



**Canadian
Blood
Services**

BLOOD
PLASMA
STEM CELLS
ORGANS
& TISSUES

COVID-19 Seroprevalence Report

COVID-19 Seroprevalence Report

May 6th, 2022

Report #20: March 2022 Survey

The advance of Omicron

Summary

March 2022

March 1 - March 31 2022 (n=26,026)

•Humoral Immunity (Based on results from the Spike antibody assay):

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 was 99.57% (95% CI 99.42, 99.73%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February likely due to third vaccine dose administration, but were starting to decline in March.

•Natural Infections (Based on results from the Nucleocapsid antibody assay):

- Seroprevalence (natural infection) in March 2022 was 28.70% (95% CI 28.15, 29.25), higher than February 2022 (23.68% (95% CI 23.18, 24.18)). ($P < 0.0001$). There was a gradual increase over the 31 day reporting period from 27.02% (95% CI 25.95, 28.09) to 27.54% (95% CI 26.47, 28.61) to 30.68% (95% CI 29.61, 31.75) to 29.52% (95% CI 28.34, 30.69) consistent with the persistence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (44.27% (95% CI 42.54, 46.01) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to February.
- Seroprevalence rates increased in March compared to February in all provinces with the exception of Prince Edward Island and Newfoundland and Labrador where sample sizes are smaller.
- Racialized groups have a higher seroprevalence rate (38.58% (95% CI 37.21, 39.95)) compared to white donors (26.27% (95% CI 25.65, 26.89)).
- Among repeat tested donors, new infections in unvaccinated donors have increased from June 1.53% (95% CI 1.14, 2.00) to 9.12% (95% CI 8.24, 10.07) in January and 29.49% (95% CI 27.57, 31.48) in March
- Potential breakthrough infections remained low from June to December, but increased from 5.19% (95% CI 4.68, 5.74) in January to 17.50 (95% CI 16.66, 18.37) in March.

February 2022

February 1 - February 28 2022 (n=28,616)

•Humoral Immunity (Based on results from the Spike antibody assay):

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 was 99.60% (95% CI 99.45, 99.75%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February likely due to third vaccine dose administration.

•Natural Infections (Based on results from the Nucleocapsid antibody assay):

- Seroprevalence (natural infection) in February 2022 was 23.68% (95% CI 23.18, 24.18), higher than January 2022 (12.12% (95% CI 11.76, 12.48)). ($P < 0.0001$). There was a gradual increase over the 28 day reporting period from 21.39% (20.31, 22.48) to 23.43% (22.41, 24.45) to 23.68% (22.77, 24.58) to 25.25% (95% CI 24.30, 26.20) consistent with emergence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (36.27% (95% CI 34.68, 37.86%)) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to January.
- Seroprevalence rates increased in February compared to January in all provinces.
- Racialized groups have a higher seroprevalence rate (33.45% (95% CI 32.16, 34.73)) compared to white donors (21.17% (95% CI 20.62, 21.72%)).
- Among repeat tested donors, new infections in unvaccinated donors have increased from June 1.53% (1.14, 2.00) to 9.12% (95% CI 8.24, 10.07) in January, and more than doubled in February (23.71%, 95% CI 22.10, 25.37).
- Potential breakthrough infections remained low from June to December, but increased from 5.19% (95% CI 4.68, 5.74) in January to 15.56% (95% CI 14.72, 16.42) in February.

January 2022

January 1 - January 31 2022 (n=32,505)

•**Humoral Immunity (Based on results from the Spike antibody assay):**

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 was 98.89% (95% CI 98.73, 99.06%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by January likely due to third vaccine dose administration.

•**Natural Infections (Based on results from the Nucleocapsid antibody assay):**

- Seroprevalence (natural infection) in January 2022 was 12.12% (95% CI 11.76, 12.48), higher than December 2021 at 6.39% (95% CI 6.01, 6.76) ($P < 0.001$). There was a gradual increase over the 31 day reporting period from 7.16% (6.62, 7.71) to 10.09% (9.46, 10.71) to 12.65% (11.84, 13.45) to 16.30% (95% CI 15.51, 17.09) consistent with emergence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (22.22% (95% CI 20.93, 23.51%)) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to December.
- Seroprevalence rates increased in January compared to December in almost all provinces.
- Racialized groups have a higher seroprevalence rate (18.29% (95% CI 17.27, 19.32)) compared to white donors (10.73% (95% CI 10.34, 11.12%)).
- Among repeat tested donors, new infections in unvaccinated donors have increased from June 1.53% (1.14, 2.00) to 3.91% (3.11, 4.83%) in December and more than doubled in January to 9.012% (95% CI 8.24, 10.07).
- Potential breakthrough infections remained low from June to December, but increased from 0.74% (95% CI 0.48, 1.10) in December to 5.19% (95% CI 4.68, 5.74) in January.

December 2021

December 14 - December 30 2021 (n=16,816)

•Humoral Immunity (Based on results from the Spike antibody assay):

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 98.58% (95% CI 98.34, 98.82%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September, but gradually decreased. A peak in values followed by decline is expected after vaccination. By December, concentrations increased in older age groups likely due to administration of third doses consistent with policies to vaccinate older age groups earlier.

•Natural Infections (Based on results from the Nucleocapsid antibody assay):

- Seroprevalence (natural infection) in December was 6.39% (95% CI 6.01, 6.76), higher than November at 5.08% (95% CI 4.58, 5.50) ($P < 0.001$). There was a gradual increase over the 17 day reporting period from 5.60% (5.03, 6.18) to 6.55% (5.95, 7.15) to 7.51% (6.63, 8.39) consistent with emergence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (11.37% (95% CI 9.99, 12.75%)) compared to other age groups.
- Seroprevalence rates remained similar to November in most provinces, however, rates increased in December in Alberta (12.94% (95% CI 11.62, 14.27%), $P < 0.001$) and Ontario (5.43% (95% CI 4.94, 5.92%), $P < 0.001$) compared to November.
- Racialized groups have a higher seroprevalence rate (10.40% (95% CI 9.32, 11.48%)) compared to white donors (5.21% (95% CI 4.81, 5.61%)).
- Among repeat tested donors, new infections in unvaccinated donors have increased since June 1.53% (1.14, 2.00) to 3.91% (3.11, 4.83%) in December but vaccine breakthrough infections are low, 0.74% (0.48, 1.10%).

November 2021

November 13 - November 24 2021 (n=9,018)

- **Humoral Immunity (Based on results from the Spike antibody assay):**

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 was 98.52% (95% CI 98.18, 98.86%), slightly higher than October (based on results from the Spike antibody assay) ($P = 0.039$). This was predominantly driven by vaccination.
- Spike antibody concentrations were very high (>2500 U/mL) by July, but gradually decreasing in almost all age groups as the months progress with the greatest decrease in older age groups. A peak in values followed by decline is expected after vaccination. These results are consistent with policies to vaccinate older age groups earlier.

- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**

- Seroprevalence (natural infection) in November was 5.08% (95% CI 4.58, 5.50), higher than October at 4.26% (95% CI 3.85, 4.68%) ($P = 0.014$).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (9.35% (95% CI 7.62, 11.07%)) compared to other age groups.
- Racialized groups have a higher seroprevalence rate (8.28% (95% CI 6.82, 9.74%)) compared to white donors (4.56% (95% CI 4.05, 5.07%)).
- Among repeat tested donors, new infections in unvaccinated donors have increased since June 1.53% (1.14, 2.00) to 3.19% (2.42, 4.13) in November but vaccine breakthrough infections are low, 0.6% (0.37, 0.93).

October 2021

October 14 - October 23 2021 (n=9,627)

•**Humoral Immunity (Based on results from the Spike antibody assay):**

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 98.01% (95% CI 97.65, 98.36%), slightly higher than September (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were very high (>2500 AU/mL) by July, but began to decrease in older individuals by September. In October values are still very high but gradually decreasing in all age groups. A peak in values followed by decline is expected after vaccination. These results are consistent with policies to vaccinate older age groups earlier.
- Similar to past reports, donors living in affluent neighbourhoods had higher seroprevalence rates, 99.25% (95% CI 98.72, 99.79%) compared to those living in the most materially deprived neighbourhoods, 97.13% (95% CI 95.64, 98.61%).
- Of 25,100 donors tested on 2 or more occasions since January 2021, the most common (55.2%) test profile was presumed unvaccinated to vaccinated (N negative S negative on their first tested donation and N negative S positive on their last tested donation). There were 15 presumed breakthrough infections (donors who were N negative S positive on their first tested donation and N positive S positive on their last tested donation).

•**Natural Infections (Based on results from the Nucleocapsid antibody assay):**

- Seroprevalence (natural infection) in October was 4.26% (95% CI 3.85, 4.68%) similar to September, 2021 at 4.38% (95% CI 3.96, 4.81%).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (7.50% (95% CI 5.98, 9.01%)) compared to other age groups.
- Racialized groups have a higher seroprevalence rate (6.18% (95% CI 4.92, 7.45%)) compared to white donors (3.85% (95% CI 3.40, 4.31%)).

September 2021

September 14 - September 24 2021 (n=9,363)

•**Humoral Immunity (Based on results from the Spike antibody assay):**

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 97.03% (95% CI 96.62, 97.44%), slightly higher than August (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were very high (>2500 AU/mL) by July, but are beginning to decrease in older individuals by September. A peak in values followed by decline is expected after vaccination. These results are consistent with policies to vaccinate older age groups earlier.
- Similar to past reports, donors living in affluent neighbourhoods had higher seroprevalence rates, 97.56% (95% CI 96.83, 98.28%) compared to those living in the most materially deprived neighbourhoods, 94.72% (95% CI 92.93, 96.51%).
- Of 21,727 donors tested on 2 or more occasions since January 2021, the most common (54.0%) test profile was presumed unvaccinated to vaccinated (N negative S negative on their first tested donation and N negative S positive on their last tested donation). There were 12 presumed breakthrough infections (donors who were N negative S positive on their first tested donation and N positive S positive on their last tested donation).

•**Natural Infections (Based on results from the Nucleocapsid antibody assay):**

- Seroprevalence (natural infection) in September was 4.38% (95% CI 3.96, 4.81%) similar to August, 2021 at 4.43% (95% CI 3.99, 4.86%).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (8.70% (95% CI 7.06, 10.34%)) compared to other age groups. Rates in the 60+ age group increased significantly in September (2.78% (95% CI 2.13, 3.43%)) compared to August (1.61% (95% CI 1.09, 2.12%)) while other age groups did not change.
- Racialized groups have a higher seroprevalence rate (7.61% (95% CI 6.24, 8.97%)) compared to white donors (3.65% (95% CI 3.20, 4.10%)).

August 2021

August 15 - August 26 2021 (n=9,109)

•Humoral Immunity (Based on results from the Spike antibody assay):

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 96.09% (95% CI 95.63, 96.54) slightly up from July (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Median spike antibody concentrations increased in July compared to previous months ($P < 0.001$) but increased even further in August ($P < 0.001$).
- Similar to past reports, donors living in affluent neighbourhoods had higher seroprevalence rates, 98.25% (95% CI 97.56, 98.95%) compared to those living in the most materially deprived neighbourhoods, 93.41% (95% CI 91.45, 95.37%).
- Of 17,762 donors tested on 2 or more occasions since January 2021, the most common (52.9%) test profile was presumed unvaccinated to vaccinated (N negative S negative on their first tested donation and N negative S positive on their last tested donation). There were 11 presumed breakthrough infections (donors who were N negative S positive on their first tested donation and N positive S positive on their last tested donation).

•Natural Infections (Based on results from the Nucleocapsid antibody assay):

- Seroprevalence (natural infection) in August was 4.43% (95% CI 3.99, 4.86%) similar to July, 2021 at 4.08% (95% CI 3.65, 4.51%).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (8.44% (95% CI 6.80, 10.09%)) compared to other age groups. Rates in this age group were highest in Manitoba at 24.95% (95% CI 13.53, 36.37%).
- Racialized groups have a higher seroprevalence rate (11.14% (95% CI 9.14, 13.15%)) compared to white donors (3.30% (95% CI 2.86, 3.74%)). Natural infection rates in racialized donors also increased significantly compared to July. Compared to previous reports, the gap between those in materially deprived vs. affluent neighbourhoods has begun to widen likely due to the 4th wave, 7.85% (95% CI 5.87, 9.83%) vs 3.27% (95% CI 2.52, 4.02%).

July 2021

July 14 - July 23 2021 (n=8,457)

•Humoral Immunity (Based on results from the Spike antibody assay):

- Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Nucleocapsid and Spike antibody positive results together likely have been infected and may or may not have been vaccinated.
- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 94.69% (95% CI 94.16, 95.22) a significant increase from June (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Median Spike antibody concentrations increased in June compared to previous months ($P < 0.001$) but increased more in July ($P < 0.001$).
- The seroprevalence of white donors (95.04% (95% CI 94.44, 95.64%)) was not different from racialized groups (93.82% (95% CI 92.48, 95.15%)), this gap has closed compared to earlier surveys. Similar to past reports, donors living in affluent neighbourhoods had higher seroprevalence rates, 96.72% (95% CI 95.82, 97.61%) compared to those living in the most materially deprived neighbourhoods, 92.94% (95% CI 90.89, 95.00%).
- Of 14, 201 donors tested on 2 or more occasions since January 2021 the most common (51.2%) test profile was N negative S negative on their first tested donation and N negative S positive on their last tested donation, most likely due to vaccination. There were 5 donors who were N negative S positive on their first tested donation and N positive S positive on their last tested donation, potentially breakthrough infections.

•Natural Infections (Based on results from the Nucleocapsid antibody assay):

- Seroprevalence (natural infection) in July was 4.08% (95% CI 3.65, 4.51%), decreased from June, 2021.
- Natural seroprevalence in most provinces except Alberta plateaued, likely due to widescale vaccination and social restrictions.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (6.71% (95% CI 5.17, 8.25%)) compared to other age groups, however, this number has decreased since June, 2021.
 - Rates in this age group were highest in Alberta at 11.88% (95% CI 6.80, 16.97%) and British Columbia at 9.91% (95% CI 5.44, 14.37%). Since June, 2021 these rates have decreased or stayed very similar in almost every province with the exception of British Columbia where they have increased.
- Racialized groups had a higher seroprevalence rate (7.29% (95% CI 5.95, 8.63%)) compared to white donors (3.33% (95% CI 2.87, 3.78%)). Compared to previous reports, the gap between those in materially deprived vs. affluent neighbourhoods is closing, 4.62% (95% CI 3.03, 6.22%) vs 3.87% (95% CI 3.02, 4.71%). However, those living in more socially deprived settings (had lower social contact) had lower seroprevalence rates compared to those that were least deprived, 3.35% (95% CI 2.39, 4.30%) vs. 5.63% (95% CI 4.47, 6.80%).

June 2021

June 14 - June 29 2021 (n=16,884)

•**Humoral Immunity (Based on results from the Roche S assay):**

- Roche S results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Because people are advised to be vaccinated irrespective of past infection, those with Roche N and S positive results together likely have been infected and may or may not have been vaccinated.
- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 90.78% (95% CI 90.32, 91.25) a significant increase from May (based on results from the Roche S assay). This was predominantly driven by vaccination.
- The proportion of blood donors with presumed vaccine-induced humoral immunity to SARS-CoV-2 was 86.05% (95% CI 85.50, 86.59%), a significant increase from May (based on results from the Roche S-only assay).
- White donors did not have different seroprevalence rates (Roche S, primarily vaccine-induced) (90.81% (95% CI 90.25, 91.35%)) compared to other racialized groups (91.37% (95% CI 90.27, 92.47%)), this gap has closed compared to previous surveys. However, white donors had higher seroprevalence rates (Roche S-only, presumed vaccine induced) (86.87% (95% CI 86.26, 87.49%)), compared to other racialized groups (83.14% (95% CI 81.72, 84.56%)) with a decreased difference between these two groups compared to May. Similarly, donors living in affluent neighbourhoods had higher seroprevalence rates (Roche S, primarily vaccine-induced), 93.68% (95% CI 92.90, 94.46%) compared to those living in the most materially deprived neighbourhoods, 88.33% (95% CI 86.60, 90.06%).

•**Natural Infections (Based on results from the Roche N assay):**

- Seroprevalence (natural infection) in June was 4.5% (95% CI 4.19, 4.83%), increased from May, 2021.
- Natural infections in most provinces except Alberta plateaued, likely due to widescale vaccination.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (9.3% (95% CI 8.04, 10.57%)) compared to other age groups.
 - Rates in this age group were highest in Alberta at 17.53% (95% CI 13.23, 21.82%), Saskatchewan at 14.26% (95% CI 6.66, 21.87%), and Manitoba at 15.56% (95% CI 8.46, 22.65%).
- Racialized groups had a higher seroprevalence rate (7.95% (95% CI 6.95, 8.95%)) compared to white donors (3.72% (95% CI 3.38, 4.06%)). Those living in materially deprived vs. affluent neighbourhoods had a higher rate of natural infections, 6.95% (95% CI 5.62, 8.27%) vs 4.26% (95% CI 3.66, 4.87%).

May 2021

May 22 -June 4 2021 (n=17,001)

- The proportion of blood donors with humoral immunity for SARS-CoV-2 was 63.9% (95% CI 63.2, 64.6) a significant increase from April (based on results from the Roche S assay). This was predominantly driven by vaccination.

• **Vaccine-Induced Humoral Immunity (Reactive to Roche S-only):**

- The proportion of blood donors with vaccine-induced humoral immunity to SARS-CoV-2 was 59.8% (95% 59.1, 60.6), a significant increase from April.
- White donors had higher seroprevalence rates (vaccine-induced) (61.8% (95% CI 60.9, 62.7) compared to other racialized groups (48.9% (95% CI 47.1, 50.7%). Similarly, donors living in affluent neighbourhoods also had higher seroprevalence rates 64.8% (95% CI 63.4, 66.2%) compared to those living in the most materially deprived neighbourhoods, 56.6% (95% CI 54.0, 59.1%).

• **Natural Infections (Based on results from the Roche N assay):**

- Seroprevalence (natural infection) in May was 4.0% (95% CI 3.7, 4.3), increased from April, 2021.
- Natural infections in most provinces except Ontario and Alberta plateaued, likely due to widescale vaccination.
- Consistent with previous surveys donors aged 17-24 years old had the highest seroprevalence rate (7.0% (95% CI 5.9, 8.1)) compared to other age groups.
 - Rates in this age group were highest in Alberta 12.7% (95% CI 9.0, 16.4) and Manitoba 11.3% (95% CI 5.2, 17.4).
- Racialized groups had a higher seroprevalence rate (7.4% (95% CI 6.5, 8.3)) compared to white donors (3.3% (95% CI 2.9, 3.6)). Those living in materially deprived vs. affluent neighbourhoods had a higher rate of natural infections 5.7% (95% CI 4.5, 6.8) vs 3.1% (95% CI 2.6, 3.6).

April 2021

April 13-April 30 2021 (n=16,931)

- The proportion of blood donors with humoral immunity to SARS-CoV-2 was 26.9% (95% CI 26.2, 27.6) a significant increase from March (based on results from the Roche S assay). This was predominantly driven by vaccination.

•Vaccine-Induced Humoral Immunity (Reactive to Roche S-only):

- The proportion of blood donors with vaccine-induced humoral immunity to SARS-CoV-2 was 23.6% (95% CI 23.0, 24.3), a significant increase from March.
- Vaccine inequity emerged in April 2021.
- White donors had higher seroprevalence rates (vaccine-induced) (25.0% (95% CI 24.3, 25.8) compared to other racialized groups (17.9% (95% CI 16.5, 19.3%). Similarly, donors living in affluent neighbourhoods also had higher seroprevalence rates 26.9% (95% CI 25.6, 28.2%) compared to those living in the most materially deprived neighbourhoods, 20.9% (95% CI 18.8, 23.0%).

•Natural Infections (Based on results from the Roche N assay):

- Seroprevalence (natural infection) in April was 3.2% (95% CI 3.0, 3.5), similar to March 2021.
- Natural infections in most provinces except Ontario decreased or plateaued, likely due to widescale vaccination.
- Consistent with previous surveys donors aged 17-24 years old had the highest seroprevalence rate (5.4% (95% CI 4.4, 6.3)) compared to other age groups.
- Rates in this age group were significantly higher in Alberta 8.9% (95% CI 5.7, 12.0) and Manitoba 15.0% (95% CI 7.9, 22.0) compared to the full sample.
- Racialized groups had a higher seroprevalence rate (5.3% (95% CI 4.4, 6.1)) compared to white donors (2.8 (95% CI 2.5, 3.1)). Those living in materially deprived vs. affluent neighbourhoods had a higher rate of natural infections 4.6% (95% CI 3.5, 5.7) vs 2.7% (95% CI 2.2, 3.2).

March 2021

February 27-March 13, 2021 (n=16,873)

- Serological testing using the Roche nucleocapsid (N) and the Roche spike (S) total antibody assays allows us to monitor trends in natural infection transmission and vaccine-induced seropositivity.
- Overall, as of March 2021 adjusted seroprevalence by the Roche S assay (proxy for humoral immunity, vaccine or natural infection immunity) was 9.9% (95% CI 9.4, 10.3). The fraction of the population naturally exposed as opposed to developing immunity post-vaccination varied across Canada.
- Adjusted seroprevalence by the Roche S assay alone (N negative, proxy for vaccine-induced immunity) was 6.8% (95% 6.4, 7.16) a significant increase from January.
- Using self-reported vaccine history the Roche S assay alone had a sensitivity of 96.1% to identify vaccination (after 2 weeks)
- Despite broader access to COVID-19 vaccines, seroprevalence by the Roche N assay (proxy for natural infections) continued to increase from January (2.2% (95% 2.1, 2.4) to March (3.3% (95% CI 3.0, 3.5))
- Consistent with previous surveys, donors aged 17-24 years old demonstrated the highest seroprevalence rate (natural infection immunity) 6.37% (5.31, 7.44) compared to other age groups. Rates in this age group were significantly higher in Alberta 14.7% (95% CI 10.8, 18.6) and Manitoba 20.8% (95% CI 12.3, 28.0) than for the full sample.
- The disparities in natural infection immunity seroprevalence rates between racialized groups and white donors and those living in materially deprived vs. affluent neighbourhoods narrowed for the first time since November 2020 when disparities began to widen.

January 2021 (Roche)

January 1-27, 2021 (n=33,400 Roche)

- In order to evaluate seroprevalence in the vaccine era, residual blood is now tested using the Roche Elecsys® Anti-SARS-CoV-2 Spike (S) (semi-quantitative) and N (qualitative) assays. All vaccines will produce antibodies to S but not N, and natural infection will usually produce antibodies to S and N.
- In January 2021, seroprevalence estimates were higher by the Roche S assay (2.78% (95% CI 2.58, 2.97%) compared to either nucleocapsid assays. Seroprevalence by the Roche N assay was 2.24% (95% CI 2.08, 2.41) comparable to the Abbott N (1.99% (95% CI 1.84, 2.15)).
- **New:** 511 (1.5%) of donors self-reported vaccination against COVID-19 in the last 3 months in January 2021.

January 2021

January 1-27, 2021 (n=34,921)

- Seroprevalence in January was 1.99% (95% CI 1.84, 2.15)
- Across Canada seroprevalence remained the highest in Manitoba (3.92% (95% CI 2.92, 4.93)) and lowest in PEI (0%)
- Seroprevalence increased significantly in Ontario (1.16% vs 1.82%) and in Alberta (2.12% to 3.41%) from December 2020 until January 2021
- Consistent with previous surveys, donors aged 17-24 years old the highest seroprevalence rate (3.45% (95% CI 2.87, 4.02)).
- Disparities by socioeconomic status and racialized groups widened. Donors living in the most materially deprived neighbourhoods were nearly 4-times more likely to be positive than those living in affluent neighbourhoods (4.04% compared with 1.17%) . Racialized groups of donors were two time more likely to be positive than self identified white donors (3.37% compared to 1.66%)
- Detailed comparison with the previous survey (December 2020) is included.

December 2020

December 10-23, 2020 (n=16,961)

- Seroprevalence in December was 1.37% (95% CI 1.18, 1.56)
- Regional variation: Across Canada seroprevalence remained the highest in Manitoba (3.02% (95% CI 1.75, 4.29)) however this was a significant decrease from the last report.
- Donors aged 17-24 years old remained the age group with the highest seroprevalence (2.75% (95% CI 2.01, 3.49))
- Disparities by socioeconomic status widened, donors living in the most materially deprived neighbourhoods were 3-times more likely to be positive than those living in affluent neighbourhoods (2.2% compared with 0.72%)
- **New:** Longitudinal data on repeat donors illustrating waning S/co ratios over time

November 2020

November 7-25, 2020 (n=17,049)

- Seroprevalence in November was 1.51% (95% CI 1.31, 1.71)
- Regional variation: Seroprevalence increased mostly in Western Canada. Highest rates were observed in the Prairies; Manitoba's rate increased to 8.56% (95% CI 6.51, 10.62) and Saskatchewan's rate increased to 4.2% (95% CI 2.3, 5.8). There was a slight decrease in Ontario to 0.77% (95% CI 0.56, 0.97%) and PEI remained at 0.
- Donors aged 17-24 years old had the highest seroprevalence rates 2.97% (95% CI 2.20, 3.37%) while donors 40-59 years old 1.09% (95% CI 0.80, 1.38%) had the lowest rates.
- New: Revised time series (Additional data from the correlates of immunity study from April until Aug 31, 2020 are included in this report)
- Comparison of Wave 1 (May-July) to November 2020

October 2020

October 12-31, 2020 (n=16,811)

- Seroprevalence increased significantly in October to 0.88% (95% CI 0.73, 1.04) (p=0.04).
- Regional variation: Manitoba's seroprevalence rate increased to 2.96% (95% CI 1.70, 4.23), the highest in Canada. Ontario remained stable at 0.87% (0.65, 1.08)
- New: Heat maps to illustrate inter-provincial variation (by economic regions)
- Disparities widen: Donors that self-identified as white (0.75%; 95% CI 0.61, 0.92) had significantly lower seroprevalence compared to other racialized groups (1.82%; 95% CI 1.21, 2.62)

Wave 1

May 9, 2020- July 21, 2020 (n=74,642)

- Seroprevalence was estimated at 0.70% (95% CI 0.63, 0.77)
- Regional variation: Ontario, 0.88% (95% CI 0.78, 0.99) had the highest seroprevalence, very low seroprevalence in Atlantic provinces.
- Disparities: Donors that self-identified as white (0.66%; 95% CI 0.59, 0.74) had lower seroprevalence compared to racialized groups (1.09%; 95% CI 0.84, 1.34)

Introduction

SARS-CoV-2 is responsible for the respiratory illness, coronavirus infection disease 2019 (COVID-19). Some people become extremely ill and can die from complications, while others experience mild symptoms or may not be aware of their infection at all. Early in the pandemic (by late March 2020) strict physical distancing measures were implemented. As a result, the first wave of the epidemic in Canada peaked by the end of April 2020 and plateaued during the summer. A resurgence of cases began in late September 2020, peaking in January 2021 (the second wave). This was followed by a third wave that emerged in many regions across Canada in March 2021, which then subsided in late April. A fourth wave of this epidemic began in early August 2021 and subsided by the end of October. In mid-December 2021, a fifth wave began and subsided somewhat over January but by late March a sixth wave had begun. As of March 31, 2022, 3,484,859 cases of COVID-19 had been reported in Canada.

Beginning in January 2021, Alpha (B.1.1.7) began to establish itself as the primary variant of concern (VOC). In late June 2021, Delta (B.1.617.2) was transitioning to be the primary VOC. In mid-December 2021, a new more contagious VOC, Omicron (B.1.1.529) began to establish itself as a primary VOC. Peak timepoints when each VOC became dominant varied between provinces. By late December 2021 public health testing facilities were overwhelmed and restrictions on testing were implemented in many jurisdictions. Because many people with symptoms were not being tested, as well as those infected but without symptoms, the reported cases underestimate the infection rate. Surveillance studies that monitor SARS-CoV-2 antibodies are important to understand what proportion of the population have detectable antibodies (the seroprevalence) and to monitor trajectories over the course of the pandemic. This information improves mathematical models to predict the course of infection and informs public health policies.

Antibody concentrations typically peak within a month of vaccination and then gradually decrease. Antibody concentrations can be much higher after a second or third dose of vaccine, or when an infection occurs pre- or post-vaccination. More than 85% of the eligible (5 and older) population had received two doses as of March 27th, 2022. Starting in November 2021, some Canadians became eligible for a third dose. By March 27, 2022, almost 57% of the eligible population (18 and older) had received a third dose. Monitoring spike (vaccine) antibody concentrations and the proportion of people with Omicron variant infection provides data for mathematical models to estimate the status of humoral immunity.

In partnership with the COVID-19 Immunity Task Force, Canadian Blood Services is testing residual blood for SARS-CoV-2 antibodies from blood donors. This report tracks SARS-CoV-2 seroprevalence distinguishing natural and likely vaccine induced humoral immunity. We present seroprevalence rates based on two Roche total Ig- assays that detect Spike (S) and Nucleocapsid (N) antibodies and monitor the concentration of S antibodies. We assess temporal changes and evaluate differences by geographical regions, age groups, racialized groups, and socioeconomic status.

Methods

Population

Canadian Blood Services has blood collection sites in all large cities and many smaller urban centres in all provinces except Quebec. People in rural areas may have less opportunity to donate and donations are not collected in the northern territories. Blood donors are reasonably representative of healthy Canadians between the ages of 17 and about 60.

Blood donor eligibility

Before each donation, blood donors must answer screening questions to ensure that they are in good health and do not have risk factors for infections that may be transmitted to blood recipients. There is no evidence that SARS-CoV-2 can be transmitted through blood transfusion, but it is important to ensure other donors and staff are safe while in the blood clinic. Donors are asked if they have had COVID-19 or been in contact with someone who has. Donors are deferred if they have been in contact with someone who was infected or if they have had the infection for 2 weeks after symptoms disappear (3 weeks if hospitalized). Donors also have their temperature checked before they enter the clinic, and their hemoglobin level is checked before they can donate.

Blood samples

Just before a donor gives their blood donation, several small tubes of blood are collected for infectious disease screening. An extra sample is taken, known as the retention sample, in case extra testing is required (80% of these retention samples are not needed for operational testing). For this study retention samples were aliquoted and frozen at -20°C or colder, starting on May 9, 2020.

Periodicity

All retention samples were tested for SARS-CoV-2 antibodies until July 21, 2020 (Wave 1). From August 2020 until December 2020, only samples from approximately the last two weeks of each month were tested (except samples from August and September which were stored but not tested). In January 2021 a larger sample was tested and in February samples were stored but not tested. As of March, testing of approximately 2 weeks per month resumed. Beginning in July 2021 the sample size was reduced to include about 300 samples per age/region grouping plus extra repeat tested donors. In December 2021 samples from 2 weeks were tested without sorting in order to be able to report more quickly, and as of January 2022 samples from all weeks of the month were tested. Seroprevalence estimates also include an additional 1,500 residual blood tests from the correlates of immunity study from April 2020 to January 2021. These were tested on a battery of assays (orthogonal testing) including the Abbott IgG Assay.

	2020																																			
	March			April			May			June			July			August			September			October			November			December								
Seroprevalence ¹								14,541			51,963			21,594									16,811			17,049			16,963							
Correlates of Immunity Study ²																																				
	2021																																			
	January			February			March			April			May			June			July			August			September			October			November			December		
Seroprevalence ¹	34,921							16,873			16,931			17,001			16,884			8,457			9,109			9,363			9,627			9,018			16,811	
Correlates of Immunity Study ²																																				
	2022																																			
	January			February			March			April																										
Seroprevalence ¹			32,505			28,616			26,027																											
Orthogonal Testinn ²																																				

sex, racialized groups, Forward Sortation Area of residential postal code) and linked to the test data. In the donor pamphlet “What you must know to donate blood” which donors must read before each donation, and in the pamphlet entitled “What happens to your blood donation?” donors were informed that their blood will be tested for routine infectious disease markers and other tests as required. Information about the study was made available on the website in late June 2020 prior to commencing testing. Donors were not informed of their results because confirmatory/supplemental testing was not carried out. This study was approved by the Canadian Blood Services Research Ethics Board.

Data management and analysis

De-identified demographic data were analysed by the Canadian Blood Services Epidemiology & Surveillance Department. Socioeconomic status was estimated by quintiles of the Pampalon Material and Social Deprivation Indices (MSDI). MSDI was derived from 2016 Statistics Canada census, aggregated from postal codes to the dissemination area (DA) level (the smallest geographic unit available in the Canadian census, consisting of 400–700 persons). Because blood donors tend to live in areas close to a blood clinic there will be higher concentrations of donors in certain areas compared with the general population, and lower concentrations in other areas. To make inference to the general population, weighting factors were applied based on the donor’s residential Forward Sortation Area (FSA), age group and sex. Data were weighted based on Statistics Canada data (catalogue # 98-400-X2016008). For FSAs with few donors, several FSAs were combined, generally to include at least 500 donors. For data with no FSA recorded or if not in a province where blood is collected (0.2% of samples) weighting was based on FSA of the blood centre.

The seroprevalence was calculated as the number of positive samples divided by all samples tested. Ninety-five percent confidence intervals were calculated based on the Exact method. The adjusted seroprevalence and confidence intervals present the weighted data adjusted for sensitivity and specificity of the assay using the Rogan-Gladen equation³. SARS-CoV-2 seroprevalence was stratified by geography (regions, province and selected metropolitan cities), sex, age groups, self-reported ethnicity, and social and material deprivation indices.

Temporal trends by monthly intervals were evaluated by demographic variables. Statistical comparisons between groups were carried out using logistic regression.

Donors who donated more than once since testing began with the Roche assay in January 2021 and whose samples were selected for seroprevalence testing (at least two samples tested per donor) were included in a separate dataset for analysis and are referred to as “repeat donors”. At monthly intervals, beginning with June 2021, donations from repeat donors were evaluated for potential incident infections. If a donor was S positive and N negative on their previous donation (presumed vaccinated) before the month being observed and then was S positive N positive on their following donation in the corresponding month, this was considered a potential incident breakthrough infection. Percent incidence for each month was calculated by dividing the number of new incident infections (S positive N positive) in that month by the total number of donors who tested S positive N negative on their previous donation prior to the corresponding month. This same approach was used to evaluate incident cases among donors who were S

negative and N negative (presumed unvaccinated) on their previous donation who then were S positive N positive on their following donation in the corresponding month.

Results

Between March 1 and March 31, 2022, a total of 26,027 unique donors were tested for SARS-CoV-2 antibodies.

Table 1 compares adjusted seroprevalence rates by different assays (**Nucleocapsid and Spike antibody**) by sociodemographic variables for all Canadian provinces (except Quebec and territories). Overall adjusted seroprevalence by Spike antibody (a proxy of humoral immunity) was 99.57% (95% CI 99.42, 99.73%). The adjusted seroprevalence by Nucleocapsid antibody (proxy for natural infection) was 28.70% (95% CI 28.15, 29.25) (please refer to points of interpretation). There was a gradual increase over the 28-day reporting period from 27.02% (25.95, 28.09) to 27.54% (95% CI 26.47, 28.61) to 30.68% (95% CI 29.61, 31.75) to 29.52% (95% CI 28.34, 30.69) consistent with the persistence of the Omicron variant.

Figure 1 illustrates temporal trends of SARS-CoV-2 seroprevalence from April 4, 2020, until March 31, 2022, by monthly intervals. The discontinuation of the line in January 2021 represents the transition from the Abbott assay to the Roche assay. The largest increase in seroprevalence was seen in the Roche S assay, from early-March 2021 onwards, mirroring wider vaccine roll out. Figure 2 (A-E) stratifies seroprevalence by regions. Most of the humoral immunity was induced by vaccines (compared to natural infections) across the country. The largest increase in seroprevalence using Roche N was seen in February 2022, but also increased in March, consistent with the Omicron variant wave. Appendix Tables A1.1-A1.6 compare seroprevalence rates by sex, age groups and material deprivation in different regions.

Table 2A compares temporal changes in seroprevalence rates by natural infection (**Nucleocapsid antibody** between February 2022 and March 2022). Overall, the seroprevalence rate for natural infections was higher in March (28.70% (95% CI 28.15, 29.25)) compared to February (23.68% (95% CI 23.18, 24.18) ($P < 0.0001$)), and natural infections increased compared to the previous month across all demographics. Donors aged 17-24 years old continued to have the highest seroprevalence rate at 44.27% (95% CI 42.54, 46.01) compared to other age groups.

Table 2B shows that the percentage of donors with **Spike antibody** (proxy for humoral immunity) is at least 99% seroprevalence in all sociodemographic groups and no longer increasing.

After vaccination an increase in antibody concentration followed by gradual decline is expected. From September 2021 to March 2022 dilution of high concentration spike antibody samples permitted measurement of antibody concentrations as high as 100,000 U/mL. Figure 3 illustrates distributions of log transformed S antibody concentrations by age group from September to March.

From June to October 2021 the percentage of incident breakthrough infections were rare and varied by month with no clear trend (See Table 3). There was a small increase over November and December which increased in January/February and in March was 17.50% (95% CI 16.66, 18.37). Table 4 shows the percentage of incident cases by month in likely unvaccinated donors. Since June the percentage slowly increased to 3.91% (95% CI 3.11, 4.83) by December then increased much further to 29.49% (95% CI 27.57, 31.48) by March.

Figure 4 shows regional weekly trends since December 2021 for Nucleocapsid by age group. Figures 5A-H illustrate temporal trends of seroprevalence by Nucleocapsid and Spike antibody results by sociodemographic variables (ethnicity, age, material deprivation, and social deprivation) from January 2021 to March 2022. Differences in natural infections between white and racialized groups were seen from January 2021 to March 2022 with racialized groups having higher natural infection rates. Other sociodemographic variables had significant differences at various months corresponding to the vaccine roll out across Canada with evident trends in certain groups having increased Spike and/or Nucleocapsid antibodies compared to others. Tables A 1.1 to A 1.6 show selected demographic results for March by region (Nucleocapsid and Spike), and additional weekly breakdown of Nucleocapsid results are shown in Tables A 2.1 and A 2.2

Conclusion

As of March 2022, adjusted seroprevalence by the Spike antibody assay (proxy for humoral immunity) was 99.57% (95% CI 99.42, 99.73%). While humoral immunity was largely driven by vaccination, the fraction of the population naturally exposed has increase sharply since December consistent with the arrival of the Omicron variant. Among repeat tested donors, breakthrough infections in unvaccinated donors have increased slowly since June and more substantially by March 2022.

Points for Interpretation

1. Blood donors are a healthy sub-set of the adult Canadian population. Important points to keep in mind with regard to representativeness of the sample are:
 - blood donors self-select to donate blood therefore those who choose not to donate blood for whatever reason are not included in the sample.
 - Blood donations are collected from people aged 17 years and older, however there are relatively few donations from elderly donors.
 - Blood donations are collected in larger cities and many smaller urban areas, but people in rural areas may be under-represented. Canadian Blood Services does not collect blood in the northern territories or the province of Quebec.
2. Data were weighted for age, sex, and location to more closely reflect the Canadian population. For example, the Nucleocapsid antibody assay unweighted SARS-CoV-2

seroprevalence for the full sample was 29.04% (95% CI 28.48, 29.59), and after weighting factors applied it was 28.70% (95% CI 28.15, 29.25), then after the weighted seroprevalence was adjusted for sensitivity and specificity, 28.70% (95% CI 28.15, 29.25). Using the Spike antibody assay, the unweighted SARS-CoV-2 seroprevalence for the full sample was 98.33% (95% CI 98.17, 98.48), and after weighting factors applied it was 98.39% (95% CI 98.23, 98.54), then after the weighted seroprevalence was adjusted for sensitivity and specificity, 99.57% (95% CI 99.42, 99.73).

3. The sensitivity and specificity of the Roche assays are very good, but it is still possible that some true positives may be missed, and some positive results may be false. Confirmatory testing has not been performed. The seroprevalence was adjusted for sensitivity and specificity using a well-established mathematical formula.
4. Different seroprevalence rates by the assays reflect different isotypes being measured. The Roche assay identifies IgA, IgG and IgM antibodies. The Abbott assay measured IgG. Detection of Nucleocapsid antibodies is likely a marker of natural infection while Spike antibodies can be induced by either natural infection or by vaccines.
5. Seroprevalence results reflect measurement of humoral immunity. The exact mechanisms of protective immunity against SARS-CoV-2 remains unknown. The protection at particular levels of Spike antibody is unknown. Quantitative results from the Spike antibody assay will be valuable to inform policy regarding booster shots as the science evolves.
6. As of September 2021, the dilution for higher concentration (>250 U/mL) was increased from 1:10 to 1:400. This allows antibody concentration to be measured as high as 100,000 U/mL rather than 2,500 U/mL. It is possible that values between 160 and 320 U/mL may be less accurate because they are at the lower end of sensitivity of the assay.
7. SARS-CoV-2 antibody signals wane over time.
8. Spike antibodies reflect SARS-CoV-2 humoral response. Most Spike antibody positive results are related to vaccination. However, some Spike antibody positives may be due to natural infection (with or without N antibodies). Donors with both Spike and Nucleocapsid antibodies are assumed to have had a natural infection; however, they may have also been vaccinated before or after the infection.

Due to a variety of biological factors, donors may have variable antibody responses to different binding sites on the SARS-CoV-2 virus (e.g., Spike, receptor binding domain of Spike, nucleocapsid protein). In March the most common positive antibody profile was positive on Spike antibody and negative on Nucleocapsid antibody (see below).

Diagnostic phenotypes in March 2022 (unadjusted)

	Nucleocapsid Antibody	Spike Antibody	Total N (%)
	Negative	Negative	380 (1.5%)
	Negative	Positive	18,089 (69.5%)
	Positive	Negative	54 (0.2%)
	Positive	Positive	7,503 (28.8%)
Total			26,026 ¹

¹One donor missing Spike

Disclaimer: Canadian Blood Services is providing this report of the study results on an "as is" basis and makes no representations or warranties, express or implied, including with regards to the accuracy, reliability or validity of the information or its fitness for a particular purpose. The use of this report and/or any study results is the responsibility of the user. Canadian Blood Services assumes no liability resulting from any such use. This report may not be reproduced without permission from Canadian Blood Services.

References

1. <https://diagnostics.roche.com/global/en/products/params/elecsys-anti-sars-cov-2-s.html>
2. Whitaker HJ, Elgohari S, Rowe C, Otter AD, Brooks T, Linley E, et al., Impact of COVID-19 vaccination program on seroprevalence in blood donors in England, 2021, Journal of Infection (2021), doi: <https://doi.org/10.1016/j.jinf.2021.04.037>
3. Lang Z, Reiczigel J. Confidence limits for prevalence of disease adjusted for estimated sensitivity and specificity. Preventive Veterinary Medicine. 2014;113:13-2

Table 1. Comparing SARS-CoV-2 seroprevalence by sociodemographic variables by Nucleocapsid and Spike antibody results in March 2022

Nucleocapsid Antibody Results (proxy for natural infection)					Spike Antibody Results (proxy for humoral immunity by either natural infection or vaccination)			
	Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	11,299	3,259	27.22	26.46, 27.98	11,298	11,132	99.78	99.58, 99.98
Male	14,728	4,298	30.27	29.46, 31.07	14,728	14,460	99.35	99.11, 99.59
Age								
17-24	1,906	876	44.27	42.54, 46.01	1,906	1,895	100.00	100.00, 100.00
25-39	7,134	2,649	36.47	35.28, 37.66	7,134	7,035	99.72	99.42, 100.00
40-59	9,707	2,858	28.78	27.85, 29.72	9,706	9,524	99.39	99.11, 99.67
60+	7,280	1,174	15.11	14.28, 15.93	7,280	7,138	99.20	98.88, 99.52
Province								
British Columbia	4,646	1,497	32.09	30.74, 33.44	4,646	4,576	99.78	99.43, 100.00
Alberta	5,373	2,031	39.82	38.26, 41.38	5,373	5,282	99.43	99.01, 99.86
Saskatchewan	1,341	384	30.77	27.92, 33.62	1,341	1,319	99.52	98.73, 100.00
Manitoba	1,575	491	33.16	30.48, 35.85	1,575	1,548	99.45	98.69, 100.00
Ontario	10,829	2,833	26.25	25.49, 27.01	10,829	10,632	99.44	99.21, 99.67
New Brunswick	851	116	15.03	12.44, 17.63	851	840	99.78	98.92, 100.00
Nova Scotia	1,067	184	18.01	15.51, 20.51	1,067	1,055	99.95	99.23, 100.00
Prince Edward Island	109	7	7.63	3.02, 12.24	109	107	99.17	96.77, 100.00
Newfoundland	236	14	5.96	3.80, 8.12	235	233	100.00	99.28, 100.00
Metro area								
Vancouver	2,524	921	35.72	33.85, 37.59	2,524	2,501	100.00	99.91, 100.00
Calgary	1,977	720	37.41	34.71, 40.11	1,977	1,954	99.90	99.26, 100.00
Edmonton	1,823	636	35.89	33.31, 38.47	1,823	1,801	99.98	99.39, 100.00

COVID-19 Seroprevalence Report
March Survey

Ottawa	1,459	285	19.56	16.95, 22.17	1,459	1,451	100.00	99.99, 100.00
Toronto	3,227	924	27.80	26.61, 28.99	3,227	3,177	99.79	99.47, 100.00
Winnipeg	964	260	28.44	25.07, 31.81	964	954	99.85	98.99, 100.00
Ethnicity^{1,2}								
White	19,546	5,237	26.27	25.65, 26.89	19,545	19,210	99.51	99.33, 99.70
Indigenous	361	118	31.13	26.20, 36.05	361	356	99.32	97.87, 100.00
Asian	1,433	469	30.55	28.24, 32.86	1,433	1,421	100.00	99.95, 100.00
Other racialized groups	2,842	1,208	43.54	41.76, 45.32	2,842	2,806	99.97	99.58, 100.00
Social Deprivation³								
1 (least deprived)	4,990	1,591	31.32	30.04, 32.60	4,990	4,917	99.70	99.37, 100.00
2	4,764	1,339	27.21	25.96, 28.47	4,763	4,679	99.46	99.09, 99.83
3	4,640	1,297	27.90	26.60, 29.20	4,640	4,566	99.71	99.36, 100.00
4	4,265	1,148	27.30	25.96, 28.64	4,265	4,200	99.79	99.43, 100.00
5 (most deprived)	4,221	1,196	28.12	26.73, 29.52	4,221	4,142	99.34	98.92, 99.76
Material Deprivation³								
1 (least deprived)	6,868	1,841	25.93	24.87, 27.00	6,868	6,786	99.95	99.68, 100.00
2	5,660	1,524	26.13	24.98, 27.28	5,660	5,574	99.83	99.53, 100.00
3	4,644	1,354	28.89	27.59, 30.20	4,644	4,559	99.45	99.07, 99.83
4	3,565	1,098	30.78	29.28, 32.27	3,564	3,489	99.21	98.76, 99.67
5 (most deprived)	2,143	754	36.58	34.60, 38.57	2,143	2,096	99.00	98.40, 99.61
Total	26,027	7,557	28.70	28.15, 29.25	26,026	25,592	99.57	99.42, 99.73

¹ Self reported ethnicity was missing for 1,845 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 27.93% (95% CI 25.80, 30.06); and Spike antibody was 98.74% (95% CI 98.00, 98.48).

² Combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 38.58% (95% CI 37.21, 39.95) by the Nucleocapsid antibody assay, and 100.00% (95% CI 99.76, 100.00) by Spike antibody.

³ Postal Codes were missing for 3,147(12.1%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 30.67% (95% CI 29.02, 32.32) and Spike antibody was 99.32% (95% CI 98.83, 99.81).

Table 2a. Changes in SARS-CoV-2 seroprevalence by **Nucleocapsid Antibody assay (proxy for natural infection)** by sociodemographic variables between February and March 2022

February 2022 (crude)		February 2022 (adjusted)		March 2022 (crude)		March 2022 (adjusted)		P-Value*
Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	
Sex								
Female	12,659	2,945	22.09 21.42, 22.77	11,299	3,259	27.22 26.47, 27.98		<0.0001
Male	15,957	3,848	25.36 24.63, 26.09	14,728	4,298	30.27 29.46, 31.07		<0.0001
Age								
17-24	2,203	814	36.27 34.68, 37.86	1,906	876	44.27 42.54, 46.01		<0.0001
25-39	7,755	2,400	30.99 29.90, 32.08	7,134	2,649	36.47 35.28, 37.66		<0.0001
40-59	10,741	2,610	23.62 22.78, 24.45	9,707	2,858	28.78 27.85, 29.72		<0.0001
60+	7,917	969	11.87 11.15, 12.58	7,280	1,174	15.11 14.28, 15.93		<0.0001
Province								
British Columbia	4,438	1,116	25.52 24.32, 26.73	4,646	1,497	32.09 30.74, 33.44		<0.0001
Alberta	5,560	1,691	31.79 30.38, 33.19	5,373	2,031	39.82 38.26, 41.38		<0.0001
Saskatchewan	1,213	281	22.28 19.81, 24.75	1,341	384	30.77 27.92, 33.62		<0.0001
Manitoba	1,479	411	28.05 25.61, 30.50	1,575	491	33.16 30.48, 35.85		0.0057
Ontario	13,633	3,061	22.65 21.96, 23.34	10,829	2,833	26.25 25.49, 27.01		<0.0001
New Brunswick	797	74	9.82 7.76, 11.89	851	116	15.03 12.44, 17.63		0.0020
Nova Scotia	962	117	12.77 10.69, 14.85	1,067	184	18.01 15.51, 20.51		0.0015
Prince Edward Island	140	10	7.21 3.05, 11.36	109	7	7.63 3.02, 12.24		0.8944
Newfoundland	394	32	8.18 5.87, 10.50	236	14	5.96 3.80, 8.12		0.1734

COVID-19 Seroprevalence Report
March Survey

Metro area									
Vancouver	2,384	730	30.12	28.43, 31.82	2,524	921	35.72	33.85, 37.59	<0.0001
Calgary	2,285	695	31.76	29.33, 34.19	1,977	720	37.41	34.71, 40.11	0.0023
Edmonton	1,753	478	27.97	25.74, 30.20	1,823	636	35.89	33.31, 38.47	<0.0001
Ottawa	1,151	195	17.38	15.31, 19.46	1,459	285	19.56	16.95, 22.17	0.1970
Toronto	4,645	1,221	25.71	24.59, 26.82	3,227	924	27.80	26.61, 28.99	0.0119
Winnipeg	1,029	249	23.96	21.11, 26.81	964	260	28.44	25.07, 31.81	0.0458
Ethnicity^{1,2}									
White	21,522	4,630	21.17	20.62, 21.72	19,546	5,237	26.27	25.65, 26.89	<0.0001
Indigenous	383	96	23.88	19.69, 28.08	361	118	31.13	26.20, 36.05	0.0277
Asian	1,466	423	29.06	26.81, 31.31	1,433	469	30.55	28.24, 32.86	0.3650
Other racialized groups	3,120	1,118	36.79	35.12, 38.46	2,842	1,208	43.54	41.76, 45.32	<0.0001
Social Deprivation³									
1 (least deprived)	5,402	1,402	26.19	25.00, 27.38	4,990	1,591	31.32	30.04, 32.60	<0.0001
2	5,482	1,214	21.86	20.77, 22.95	4,764	1,339	27.21	25.96, 28.47	<0.0001
3	5,040	1,158	22.98	21.81, 24.15	4,640	1,297	27.90	26.60, 29.20	<0.0001
4	4,587	1,084	23.70	22.47, 24.94	4,265	1,148	27.30	25.96, 28.64	0.0001
5 (most deprived)	4,759	1,084	22.24	21.04, 23.44	4,221	1,196	28.12	26.73, 29.52	<0.0001
Material Deprivation³									
1 (least deprived)	7,647	1,744	22.39	21.44, 23.34	6,868	1,841	25.93	24.87, 27.00	<0.0001
2	6,110	1,337	22.10	21.04, 23.15	5,660	1,524	26.13	24.98, 27.28	<0.0001
3	5,156	1,182	22.83	21.67, 23.99	4,644	1,354	28.89	27.59, 30.20	<0.0001
4	3,977	971	24.48	23.15, 25.81	3,565	1,098	30.78	29.28, 32.27	<0.0001

COVID-19 Seroprevalence Report
March Survey

5 (most deprived)	2,380	708	28.9	27.13, 30.67	2,143	754	36.58	34.60, 38.57	<0.0001
Total	28,616	6,793	23.68	23.18, 24.18	26,027	7,557	28.70	28.15, 29.25	<0.0001

*P-value reflects the difference between February and March results.

¹ In February, Self reported ethnicity was missing for 2125 (7.4%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 24.82% (95% CI 22.95, 26.68). In March, Self reported ethnicity was missing for 1,845 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 27.93% (95% CI 25.80, 30.06).

² In February, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 33.45% (95% CI 32.16, 34.73) by the Nucleocapsid antibody assay. In March, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 38.58% (95% CI 37.21, 39.95) by the Nucleocapsid antibody assay.

³ In February, postal codes were missing for 3,346 (11.7%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 25.83% (95% CI 24.32, 27.34). In March, postal codes were missing for 3,147 (12.1%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 30.67% (95% CI 29.02, 32.32).

Table 2b. Changes in SARS-CoV-2 seroprevalence using Spike antibody results (proxy for natural infection or vaccine induced immunity) by sociodemographic variables between February and March 2022

February 2022 (crude)		February 2022 (adjusted)		March 2022 (crude)		March 2022 (adjusted)		P- Value*
Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	
Sex								
Female	12,659	12,476	99.85 99.66, 100.00	11,298	11,132	99.78 99.58, 99.98		0.6355
Male	15,957	15,632	99.33 99.11, 99.56	14,728	14,460	99.35 99.11, 99.59		0.9275
Age								
17-24	2,203	2,185	100.00 100.00, 100.00	1,906	1,895	100.00 100.00, 100.00		0.3792
25-39	7,755	7,624	99.54 99.24, 99.85	7,134	7,035	99.72 99.42, 100.00		0.4148
40-59	10,741	10,542	99.41 99.14, 99.67	9,706	9,524	99.39 99.11, 99.67		0.9257
60+	7,917	7,757	99.49 99.21, 99.78	7,280	7,138	99.20 98.88, 99.52		0.1776
Province								
British Columbia	4,438	4,368	99.68 99.34, 100.00	4,646	4,576	99.78 99.43, 100.00		0.7035
Alberta	5,560	5,427	98.88 98.43, 99.34	5,373	5,282	99.43 99.01, 99.86		0.0842
Saskatchewan	1,213	1,185	98.98 98.10, 99.86	1,341	1,319	99.52 98.73, 100.00		0.3745
Manitoba	1,479	1,451	99.13 98.35, 99.91	1,575	1,548	99.45 98.69, 100.00		0.5699
Ontario	13,633	13,397	99.67 99.47, 99.87	10,829	10,632	99.44 99.21, 99.67		0.1414
New Brunswick	797	794	100.00 100.00, 100.00	851	840	99.78 98.92, 100.00		0.0436
Nova Scotia	962	956	100.00 99.98, 100.00	1,067	1,055	99.95 99.23, 100.00		0.1832
Prince Edward Island	140	138	99.40 97.30, 100.00	109	107	99.17 96.77, 100.00		0.9774
Newfoundland	394	392	100.00 99.54, 100.00	235	233	100.00 99.28, 100.00		0.8674

COVID-19 Seroprevalence Report
March Survey

Metro area									
Vancouver	2,384	2,351	99.85	99.43, 100.00	2,524	2,501	100.00	99.91, 100.00	0.0812
Calgary	2,285	2,242	99.44	98.75, 100.00	1,977	1,954	99.90	99.26, 100.00	0.1986
Edmonton	1,753	1,719	99.30	98.62, 99.98	1,823	1,801	99.98	99.39, 100.00	0.0734
Ottawa	1,151	1,145	100.00	99.99, 100.00	1,459	1,451	100.00	99.99, 100.00	0.6848
Toronto	4,645	4,594	100.00	99.88, 100.00	3,227	3,177	99.79	99.47, 100.00	0.0598
Winnipeg	1,029	1,019	99.90	99.14, 100.00	964	954	99.85	98.99, 100.00	0.9953
Ethnicity^{1,2}									
White	21,522	21,131	99.57	99.40, 99.74	19,545	19,210	99.51	99.33, 99.70	0.6465
Indigenous	383	376	99.16	97.76, 100.00	361	356	99.32	97.87, 100.00	0.8722
Asian	1,466	1,458	100.00	100.00, 100.00	1,433	1,421	100.00	99.95, 100.00	0.2607
Other racialized groups	3,120	3,073	99.74	99.33, 100.00	2,842	2,806	99.97	99.58, 100.00	0.4345
Social Deprivation³									
1 (least deprived)	5,402	5,316	99.86	99.55, 100.00	4,990	4,917	99.70	99.37, 100.00	0.5003
2	5,482	5,381	99.53	99.19, 99.87	4,763	4,679	99.46	99.09, 99.83	0.7766
3	5,040	4,944	99.50	99.14, 99.86	4,640	4,566	99.71	99.36, 100.00	0.4014
4	4,587	4,511	99.66	99.30, 100.00	4,265	4,200	99.79	99.43, 100.00	0.6110
5 (most deprived)	4,759	4,672	99.55	99.18, 99.92	4,221	4,142	99.34	98.92, 99.76	0.4628
Material Deprivation³									
1 (least deprived)	7,647	7,554	100.00	99.94, 100.00	6,868	6,786	99.95	99.68, 100.00	0.1754
2	6,110	6,004	99.70	99.39, 100.00	5,660	5,574	99.83	99.53, 100.00	0.5535
3	5,156	5,046	99.26	98.88, 99.65	4,644	4,559	99.45	99.07, 99.83	0.4982
4	3,977	3,893	99.31	98.89, 99.74	3,564	3,489	99.21	98.76, 99.67	0.7486

COVID-19 Seroprevalence Report
March Survey

5 (most deprived)	2,380	2,327	98.93	98.35, 99.52	2,143	2,096	99.00	98.40, 99.61	0.8689
Total	28,616	28,108	99.60	99.45, 99.75	26,026	25,592	99.57	99.42, 99.73	0.8070

*P-value reflects the difference between February and March results.

¹ In February, self reported ethnicity was missing for 2,125 (7.4%) donors; Adjusted seroprevalence by the Spike antibody was 98.82% (95% CI 98.16, 99.47). In March, self reported ethnicity was missing for 1845 (7.1%) donors; Adjusted seroprevalence by the Spike antibody was 98.74% (95% CI 98.00, 99.48).

². In February, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 99.99% (95% CI 99.69, 100.00) by Spike antibody. In March, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 100% (95% CI 99.76, 100.00) by Spike antibody.

³ In February, postal codes were missing for 3,346 (11.7%) of donors; Adjusted seroprevalence by the Spike antibody was 99.43% (95% CI 98.98, 99.89). In March, postal codes were missing for 3,147 (12.1%) of donors; Adjusted seroprevalence by the Spike antibody was 99.32% (95% CI 98.83, 99.81).

Table 3. SARS-CoV-2 incidence among anti-S positive donors by month from June 2021 – March 2022.

Month	Total donors tested	Repeat Donors	Previous S positive, N negative	S Positive, N Positive		
				N	%	95% CI
Jun	16,884	4,452	929	2	0.22	0.03, 0.78
Jul	8,457	2,853	1,054	5	0.47	0.15, 1.10
Aug	9,109	5,400	2,719	8	0.29	0.13, 0.58
Sep	9,363	5,728	2,915	3	0.10	0.02, 0.30
Oct	9,627	5,898	3,313	12	0.36	0.19, 0.63
Nov	9,018	5,290	3,318	20	0.60	0.37, 0.93
Dec	16,816	5,560	3,241	24	0.74	0.48, 1.10
Jan	32,505	11,296	6,973	362	5.19	4.68, 5.74
Feb	28,616	10,200	7,065	1,099	15.56	14.72, 16.42
Mar	26,026	10,636	7,741	1,355	17.50	16.66, 18.37

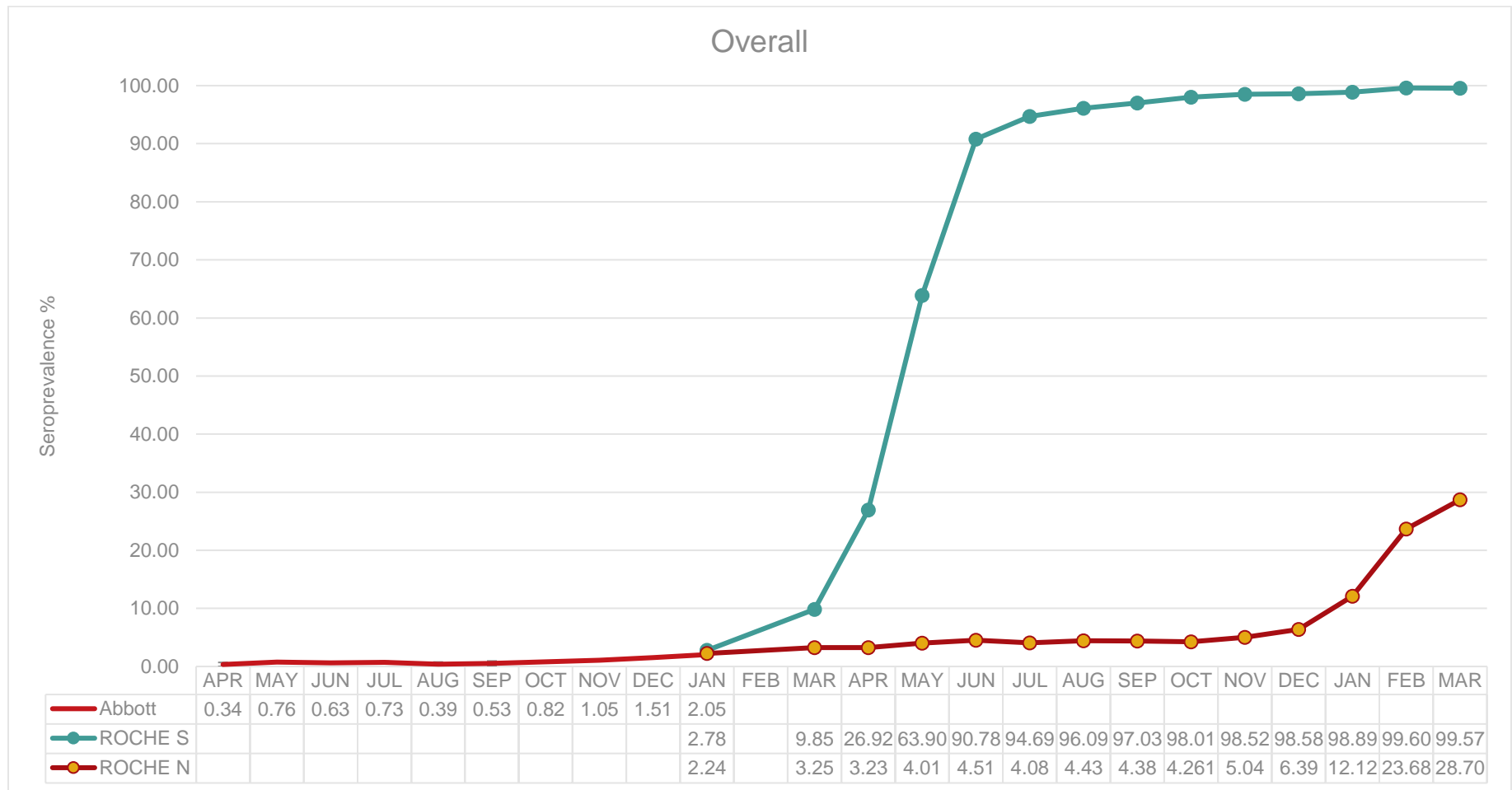
Note: A donation was considered a potential breakthrough incident infection if donors tested S positive and N negative on their previous donation and then tested S positive and N positive on their following donation.

Table 4. SARS-CoV-2 incidence among anti-S negative donors by month from June 2021 – March 2022.

Month	Total donors tested	Repeat Donors	Previous S negative, N negative	S Positive, N Positive		
				N	%	95% CI
Jun	16,884	4,452	3,409	52	1.53	1.14, 2.00
Jul	8,457	2,853	1,697	24	1.41	0.91, 2.10
Aug	9,109	5,400	2,487	29	1.17	0.78, 1.67
Sep	9,363	5,728	2,628	53	2.02	1.51, 2.63
Oct	9,627	5,898	2,385	61	2.56	1.96, 3.27
Nov	9,018	5,290	1,754	56	3.19	2.42, 4.13
Dec	16,817	5,560	2,073	81	3.91	3.11, 4.83
Jan	32,505	11,296	3,924	358	9.12	8.24, 10.07
Feb	28,616	10,200	2,666	632	23.71	22.10, 25.37
Mar	26,026	10,636	2,136	630	29.49	27.57, 31.48

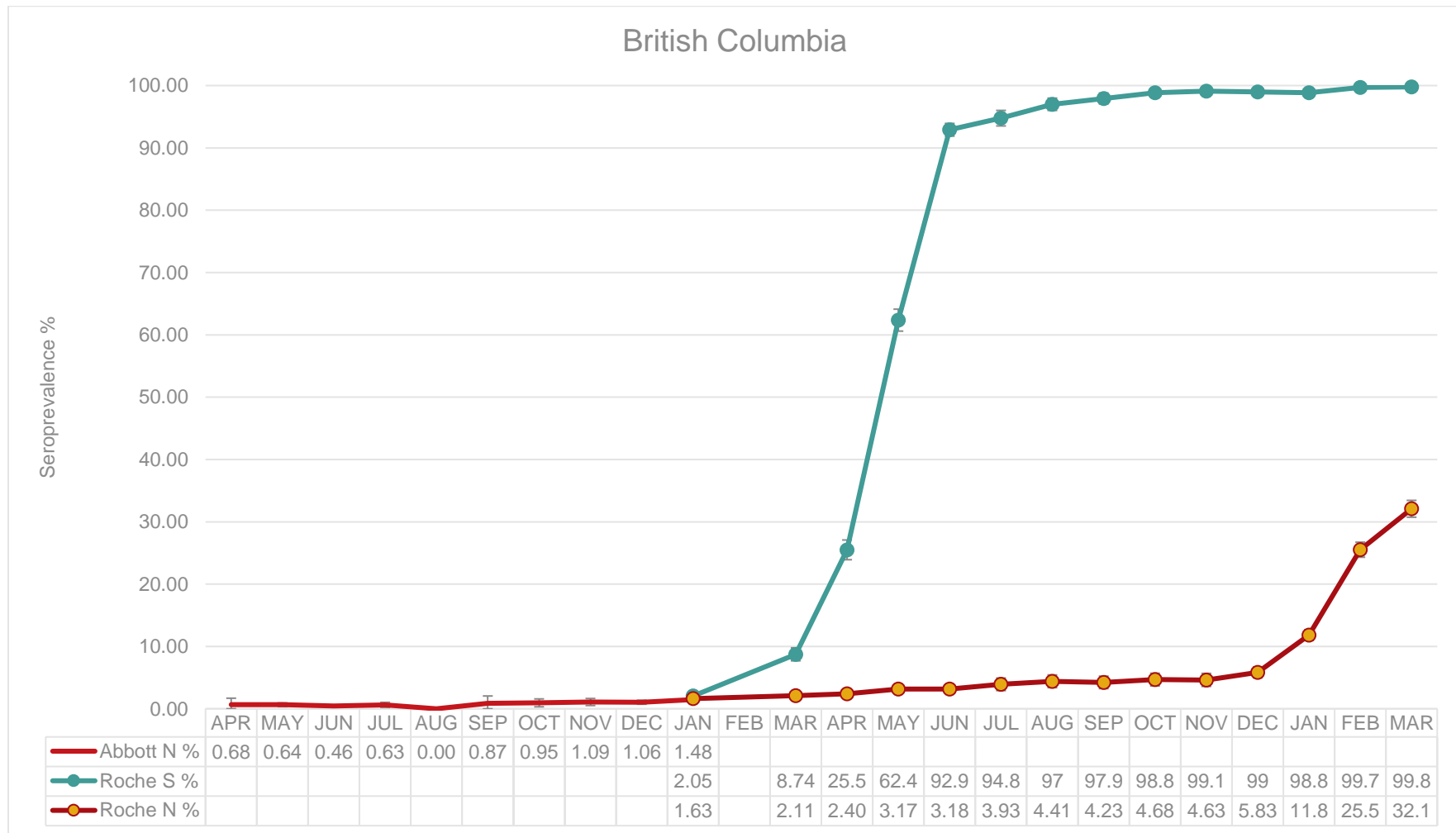
Note: A donation was considered a potential incident infection if donors tested S negative and N negative on their previous donation and then tested S positive and N positive on their following donation.

Figure 1. Overall temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from April 2020-March 2022 (comparing results from Abbott N (until January 2021) followed by seroprevalence estimated by Roche N and Roche S results).

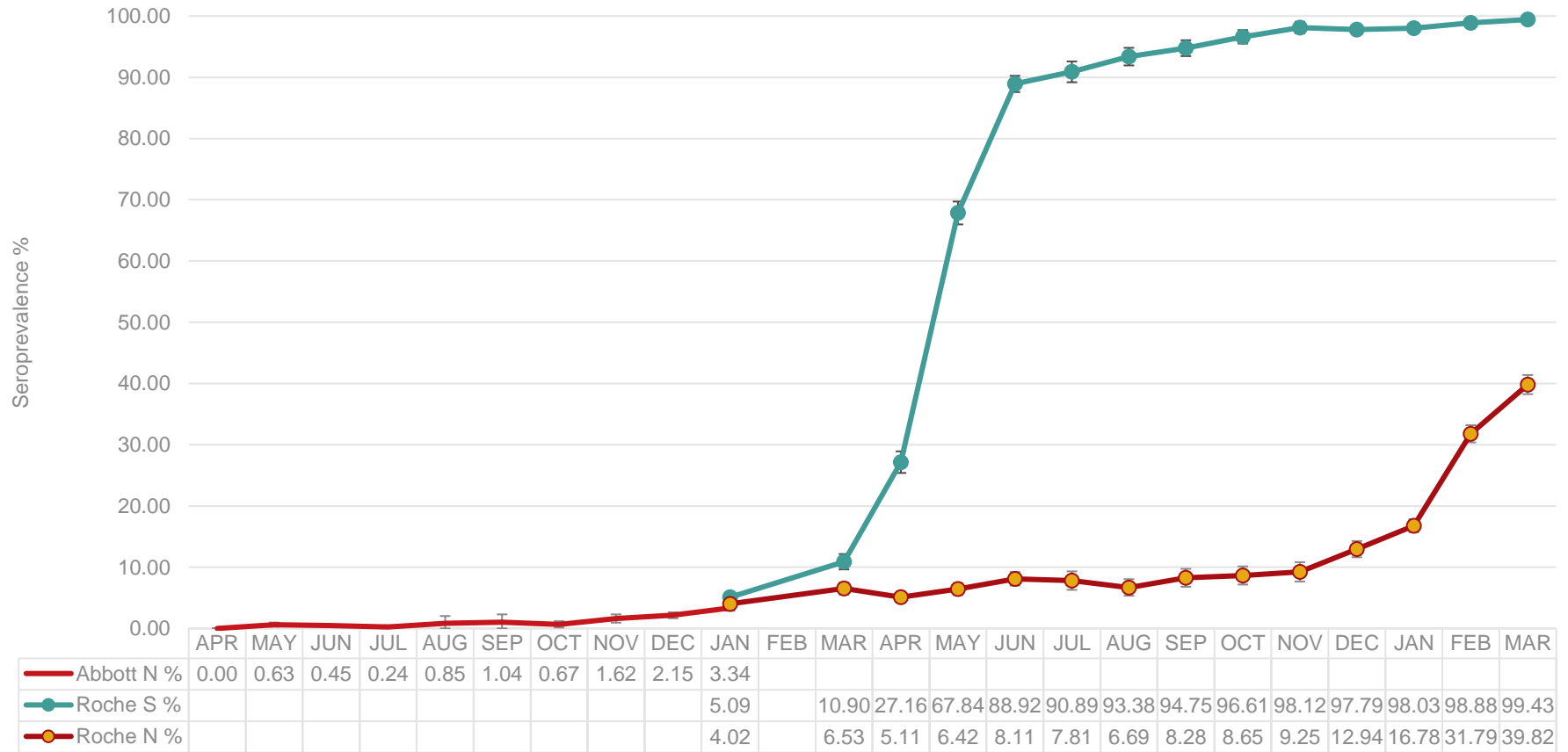


Notes: SARS-CoV-2 seroprevalence rates (95% CI), that have been weighted and adjusted for test characteristics. Data from the CIHR funded study (Correlates of Immunity) from April 9, 2020-January 31, 2021, have been included.

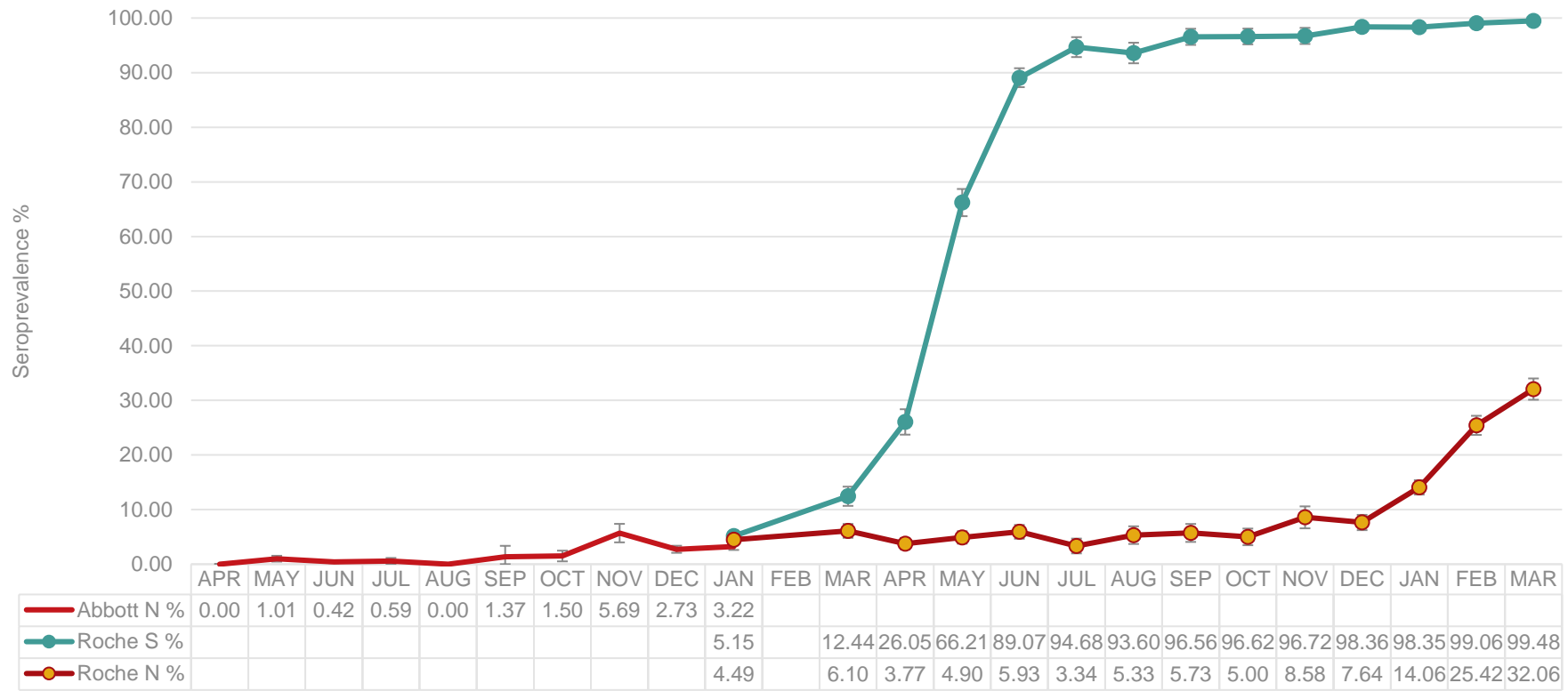
Figure 2. Regional temporal trends of SARS-CoV-2 seroprevalence monthly from April 2020-March 2022 (by Abbott N, Roche N and Roche S assays)

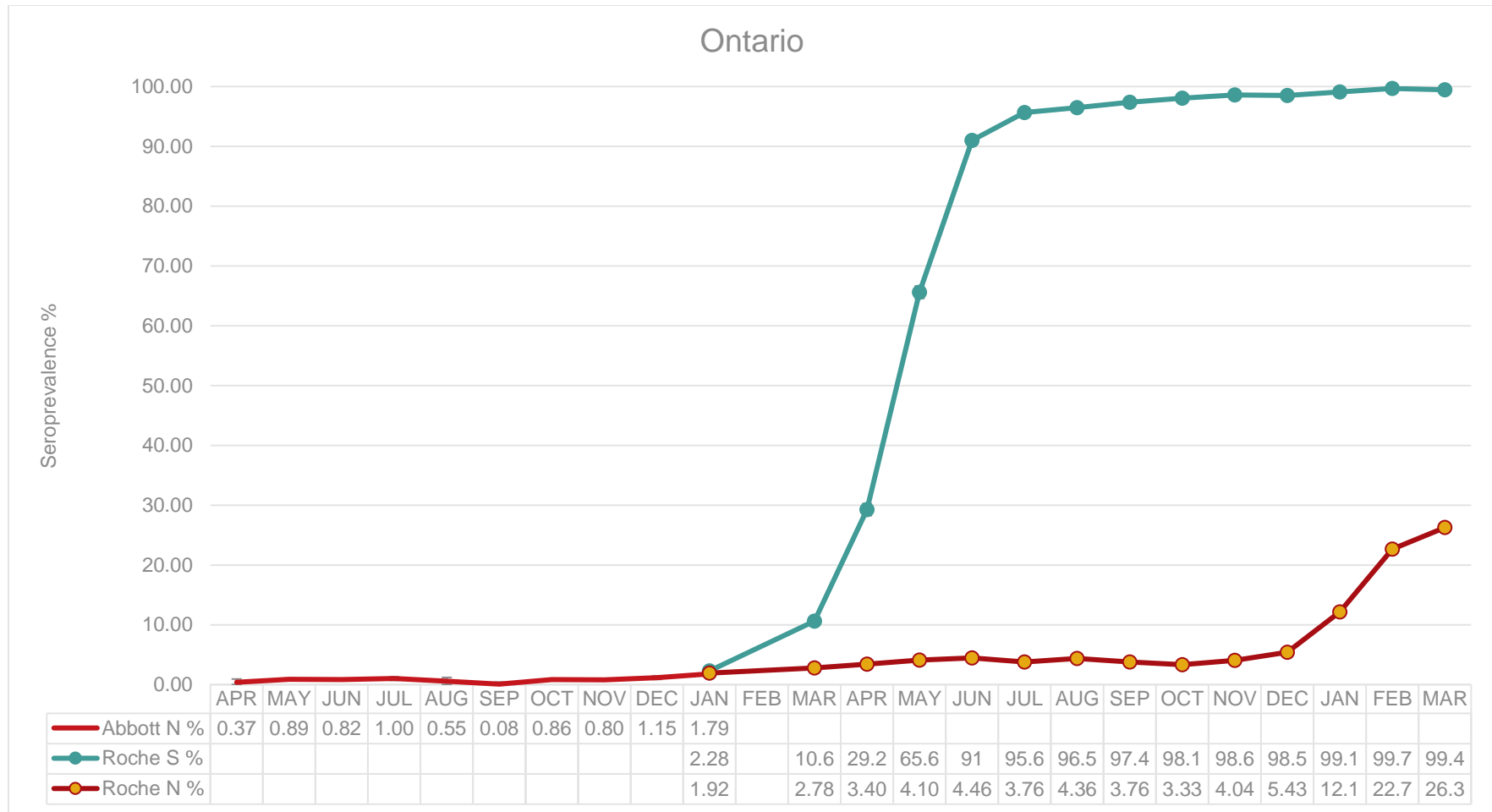


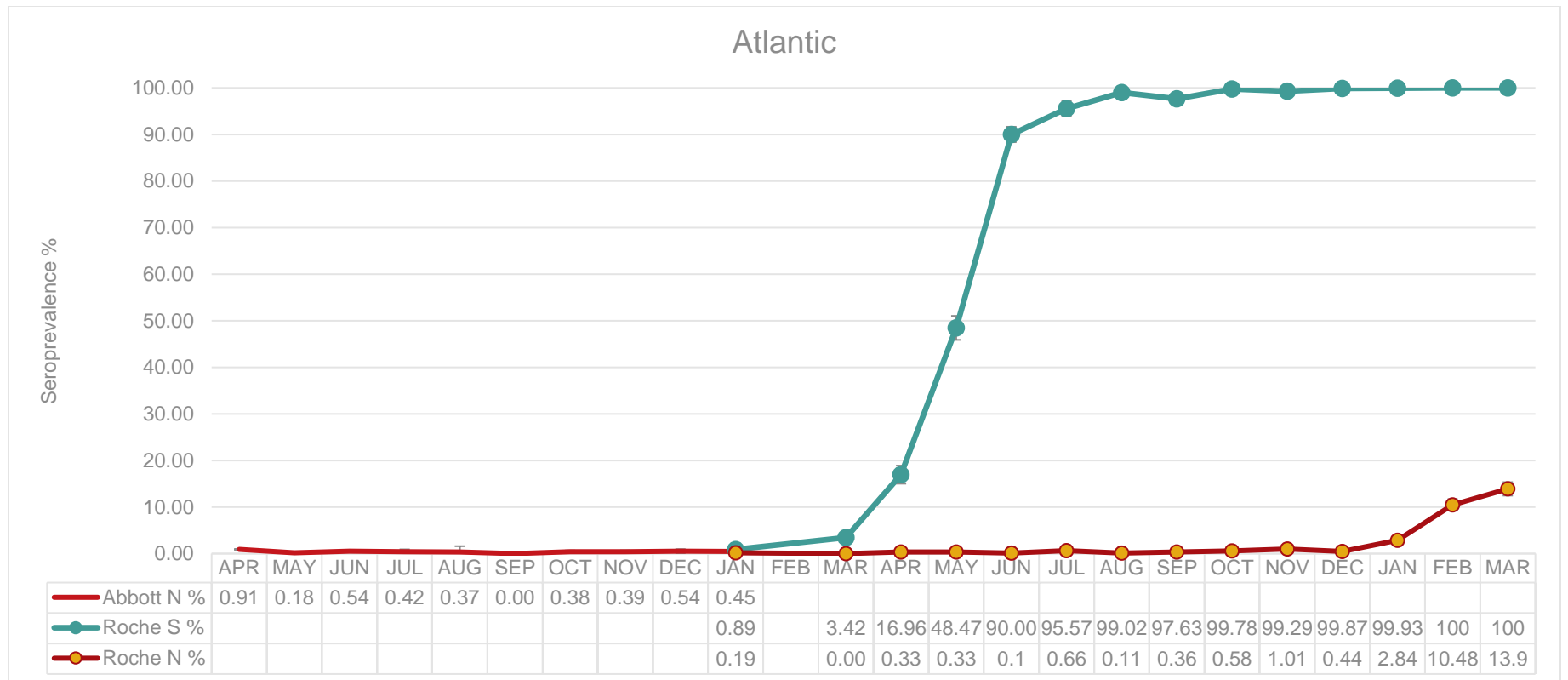
Alberta



Prairies







Note: SARS-CoV-2 seroprevalence rates (95% CI), that have been weighted and adjusted for test characteristics. Data from the CIHR funded study (Correlates of Immunity) from April 9, 2020-January 31, 2021, have been included.

Figure 3. Distributions of log transformed Spike antibody concentration results (U/mL) (grey circle represents the median and the bar represents the IQR) in spike antibody seropositive donations from September 2021 to March 2022 stratified by age group.

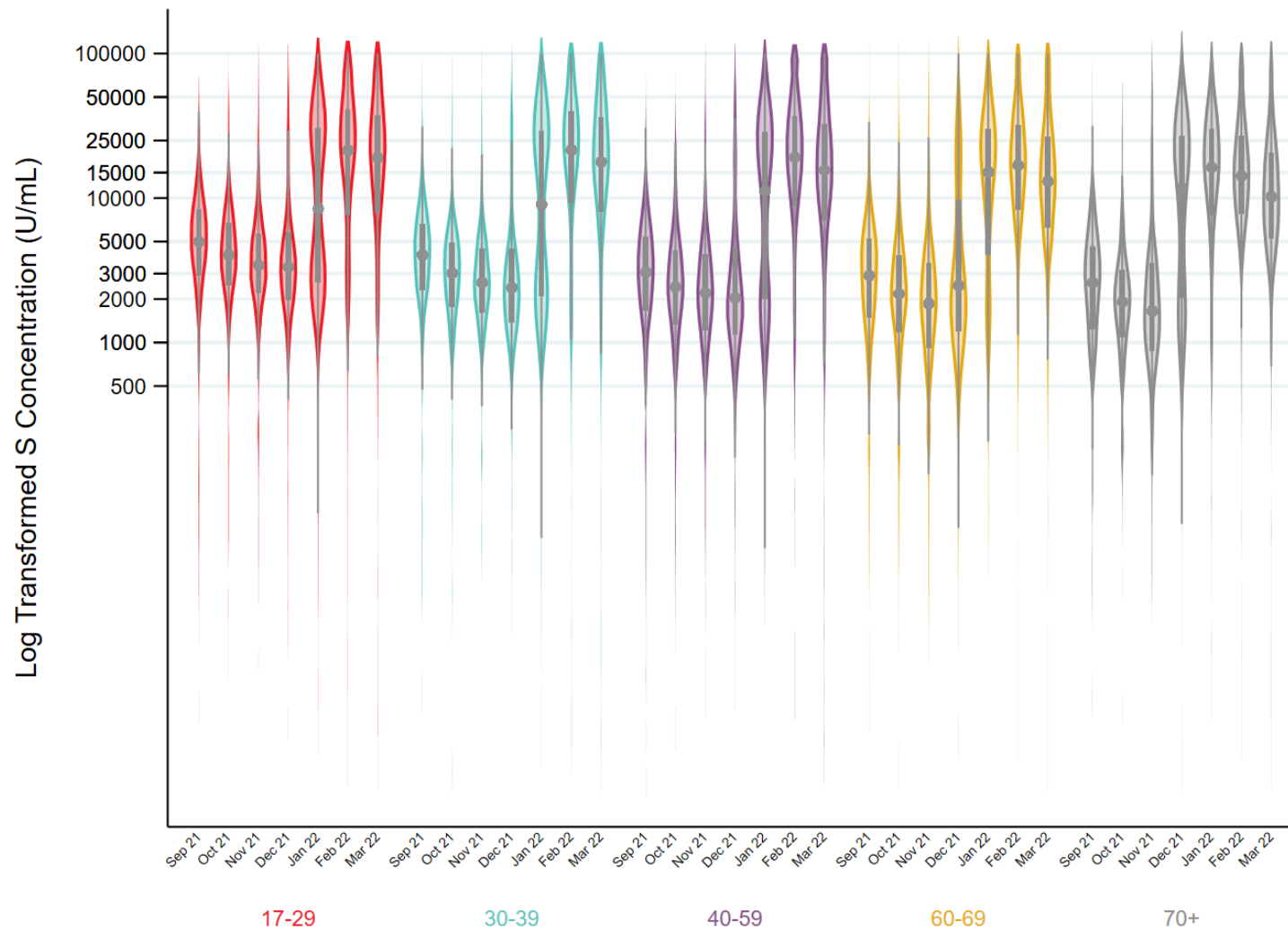
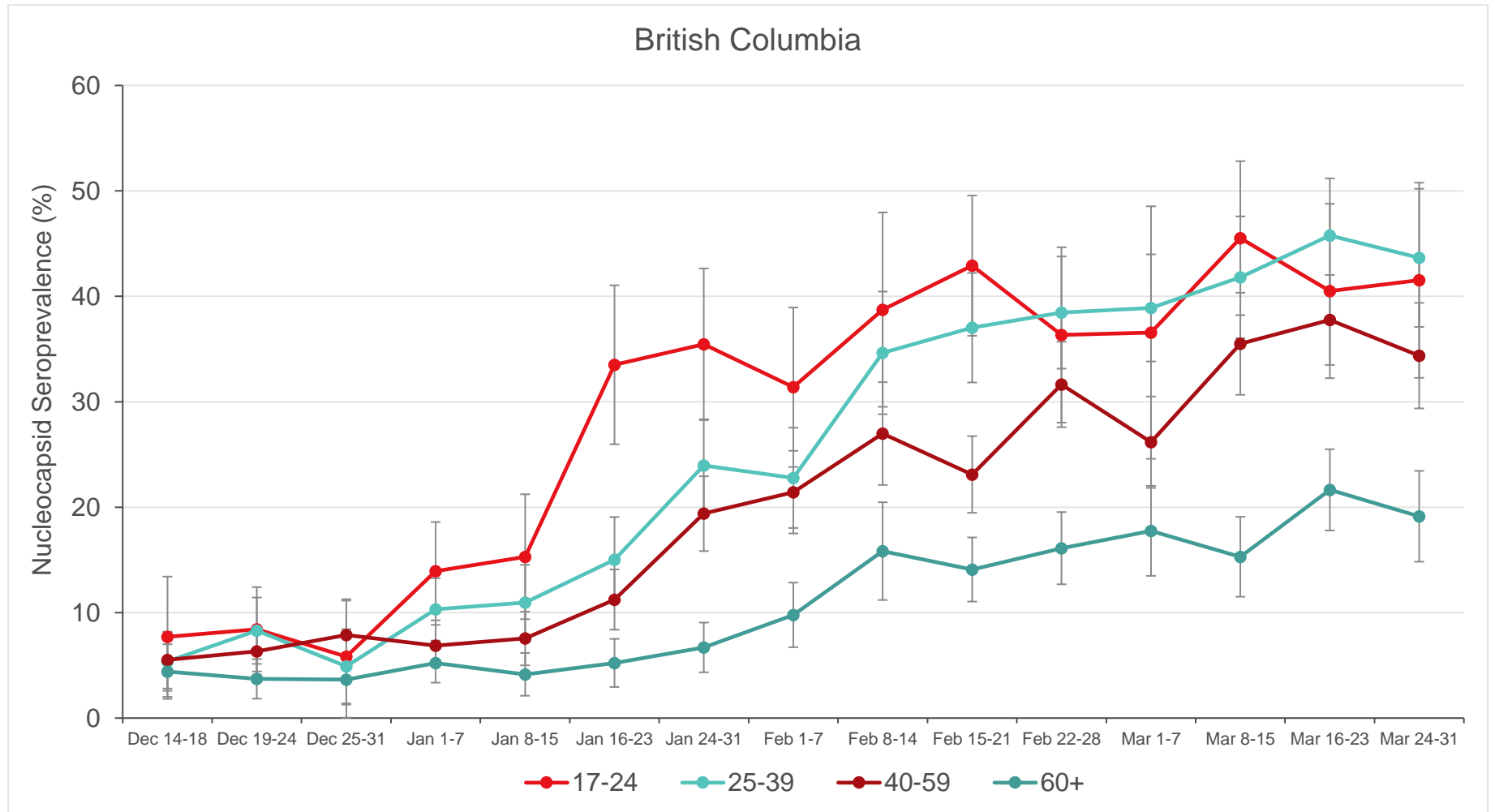
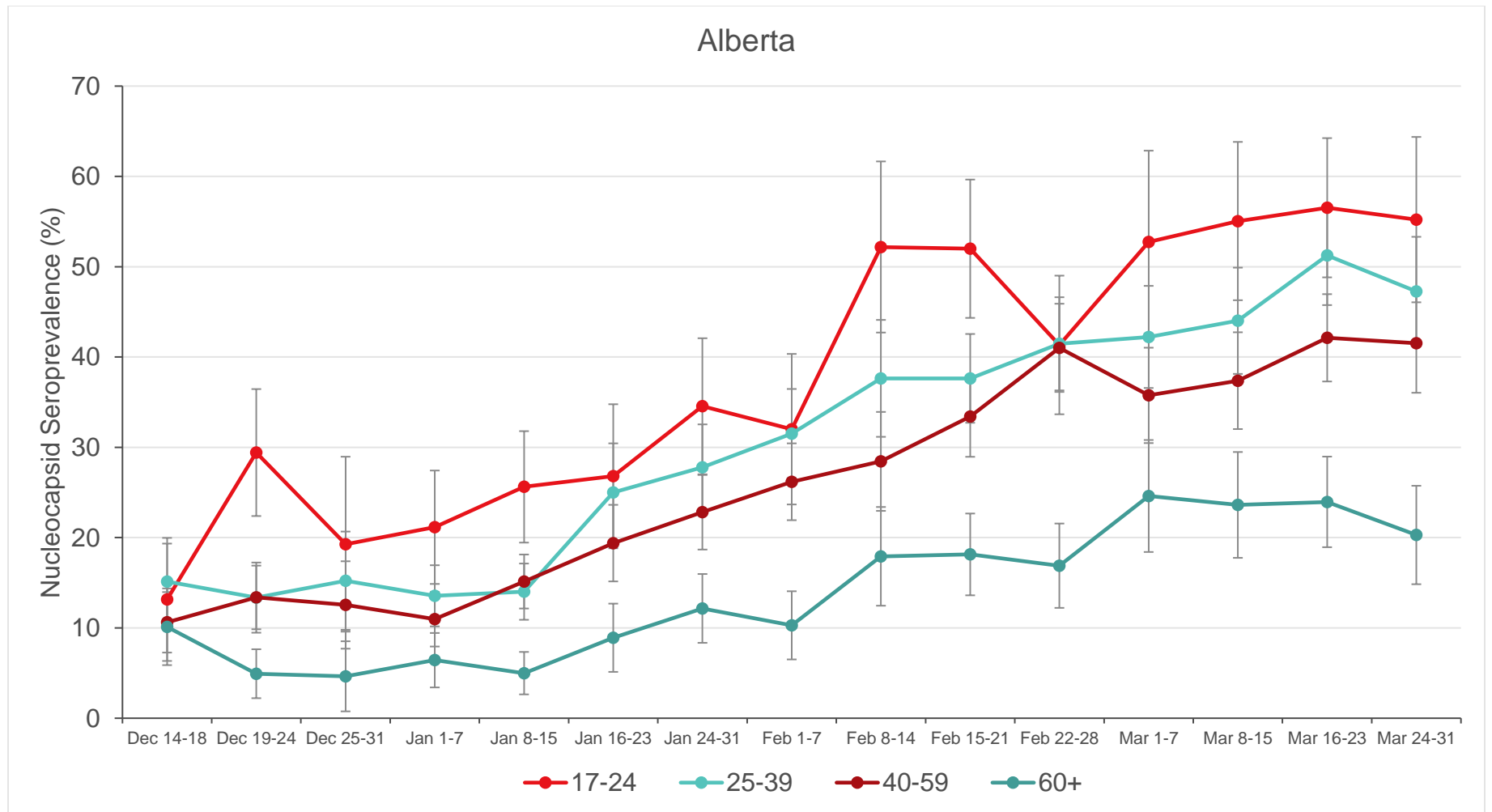
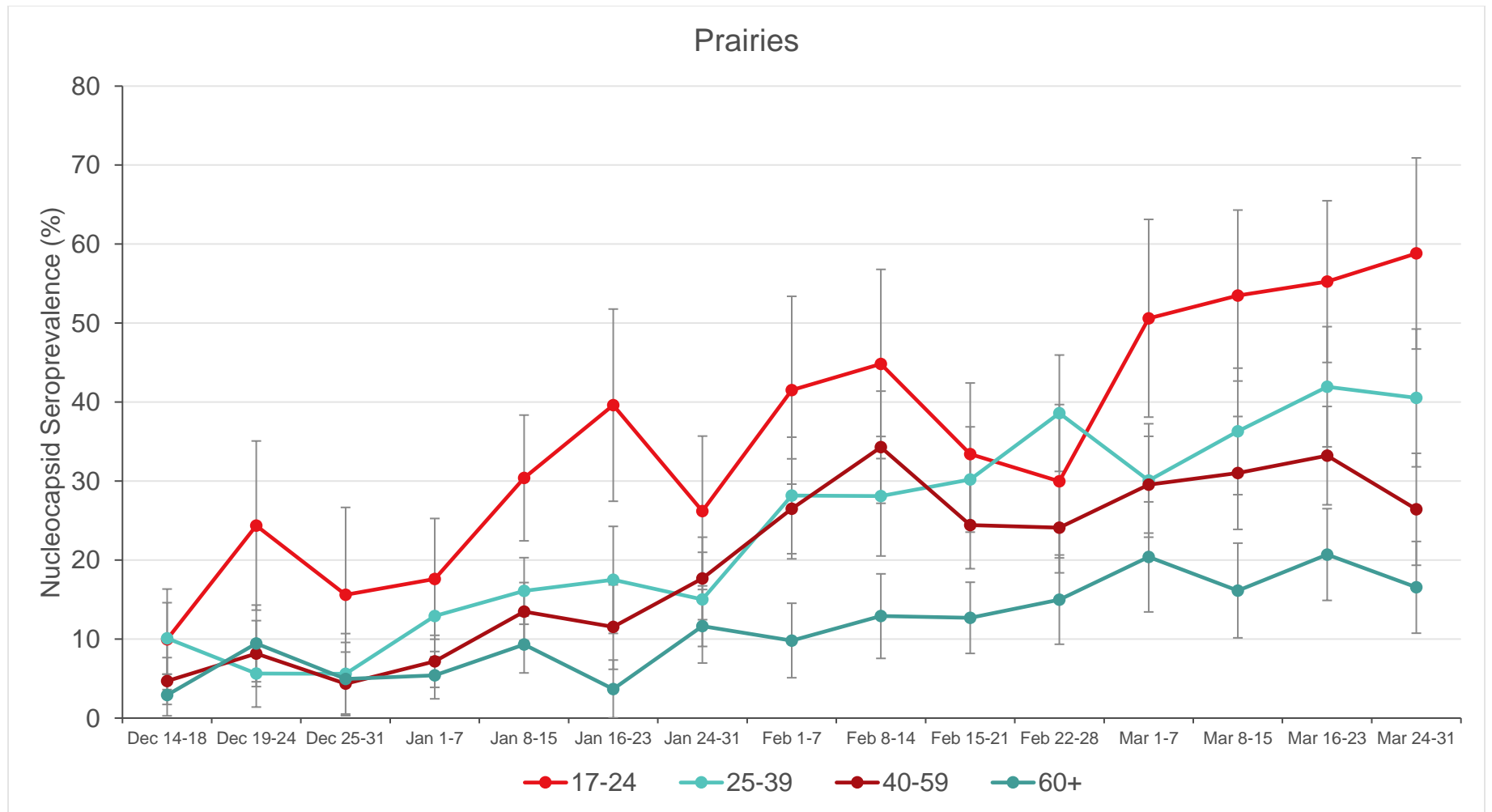
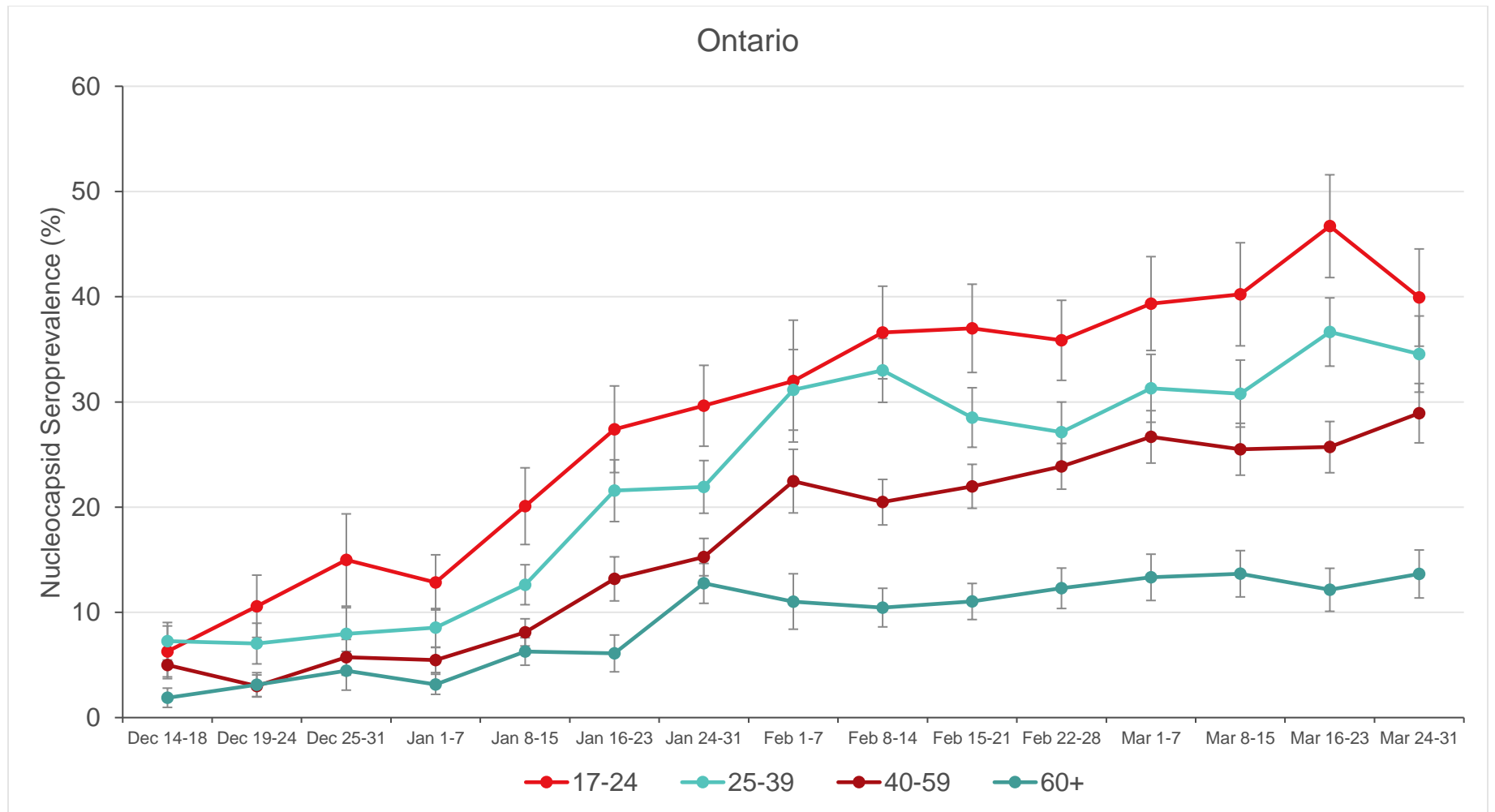


Figure 4. Regional temporal trends of SARS-CoV-2 Nucleocapsid (infection) seroprevalence by age group weekly from December 2021- March 2022







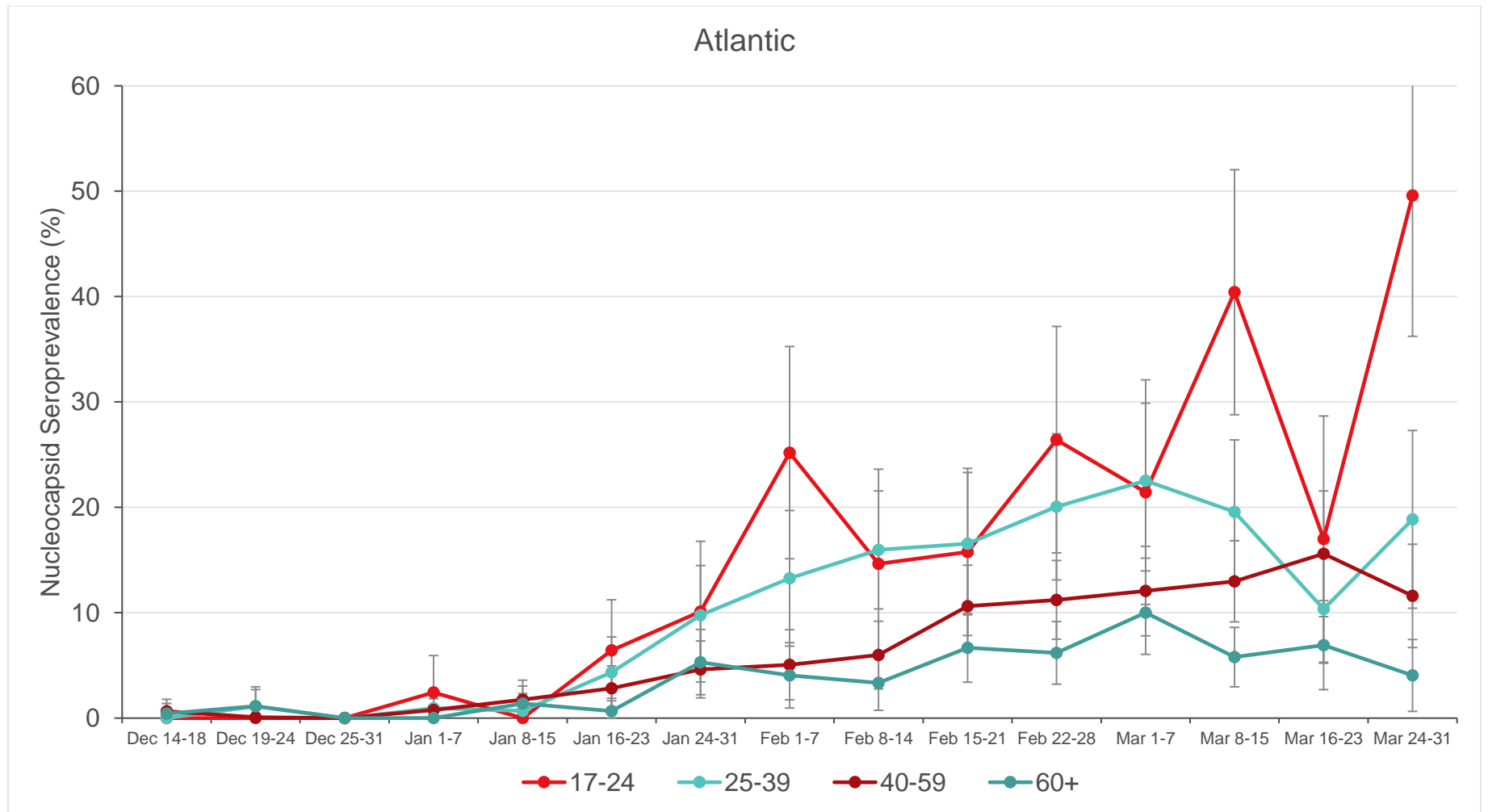


Figure 5A. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Nucleocapsid antibody results by ethnicity.

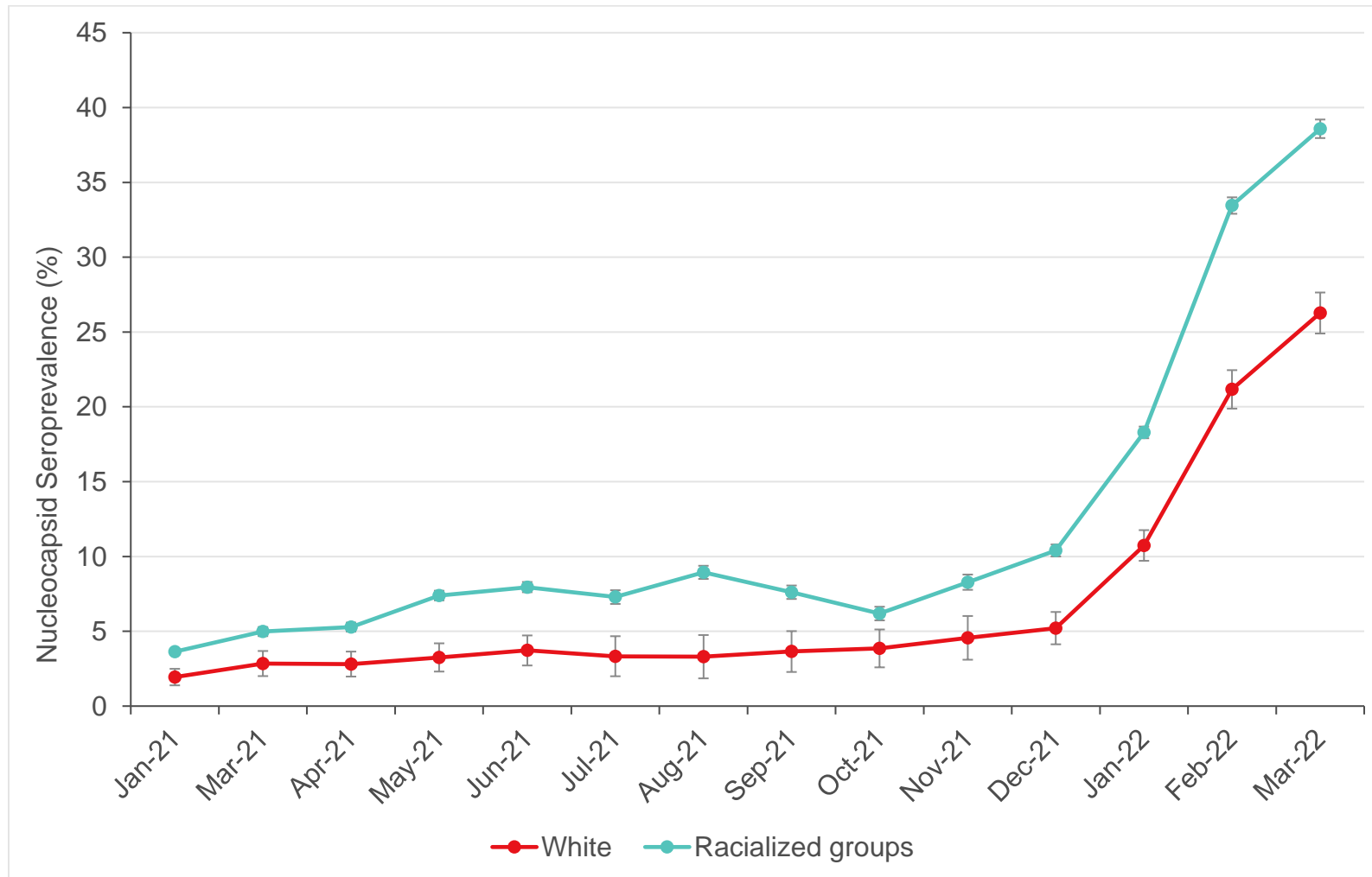


Figure 5B. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Spike antibody results by ethnicity.

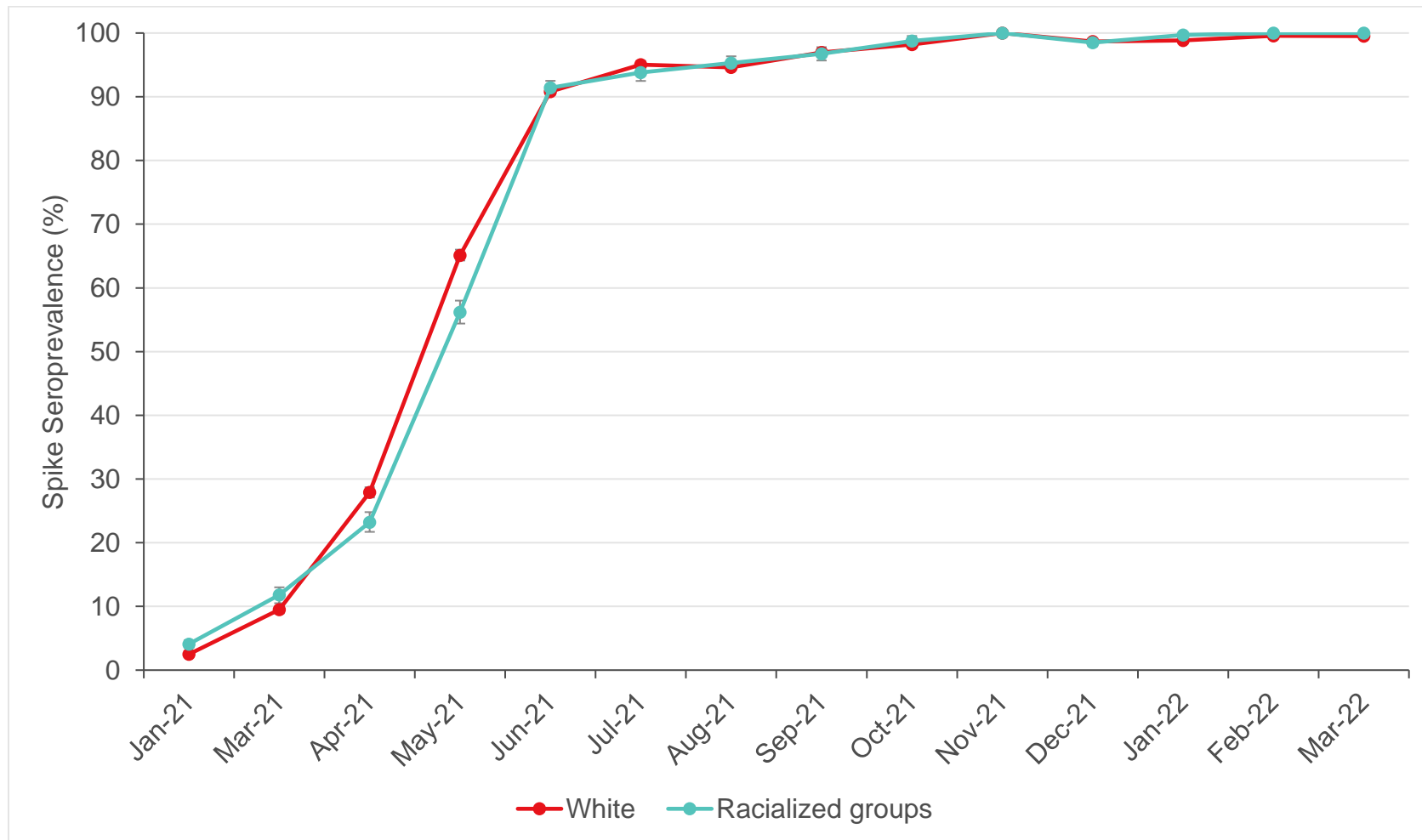


Figure 5C. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Nucleocapsid antibody results by age group.

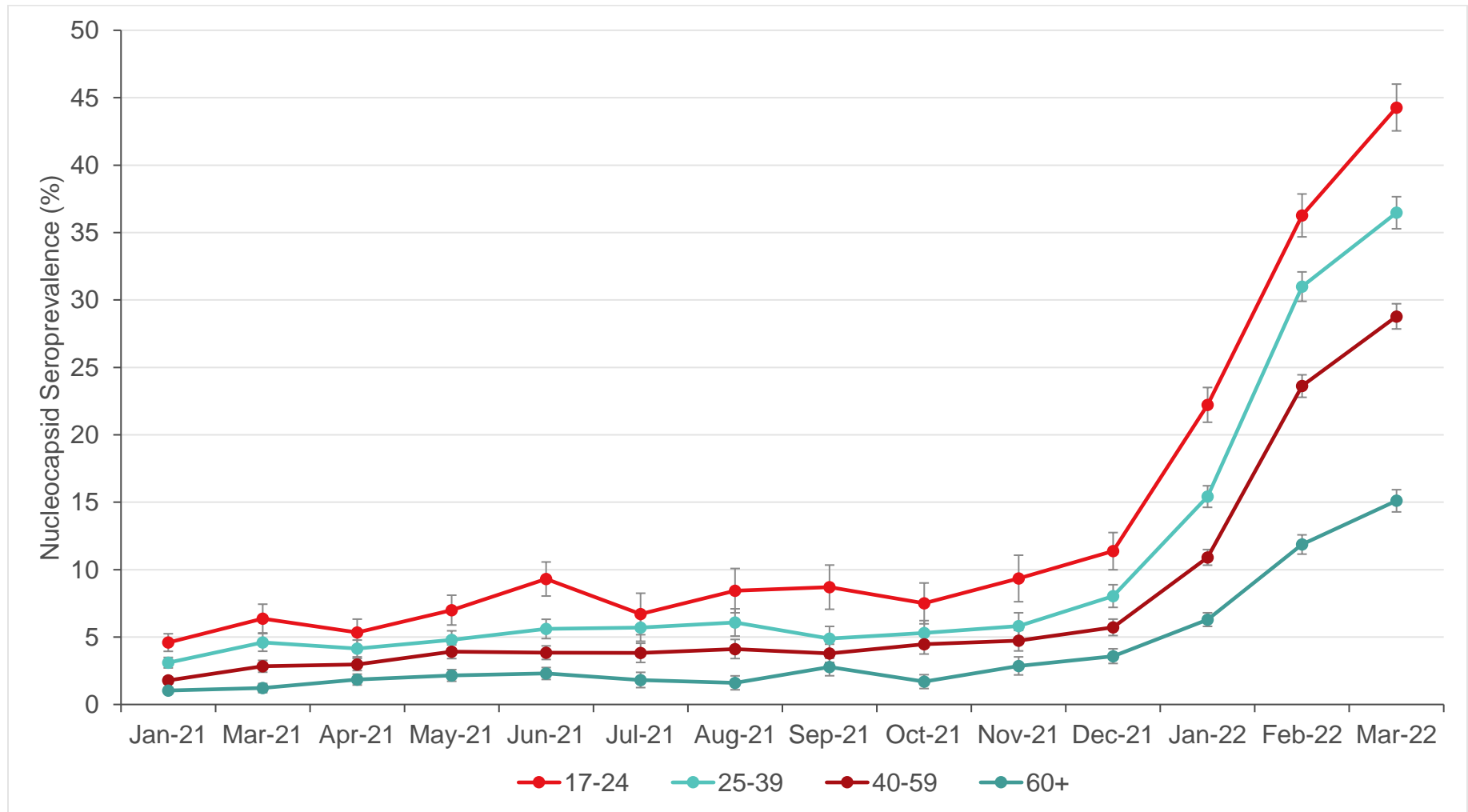


Figure 5D. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Spike antibody results by age group.

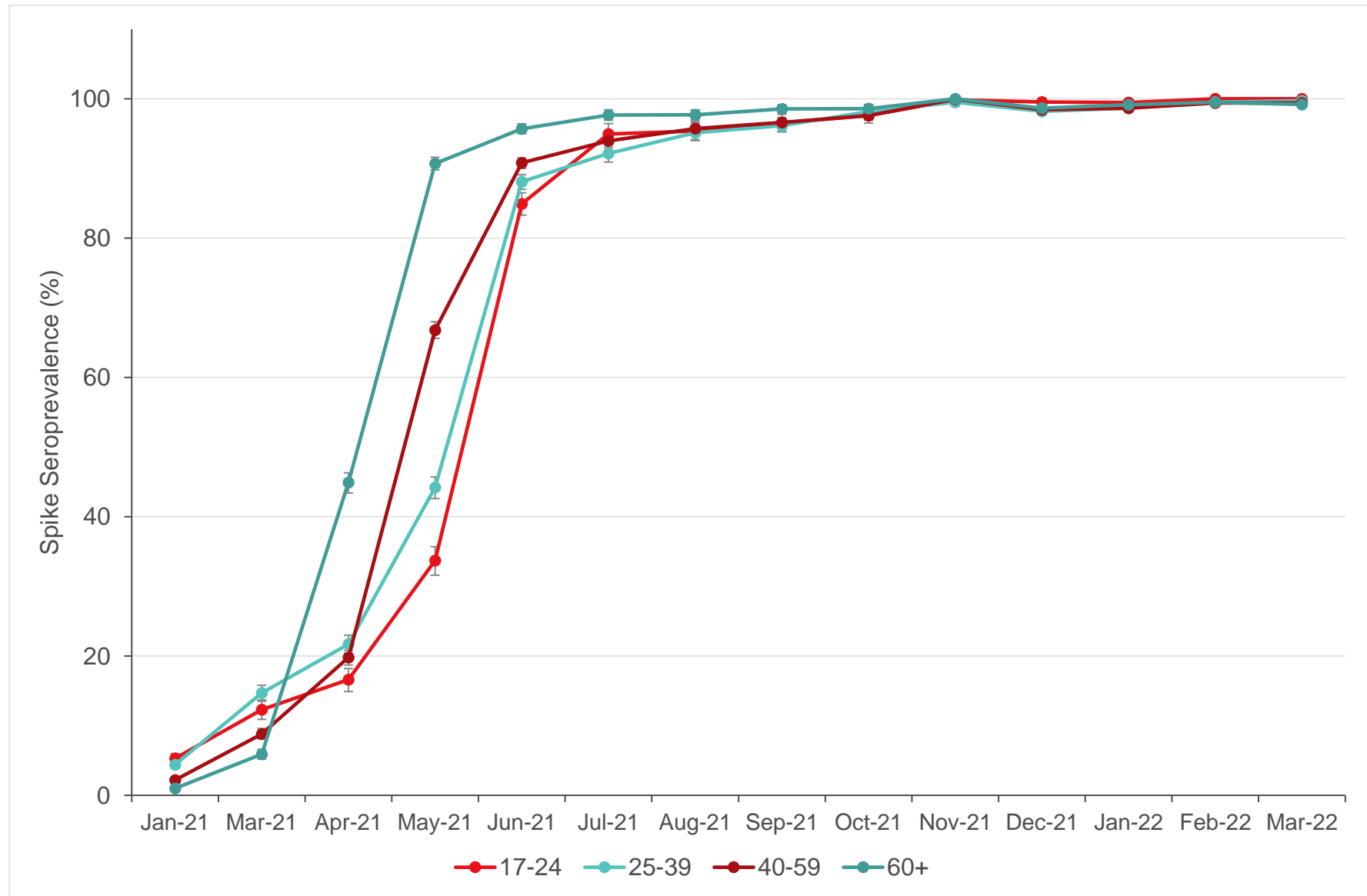


Figure 5E. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Nucleocapsid antibody results by material deprivation level (1 = least deprived and 5 = most deprived).

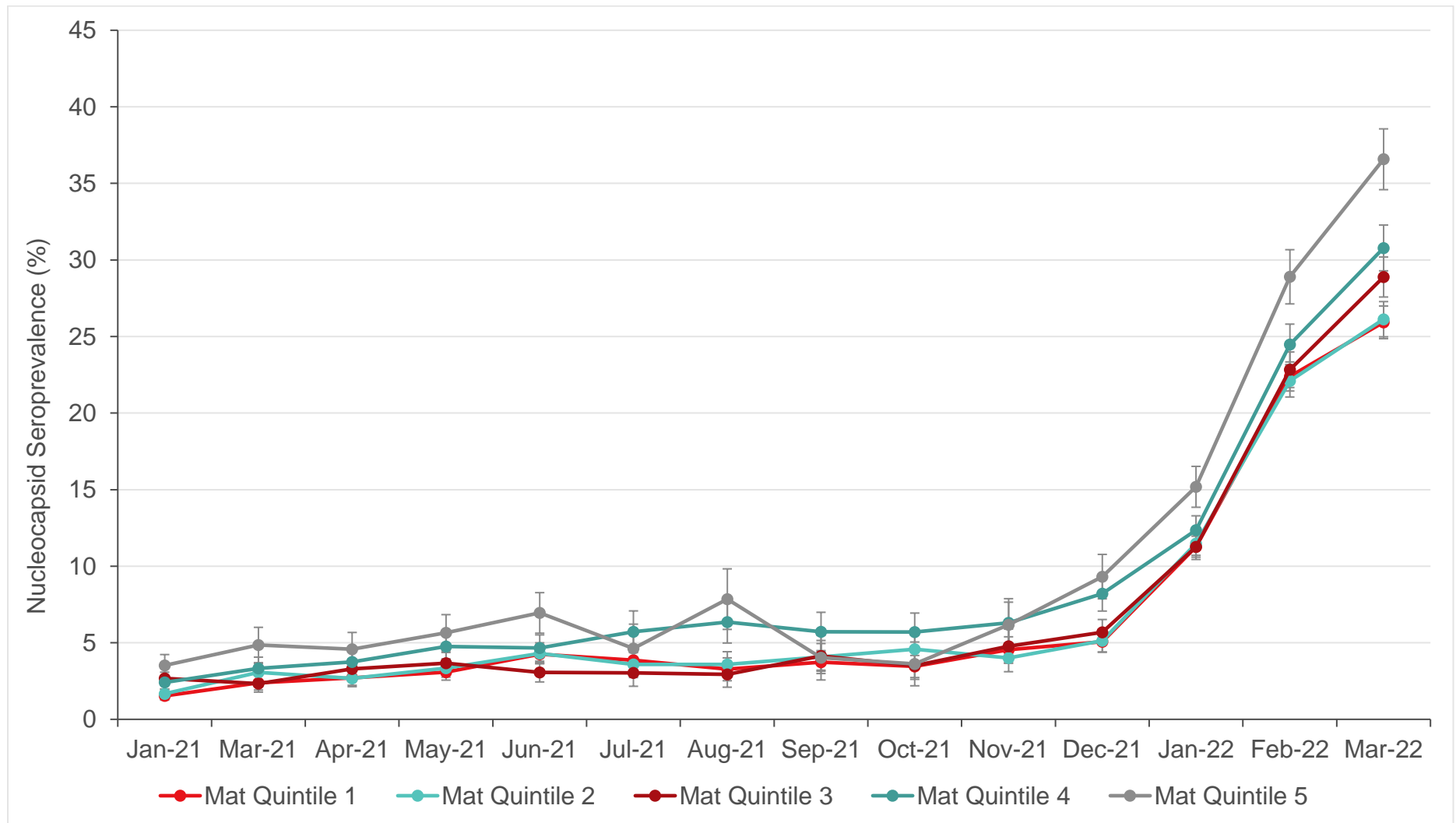


Figure 5F. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Spike antibody results by material deprivation level (1 = least deprived and 5 = most deprived).

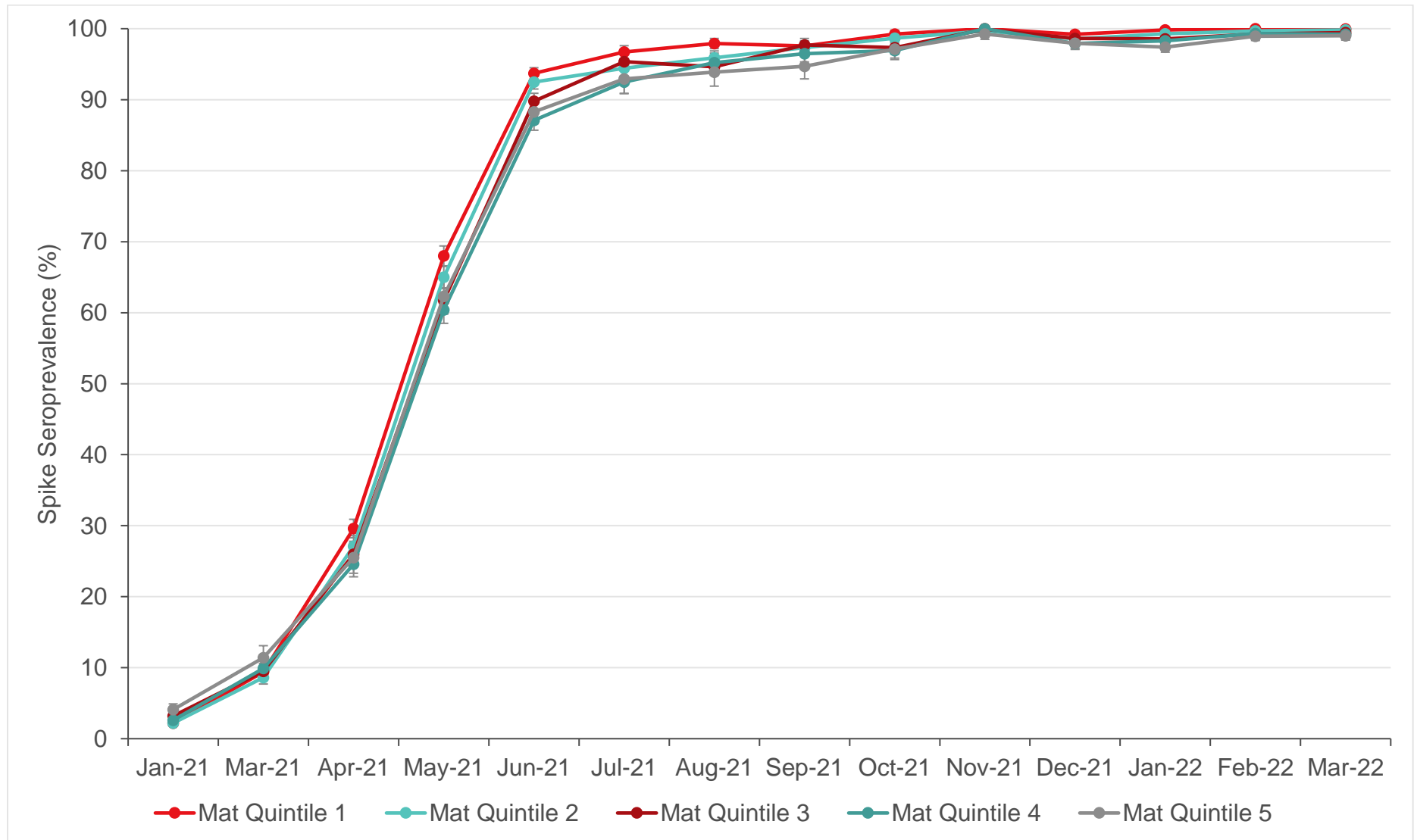


Figure 5G. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Nucleocapsid antibody results by social deprivation level (1 = least deprived and 5 = most deprived).

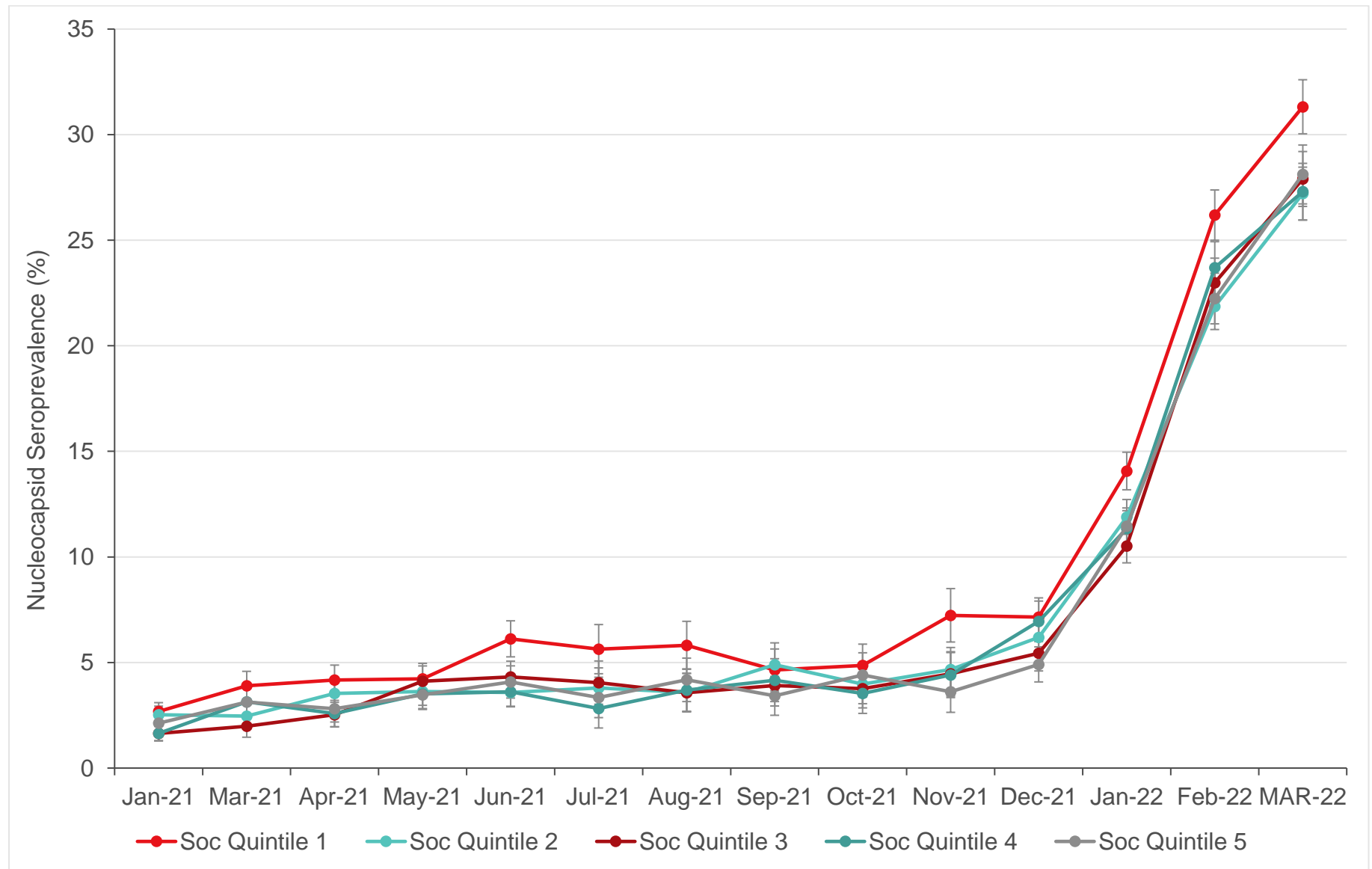


Figure 5H. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021-March 2022 estimated by Spike antibody results by social deprivation level (1 = least deprived and 5 = most deprived).

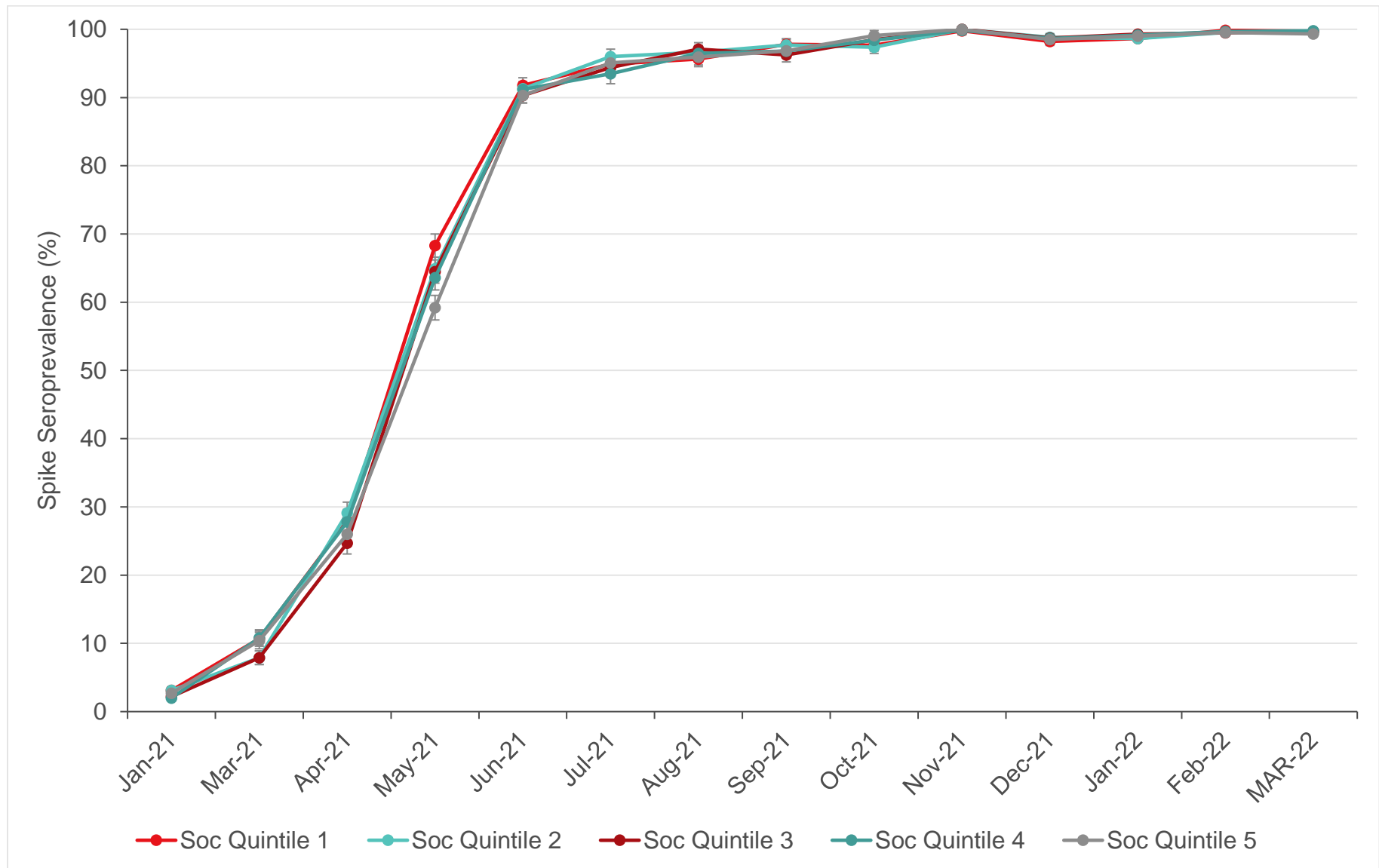


Table A1.1 British Columbia SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike results in March 2022

Nucleocapsid Antibody Results (proxy for natural infection)					Spike Antibody Results (proxy for humoral immunity by either natural infection or vaccination)			
Crude		Adjusted			Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	2,056	640	30.25	28.39, 32.10	2,056	2,033	100.00	99.56, 100.00
Male	2,590	857	34.04	32.07, 36.01	2,590	2,543	99.45	98.91, 100.00
Age								
17-24	284	115	41.64	37.44, 45.83	284	283	100.00	99.85, 100.00
25-39	1,380	581	42.68	39.73, 45.62	1,380	1,366	100.00	99.45, 100.00
40-59	1,627	550	33.71	31.38, 36.04	1,627	1,602	99.66	99.05, 100.00
60+	1,355	251	18.37	16.33, 20.41	1,355	1,325	99.10	98.34, 99.86
Material Deprivation¹								
1 (least)	1,134	338	29.18	26.52, 31.84	1,134	1,130	100.00	100.00, 100.00
2	1,083	321	29.82	27.06, 32.58	1,083	1,067	99.90	99.21, 100.00
3	859	283	33.87	30.70, 37.03	859	842	99.18	98.24, 100.00
4	621	207	33.90	30.11, 37.69	621	603	98.65	97.39, 99.92
5 (most)	378	156	40.66	35.73, 45.60	378	371	99.42	98.09, 100.00
Total	4,646	1,497	32.09	30.74, 33.44	4,646	4,576	99.78	99.43, 100.00

¹Postal codes were missing for 571 (12.3%) of donors which could not be included in the quintiles of Material Deprivation; 192/571 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 31.72% (95% CI 27.86, 35.57); and 563/571 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.71% (95% CI 98.70, 100.00).

Table A1.2 Alberta SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in March 2022

Nucleocapsid Antibody Results (proxy for natural infection)					Spike Antibody Results (proxy for humoral immunity by either natural infection or vaccination)			
	Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	2,386	910	38.56	36.37, 40.76	2,386	2,350	99.78	99.24, 100.00
Male	2,987	1,121	41.09	38.86, 43.31	2,987	2,932	99.09	98.44, 99.74
Age								
17-24	466	255	55.08	50.62, 59.53	466	464	100.00	99.50, 100.00
25-39	1,592	713	46.51	43.59, 49.43	1,592	1,567	99.35	98.56, 100.00
40-59	1,971	755	39.43	36.78, 42.08	1,971	1,932	99.10	98.33, 99.88
60+	1,344	308	23.15	20.32, 25.97	1,344	1,319	99.32	98.41, 100.00
Material Deprivation¹								
1 (least)	1,986	686	36.09	33.51, 38.67	1,986	1,968	100.00	99.62, 100.00
2	1,142	425	38.38	35.05, 41.72	1,142	1,120	99.14	98.16, 100.00
3	682	262	40.33	35.99, 44.66	682	664	98.68	97.29, 100.00
4	498	216	46.15	41.17, 51.14	498	488	98.97	97.48, 100.00
5 (most)	211	102	49.72	41.86, 57.57	211	203	97.57	94.62, 100.00
Total	5,373	2,031	39.82	38.26, 41.38	5,373	5,282	99.43	99.01, 99.86

¹Postal codes were missing for 854 (15.9%) of donors which could not be included in the quintiles of Material Deprivation; 340/854 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 43.03% (95% CI 39.04, 47.01); 839/854 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.31% (95% CI 98.21, 100.00).

Table A1.3 Saskatchewan SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in March 2022

Nucleocapsid Antibody Results (proxy for natural infection)					Spike Antibody Results (proxy for humoral immunity by either natural infection or vaccination)			
	Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	556	168	30.87	26.87, 34.88	556	546	99.52	98.40, 100.00
Male	785	216	30.66	26.60, 34.71	785	773	99.52	98.39, 100.00
Age								
17-24	109	53	51.30	42.72, 59.89	109	108	98.85	96.28, 100.00
25-39	386	137	35.54	29.81, 41.28	386	381	99.46	97.88, 100.00
40-59	454	122	27.80	22.97, 32.63	454	444	99.31	97.83, 100.00
60+	392	72	20.19	15.50, 24.89	392	386	99.49	97.97, 100.00
Material Deprivation¹								
1 (least)	489	131	29.97	25.17, 34.78	489	478	98.75	97.12, 100.00
2	277	74	29.17	23.05, 35.28	277	274	99.15	97.25, 100.00
3	207	68	34.02	26.68, 41.37	207	204	99.93	98.19, 100.00
4	121	39	32.65	23.36, 41.94	121	119	99.68	97.24, 100.00
5 (most)	45	16	37.99	21.31, 54.67	45	44	99.79	95.72, 100.00
Total	1,341	384	30.77	27.92, 33.62	1,341	1,319	99.52	98.73, 100.00

¹Postal codes were missing for 202 (15.1%) of donors which could not be included in the quintiles of Material Deprivation 56/202 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 28.72% (95% CI 21.65, 35.79); 200/202 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 98.83% (95% CI 96.48, 100.00).

Table A1.4 Manitoba SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in March 2022

Nucleocapsid Antibody Results					Spike Antibody Results			
(proxy for natural infection)					(proxy for humoral immunity by either natural infection or vaccination)			
Crude			Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	663	223	33.50	29.74, 37.26	663	651	99.38	98.31, 100.00
Male	912	268	32.81	28.98, 36.64	912	897	99.52	98.46, 100.00
Age								
17-24	148	85	57.23	49.57, 64.88	148	146	99.90	98.14, 100.00
25-39	410	155	38.49	32.98, 44.01	410	406	99.61	98.19, 100.00
40-59	546	171	32.49	27.88, 37.10	546	538	99.76	98.58, 100.00
60+	471	80	17.23	13.12, 21.34	471	458	98.13	96.25, 100.00
Material Deprivation ¹								
1 (least)	358	82	24.09	18.77, 29.40	358	350	98.87	96.99, 100.00
2	299	78	27.40	21.54, 33.26	299	296	99.26	97.45, 100.00
3	323	112	36.92	30.94, 42.90	323	319	99.30	97.62, 100.00
4	250	96	39.39	32.53, 46.24	250	245	99.19	97.21, 100.00
5 (most)	122	55	47.33	37.32, 57.35	122	118	98.14	94.67, 100.00
Total	1,575	491	33.16	30.48, 35.85	1,575	1,548	99.45	98.69, 100.00

¹Postal codes were missing for 223 (14.2%) of donors which could not be included in the quintiles of Material Deprivation; 68/223 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 33.38% (95% CI 26.30, 40.46); 220/223 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.6% (95% CI 97.71, 100.00).

Table A1.5 Ontario SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in March 2022

Nucleocapsid Antibody Results (proxy for natural infection)					Spike Antibody Results (proxy for humoral immunity by either natural infection or vaccination)			
	Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	4,558	1,144	24.44	23.41, 25.48	4,558	4,484	99.63	99.33, 99.93
Male	6,271	1,689	28.19	27.07, 29.31	6,271	6,148	99.24	98.89, 99.58
Age								
17-24	772	324	41.38	39.00, 43.76	772	767	100.00	100.00, 100.00
25-39	2,932	970	33.37	31.70, 35.05	2,932	2,887	99.57	99.12, 100.00
40-59	4,212	1,131	26.58	25.30, 27.86	4,212	4,126	99.29	98.89, 99.69
60+	2,913	408	13.10	12.00, 14.20	2,913	2,852	99.00	98.52, 99.47
Material Deprivation¹								
1 (least)	2,577	559	21.30	19.86, 22.74	2,577	2,537	99.58	99.14, 100.00
2	2,376	554	23.45	21.87, 25.02	2,376	2,339	99.84	99.41, 100.00
3	2,187	573	25.99	24.28, 27.71	2,187	2,149	99.49	98.98, 100.00
4	1,605	476	29.43	27.41, 31.45	1,605	1,572	99.30	98.69, 99.90
5 (most)	967	366	39.41	36.65, 42.16	967	948	98.97	98.13, 99.80
Total	10,829	2,833	26.25	25.49, 27.01	10,829	10,632	99.44	99.21, 99.67

¹Postal codes were missing for 1,117(10.3%) of donors which could not be included in the quintiles of Material Deprivation; 305/1117 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 27.52% (95% CI 25.11, 29.92); 1087/1117 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 98.82% (95% CI 98.00, 99.64).

Table A1.6 Atlantic Provinces SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in March 2022

Nucleocapsid Antibody Results					Spike Antibody Results			
(proxy for natural infection)					(proxy for humoral immunity by either natural infection or vaccination)			
	Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval
Sex								
Female	1,080	174	13.95	11.97, 15.94	1,079	1,068	100.00	99.63, 100.00
Male	1,183	147	13.84	11.76, 15.92	1,183	1,167	99.91	99.23, 100.00
Age								
17-24	127	44	34.84	28.47, 41.22	127	127	100.00	99.08, 100.00
25-39	434	93	17.28	13.83, 20.73	434	428	99.75	98.67, 100.00
40-59	897	129	13.00	10.68, 15.32	896	882	99.69	98.85, 100.00
60+	805	55	6.83	5.01, 8.65	805	798	100.00	99.66, 100.00
Material Deprivation ¹								
1 (least)	324	45	14.34	10.47, 18.20	324	323	100.00	99.40, 100.00
2	483	72	12.35	9.55, 15.15	483	478	100.00	99.37, 100.00
3	386	56	14.10	10.53, 17.68	386	381	99.71	98.48, 100.00
4	470	64	14.48	11.15, 17.82	469	462	99.74	98.60, 100.00
5 (most)	420	59	16.23	12.60, 19.87	420	412	99.42	98.11, 100.00
Total	2,263	321	13.9	12.46, 15.34	2,262	2,235	100.00	99.83, 100.00

¹Postal codes were missing for 180 (8.0%) of donors which could not be included in the quintiles of Material Deprivation; 25/180 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 11.04% (95% CI 6.65, 15.43); 179/180 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.9% (95% CI 98.32, 100.00).

Table A2.1. Weekly SARS-CoV-2 seroprevalence by sociodemographic variables by Nucleocapsid results in March 2022.

	March 1-7			March 8-15			March 16-23			March 24-31		
	Crude	Adjusted		Crude	Adjusted		Crude	Adjusted		Crude	Adjusted	
	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI
Sex												
Female	3040 (818)	25.85	24.40, 27.30	2983 (820)	25.98	24.53, 27.43	2918 (913)	29.32	27.83, 30.80	2447 (733)	27.83	26.19, 29.46
Male	3802 (1039)	28.34	26.75, 29.93	3816 (1047)	29.26	27.69, 30.84	4106 (1272)	32.06	30.53, 33.60	3483 (1058)	31.22	29.53, 32.91
Age												
17-24	472 (198)	40.34	36.93, 43.76	502 (234)	44.86	41.49, 48.23	504 (242)	47.09	43.69, 50.49	450 (215)	44.63	41.12, 48.14
25-39	1920 (664)	33.85	31.57, 36.13	1828 (631)	34.48	32.17, 36.78	1925 (773)	39.37	37.11, 41.64	1562 (619)	38.08	35.49, 40.67
40-59	2603 (701)	26.62	24.84, 28.41	2513 (708)	27.49	25.69, 29.30	2609 (819)	30.82	29.01, 32.63	2163 (675)	30.22	28.19, 32.25
60+	1847 (294)	15.26	13.59, 16.94	1956 (294)	14.09	12.53, 15.66	1986 (351)	16.24	14.63, 17.84	1755 (282)	15.02	13.31, 16.72
Province												
British Columbia	1136 (323)	28.20	25.55, 30.85	1162 (376)	32.56	29.88, 35.23	1403 (485)	34.81	32.31, 37.32	1003 (332)	32.31	29.40, 35.21
Alberta	1334 (477)	37.34	34.16, 40.53	1345 (492)	38.72	35.56, 41.88	1674 (655)	42.23	39.38, 45.08	1351 (506)	39.97	36.76, 43.18
Saskatchewan	317 (87)	29.07	23.31, 34.83	359 (97)	30.23	24.86, 35.60	430 (137)	33.66	28.61, 38.70	247 (64)	27.90	21.26, 34.55
Manitoba	417 (120)	30.50	25.47, 35.53	329 (102)	33.56	27.66, 39.46	417 (140)	36.06	30.82, 41.29	418 (130)	32.61	27.45, 37.77
Ontario	2937 (748)	25.84	24.37, 27.31	2829 (697)	25.14	23.66, 26.61	2677 (710)	26.94	25.46, 28.41	2474 (695)	27.27	25.67, 28.88
New Brunswick	217 (30)	14.98	9.93, 20.02	330 (39)	13.39	9.44, 17.33	181 (23)	13.18	7.78, 18.57	134 (25)	20.85	13.42, 28.28
Nova Scotia	393 (71)	17.88	13.78, 21.98	311 (51)	18.11	13.45, 22.76	168 (31)	19.88	13.26, 26.49	224 (34)	16.52	11.19, 21.84
Prince Edward Island	53 (.)	0.00	0.00, 0.00	23 (3)	19.86	3.40, 36.32	17 (2)	17.76	0.00, 35.89	37 (3)	8.40	0.33, 16.48
Newfoundland	38 (1)	1.88	0.00, 5.60	111 (10)	8.53	4.51, 12.55	57 (2)	1.35	0.00, 3.31	42 (2)	9.19	3.08, 15.30
Metro area												

COVID-19 Seroprevalence Report

Vancouver	631 (216)	33.88	30.22, 37.55	665 (245)	36.50	32.87, 40.12	715 (267)	36.93	33.44, 40.43	532 (203)	35.83	31.70, 39.95
Calgary	510 (185)	37.57	32.14, 42.99	519 (179)	35.07	29.87, 40.27	476 (166)	37.03	31.37, 42.69	588 (217)	38.50	33.39, 43.61
Edmonton	462 (159)	35.99	30.70, 41.28	435 (149)	35.43	29.98, 40.88	662 (237)	37.12	32.70, 41.54	397 (126)	32.98	27.32, 38.64
Ottawa	308 (54)	18.56	13.02, 24.09	477 (84)	17.62	13.18, 22.06	348 (74)	18.30	13.17, 23.44	334 (74)	24.11	18.44, 29.78
Toronto	687 (198)	27.23	24.70, 29.77	837 (221)	26.17	23.90, 28.44	1049 (321)	29.94	27.82, 32.07	657 (185)	27.11	24.56, 29.66
Winnipeg	286 (79)	29.38	23.26, 35.49	233 (52)	23.28	16.84, 29.72	229 (65)	30.63	23.63, 37.63	221 (65)	30.32	23.15, 37.48
Ethnicity¹												
White	5221 (1282)	24.43	23.24, 25.62	5151 (1319)	25.46	24.26, 26.67	5224 (1518)	28.36	27.14, 29.57	4434 (1233)	26.85	25.52, 28.18
Indigenous	106 (37)	32.24	23.39, 41.09	96 (25)	22.56	13.96, 31.16	87 (30)	32.19	21.80, 42.59	79 (29)	37.59	26.62, 48.56
Asian	336 (97)	26.23	21.52, 30.93	383 (117)	29.68	25.24, 34.12	419 (157)	34.84	30.53, 39.15	311 (106)	30.38	25.49, 35.27
Other racialized groups	709 (312)	43.57	39.95, 47.19	699 (288)	43.17	39.63, 46.70	795 (332)	43.35	40.03, 46.66	687 (290)	43.73	40.08, 47.38
Social Deprivation²												
1 (least deprived)	1243 (375)	28.67	26.14, 31.20	1243 (396)	32.51	29.91, 35.11	1389 (451)	32.89	30.47, 35.31	1207 (405)	31.62	28.98, 34.27
2	1254 (345)	26.94	24.47, 29.40	1250 (333)	25.23	22.83, 27.63	1228 (360)	28.30	25.87, 30.74	1150 (324)	28.11	25.48, 30.74
3	1243 (333)	26.87	24.37, 29.38	1252 (330)	26.66	24.21, 29.11	1236 (360)	28.60	26.09, 31.11	1001 (295)	29.52	26.64, 32.40
4	1180 (282)	24.58	22.08, 27.07	1112 (284)	25.77	23.20, 28.33	1111 (348)	32.01	29.29, 34.74	949 (258)	27.08	24.26, 29.90
5 (most deprived)	1167 (308)	27.05	24.40, 29.70	1166 (295)	25.94	23.35, 28.52	1114 (352)	31.39	28.59, 34.19	908 (267)	28.00	25.03, 30.96
Material Deprivation²	0.129261			0.1145			0.11361			0.111787		
1 (least deprived)	1717 (457)	25.37	23.20, 27.53	1830 (437)	24.11	22.09, 26.13	1932 (556)	27.60	25.55, 29.66	1605 (439)	26.25	24.04, 28.46
2	1527 (384)	25.05	22.84, 27.26	1471 (398)	26.46	24.21, 28.71	1495 (407)	25.81	23.63, 28.00	1296 (372)	27.48	25.02, 29.94
3	1300 (348)	26.34	23.92, 28.76	1243 (366)	29.41	26.86, 31.96	1209 (385)	31.86	29.29, 34.43	971 (270)	27.73	24.91, 30.56
4	961 (258)	26.44	23.71, 29.17	907 (258)	28.55	25.65, 31.45	903 (308)	35.62	32.60, 38.64	864 (294)	33.46	30.29, 36.62
5 (most deprived)	582 (196)	36.93	33.05, 40.80	572 (179)	31.90	28.22, 35.57	539 (215)	41.61	37.67, 45.54	479 (174)	35.89	31.69, 40.10
Total	6842 (1857)	27.02	25.95, 28.09	6799 (1867)	27.54	26.47, 28.61	7024 (2185)	30.68	29.61, 31.75	5930 (1791)	29.52	28.34, 30.69

¹ In Week 1, self reported ethnicity was missing for 470 (6.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 28.74% (95% CI 24.41, 33.07). In Week 2, self reported ethnicity was missing for 470 (6.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 23.59% (95% CI 19.61, 27.56). In Week 3, self reported ethnicity was missing for 499 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 29.21% (95% CI 25.18, 33.25). In Week 4, self reported ethnicity was missing for 419 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 30.64% (95% CI 25.99, 35.29).

² In Week 1, postal codes were missing for 755 (11.0%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 28.49% (95% CI 25.10, 31.87). In Week 2, postal codes were missing for 776 (11.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 29.72% (95% CI 26.42, 33.01). In Week 3, postal codes were missing for 946 (13.5%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 30.96% (95% CI 28.02, 33.90). In Week 4, postal codes were missing for 715 (12.1%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 33.59% (95% CI 30.01, 37.16).

Table A2.2. Weekly SARS-CoV-2 seroprevalence by province and age group by Nucleocapsid results in March 2022

	March 1-7			March 8-15			March 16-23			March 24-31		
	Adjusted			Adjusted			Adjusted			Adjusted		
	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI	N Tested (N Positive)	Percent Positive	95% CI
British Columbia												
17-24	63 (23)	36.56	24.59, 48.54	95 (42)	45.52	38.22, 52.82	71 (28)	40.51	32.24, 48.78	58 (24)	41.53	32.27, 50.78
25-39	358 (139)	38.90	33.82, 43.98	353 (146)	41.81	36.03, 47.58	401 (178)	45.77	40.34, 51.19	283 (125)	43.65	37.10, 50.20
40-59	401 (105)	26.17	21.83, 30.50	380 (136)	35.50	30.66, 40.34	502 (186)	37.76	33.49, 42.03	356 (125)	34.38	29.37, 39.38
60+	314 (56)	17.76	13.49, 22.02	334 (52)	15.30	11.51, 19.09	429 (93)	21.65	17.79, 25.50	306 (58)	19.14	14.83, 23.45
Total	1136 (323)	28.20	25.55, 30.85	1162 (376)	32.56	29.88, 35.23	1403 (485)	34.81	32.31, 37.32	1003 (332)	32.31	29.40, 35.21
Alberta												
17-24	86 (44)	52.73	42.61, 62.85	125 (70)	55.05	46.29, 63.82	158 (90)	56.53	48.82, 64.24	111 (61)	55.21	46.06, 64.37
25-39	420 (175)	42.22	36.57, 47.88	393 (166)	44.01	38.13, 49.90	459 (220)	51.25	45.75, 56.74	386 (179)	47.27	41.23, 53.31
40-59	500 (179)	35.75	30.47, 41.03	478 (177)	37.38	32.02, 42.74	604 (241)	42.13	37.29, 46.96	487 (190)	41.54	36.04, 47.03
60+	328 (79)	24.61	18.41, 30.81	349 (79)	23.62	17.76, 29.48	453 (104)	23.95	18.94, 28.97	367 (76)	20.29	14.84, 25.74
Total	1334 (477)	37.34	34.16, 40.53	1345 (492)	38.72	35.56, 41.88	1674 (655)	42.23	39.38, 45.08	1351 (506)	39.97	36.76, 43.18
Saskatchewan												
17-24	22 (10)	49.03	29.41, 68.65	45 (19)	46.91	34.00, 59.82	26 (15)	59.80	42.49, 77.11	16 (9)	53.64	31.74, 75.54
25-39	104 (32)	29.22	18.96, 39.48	93 (29)	32.77	21.42, 44.13	126 (48)	38.69	28.59, 48.79	64 (28)	44.06	29.18, 58.93
40-59	116 (28)	26.43	17.05, 35.81	121 (37)	30.67	20.94, 40.40	142 (44)	31.95	23.14, 40.77	80 (14)	17.63	7.86, 27.40
60+	75 (17)	23.70	12.25, 35.14	100 (12)	14.02	5.95, 22.08	136 (30)	23.77	15.76, 31.78	87 (13)	16.73	6.74, 26.72
Total	317 (87)	29.07	23.31, 34.83	359 (97)	30.23	24.86, 35.60	430 (137)	33.66	28.61, 38.70	247 (64)	27.90	21.26, 34.55
Manitoba												

COVID-19 Seroprevalence Report

17-24	33 (17)	51.70	35.45, 67.94	22 (15)	68.99	50.57, 87.41	54 (29)	52.91	40.26, 65.56	39 (24)	61.17	46.72, 75.63
25-39	111 (34)	30.88	20.83, 40.92	97 (37)	39.46	28.23, 50.69	96 (43)	45.97	34.48, 57.47	106 (41)	38.62	27.88, 49.36
40-59	168 (51)	31.60	23.56, 39.65	103 (29)	31.46	20.94, 41.98	152 (51)	34.45	25.65, 43.24	123 (40)	32.16	22.52, 41.80
60+	105 (18)	18.10	9.42, 26.77	107 (21)	18.23	9.41, 27.04	115 (17)	16.47	8.27, 24.68	150 (25)	16.47	9.34, 23.60
Total	417 (120)	30.50	25.47, 35.53	329 (102)	33.56	27.66, 39.46	417 (140)	36.06	30.82, 41.29	418 (130)	32.61	27.45, 37.77
Ontario												
17-24	229 (95)	39.35	34.89, 43.81	177 (72)	40.23	35.33, 45.13	172 (76)	46.71	41.82, 51.59	197 (82)	39.92	35.30, 44.54
25-39	788 (250)	31.30	28.07, 34.52	756 (225)	30.79	27.61, 33.98	757 (269)	36.65	33.40, 39.89	641 (228)	34.55	30.93, 38.17
40-59	1150 (303)	26.68	24.19, 29.17	1108 (285)	25.50	23.04, 27.97	1045 (269)	25.71	23.27, 28.14	946 (282)	28.93	26.11, 31.75
60+	770 (100)	13.33	11.13, 15.53	788 (115)	13.67	11.47, 15.87	703 (96)	12.15	10.10, 14.19	690 (103)	13.65	11.37, 15.93
Total	2937 (748)	25.84	24.37, 27.31	2829 (697)	25.14	23.66, 26.61	2677 (710)	26.94	25.46, 28.41	2474 (695)	27.27	25.67, 28.88
Atlantic Canada												
17-24	39 (9)	21.44	10.79, 32.10	38 (16)	40.42	28.79, 52.04	23 (4)	16.99	5.31, 28.67	29 (15)	49.60	36.23, 62.98
25-39	139 (34)	22.53	15.18, 29.88	136 (28)	19.57	12.73, 26.40	86 (15)	10.35	5.21, 15.50	82 (18)	18.87	10.43, 27.30
40-59	268 (35)	12.06	7.81, 16.30	323 (44)	12.98	9.13, 16.83	164 (28)	15.60	9.63, 21.56	171 (24)	11.60	6.70, 16.50
60+	255 (24)	10.01	6.05, 13.97	278 (15)	5.79	2.97, 8.61	150 (11)	6.93	2.70, 11.15	155 (7)	4.05	0.64, 7.46
Total	701 (102)	14.24	11.51, 16.97	775 (103)	14.01	11.54, 16.48	423 (58)	11.50	8.57, 14.43	437 (64)	15.34	11.95, 18.73
Overall Total	6842 (1857)	27.02	25.95, 28.09	6799 (1867)	27.54	26.47, 28.61	7024 (2185)	30.68	29.61, 31.75	5930 (1791)	29.52	28.34, 30.69