

COVID-19 Seroprevalence Brief Report

Report #30A: January 1 - January 15, 2023, Survey

(Reported February 15, 2023)

Introduction

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

This is a brief bi-weekly report intended to provide updates to inform public health policy and mathematical modelling as the Omicron variant wave progresses. Full reports with more detailed results are released monthly.

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.

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%. All testing was conducted at Canadian Blood Services laboratories in Ottawa.

Full details on methods, data management and analysis, and ethical issues can be found in the previous Report, #29: December 2022.

Results

Between January 1 and January 15, 2023, a total of 16,297 unique donors were tested for SARS-CoV-2 antibodies.

Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. The (adjusted) proportion of blood donors with humoral immunity was 100% (95% CI, 100.00, 100.00) (based on results from the Spike antibody assay). A peak in blood concentration followed by decline is expected after vaccination. Spike antibody concentrations are shown since September 2021 (Figure 1) and declines and peaks in antibody concentration are consistent with the roll-out of third and fourth vaccination doses in late 2021/early 2022, in the spring of 2022 and in the fall of 2022. Peaks occurred earlier in older age groups, consistent with the policies to vaccinate older age groups earlier and progressively in younger donors. Anti-Spike concentrations increased since the summer of 2022, however in January they have started to decline, particularly in older age groups.

The nucleocapsid seroprevalence is indicative of natural infection (Table 1). There was an increase over the 15-day reporting period from 75.25% (95% CI, 74.27, 76.22) in the last week of December, to 76.23% (95% CI, 75.29, 77.17) in the first week of January. The rate remained at 76.23% (95% CI, 75.29, 77.16) in the second week of January. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups (89.03% (95% CI 87.06, 91.00) in the week of January 8-15, 85.68% (95% CI, 83.46, 87.90) from January 1-7). Racialized groups continue to have higher seroprevalence compared with white donors (82.08% (95% CI, 80.10, 84.06) vs 74.97% (95% CI, 73.91, 76.03) in the week of January 8-15, 80.61% (95% CI, 78.53, 82.68) vs 75.26% (95% CI, 74.20, 76.31) from January 1-7).

Conclusion

Spike antibody concentrations remain high. This may be related to a combination of vaccination and breakthrough natural infections. Despite all donors having vaccine related antibodies, the infection related antibody rate is 76.23% (95% CI, 75.29, 77.16) by mid-January, consistent with the continued prevalence of the Omicron subvariants.

Table 1. Weekly SARS-CoV-2 seroprevalence by sociodemographic variables by natural infection (nucleocapsid) results in December 2022 and January 2023 (weighted for population demographics and adjusted for test characteristics (sensitivity and specificity)).

	December 24-31				January 1 – 7				January 8 – 15			
	Crude		Adjusted		Crude		Adjusted		Crude		Adjusted	
	Number Tested	Number Positive	Percent Positive	95% CI	Number Tested	Number Positive	Percent Positive	95% CI	Number Tested	Number Positive	Percent Positive	95% CI
Sex												
Female	3,307	2,450	73.01	71.62, 74.40	3,600	2,736	76.63	75.34, 77.93	3,515	2,638	75.29	73.97, 76.61
Male	4,359	3,285	77.66	76.30, 79.02	4,677	3,462	75.80	74.44, 77.15	4,501	3,389	77.21	75.89, 78.53
Age												
17-24	644	561	88.02	85.98, 90.06	515	438	85.68	83.46, 87.90	488	436	89.03	87.06, 91.00
25-39	1,979	1,617	82.46	80.74, 84.17	2,070	1,663	81.44	79.70, 83.17	1,993	1,633	82.61	80.92, 84.31
40-59	3,090	2,325	74.01	72.38, 75.65	3,044	2,346	77.46	75.91, 79.01	2,934	2,298	78.54	77.01, 80.07
60+	1,953	1,232	62.89	60.70, 65.07	2,648	1,751	66.06	64.10, 68.01	2,601	1,660	62.37	60.39, 64.36
Province												
British Columbia	1,434	1,034	72.89	70.74, 75.03	1,547	1,105	72.25	69.90, 74.60	1,518	1,115	74.61	72.31, 76.90
Alberta	1,796	1,404	79.07	76.80, 81.34	1,734	1,340	78.90	76.65, 81.15	1,448	1,161	81.95	79.62, 84.28
Saskatchewan	511	393	79.12	75.24, 83.00	405	308	77.79	73.49, 82.10	289	221	78.35	73.24, 83.45
Manitoba	482	388	82.00	78.25, 85.74	421	328	78.54	74.41, 82.67	351	267	78.01	73.54, 82.48
Ontario	3,034	2,207	73.55	72.07, 75.03	3,413	2,549	76.22	74.87, 77.58	3,847	2,850	75.29	74.03, 76.56
New Brunswick	31	26	85.01	74.72, 95.30	268	207	80.15	74.96, 85.34	216	164	76.82	70.50, 83.13
Nova Scotia	295	221	74.95	69.69, 80.22	284	213	75.87	70.55, 81.19	279	202	73.86	68.23, 79.49
Prince Edward Island	40	28	71.20	52.73, 89.67	73	51	76.38	65.90, 86.86	20	11	56.32	31.48, 81.16
Newfoundland	43	34	79.63	69.52, 89.75	132	97	75.84	70.25, 81.43	48	36	76.73	67.23, 86.23
Metro area												
Vancouver	719	546	75.54	72.81, 78.27	849	640	75.95	72.94, 78.96	829	619	75.40	72.33, 78.48
Calgary	729	586	81.47	77.89, 85.05	614	473	79.75	76.02, 83.47	519	421	82.35	78.40, 86.31

Edmonton	548	405	74.91	70.77, 79.05	616	473	77.37	73.51, 81.23	346	268	79.14	74.15, 84.12
Ottawa	320	220	70.69	64.64, 76.74	485	334	68.75	63.87, 73.63	407	295	74.22	69.18, 79.27
Toronto	953	714	73.88	71.69, 76.07	855	652	77.27	75.06, 79.48	1029	774	75.79	73.80, 77.79
Winnipeg	315	249	80.27	75.27, 85.28	262	201	77.76	72.51, 83.01	197	144	74.68	68.34, 81.03
Ethnicity¹												
White	5,924	4,348	73.79	72.64, 74.93	6,749	5,001	75.26	74.20, 76.31	6,600	4,890	74.97	73.91, 76.03
Indigenous	101	86	85.73	78.61, 92.85	129	97	76.24	68.71, 83.78	116	89	77.71	70.10, 85.31
Asian	945	752	79.47	76.99, 81.94	672	536	81.96	79.08, 84.83	612	499	82.05	79.25, 84.85
Other racialized groups	568	459	80.50	77.36, 83.64	565	442	79.93	76.67, 83.18	563	457	82.93	79.95, 85.92
Social Deprivation²												
1 (least deprived)	1,441	1,116	78.55	76.38, 80.72	1,673	1,306	79.54	77.64, 81.45	1,432	1,083	76.22	74.01, 78.43
2	1,371	1,061	77.44	75.21, 79.66	1,515	1,119	74.66	72.41, 76.91	1,580	1,173	74.63	72.49, 76.76
3	1,395	1,033	74.48	72.19, 76.78	1,420	1,026	73.32	70.97, 75.67	1,387	1,046	76.21	73.96, 78.46
4	1,244	894	72.49	70.00, 74.98	1,344	983	73.72	71.28, 76.17	1,256	928	75.11	72.72, 77.50
5 (most deprived)	1,220	875	71.38	68.85, 73.91	1,346	1,001	76.23	73.89, 78.57	1,411	1,056	76.66	74.43, 78.89
Material Deprivation²												
1 (least deprived)	2,063	1,529	74.31	72.37, 76.24	2,157	1,573	74.29	72.40, 76.18	2,122	1,573	74.68	72.84, 76.53
2	1,694	1,242	74.22	72.10, 76.34	1,854	1,382	75.62	73.61, 77.63	1,761	1,331	76.90	74.92, 78.89
3	1,413	1,062	75.10	72.84, 77.37	1,575	1,197	77.59	75.50, 79.69	1,436	1,065	74.54	72.27, 76.81
4	929	682	73.32	70.53, 76.11	1,059	789	75.46	72.83, 78.09	1,078	800	75.57	73.01, 78.14
5 (most deprived)	572	464	81.60	78.54, 84.66	653	494	76.49	73.25, 79.72	669	517	78.82	75.78, 81.87
Total	7,666	5,735	75.25	74.27, 76.22	8,277	6,198	76.23	75.29, 77.17	8,016	6,027	76.23	75.29, 77.16

¹ In Week 1, self reported ethnicity was missing for 128 (1.7%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 72.89% (95% CI 65.35, 80.43). In Week 2, self reported ethnicity was missing for 162 (2.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 76.87% (95% CI 70.22, 83.52). In Week 3, self reported ethnicity was missing for 125 (1.6%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 72.26% (95% CI 63.98, 80.55).

² In Week 1, postal codes were missing for 995 (13.0%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 76.97% (95% CI 74.28, 79.67). In Week 2, postal codes were missing for 979 (11.8%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 80.09% (95% CI 77.52, 82.67). In Week 3, postal codes were missing for 950 (11.9%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 79.86% (95% CI 77.28, 82.44).

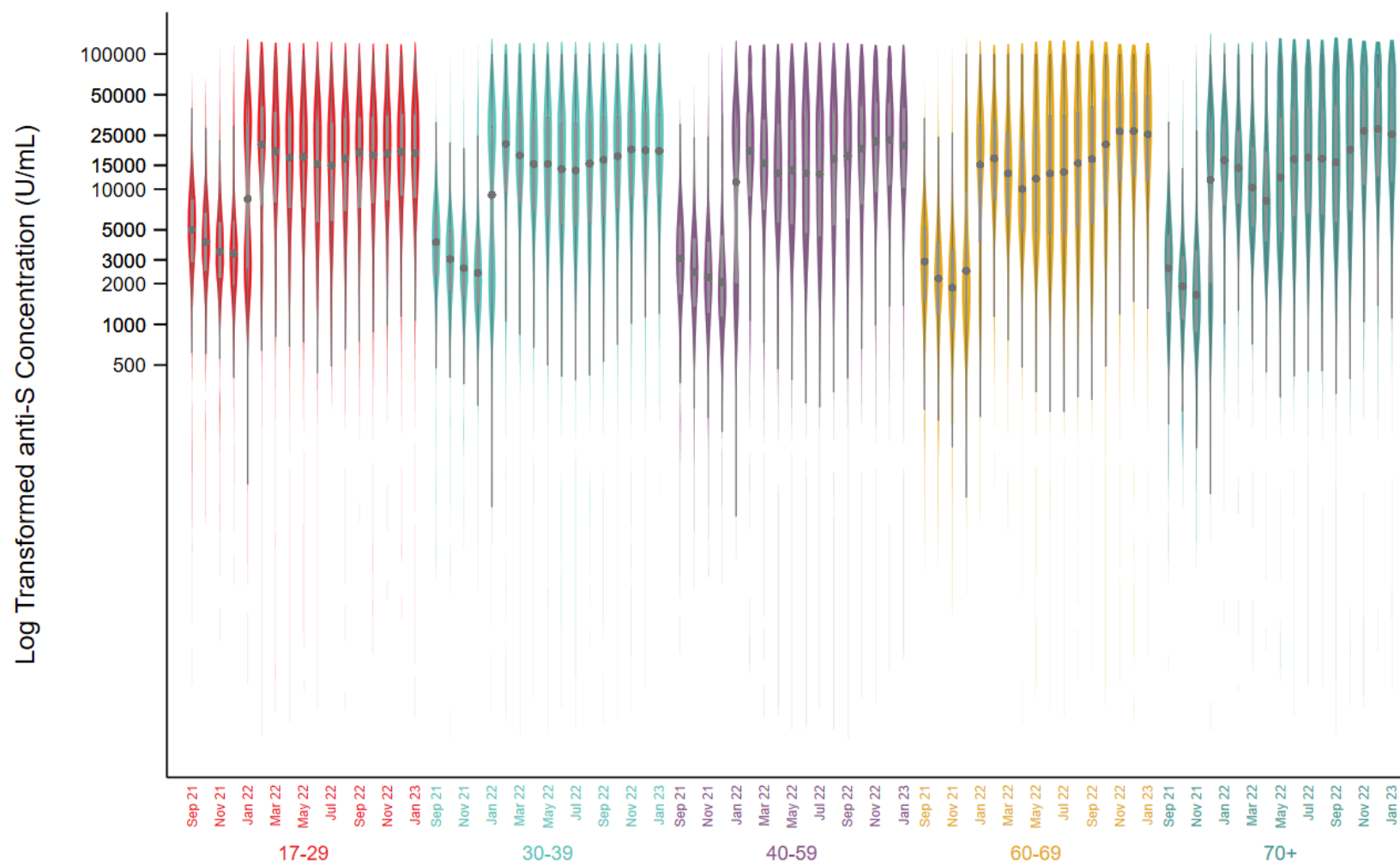


Figure 1. Spike antibody concentration (U/mL) by month and age group from September 1, 2021, to January 15, 2023.