COVID-19 Seroprevalence Brief Report

Report #19A: February 1-15, 2022 Survey

(Reported March 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, #18: January 2022.

Results

Between February 1 and February 15, 2022, a total of 13,189 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 (99.65% (99.43, 99.86) 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 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 February 15 median Spike concentrations were very high among all age groups. This is likely due to administration of third doses 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 indictive of natural infection (Table 1). There was an increase over the 22-day reporting period from 16.30% (15.51, 17.09%) in the last week of January to 20.63% (19.57, 21.69) to 22.65% (21.70, 23.61%) by mid-February consistent with emergence of the Omicron variant. Consistent with previous surveys, donors aged 17-24 years old had the highest seroprevalence rate compared to other age groups (36.59% (95% CI 33.52, 39.66%)). The seroprevalence rate increased in all provinces except for some Atlantic provinces from which few samples were tested. Racialized groups continue to have higher seroprevalence compared with white donors (32.36% (29.85, 34.88%) vs 20.13 (19.07, 21.18%)) but by mid-February there was less variability across social and material deprivation indices compared with 2021 reports.

Conclusion

Vaccine related antibody concentrations are high, and there is early evidence of increased concentrations consistent with deployment of the third dose of vaccine and possibly boost from infection. Despite nearly all donors having vaccine related antibodies as of December 2021, with the emergence of the Omicron variant, by mid-February 2022 the infection related antibody rate is more than four times the monthly seroprevalence rate observed for the year of 2021.

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

	January 24 – 31				February 1 – 7				February 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	3547	595	16.25	15.15, 17.35	2460	490	18.43	17.00, 19.85	3260	745	21.02	19.74, 22.31
Male	4872	802	16.36	15.22, 17.50	3319	746	22.87	21.31, 24.42	4198	956	24.43	23.02, 25.85
Age												
17-24	595	135	21.87	19.32, 24.42	401	131	31.37	27.88, 34.87	551	206	36.59	33.52, 39.66
25-39	2227	426	18.54	16.84, 20.25	1637	461	27.08	24.78, 29.38	2004	618	30.44	28.29, 32.59
40-59	3040	499	15.84	14.52, 17.17	2171	487	21.23	19.43, 23.04	2776	636	21.98	20.38, 23.57
60+	2557	337	12.69	11.36, 14.02	1570	157	9.21	7.77, 10.66	2127	241	10.80	9.47, 12.12
Province												
British Columbia	1315	230	18.90	16.90, 20.91	1101	212	19.01	16.91, 21.12	834	228	27.32	24.58, 30.07
Alberta	1688	365	23.01	20.62, 25.41	1540	374	24.89	22.37, 27.40	1079	311	31.22	28.03, 34.41
Saskatchewan	343	37	9.72	6.19, 13.24	297	58	18.99	14.48, 23.51	224	59	26.68	20.83, 32.53
Manitoba	452	88	19.48	15.23, 23.72	317	89	28.60	23.35, 33.86	362	104	29.17	24.22, 34.13
Ontario	3697	617	16.34	15.20, 17.49	2046	461	21.33	19.56, 23.10	4376	952	21.19	19.99, 22.38
New Brunswick	272	13	5.09	2.75, 7.43	156	10	6.66	2.22, 11.09	300	29	11.48	7.30, 15.66
Nova Scotia	442	37	8.42	5.84, 11.00	260	25	9.98	6.82, 13.14	51	2	3.11	0.00, 7.52
Prince Edward Island	113	2	1.90	0.00, 4.00	47	5	11.36	0.51, 22.21	46	5	7.44	0.00, 15.89
Newfoundland	97	8	6.18	1.82, 10.54	15	2	11.87	0.00, 27.88	186	11	5.01	2.02, 7.99
Metro area												
Vancouver	705	166	24.11	21.27, 26.94	608	153	25.23	22.08, 28.39	486	154	32.15	28.34, 35.97
Calgary	681	150	23.18	19.19, 27.16	597	151	26.23	21.93, 30.53	475	139	31.72	26.74, 36.69

Edmonton	560	105	20.03	16.07, 23.98	523	108	20.87	16.95, 24.78	313	83	28.54	22.88, 34.21
Ottawa	581	62	10.54	7.97, 13.12	84	13	16.05	9.94, 22.17	265	51	19.38	15.56, 23.20
Toronto	900	217	22.27	19.93, 24.62	812	216	24.88	21.95, 27.82	1664	460	25.42	23.39, 27.44
Winnipeg	294	45	15.28	10.40, 20.17	245	66	26.85	20.96, 32.74	207	44	20.62	14.73, 26.51
Ethnicity[1,2]												
White	6452	956	14.44	13.58, 15.30	4364	837	18.51	17.35, 19.68	5583	1130	20.13	19.07, 21.18
Indigenous	108	13	10.79	4.83, 16.75	85	18	17.33	9.55, 25.11	86	19	21.58	13.50, 29.67
Asian	388	84	21.18	17.21, 25.15	292	69	24.85	19.75, 29.95	380	119	30.88	26.34, 35.42
Other racialized groups	824	231	27.96	24.88, 31.03	609	219	34.96	31.15, 38.78	846	292	34.37	31.14, 37.60
Social Deprivation[3]												
1 (least deprived)	1510	275	17.85	15.89, 19.81	1022	241	23.50	20.80, 26.19	1487	381	26.08	23.79, 28.37
2	1742	304	15.93	14.19, 17.67	1037	181	16.45	14.18, 18.73	1437	295	19.80	17.76, 21.85
3	1447	213	14.83	13.02, 16.64	1019	229	21.43	18.94, 23.92	1314	283	20.84	18.64, 23.03
4	1404	231	17.12	15.15, 19.09	936	214	22.49	19.79, 25.20	1194	285	24.65	22.21, 27.08
5 (most deprived)	1407	215	16.18	14.27, 18.09	1018	195	18.07	15.69, 20.46	1188	244	20.06	17.81, 22.31
Material Deprivation[3]												
1 (least deprived)	2279	361	16.46	14.90, 18.01	1591	329	20.31	18.28, 22.34	1926	434	22.39	20.53, 24.24
2	1996	287	13.69	12.16, 15.23	1187	247	20.70	18.35, 23.05	1619	317	20.06	18.09, 22.04
3	1457	241	15.97	14.08, 17.86	1029	215	19.92	17.49, 22.35	1315	290	22.13	19.86, 24.39
4	1149	219	18.69	16.50, 20.88	784	158	18.65	15.94, 21.37	1088	269	23.84	21.32, 26.37
5 (most deprived)	629	130	20.17	17.19, 23.15	441	111	23.14	19.24, 27.03	672	178	24.78	21.60, 27.97
Total	8419	1397	16.30	15.51, 17.09	5779	1236	20.63	19.57, 21.69	7458	1701	22.65	21.70, 23.61

[1] In Week 1, self reported ethnicity was missing for 647 (7.7%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 17.86% (95% CI 14.86, 20.85). In Week 2, self reported ethnicity was missing for 429 (7.4%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 19.61% (95% CI 15.74, 23.47). In Week 3, self reported ethnicity was missing for 563 (7.5%) donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 24.93% (95% CI 21.21, 28.66).

[2] In Week 1, postal codes were missing for 909 (10.8%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 15.80% (95% CI 13.37, 18.23). In Week 2, postal codes were missing for 747 (12.9%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 22.88% (95% CI 19.77, 25.99). In Week 3, postal codes were missing for 838 (11.2%) of donors; Adjusted seroprevalence by the Nucleocapsid antibody assay was 25.78% (95% CI 22.74, 28.81).

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