



COVID-19
IMMUNITY
TASK FORCE

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

JUNE
2022

CITF MONTHLY REVIEW

The extent of the
Omicron tsunami
in Canada

The facts
about **hybrid**
immunity

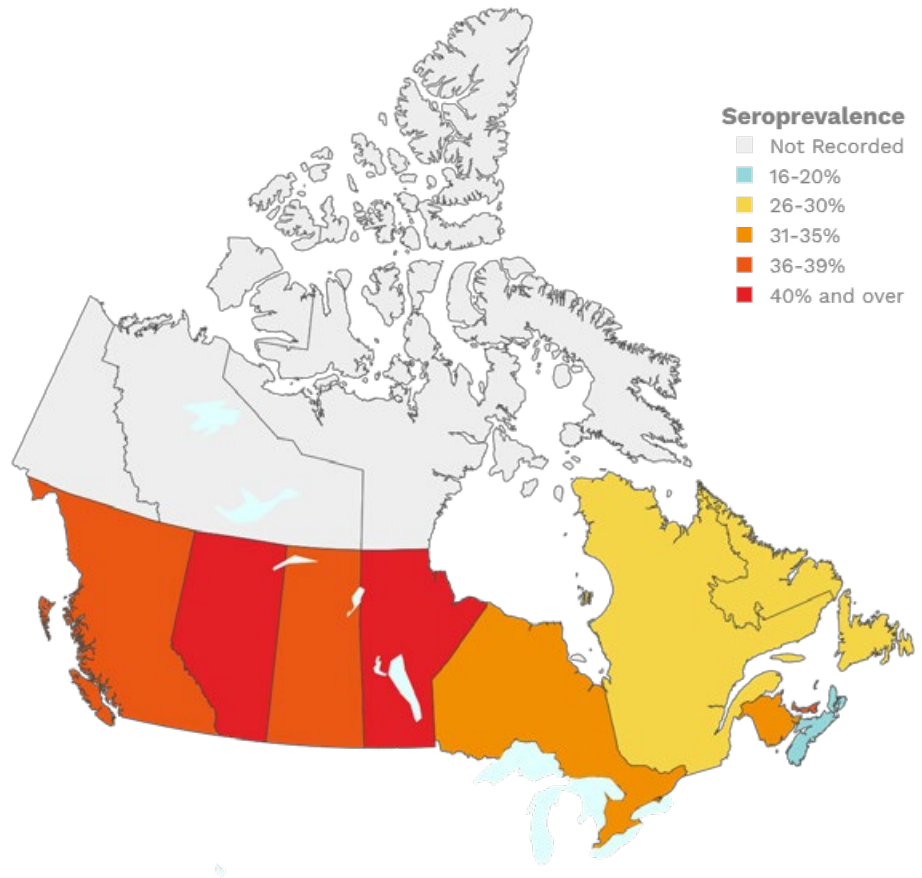
COVID-19 **doesn't**
always induce an
immune response



MID-MARCH REPORT

More than a quarter of Quebec adults had recently acquired infection-induced antibodies to SARS-CoV-2

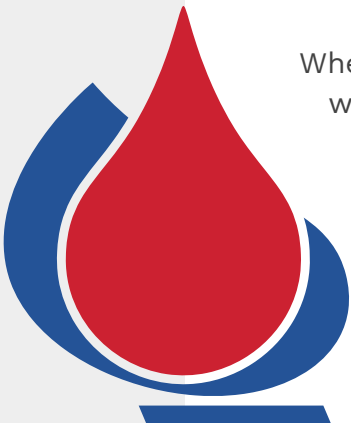
This map shows how Quebec compares with the rest of the country with respect to infection-acquired seroprevalence. Data from Quebec is from mid-March. Data from the other nine provinces is from end of April.



Between January and mid-March 2022, during the first Omicron wave, 27.4% of adults in Quebec developed infection-acquired antibodies to SARS-CoV-2 – more than double that reported by PCR-confirmed case counts. This, according to estimates from Héma-Québec based on data collected from donors enrolled in the CITF-funded PLASCOV project.

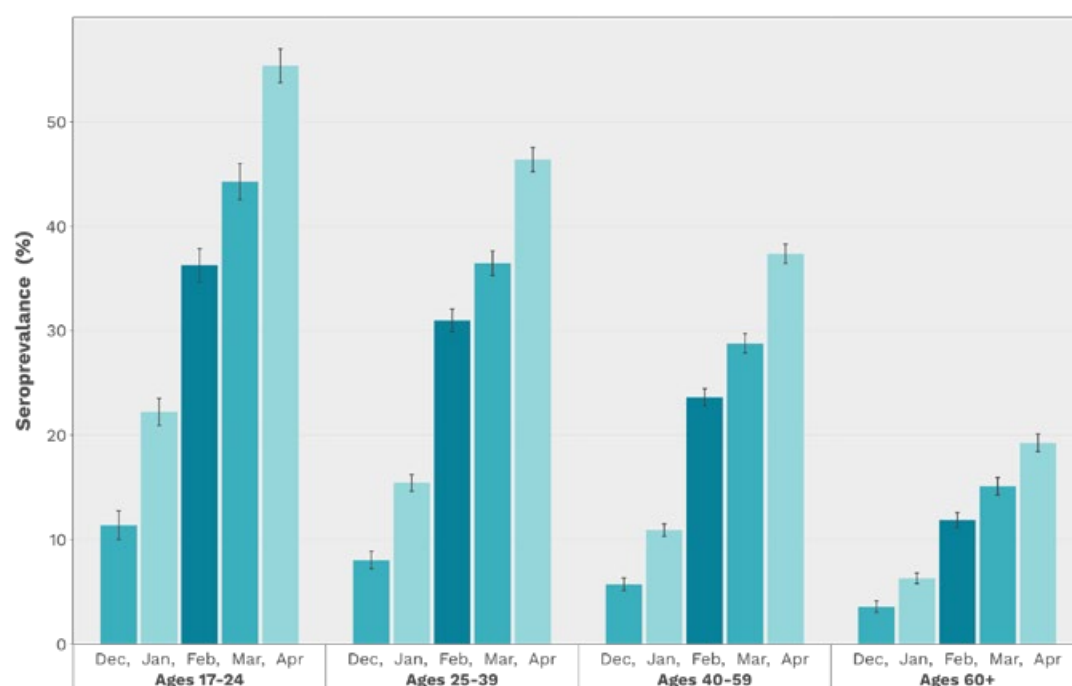
When extrapolated to the entire province, it would mean about 1.9 million adults would have been infected with SARS-CoV-2 during the initial Omicron wave. This number jumps to about 2.4 million people infected with SARS-CoV-2 in Quebec if the results in adults are extrapolated to include the pediatric population.

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APRIL REPORT

Nearly 40% of Canadian adults have had an Omicron infection

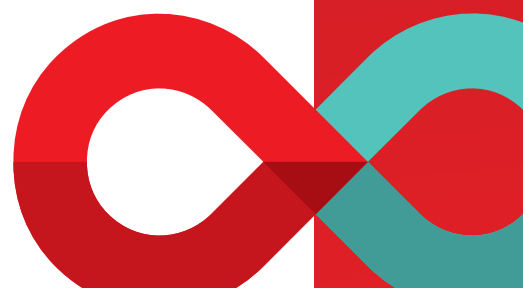


Consistent with the ongoing transmission of the Omicron variant, infection-acquired seropositivity increased among blood donors in Canada throughout April, from 33% at the beginning of the month to 40% by the end. The average for the month, 36.7%, was higher than March's average of 28.7%. The newest Canadian Blood Services data emphasize that young adults (55.4% of 17- to 24-year-olds were positive for infection-acquired antibodies) and racialized communities (45.0% vs. 34.8% among self-declared white donors) were still more prone to infection than other groups.

The unvaccinated had a higher chance of getting a SARS-CoV-2 infection: 37% of unvaccinated blood donors had evidence of a previous infection, compared to 22% of vaccinated donors.

Finally, whereas all provinces saw an increase in infection-acquired seropositivity, the numbers doubled in the Atlantic provinces, increasing five-fold in three of them.

» DISCOVER



One of the CITF-funded studies highlighted here estimated 9 million Canadian adults became infected with Omicron by mid-March 2022. Another of our studies found that 1 in 8 individuals do not develop antibodies following infection, highlighting the uncertainty of infection-induced immunity.

Incidence of Omicron SARS-CoV-2 infection among vaccinated Canadian adults

In a letter published in the *New England Journal of Medicine*, the Ab-C Study, led by Dr. Prabhat Jha (University of Toronto), quantified SARS-CoV-2 incidence during the Omicron (BA.1/1.1) wave among Canadian adult members of the Angus Reid Forum. They found that infection-acquired antibodies rose from 11.2% pre-Omicron to 36.9% during the Omicron era, translating to an estimated 9 million adults newly infected during Omicron.

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Coronavirus infections don't always induce an immune response

Published in the *Pediatric Infectious Disease Journal*, this study led by Drs. Marc-André Langlois, Malaa Bhatt, and Roger Zemek (University of Ottawa) found that approximately 1 in 8 individuals with COVID-19 did not develop detectable antibodies (seroconversion) as a result of infection. Children, particularly the youngest, were approximately half as likely to seroconvert. The paper also points out that the absence of fever/chills was the only strong symptomatic predictor of an inability to create antibodies.

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EnCORE Study finds only 15% of children still had infection-induced antibodies after 14 months

The latest, preliminary, non-peer reviewed results from the EnCORE study led by Dr. Kate Zinszer (Université de Montréal) showed twice the number of Montreal youth, aged 2 to 17, acquired antibodies due to a SARS-CoV-2 infection between October 2020 and December 2021 (mostly before the Omicron variant became widespread). Researchers also found only 15% of children still had infection-induced antibodies after 14 months.

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The National Advisory Committee on Immunization (NACI) recommends at least three doses of COVID-19 vaccine for all adults in Canada, and four doses for some. The CITF-funded research results below show that third doses effectively boost waning immunity and provide continued protection against severe illness and death (including against Omicron) in healthy people, older adults, those who are immunocompromised, and those with inflammatory bowel disease (IBD).

Study shows booster doses elicit strong antibody responses including against Omicron

A paper published in the *Journal of Infectious Diseases* showed that a third dose of COVID-19 vaccine elevated both the levels of antibodies and their neutralizing capacity above that of two doses in all individuals, including older adults. The research team also showed that a third dose stimulated stronger responses against Omicron than that which was seen after two doses. The study was led by Drs. Mark Brockman (Simon Fraser University), Zabrina Brumme (Simon Fraser University and the BC Centre for Excellence in HIV/AIDS), and Marc Romney (Providence Health Care and the University of British Columbia).

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Immune responses to mRNA COVID-19 vaccine in immune-deficient patients

A paper published in *JCI Insight* by Drs. Anne-Claude Gingras, Tania Watts, and Vinod Chandran (University of Toronto) provides evidence of the need for a third dose of mRNA vaccine in patients with immune-mediated inflammatory diseases (IMID). Most patients with a variety of IMIDs who were receiving immunomodulatory maintenance therapy showed increased antibody and T cell responses after the first and second dose of mRNA vaccine, but those responses had significantly decreased three months after the second dose.

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Third doses lead to high antibody responses among people living with inflammatory bowel disease (IBD)

Over 99% of a subset of individuals living with inflammatory bowel disease (IBD) mounted an antibody response against the spike protein after their third vaccine dose. These findings were reported in a letter published in *Gut*, under the leadership of Dr. Gil Kaplan (University of Calgary) and co-authored by Dr. Sasha Bernatsky (Research Institute of the McGill University Health Centre). Age, sex, IBD type, vaccine product, and vaccine schedule were not found to influence the generation of antibodies; however, individuals taking corticosteroids had lower spike antibody concentrations compared to those who did not.

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The COVID-19 pandemic has had an impact on other viruses that commonly circulate – and our reactions to them. In the CITF-funded research described below, one study suggests the lockdowns reduced people’s antibodies to respiratory syncytial virus causing a recent resurgence among some people. Another study has found good news: that a virus that often reduces immune competence in older adults does not reduce their immune response (or several aspects of it) to the COVID-19 vaccine.

COVID-19 lockdowns may be to blame for off-season resurgences of respiratory syncytial virus

Where an average of 1,450 cases of respiratory syncytial virus (RSV) are reported each year in British Columbia, only five cases were reported in the province in 2020-2021 due largely to drastically reduced interactions while provincial lockdowns were in effect. In a paper published in the *Journal of Infectious Diseases*, Dr. Pascal Lavoie and his team from the University of British Columbia discovered that infants and women of childbearing age exhibited a profound loss of antibodies against RSV after one year of the COVID-19 pandemic. These results have important implications for the recent resurgences of RSV infections.

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Cytomegalovirus infection does not hinder immune response to COVID-19 vaccines in older adults

Infection with cytomegalovirus (CMV), which has been shown to influence immune competence in older adults, does not alter antibody and memory T cell responses to COVID-19 vaccination in older adults in assisted-living facilities. The findings, from a study led by Drs. Dawn Bowdish, Andrew Costa, Ishac Nazy (McMaster University), are in preprint, therefore not yet peer-reviewed.

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SARS-CoV-2 infection during pregnancy associated with increased risk of adverse maternal and perinatal outcomes

Dr. Deborah Money (University of British Columbia) and the CANCOVID-Preg team published a study in *JAMA*, observing that SARS-CoV-2 infection during pregnancy was significantly associated with an increased risk of adverse maternal outcomes and preterm births for those who were unvaccinated. None of those pregnant individuals who had received at least two doses of a COVID-19 vaccine experienced any adverse maternal outcomes.

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COVID-19 vaccine safety

Since the introduction of COVID-19 vaccines, more than 11.5 billion doses have been administered to 5.6 billion people worldwide – more than 66% of the global population. In Canada, more than 82 million doses of vaccine have been given. Despite extensive real-world data showing that COVID-19 vaccines are safe, misperceptions continue to circulate and fuel doubt. As part of our *Research Results & Implications* seminar series, the CITF and CanCOVID convened a panel of CITF-affiliated researchers to present their data on vaccine safety.

KEY POINTS:

- 1 Close surveillance in Canada has revealed that **adverse events from immunization (AEFI) are exceedingly rare**. All AEFIs, including mild ones, amounted to only 0.05% of all vaccinations, of which only 0.01% were classified as serious.
- 2 Most adverse events were experienced after the first vaccine dose. Importantly, most adults who experienced an adverse event were **safely revaccinated**.
- 3 The Pfizer vaccine is **well-tolerated in children**, rarely provoking serious events. Adverse events from immunization were even more rare among children under 17 than among adults.
- 4 Most adults assessed for AEFIs were **women**, between the ages of 40 and 64, following the Pfizer vaccine.



5 Strategies to **mitigate the risk of myocarditis and pericarditis** include recommending the Pfizer vaccine for males under 30, as well as longer intervals between doses (>8 weeks).

6 Pregnant women who were vaccinated **did not experience any more pregnancy-related events** than non-vaccinated pregnant women.

7 **Unvaccinated** pregnant people had a **higher risk of severe outcomes** (including hospitalization and ICU admission) from COVID-19 infection than from vaccines.

8 **Continued education** (facts regarding how vaccines were safely developed, carefully tested, and closely monitored) is necessary to boost vaccine confidence.

9 CITF-funded studies, in collaboration with the Public Health Agency of Canada (PHAC), the Canadian Immunization Research Network (CIRN), and the National Advisory Committee on Immunization (NACI), continue to **monitor adverse events** and devise strategies to minimize their occurrence.

» FULL SUMMARY

Hybrid immunity: Why previously infected people need vaccination for longer lasting immunity

This review was written by members of the CITF Secretariat. The results and/or conclusions contained herein do not necessarily reflect the views of all CITF members.

As the COVID-19 pandemic evolves and new variants of SARS-CoV-2 emerge, incidents of breakthrough infections among vaccinated individuals and reinfections among previously infected individuals have risen worldwide. Now, as restrictions are lifted, it is important to understand the impact of vaccination – in conjunction with infection (hybrid immunity) – and of infection alone, to better inform public policy and recommendations for Canadians. Here, we summarize recent studies. The takeaway message: vaccination – with all recommended doses – is advised, even in individuals who have previously had COVID-19.



Researchers studying populations around the world have demonstrated that vaccination provides effective protection against severe outcomes associated with reinfection among individuals who had previously had SARS-CoV-2. This has become even more true with the advent of the Omicron variant, as infection-acquired immunity to this variant has so far been shown to be short-lived. Given the high transmissibility of Omicron, the public health focus continues to be on reducing the severity of disease outcomes and avoiding deaths.

Research has shown that prior infection alone does not confer sufficient immunity to ward off COVID-19. For those who have been vaccinated, but suffer a breakthrough infection, the resulting hybrid immunity may be more robust than that which is provided by vaccination alone. However, this is not to suggest that becoming infected is desirable. Precautions against COVID-19 are in everyone's best interest to avoid serious illness and death, to thwart after-effects of the disease such as long COVID, and to prevent spreading the virus to others – including the most vulnerable and our loved ones.

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Risk factors for severe COVID-19 in hospitalized children in Canada: A national prospective study from March 2020 to May 2021

New research, led by CITF-affiliated researchers Dr. Shaun Morris (University of Toronto) and Dr. Fatima Kakkar (Université de Montréal), along with Dr. Jesse Papenburg (McGill University), Dr. Manish Sadarangani (University of British Columbia), and Dr. Karina Top (Dalhousie University), has found that among children who were hospitalized with COVID-19 in Canada, more than 40% had a chronic disease or comorbidity.

In this preprint, not yet peer-reviewed, they also state that severe COVID occurred in about a third of pediatric hospitalizations and most frequently among children 2- to 4-years-old and 12- to 17-years-old.

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Fourth vaccine dose proved highly effective at protecting Ontario's long-term care residents

A recent study demonstrates that a fourth dose of mRNA vaccine was highly effective at protecting residents of long-term care facilities against severe COVID-19 outcomes (86%), symptomatic infection (69%), and any SARS-CoV-2 infection (49%) during the Omicron-fuelled fifth wave. The research, released in preprint and therefore not yet peer-reviewed, was led in part by CITF-funded researchers Dr. Jeffrey Kwong from ICES and Dr. Andrew Costa from McMaster University.

Residents of long-term care homes in Ontario have been disproportionately burdened by COVID-19, accounting for nearly two-thirds of deaths during the first two waves of the pandemic. While vaccines have provided good protection, their protection wanes over time. This study also found that roughly three months after the third dose, vaccine effectiveness was 77% against severe outcomes, 55% against symptomatic infection, and 37% against any SARS-CoV-2 infection.

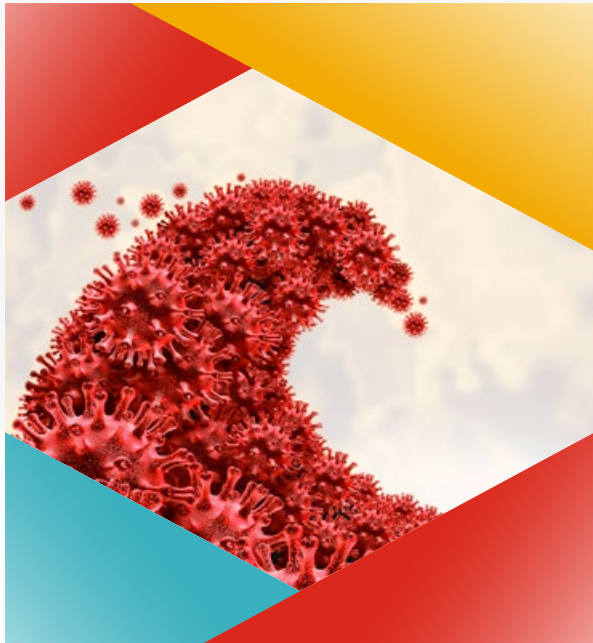
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The Omicron tsunami

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Thursday, June 23, 2022

11:00 a.m. to 12:30 p.m. EDT

Our 8th *Research Results & Implications* seminar will bring together CITF-affiliated experts to discuss how the Omicron variant changed the course of the pandemic by rapidly infecting hundreds of millions of healthy people around the globe, spurring the distribution of additional vaccine doses to boost immunity. What do we know and what's next? Our presenters will report on 1) The extent and nature of Omicron infection in Canada and around the globe; 2) How Omicron evaded existing immunity to spread so widely; 3) The notion of hybrid immunity, and how infection-acquired and vaccine-induced immunity can function together; and 4) Those at greatest risk of COVID-19 and why.

Presenters



David Buckeridge
MD, PhD, FRCPC



Michael Grant
MD



Ciriaco Piccirillo
PhD



Harriet Ware
MSc



Catherine Hankins
MD, PhD

Host

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