COVID-19 Seroprevalence Report

April 5, 2023

Report #31: February 2023 Survey

Summary

February 2023 **February 1 – February 28, 2023 (n = 31,755)**

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 100.00% (95% CI 100.00, 100.00) (based on results from the Spike antibody assay). This was largely driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. Recently rising values in most age groups may be related to vaccination or infection. February 2023 saw a slight decrease in concentrations among older age groups.

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

- Seroprevalence (natural infection) in February was 77.59% (95% CI 77.13, 78.06), higher than in January (76.73%, 95% CI 76.27, 77.20), $P < 0.01$). There was a week-to-week variation over February from 78.48% (95% CI 77.56, 79.40) to 77.22% (95% CI 76.26, 78.19) to 77.01% (95% CI 76.08, 77.93) to 77.49% (95% CI 76.62, 78.37).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate at 88.40% (95% CI 87.38, 89.42) compared to other age groups. The seroprevalence rate increased in 17-24 and 40-59 age groups compared to January.
- Racialized groups have a higher seroprevalence rate (83.52% (95% CI 82.60, 84.44)) compared to white donors (75.92% (95% CI 75.38, 76.46)).

January 2023

January 1 – January 31, 2023 (n = 32,062)

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 100.00% (95% CI 100.00, 100.00) (based on results from the Spike antibody assay). This was largely driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. Recently rising values in most age groups may be related to vaccination or infection. January 2023 saw a slight decrease in concentrations among older age groups.

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

- Seroprevalence (natural infection) in January was 76.72% (95% CI 76.25, 77.19), higher than in December (73.50%, 95% CI 73.01, 73.98), $P < 0.0001$). There was a gradual week-to-week change over January from 76.08% (95% CI 75.14, 77.03) to 75.91% (95% CI 74.97, 76.85) to 76.46% (95% CI 75.59, 77.34) to 78.48% (95% CI 77.54, 79.43).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate at 86.55% (95% CI 85.46, 87.63) compared to other age groups. The seroprevalence rate increased in all age groups, excluding 17-24 year olds, compared to December.
- Racialized groups have a higher seroprevalence rate (81.95% (95% CI 80.97, 82.94)) compared to white donors (75.44% (95% CI 74.91, 75.98)).

December 2022

December 1 – December 31, 2022 (n = 32,698)

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 100.00% (95% CI 100.00, 100.00) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. Recently rising values in most age groups may be related to vaccination or infection.

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

- Seroprevalence (natural infection) in December was 73.50% (95% CI 73.01, 73.98), higher than in November was 70.78% (95% CI 70.27, 71.30), $P < 0.0001$). There was a gradual week-to-week increase over December from 71.6% (95% CI 70.52, 72.69) to 73.04% (95% CI 72.19, 73.90) to 73.82% (95% CI 72.88, 74.76) to 75.26% (95% CI 74.27, 76.22).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate at 86.76% (95% CI 85.70, 87.82) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to November.
- Seroprevalence rates increased in December compared to November in all provinces, however the increase was not statistically significant in Nova Scotia and Prince Edward Island.
- Racialized groups have a higher seroprevalence rate (79.57% (95% CI 78.56, 80.58)) compared to white donors (71.97% (95% CI 71.41, 72.52)).

November 2022

November 1 – November 30, 2022 (n = 31,080)

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 100.00% (95% CI 100.00, 100.00) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. Recently rising values in most age groups may be related to vaccination or infection.

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

- Seroprevalence (natural infection) in November was 70.78% (95% CI 70.27, 71.30), higher than in October was 67.37% (95% CI 66.84, 67.89), $P < 0.0001$). There was week-to-week fluctuation over November from 69.90% (95% CI 68.74, 71.06) to 70.42% (95% CI 69.50, 71.34) to 71.23% (95% CI 70.26, 72.20) to 70.80% (95% CI 69.77, 71.83).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate at 84.55% (95% CI 83.39, 85.71) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to October.
- Seroprevalence rates increased in November compared to October in all provinces, however the increase was not statistically significant in Saskatchewan, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland.
- Racialized groups have a higher seroprevalence rate (78.67% (95% CI 77.65, 79.70)) compared to white donors (68.58% (95% CI 67.99, 69.17)).

October 2022

October 1 – October 31, 2022 (n = 31,457)

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 (adjusted) proportion of blood donors with humoral immunity for SARS-CoV-2 was 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. Recently rising values in most age groups may be related to vaccination or infection.

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

- Seroprevalence (natural infection) in October was 67.37% (95% CI 66.84, 67.89), higher than in September (63.22% (95% CI 62.69, 63.76), P < 0.0001). There was a modest week to-week change over October from 66.37% (95% CI 65.29, 67.44) to 66.12% (95% CI 65.07, 67.16) to 67.79% (95% CI 66.72, 68.86) to 68.47% (95% CI 67.51, 69.42).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate at 81.73% (95% CI 80.50, 82.96) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to September.
- Seroprevalence rates increased in October compared to September in all provinces, however the increase was not statistically significant in Manitoba, New Brunswick, Prince Edward Island and Newfoundland.
- Racialized groups have a higher seroprevalence rate (75.25% (95% CI 74.14, 76.35)) compared to white donors (65.33% (95% CI 64.73, 65.94)).

September 2022

September 1 - September 30, 2022 (n=31,637)

- **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 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration.
- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in September was 63.22% (95% CI 62.69, 63.76), higher than in August (58.54% (95% CI 58.02, 59.06)), $P < 0.0001$). There was a modest week-to-week change over September from 61.14% (95% CI 60.02, 62.26) to 63.43% (95% CI 62.41, 64.46) to 62.85% (95% CI 61.84, 63.86) to 65.38% (95% CI 64.29, 66.48).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (78.26% (95% CI 76.96, 79.57) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to August.
- Seroprevalence rates increased in September compared to August in all provinces, however the increase was not statistically significant in Newfoundland and Prince Edward Island.
- Racialized groups have a higher seroprevalence rate (70.14% (95% CI 68.97, 71.31)) compared to white donors (61.75% (95% CI 61.13, 62.37)).

August 2022

August 1 - August 31 2022 (n=35,165)

- **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 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration.
- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in August was 58.54% (95% CI 58.02, 59.06), higher than in July (54.01% (95% CI 53.45, 54.56)), $P < 0.0001$). There was a modest week-to-week change over August from 56.80% (95% CI 55.64, 57.96) to 58.29% (95% CI 57.30, 59.27) to 58.59% (95% CI 57.59, 59.59) to 59.87% (95% CI 58.89, 60.86).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (74.98% (95% CI 73.68, 76.28) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to July.
- Seroprevalence rates increased in August compared to July in all provinces, however the increase was not statistically significant in Saskatchewan and Prince Edward Island.
- Racialized groups have a higher seroprevalence rate (67.44% (95% CI 66.30, 68.58)) compared to white donors (56.62% (95% CI 56.02, 57.23)).

July 2022

July 1 - July 31 2022 (n=31,275)

- **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 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. A slight increase in concentration in those over 60 was observed in May and June, consistent with a fourth dose, however this increase levelled off in July.

- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in July was 54.01% (95% CI 53.45, 54.56), higher than in June (50.7% (95% CI 50.15, 51.26)) $P < 0.0001$). There was a modest week-to-week change over July from 52.32% (95% CI 51.22, 53.42) to 52.70% (95% CI 51.62, 53.77) to 54.68% (95% CI 53.61, 55.74) to 56.51% (95% CI 55.35, 57.67).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (71.15% (95% CI 69.71, 72.59) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to June.
- Seroprevalence rates increased in July compared to June in all provinces except PEI, however the increase was only statistically significant in British Columbia, Ontario, New Brunswick and Newfoundland.
- Racialized groups have a higher seroprevalence rate (62.27% (95% CI 61.03, 63.51)) compared to white donors (52.01% (95% CI 51.37, 52.06)).

June 2022

June 1 - June 30 2022 (n=32,121)

- **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 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. An increase in concentration in those over 60 is observed in May and contunued into June consistent with a fourth dose.

- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in June was 50.7% (95% CI 50.15, 51.26), higher than in May 2022 (46.32% (95% CI 45.77, 46.87) $P < 0.0001$). There was minimal week-to-week change over June from 50.47% (95% CI 49.32, 51.63) to 51.07% (95% CI 50.04, 52.10) to 50.26% (95% CI 49.25, 51.27) to 50.76% (95% CI 49.58, 51.94).
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (66.29% (95% CI 64.81, 67.77) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to May.
- Seroprevalence rates increased in June compared to May in all provinces.
- Racialized groups have a higher seroprevalence rate (58.03% (95% CI 56.79, 59.27)) compared to white donors (49.01% (95% CI 48.38, 49.65)).

May 2022

May 1 - May 31 2022 (n=31,764)

- **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 100.00% (95% CI 100.00, 100.00%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration. An increase in concentration in those over 60 is observed in May.

- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in May 2022 was 46.32% (95% CI 45.77, 46.87), higher than April 2022 (36.71% (95% CI 36.16, 37.26), $P < 0.0001$). There was a gradual increase over May from 42.74% (95% CI 41.65, 43.84) to 46.11% (95% CI 45.00, 47.21) to 47.03% (95% CI 45.96, 48.10) to 48.96% (95% CI 47.87, 50.06) with the persistence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (64.47% (95% CI 62.96, 65.98) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to April.
- Seroprevalence rates increased in May compared to April in all provinces except PEI.
- Racialized groups have a higher seroprevalence rate (54.35% (95% CI 53.12, 55.58)) compared to white donors (44.31% (95% CI 43.67, 44.95)).
- Among repeat tested donors, new infections in unvaccinated donors have increased from June 2021 1.53% (95% CI 1.14, 2.00) to 9.12% (95% CI 8.24, 10.07) in January 2022 and 46.83% (95% CI 44.57, 49.10) in May 2022
- Potential breakthrough infections remained low from June 2021 to December 2021, but increased from 5.19% (95% CI 4.68, 5.74) in January 2022 to 31.02% (95% CI 30.17, 31.88) in May 2022.

April 2022

April 1 - April 30 2022 (n=29,787)

- **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 99.74% (95% CI 99.60, 99.88%) (based on results from the Spike antibody assay). This was predominantly driven by vaccination.
- Spike antibody concentrations were high by September 2021, but gradually decreased. A peak in values followed by decline is expected after vaccination. Concentrations increased in all age groups by February 2022 likely due to third vaccine dose administration, but are now declining.

- **Natural Infections (Based on results from the Nucleocapsid antibody assay):**
- Seroprevalence (natural infection) in April 2022 was 36.71% (95% CI 36.16, 37.26), higher than March 2022 (28.70% (95% CI 28.15, 29.26), $P < 0.0001$). There was a gradual increase over April from 32.83% (95% CI 31.67, 33.98) to 35.54% (95% CI 34.47, 36.60) to 37.64% (95% CI 36.62, 38.65) to 40.04% (95% CI 38.90, 41.18) with the persistence of the Omicron variant.
- Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate (55.37% (95% CI 53.76, 56.99) compared to other age groups. However, the seroprevalence rate increased in all age groups compared to March.
- Seroprevalence rates increased in April compared to March in all provinces.
- Racialized groups have a higher seroprevalence rate (45.06% (95% CI 43.77, 46.34)) compared to white donors (34.78% (95% CI 34.15, 35.42)).
- Among repeat tested donors, new infections in unvaccinated donors have increased from June 2021 1.53% (95% CI 1.14, 2.00) to 9.12% (95% CI 8.24, 10.07) in January 2022 and 37.19% (95% CI 35.14, 39.28) in April 2022
- Potential breakthrough infections remained low from June 2021 to December 2021, but increased from 5.19% (95% CI 4.68, 5.74) in January 2022 to 21.99 (95% CI 21.19. 22.80) in April 2022.

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% C I4.68, 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 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% 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. Seroprevalance 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 pandemic 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 with a sixth wave in March/April and a seventh in July. As of March 4, 2023, 4,609,574 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 followed by subvariants. 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. Many regions relaxed public health restrictions by 2022 due to milder symptoms for many people. 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. These data improve mathematical models to predict the course of infection and inform public health policies.

Antibody concentrations typically peak within a month of vaccination and then gradually decrease. Antibody concentrations can be much higher after a subsequent dose of vaccine, or when an infection occurs pre- or post-vaccination. More than 89% of the people in Canada aged 18 and older had received a primary vaccine series as of February 26, 2023. Starting in November 2021, some Canadians became eligible for a third dose. A fourth dose was encouraged in risk groups and older individuals and bi-valent vaccines became widely available in August 2022. By fall of 2022 the additional dose was encouraged for all age groups. 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 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

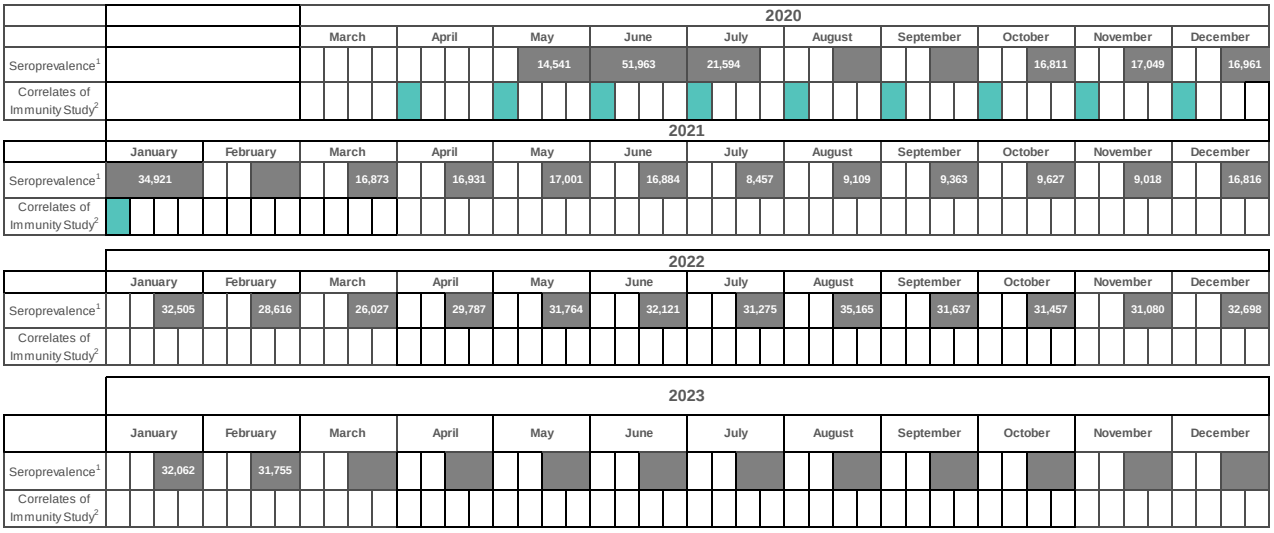
Before each donation, blood donors must answer screening questions to ensure that they are in good health and do not have risk factors for infections that may be transmitted to blood recipients. There is no evidence that SARS-CoV-2 can be transmitted through blood transfusion, but it is important to 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 for 2 weeks after symptoms disappear (3 weeks if hospitalized) if they have been in contact with someone who was infected or if they have had the infection. Donors also have their temperature and their hemoglobin level 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 not tested). In January 2021 a larger sample was tested and in February 2021 samples were not tested. As of March 2021, 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.



[1] Samples tested with the **Abbott SARS-CoV-2 IgG Assay until January 2021** (residual blood from August 2020, September 2020 and February 2021 are aliquoted but have not been tested). As of January 2021, all samples were tested using the Roche Elecsys ® Anti-SARS-CoV-2 assays (S and N).

[2] Orthogonal Testing (PI: S. Drews (CIHR 2020) sampling 1,500 samples per month until and including January 2021 (Abbott tested); this study is known as the "Correlates of Immunity Study"

SARS-CoV-2 antibody testing

Two assays were used. The Roche Elecsys ® Anti-SARS-CoV-2 spike semi-quantitative immunoassay detects total antibodies (including IgA, IgM and IgG) to the SARS-CoV-2 spike (S) protein (**Spike antibody**). The Elecsys® Anti-SARS-CoV-2 qualitative immunoassay detects total antibodies (including IgA, IgM and IgG) to SARS-CoV-2 using a recombinant protein, nucleocapsid (N) antigen (**Nucleocapsid antibody).** At a concentration of ≥ 0.8 U/mL, the Spike antibody assay was assumed to have sensitivity of 98.8% and specificity of 99.6%. At a concentration of ≥ 1.0 U/mL, the Nucleocapsid antibody assay was assumed to have sensitivity of 99.5% and specificity of 99.8%[1]. All testing was conducted at Canadian Blood Services laboratories in Ottawa.

Samples from January 2021 to August 2021 were tested neat and at a 1:10 dilution for Spike antibody, however, by June 2021 many samples were above the maximum detection level when diluted. From September 2021 onwards samples were tested up to a 1:400 dilution.

Serological testing using the Nucleocapsid, and Spike antibody assay allows trends in natural infection transmission and vaccine-induced seropositivity to be monitored[2]. In this report the dual terms Spike antibody/ humoral immunity (by vaccine or natural infection) and Nucleocapsid antibody/proxy for natural infection will be used interchangeably. This is to ease interpretation for readers, with the caveat that these interpretations do not reflect the complexity of adaptive immunity.

Ethical issues

All data were de-identified by the information technology team at Canadian Blood Services by providing a random identification number. Demographic variables and vaccination history were extracted from the Canadian Blood Services donor database (e.g., donation date, birth year, 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 equation[3]. 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.

Results

Between February 1 and February 28, 2023 a total of 31,755 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 100.00% (95% CI 100.00, 100.00%). The adjusted seroprevalence by Nucleocapsid antibody (proxy for natural infection) was 77.59% (95% CI 77.13, 78.06) (please refer to points of interpretation). There was week-to-week variability over the 28-day reporting period from 78.48% (95% CI 77.56, 79.40) to 77.22% (95% CI 76.26, 78.19) to 77.01% (95% CI 76.08, 77.93) to 77.49% (95% CI 76.62, 78.37).

Figure 1 illustrates temporal trends of SARS-CoV-2 seroprevalence from April 4, 2020, until February 28, 2023, 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 to July 2021, mirroring wider first and second dose vaccine roll out. Figure 2 stratifies seroprevalence by regions. Much of the humoral immunity was induced by vaccines (compared to natural infections) across the country. The largest increase in seroprevalence using Roche N began in February 2022 and has continued to increase 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 2 compares temporal changes in seroprevalence rates by natural infection (**Nucleocapsid antibody** between January 2022 and February 2023. Overall, the seroprevalence rate for natural infections was higher in February (77.59 (95% CI 77.13, 78.06) compared to January (76.74% (95% CI 76.27, 77.20) ($P < 0.011$)).

Natural infections increased compared to the previous month in British Columbia and 17-24 and 40-59 years olds. Donors aged 17-24 years old continued to have the highest seroprevalence rate at 88.40% (95% CI 87.38, 89.42) compared to other age groups.

After vaccination an increase in antibody concentration followed by gradual decline is expected. From September 2021 to February 2023 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 2021 to February 2023.

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 February 2023. Differences in natural infections between white and racialized groups were seen from January 2021 to February 2023 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 February 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 February 2023 adjusted seroprevalence by the Spike antibody assay (proxy for humoral immunity) was 100.00% (95% CI 100.00, 100.00%). While humoral immunity has been largely driven by vaccination, the fraction of the population naturally exposed (with hybrid immunity) has increase sharply since December 2021 consistent with the arrival of the Omicron variant and subsequent subvariants.

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-sampled. 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 76.76% (95% CI 76.29, 77.22), and after weighting factors applied it was 77.25% (95% CI 76.78, 77.71), then after the weighted seroprevalence was adjusted for sensitivity and specificity, 77.59% (95% 77.13, 78.06). Using the Spike antibody assay, the unweighted SARS-CoV-2 seroprevalence for the full sample was 99.53% (95% CI 99.45, 99.60), and after weighting factors applied it was 99.55% (95% CI 99.47, 99.62), then after the weighted seroprevalence was adjusted for sensitivity and specificity, 100% (95% CI 100.00, 100.00).
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. Many Spike antibody positive results are related to vaccination. However, Spike antibody positives are also 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 February 2023 the two most common positive antibody profile was positive on Spike antibody/positive on Nucleocapsid antibody (76.62%) followed by positive on Spike antibody/negative on Nucleocapsid antibody (22.90%) (see below).

Diagnostic phenotypes in February 2023 (unadjusted)

	Nucleocapsid Antibody	Spike Antibody	Total N (%)
	Negative	Negative	107 (0.34)
	Negative	Positive	7,273 (22.90)
	Positive	Negative	43 (0.14)
	Positive	Positive	24,331 (76.62)
Total			31,755

Note: samples missing N or S results not included in the above

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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 February 2023

	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	12,865	9,949	77.20	76.55, 77.85	12,865	12,819	100.00	100.00, 100.00
Male	18,889	14,425	78.00	77.34, 78.66	18,890	18,786	100.00	100.00, 100.00
Age								
17-24	2,438	2,136	88.40	87.38, 89.42	2,438	2,435	100.00	100.00, 100.00
25-39	8,206	6,832	84.02	83.19, 84.85	8,206	8,189	100.00	100.00, 100.00
40-59	11,990	9,472	79.48	78.72, 80.24	11,991	11,935	100.00	100.00, 100.00
60+	9,120	5,934	64.92	63.93, 65.92	9,120	9,046	100.00	100.00, 100.00
Province								
British Columbia	5,201	3,887	76.01	74.88, 77.14	5,201	5,168	100.00	100.00, 100.00
Alberta	5,878	4,753	82.46	81.36, 83.56	5,878	5,849	100.00	100.00, 100.00
Saskatchewan	1,320	1,006	77.75	75.41, 80.09	1,320	1,318	100.00	100.00, 100.00
Manitoba	1,470	1,175	79.60	77.50, 81.70	1,470	1,466	100.00	100.00, 100.00
Ontario	14,701	11,142	76.70	76.04, 77.37	14,702	14,631	100.00	100.00, 100.00
New Brunswick	1,300	987	77.20	74.43, 79.97	1,300	1,293	100.00	99.95, 100.00
Nova Scotia	1,298	968	73.86	71.26, 76.46	1,298	1,295	100.00	100.00, 100.00
Prince Edward Island	146	111	80.19	74.12, 86.27	146	145	99.73	97.91, 100.00
Newfoundland	440	345	79.16	75.93, 82.39	440	440	100.00	100.00, 100.00
Metro area								
Vancouver	2,661	2,069	78.36	76.90, 79.81	2,661	2,652	100.00	100.00, 100.00
Calgary	2,137	1,741	82.47	80.51, 84.44	2,137	2,130	100.00	100.00, 100.00
Edmonton	1,891	1,505	81.13	79.22, 83.03	1,891	1,885	100.00	100.00, 100.00

Ottawa	1,435	1,039	73.76	71.10, 76.42	1,435	1,434	100.00	100.00, 100.00
Toronto	4,658	3,681	79.08	78.10, 80.07	4,659	4,635	100.00	100.00, 100.00
Winnipeg	919	714	77.57	74.80, 80.34	919	916	100.00	100.00, 100.00
Ethnicity[1,2]								
White	25,242	19,024	75.92	75.38, 76.46	25,243	25,121	100.00	100.00, 100.00
Indigenous	436	336	77.73	73.81, 81.65	436	432	99.75	98.62, 100.00
Asian	3,045	2,534	84.27	83.03, 85.50	3,045	3,042	100.00	100.00, 100.00
Other racialized groups	2,409	1,986	83.51	82.05, 84.98	2,409	2,394	100.00	100.00, 100.00
Social Deprivation[3]								
1 (least deprived)	6,031	4,722	79.35	78.32, 80.38	6,031	6,009	100.00	100.00, 100.00
2	6,006	4,609	77.10	76.02, 78.17	6,006	5,976	100.00	100.00, 100.00
3	5,566	4,202	76.70	75.58, 77.83	5,566	5,537	100.00	100.00, 100.00
4	5,189	3,953	77.10	75.94, 78.26	5,189	5,162	100.00	100.00, 100.00
5 (most deprived)	5,176	3,913	75.98	74.81, 77.16	5,177	5,153	100.00	100.00, 100.00
Material Deprivation[3]								
1 (least deprived)	7,941	6,083	76.81	75.87, 77.76	7,942	7,919	100.00	100.00, 100.00
2	6,980	5,317	77.10	76.08, 78.11	6,980	6,948	100.00	100.00, 100.00
3	5,887	4,485	76.76	75.67, 77.86	5,887	5,849	100.00	100.00, 100.00
4	4,474	3,427	78.05	76.84, 79.26	4,474	4,451	100.00	100.00, 100.00
5 (most deprived)	2,686	2,087	79.00	77.50, 80.50	2,686	2,670	100.00	100.00, 100.00
Total	31,754	24,374	77.59	77.13, 78.06	31,755	31,605	100.00	100.00, 100.00

[1]Self reported ethnicity was missing for 622 (2.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 82.70% (95% CI 79.69, 85.71); and Spike antibody was 99.85% (95% CI 98.94, 100,00).

[2]Combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 83.52% (95% CI 82.60, 84.44) by the Nucleocapsid antibody assay, and 100.00% (95% CI 100.00, 100.00) by Spike antibody.

[3]Postal codes were missing for 3,786 (11.9%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 79.76% (95% CI 78.46, 81.07) and Spike antibody was 100.00% (95% CI 100.00, 100.00).

Table 2. Changes in SARS-CoV-2 seroprevalence by **Nucleocapsid Antibody assay (proxy for natural infection)** by sociodemographic variables between January and February 2023

	January 2023 (crude)		January 2023 (adjusted)		February 2023 (crude)		February 2023 (adjusted)		
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	P-Value*
Sex									
Female	13,817	10,604	76.77	76.12, 77.43	12,865	9,949	77.20	76.55, 77.85	0.3579
Male	18,305	13,758	76.69	76.02, 77.37	18,889	14,425	78.00	77.34, 78.66	0.0065
Age									
17-24	2,182	1,898	86.55	85.46, 87.63	2,438	2,136	88.40	87.38, 89.42	0.0146
25-39	8,300	6,831	83.02	82.17, 83.86	8,206	6,832	84.02	83.19, 84.85	0.0971
40-59	11,770	9,193	78.13	77.36, 78.91	11,990	9,472	79.48	78.72, 80.24	0.0152
60+	9,870	6,440	65.34	64.35, 66.32	9,120	5,934	64.92	63.93, 65.92	0.5640
Province									
British Columbia	6,128	4,466	74.03	72.86, 75.20	5,201	3,887	76.01	74.88, 77.14	0.0167
Alberta	6,519	5,231	81.39	80.26, 82.53	5,878	4,753	82.46	81.36, 83.56	0.1860
Saskatchewan	1,436	1,094	77.72	75.36, 80.08	1,320	1,006	77.75	75.41, 80.09	0.9889
Manitoba	1,569	1,234	79.47	77.34, 81.60	1,470	1,175	79.60	77.50, 81.70	0.9308
Ontario	14,013	10,515	76.26	75.60, 76.91	14,701	11,142	76.70	76.04, 77.37	0.3471
New Brunswick	830	635	78.21	75.35, 81.06	1,300	987	77.20	74.43, 79.97	0.6183
Nova Scotia	1,086	780	72.08	69.38, 74.78	1,298	968	73.86	71.26, 76.46	0.3526
Prince Edward Island	153	113	76.41	69.90, 82.92	146	111	80.19	74.12, 86.27	0.4052
Newfoundland	388	294	76.80	73.42, 80.18	440	345	79.16	75.93, 82.39	0.3224
Metro area									
Vancouver	3,243	2,474	76.44	74.96, 77.92	2,661	2,069	78.36	76.90, 79.81	0.0705
Calgary	2,494	2,007	81.95	79.94, 83.95	2,137	1,741	82.47	80.51, 84.44	0.7116
Edmonton	2,039	1,604	79.20	77.22, 81.18	1,891	1,505	81.13	79.22, 83.03	0.1685
Ottawa	1,566	1,097	70.46	67.73, 73.19	1,435	1,039	73.76	71.10, 76.42	0.0898

Toronto	4,248	3,253	77.15	76.17, 78.13	4,658	3,681	79.08	78.10, 80.07	0.0062
Winnipeg	891	684	77.60	74.67, 80.52	919	714	77.57	74.80, 80.34	0.9900
Ethnicity[1,2]									
White	26,058	19,464	75.46	74.93, 76.00	25,242	19,024	75.92	75.38, 76.46	0.2413
Indigenous	493	382	78.42	74.75, 82.09	436	336	77.73	73.81, 81.65	0.8023
Asian	2,779	2,261	82.30	80.94, 83.67	3,045	2,534	84.27	83.03, 85.50	0.0368
Other racialized groups	2,224	1,808	82.23	80.68, 83.78	2,409	1,986	83.51	82.05, 84.98	0.2380
Social Deprivation[3]									
1 (least deprived)	6,113	4,733	78.46	77.41, 79.50	6,031	4,722	79.35	78.32, 80.38	0.2300
2	6,098	4,595	75.91	74.82, 71.00	6,006	4,609	77.10	76.02, 78.17	0.1296
3	5,589	4,128	74.62	73.47, 75.77	5,566	4,202	76.70	75.58, 77.83	0.0112
4	5,098	3,806	75.55	74.37, 76.73	5,189	3,953	77.10	75.94, 78.26	0.0670
5 (most deprived)	5,356	4,053	76.42	75.27, 77.58	5,176	3,913	75.98	74.81, 77.16	0.6031
Material Deprivation[3]									
1 (least deprived)	8,489	6,350	75.48	74.55, 76.42	7,941	6,083	76.81	75.87, 77.76	0.0500
2	7,185	5,459	77.05	76.06, 78.05	6,980	5,317	77.10	76.08, 78.11	0.9532
3	5,847	4,366	75.20	74.08, 76.31	5,887	4,485	76.76	75.67, 77.86	0.0500
4	4,270	3,216	76.31	75.04, 77.58	4,474	3,427	78.05	76.84, 79.26	0.0519
5 (most deprived)	2,463	1,924	78.57	76.99, 80.14	2,686	2,087	79.00	77.50, 80.50	0.6945
Total	32,122	24,362	76.73	76.27, 77.20	31,754	24,374	77.59	77.13, 78.06	0.0107

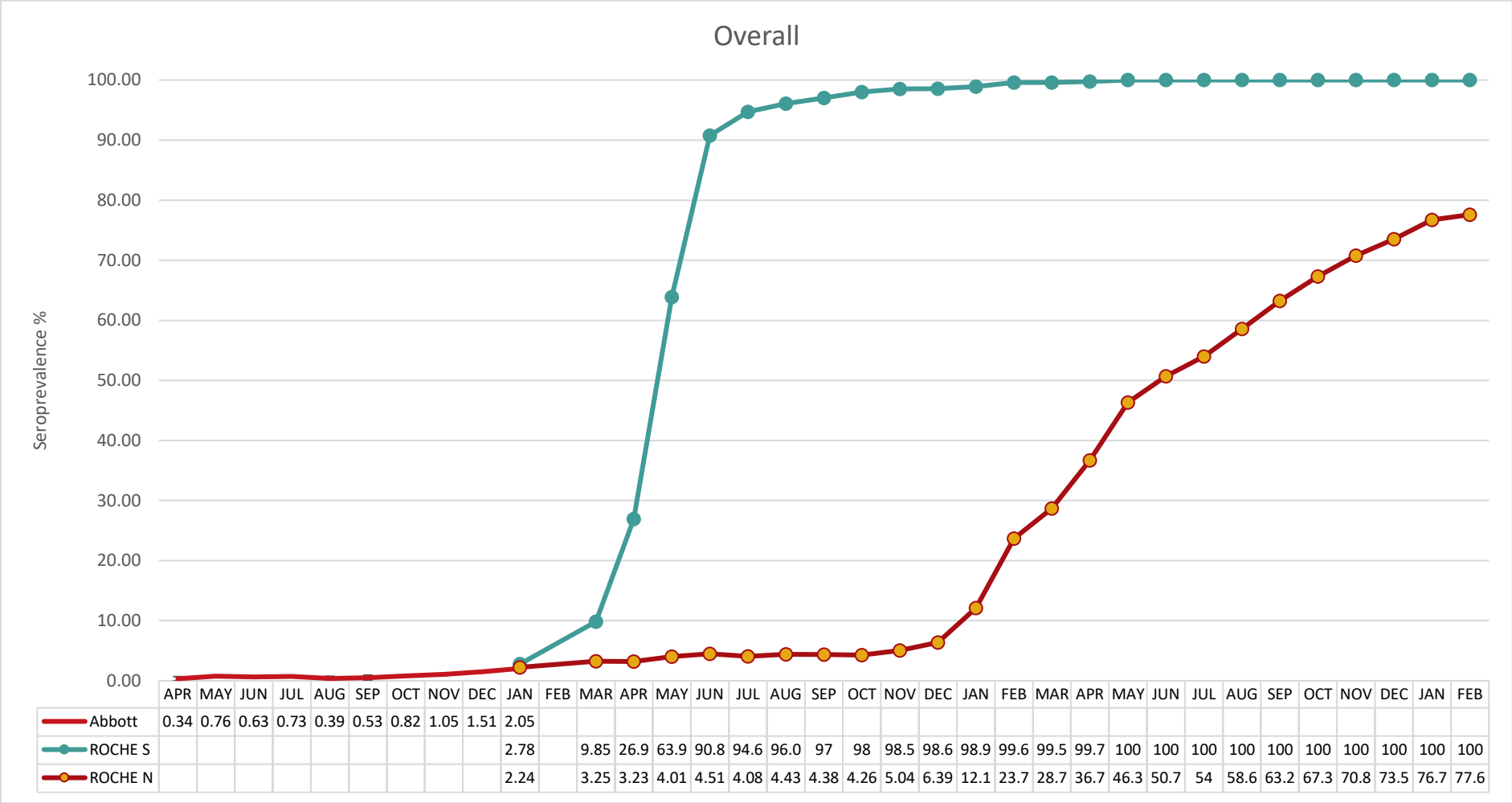
*P-value reflects the difference between January and February results.

[1] In January, self reported ethnicity was missing for 568 (1.8%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 78.86% (95% CI 75.48, 82.25); and Spike antibody was 100.00% (95% CI 99.42, 100,00). In February, self reported ethnicity was missing for 622 (2.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 82.70% (95% CI 79.69, 85.71); and Spike antibody was 99.85% (95% CI 98.94, 100,00).

[2] In January, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 81.95% (95% CI 80.96, 82.94) by the Nucleocapsid antibody assay, and 100.00% (95% CI 100.00, 100.00) by Spike antibody. In February, combining all racialized groups together resulted in adjusted SARS-CoV-2 seroprevalence of 83.52% (95% CI 82.60, 84.44) by the Nucleocapsid antibody assay, and 100.00% (95% CI 100.00, 100.00) by Spike antibody.

[3] In January, postal codes were missing for 3,868 (12.0%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.51% (95% CI 79.22, 81.79) and Spike antibody was 100.00% (95% CI 100.00, 100.00). In February, postal codes were missing for 3,786 (11.9%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 79.76% (95% CI 78.46, 81.07) and Spike antibody was 100.00% (95% CI 100.00, 100.00).

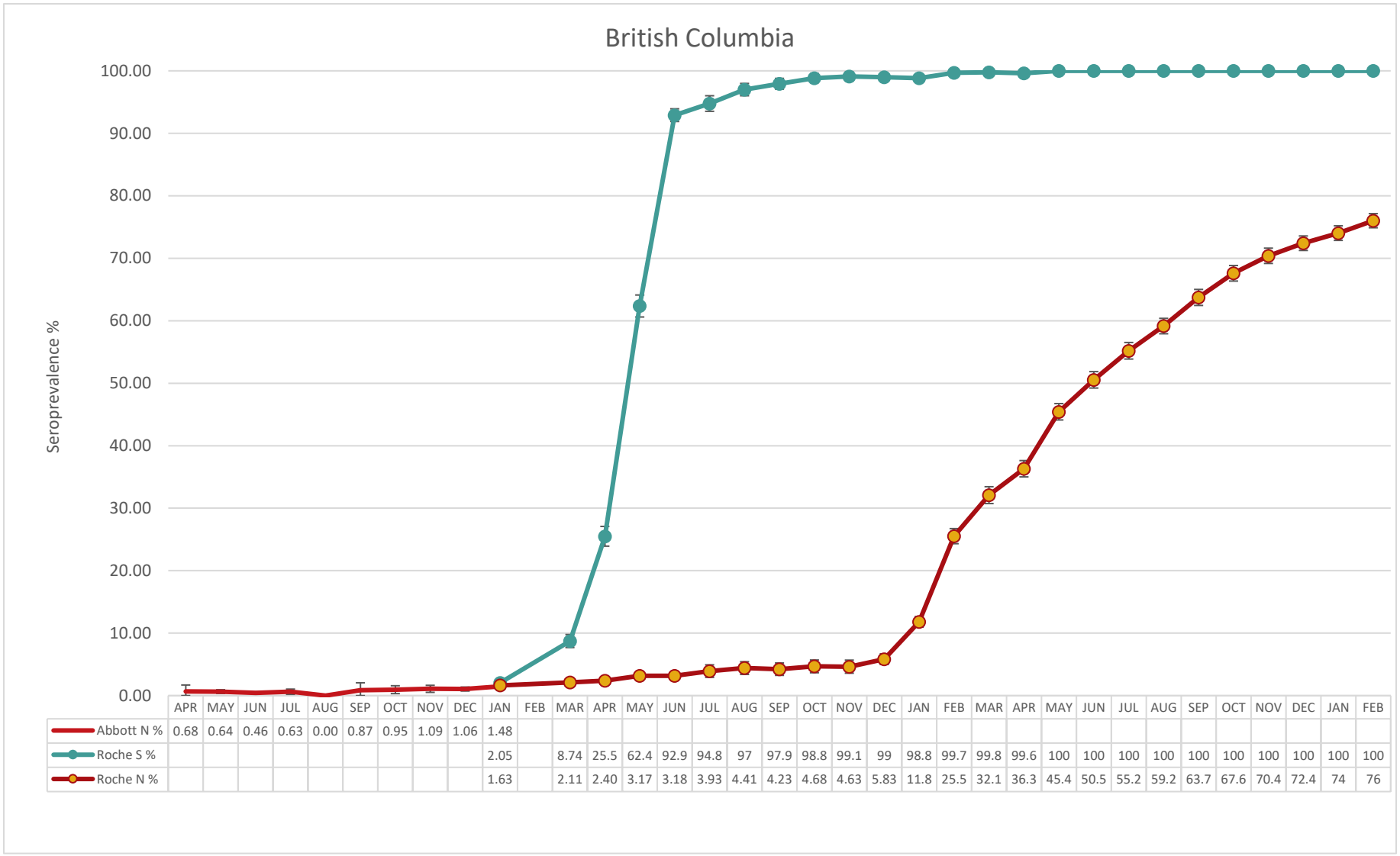
Figure 1. Overall temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from April 2020 - February 2023 (comparing results from Abbott N (until January 2021) followed by seroprevalence estimated by Roche N and Roche S results.



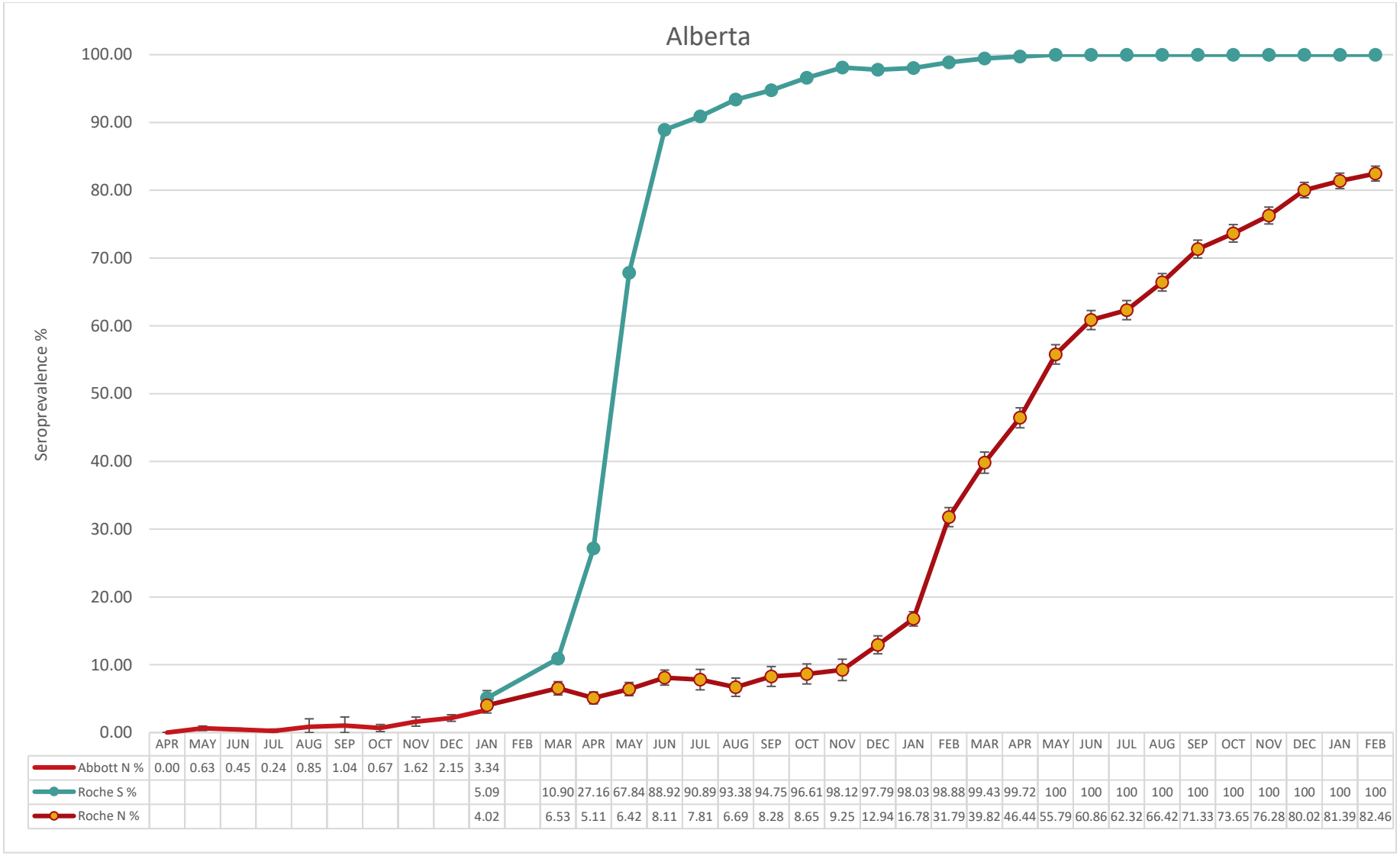
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott	0.34	0.76	0.63	0.73	0.39	0.53	0.82	1.05	1.51	2.05																									
ROCHE S										2.78		9.85	26.9	63.9	90.8	94.6	96.0	97	98	98.5	98.6	98.9	99.6	99.5	99.7	100	100	100	100	100	100	100	100	100	100
ROCHE N										2.24		3.25	3.23	4.01	4.51	4.08	4.43	4.38	4.26	5.04	6.39	12.1	23.7	28.7	36.7	46.3	50.7	54	58.6	63.2	67.3	70.8	73.5	76.7	77.6

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.

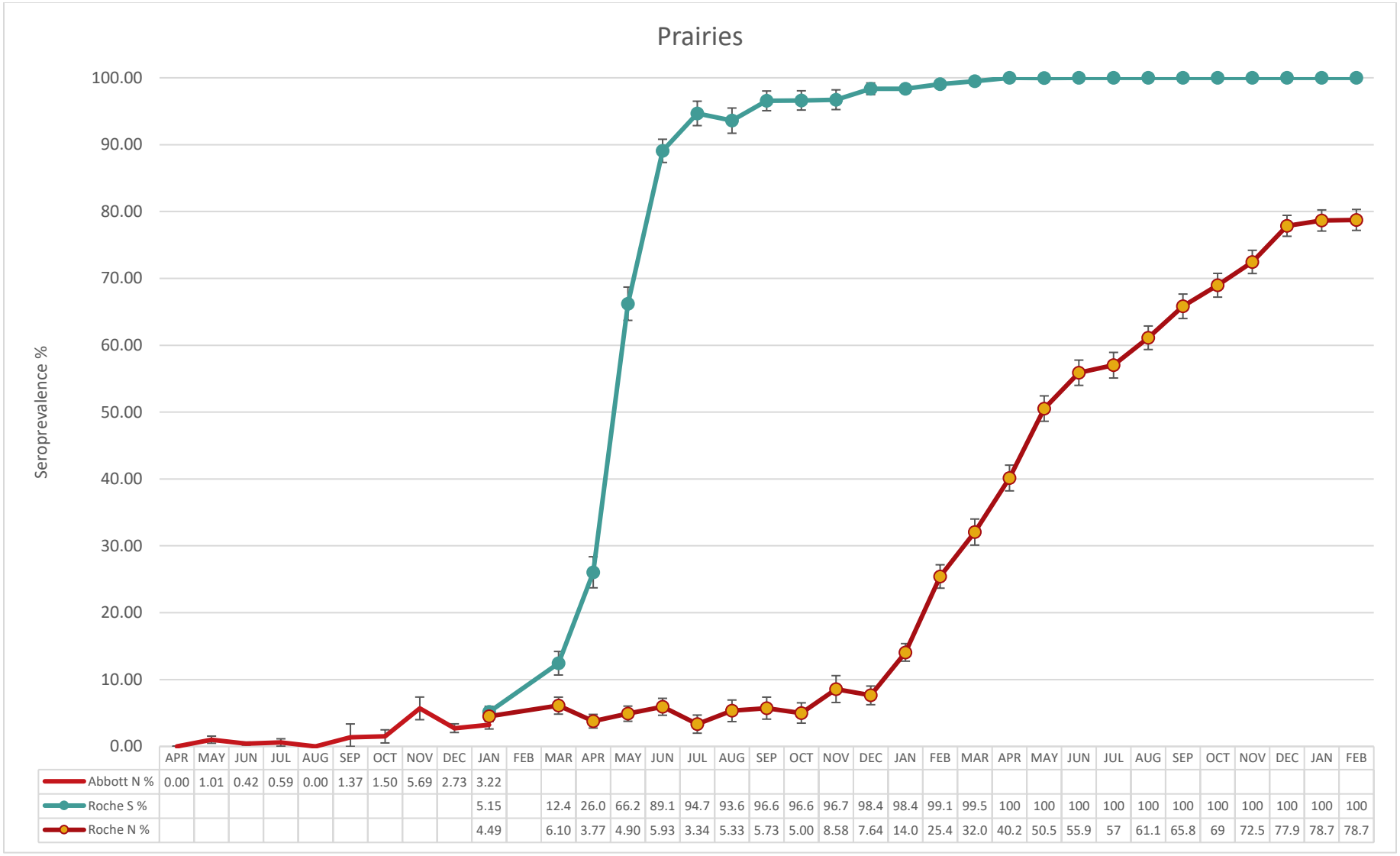
Figure 2. Regional temporal trends of SARS-CoV-2 seroprevalence monthly from April 2020 - February 2023 (by Abbott N, Roche N and Roche S assays)



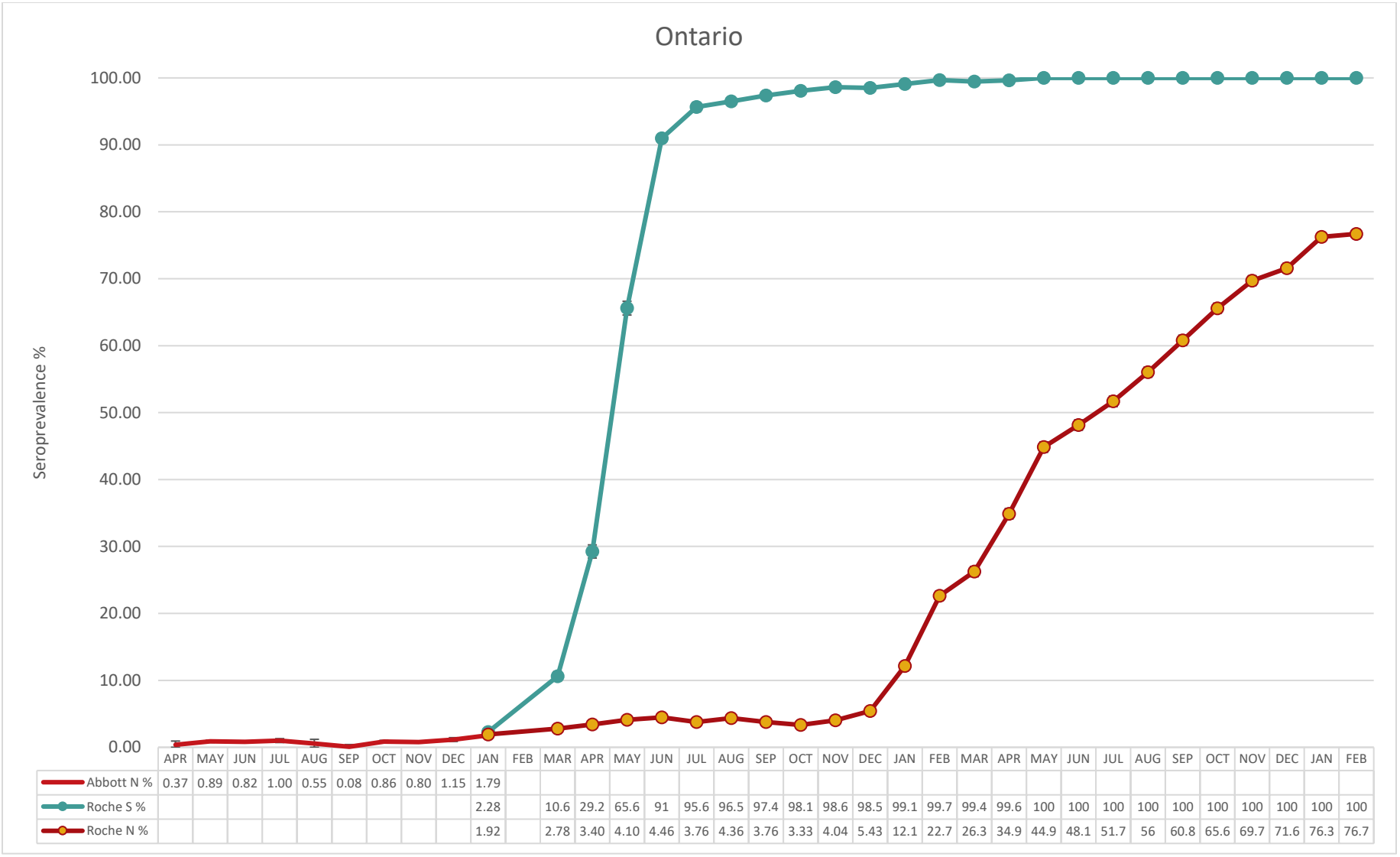
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott N %	0.68	0.64	0.46	0.63	0.00	0.87	0.95	1.09	1.06	1.48																									
Roche S %										2.05		8.74	25.5	62.4	92.9	94.8	97	97.9	98.8	99.1	99	98.8	99.7	99.8	99.6	100	100	100	100	100	100	100	100	100	100
Roche N %										1.63		2.11	2.40	3.17	3.18	3.93	4.41	4.23	4.68	4.63	5.83	11.8	25.5	32.1	36.3	45.4	50.5	55.2	59.2	63.7	67.6	70.4	72.4	74	76



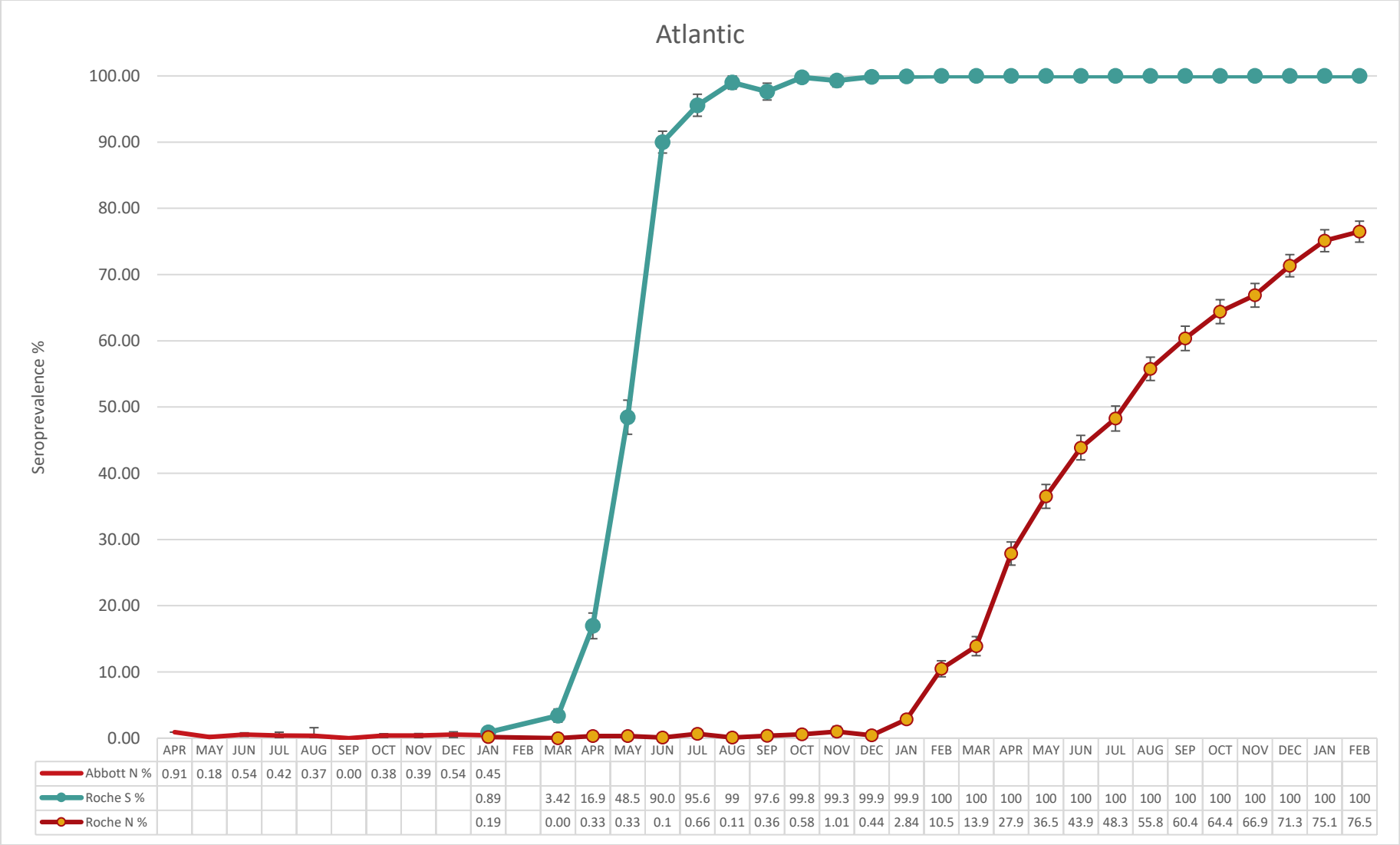
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott N %	0.00	0.63	0.45	0.24	0.85	1.04	0.67	1.62	2.15	3.34																									
Roche S %										5.09		10.90	27.16	67.84	88.92	90.89	93.38	94.75	96.61	98.12	97.79	98.03	98.88	99.43	99.72	100	100	100	100	100	100	100	100	100	100
Roche N %										4.02		6.53	5.11	6.42	8.11	7.81	6.69	8.28	8.65	9.25	12.94	16.78	31.79	39.82	46.44	55.79	60.86	62.32	66.42	71.33	73.65	76.28	80.02	81.39	82.46



	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott N %	0.00	1.01	0.42	0.59	0.00	1.37	1.50	5.69	2.73	3.22																									
Roche S %										5.15		12.4	26.0	66.2	89.1	94.7	93.6	96.6	96.6	96.7	98.4	98.4	99.1	99.5	100	100	100	100	100	100	100	100	100	100	100
Roche N %										4.49		6.10	3.77	4.90	5.93	3.34	5.33	5.73	5.00	8.58	7.64	14.0	25.4	32.0	40.2	50.5	55.9	57	61.1	65.8	69	72.5	77.9	78.7	78.7



	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott N %	0.37	0.89	0.82	1.00	0.55	0.08	0.86	0.80	1.15	1.79																									
Roche S %										2.28		10.6	29.2	65.6	91	95.6	96.5	97.4	98.1	98.6	98.5	99.1	99.7	99.4	99.6	100	100	100	100	100	100	100	100	100	100
Roche N %										1.92		2.78	3.40	4.10	4.46	3.76	4.36	3.76	3.33	4.04	5.43	12.1	22.7	26.3	34.9	44.9	48.1	51.7	56	60.8	65.6	69.7	71.6	76.3	76.7



	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
Abbott N %	0.91	0.18	0.54	0.42	0.37	0.00	0.38	0.39	0.54	0.45																									
Roche S %										0.89		3.42	16.9	48.5	90.0	95.6	99	97.6	99.8	99.3	99.9	99.9	100	100	100	100	100	100	100	100	100	100	100	100	100
Roche N %										0.19		0.00	0.33	0.33	0.1	0.66	0.11	0.36	0.58	1.01	0.44	2.84	10.5	13.9	27.9	36.5	43.9	48.3	55.8	60.4	64.4	66.9	71.3	75.1	76.5

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 – February 2023 stratified by age group.

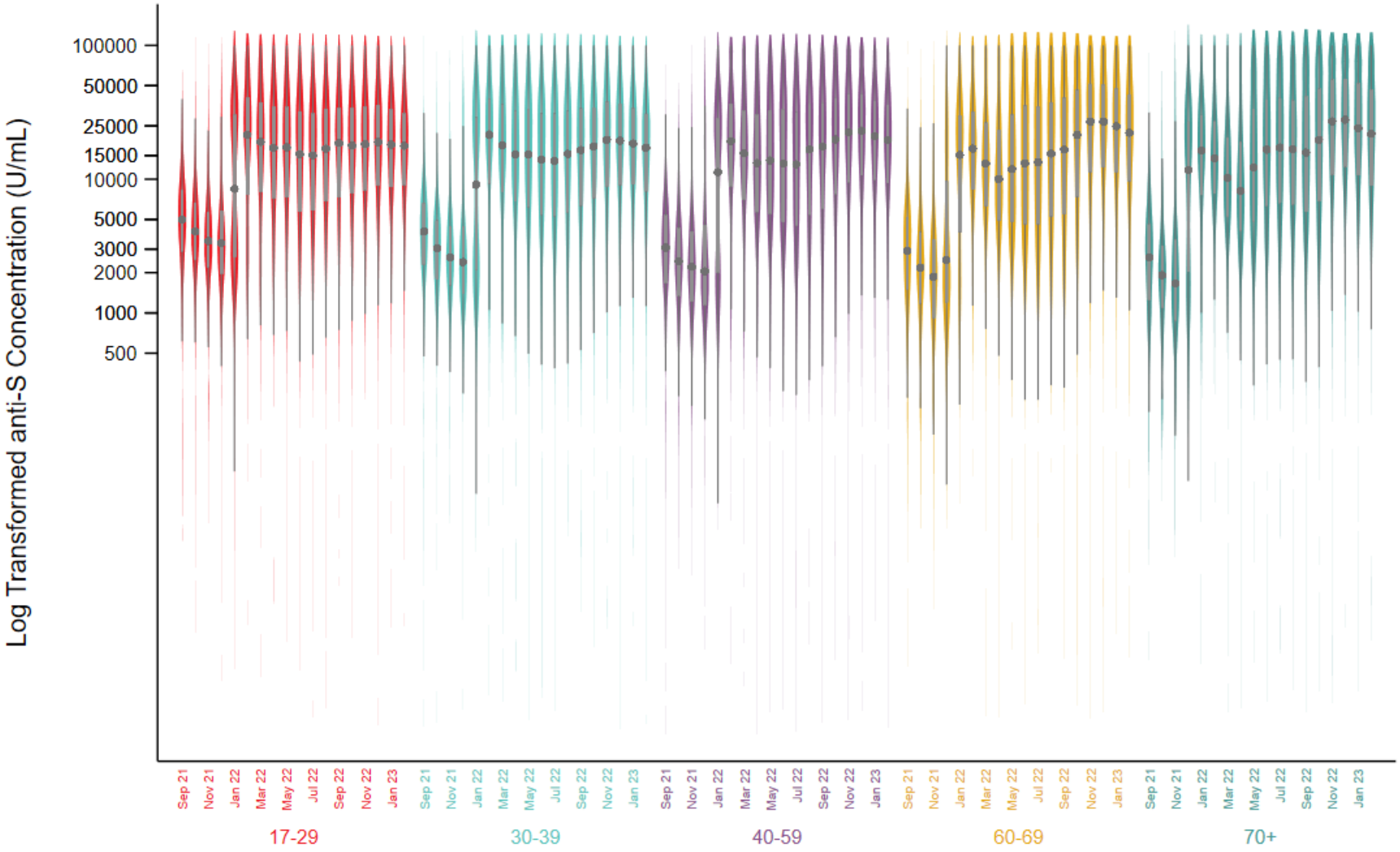
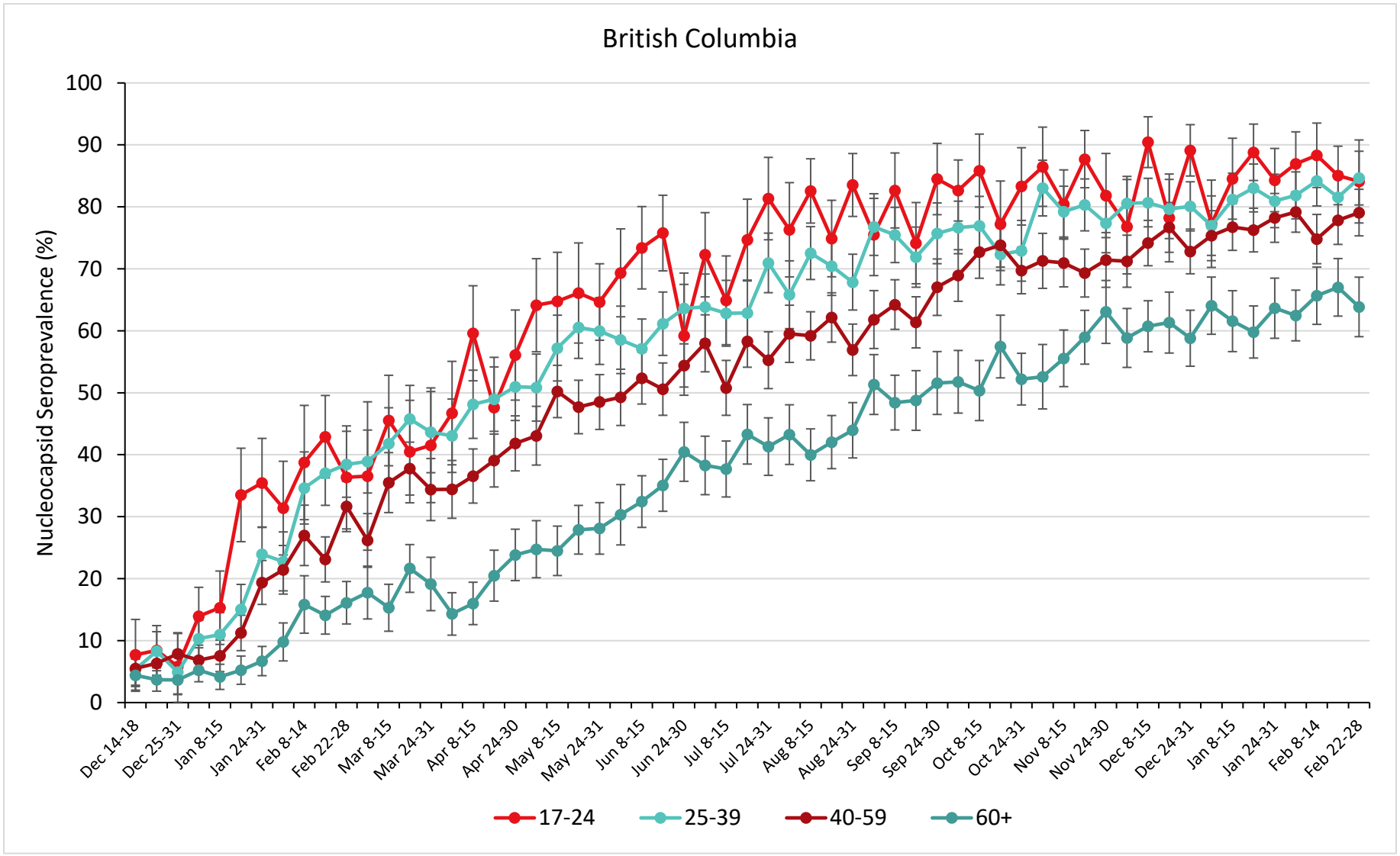
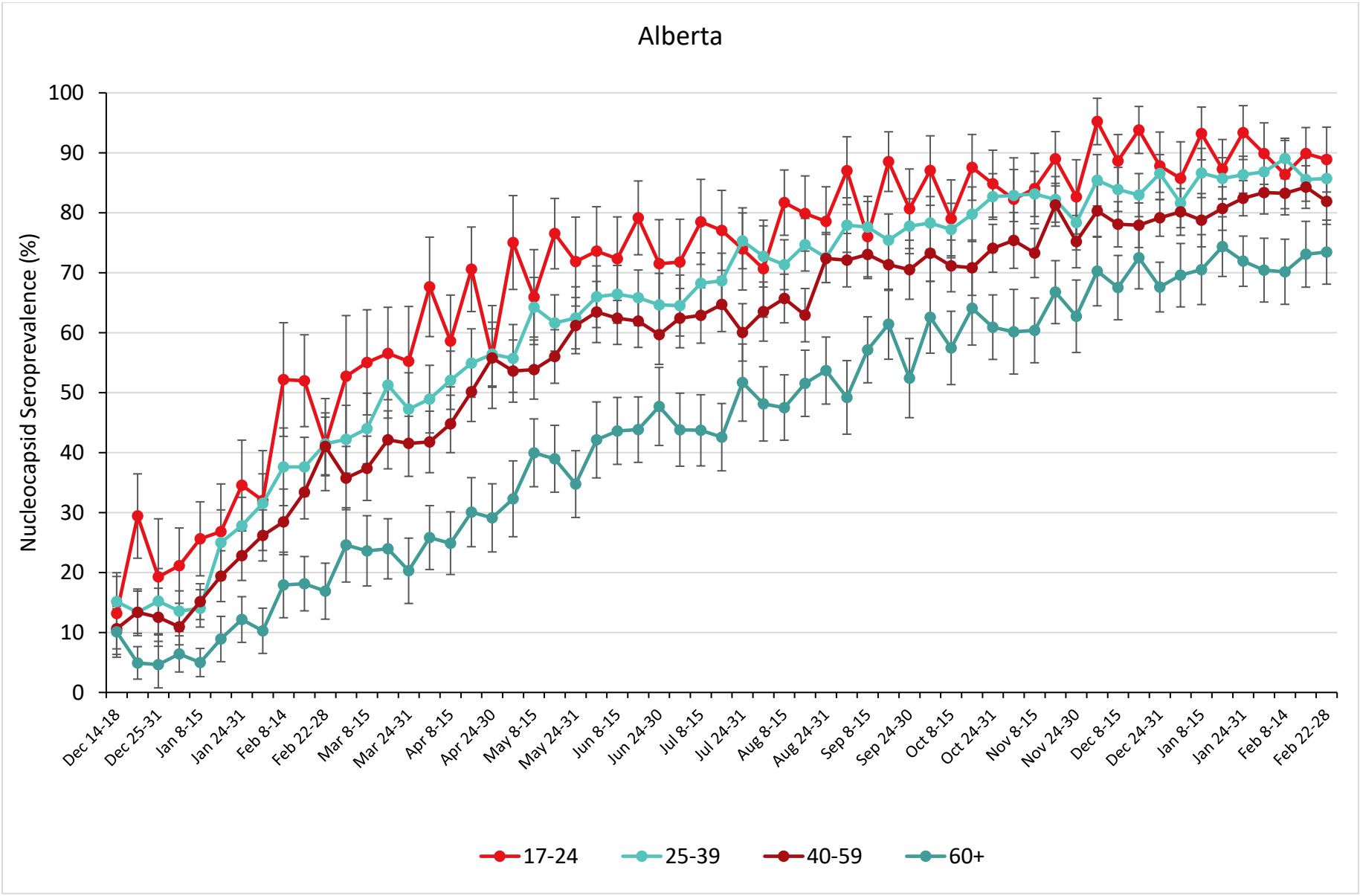
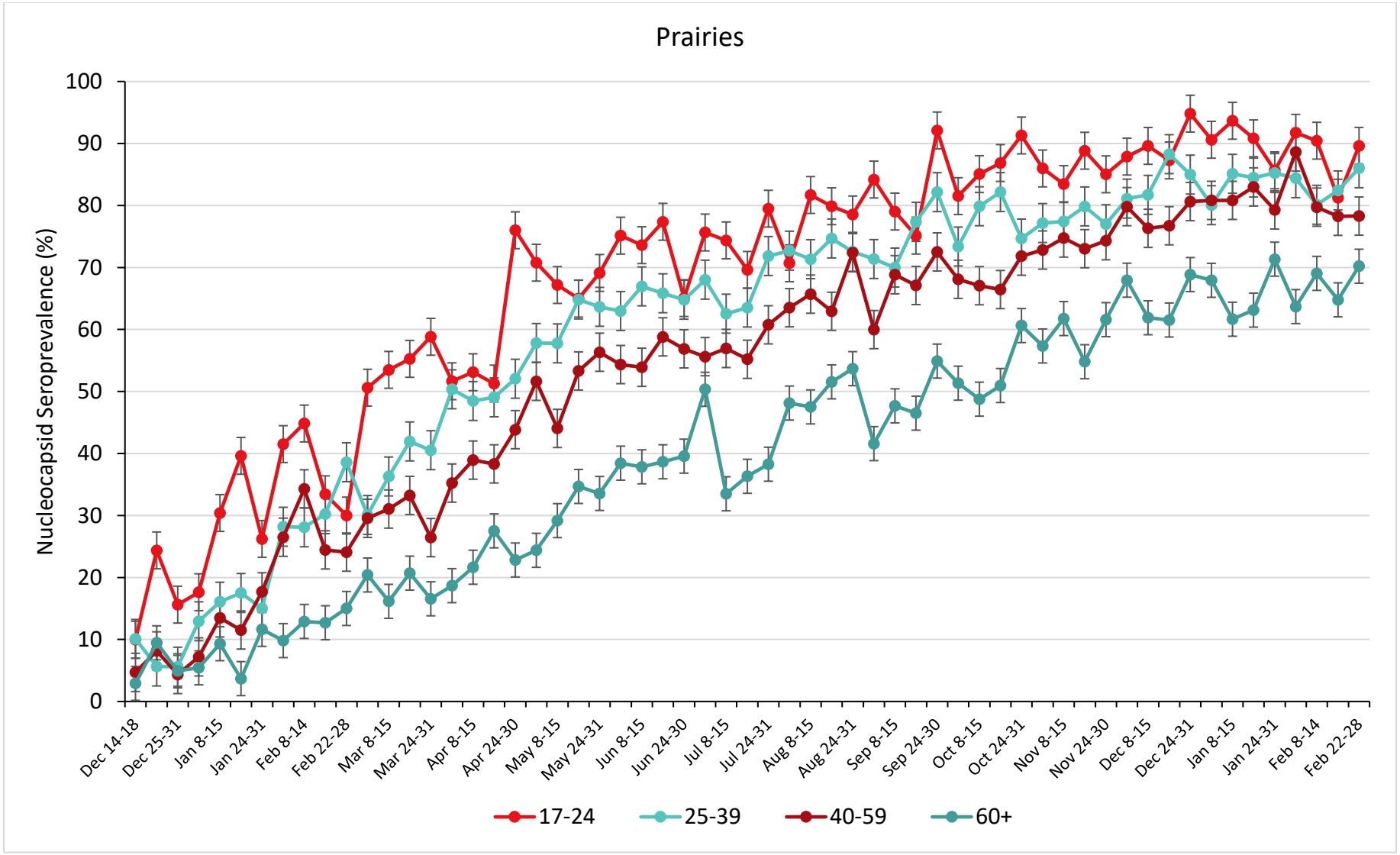
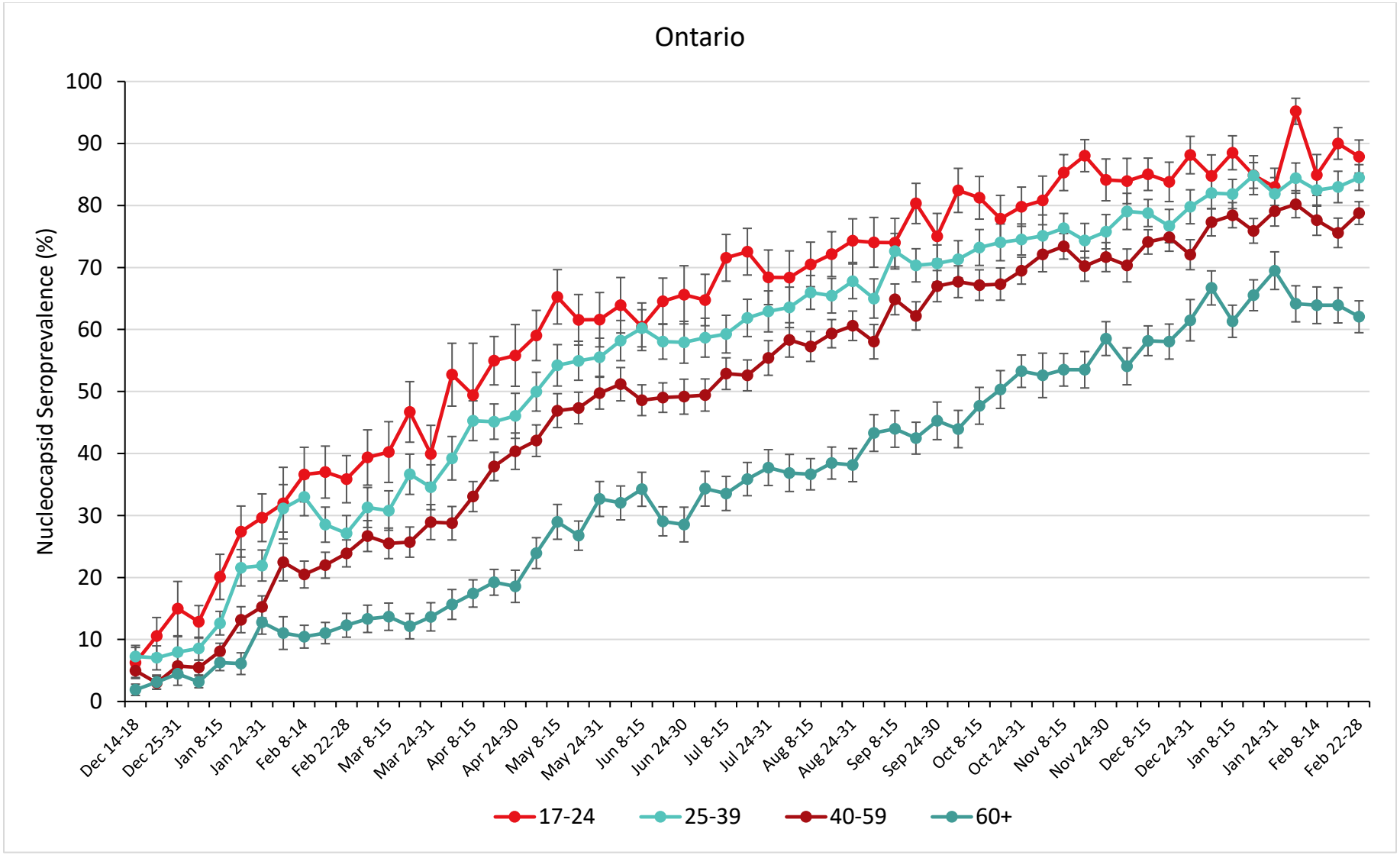


Figure 4. Regional temporal trends of SARS-CoV-2 Nucleocapsid (infection) seroprevalence by age group weekly from December 2021 – February 2023




Alberta
Nucleocapsid Seroprevalence (%)
100
90
80
70
60
50
40
30
20
10
0
Dec 14-18
Dec 25-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
Mar 8-15
Mar 24-31
Apr 8-15
Apr 24-30
May 8-15
May 24-31
Jun 8-15
Jun 24-30
Jul 8-15
Jul 24-31
Aug 8-15
Aug 24-31
Sep 8-15
Sep 24-30
Oct 8-15
Oct 24-31
Nov 8-15
Nov 24-30
Dec 8-15
Dec 24-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
17-24
25-39
40-59
60+


Prairies
Nucleocapsid Seroprevalence (%)
100
90
80
70
60
50
40
30
20
10
0
Dec 14-18
Dec 25-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
Mar 8-15
Mar 24-31
Apr 8-15
Apr 24-30
May 8-15
May 24-31
Jun 8-15
Jun 24-30
Jul 8-15
Jul 24-31
Aug 8-15
Aug 24-31
Sep 8-15
Sep 24-30
Oct 8-15
Oct 24-31
Nov 8-15
Nov 24-30
Dec 8-15
Dec 24-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
17-24
25-39
40-59
60+


Ontario
Nucleocapsid Seroprevalence (%)
100
90
80
70
60
50
40
30
20
10
0
Dec 14-18
Dec 25-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
Mar 8-15
Mar 24-31
Apr 8-15
Apr 24-30
May 8-15
May 24-31
Jun 8-15
Jun 24-30
Jul 8-15
Jul 24-31
Aug 8-15
Aug 24-31
Sep 8-15
Sep 24-30
Oct 8-15
Oct 24-31
Nov 8-15
Nov 24-30
Dec 8-15
Dec 24-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
17-24
25-39
40-59
60+

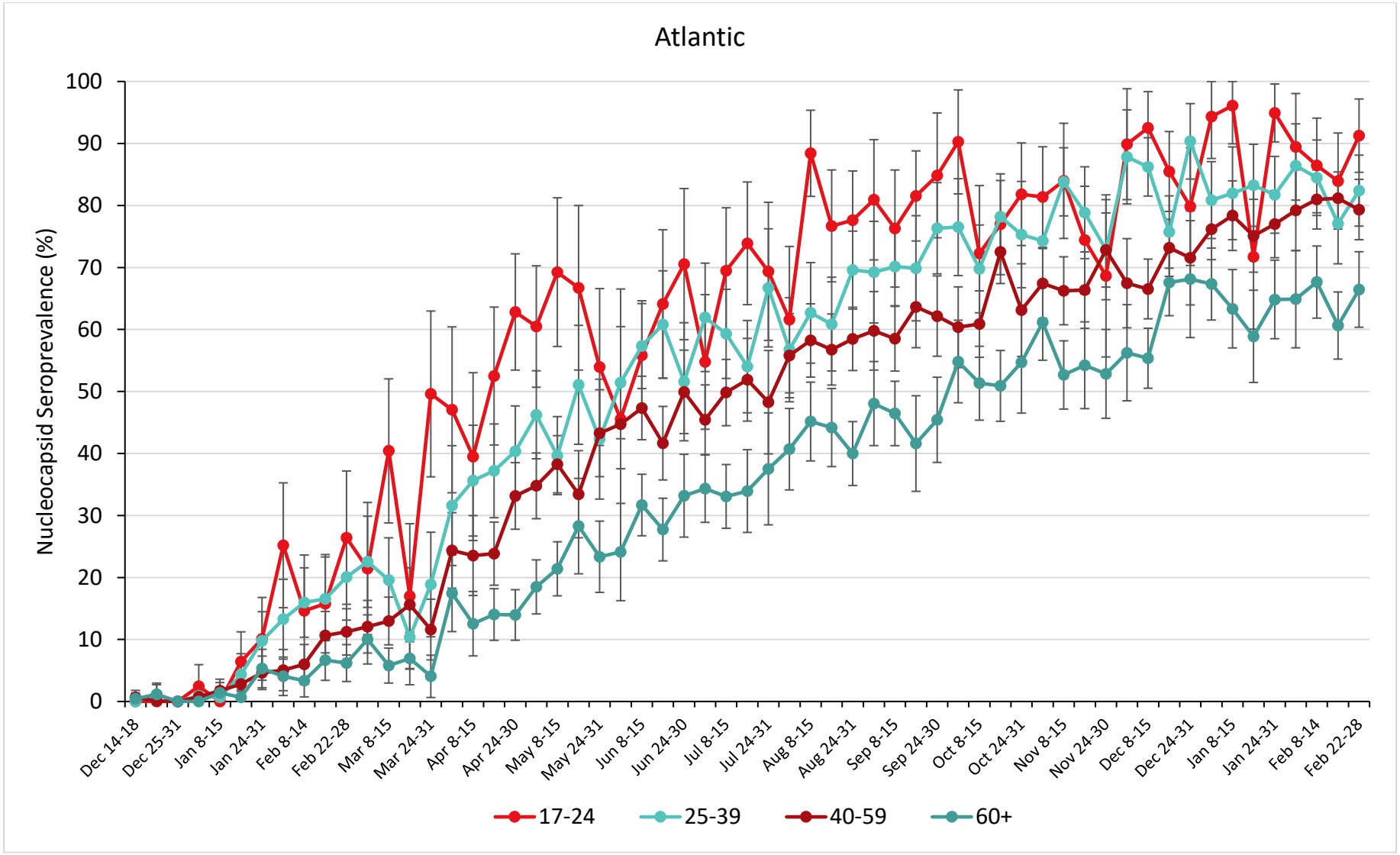

Atlantic
Nucleocapsid Seroprevalence (%)
100
90
80
70
60
50
40
30
20
10
0
Dec 14-18
Dec 25-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
Mar 8-15
Mar 24-31
Apr 8-15
Apr 24-30
May 8-15
May 24-31
Jun 8-15
Jun 24-30
Jul 8-15
Jul 24-31
Aug 8-15
Aug 24-31
Sep 8-15
Sep 24-30
Oct 8-15
Oct 24-31
Nov 8-15
Nov 24-30
Dec 8-15
Dec 24-31
Jan 8-15
Jan 24-31
Feb 8-14
Feb 22-28
17-24
25-39
40-59
60+

Figure 5A. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Nucleocapsid antibody results by ethnicity.

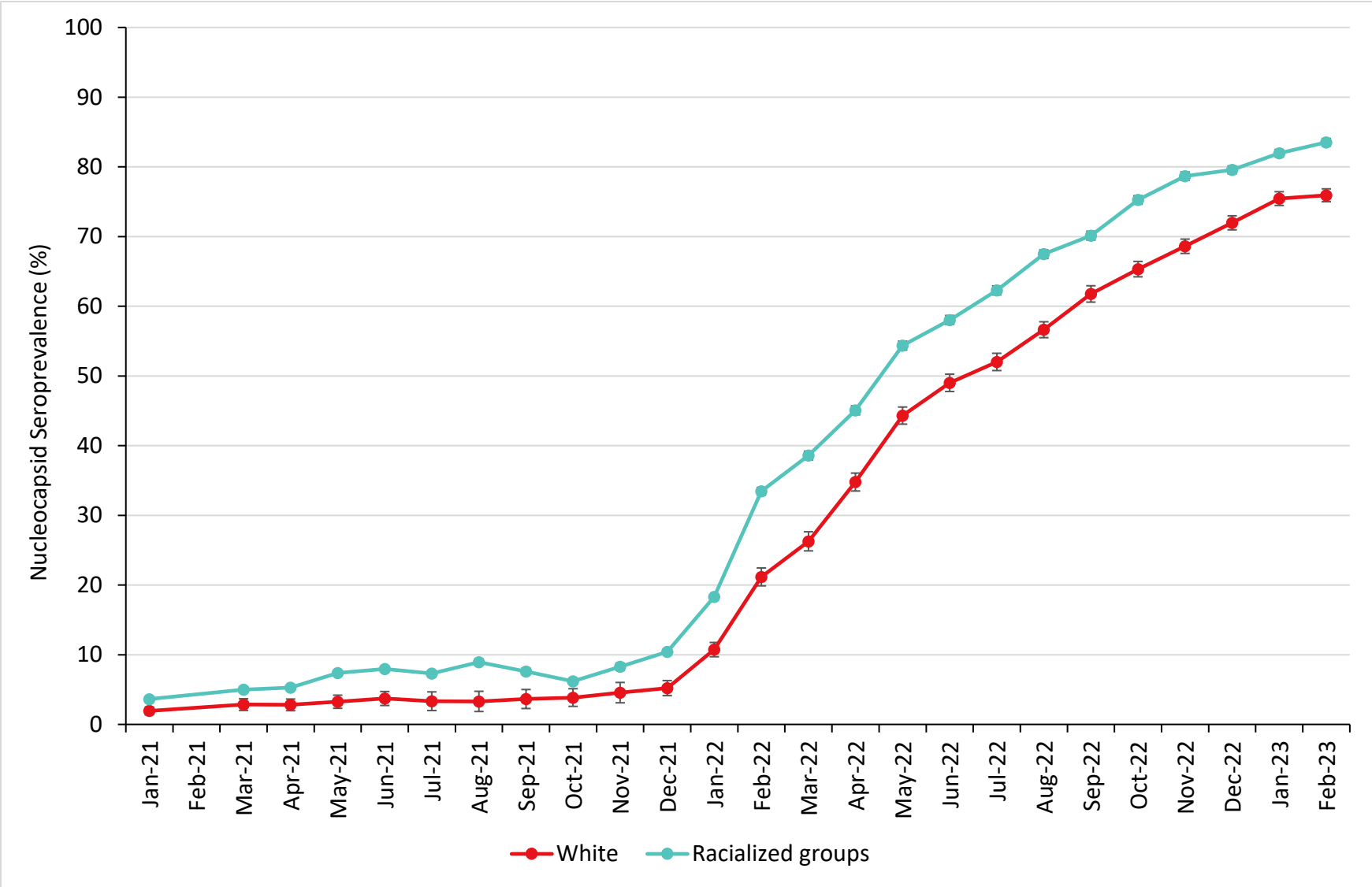


Figure 5B. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Spike antibody results by ethnicity.

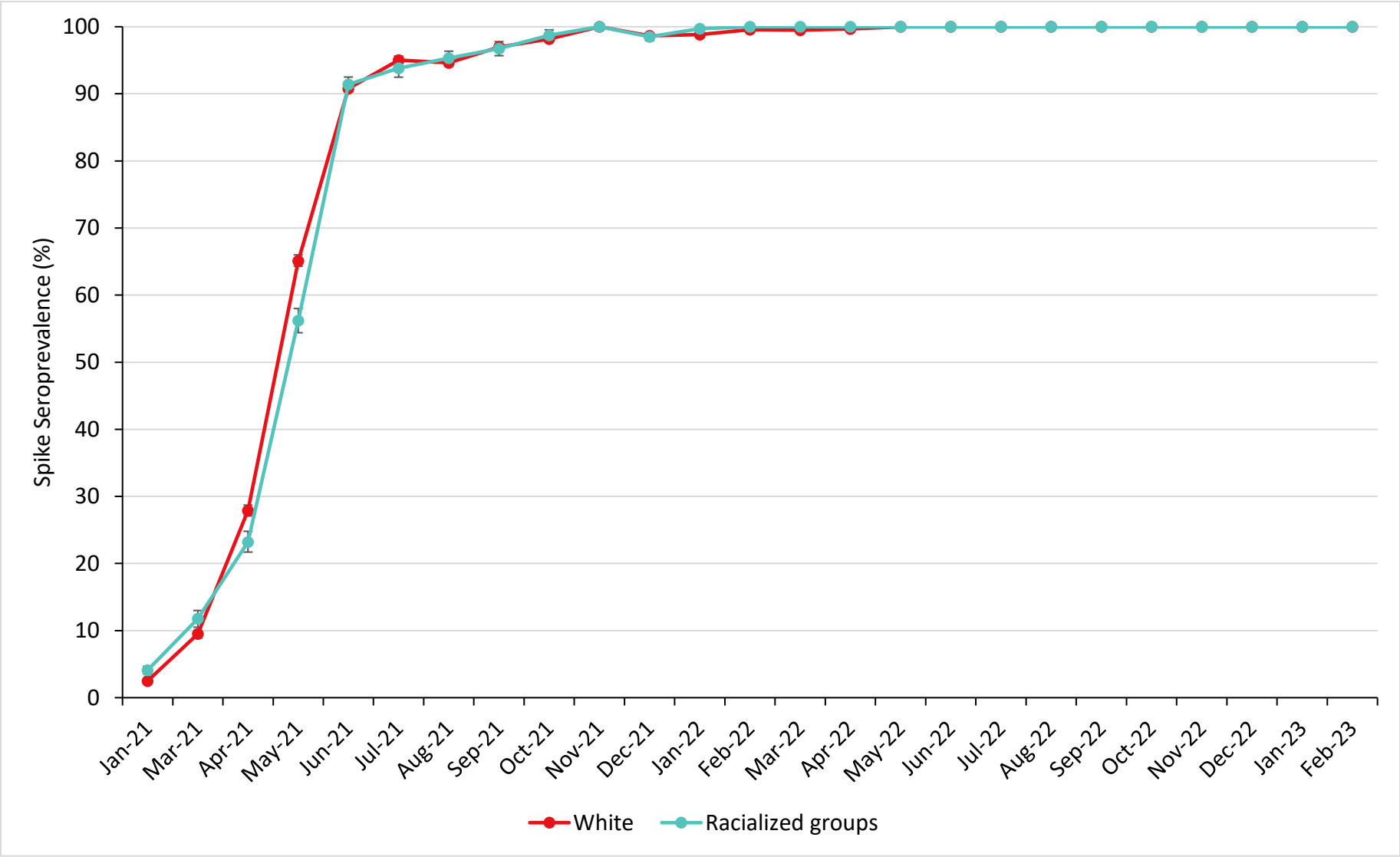


Figure 5C. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Nucleocapsid antibody results by age group.

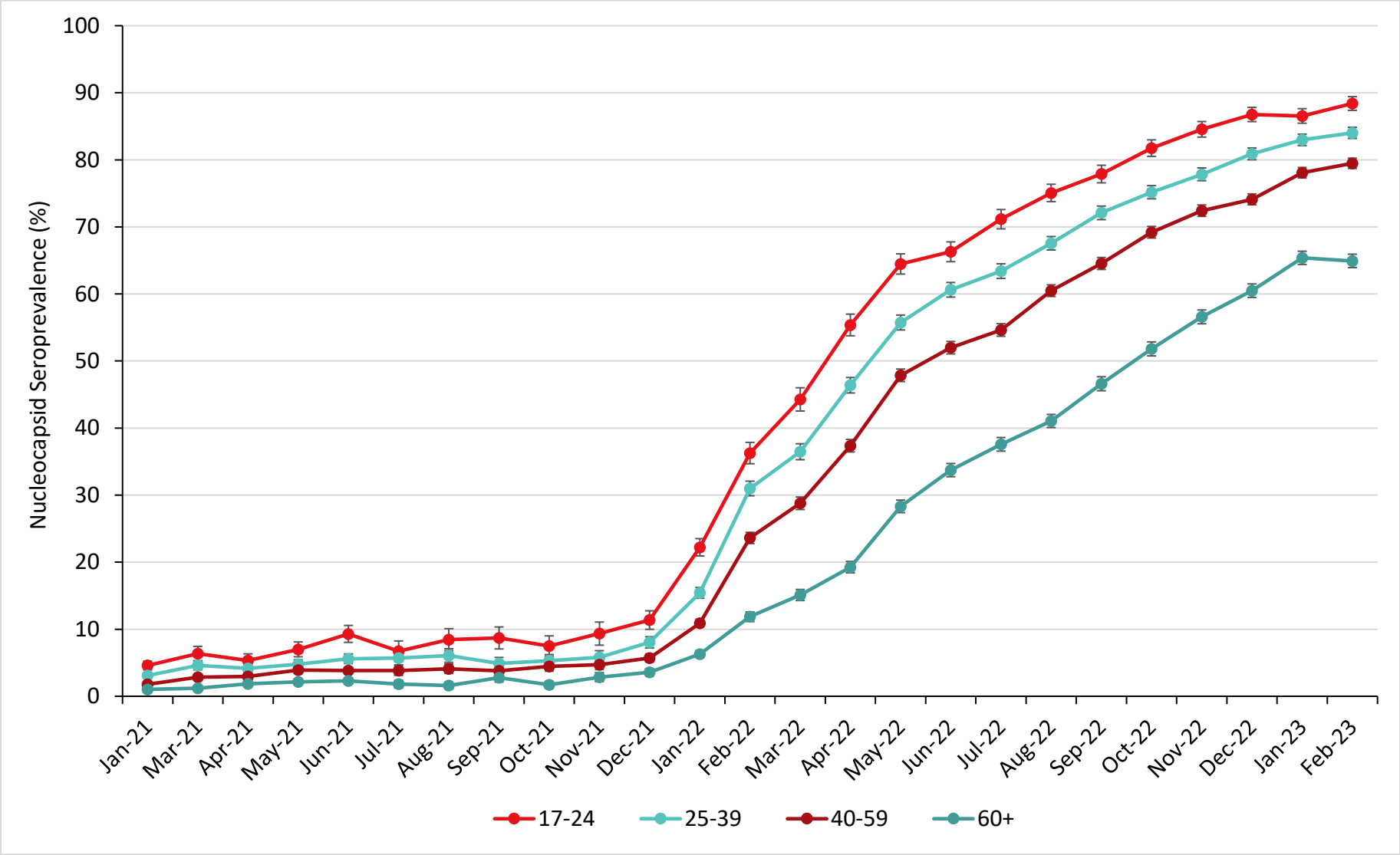


Figure 5D. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Spike antibody results by age group.

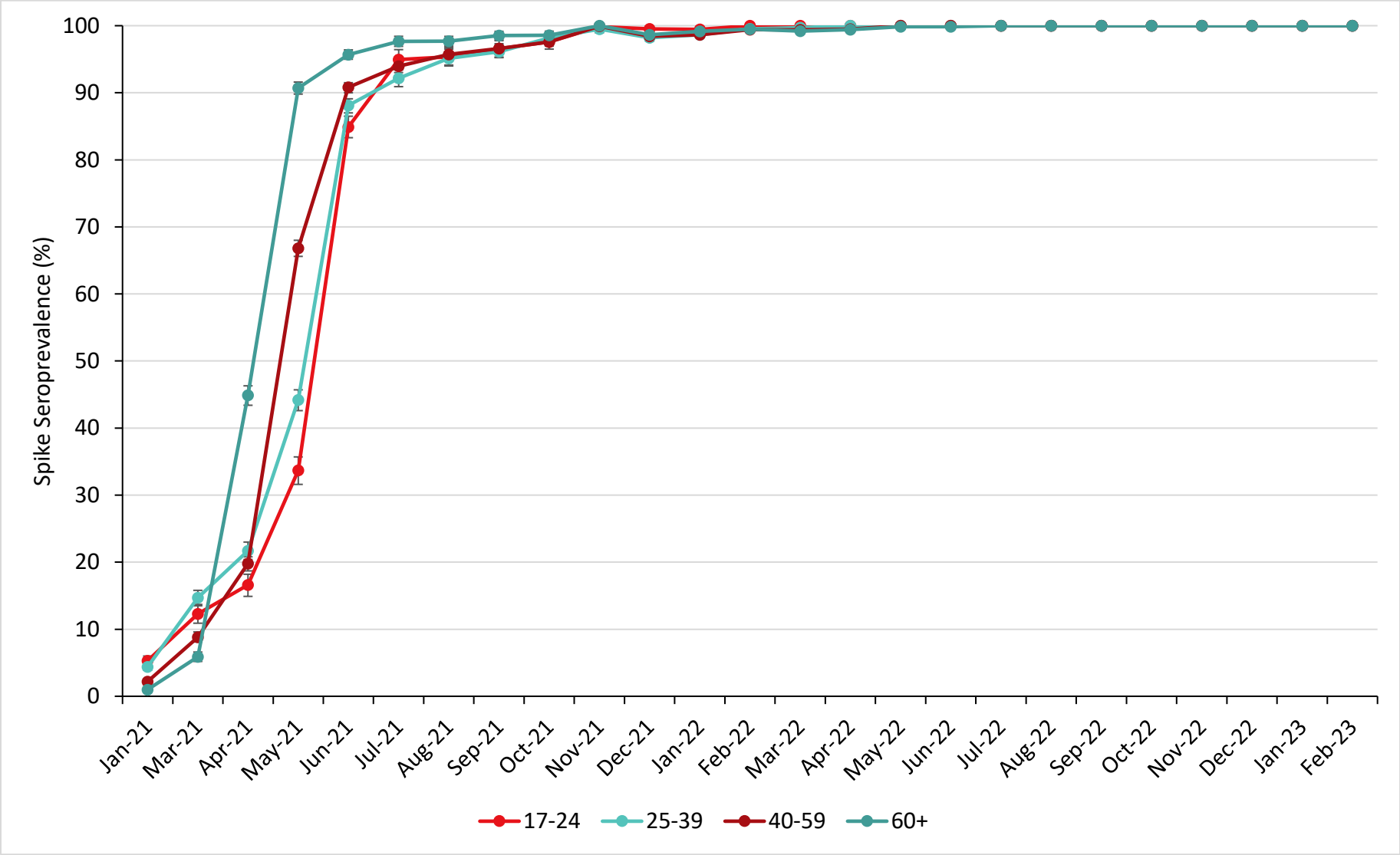


Figure 5E. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Nucleocapsid antibody results by material deprivation level (1 = least deprived and 5 = most deprived).

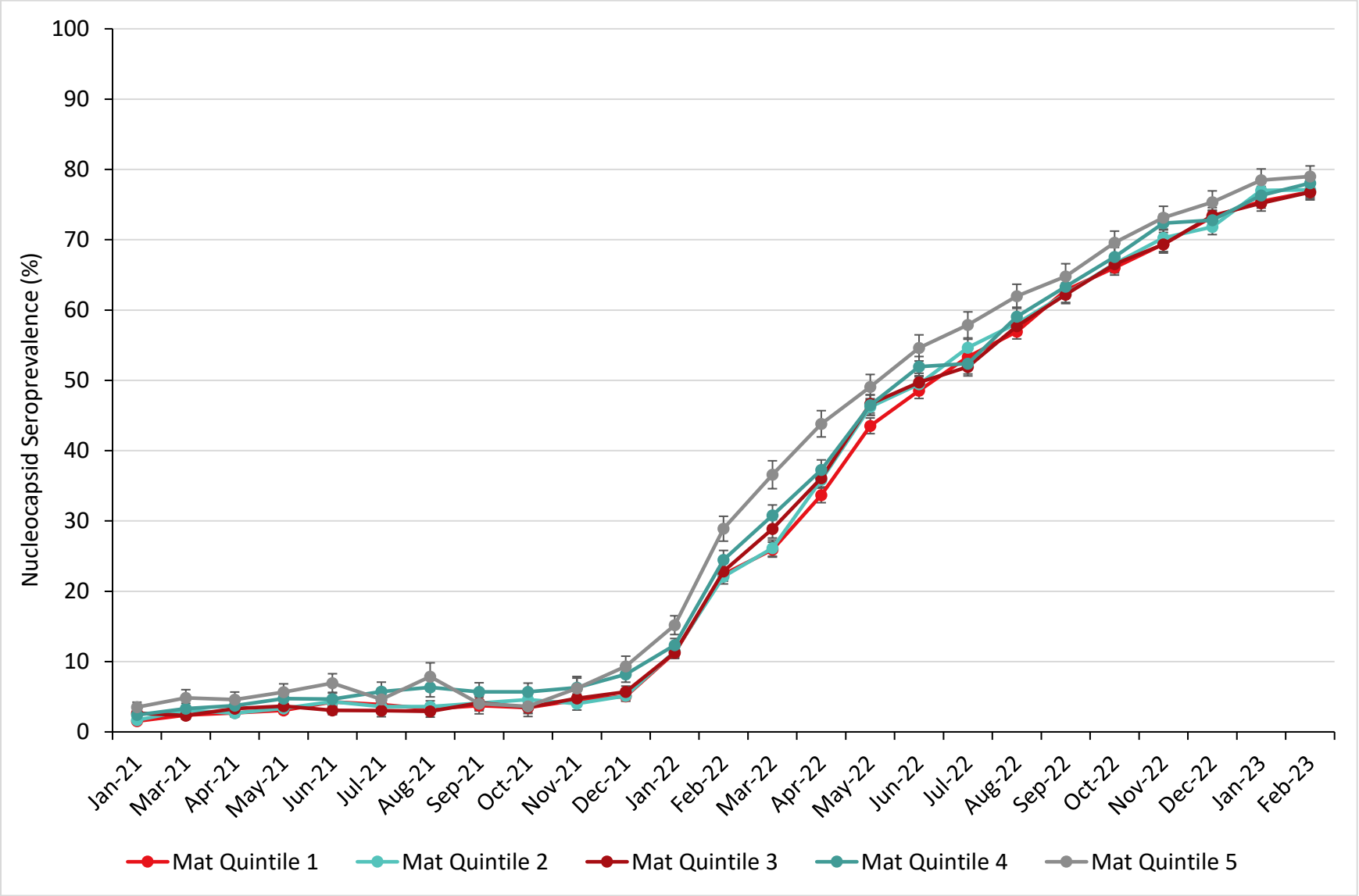


Figure 5F. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 – February 2023 estimated by Spike antibody results by material deprivation level (1 = least deprived and 5 = most deprived).

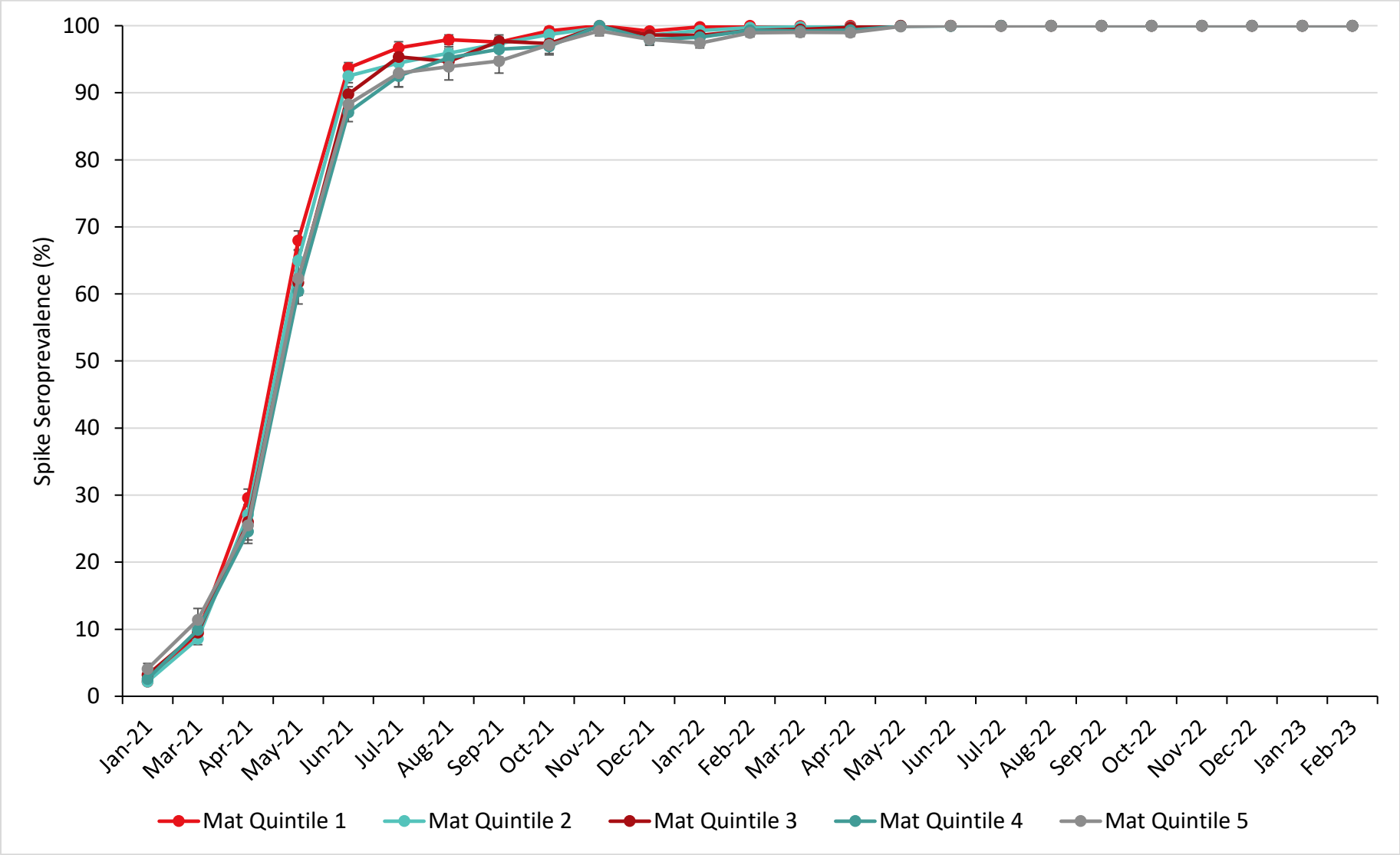


Figure 5G. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 – February 2023 estimated by Nucleocapsid antibody results by social deprivation level (1 = least deprived and 5 = most deprived).

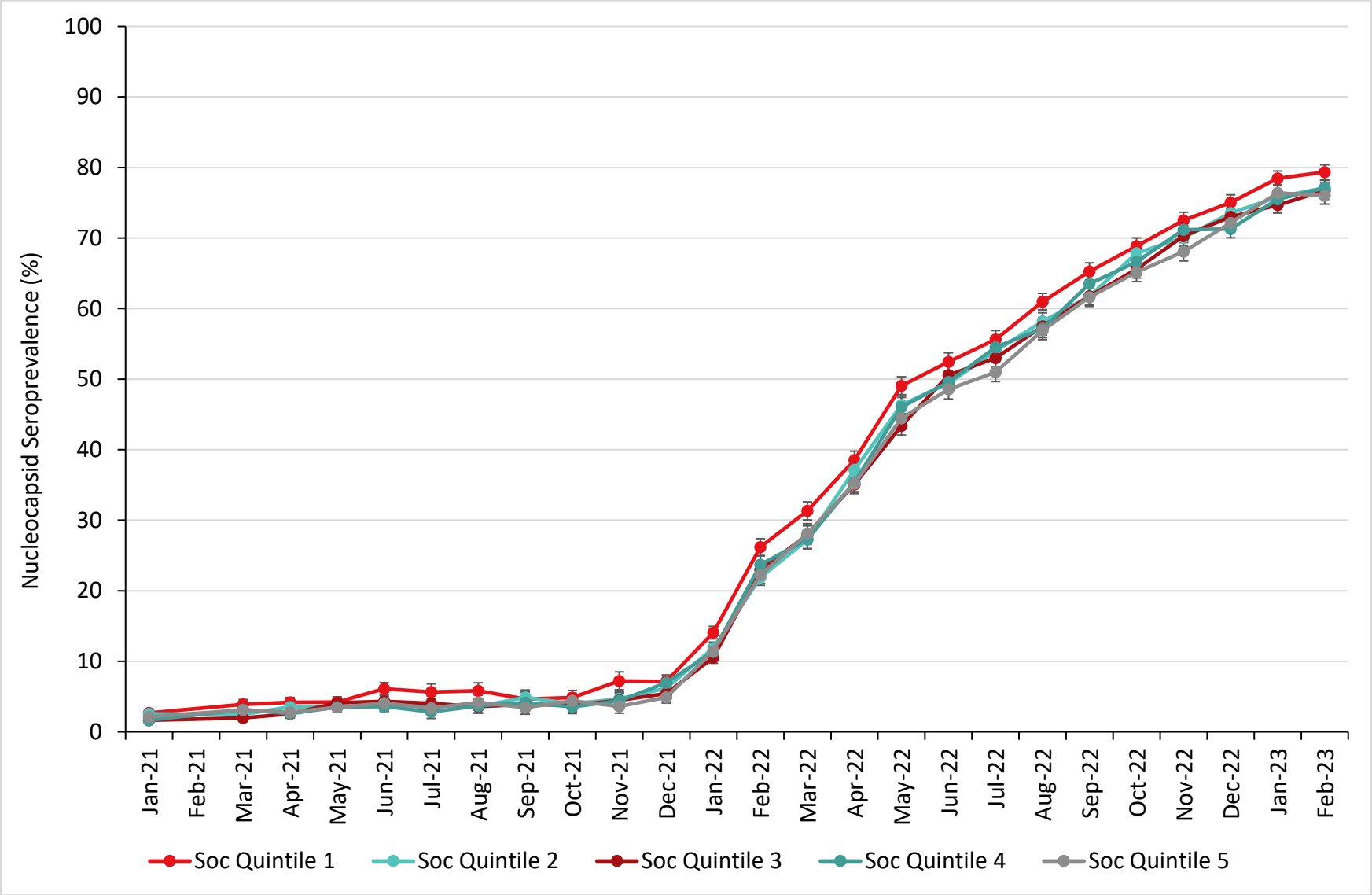


Figure 5H. Temporal trends of SARS-CoV-2 seroprevalence by monthly intervals from January 2021 - February 2023 estimated by Spike antibody results by social deprivation level (1 = least deprived and 5 = most deprived).

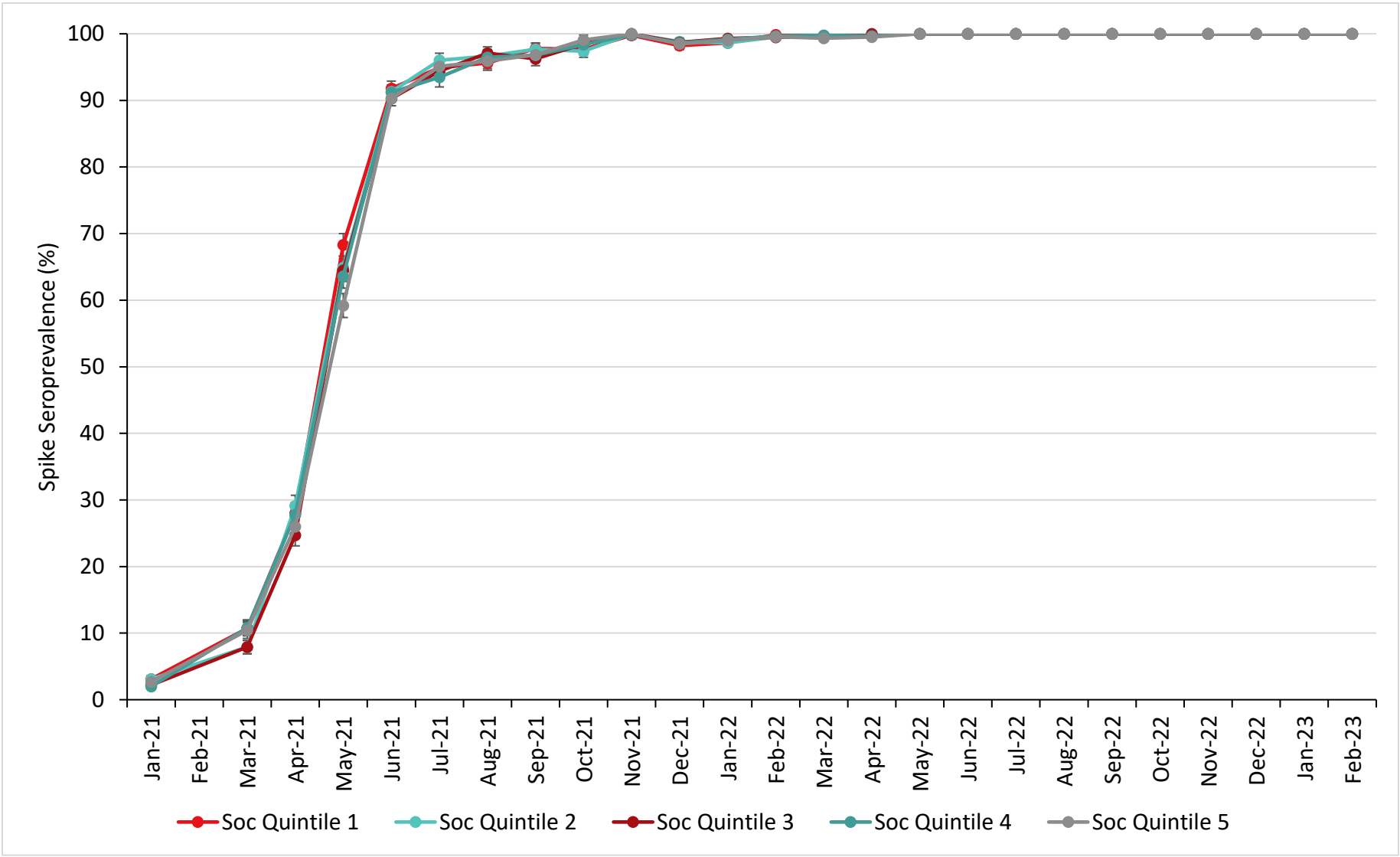


Table A1.1 British Columbia SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike results in February 2023

	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	2,182	1,653	76.10	74.53, 77.66	2,182	2,166	100.00	100.00, 100.00
Male	3,019	2,234	75.92	74.30, 77.54	3,019	3,002	100.00	100.00, 100.00
Age								
17-24	347	296	85.98	83.27, 88.69	347	347	100.00	100.00, 100.00
25-39	1,359	1,116	82.95	80.90, 85.00	1,359	1,355	100.00	100.00, 100.00
40-59	1,877	1,441	77.97	76.11, 79.84	1,877	1,864	100.00	100.00, 100.00
60+	1,618	1,034	64.59	62.30, 66.87	1,618	1,602	100.00	99.60, 100.00
Material Deprivation[1]								
1 (least)	1,354	1,028	77.07	74.91, 79.23	1,354	1,350	100.00	100.00, 100.00
2	1,203	888	74.36	71.95, 76.77	1,203	1,196	100.00	99.99, 100.00
3	967	701	74.32	71.65, 76.99	967	957	100.00	99.36, 100.00
4	708	527	75.99	72.88, 79.09	708	704	100.00	99.75, 100.00
5 (most)	359	278	79.29	75.29, 83.29	359	358	100.00	99.41, 100.00
Total	5,201	3,887	76.01	74.88, 77.14	5,201	5,168	100.00	100.00, 100.00

[1]Postal codes were missing for 610 (11.7%) of donors which could not be included in the quintiles of Material Deprivation; 465/610 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 77.56% (95% CI 74.34, 80.77); and 603/610 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.99% (95% CI 99.15, 100.00).

Table A1.2 Alberta SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in February 2023

	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	2,343	1,910	82.32	80.76, 83.88	2,343	2,332	100.00	100.00, 100.00
Male	3,535	2,843	82.60	81.05, 84.16	3,535	3,517	100.00	100.00, 100.00
Age								
17-24	429	379	88.87	86.31, 91.44	429	428	100.00	100.00, 100.00
25-39	1,608	1,386	86.89	85.09, 88.69	1,608	1,607	100.00	100.00, 100.00
40-59	2,273	1,871	83.40	81.57, 85.23	2,273	2,259	100.00	100.00, 100.00
60+	1,568	1,117	71.53	68.79, 74.26	1,568	1,555	100.00	99.71, 100.00
Material Deprivation[1]								
1 (least)	2,111	1,701	81.97	80.07, 83.87	2,111	2,101	100.00	100.00, 100.00
2	1,225	997	83.18	80.81, 85.56	1,225	1,219	100.00	100.00, 100.00
3	790	646	82.95	79.99, 85.90	790	787	100.00	100.00, 100.00
4	578	457	82.24	78.88, 85.60	578	573	99.96	99.00, 100.00
5 (most)	268	223	83.64	78.55, 88.74	268	266	99.79	98.19, 100.00
Total	5,878	4,753	82.46	81.36, 83.56	5,878	5,849	100.00	100.00, 100.00

[1]Postal codes were missing for 906 (15.4%) of donors which could not be included in the quintiles of Material Deprivation. 729/906 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 81.98% (95% CI 79.19, 84.76); 903/906 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 100% (95% CI 100.00, 100.00).

Table A1.3 Saskatchewan SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in February 2023

	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	495	394	79.48	76.29, 82.68	495	494	100.00	100.00, 100.00
Male	825	612	75.96	72.54, 79.38	825	824	100.00	100.00, 100.00
Age								
17-24	105	92	87.83	82.66, 92.99	105	105	100.00	98.35, 100.00
25-39	343	276	81.31	77.04, 85.58	343	343	100.00	99.80, 100.00
40-59	472	371	80.24	76.32, 84.16	472	472	100.00	100.00, 100.00
60+	400	267	66.76	61.76, 71.76	400	398	100.00	98.95, 100.00
Material Deprivation[1]								
1 (least)	410	313	77.43	73.23, 81.63	410	409	100.00	99.76, 100.00
2	304	223	75.22	70.17, 80.27	304	304	100.00	99.59, 100.00
3	211	155	73.86	67.74, 79.98	211	210	99.57	97.83, 100.00
4	117	94	82.22	74.86, 89.59	117	117	99.44	96.97, 100.00
5 (most)	65	49	79.07	68.75, 89.38	65	65	98.22	94.04, 100.00
Total	1,320	1,006	77.75	75.41, 80.09	1,320	1,318	100.00	100.00, 100.00

[1]Postal codes were missing for 213 (16.1%) of donors which could not be included in the quintiles of Material Deprivation 172/213 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 83.19% (95% CI 77.89, 88.49); 213/213 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 100.00% (95% CI 98.88, 100.00).

Table A1.4 Manitoba SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in February 2023

	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	625	495	78.14	75.12, 81.15	625	625	100.00	100.00, 100.00
Male	845	680	81.13	78.21, 84.06	845	841	100.00	99.87, 100.00
Age								
17-24	139	121	87.22	82.46, 91.98	139	139	100.00	98.87, 100.00
25-39	416	353	84.99	81.27, 88.72	416	415	100.00	99.59, 100.00
40-59	555	459	82.85	79.45, 86.25	555	553	100.00	99.74, 100.00
60+	360	242	66.95	62.29, 71.60	360	359	100.00	99.72, 100.00
Material Deprivation[1]								
1 (least)	312	240	75.94	71.06, 80.83	312	311	100.00	99.25, 100.00
2	301	243	79.73	75.10, 84.36	301	301	100.00	99.65, 100.00
3	281	236	83.83	79.47, 88.18	281	278	99.71	98.29, 100.00
4	232	176	76.29	70.68, 81.89	232	232	100.00	99.17, 100.00
5 (most)	148	121	81.43	75.04, 87.81	148	148	99.91	98.09, 100.00
Total	1,470	1,175	79.60	77.50, 81.70	1,470	1,466	100.00	100.00, 100.00

[1]Postal codes were missing for 196 (13.3%) of donors which could not be included in the quintiles of Material Deprivation; 159/196 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 81.38% (95% CI 75.82, 86.93); 196/196 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 100.00% (95% CI 98.84, 100.00).

Table A1.5 Ontario SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in February 2023

	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	5,909	4,494	76.00	75.07, 76.94	5909	5895	100.00	100.00, 100.00
Male	8,792	6,648	77.46	76.51, 78.41	8793	8736	100.00	100.00, 100.00
Age								
17-24	1,123	991	89.32	87.94, 90.70	1123	1121	100.00	100.00, 100.00
25-39	3,786	3,132	83.71	82.51, 84.91	3786	3776	100.00	100.00, 100.00
40-59	5,632	4,394	78.28	77.19, 79.37	5633	5610	100.00	100.00, 100.00
60+	4,160	2,625	63.23	61.81, 64.65	4160	4124	100.00	100.00, 100.00
Material Deprivation[1]								
1 (least)	3,216	2,383	74.16	72.72, 75.60	3217	3210	100.00	100.00, 100.00
2	3,285	2,463	76.26	74.81, 77.72	3285	3268	100.00	100.00, 100.00
3	2,985	2,239	75.48	73.95, 77.02	2985	2966	100.00	100.00, 100.00
4	2,193	1,686	78.11	76.44, 79.77	2193	2182	100.00	100.00, 100.00
5 (most)	1,428	1,120	80.13	78.19, 82.06	1428	1416	100.00	99.78, 100.00
Total	14,701	11,142	76.70	76.04, 77.37	14702	14631	100.00	100.00, 100.00

[1]Postal codes were missing for 1,594 (10.8%) of donors which could not be included in the quintiles of Material Deprivation.1,251/1,594 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 79.78% (95% CI 77.85, 81.70); 1,589/1,594 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 100.00% (95% CI 100.00, 100.00).

Table A1.6 Atlantic Region SARS-CoV-2 seroprevalence, Nucleocapsid vs. Spike antibody results in February 2023

	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	1,311	1,003	76.40	74.20, 78.61	1,311	1,307	100.00	100.00, 100.00
Male	1,873	1,408	76.58	74.30, 78.86	1,873	1,866	100.00	100.00, 100.00
Age								
17-24	295	257	87.66	83.90, 91.41	295	295	100.00	99.70, 100.00
25-39	694	569	82.44	79.27, 85.60	694	693	100.00	100.00, 100.00
40-59	1,181	936	80.70	78.23, 83.18	1,181	1,177	100.00	100.00, 100.00
60+	1,014	649	64.59	61.49, 67.68	1,014	1,008	100.00	99.92, 100.00
Material Deprivation[1]								
1 (least)	538	418	78.79	74.86, 82.71	538	538	100.00	100.00, 100.00
2	662	503	77.23	73.74, 80.72	662	660	100.00	100.00, 100.00
3	653	508	78.62	75.28, 81.97	653	651	100.00	100.00, 100.00
4	646	487	76.71	73.29, 80.13	646	643	100.00	99.73, 100.00
5 (most)	418	296	70.84	66.39, 75.30	418	417	100.00	99.73, 100.00
Total	3,184	2,411	76.49	74.90, 78.07	3,184	3,173	100.00	100.00, 100.00

[1]Postal codes were missing for 267 (8.4%) of donors which could not be included in the quintiles of Material Deprivation; 199/267 were positive by the Nucleocapsid antibody, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 74.18% (95% CI 68.31, 80.05); 218/219 were positive by the Spike antibody, adjusted SARS-CoV-2 seroprevalence was 99.30% (95% CI 97.48, 100.00).

Table A2.1. Weekly SARS-CoV-2 seroprevalence by sociodemographic variables by Nucleocapsid results in February 2023

	February 1-7			February 8-14			February 15-21			February 22-28		
	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	3,174 (2,478)	77.92	76.63, 79.21	3,018 (2,330)	77.17	75.82, 78.51	3,278 (2,507)	76.53	75.23, 77.82	3,526 (2,734)	77.19	75.96, 78.43
Male	4,789 (3,697)	79.08	77.77, 80.39	4,464 (3,384)	77.28	75.90, 78.67	4,704 (3,551)	77.53	76.20, 78.86	5,479 (4,185)	77.80	76.56, 79.03
Age												
17-24	538 (486)	92.10	90.27, 93.92	563 (486)	86.31	84.04, 88.57	714 (619)	87.71	85.80, 89.61	646 (566)	88.01	85.97, 90.05
25-39	2,098 (1,756)	84.44	82.81, 86.07	1,910 (1,589)	83.93	82.23, 85.63	2,041 (1,665)	82.66	80.95, 84.38	2,260 (1,902)	84.66	83.12, 86.20
40-59	2,992 (2,404)	81.18	79.70, 82.65	2,769 (2,166)	78.59	76.97, 80.21	2,923 (2,278)	78.21	76.63, 79.78	3,544 (2,790)	79.21	77.81, 80.61
60+	2,335 (1,529)	64.55	62.55, 66.54	2,240 (1,473)	65.90	63.88, 67.93	2,304 (1,496)	65.11	63.13, 67.09	2,555 (1,661)	64.64	62.74, 66.53
Province												
British Columbia	1,663 (1,238)	75.30	73.25, 77.35	1,214 (906)	74.95	72.49, 77.42	1,270 (954)	76.87	74.65, 79.09	1,183 (878)	76.02	73.62, 78.42
Alberta	1,595 (1,275)	82.13	79.95, 84.30	1,518 (1,226)	81.13	79.14, 83.13	1,556 (1,262)	83.24	81.13, 85.35	1,486 (1,203)	81.88	79.62, 84.14
Saskatchewan	356 (276)	78.99	74.71, 83.26	305 (219)	72.11	67.02, 77.19	353 (265)	76.95	72.38, 81.51	326 (258)	80.25	75.67, 84.82
Manitoba	382 (319)	82.63	78.82, 86.43	352 (288)	82.19	78.14, 86.25	358 (273)	75.69	71.18, 80.19	383 (299)	78.20	73.98, 82.42
Ontario	3,405 (2,637)	78.40	77.05, 79.74	3,258 (2,437)	75.13	73.63, 76.63	3,439 (2,567)	75.99	74.62, 77.36	4,743 (3,607)	76.65	75.49, 77.82
New Brunswick	258 (196)	77.46	71.24, 83.67	377 (294)	78.33	74.12, 82.54	432 (320)	74.89	69.90, 79.87	277 (208)	76.69	70.59, 82.78
Nova Scotia	261 (199)	75.90	70.13, 81.67	307 (226)	73.93	68.97, 78.90	369 (263)	69.96	64.92, 74.99	409 (311)	75.53	70.83, 80.23
Prince Edward Island	17 (12)	73.07	54.20, 91.94	23 (17)	74.23	56.16, 92.31	25 (16)	69.07	53.53, 84.62	82 (67)	85.35	77.96, 92.74
Newfoundland	26 (23)	89.16	78.80, 99.53	128 (101)	79.26	72.14, 86.38	180 (138)	77.02	71.76, 82.28	116 (88)	78.25	71.91, 84.59
Metro area												
Vancouver	780 (596)	76.35	73.58, 79.11	684 (530)	78.01	75.15, 80.88	607 (481)	80.25	77.35, 83.16	622 (484)	79.29	76.29, 82.29
Calgary	604 (484)	81.63	77.82, 85.45	506 (412)	82.08	77.95, 86.20	576 (480)	84.88	81.33, 88.43	553 (445)	81.30	77.22, 85.37
Edmonton	535 (421)	81.13	77.56, 84.69	455 (369)	82.15	78.23, 86.07	486 (390)	82.15	78.46, 85.83	500 (393)	79.75	75.89, 83.61
Ottawa	238 (176)	76.28	69.97, 82.58	272 (194)	72.57	66.47, 78.67	425 (308)	74.52	69.69, 79.34	517 (371)	72.25	67.77, 76.74

Toronto	1,080 (855)	79.04	77.01, 81.08	994 (777)	78.43	76.29, 80.57	1,006 (800)	80.13	78.08, 82.19	1,606 (1,268)	78.64	76.97, 80.30
Winnipeg	252 (200)	78.36	73.24, 83.48	224 (176)	78.92	73.57, 84.27	240 (179)	74.63	69.03, 80.23	206 (161)	78.49	72.61, 84.36
Ethnicity[1]												
White	6,301 (4,805)	77.02	75.95, 78.09	6,031 (4,519)	75.54	74.43, 76.65	6,262 (4,656)	75.11	74.02, 76.20	7,243 (5,475)	75.89	74.88, 76.90
Indigenous	124 (98)	82.76	76.00, 89.52	108 (83)	75.36	67.24, 83.48	116 (84)	71.99	64.02, 79.96	97 (76)	79.83	71.62, 88.05
Asian	796 (660)	82.94	80.44, 85.45	642 (520)	82.04	79.20, 84.89	808 (694)	88.15	86.04, 90.27	829 (680)	82.80	80.35, 85.25
Other racialized groups	586 (488)	83.70	80.71, 86.69	560 (472)	86.19	83.37, 89.01	620 (491)	79.40	76.27, 82.52	681 (567)	85.14	82.54, 87.74
Social Deprivation[2]												
1 (least deprived)	1,625 (1,253)	77.73	75.68, 79.79	1,356 (1,058)	78.79	76.58, 80.99	1,419 (1,106)	79.53	77.43, 81.63	1,767 (1,401)	79.64	77.74, 81.55
2	1,481 (1,160)	79.11	77.02, 81.19	1,331 (1,018)	77.71	75.43, 79.99	1,569 (1,178)	75.01	72.87, 77.16	1,749 (1,340)	76.95	74.96, 78.95
3	1,344 (1,023)	78.21	75.96, 80.47	1,299 (989)	76.65	74.28, 79.01	1,413 (1,047)	75.68	73.43, 77.92	1,629 (1,230)	75.84	73.73, 77.94
4	1,267 (984)	77.88	75.52, 80.24	1,306 (974)	75.56	73.20, 77.92	1,293 (967)	76.28	73.96, 78.61	1,433 (1,104)	77.38	75.19, 79.58
5 (most deprived)	1,276 (984)	78.07	75.76, 80.38	1,263 (957)	75.84	73.49, 78.19	1,318 (996)	76.38	74.05, 78.71	1,440 (1,070)	74.63	72.36, 76.90
Material Deprivation[2]												
1 (least deprived)	1,982 (1,517)	77.19	75.28, 79.11	1,865 (1,421)	76.42	74.47, 78.37	2,025 (1,548)	76.88	75.01, 78.76	2,272 (1,742)	76.63	74.87, 78.39
2	1,764 (1,367)	78.69	76.73, 80.66	1,594 (1,202)	76.58	74.45, 78.71	1,807 (1,340)	75.37	73.35, 77.40	1,978 (1,518)	77.11	75.20, 79.02
3	1,487 (1,159)	78.35	76.21, 80.49	1,364 (1,034)	76.43	74.13, 78.72	1,429 (1,076)	75.62	73.40, 77.84	1,716 (1,299)	76.55	74.51, 78.58
4	1,069 (817)	77.87	75.39, 80.34	1,091 (839)	77.75	75.27, 80.24	1,111 (844)	78.13	75.74, 80.52	1,291 (993)	78.41	76.17, 80.66
5 (most deprived)	691 (544)	79.87	76.97, 82.77	641 (500)	78.79	75.64, 81.93	640 (486)	77.97	74.85, 81.09	761 (593)	79.33	76.57, 82.09
Total	7,963 (6,175)	78.48	77.56, 79.40	7,482 (5,714)	77.22	76.26, 78.19	7,982 (6,058)	77.01	76.08, 77.93	9,005 (6,919)	77.49	76.62, 78.37

[1]In Week 1, self reported ethnicity was missing for 156 (2.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 86.25% (95% CI 80.82, 91.68).
In Week 2, self reported ethnicity was missing for 141 (1.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 86.21% (95% CI 80.41, 92.01).
In Week 3, self reported ethnicity was missing for 176 (2.2%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 78.50% (95% CI 72.41, 84.60).
In Week 4, self reported ethnicity was missing for 155 (1.7%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.67% (95% CI 74.28, 87.06).

[2]In Week 1, postal codes were missing for 970 (12.2%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.44% (95% CI 77.90, 82.99).
In Week 2, postal codes were missing for 927 (12.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 79.33% (95% CI 76.68, 81.97).
In Week 3, postal codes were missing for 970 (12.2%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.30% (95% CI 77.76, 82.84).
In Week 4, postal codes were missing for 987 (11.0%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 79.08% (95% CI 76.47, 81.70).

Table A2.2. Weekly SARS-CoV-2 seroprevalence by province and age group by Nucleocapsid results in February 2023

	February 1-7			February 8-14			February 15-21			February 22-28		
	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	94 (80)	86.93	81.75, 92.11	79 (70)	88.32	83.13, 93.52	117 (100)	85.07	80.35, 89.79	64 (53)	84.10	77.40, 90.80
25-39	422 (339)	81.85	78.07, 85.64	331 (278)	84.19	80.15, 88.22	349 (281)	81.56	77.45, 85.67	282 (237)	84.64	80.31, 88.98
40-59	612 (480)	79.17	75.91, 82.43	432 (317)	74.81	70.83, 78.78	426 (325)	77.86	73.94, 81.78	452 (348)	79.08	75.32, 82.84
60+	535 (339)	62.47	58.38, 66.56	372 (241)	65.66	61.04, 70.28	378 (248)	67.01	62.37, 71.66	385 (240)	63.86	59.05, 68.66
Total	1,663 (1238)	75.30	73.25, 77.35	1,214 (906)	75.80	73.50, 78.10	1,270 (954)	76.87	74.65, 79.09	1,183 (878)	76.02	73.62, 78.42
Alberta												
17-24	100 (88)	89.86	84.74, 94.99	102 (89)	86.37	80.68, 92.06	141 (125)	89.89	85.57, 94.21	96 (85)	88.86	83.45, 94.27
25-39	429 (370)	86.81	83.31, 90.31	387 (341)	89.05	85.68, 92.42	425 (362)	85.54	81.92, 89.16	412 (348)	85.72	81.95, 89.49
40-59	610 (495)	83.37	79.80, 86.94	597 (492)	83.23	79.65, 86.81	592 (489)	84.28	80.73, 87.84	565 (464)	81.89	78.06, 85.72
60+	456 (322)	70.43	65.11, 75.75	432 (304)	70.16	64.73, 75.59	398 (286)	73.08	67.59, 78.57	413 (306)	73.43	68.09, 78.77
Total	1,595 (1,275)	82.13	79.95, 84.30	1,518 (1,226)	82.26	80.07, 84.45	1,556 (1,262)	83.24	81.13, 85.35	1,486 (1,203)	81.88	79.62, 84.14
Saskatchewan												
17-24	30 (29)	96.41	90.73, 100.00	8 (7)	90.76	74.89, 100.00	47 (38)	80.24	71.02, 89.46	20 (18)	91.67	81.44, 100.00
25-39	99 (79)	80.34	72.41, 88.27	74 (54)	74.22	64.10, 84.34	85 (69)	82.84	74.45, 91.23	86 (75)	87.40	80.16, 94.64
40-59	123 (100)	82.87	75.86, 89.88	126 (92)	75.33	67.14, 83.53	117 (91)	79.45	71.38, 87.51	116 (93)	81.76	73.82, 89.69
60+	104 (68)	64.69	55.14, 74.23	97 (66)	68.92	58.86, 78.97	104 (67)	65.23	54.84, 75.62	104 (72)	68.38	58.75, 78.01
Total	356 (276)	78.99	74.71, 83.26	305 (219)	73.88	68.66, 79.09	353 (265)	76.95	72.38, 81.51	326 (258)	80.25	75.67, 84.82
Manitoba												
17-24	32 (28)	87.03	77.26, 96.81	44 (40)	90.39	82.90, 97.87	34 (28)	82.85	71.94, 93.76	31 (27)	88.24	78.52, 97.96
25-39	104 (92)	88.69	82.14, 95.25	111 (94)	84.43	77.21, 91.66	99 (81)	82.06	74.02, 90.10	102 (86)	84.70	77.13, 92.26
40-59	152 (141)	93.43	89.13, 97.73	119 (100)	84.21	77.17, 91.26	136 (105)	77.28	69.72, 84.84	148 (113)	75.83	68.44, 83.22
60+	94 (58)	62.84	53.91, 71.77	78 (54)	69.18	59.30, 79.05	89 (59)	64.40	54.84, 73.96	102 (73)	71.71	63.22, 80.20
Total	382 (319)	82.63	78.82, 86.43	352 (288)	81.74	77.66, 85.82	358 (273)	75.69	71.18, 80.19	383 (299)	78.20	73.98, 82.42
Ontario												
17-24	231 (217)	95.19	93.09, 97.29	263 (221)	84.92	81.62, 88.22	293 (259)	90.00	87.45, 92.56	340 (298)	87.89	85.22, 90.56
25-39	908 (759)	84.42	81.98, 86.85	848 (688)	82.47	79.90, 85.04	881 (718)	82.99	80.45, 85.52	1171 (985)	84.50	82.43, 86.58

40-59	1,292 (1,032)	80.20	78.03, 82.38	1,180 (917)	77.63	75.19, 80.07	1,268 (957)	75.58	73.21, 77.96	1,948 (1,526)	78.77	76.94, 80.61
60+	974 (629)	64.14	61.23, 67.05	967 (611)	63.91	60.95, 66.86	997 (633)	63.91	61.06, 66.76	1,284 (798)	62.05	59.48, 64.62
Total	3,405 (2,637)	78.40	77.05, 79.74	3,258 (2,437)	75.77	74.34, 77.20	3,439 (2,567)	75.99	74.62, 77.36	4,743 (3,607)	76.65	75.49, 77.82
Atlantic Canada												
17-24	51 (44)	89.46	80.86, 98.06	67 (59)	86.46	78.82, 94.09	82 (69)	83.95	76.20, 91.69	95 (85)	91.27	85.35, 97.18
25-39	136 (117)	86.41	79.67, 93.16	159 (134)	84.48	78.39, 90.56	202 (154)	77.06	70.59, 83.53	207 (171)	82.40	76.67, 88.12
40-59	203 (156)	79.22	72.70, 85.74	315 (248)	80.97	76.20, 85.75	384 (311)	81.16	76.91, 85.41	315 (246)	79.34	74.48, 84.21
60+	172 (113)	64.89	57.04, 72.74	294 (197)	67.65	61.83, 73.46	338 (203)	60.63	55.22, 66.05	267 (172)	66.45	60.36, 72.54
Total	562 (430)	77.44	73.54, 81.34	835 (638)	77.68	74.65, 80.71	1,006 (737)	73.49	70.59, 76.39	884 (674)	77.55	74.58, 80.53
Total	7,963 (6,175)	78.48	77.56, 79.40	7,482 (5,714)	77.22	76.26, 78.19	7,982 (6,058)	77.01	76.08, 77.93	9,005 (6,919)	77.49	76.62, 78.37