

COVID-19 Seroprevalence Brief Report

Report #21A: April 1-15, 2022, Survey

(Reported May 17, 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, #20: March 2022.

Results

Between April 1 and April 15, 2022, a total of 14,341 unique donors were tested for SARS-CoV-2 antibodies.

Spike antibody results indicate a SARS-CoV-2 humoral response to vaccination or natural infection. Nearly all (99.80% (99.60, 99.99)) of donors 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+. By April 15 median Spike concentrations were very high among all age groups but have been decreasing since January. 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. 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 29.5% (28.33, 30.68%) in the last week of March to 32.59% (31.44, 33.73%) to 35.26% (34.19, 36.32) by mid-April 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 (52.69% (95% CI 49.57, 55.81%)). 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 (44.54% (42.01, 47.08%) vs 33.00% (31.78, 34.21%)).

Conclusion

Vaccine related antibody concentrations are high. There are increased concentrations consistent with deployment of the third dose of vaccine and possibly boost from infection, but there is now evidence of waning. Despite nearly all donors having vaccine related antibodies as of December 2021, by mid-April 2022 the infection related antibody rate is more than six 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 March and April 2022 (weighted for population demographics and adjusted for test characteristics (sensitivity and specificity)).

	March 24 – 31				April 1 – 7				April 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	2473	740	27.81	26.19, 29.43	2669	865	32.44	30.65, 34.22	3294	1123	33.15	31.69, 34.62
Male	3504	1064	31.22	29.53, 32.90	3764	1205	32.04	30.54, 33.54	4614	1667	37.48	35.93, 39.02
Age												
17-24	460	220	44.79	41.31, 48.28	468	258	53.98	50.43, 57.52	611	319	52.69	49.57, 55.81
25-39	1572	621	37.96	35.38, 40.54	1697	705	41.49	39.04, 43.94	2135	969	45.93	43.70, 48.17
40-59	2179	679	30.18	28.15, 32.20	2378	779	32.17	30.25, 34.10	2946	1074	35.23	33.42, 37.03
60+	1766	284	15.01	13.31, 16.70	1890	328	16.87	15.16, 18.58	2216	428	17.88	16.26, 19.50
Province												
British Columbia	1003	332	32.31	29.40, 35.21	1075	328	31.29	28.60, 33.97	1233	426	35.82	33.24, 38.40
Alberta	1351	506	39.97	36.76, 43.18	1409	553	41.74	38.63, 44.85	1610	687	44.08	41.17, 47.00
Saskatchewan	247	64	27.90	21.26, 34.55	290	104	35.93	29.90, 41.97	363	143	39.03	33.59, 44.46
Manitoba	418	130	32.61	27.45, 37.77	325	115	37.12	31.95, 42.28	283	107	39.00	33.58, 44.43
Ontario	2521	708	27.29	25.69, 28.88	2805	844	30.69	29.07, 32.31	3894	1306	33.76	32.31, 35.22
New Brunswick	134	25	20.85	13.42, 28.28	125	46	36.15	29.63, 42.67	99	27	26.69	19.85, 33.52
Nova Scotia	224	34	16.52	11.19, 21.84	262	53	20.90	15.87, 25.92	258	52	20.24	15.23, 25.25
Prince Edward Island	37	3	8.40	0.33, 16.48	47	6	20.84	6.38, 35.30	48	11	34.64	19.50, 49.78
Newfoundland	42	2	9.19	3.08, 15.30	95	21	22.61	15.18, 30.04	120	31	24.62	17.99, 31.25
Metro area												
Vancouver	1190	399	32.70	29.98, 35.42	572	196	35.39	31.61, 39.17	675	259	39.91	36.33, 43.49
Calgary	1083	367	33.70	30.50, 36.90	534	205	40.24	35.13, 45.36	524	216	42.73	37.52, 47.94

Edmonton	916	263	28.44	25.24, 31.64	449	147	34.74	29.39, 40.10	570	212	37.83	33.07, 42.59
Ottawa	732	188	26.62	23.08, 30.16	274	51	20.56	15.38, 25.74	478	112	23.07	18.88, 27.25
Toronto	1558	435	26.66	24.75, 28.58	1191	378	31.62	29.38, 33.86	1137	435	37.26	34.83, 39.70
Winnipeg	451	139	32.77	28.11, 37.42	233	83	37.05	30.92, 43.18	210	70	33.12	26.99, 39.24
Ethnicity¹												
White	4477	1245	26.87	25.54, 28.19	4821	1475	30.77	29.46, 32.08	5955	1994	33.00	31.78, 34.21
Indigenous	79	29	37.59	26.62, 48.56	85	27	31.85	22.00, 41.69	91	43	45.37	34.89, 55.86
Asian	312	106	30.30	25.42, 35.18	357	116	33.82	29.07, 38.57	421	139	35.09	30.74, 39.44
Other racialized groups	687	290	43.73	40.08, 47.38	720	324	45.11	41.60, 48.62	895	428	49.18	45.96, 52.40
Social Deprivation²												
1 (least deprived)	1211	407	31.65	29.01, 34.29	1279	427	34.29	31.68, 36.90	1513	557	37.18	34.75, 39.61
2	1159	325	27.96	25.35, 30.57	1222	419	35.68	33.00, 38.35	1465	508	33.84	31.36, 36.31
3	1011	301	29.85	26.97, 32.72	1075	345	31.26	28.50, 34.02	1376	446	32.18	29.68, 34.67
4	956	260	27.14	24.32, 29.95	1060	306	29.23	26.49, 31.97	1279	430	33.80	31.18, 36.42
5 (most deprived)	920	269	27.87	24.92, 30.81	1043	304	29.72	26.94, 32.50	1336	489	36.71	34.12, 39.30
Material Deprivation²												
1 (least deprived)	1611	440	26.23	24.02, 28.43	1612	458	28.53	26.32, 30.74	2010	655	32.45	30.36, 34.53
2	1303	376	27.66	25.21, 30.12	1365	406	30.35	27.87, 32.83	1758	615	34.51	32.26, 36.76
3	984	273	27.66	24.86, 30.46	1208	392	32.62	29.97, 35.27	1495	523	34.28	31.83, 36.72
4	875	296	33.23	30.09, 36.37	883	290	33.80	30.74, 36.87	1112	394	36.52	33.69, 39.34
5 (most deprived)	484	177	36.15	31.96, 40.33	611	255	42.50	38.67, 46.33	594	243	41.01	37.18, 44.84
Total	5977	1804	29.50	28.33, 30.68	6433	2070	32.59	31.44, 33.73	7908	2790	35.26	34.19, 36.32

¹ In Week 1, self reported ethnicity was missing for 422 (7.1%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 30.63% (95% CI 26.00, 35.27). In Week 2, self reported ethnicity was missing for 450 (7.0%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 29.12% (95% CI 24.78, 33.45). In Week 3, self reported ethnicity was missing for 546 (6.9%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 33.91% (95% CI 29.75, 38.06).

² In Week 1, postal codes were missing for 720 (12.0%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 33.33% (95% CI 29.77, 36.88). In Week 2, postal codes were missing for 754 (11.7%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 35.27% (95% CI 31.82, 38.71). In Week 3, postal codes were missing for 939 (11.9%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 38.74% (95% CI 35.53, 41.95).

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

