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COVID-19 Seroprevalence Report

2021-01-12

# **COVID-19 Seroprevalence Report**

## **January 12, 2021**

### **Report #4: November 2020 Survey**

## Summary

### Report 4

**November 7, 2020 - November 25, 2020 (n=17,049)**

- Seroprevalence in November was 1.51% (95% CI 1.31, 1.71)
- Regional variation: Seroprevalence increased mostly in Western Canada. Highest rates were observed in the Prairies; **Manitoba's rate increased to 8.56% (95% CI 6.51, 10.62) and Saskatchewan's rate increased to 4.2% (95% CI 2.3, 5.8)**. There was a slight decrease in Ontario to 0.77% (95% CI 0.56, 0.97%) and PEI remained at 0.
- **Donors aged 17-24 years old had the highest seroprevalence rates 2.97% (95% CI 2.20, 3.37%) while donors 40-59 years old 1.09% (95% CI 0.80, 1.38%) had the lowest rates.**
- **New: Revised time series** (Additional data from the correlates of immunity study from April until Aug 31, 2020 are included in this report)
- Comparison of Wave 1 (May-July) to November 2020

### Report 3

**October 12, 2020 - October 31, 2020 (n=16,811)**

- Seroprevalence increased significantly in October to **0.88%** (95% CI 0.73, 1.04) (p=0.04).
- Regional variation: **Manitoba's seroprevalence rate increased to 2.96% (95% CI 1.70, 4.23), the highest in Canada.** Ontario remained stable at 0.87% (0.65, 1.08)
- **New:** Heat maps to illustrate inter-provincial variation (by economic regions)
- Disparities widen: Donors that self-identified as white (0.75%; 95% CI 0.61, 0.92) had significantly lower seroprevalence compared to **ethnic minorities (1.82%; 95% CI 1.21, 2.62)**

### Report 2

**May 9, 2020- July 21, 2020 (n=74,642)**

- Seroprevalence was estimated at **0.70%** (95% CI 0.63, 0.77)
- Regional variation: **Ontario, 0.88% (95% CI 0.78, 0.99) had the highest seroprevalence,** very low seroprevalence in Atlantic provinces.
- Disparities: Donors that self-identified as white (0.66%; 95% CI 0.59, 0.74) had lower seroprevalence compared to **ethnic minorities (1.09%; 95% CI 0.84, 1.34)**

### Report 1

**May 9, 2020- June 18, 2020 (n=37,737)**

- Seroprevalence estimate is 0.7% (95%CI 0.60,0.79)
- Regional variation: Ontario 1% Newfoundland 0.3%

## Introduction

SARS-CoV-2 is a novel coronavirus first identified in Wuhan, Hubei province China in late 2019. It is responsible for a respiratory illness, coronavirus infection disease (COVID-19). Some people become extremely ill and can die from complications, while others experience mild symptoms or may not be aware of their infection at all. With less than 500 confirmed cases across Canada, by March 23<sup>rd</sup>, 2020, strict physical distancing measures were implemented. As a direct result, the first wave of the epidemic peaked by the end of April and plateaued in July and August. A resurgence of infections began in late September 2020 and continues to grow across Canada. Yet, these statistics do not convey the true infection rate because some infections will not cause illness, others may not be severe enough for people to seek testing, and testing may be disproportionately directed to outbreaks. Testing for SARS-CoV-2 antibodies is important to understand what proportion of the population have already been infected (the seroprevalence) and to monitor infection over the course of the pandemic. This information will improve mathematical models to predict the course of infection and inform public health policy.

Blood donors are reasonably representative of healthy Canadians between the ages of 17 and about 60. There are people over 60 who donate blood, although there are fewer as age increases. There are blood collection sites in all large cities and many smaller urban centres in all provinces except Quebec but people in rural areas may have less opportunity to donate. Blood donations are not collected in the northern territories.

In partnership with the Canadian Immunity Task Force, Canadian Blood Services is testing samples left over from donations for SARS-CoV-2 antibodies. **The current report summarizes the seroprevalence estimates from residual blood from donors in November 2020. We also update our comparison from Wave 1 (May-July 2020) to November 2020.**

## Methods

### Blood donor eligibility

Before each donation blood donors must answer screening questions to ensure that they are in good health and do not have risk factors for infections that may be transmitted to blood recipients. There is no evidence that SARS-CoV-2 can be transmitted through blood transfusion, but it is important to ensure other donors and staff are safe while in the blood clinic. Donors are asked if they have had COVID-19 or been in contact with someone who has. They are deferred from donation for 2 weeks if they have been in contact with someone who was infected, and if they have had the infection deferral is for two weeks after symptoms disappear (3 weeks if hospitalized). Donors also have their temperature checked before they enter the clinic, and their hemoglobin level is checked before they can donate.

### Blood samples

Just before a donor gives their blood donation, several small tubes of blood are collected for infectious disease and other testing. An extra sample is taken, called the retention sample, in case extra testing is required. Only about 20% of these retention samples are needed. For

seroprevalence testing plasma from the 80% of retention samples not needed for operational testing was aliquoted and frozen at -20°C or colder, starting on May 9, 2020.

## Periodicity

All retention samples were tested for SARS-CoV-2 antibodies until July 21, 2020. As of August 2020, only samples from the last 2 weeks of each month are tested. Most samples from August and September have not yet been tested. **This report includes samples from November 7 - 25, 2020.**

## SARS-CoV-2 antibody testing

All plasma samples were tested using the Abbott Architect SARS-CoV-2 IgG assay (chemiluminescent microparticle immunoassay (CMIA)) which utilizes the nucleocapsid antigen. This assay was assumed to have 92.7% (90.2-94.8%) sensitivity and 99.9% (99.4 – 100%) specificity (1). Testing was conducted at Canadian Blood Services in Ottawa.

## Ethical issues

All data were de-identified by the information technology team at Canadian Blood Services by providing a random identification number. Demographic variables were extracted from the Canadian Blood Services donor database (e.g. donation date, birth year, sex, ethnic group, Forward Sortation Area of residential postal code) and linked to the test data. In the donor pamphlet “What you must know to donate blood” which donors must read before each donation, and in the pamphlet entitled “What happens to your blood donation?” donors were informed that their blood will be tested for routinely tested infectious disease markers and other tests as required. Information about the study was made available on the web-site in late June, prior to commencing testing. Donors were not informed of their results because confirmatory/supplemental testing was not carried out. This study was approved by the Canadian Blood Services Research Ethics committee.

## Data management and analysis

De-identified demographic data were analysed by the Canadian Blood Services Epidemiology & Surveillance Department. Socioeconomic status was estimated by quantiles of the Pampalon Material and Social Deprivation Indices (MSDI). MSDI was derived from 2016 Statistics Canada census, aggregated from postal codes to the dissemination area (DA) level (the smallest geographic unit available in the Canadian census, consisting of 400–700 persons). Because blood donors tend to live in areas close to a blood clinic there will be higher concentrations of donors in certain areas compared with the general population, and lower concentrations in other areas. To make inference to the general population, weighting factors were applied based on the donor’s residential Forward Sortation Area (FSA), age group and sex. Data were weighted based on Statistics Canada data (catalogue # 98-400-X2016008). For FSAs with few donors, several FSAs were combined, generally to include at least 500 donors. For data with no FSA recorded or if not in a province where blood is collected (0.2% of samples) weighting was based on FSA of the blood centre.

The seroprevalence was calculated as the number of positive samples divided by all samples tested. Ninety-five percent confidence intervals were calculated based on the Exact method. The adjusted seroprevalence and confidence intervals present the weighted data adjusted for sensitivity and specificity of the assay using the Rogan-Gladen equation (2). SARS-CoV-2 seroprevalence was stratified by geography (regions, province, economic regions (maps) and selected metropolitan cities), sex, age groups, self-reported ethnicity and social and material deprivation indices. Temporal trends at two-week intervals were evaluated by geographical region by linear regression. Statistical comparisons between groups were carried out using logistic regression.

## Results

A total of 17,232 samples were tested from 17,094 unique people donating from Nov 7, 2020 until Nov 25, 2020. Slightly over half were from male donors, all age groups were represented however the majority were from donors 40 years and older. Due to logistical issues limited samples were collected from Western Canada, therefore the majority of the samples from this survey are from Ontario (68%).

Table 2 shows the unadjusted and adjusted SARS-CoV-2 seroprevalence rates by sociodemographic variables for all Canadian provinces (except Quebec and territories). Overall seroprevalence was 1.51% (95% CI 1.31, 1.71) an increase from the previous report (October 2020) and from pandemic wave 1 ( $p > 0.0001$ ) (Table A2). Donors that self-identified as white had a significantly lower seroprevalence rate (1.35%; 95% CI 1.13, 1.57) compared to all other ethnic minority (2.08%; 95% CI 1.52, 2.64) ( $P = 0.008$ ). We found seroprevalence differed by age groups with the highest rates among donors aged 17-24 years old 2.97% (95% CI 2.2, 3.73%). Compared to wave 1, there was a significant increase in seroprevalence rates by every group except for donors aged 40-59 years old (Table A2).

Table 3 compares SARS-CoV-2 seroprevalence by province. The highest adjusted rate was in Manitoba 8.56% (95% CI 6.51, 10.62) and Saskatchewan 4.2% (95% CI 2.3, 10.62) and the lowest in Newfoundland and Prince Edward Island. Seroprevalence increased significantly in the Western and Prairie provinces in November compared to Wave 1 (Table A3). Tables A1.1-A1.5 summarize all provincial rates stratified by age and sex.

Figure 1A illustrates temporal trends of SARS-CoV-2 seroprevalence from April 4, 2020 until November 25, 2020 by approximately two-week intervals<sup>1</sup>. The greatest increase was in the last week of November, which resulted in a positive linear trend. Figure 1B stratifies temporal trends by regions. Increases in the Prairie provinces are leading the increase in seroprevalence rates overall in Canada. Figure 2A/2B illustrates inter-regional variations within each province. Seroprevalence hot spots are evident in each region, for example in Manitoba's North Central region, the seroprevalence was 27.5% (95% CI 19.2, 35.8) and in Saskatchewan's Swift Current

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<sup>1</sup> Data from the CIHR funded "Correlates of Immunity" study, that samples 1500 donors per month from April 2020-March 2021 were included to create these graphs

Moose Jaw region the seroprevalence was 14.3% (95% CI 8.9, 19.8) (Table A5 lists all regional seroprevalence rates and compares their rate to October 2020 data).

Table 4 shows SARS-CoV-2 seroprevalence by cities. The highest seroprevalence was observed in Winnipeg 5.1% (95% CI 3.2, 6.9), Calgary 2.2% (95% CI 1.3, 3.2) and Edmonton 2.2% (95% CI 1.3, 3.2). These were all significant increases compared to the first wave while Toronto and Ottawa did not change.

## Conclusion

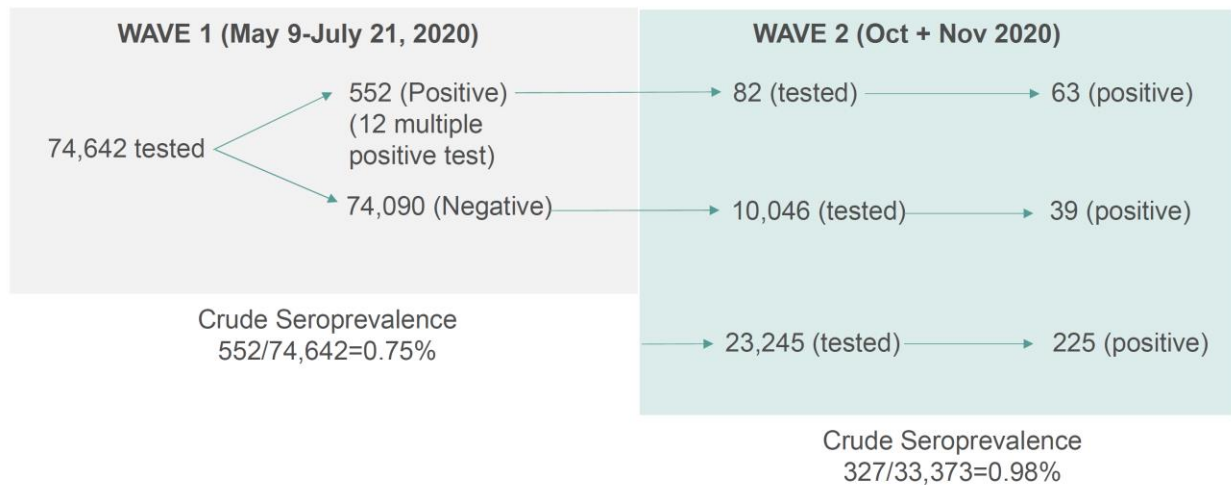
Overall seroprevalence of SARS-CoV-2 remained low in Canadian blood donors between November 7 to November 25, 2020 (less than 2%) but there was significant regional variation. Manitoba had a seroprevalence rate of 8.5%. Ethnic minorities remained more likely to have antibodies compared to white donors and the disparity had widen since the last report. While the donor selection criteria ensure blood donors are healthy, caution should be exercised in extrapolating findings to all healthy Canadians adults because donors self-select to be blood donors, in some areas access to a donation clinic may be limited and because there are fewer elderly donors.

## Points for Interpretation

1. Blood donors are a healthy sub-set of the adult Canadian population. Important points to keep in mind with regards to representativeness of the sample are:
  - blood donors self-select to donate blood therefore those who choose not to donate blood for whatever reason are not included in the sample.
  - Blood donations are collected from people aged 17 years and older, however there are relatively few donations from elderly donors.
  - Blood donations are collected in larger cities and many smaller urban areas, but people in rural areas may be under-represented. Canadian Blood Services does not collect blood in the northern territories or the province of Quebec.
2. Data were weighted for age, sex and location to more closely reflect the Canadian population. For example, the unweighted SARS-CoV-2 seroprevalence for the full sample was 1.06% (95% CI 0.91, 1.22), and after weighting factors applied it was 1.5% (95% CI 1.32, 1.70), then after the weighted seroprevalence was adjusted for sensitivity and specificity, 1.51% (95% CI 1.31, 1.71).
3. The sensitivity and specificity of the Abbott assay were obtained from a report from the United Kingdom. The manufacturer indicates higher sensitivity. A study from Denmark indicates sensitivity may be slightly lower.
4. The sensitivity and specificity of the assay are very good, but it is still possible that some true positives may be missed, and some positive results may be false. Confirmatory testing has not been performed. The seroprevalence was adjusted for sensitivity and specificity

using a well-established mathematical formula. The Abbott assay used by Canadian Blood Services detects IgG antibodies to the SARS-CoV-2 nucleocapsid protein. IgG develops during infection but may not be present early in the course of infection. Donors are deferred if they have recent COVID-19 infection, but asymptomatic early stage infections may not be detected. Due to a variety of biological factors, donors may have variable antibody responses to different binding sites on the SARS-CoV-2 virus (e.g. Spike, receptor binding domain of Spike, nucleocapsid protein).

5. In total, 17,232 samples from November were tested. Of these 183 (1.1%) were a donation from donors who had been tested more than once during the sampling period. None of the repeated donors were positive. Repeat tested samples were excluded from the present analysis. Analysis is presented for the 17,079 unique donors in this study period.
6. It is common for blood donors to donate multiple times over a year. The following flow diagram highlights donors that tested multiple times over the sampling period of May 9 to Nov 25, 2020. Of the 552 positive donors in wave 1, 82 were re-tested in wave 2 and 63/82 (77%) remained positive. Of the 74,090 negative donors in wave 1, 10,046 were re-tested in wave 2 and 39/10,046 (0.39%) seroconverted. Wave 2 included 23,245 naïve donors (to the seroprevalence study), of whom 225 were positive (0.98%).



7. There is growing evidence that SARS-CoV-2 antibody levels begin to wane in some individuals by about 100 days post-infection. A mathematical modelling approach will be used to take into account waning antibody levels once enough suitable data is available.
8. Disclaimer: Canadian Blood Services is providing this report of the study results on an "as is" basis and makes no representations or warranties, express or implied, including with regards to the accuracy, reliability or validity of the information or its fitness for a particular purpose. The use of this report and/or any study results is the responsibility of the user. Canadian Blood Services assumes no liability resulting from any such use. This report may not be reproduced without permission from Canadian Blood Services.

## References

1. The National SARS-CoV-2 Serologic Assay Evaluation Group. Head-to-head benchmark evaluation of the sensitivity and specificity of five immunoassays for SARS-CoV-2 serology on >1500 samples. Available at: <https://doi.org/10.6084/m9.figshare.12593288.v1>.
2. Lang Z, Reiczigel J. Confidence limits for prevalence of disease adjusted for estimated sensitivity and specificity. Preventive Veterinary Medicine. 2014;113:13-22.



**Table 1.** November survey of 17,049 Canadian Blood Services donors

	Number Tested	Percentage
<b>Sex</b>		
Female	7,451	43.7
Male	9,598	56.3
<b>Age</b>		
17-24	1,631	9.6
25-39	4,644	27.2
40-59	6,382	37.4
60+	4,392	25.8
<b>Province</b>		
British Columbia	914	5.4
Alberta	1297	7.6
Saskatchewan	290	1.7
Manitoba	380	2.2
Ontario	11662	68.4
New Brunswick	988	5.8
Nova Scotia	890	5.2
Prince Edward Island	201	1.2
Newfoundland	427	2.5
<b>Total</b>	<b>17,049</b>	

Note: 17,232 donations were tested, if multiple donations were from the same donor only the first was counted.

**Table 2.** SARS-CoV-2 Seroprevalence by Sociodemographic Variables (November 2020 Survey)

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	7,451	76	1.02	0.80, 1.28	1.51	1.24, 1.78
Male	9,598	104	1.08	0.89, 1.31	1.51	1.23, 1.80
<b>Age</b>						
17-24	1,631	33	2.02	1.40, 2.83	2.97	2.20, 3.73
25-39	4,644	50	1.08	0.80, 1.42	1.58	1.17, 1.99
40-59	6,382	58	0.91	0.69, 1.17	1.09	0.80, 1.38
60+	4,392	39	0.89	0.63, 1.21	1.33	0.98, 1.68
<b>Ethnicity<sup>1,2</sup></b>						
White	12806	122	0.95	0.79, 1.14	1.35	1.13, 1.57
Indigenous	174	3	1.72	0.36, 4.96	3.59	0.88, 6.30
Asian	527	10	1.9	0.91, 3.46	2.43	1.11, 3.75
Others	1800	27	1.5	0.99, 2.17	1.82	1.20, 2.44
<b>Social Deprivation Index<sup>3</sup></b>						
1 (least deprived)	3105	41	1.32	0.95, 1.79	1.93	1.43, 2.43
2	3517	26	0.74	0.48, 1.08	0.75	0.43, 1.08
3	3139	26	0.83	0.54, 1.21	1.03	0.64, 1.42
4	2705	24	0.89	0.57, 1.32	1.26	0.80, 1.72
5 (most deprived)	2757	29	1.05	0.71, 1.51	1.73	1.21, 2.25

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<b>Material Deprivation Index<sup>3</sup></b>							
1 (least deprived)	3900	31	0.79	0.54, 1.13	1.11	0.77, 1.45	
2	3911	43	1.1	0.80, 1.48	1.7	1.26, 2.14	
3	3248	31	0.95	0.65, 1.35	0.91	0.54, 1.27	
4	2589	18	0.7	0.41, 1.10	1.05	0.60, 1.49	
5 (most deprived)	1575	23	1.46	0.93, 2.18	2.43	1.58, 3.28	
<b>Total</b>	<b>17,049</b>	<b>180</b>	<b>1.06</b>	<b>0.91, 1.22</b>	<b>1.51</b>	<b>1.31, 1.71</b>	

<sup>1</sup> Self-reported ethnicity was missing for 1742 (10.2%) donors; 18 were positive, adjusted SARS-CoV-2 seroprevalence of those missing ethnicities was 1.75% (95% CI 1.10, 2.40)

<sup>2</sup> All ethnicity minorities grouped together resulted in adjusted SARS-CoV-2 seroprevalence of 2.08% (95% CI 1.52, 2.64)

<sup>3</sup> Postal Codes were missing for 1826 (10.71%) donors; 34 were positive, adjusted SARS-CoV-2 seroprevalence among missing postal codes was 2.89% (95% 2.10, 3.68)

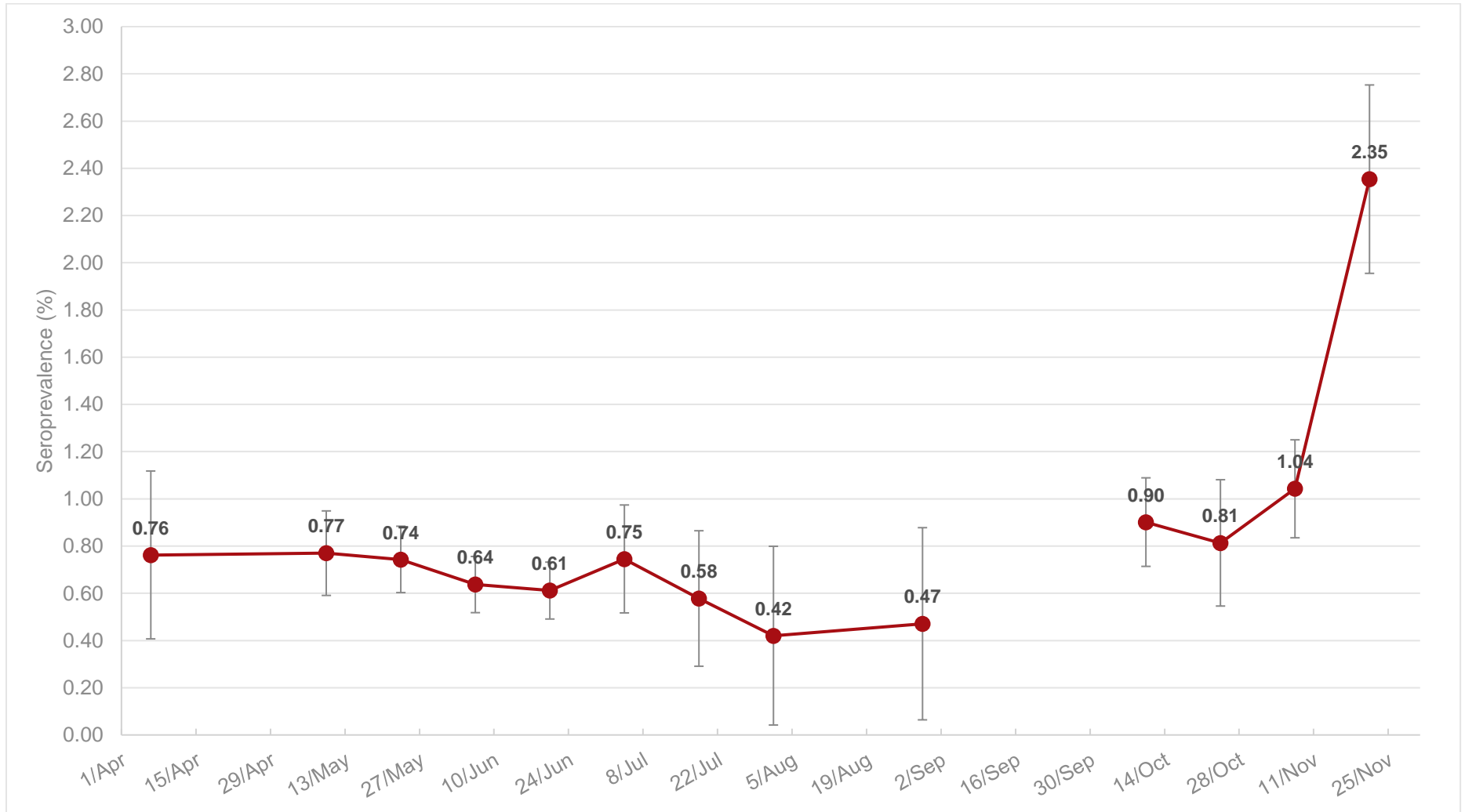
**Table 3.** SARS-CoV-2 seroprevalence by province (November Survey)

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
British Columbia	914	13	1.42	0.76, 2.42	1.51	1.04, 1.97
Alberta	1297	23	1.77	1.13, 2.65	1.79	1.24, 2.34
Saskatchewan	290	12	4.14	2.16, 7.12	4.17	2.57, 5.77
Manitoba	380	27	7.11	4.73, 10.17	8.56	6.51, 10.62
Ontario	11662	91	0.78	0.63, 0.96	0.77	0.56, 0.97
New Brunswick	988	6	0.61	0.22, 1.32	0.49	0.00, 1.20
Nova Scotia	890	3	0.34	0.07, 0.98	0.19	0.00, 0.65
Prince Edward Island	201	0	0	0.00, 1.82	0	
Newfoundland and Labrador	427	5	1.17	0.38, 2.71	0.95	0.00, 2.09
<b>Total</b>	<b>17,049</b>	<b>180</b>	<b>1.06</b>	<b>0.91, 1.22</b>	<b>1.51</b>	<b>1.31, 1.71</b>

**Table 4.** SARS-CoV-2 seroprevalence in selected cities (November Survey)

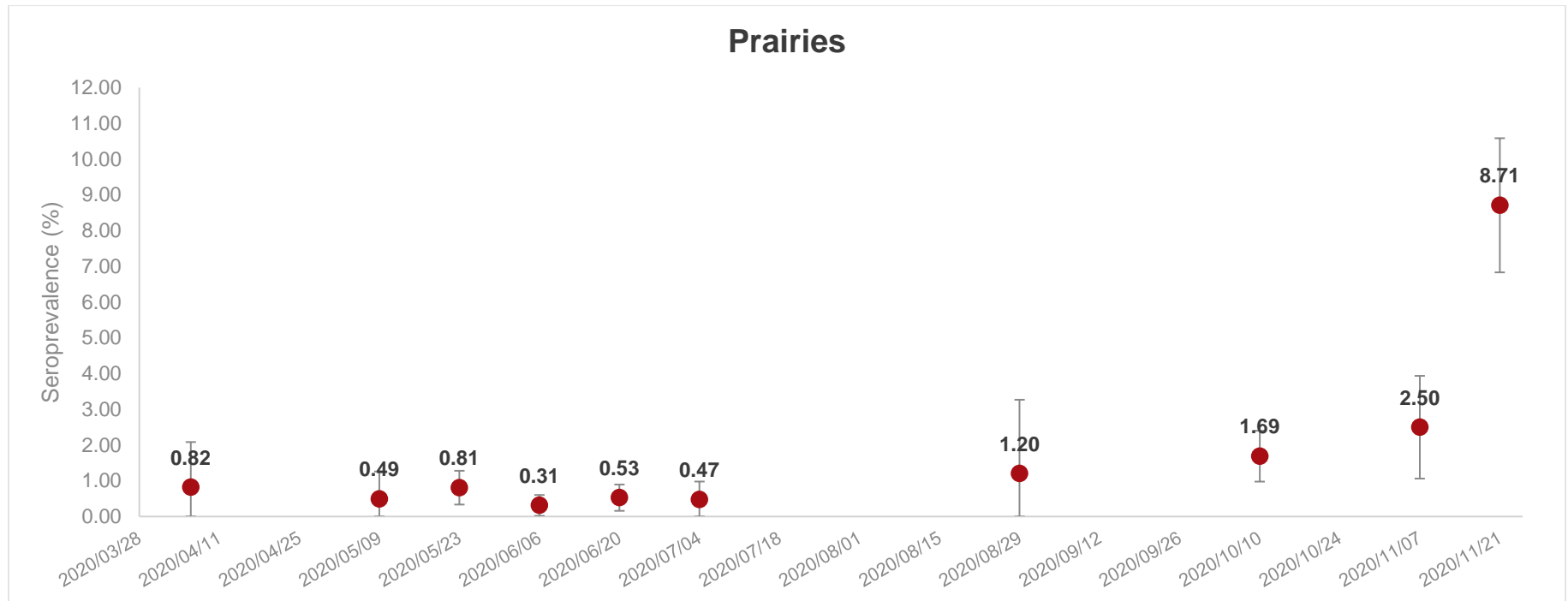
	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
Vancouver	677	9	1.33	0.61, 2.51	1.42	0.9, 1.96
Calgary	527	12	2.28	1.18, 3.94	2.22	1.3, 3.18
Edmonton	529	11	2.08	1.04, 3.69	2.23	1.3, 3.18
Ottawa	1101	9	0.82	0.37, 1.55	0.88	0.2, 1.60
Toronto	3425	33	0.96	0.66, 1.35	0.98	0.6, 1.41
Winnipeg	288	11	3.82	1.92, 6.73	5.09	3.2, 6.94

**Figure 1A.** Overall temporal trends of SARS-CoV-2 seroprevalence by two-week intervals from April-November 2020.

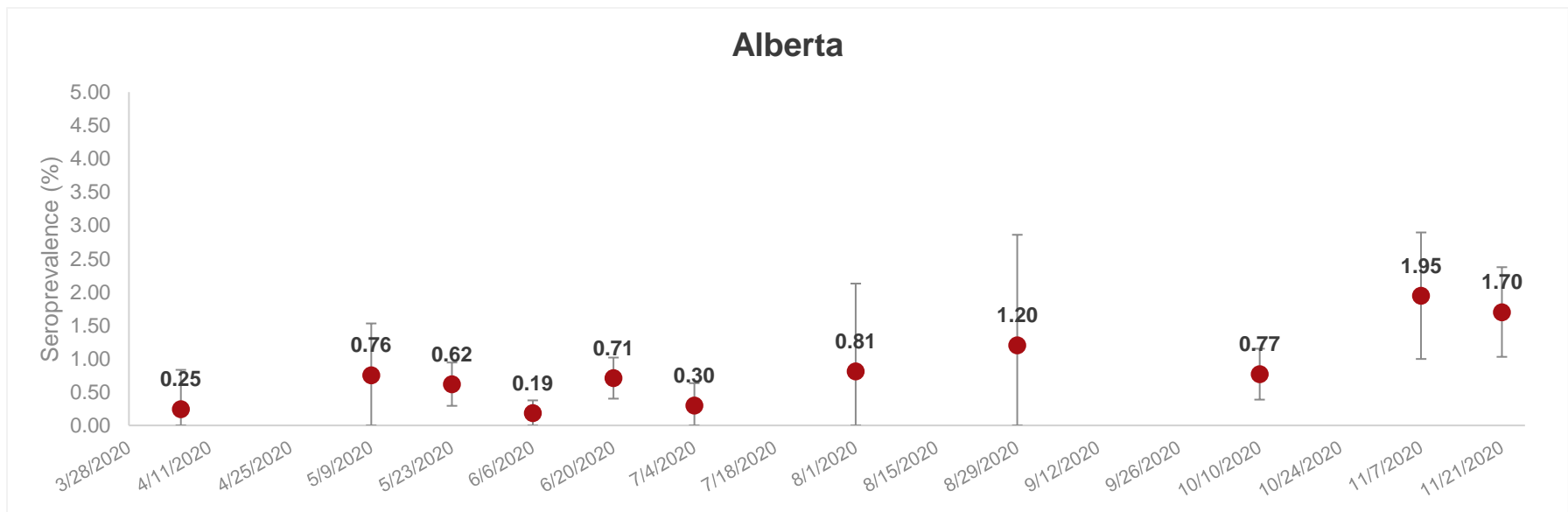
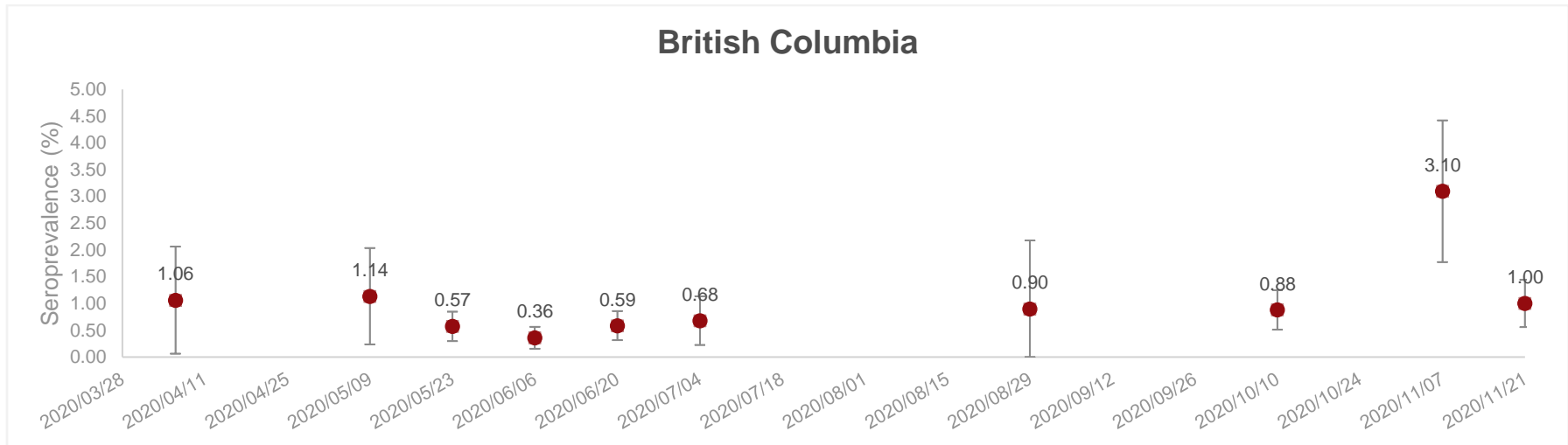


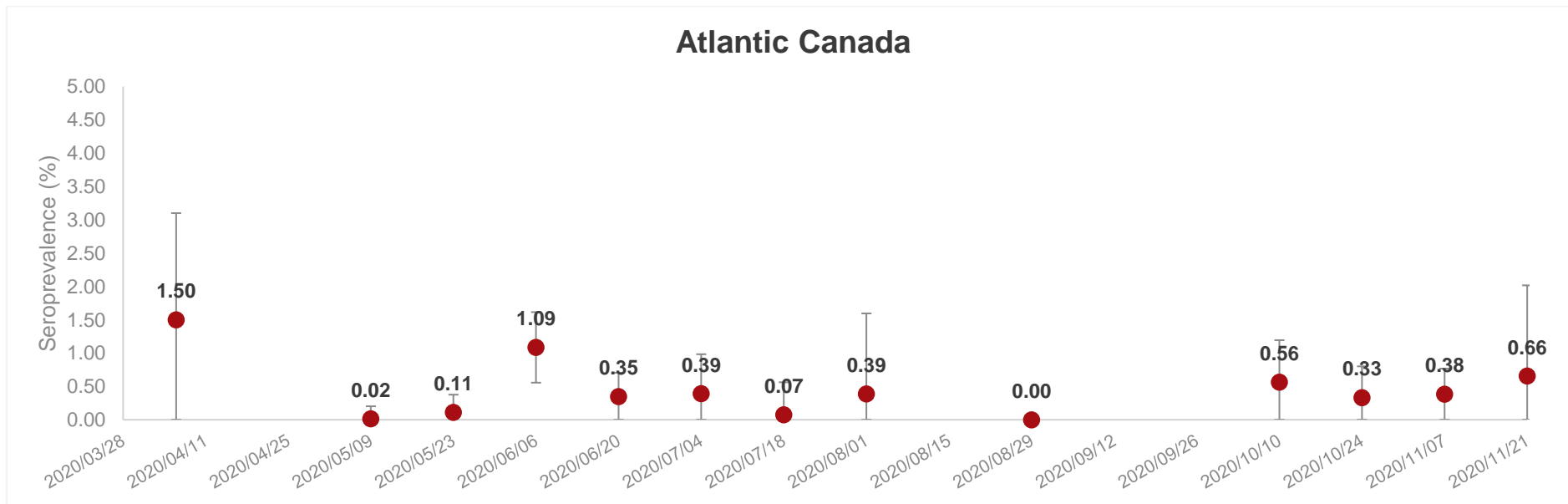
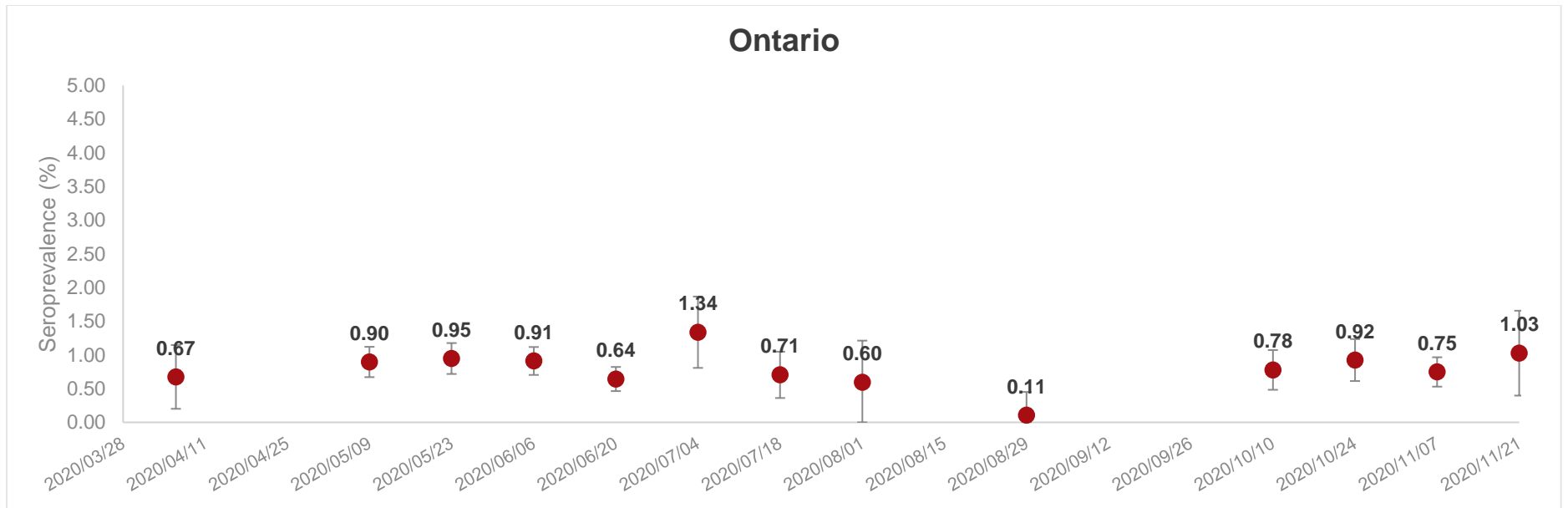
Notes: SARS-CoV-2 seroprevalence rates (95% CI), that have been weighted and adjusted for test characteristics. Data from the CIHR funded study (Correlates of Immunity) from April 9-August 31, 2020 have been included. The last data point represents n=3890 donors (75 were positive; BC=15; AL=3; Prairies=34; ON=16 & Atlantic=3). There is a significant linear temporal trend.

**Figure 1B.** Regional temporal trends of SARS-CoV-2 seroprevalence by two-week intervals from April-November.



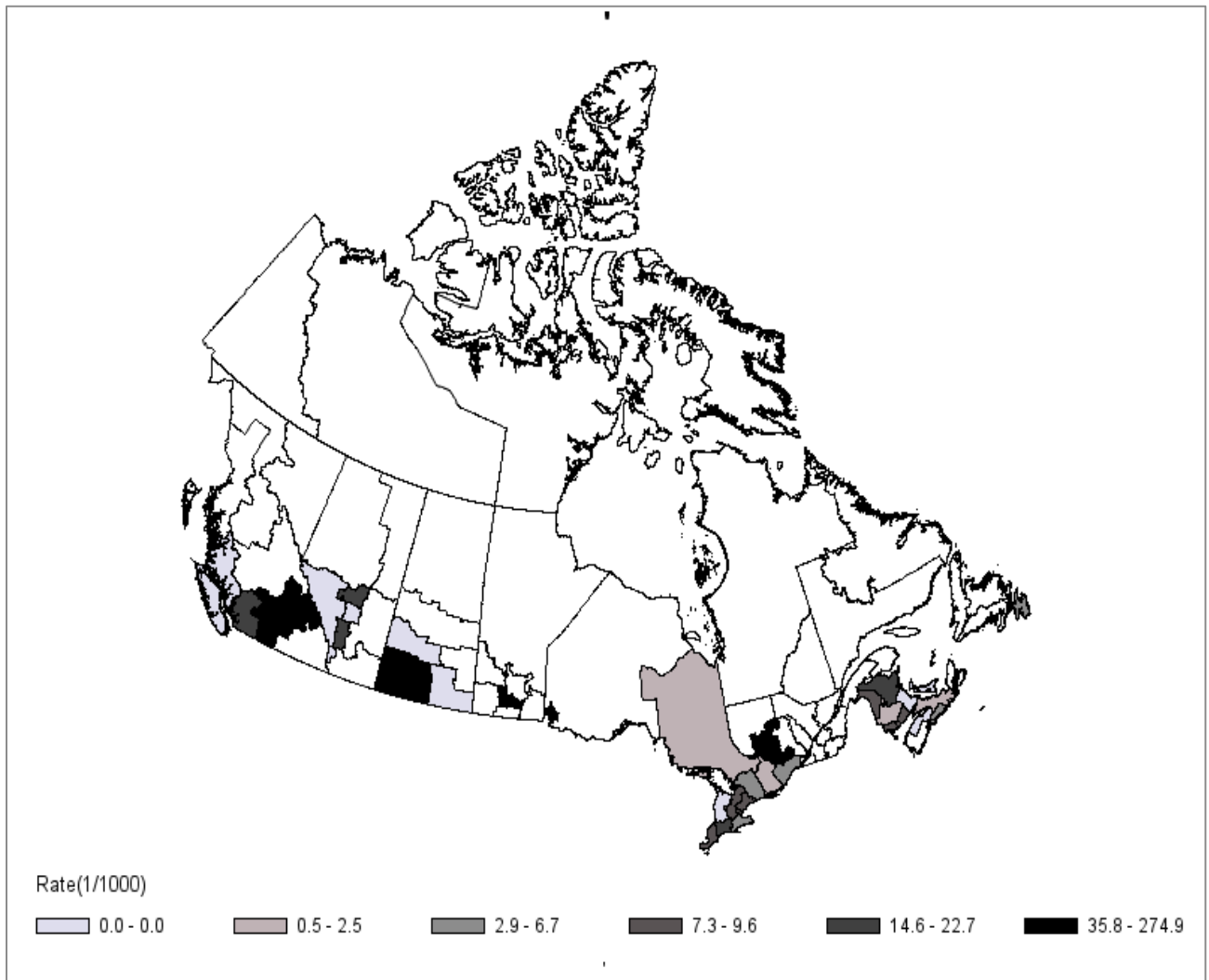
Note: SARS-CoV-2 seroprevalence rates (95% CI), that have been weighted and adjusted for test characteristics. Data from the CIHR funded study (Correlates of Immunity) from April 9-August 31, 2020 have been included. **Y-axis is different for the Prairie panel**





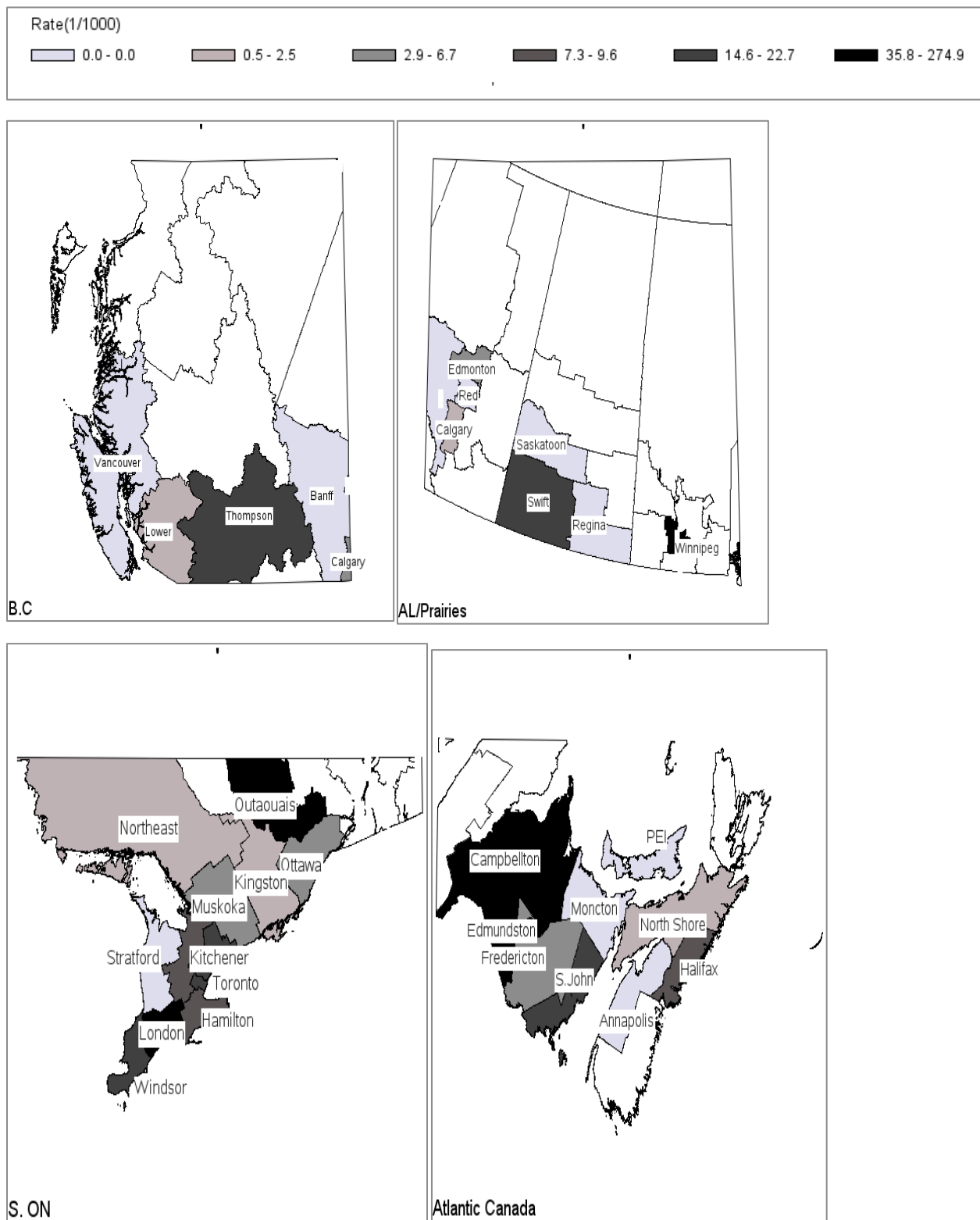


**Figure 2A.** SARS-CoV-2 seroprevalence by economic regions per 1000 donors (November survey)



The last rate category includes a wide range, this is because 2 regions had a very high seroprevalence rate. Table A5 summarizes SARS-CoV-2 seroprevalence by economic regions.

**Figure 2B.** SARS-CoV-2 seroprevalence by economic regions per 1000 donors (inter-regional variation November survey)



## Appendix – Regional SARS-CoV-2 seroprevalence by sex and age

Table A1.1 British Columbia

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	358	6	1.68	0.62, 3.61	1.79	1.1, 2.49
Male	556	7	1.26	0.51, 2.58	1.21	0.6, 1.81
<b>Age</b>						
17-24	86	1	1.16	0.03, 6.31	1.09	0.0, 2.27
25-39	263	3	1.14	0.24, 3.30	1.3	0.4, 2.20
40-59	351	5	1.42	0.46, 3.29	1.27	0.5, 2.01
60+	214	4	1.87	0.51, 4.72	2.09	1.1, 3.08
<b>Total</b>	<b>914</b>	<b>13</b>	<b>1.42</b>	<b>0.76, 2.42</b>	<b>1.51</b>	<b>1.04, 1.97</b>

Table A1.2 Alberta

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	575	8	1.39	0.60, 2.72	1.34	0.7, 2.02
Male	722	15	2.08	1.17, 3.40	2.25	1.4, 3.12
<b>Age</b>						
17-24	140	4	2.86	0.78, 7.15	3.14	1.1, 5.15
25-39	411	10	2.43	1.17, 4.43	2.45	1.3, 3.63
40-59	481	7	1.46	0.59, 2.98	1.39	0.6, 2.23
60+	265	2	0.75	0.09, 2.70	0.76	0.0, 1.54
<b>Total</b>	<b>1297</b>	<b>23</b>	<b>1.77</b>	<b>1.13, 2.65</b>	<b>1.79</b>	<b>1.24, 2.34</b>

Table A1.3 Saskatchewan

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	124	4	3.23	0.89, 8.05	3.06	1.1, 5.01
Male	166	8	4.82	2.10, 9.27	5.31	2.8, 7.86
<b>Age</b>						
17-24	29	5	17.24	5.85, 35.77	18.32	9.7, 26.90
25-39	99	3	3.03	0.63, 8.60	3.37	0.6, 6.19
40-59	118	4	3.39	0.93, 8.45	2.88	0.5, 5.23
60+	44	0	0	0.00, 8.04	0	
<b>Total</b>	<b>290</b>	<b>12</b>	<b>4.14</b>	<b>2.16, 7.12</b>	<b>4.17</b>	<b>2.57, 5.77</b>

Table A1.4 Manitoba

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	161	15	9.32	5.31, 14.90	11.09	7.9, 14.32
Male	219	12	5.48	2.86, 9.38	5.92	3.4, 8.40
<b>Age</b>						
17-24	49	7	14.29	5.94, 27.24	15.43	8.2, 22.63
25-39	106	9	8.49	3.96, 15.51	8.79	4.6, 12.93
40-59	148	5	3.38	1.11, 7.71	3.76	1.3, 6.19
60+	77	6	7.79	2.91, 16.19	10.82	6.5, 15.17
<b>Total</b>	<b>380</b>	<b>27</b>	<b>7.11</b>	<b>4.73, 10.17</b>	<b>8.56</b>	<b>6.51, 10.62</b>

Table A1.5 Ontario

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	5029	38	0.76	0.54, 1.04	0.7	0.4, 0.97
Male	6633	53	0.8	0.60, 1.04	0.84	0.5, 1.15
<b>Age</b>						
17-24	1079	16	1.48	0.85, 2.40	1.56	0.8, 2.35
25-39	3178	20	0.63	0.38, 0.97	0.58	0.2, 0.96
40-59	4355	31	0.71	0.48, 1.01	0.66	0.3, 0.99
60+	3050	24	0.79	0.50, 1.17	0.69	0.3, 1.06
<b>Total</b>	<b>11662</b>	<b>91</b>	<b>0.78</b>	<b>0.63, 0.96</b>	<b>0.77</b>	<b>0.56, 0.97</b>

Table A1.5 Atlantic Provinces

	Unweighted				Adjusted	
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Percent Positive	95% Confidence Interval
<b>Sex</b>						
Female	1204	5	0.42	0.13, 0.97	0.25	0.0, 0.68
Male	1302	9	0.69	0.32, 1.31	0.65	0.0, 1.30
<b>Age</b>						
17-24	248	0	0	0.00, 1.48	0	
25-39	587	5	0.85	0.28, 1.98	0.98	0.0, 2.19
40-59	929	6	0.65	0.24, 1.40	0.58	0.0, 1.30
60+	742	3	0.4	0.08, 1.18	0.13	0.0, 0.58
<b>Total</b>	<b>2506</b>	<b>14</b>	<b>0.56</b>	<b>0.31, 0.94</b>	<b>0.44</b>	<b>0.05, 0.83</b>

**Table A2.** Comparison of SARS-CoV-2 seroprevalence by socio-demographic variables (Wave 1 to November 2020)

	WAVE 1: MAY-JULY 2020				WAVE 2: NOVEMBER 2020				WAVE 1 compared to WAVE 2 (p-value)
	Unadjusted		Adjusted		Unadjusted		Adjusted		
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	
<b>Sex</b>									
Female	35,547	256	0.67	0.58, 0.76	7,451	76	1.51	1.24, 1.78	0.0000
Male	39,095	296	0.73	0.64, 0.83	9,598	104	1.51	1.23, 1.80	0.0000
<b>Age</b>									
17-24	7,165	61	0.76	0.57, 0.96	1,631	33	2.97	2.20, 3.73	0.0000
25-39	21,733	166	0.74	0.60, 0.88	4,644	50	1.58	1.17, 1.99	0.0002
40-59	27,777	202	0.70	0.59, 0.81	6,382	58	1.09	0.80, 1.38	0.3755
60+	17,967	123	0.63	0.51, 0.76	4,392	39	1.33	0.98, 1.68	0.0000
<b>Ethnicity</b>									
White	52,852	370	0.66	0.59, 0.74	12806	122	1.35	1.13, 1.57	0.0000
Indigenous	778	6	0.93	0.21, 1.65	174	3	3.59	0.88, 6.30	0.0102
Asian	3,098	33	0.93	0.60, 1.27	527	10	2.43	1.11, 3.75	0.0037
Other Minorities	6,819	80	1.09	0.84, 1.34	1800	27	1.82	1.20, 2.44	0.0160
<b>Con't to next page</b>									

<b>Social Deprivation Index</b>									
1 (least deprived)	14,004	118	0.79	0.64, 0.94	3105	41	1.93	1.43, 2.43	0.0000
2	13,865	90	0.65	0.51, 0.79	3517	26	0.75	0.43, 1.08	0.5562
3	13,151	95	0.71	0.55, 0.86	3139	26	1.03	0.64, 1.42	0.0982
4	12,341	88	0.67	0.52, 0.83	2705	24	1.26	0.80, 1.72	0.0046
5 (most deprived)	13,170	101	0.70	0.54, 0.86	2757	29	1.73	1.21, 2.25	0.0000
<b>Material Deprivation Index</b>									
1 (least deprived)	19,633	136	0.66	0.54, 0.79	3900	31	1.11	0.77, 1.45	0.0054
2	16,457	97	0.52	0.40, 0.65	3911	43	1.7	1.26, 2.14	0.0000
3	13,872	126	0.86	0.70, 1.02	3248	31	0.91	0.54, 1.27	0.8137
4	10,460	77	0.79	0.61, 0.96	2589	18	1.05	0.60, 1.49	0.2490
5 (most deprived)	6,109	56	0.80	0.58, 1.03	1575	23	2.43	1.58, 3.28	0.0000
<b>Total</b>	<b>74,642</b>	<b>552</b>	<b>0.70</b>	<b>0.63, 0.77</b>	<b>17049</b>	<b>180</b>	<b>1.51</b>	<b>1.31, 1.71</b>	<b>&lt;0.0001</b>

**Table A3.** Comparison of SARS-CoV-2 seroprevalence by province (Wave 1 compared to November 2020)

	WAVE 1: MAY-JULY 2020				WAVE 2: NOVEMBER 2020				WAVE 1 compared to WAVE 2 (p-value)
	Unadjusted		Adjusted		Unadjusted		Adjusted		
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	
British Columbia	10,309	62	0.56	0.41, 0.70	914	13	1.51	1.04, 1.97	0.0000
Alberta	12,107	60	0.48	0.33, 0.62	1297	23	1.79	1.24, 2.34	0.0000
Saskatchewan	3,050	20	0.53	0.23, 0.83	290	12	4.17	2.57, 5.77	0.0000
Manitoba	3,455	20	0.59	0.30, 0.88	380	27	8.56	6.51, 10.62	0.0000
Ontario	37,928	355	0.88	0.78, 0.99	11662	91	0.77	0.56, 0.97	0.3406
New Brunswick	2,595	9	0.23	0.00, 0.49	988	6	0.49	0.00, 1.20	0.4231
Nova Scotia	3,408	20	0.69	0.33, 1.05	890	3	0.19	0.00, 0.65	0.2068
Prince Edward Island	703	1	0.04	0.00, 0.42	201	0	0		0.7259
Newfoundland and Labrador	1,087	5	0.44	0.04, 0.84	427	5	0.95	0.00, 2.09	0.3094
<b>Total</b>	<b>74,642</b>	<b>552</b>	<b>0.70</b>	<b>0.63, 0.77</b>	<b>17,049</b>	<b>180</b>	<b>1.51</b>	<b>1.31, 1.71</b>	<b>&lt;0.0001</b>



**Table A4.** Comparison of SARS-CoV-2 seroprevalence in selected cities (Wave 1 compared to Wave 2)

	WAVE 1: MAY-JULY 2020				WAVE 2: NOVEMBER 2020				WAVE 1 compared to WAVE 2 (p-value)
	Unadjusted		Adjusted		Unadjusted		Adjusted		
	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	Number Tested	Number Positive	Percent Positive	95% Confidence Interval	
Vancouver	5,819	43	0.75	0.53, 0.96	677	9	1.42	0.9, 1.96	0.0067
Calgary	4,192	25	0.55	0.27, 0.82	527	12	2.22	1.3, 3.18	0.0000
Edmonton	4,404	16	0.29	0.08, 0.49	529	11	2.23	1.3, 3.18	0.0000
Ottawa	3,680	32	1.08	0.74, 1.43	1101	9	0.88	0.2, 1.60	0.6362
Toronto	13,203	142	0.96	0.80, 1.13	3425	33	0.98	0.6, 1.41	0.9399
Winnipeg	2242	16	0.73	0.31, 1.14	288	11	5.09	3.2, 6.94	0.0000

**Table A5.** Comparing seroprevalence (from highest to lowest) by economic region per 1000 donors from October to November 2020

Economic Region	ID	October 2020				November 2020				Change*
		total	Positive	Rate	(95% CI)	total	Positive	Rate	(95% CI)	
<b>British Columbia/Yukon</b>										
Thompson--Okanagan	5930	85	2	1.69	(0.38 3.02)	115	4	3.58	(1.68, 5.48)	+
Lower Mainland--Southwest	5920	259	3	0.91	(0.34 1.49)	659	9	1.46	(0.92, 2.01)	+
Vancouver Island and Coast	5910	235	2	0.61	(0.11 1.13)	94	0	.	.	-
Kootenay	5940	4	0	.	.	2	0	.	.	NC
Cariboo	5950	2	0	.	.	0		.	.	NC
Yukon	6010	3	0	.	.	1	0	.	.	NC
<b>Alberta</b>										
Camrose—Drumheller	4820	6	1	23.61	(0.00 47.61)	14	0	.	.	-
Calgary	4830	452	4	0.78	(0.20 1.38)	488	10	1.96	(1.02, 2.90)	+
Edmonton	4860	425	4	0.73	(0.16 1.31)	518	11	2.28	(1.30, 3.25)	+
Lethbridge--Medicine Hat	4810	1	0	.	.	6	0	.	.	NC
Banff--Jasper--Rocky Mountain House	4840	7	0	.	.	70	0	.	.	NC
Red Deer	4850	61	0	.	.	85	0	.	.	NC
Athabasca--Grande Prairie--Peace River	4870	8	0	.	.	7	0	.	.	NC
Wood Buffalo--Cold Lake	4880	8	0	.	.	3	0	.	.	NC
<b>Saskatchewan</b>										
Saskatoon—Biggar	4730	113	1	0.59	(0.00 1.65)	84	0	.	.	-
Regina--Moose Mountain	4710	82	0	.	.	105	0	.	.	NC

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Swift Current--Moose Jaw	4720	3	0	.	.	.	81	11	14.34	(8.92, 19.75)	+
Yorkton—Melville	4740	67	0	.	.	.	3	0			NC
Prince Albert	4750	9	0	.	.	.	3	0			NC
<b>Manitoba</b>											
North Central / Centre nord*	4640	38	5	13.8	(7.25	20.37)	63	15	27.5	(19.24, 35.76)	+
South Central / Centre sud	4620	68	1	1.87	(0.00	3.84)	2	0			-
Winnipeg	4650	127	1	0.77	(0.00	1.76)	277	10	4.85	(3.01, 6.70)	+
Southeast / Sud-est	4610	1	0	.	.	.	10	0			NC
Southwest / Sud-ouest	4630	1	0	.	.	.	1	0			NC
Interlake	4660	11	0	.	.	.	8	0			NC
Parklands	4670	3	0	.	.	.	1	0			NC
North / Nord	4680	1	0	.	.	.	2	0			NC
<b>Ontario</b>											
Stratford--Bruce Peninsula	3580	194	2	1.42	(0.00	3.52)	430	0			-
Toronto	3530	3795	45	1.13	(0.70	1.57)	3301	28	0.85	(0.45, 1.26)	-
Kitchener--Waterloo--Barrie	3540	1852	16	0.85	(0.31	1.40)	1784	13	0.73	(0.22, 1.24)	-
Ottawa	3510	1239	10	0.78	(0.14	1.44)	1158	6	0.56	(0.00, 1.13)	-
Muskoka--Kawarthas	3520	514	5	0.77	(0.00	1.74)	376	3	0.55	(0.00, 1.53)	-
Windsor--Sarnia	3570	453	5	0.76	(0.00	1.81)	844	8	0.97	(0.13, 1.80)	+
London	3560	897	8	0.71	(0.00	1.44)	876	13	1.52	(0.49, 2.55)	+
Kingston--Pembroke	3515	610	4	0.53	(0.00	1.30)	603	1	0.05	(0.00, 0.44)	-
Northeast / Nord-est	3590	331	2	0.50	(0.00	1.52)	330	1	0.26	(0.00, 1.03)	-
Hamilton--Niagara Peninsula	3550	1316	7	0.45	(0.00	0.96)	1367	9	0.68	(0.11, 1.24)	+
Northwest / Nord-ouest	3595	5	0	.	.	.	4	0			NC

<b>Nova Scotia</b>											
Annapolis Valley	1230	272	3	1.42	(0.00	3.47)	113	0			-
Halifax	1250	576	6	1.08	(0.00	2.34)	444	2	0.3	(0.00, 1.05)	-
Cape Breton	1210	141	1	0.50	(0.00	2.30)	7	0			-
North Shore	1220	45	0	.	.	.	269	1	0.22	(0.00, 1.09)	+
Southern / Sud	1240	17	0	.	.	.	9	0			NC
<b>New Brunswick</b>											
Saint John--St. Stephen	1330	251	1	0.25	(0.00	1.38)	182	2	0.83	(0.00, 2.94)	+
Fredericton--Oromocto	1340	339	1	0.21	(0.00	1.13)	309	1	0.26	(0.00, 3.62)	-
Moncton--Richibucto	1320	357	1	0.11	(0.00	0.82)	269	0			-
Campbellton--Miramichi	1310	18	0	.	.	.	91	2	2.17	(0.00, 6.85)	+
Edmundston--Woodstock	1350	5	0	.	.	.	115	1	0.89	(0.00, 3.62)	+
<b>Newfoundland</b>											
Avalon Peninsula	1010	319	0	.	.	.	376	2	0.42	(0.00, 1.28)	+
South Coast--Burin Peninsula	1020	2	0	.	.	.	2	0			NC
West Coast--Northern Peninsula--Labrador	1030	8	0	.	.	.	8	0			NC
Notre Dame--Central Bonavista Bay	1040	98	0	.	.	.	11	1	8.08	(0.00, 26.57)	+
<b>PEI</b>											
Prince Edward Island / Île-du-Prince-Édouard	1110	299	0	.	.	.	190	0			NC

Notes: November data is illustrated in Figure 2  
 \*Change: + Increase; - Decrease; NC, No Change