COVID-19 Seroprevalence Brief Report

Report #26A: September 1-14, 2022, Survey

(Reported September 24, 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, #25: August 2022.

Results

Between September 1 and September 14, 2022, a total of 15,180 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 and in the spring 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 14-day reporting period from 59.87% (95% CI, 58.89, 60.86) in the last week of August, to 61.17% (95% CI, 60.07, 62.28) in the first week of September, to 63.62% (95% CI, 62.53, 64.71) by mid-September. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups (76.70% (95% CI 73.89, 79.51) in the week of September 8-14, 77.43% (95% CI, 74.80, 80.07) from September 1-7). Compared to the last week of August, the seroprevalence rate increased in all provinces except New Brunswick and Newfoundland where few samples were tested. Racialized groups continue to have higher seroprevalence compared with white donors (70.39% (95% CI, 67.88, 72.90) vs 62.28% (95% CI, 61.03, 63.53) in the week of September 8-14, 67.16% (95% CI, 64.76, 69.57) vs 60.05% (95% CI, 58.75, 61.34) from September 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 is possibly related to breakthrough natural infections in these age groups. Despite all donors having vaccine related antibodies as of September 2022, the infection related antibody rate is 62.40% (95% CI, 61.62, 63.18) in the period September 1-14, consistent with the continued prevalence of the Omicron variant and subvariants.

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

	August 24-31				September 1 – 7				September 8 – 14			
	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	4,422	2,635	58.77	57.39, 60.15	3,287	2,004	60.49	58.92, 62.06	3,458	2,224	64.20	62.71, 65.70
Male	5,308	3,134	61.04	59.63, 62.44	4,301	2,617	61.86	60.30, 63.43	4,134	2,570	62.98	61.39, 64.56
Age												
17-24	745	570	76.87	74.49, 79.24	563	445	77.43	74.80, 80.07	510	397	76.70	73.89, 79.51
25-39	2,660	1,809	68.74	66.86, 70.62	2,033	1,432	70.30	68.21, 72.39	1,939	1,398	73.07	71.02, 75.12
40-59	3,569	2,206	61.81	60.16, 63.47	2,773	1,702	60.47	58.55, 62.38	2,969	1,950	66.05	64.26, 67.83
60+	2,756	1,184	41.68	39.80, 43.56	2,219	1,042	46.45	44.32, 48.58	2,174	1,049	46.99	44.86, 49.11
Province												
British Columbia	1,605	935	59.32	56.94, 61.69	1,295	827	64.38	61.73, 67.02	1,406	878	63.39	60.83, 65.96
Alberta	1,839	1,248	69.24	66.84, 71.64	1,522	1,044	70.62	67.90, 73.34	1,548	1,079	71.02	68.35, 73.69
Saskatchewan	408	234	59.06	53.94, 64.18	381	222	59.34	53.92, 64.76	324	203	62.37	56.50, 68.23
Manitoba	474	286	62.13	57.59, 66.66	380	236	63.95	58.71, 69.18	419	267	64.87	59.86, 69.87
Ontario	4,270	2,443	57.78	56.36, 59.20	3,304	1,878	57.56	56.01, 59.11	3,073	1,901	62.37	60.81, 63.92
New Brunswick	297	169	58.64	52.78, 64.50	292	191	67.94	61.89, 73.99	255	146	56.91	49.88, 63.95
Nova Scotia	561	289	52.88	48.29, 57.47	338	174	50.79	44.42, 57.16	415	230	56.85	51.09, 62.61
Prince Edward Island	132	79	60.40	50.34, 70.45	3	2	53.58	23.11, 84.06	20	15	75.04	64.39, 85.68
Newfoundland	144	86	59.68	52.96, 66.39	73	47	65.90	56.08, 75.72	132	75	58.37	50.92, 65.83
Metro area												
Vancouver	880	555	63.16	60.18, 66.15	645	432	68.09	64.40, 71.78	737	504	69.16	65.75, 72.56
Calgary	675	471	71.69	67.44, 75.94	601	410	70.99	66.45, 75.54	552	399	74.29	69.69, 78.89

Edmonton	593	364	61.65	57.36, 65.94	459	312	69.53	64.69, 74.37	492	318	66.16	61.38, 70.93
Ottawa	507	269	52.55	47.17, 57.93	327	181	56.70	50.97, 62.43	360	205	57.60	52.17, 63.03
Toronto	1,177	693	59.21	56.89, 61.53	916	530	57.81	55.33, 60.29	843	548	63.56	61.14, 65.98
Winnipeg	338	203	62.20	56.49, 67.92	224	131	59.89	52.95, 66.83	206	127	62.89	55.61, 70.17
Ethnicity[1]												
White	7,475	4,317	58.13	56.99, 59.27	5,737	3,435	60.05	58.75, 61.34	5,932	3,677	62.28	61.03, 63.53
Indigenous	126	80	66.93	59.23, 74.63	99	73	73.93	65.10, 82.75	83	53	57.68	46.82, 68.54
Asian	489	313	63.94	59.92, 67.97	407	253	58.36	53.90, 62.81	337	230	67.77	63.05, 72.50
Other racialized groups	1,035	722	71.58	68.84, 74.31	846	590	71.04	68.08, 74.01	759	540	72.83	69.78, 75.89
Social Deprivation[2]												
1 (least deprived)	1,847	1,124	60.74	58.53, 62.96	1,443	926	64.15	61.68, 66.62	1,435	950	67.17	64.69, 69.65
2	1,799	1,045	58.42	56.15, 60.70	1,434	828	57.85	55.30, 60.40	1,435	894	62.12	59.62, 64.62
3	1,686	1,011	61.75	59.40, 64.09	1,261	759	59.16	56.43, 61.89	1,344	851	64.42	61.84, 67.00
4	1,657	965	59.82	57.42, 62.22	1,263	776	63.90	61.21, 66.59	1,153	717	62.18	59.37, 64.98
5 (most deprived)	1,606	913	56.61	54.08, 59.13	1,300	773	59.59	56.87, 62.31	1,219	727	60.33	57.59, 63.07
Material Deprivation[2]												
1 (least deprived)	2,591	1,458	56.43	54.43, 58.44	1,920	1,172	60.50	58.28, 62.71	1,954	1,235	62.27	60.11, 64.44
2	2,103	1,266	61.15	59.01, 63.29	1,584	956	60.64	58.19, 63.09	1,665	1,050	63.99	61.61, 66.37
3	1,752	1,035	59.12	56.83, 61.42	1,386	853	62.75	60.17, 65.32	1,374	854	63.18	60.61, 65.76
4	1,390	837	61.28	58.78, 63.77	1,154	686	59.43	56.62, 62.23	1,007	636	63.80	60.85, 66.75
5 (most deprived)	759	462	62.24	58.95, 65.53	657	395	61.72	58.07, 65.37	586	364	64.46	60.80, 68.12
Total	9,730	5,769	59.87	58.89, 60.86	7,588	4,621	61.17	60.07, 62.28	7,592	4,794	63.62	62.53, 64.71

[1] In Week 1, self reported ethnicity was missing for 605 (6.2%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 54.70% (95% CI 50.66, 58.74). In Week 2, self reported ethnicity was missing for 499 (6.6%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 55.69% (95% CI 51.23, 60.14). In Week 3, self reported ethnicity was missing for 481 (6.3%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 61.72% (95% CI 57.25, 66.20).

[2] In Week 1, postal codes were missing for 1,135 (11.7%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 62.44% (95% CI 59.56, 65.31). In Week 2, postal codes were missing for 887 (11.7%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 63.14% (95% CI 59.85, 66.43). In Week 3, postal codes were missing for 1,006 (13.3%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 65.55% (95% CI 62.57, 68.52).

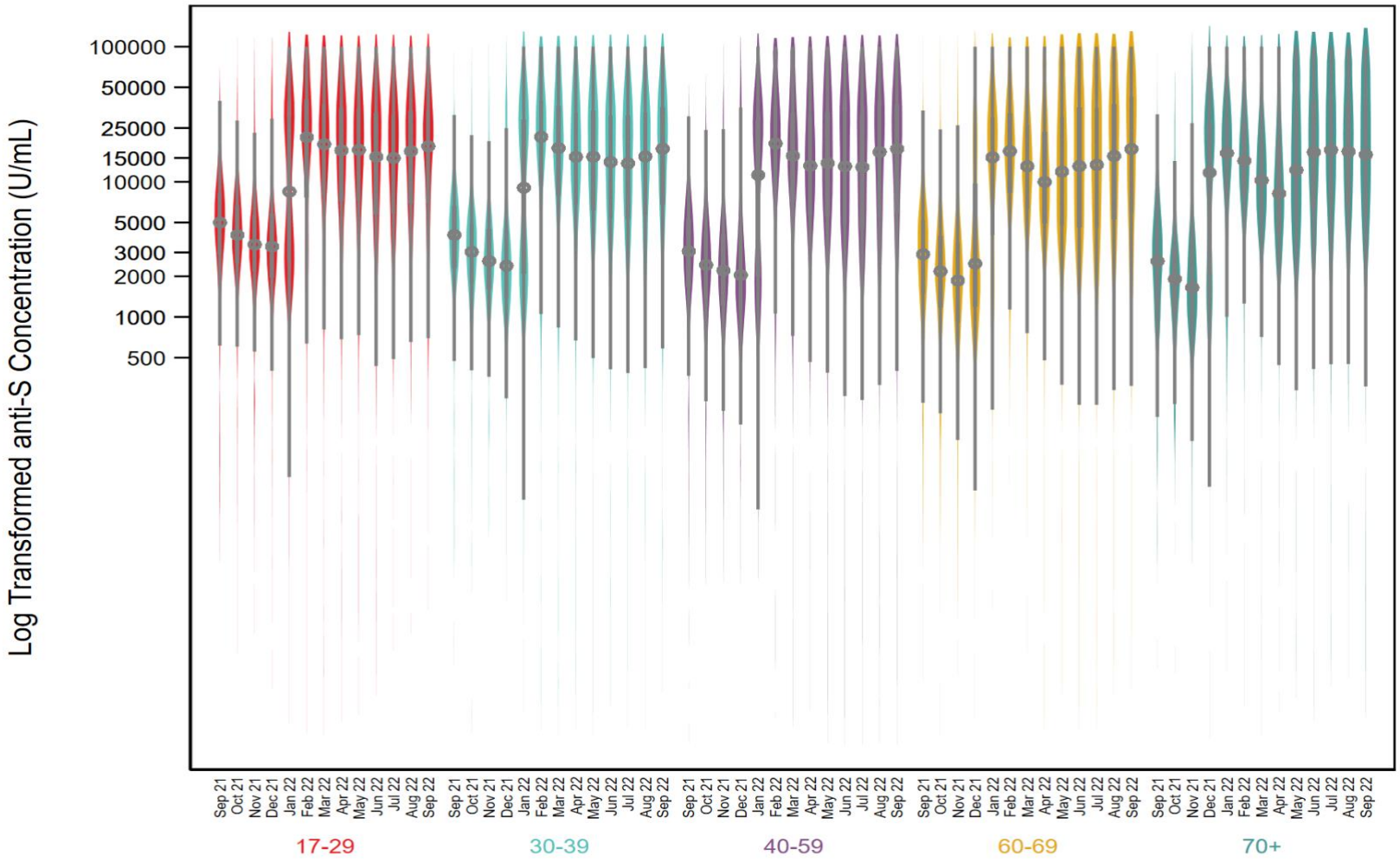

Figure 1. Spike antibody concentration (U/mL) by month and age group from September 1, 2021, to September 14, 2022.