COVID-19 Seroprevalence Brief Report

Report #22A: May 1-15, 2022, Survey

(Reported June 12, 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, #21: April 2022.

Results

Between May 1 and May 15, 2022, a total of 15,958 unique donors were tested for SARS-CoV-2 antibodies.

Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Almost all donors (100% (95% CI, 99.79, 100.00) had a positive test for spike antibody. A peak in blood concentration followed by decline is expected after vaccination. Spike antibody concentrations are shown since September 2021 gradually decreasing (Figure 1). In December, concentrations increased in older age groups and in January, median Spike antibody concentrations increased in all age groups and were highest in those aged 60-69 and 70+. This is likely related to administration of third doses starting in December 2021/January 2022 and consistent with policies to vaccinate older age groups earlier. From January to April these concentrations decreased, however, in May the median Spike concentrations once again increased, particularly in the older age groups. This is likely due to the administration of a fourth dose. It is possible that new infections would also result in higher concentrations of spike antibody.

The nucleocapsid seroprevalence is indicative of natural infection (Table 1). There was an increase over the 15-day reporting period from 40.04% (95% CI, 38.90, 41.18%) in the last week of April to 42.85% (95% CI, 41.76, 43.94%) to 46.08% (95% CI, 44.97, 47.18) by mid-May, consistent with a second wave of the Omicron variant in late March and April. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups (65.14% (95% CI 62.05, 68.24%)). The seroprevalence rate increased in all provinces, however few samples were tested from some Atlantic provinces. Racialized groups continue to have higher seroprevalence compared with white donors (54.95% (52.47, 57.43%) vs 43.89% (42.60, 45.17%)).

Conclusion

Vaccine related antibody concentrations are high. While there is evidence of waning antibody concentrations since roll-out of the third shot in January, by May concentrations are beginning to increase consistent with early roll-out of the fourth shot. Despite nearly all donors having vaccine related antibodies as of December 2021, by mid-May 2022 the infection related antibody rate is more than eight times the seroprevalence rate observed prior to the emergence of the Omicron variant.

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

	April 24-30				May 1 – 7				May 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	3,049	1,186	37.88	36.30, 39.46	3,360	1,426	41.76	40.25, 43.27	3,341	1,510	44.93	43.39, 46.47
Male	4,149	1,659	42.32	40.67, 43.97	4,599	1,937	44.01	42.44, 45.58	4,658	2,112	47.28	45.70, 48.87
Age												
17-24	533	311	58.86	55.63, 62.10	628	396	62.50	59.54, 65.46	576	379	65.14	62.05, 68.24
25-39	1,920	936	49.04	46.70, 51.39	2,165	1,107	51.58	49.36, 53.80	2,129	1,159	55.77	53.54, 58.00
40-59	2,621	1,109	42.58	40.62, 44.54	2,934	1,288	43.68	41.83, 45.54	2,982	1,403	47.25	45.38, 49.12
60+	2,124	489	20.73	18.95, 22.51	2,232	572	24.84	23.03, 26.64	2,312	681	28.66	26.79, 30.53
Province												
British Columbia	1,246	500	40.54	37.95, 43.12	1,210	501	41.98	39.33, 44.63	1,358	602	44.42	41.89, 46.95
Alberta	1,447	685	50.08	47.13, 53.02	1,306	658	52.76	49.77, 55.75	1,555	824	54.65	51.89, 57.40
Saskatchewan	353	153	42.72	37.19, 48.25	312	132	44.35	38.67, 50.03	344	157	46.47	41.07, 51.88
Manitoba	384	163	45.34	40.39, 50.29	381	191	51.53	46.29, 56.76	402	180	45.53	40.43, 50.62
Ontario	2,868	1,078	37.48	35.76, 39.20	3,671	1,509	41.16	39.67, 42.66	3,297	1,501	45.80	44.19, 47.40
New Brunswick	350	125	36.94	32.09, 41.78	422	164	41.08	34.60, 47.55	418	150	37.45	31.02, 43.89
Nova Scotia	382	96	25.17	20.27, 30.07	441	140	31.71	26.24, 37.17	437	149	33.49	27.94, 39.04
Prince Edward Island	57	12	34.53	20.14, 48.93	59	17	21.36	8.06, 34.65	63	19	42.62	26.94, 58.31
Newfoundland	111	33	31.82	23.65, 39.99	157	51	33.38	26.41, 40.35	125	40	33.40	25.46, 41.35
Metro area												
Vancouver	706	310	43.80	40.46, 47.14	566	245	43.57	39.63, 47.51	788	393	49.55	46.18, 52.92
Calgary	529	247	47.66	42.41, 52.92	495	249	51.93	46.82, 57.03	558	285	52.67	47.79, 57.54

Edmonton	494	218	46.62	41.62, 51.63	457	214	50.20	45.25, 55.14	465	227	49.83	44.88, 54.78
Ottawa	314	99	32.17	25.92, 38.41	350	101	27.67	22.40, 32.94	369	144	40.50	34.88, 46.13
Toronto	1,076	434	40.07	37.46, 42.67	1,115	496	43.86	41.48, 46.24	1,066	516	47.30	44.80, 49.79
Winnipeg	228	88	41.34	34.90, 47.77	258	104	41.23	34.95, 47.51	251	103	40.94	34.51, 47.36
Ethnicity[1]												
White	5,474	2,100	38.61	37.30, 39.92	6,034	2,450	41.16	39.90, 42.41	5,990	2,589	43.89	42.60, 45.17
Indigenous	98	45	45.91	36.18, 55.64	109	49	42.74	33.94, 51.54	106	59	57.86	48.69, 67.03
Asian	378	161	44.76	39.93, 49.58	414	180	42.81	38.33, 47.30	460	219	46.20	41.89, 50.51
Other racialized groups	743	366	50.07	46.58, 53.57	854	475	56.08	52.88, 59.28	873	507	59.48	56.31, 62.65
Social Deprivation[2]												
1 (least deprived)	1,361	567	41.99	39.37, 44.61	1,385	607	44.89	42.28, 47.50	1,516	733	48.49	45.96, 51.02
2	1,306	545	41.46	38.77, 44.14	1,584	713	45.01	42.56, 47.46	1,502	674	44.99	42.46, 47.52
3	1,331	506	38.15	35.55, 40.76	1,469	563	38.57	36.08, 41.06	1,448	629	43.54	40.97, 46.12
4	1,181	452	39.44	36.60, 42.28	1,289	543	44.12	41.39, 46.86	1,299	540	41.66	38.96, 44.36
5 (most deprived)	1,195	439	37.17	34.39, 39.95	1,326	502	37.39	34.77, 40.01	1,329	612	46.17	43.47, 48.87
Material Deprivation[2]												
1 (least deprived)	1,951	731	37.16	34.94, 39.38	1,927	749	38.80	36.62, 40.97	1,901	788	41.95	39.67, 44.23
2	1,561	616	40.04	37.58, 42.50	1,638	668	42.51	40.07, 44.96	1,809	837	46.91	44.57, 49.26
3	1,292	506	39.53	36.86, 42.19	1,407	595	42.69	40.10, 45.28	1,501	728	49.06	46.51, 51.60
4	1,014	401	40.19	37.19, 43.19	1,257	541	42.41	39.70, 45.12	1,210	537	45.81	42.99, 48.62
5 (most deprived)	556	255	45.94	42.04, 49.84	824	375	47.03	43.67, 50.39	673	298	45.78	42.05, 49.52
Total	7,198	2,845	40.04	38.90, 41.18	7,959	3,363	42.85	41.76, 43.94	7,999	3,622	46.08	44.97, 47.18

[1] In Week 1, self reported ethnicity was missing for 505 (7.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 34.26% (95% CI 30.07, 38.45). In Week 2, self reported ethnicity was missing for 548 (6.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 38.38% (95% CI 34.17, 42.59). In Week 3, self reported ethnicity was missing for 570 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 43.83% (95% CI 39.69, 47.97).

[2] In Week 1, postal codes were missing for 824 (11.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 42.61% (95% CI 39.15, 46.06). In Week 2, postal codes were missing for 906 (11.4%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 48.91% (95% CI 45.66, 52.15). In Week 3, postal codes were missing for 905 (11.3%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 48.38% (95% CI 45.11, 51.66).

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