

Understanding immunity in Canada: COVID-19 seroprevalence studies

What was achieved?

Over three years of the COVID-19 pandemic, Canadian Blood Services has played a key role in understanding immunity to SARS-CoV-2, the virus that causes COVID-19. Our seroprevalence studies, which analyze antibodies against SARS-CoV-2 in donated blood samples, have provided valuable information on the movement of the virus through communities in Canada. This work was undertaken as part of a research partnership with the Government of Canada's COVID-19 Immunity Task Force.

Seroprevalence analysis helps us build a reliable picture of the overall extent of infection as well as virus levels in communities. It allows us to understand infection rates across different parts of the country, levels of immunity due to natural infection or vaccination, and the impact of factors like age, sex, and race or ethnicity.

Importantly, serological testing reveals a history of infections that would not otherwise be detected by polymerase chain reaction (PCR) tests. For example, serological testing shows infections in people who did not have symptoms, people whose symptoms were not severe enough for testing, and people who either could not access PCR testing centres or were not prioritized for this type of testing.

How was this achieved?

Since May 2020, our research team has been testing thousands of small samples of blood every day for antibodies to COVID-19. Canadian Blood Services is uniquely positioned to perform this work thanks to our dedicated donor base, logistical capacity, and research and medical expertise. As of August 2023, over 800,000 samples have been tested. Results show that more than 78 per cent of blood donors have antibodies due to COVID-19 infection and 100 per cent have antibodies as the result of vaccination. These results demonstrate both the extent to which COVID-19 has spread and high rates of vaccination among blood donors.

The Canadian Blood Services team shares the results of our seroprevalence analyses in monthly reports for the COVID-19 Immunity Task Force secretariat at McGill University, the Public Health Agency of Canada, and the provincial and territorial ministries of health. The findings are also shared on a platform that reports on SARS-CoV-2 surveillance efforts around the world. This information gives public policy decision-makers helpful global context for the patterns of seroprevalence we are seeing in Canada.

Our COVID-19 seroprevalence research will continue through 2023–2024, supported by \$6 million in funding from the Public Health Agency of Canada (Canadian Blood Services, 2023). This funding will allow us to collect and analyze more de-identified data over the coming months and contribute to a better understanding of how COVID-19 continues to affect Canada.



What was the impact and outcome?

The knowledge we gained from seroprevalence studies was used to support public health policy decisions aimed at reducing the spread of COVID-19. These insights were especially valuable early in the pandemic when we were still learning about COVID-19 immunity (O'Brien et al., 2020). For example, we learned that racialized people and people who are the most materially deprived — people with the lowest average household income and high school education rate combined with the highest unemployment rate — were more likely to have been affected by COVID-19. We learned that SARS-CoV-2 immunity across Canada varied by age and geography, which means public health policy decisions should be tailored to local contexts (Murphy et al., 2023). When the Omicron variant of the virus arrived in late 2021 and PCR testing was scaled back, Canadian Blood Services' seroprevalence studies were the most comprehensive ongoing assessments of the true infection rate in Canada.

The impacts of our COVID-19 seroprevalence studies highlight the value that Canadian Blood Services can bring to public health surveillance more broadly and suggest possibilities for more collaborations. For the first time, the Public Health Agency of Canada is incorporating blood donor data collected by Canadian Blood Services into its national estimates for hepatitis C (Popovic et al., 2022) and hepatitis B infection rates alongside more traditional data sources, such as reported cases in the community. Canadian Blood Services is now developing a post-pandemic role in public health research and surveillance (O'Brien, 2022) that will continue to leverage our donor base, capacity and expertise.

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