 |
| **Extremely preterm** (20-27wks) | 41 (1.6%) | 1 069 (0.4%) | **4.14 (2.9-5.5)** | < 0.0001 |
| **Stillbirth** (n=2 630, n=297 356) | 26 (1.0%) | 2 535 (0.9%) | 1.16 (0.7-1.6) | 0.516 |

Pregnant people with COVID had a significantly higher chance of preterm birth than those **without** COVID

* Canadian Institutes of Health Informatics (CIHI), COVID-19 excluded

# CANCOVID-Preg informs public health policy

| | |
|---|---|
| **Report #1**<br>December 2, 2020 | Society of Obstetricians and Gynecologists of Canada (SOGC) **recommends vaccination** for all pregnant individuals due to risk of COVID-19 in pregnancy |
| **Report #2**<br>January 15, 2021 | COVID-19 in pregnancy guideline for clinical care – February 15, 2021 |
| **Report #3**<br>February 25, 2021 | SOGC calls for a Canada-wide policy change to **prioritize pregnant individuals** for vaccination<br>**Vaccination policies updated** in: ON, BC, NL, NB, SK, MB |
| **Report #4**<br>June 3, 2021 | Pregnant persons with COVID at risk of complications similar to 55-59-year-olds |

June 2021, **all provinces** recommend pregnant individuals be vaccinated.

# COVERED: COVID-19 Vaccine Registry for Pregnant and Lactating Individuals

## Summary

- Pregnant individuals are a key population for COVID-19 prevention due to increased risk of hospitalization and ICU admission
- We have a national registry of unvaccinated and vaccinated pregnant and/or lactating women and people
- Collecting data on safety, effectiveness and vaccine attitudes

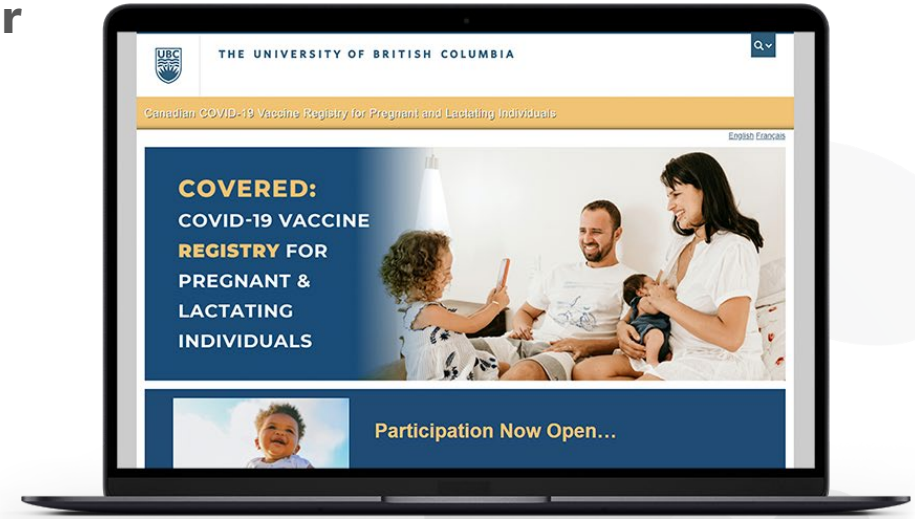
**https://covered.med.ubc.ca/**

# Canadian COVID-19 vaccine registry for pregnant & lactating individuals (COVERED)

## Early data show no safety signals or adverse pregnancy outcomes

- 5647 e-consents completed (total of English and French e-consents)
- 5131 baseline surveys submitted (91.1% immediate engagement)

We are still recruiting!
**https://covered.med.ubc.ca/**



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CIHR IRSC
Canadian Institutes of Health Research
Instituts de recherche en santé du Canada

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# COVID-19 vaccination during pregnancy in Ontario: a province-wide evaluation

Ontario


**Deshayne Fell**

PhD, Associate Professor, School of Epidemiology and Public Health, uOttawa

Scientist, Children's Hospital of Eastern Ontario Research Institute

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# Disclaimer

I do not have any conflicts of interest to declare

# Emerging evidence: COVID-19 vaccines during pregnancy

- Initial pre-licensure randomized clinical trials (RCT) of COVID-19 vaccines excluded pregnant people
- Real-world observational evidence is rapidly emerging following recommendations in many countries encouraging COVID-19 vaccination during pregnancy:
  - COVID-19 vaccination in pregnant people induces good immune responses [1]
  - Pregnant people experience similar side effects (e.g., sore arm, temporary muscle soreness) as non-pregnant people [2]
  - Vaccine effectiveness studies have shown similar high effectiveness in pregnant people [3]
  - Vaccinated people do not have fertility problems compared with unvaccinated people [4]

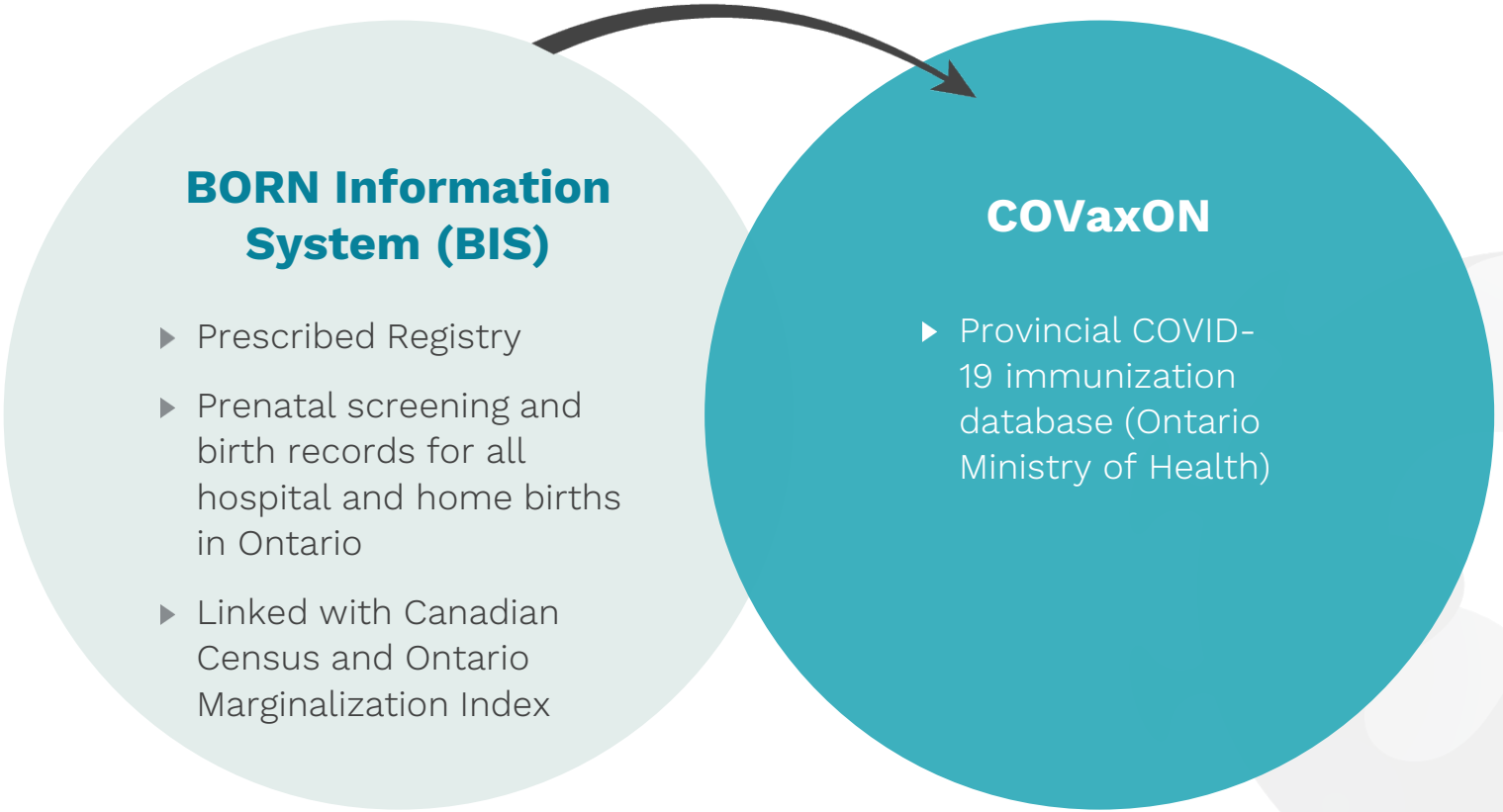
# Evidence on COVID-19 vaccine safety in pregnancy

- Two large population-based studies of COVID-19 vaccination during early pregnancy did not find any association with risk of miscarriage [5,6]
- Evaluation of other pregnancy outcomes is required

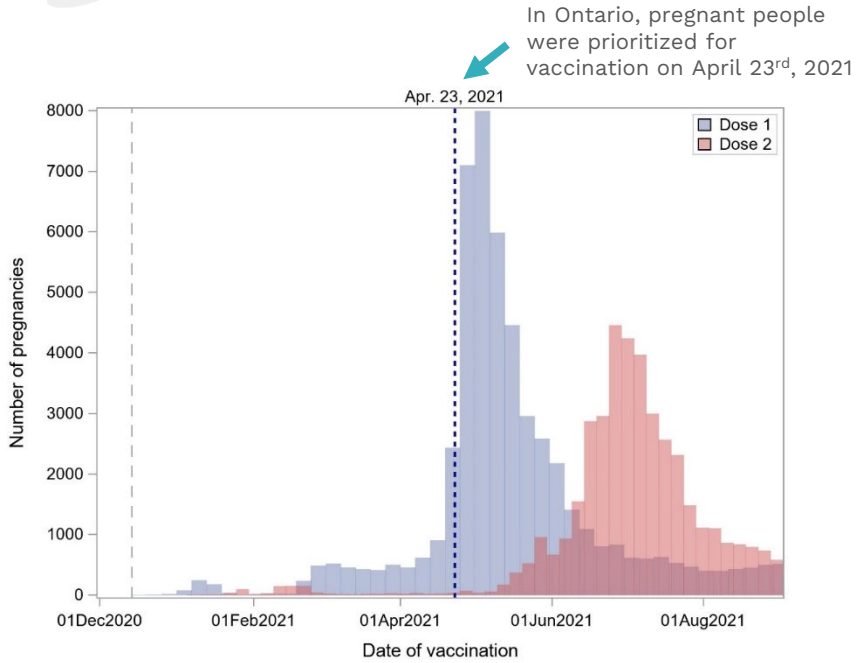
## Objectives of our study:

1. To **assess COVID-19 vaccine uptake and coverage** among pregnant individuals in Ontario
2. To **evaluate obstetric and newborn outcomes** among those who received COVID-19 vaccination during pregnancy, compared with unvaccinated pregnant individuals

# Data sources (updated monthly)



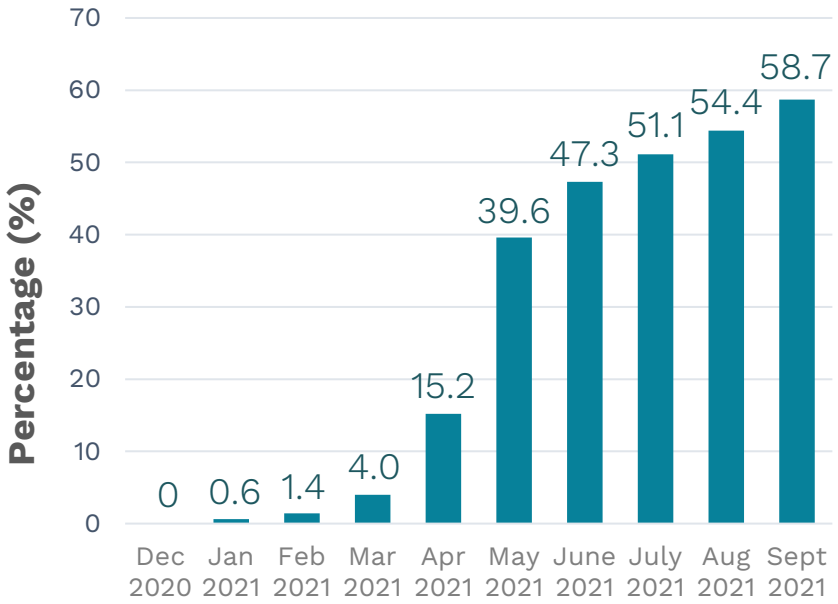
# COVID-19 vaccine uptake in pregnancy




As of September 30th, 2021:

- **59,984** people had received ≥1 dose of COVID-19 vaccine **during** pregnancy
  - **52,814** initiated series **during** pregnancy (i.e., dose 1)
  - **36,055** had received **both doses** during pregnancy

# COVID-19 vaccine coverage in pregnancy




As of September 30th, 2021:

- **58.7%** received ≥1 dose of COVID-19 vaccine **before or during** pregnancy
- Showing signs of plateauing among currently pregnant people in recent months
- Approximately 25 percentage points lower than reproductive age people in general Ontario population

# Evaluation of obstetric and newborn outcomes

## Study design:

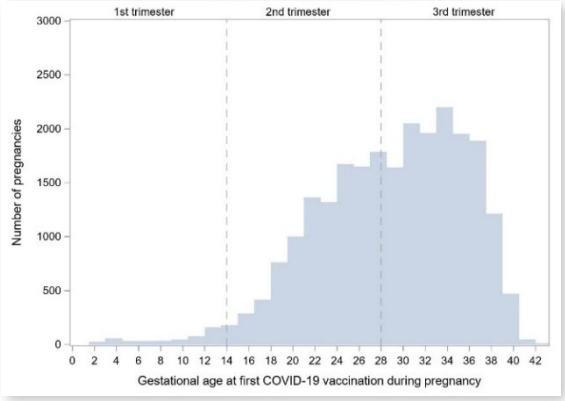
- Retrospective cohort study of all births in Ontario after 20 weeks of gestation
- December 14th, 2020, to September 30th, 2021

## Comparison groups:

- **Vaccinated group:** Received one or more COVID-19 vaccine doses between conception and giving birth
- **Two groups of people who were not vaccinated during pregnancy:**
  - **Comparison group 1:** vaccinated after the pregnancy ended
  - **Comparison group 2:** not vaccinated at any point before, during or after pregnancy

# Obstetric and newborn outcomes

- Vaccine timing is important when determining which outcomes to assess
- Among the completed pregnancies by September 30th, 2021, vaccinated people had mainly had their vaccine during late 2nd/3rd trimester




Data as of September 30, 2021

- Therefore, we evaluated outcomes that occur close to the time of birth:

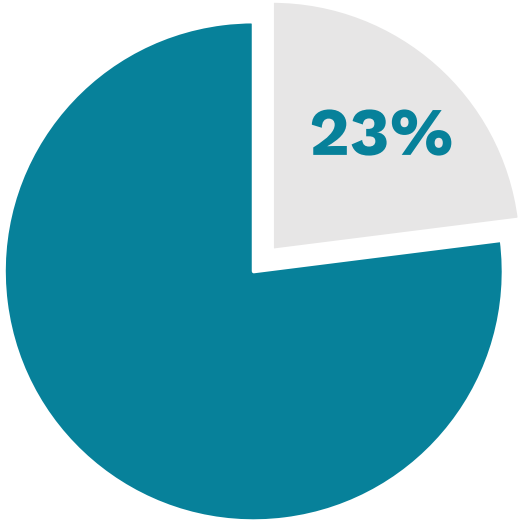
**Obstetric:**

- Postpartum hemorrhage
- Chorioamnionitis
- Cesarean delivery

**Newborn:**

- NICU admission
- 5-minute Apgar score <7

# Among **97,590** pregnant individuals who gave birth during the study period (December 14th, 2020– September 30th, 2021)…




**22,660** received ≥1 dose of COVID-19 vaccine **during** pregnancy

(52% received dose 1 only; 48% received dose 1 and dose 2)

- 46% (44,815) initiated COVID-19 vaccine series after pregnancy (comparison group 1)
- 31% (30,115) not vaccinated with COVID-19 vaccine at any time (comparison group 2)

# Characteristics of the study population

Vaccinated **during** pregnancy

- Under 25 years: **4.0%**
- Smoked during pregnancy: **3.2%**
- Live in lowest income neighbourhood: **15.4%**
- Live in rural area: **13.2%**
- Gave birth before April 23, 2021: **2.4%**

Vaccinated **after** pregnancy

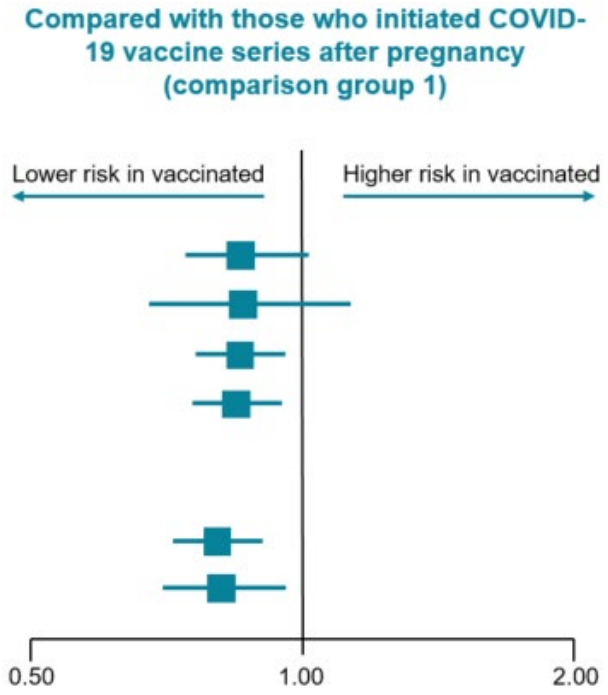
- Under 25 years: **7.3%**
- Smoked during pregnancy: **5.1%**
- Live in lowest income neighbourhood: **18.9%**
- Live in rural area: **13.3%**
- Gave birth before April 23, 2021: **71.5%**

**Not vaccinated** at any time

- Under 25 years: **14.0%**
- Smoked during pregnancy: **11.2%**
- Live in lowest income neighbourhood: **25.7%**
- Live in rural area: **18.0%**
- Gave birth before April 23, 2021: **45.8%**

# COVID-19 vaccination during pregnancy was not associated with negative outcomes

| Outcome | Received ≥1 dose of COVID-19 vaccine during pregnancy No. (%) | Initiated COVID-19 vaccine series after pregnancy No. (%) |
|---|---|---|
| **Pregnant individuals with a live birth or stillbirth** | **N=22,660** | **N=44,815** |
| - Postpartum hemorrhage | 677 (3.0) | 1,351 (3.0) |
| - Chorioamnionitis | 101 (0.5) | 214 (0.5) |
| - Cesarean birth | 6,988 (30.8) | 14,427 (32.2) |
| - Emergency cesarean | 2,829 (15.3) | 5,943 (16.4) |
| **Live born infants** | **N=22,746** | **N=44,943** |
| - NICU admission | 2,508 (11.0) | 5,969 (13.3) |
| - 5-minute Apgar score <7 | 403 (1.8) | 894 (2.0) |




Individuals who received ≥1 dose during pregnancy were compared with those who initiated COVID-19 vaccine series after pregnancy (comparison group 1)

# Comparison by vaccine, number of doses and timing of vaccination

We also found **no increase** in risk of any adverse outcomes in sub-group analyses where we compared:

- Pfizer-BioNTech vs. Moderna for dose 1
- One vs. two doses during pregnancy
- Dose 1 in 1st/2nd trimester vs. dose 1 in 3rd trimester

# Our findings, in a large population of pregnant people and newborns, show…

- No association between COVID-19 vaccination during pregnancy and adverse peripartum outcomes
  - No difference in outcomes comparing people vaccinated during pregnancy and those vaccinated after pregnancy or people never vaccinated (before, during or after pregnancy)
  - Significant consistency in sub-group analyses

These findings are reassuring and **support the safety of COVID-19 vaccination during pregnancy**, although evaluation of other important pregnancy outcomes is required

# Study investigators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BORN Ontario staff for their assistance with data extraction, linkage, code review, and results review

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VSRG | GRSV

VACCINE SURVEILLANCE REFERENCE GROUP

GROUPE DE RÉFÉRENCE SUR LA SURVEILLANCE DES VACCINS

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2. Shimabukuro TT, et al. Preliminary findings of mRNA Covid-19 vaccine safety in pregnant persons. *N Engl J Med*. 384(24):2273-2282.
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7. Murphy MSQ, et al. Data Resource Profile: Better Outcomes Registry & Network (BORN) Ontario. *Int J Epidemiol*. 2021;50(5):1416-1417h.

# Impact of COVID-19 disease and vaccination on human milk antibodies

Ontario


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SickKids

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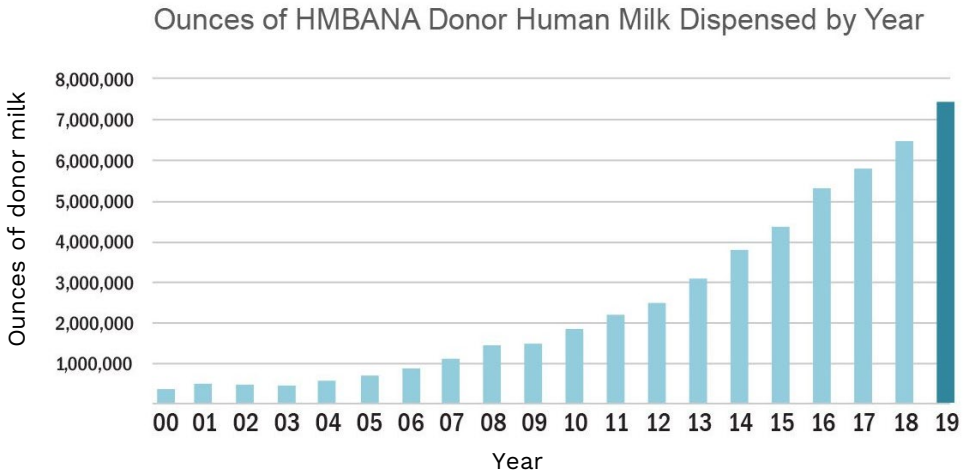
# Disclaimer

I do not have any conflicts of interest to declare

# Donation of human milk has increased substantially over the last 20 years




**HMBANA:** Human Milk Banking Association of North America

Donor Human Milk Distribution Increases By Nearly 1 Million Ounces (hmbana.org)

- ~1,400% increase in donor human milk dispensed in the last 20 years by HMBANA-accredited facilities
- Primary recipients are hospitalized infants at risk of necrotizing enterocolitis[2]


1. Pound C, Unger S, Blair B. Paediatr Child Health 2020; 25(8).
2. O'Connor DL et al. *JAMA* 2016;36:8.

Los Angeles Times

Human Milk Banks Come Back, but Questions Remain : Health: Many shut down after AIDS became prevalent; eight now serve 2,000 infants a year. Processing reduces risk but saps nutrition.

By JAN CIENSKI
NOV. 12, 1995 12 AM PT
ASSOCIATED PRESS

BOSTON — Rhian
met. Lei
has

unconvinced about the benefits of milk banks and
mend that doctors not use them.

When we added the possible benefits and the possible shortcomings, we felt, at least in 1995 in Canada, we would not recommend the use of human donor milk," said Dr.



- Past global epidemics, such as HIV/AIDS, have had devastating effects on donor human milk banking because of perceived risks
- Some pathogens, such as HIV, can be transmitted through human milk. To ensure a safe supply at HMBANA-accredited facilities potential donors are extensively screened and milk is pasteurized (destroys HIV)
- Early in the COVID-19 pandemic, unknowns destabilized donor human milk banks globally
- However, in Canada, quick action and research avoided a destabilization of milk banks

Cohen M and Cassidy Matern Child Nutr 2021 17(4);e13234.

**Stability of SARS-CoV-2 in donated human milk with and without holder pasteurization**

| Sample | Unpasteurized (room temperature for 30 min) | Pasteurized (62.5°C for 30 min) |
|---|---|---|
| A | $2.0 \times 10^5$ | Undetected |
| B | $6.3 \times 10^4$ | Undetected |
| C | $6.3 \times 10^5$ | Undetected |
| D | $6.3 \times 10^6$ | Undetected |
| E | $6.3 \times 10^5$ | Undetected |
| F | $2.0 \times 10^5$ | Undetected |
| G | $6.3 \times 10^5$ | Undetected |
| H | $6.3 \times 10^5$ | Undetected |
| I | $6.3 \times 10^5$ | Undetected |
| J | $6.3 \times 10^5$ | Undetected |
| SARS-CoV-2 alone (positive control) | $6.3 \times 10^6$ | $6.3 \times 10^3$ |
| Mock infection (negative control) | Undetected | Undetected |

Note: SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2, $TCID_{50}$ = 50% of the tissue culture infectivity dose.
*$TCID_{50}$/mL calculations defined by duplicate dilution series of indicated samples.

# Holder pasteurization destroys SARS-CoV-2 in human milk

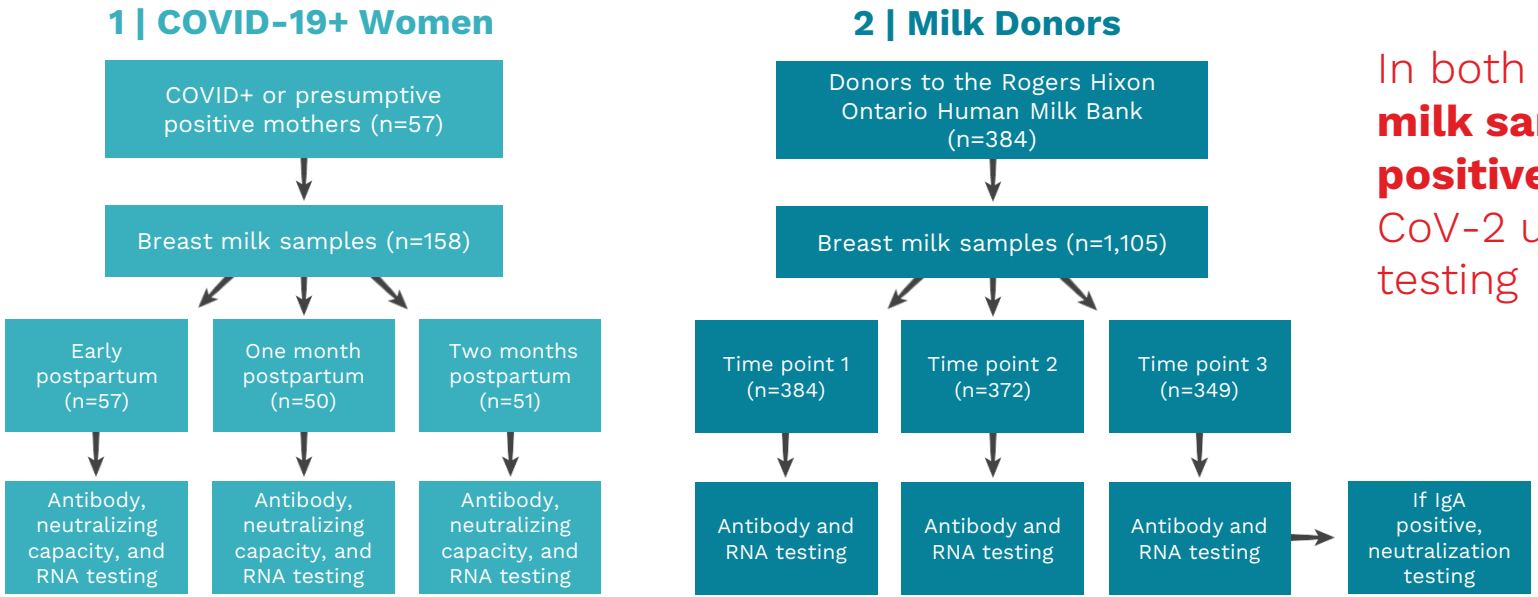
- Our early work showed no cytopathic activity in any of the SARS-CoV-2-spiked milk samples that had been pasteurized
- Some reduction in cytopathic effects of SARS-CoV-2 in milk samples not heat treated but held at room temperature
- Many biological components in human milk are known to have beneficial antiviral properties

Sharon Unger et al. CMAJ 2020;192:E871-E874

# Research Questions

1. **Can COVID-19 disease be transmitted into human milk?**
2. Can maternal antibodies to SARS-CoV-2 be transmitted through human milk?
    - If present, are these antibodies neutralizing?
3. What impact does maternal vaccination have on antibodies to SARS-CoV-2 in human milk?
    - If present, are these antibodies neutralizing?
    - Does vaccine type or time between doses matter?

# Milk from two cohorts examined

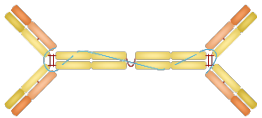



In both cohorts, **no milk sample tested positive** for SARS-CoV-2 using PCR testing

# Research Questions

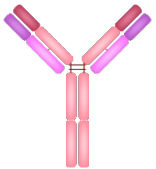
1. Can COVID-19 disease be transmitted into human milk?
2. **Can maternal antibodies to SARS-CoV-2 be transmitted through human milk?**
    - **If present, are these antibodies neutralizing?**
3. What impact does maternal vaccination have on antibodies to SARS-CoV-2 in human milk?
    - If present, are these antibodies neutralizing?
    - Does vaccine type or time between doses matter?

# Types of antibodies in human milk

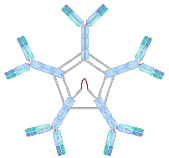


**IgA** = 90% of immunoglobulins

- Secretory IgA is resistant to digestion and **plays a dominant role in neonatal mucosal immunity**



**IgG** = 2% of immunoglobulins



**IgM** = 8% of immunoglobulins

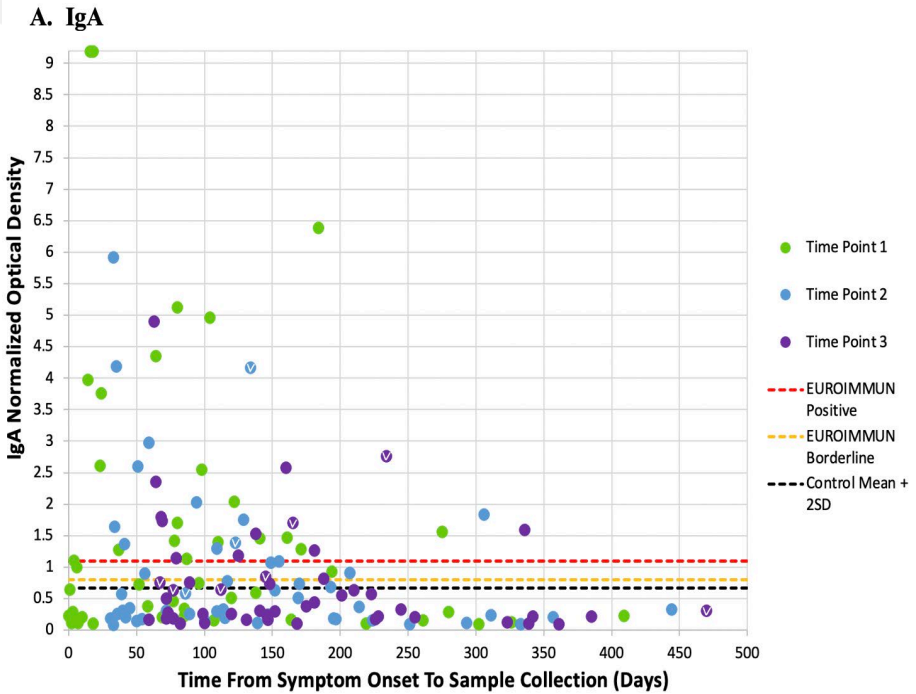
## How they are measured

Assessment of IgA performed using EUROIMMUN Anti-SARS-CoV-2 IgA kits after validation in-house for human milk*

Neutralization capacity assessed using a live virus microneutralization assay

*Answer S, Ismail S, Yau Y et al. *J. Assoc. Med. Microbiol. Infect. Dis. Can.* 2021;6:55.

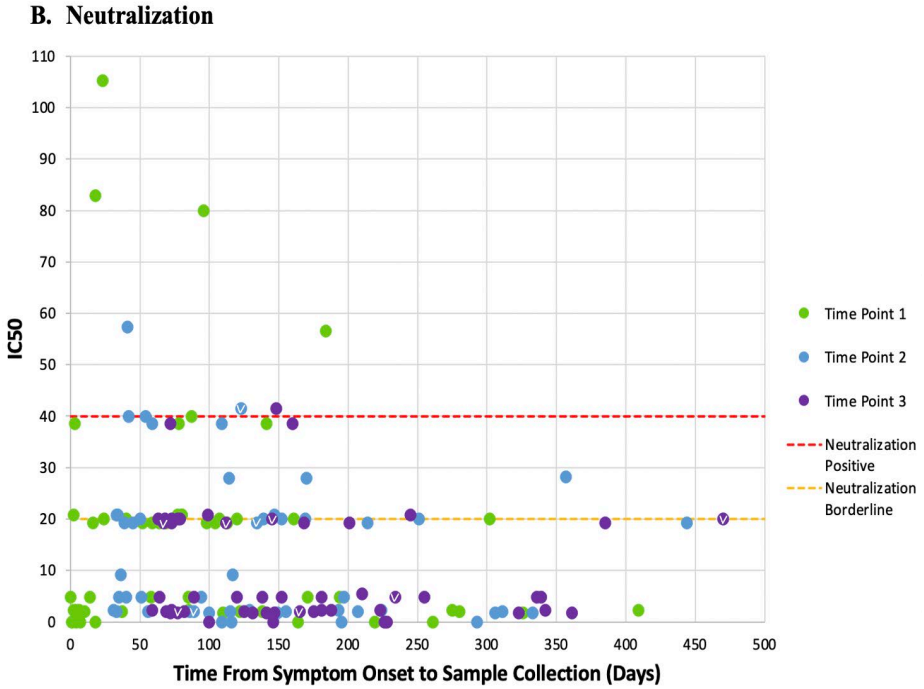
**Levels of anti-SARS-COV-2 in milk from COVID-19+ women over time**




# Antibodies to SARS-CoV-2 are frequently found in human milk following COVID-19

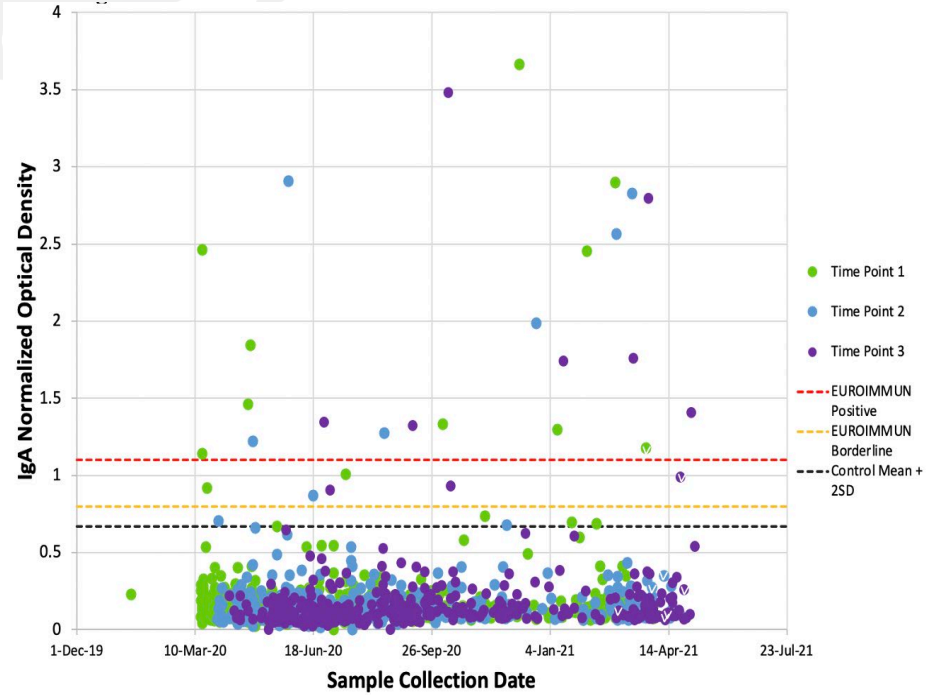
- Excluding samples collected after vaccination
  - 52.7% (29/55) of women had ≥ 1 milk sample positive for anti-SARS-CoV-2 IgA
  - Samples positive for anti-SARS-CoV-2 IgA diminished over time

## Neutralizing activity of milk from COVID-19+ women




# Neutralizing activity detected in nearly half of milk samples

- ~Half of participants had at least one milk sample that was neutralizing
  - 39% of samples that tested positive for IgA were neutralizing
  - 25% of samples that were negative for IgA were neutralizing



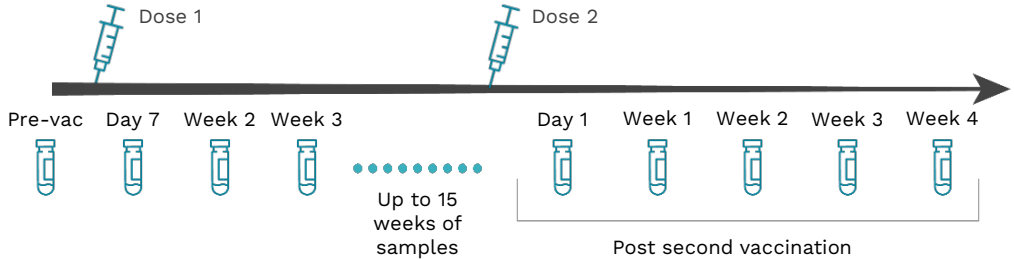

# Approx. 5% of donors had at least one milk sample positive for anti-SARS-CoV-2 IgA

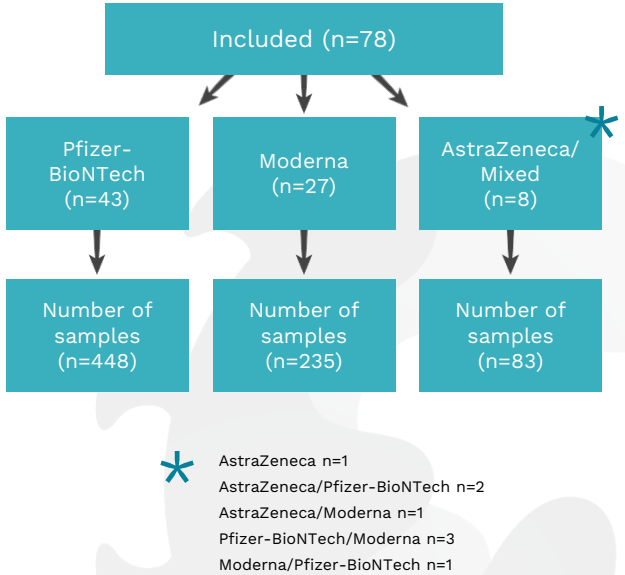
- ~5% of women who donated milk to the milk bank had ≥ 1 milk sample that tested positive for anti-SARS-CoV-2 IgA
- Of samples that contained anti-SARS-CoV-2 IgA, ~one-third were neutralizing

# Research Questions

1. Can COVID-19 disease be transmitted into human milk?
2. Can maternal antibodies to SARS-CoV-2 be transmitted through human milk?
    - If present, are these antibodies neutralizing?
3. **What impact does maternal vaccination have on antibodies to SARS-CoV-2 in human milk?**
    - **If present, are these antibodies neutralizing?**
    - **Does vaccine type or time between doses matter?**

# Details of the cohort to study impacts on human milk in individuals vaccinated against COVID-19



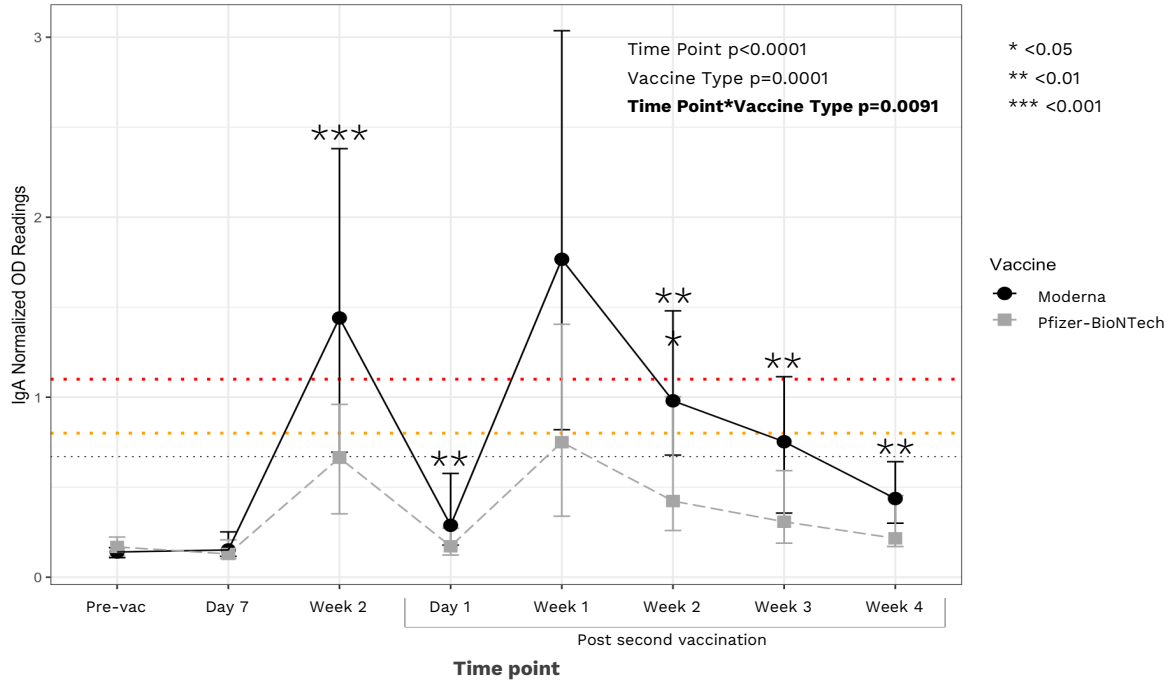



# Presence of anti-SARS-CoV-2 IgA in milk after immunization with mRNA vaccines

## IgA Results by Vaccine Type

**IgA – 1:101 Dilution**

COVID-19+ individuals removed

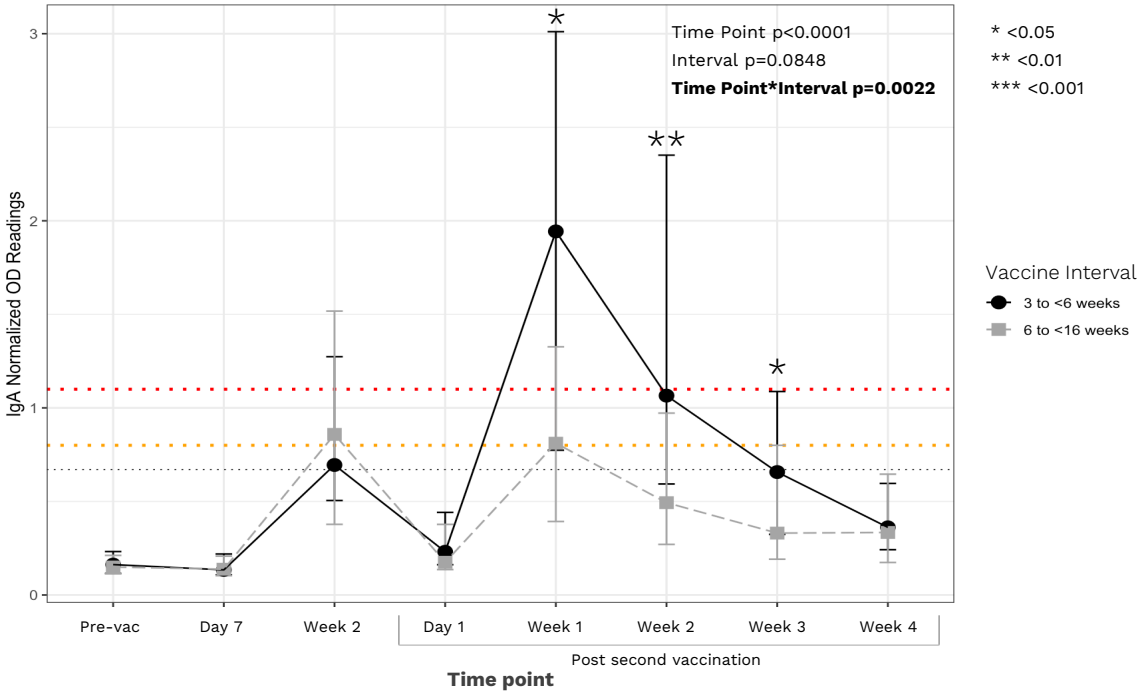


# Anti-SARS-CoV-2 IgA in milk detected after various intervals between doses

## IgA Results by Dose Interval

**IgA – 1:101 Dilution**

COVID-19+ individuals removed

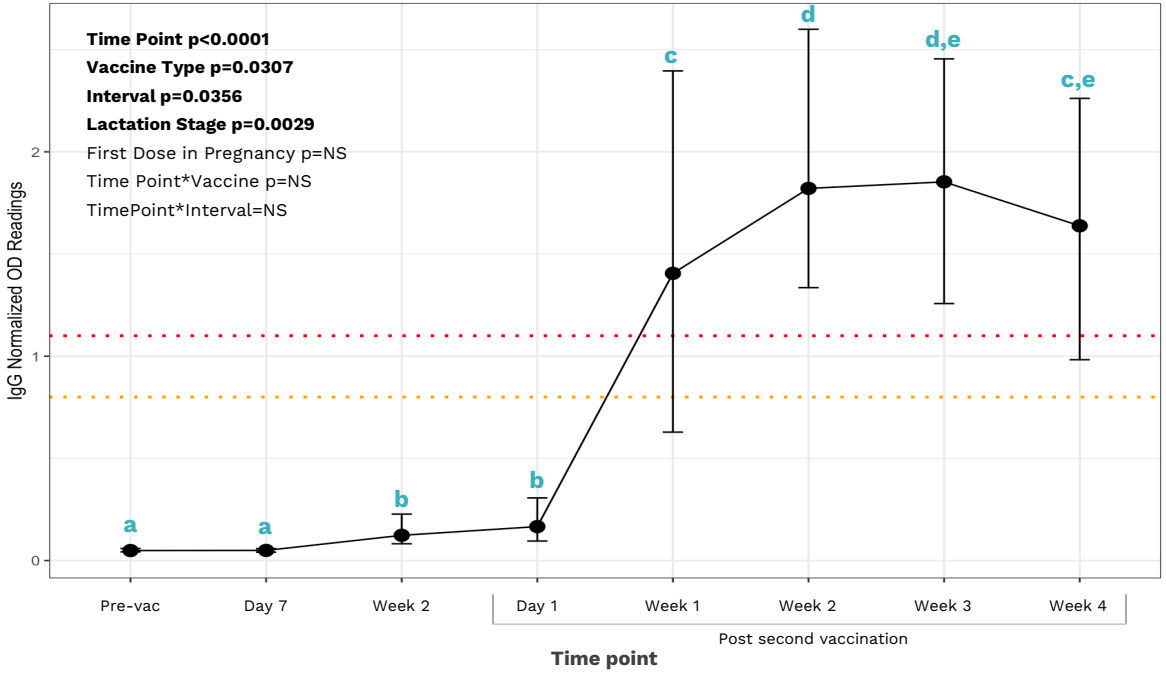


# Presence of anti-SARS-CoV-2 IgG in milk after immunization with mRNA vaccines

## Overall IgG Results

**IgG – 1:10 Dilution**

COVID-19+ individuals removed



# Conclusions

- SARS-CoV-2 is **unlikely to be transmitted** into human milk
- Antibodies to SARS-CoV-2 are **frequently found in milk of women following COVID-19**
  - Antibodies infrequently observed 6 months after symptom onset
- While the presence of anti-SARS-CoV-2 IgA appears to be associated with capacity to neutralize the virus, milk samples without antibodies can also be neutralizing
- Presence of anti-SARS-CoV-2 IgA in milk associated with:
  - The mRNA COVID-19 vaccine administered
  - The interval between doses
  - We are currently investigating whether this impacts neutralizing capacity of milk

# Study Team

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Combined Containment Level 3 Unit

Rogers Hixon Ontario Human Milk Bank

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COVID-19 IMMUNITY TASK FORCE
GROUPE DE TRAVAIL SUR L'IMMUNITÉ FACE À LA COVID-19

# Catherine Hankins

MD, PhD, FRCPC, COVID-19 Immunity Task Force
Co-Chair

RECAP:

# Key Findings

# COVID-19 is serious among pregnant people

- The number of pregnant people in Canada with COVID-19 has increased steadily from Apr. 2020-Nov. 2021
- 100% of pregnant people hospitalized with COVID-19 were unvaccinated or incompletely vaccinated (early analysis-end Sept. 2021)
- Pregnant people with COVID-19 suffer more severe disease than do non-pregnant women of child-bearing age (i.e., between 20 and 49 years old)
  - **Three times more likely to be hospitalized** + **nearly seven times more likely to be admitted to the ICU**
- Although pregnant people are usually between 20 and 49-years-old, they have the same COVID-19 complications profile as people aged 55 to 59

# COVID+ pregnant people = high risk on baby

Pregnant people with COVID-19 are **two times more likely** to have a premature birth (late, moderate, or very pre-term) than those without the disease.

Pregnant people with COVID-19 are **four times more likely** to have an extremely premature birth (20-27 weeks gestation) than those without the disease.

# COVID-19 vaccines are effective in pregnant people

- Approved COVID-19 vaccines induce **good immune responses in pregnant people**
- **No increase in risk of any adverse outcomes:**
  - Pfizer-BioNTech vs. Moderna for dose 1
  - One vs. two doses during pregnancy
  - When in pregnancy vaccine was given

# Vaccines appear safe in pregnant people

- **No association** made between COVID-19 vaccination during pregnancy and **adverse birth outcomes**
- **No increased side effects risk by trimester** observed after a 1st or 2nd dose
- Pregnant people experience **similar side effects** (e.g., sore arm, temporary muscle soreness) **as non-pregnant people**
- No evidence that vaccination negatively affects fertility: vaccinated people have the **same incidence of pregnancy** compared with unvaccinated people

# Human milk appears to be safe for infants

- The SARS-CoV-2 virus is **unlikely to get into human milk**
- **Antibodies to SARS-CoV-2** are frequently found in milk of women following COVID-19; however infrequently observed six months after symptom onset
- While the presence of anti-SARS-CoV-2 IgA appears to be associated with the capacity to neutralize the virus, milk samples without antibodies can also be neutralizing
- Vaccine-induced **antibodies are secreted** into human milk

# Policy implications moving forward

- **Prioritize third doses (booster)** in pregnant people in the face of Delta and Omicron
- **Reinforce vaccine confidence** among pregnant people, primary caregivers, and other birthing professionals
- **Tailor vaccine confidence campaigns** to reach out particularly to pregnant people who:
  - Have been least likely to be vaccinated: **under 25, from lower-income areas, in rural regions, and who smoke**
  - Have other **young children not yet eligible** for vaccination
  - Are likely to participate in **congregate settings** with unvaccinated children (daycare, school, etc.)

# Policy implications moving forward

- **Strengthen vaccine confidence in individuals who wish to become pregnant**:
  - Amplify evidence-informed messaging
  - Refute erroneous disinformation linking infertility to COVID-19 vaccines
  - Use social media platforms for effective messaging

- **Conduct campaigns to reinforce the safety of human milk**, as evidence indicates that human milk remains a safe and healthy choice for infants


You'll find our summary of this seminar at

**covid19immunitytaskforce.ca**

# Questions?

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**CanCOVID-Preg Report # 3**, CANADIAN SURVEILLANCE OF COVID-19 IN PREGNANCY: EPIDEMIOLOGY, MATERNAL AND INFANT OUTCOMES: Released February 25, 2021

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