

COVID-19 Seroprevalence Brief Report

Report #27A: October 1 - October 15, 2022

(Reported November 23, 2022)

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, #26: September 2022.

Results

Between October 1 and October 15, 2022, a total of 15,612 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 consistent with infection rates.

The nucleocapsid seroprevalence is indicative of natural infection (Table 1). There was an increase over the 15-day reporting period from 65.38% (95% CI, 64.29, 66.48) in the last week of September, to 66.18% (95% CI, 65.12, 67.24) in the first week of October, to 66.31% (95% CI, 65.26, 67.35) by mid-October. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups (81.07% (95% CI 78.58, 83.56) in the week of October 8-15, 83.26% (95% CI, 80.88, 85.64) from October 1-7). Compared to the last week of September, the seroprevalence rate increased in all provinces except Saskatchewan, Manitoba, New Brunswick, and Prince Edward Island where few samples were tested. Racialized groups continue to have higher seroprevalence compared with white donors (73.27% (95% CI, 71.33, 75.21) vs 63.86% (95% CI, 62.58, 65.15) in the week of October 8-15, 70.48% (95% CI, 68.47, 72.48) vs 64.65% (95% CI, 63.35, 65.95) from October 1-7).

Conclusion

Spike antibody concentrations are high. While antibody concentrations have waned from their peak seen around the roll-out of the third dose in January, levels have remained consistently high, particularly among younger donors. This may be related to breakthrough natural infections in these age groups. Despite all donors having vaccine related antibodies as of October 2022, the infection related antibody rate is 66.31% (95% CI, 65.26, 67.35) by mid-October, 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 September and October 2022 (weighted for population demographics and adjusted for test characteristics (sensitivity and specificity)).

	September 24-30				October 1 – 7				October 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	3,078	2,003	64.72	63.16, 66.28	3,189	2,107	65.07	63.58, 66.55	3,375	2,216	65.45	63.98, 66.93
Male	4,222	2,721	66.04	64.51, 67.58	4,366	2,891	67.37	65.86, 68.89	4,830	3,181	67.19	65.71, 68.68
Age												
17-24	546	433	79.25	76.65, 81.85	573	481	83.26	80.88, 85.64	593	484	81.07	78.58, 83.56
25-39	1,955	1,437	74.19	72.18, 76.20	2,035	1,511	73.79	71.81, 75.76	2,112	1,569	74.83	72.86, 76.81
40-59	2,812	1,900	67.64	65.81, 69.46	2,806	1,900	67.90	66.12, 69.68	3,137	2,138	68.57	66.84, 70.30
60+	1,987	954	47.75	45.55, 49.94	2,141	1,106	49.53	47.41, 51.65	2,363	1,206	50.06	47.99, 52.12
Province												
British Columbia	1,274	826	66.65	64.02, 69.28	1,379	943	68.27	65.86, 70.67	1,235	837	67.68	65.13, 70.23
Alberta	1,401	966	70.26	67.44, 73.09	1,472	1,072	74.20	71.58, 76.82	1,637	1,145	71.18	68.59, 73.76
Saskatchewan	344	238	72.47	67.26, 77.67	324	207	65.52	59.99, 71.05	363	250	69.77	64.73, 74.81
Manitoba	381	281	74.38	69.56, 79.21	378	247	67.28	62.26, 72.30	395	257	66.37	61.47, 71.28
Ontario	3,201	1,988	63.07	61.54, 64.61	3,389	2,142	63.17	61.66, 64.68	3,746	2,413	65.04	63.56, 66.53
New Brunswick	199	120	61.30	54.11, 68.50	227	133	60.85	54.14, 67.55	238	139	59.94	53.68, 66.21
Nova Scotia	359	209	58.00	52.22, 63.78	172	111	66.51	58.66, 74.37	460	270	58.52	53.60, 63.43
Prince Edward Island	1	1	65.30	25.14, 100.00	93	58	67.34	53.38, 81.30	86	51	62.17	46.96, 77.38
Newfoundland	140	95	66.54	59.42, 73.66	121	85	70.17	64.12, 76.23	45	35	77.76	68.72, 86.81
Metro area												
Vancouver	719	489	70.23	66.89, 73.57	676	501	74.22	70.95, 77.49	653	462	70.39	66.92, 73.86
Calgary	554	385	72.00	67.15, 76.86	573	434	76.77	72.63, 80.92	589	419	73.31	68.97, 77.64

Edmonton	392	259	66.27	61.18, 71.36	467	320	70.85	66.04, 75.67	548	367	68.05	63.53, 72.57
Ottawa	270	151	54.92	48.38, 61.47	190	112	55.35	48.54, 62.16	495	308	62.99	58.86, 67.11
Toronto	1,050	684	65.37	62.96, 67.77	1,450	941	64.24	62.17, 66.30	943	645	67.99	65.48, 70.51
Winnipeg	253	185	72.65	66.59, 78.70	222	133	62.26	55.44, 69.08	293	187	65.09	59.26, 70.92
Ethnicity¹												
White	5,491	3,457	63.22	61.94, 64.51	5,073	3,280	64.65	63.35, 65.95	5,539	3,532	63.86	62.58, 65.15
Indigenous	94	73	78.01	69.63, 86.38	85	54	67.76	57.81, 77.71	84	63	76.10	66.62, 85.57
Asian	418	300	71.58	67.45, 75.71	809	607	73.21	70.28, 76.15	800	618	78.39	75.55, 81.24
Other racialized groups	850	623	75.56	72.74, 78.37	1,122	752	68.37	65.53, 71.21	1,252	850	69.36	66.66, 72.06
Social Deprivation²												
1 (least deprived)	1,385	921	66.76	64.26, 69.26	1,625	1,096	67.62	65.37, 69.88	1,549	1,066	69.00	66.69, 71.31
2	1,349	864	65.01	62.42, 67.60	1,391	920	66.73	64.28, 69.18	1,457	963	66.91	64.43, 69.39
3	1,275	808	64.24	61.58, 66.90	1,236	803	65.95	63.33, 68.57	1,446	913	63.97	61.44, 66.49
4	1,208	779	65.91	63.24, 68.58	1,229	825	67.13	64.51, 69.74	1,363	874	63.78	61.15, 66.42
5 (most deprived)	1,169	759	64.79	62.13, 67.44	1,123	707	60.99	58.15, 63.82	1,395	898	65.15	62.57, 67.74
Material Deprivation²												
1 (least deprived)	1,688	1,084	64.60	62.28, 66.92	1,822	1,191	64.59	62.41, 66.76	2,067	1,337	63.86	61.74, 65.98
2	1,593	1,007	63.99	61.59, 66.39	1,614	1,027	63.77	61.41, 66.12	1,808	1,166	65.18	62.91, 67.44
3	1,331	874	66.44	63.93, 68.95	1,381	916	66.45	63.95, 68.94	1,427	929	65.80	63.29, 68.31
4	1,162	765	66.71	64.03, 69.39	1,056	699	66.09	63.26, 68.91	1,230	820	67.46	64.77, 70.15
5 (most deprived)	612	401	65.80	62.14, 69.46	731	518	72.21	69.08, 75.35	678	462	70.80	67.40, 74.21
Total	7,300	4,724	65.38	64.29, 66.48	7,555	4,998	66.18	65.12, 67.24	8,205	5,397	66.31	65.26, 67.35

¹ In Week 1, self reported ethnicity was missing for 447 (6.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 61.66% (95% CI 56.99, 66.34). In Week 2, self reported ethnicity was missing for 466 (6.2%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 64.84% (95% CI 60.32, 69.37). In Week 3, self reported ethnicity was missing for 530 (6.5%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 64.37% (95% CI 60.09, 68.66).

² In Week 1, postal codes were missing for 914 (12.5%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 65.56% (95% CI 62.45, 68.66). In Week 2, postal codes were missing for 961 (12.6%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 68.08% (95% CI 65.11, 71.06). In Week 3, postal codes were missing for 995 (12.1%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 69.48% (95% CI 66.54, 72.42).

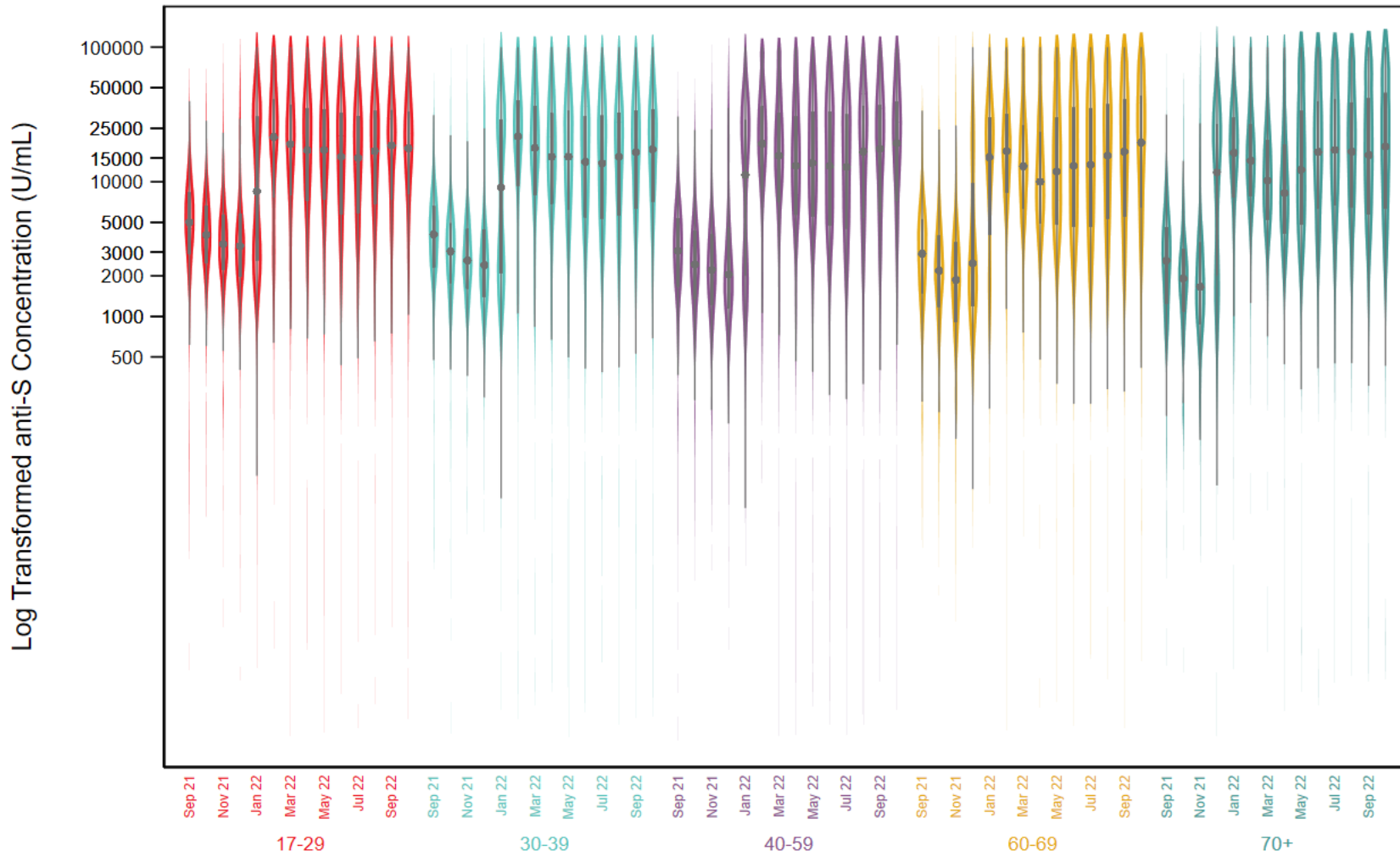


Figure 1. Spike antibody concentration (U/mL) by month and age group from September 1, 2021, to October 15, 2022.